

UMTRI-94-47

“Portrait of a Young Driver”

Technical Background Information

Final Report

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Acknowledgements

This document is a compilation of information from a wide variety of sources. The sources of data used in each chart or table is identified within the figure or in the accompanying text.

Without the help of the following UMTRI colleagues applying their expertise in helping me acquire and distill the large amount of information available, this compilation would not have been possible – Ken Campbell, Laurel Copeland, David Eby, Sylvia Lang, Dawn Massie, Jean Shope, Michael Sivak, Pat Waller.

While the assistance of these colleagues was invaluable, the opinions, findings, and conclusions in this compilation are solely those of the author and do not necessarily reflect those of my UMTRI colleagues or AAA-Michigan.

"Portrait of a Young Driver"

Technical Background Information

Compiled by F.M. Streff, Ph.D.

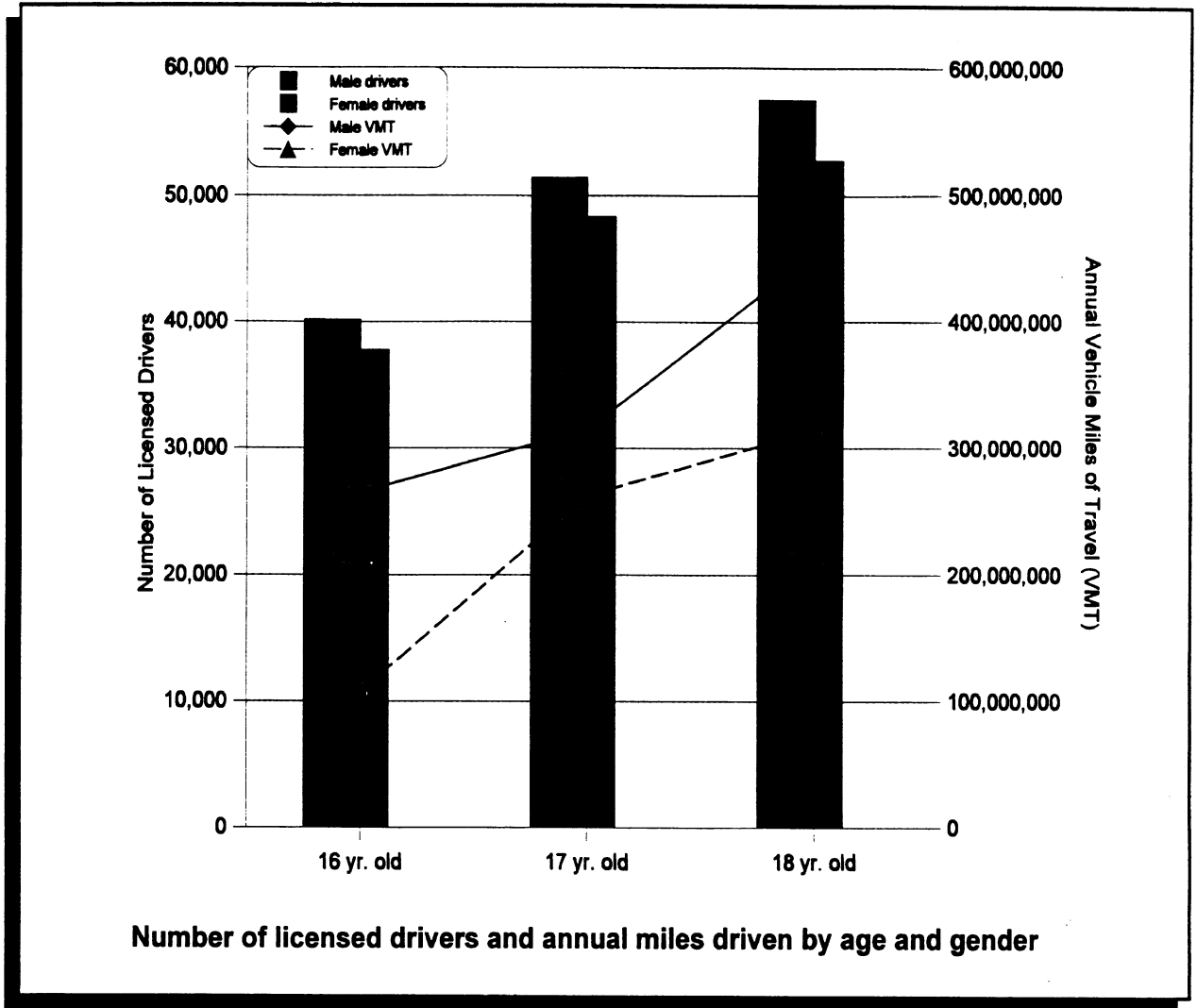
The University of Michigan
Transportation Research Institute

The following materials were compiled for AAA-Michigan in support of the effort to prepare another edition of a series of "Portraits of . . ." The current issue is the young driver. As defined for the purposes of this effort, a young driver is a driver age 15-18 inclusive. Data from student surveys, personal transportation surveys, Michigan State Police crash records, and Michigan Department of State driver history files, as well as existing scientific literature describing the young driver were examined to provide insight into a description of the young driver in Michigan.

This report is organized as follows:

- Number of licensed drivers and annual mileage
- Trip characteristics
- Traffic crashes
 - Frequency
 - Severity
 - Chronology
 - Contributing factors
- Summary and recommendations

How Many?



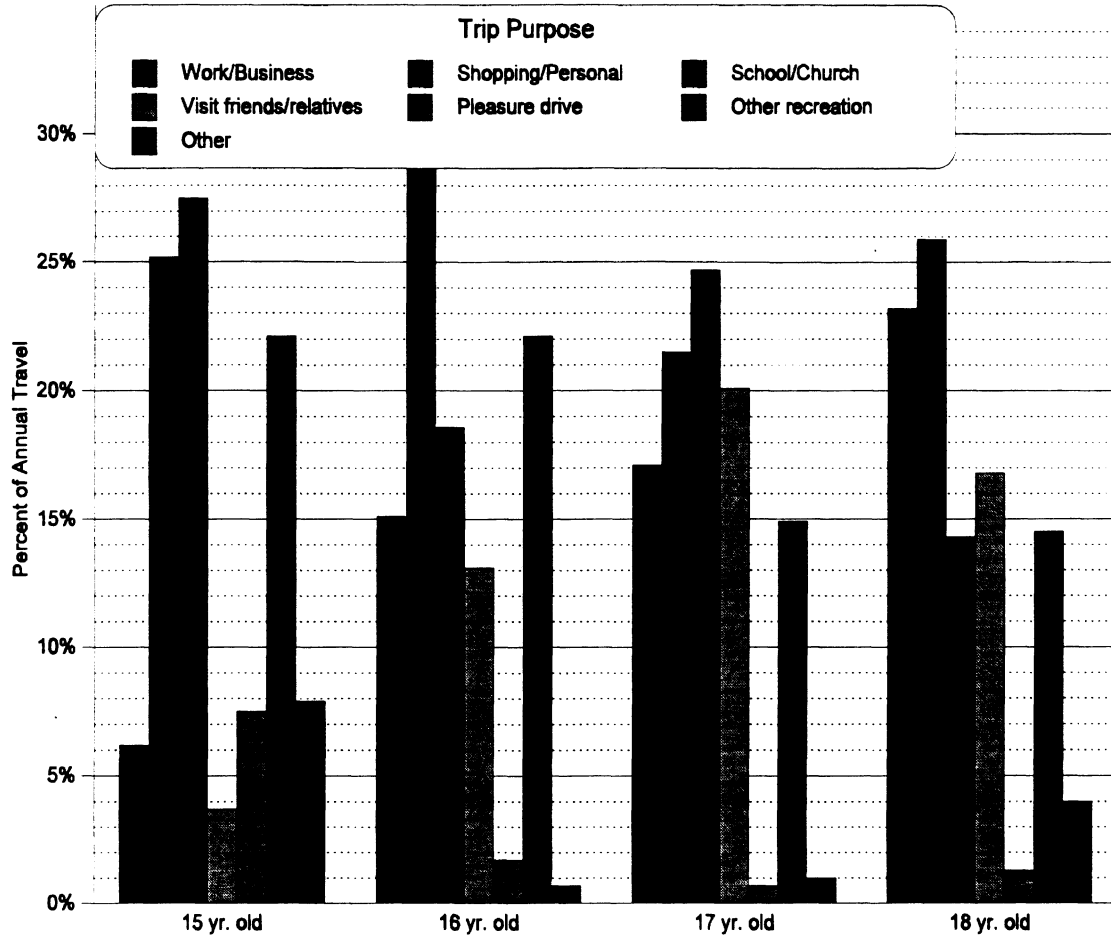
Average Annual Mileage per Licensed Driver

Driver Age	Male	Female
16	6,591	2,850
17	6,127	5,427
18	7,898	5,951

Source: 1990 NPTS

The preceding chart shows the number of licensed drivers in Michigan (in 1993, left vertical axis) by the driver's age (bottom horizontal axis) and gender (indicated by shading), as well as the estimated miles traveled by these drivers each year (right vertical axis). Driver counts were obtained from the Michigan Department of State. Annual vehicle miles of travel (VMT) were estimated from the most recent (1990) National Personal Transportation Survey (NPTS) conducted by the U.S. Department of Transportation, Federal Highway Administration. This chart shows that more males than females are licensed at each age, and total mileage is higher for males. As one might expect, the number of licensed drivers increases with age, as does VMT.

Where are they Going?



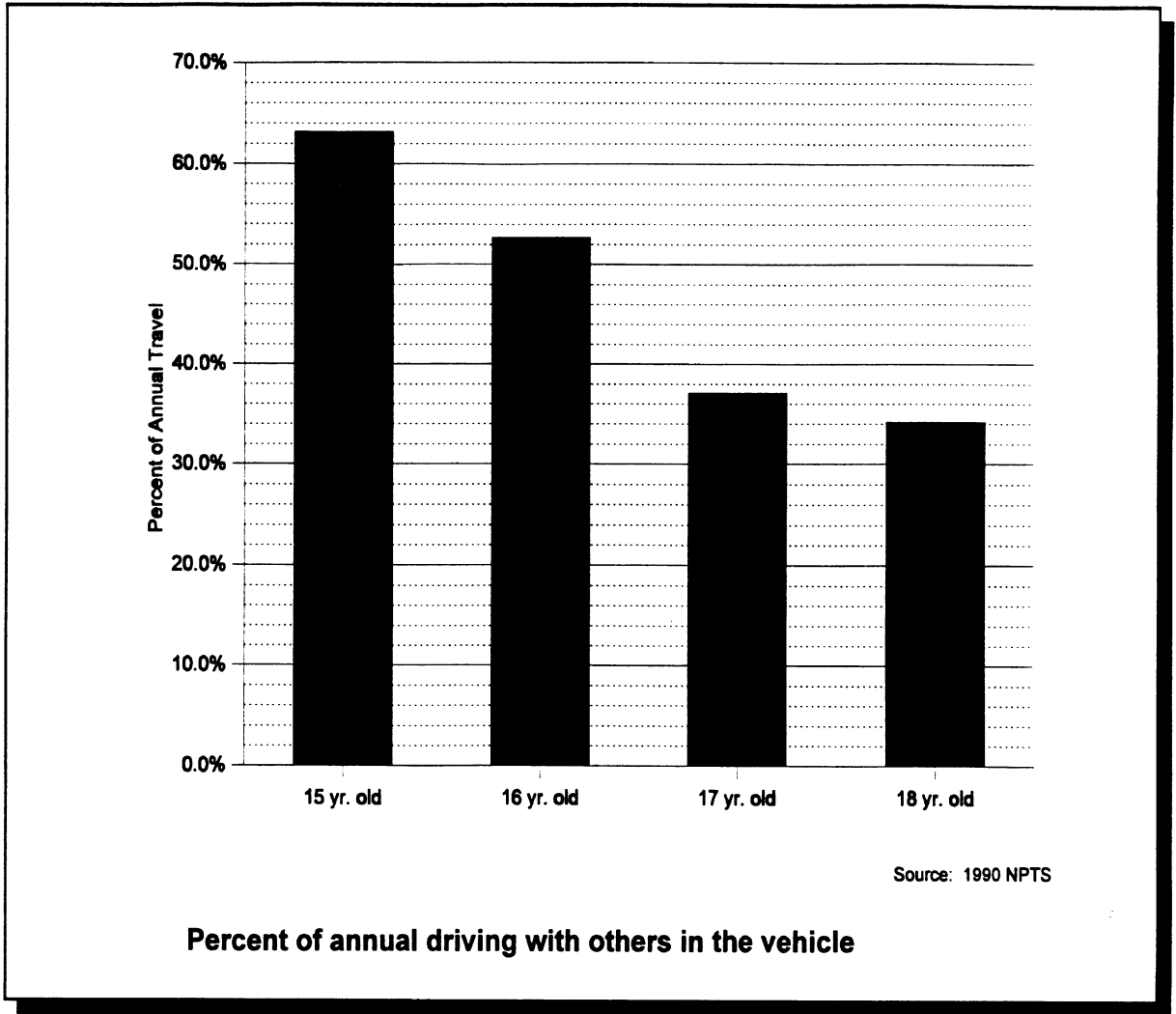
Source: 1990 NPTS

Percent of annual travel by trip purpose and driver age

Travel patterns change with age. Work and business travel increases with age, as does visits with friends/relatives. "Pleasure drives" peak for 15 year olds (about 7.5%), and rapidly decline with age. Interestingly, recreational travel is higher among 15-16 year olds (about 22%) than for 17-18 year olds (about 15%). The amount of "pleasure driving" is particularly important given that nearly 20% of all "dangerous driving actions" reported by high school students occurred when "cruising or driving with no particular destination."¹ This latter finding will be discussed in more detail later in the paper.

¹Farrow, J.A. (1987). Young driver risk taking: A description of dangerous driving situations among 16- to 19-year-old drivers. *The International Journal of the Addictions*, Vol.22(12), 1255-1267.

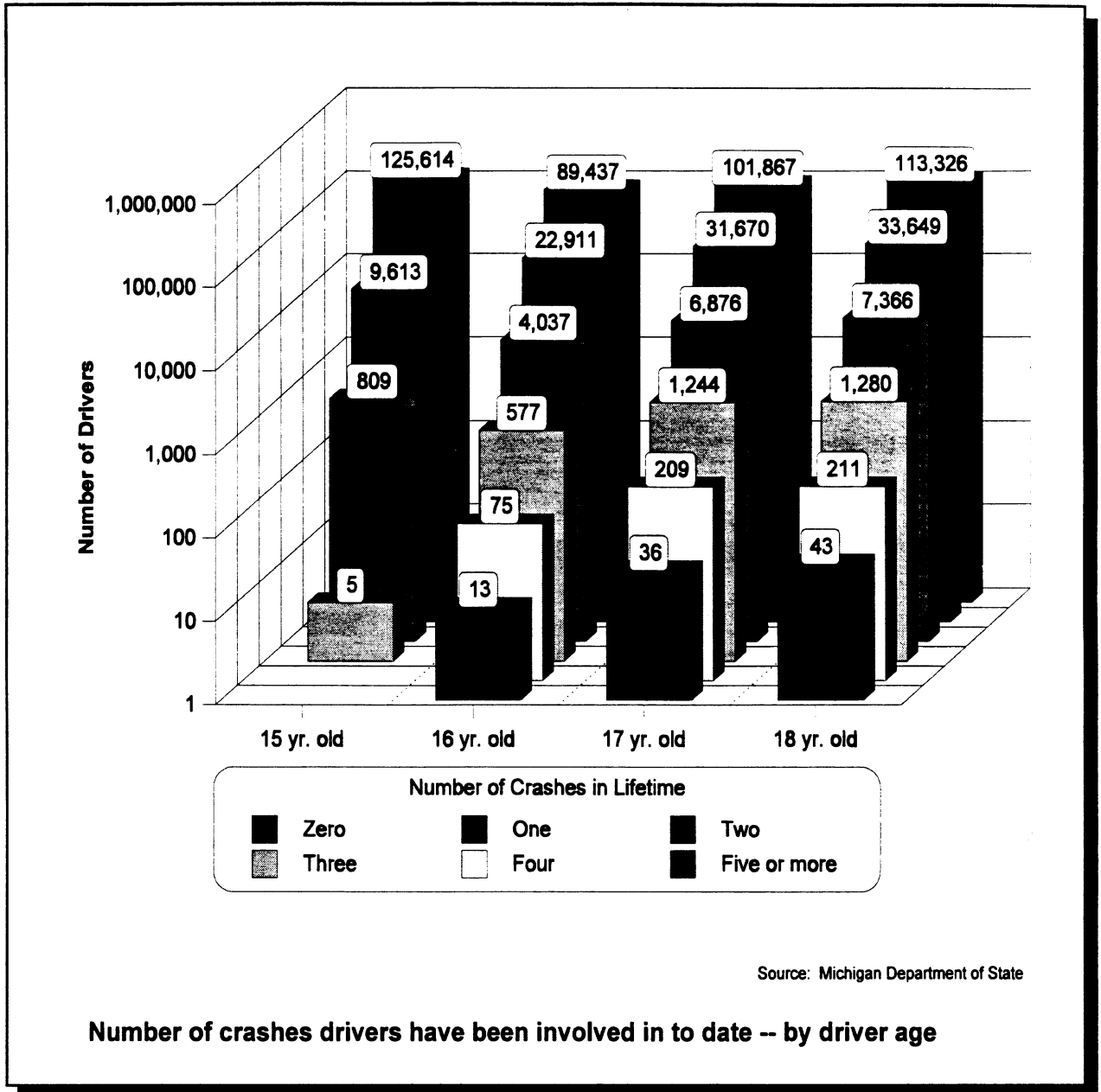
Driving Alone or with Others?



The preceding chart shows that at age 15-16 drivers travel with others at least half of the time, with ridership declining to just over 30% for ages 17 and 18. Data were insufficient to conduct an analysis of who may be riding in the vehicles. One would expect quite different driving behaviors if the passengers were adults, parents in particular, as compared to friends or siblings. Indeed, Farrow (cited earlier) found that in 85% of dangerous driving events among youth there was one or more peers riding in the car with the driver.

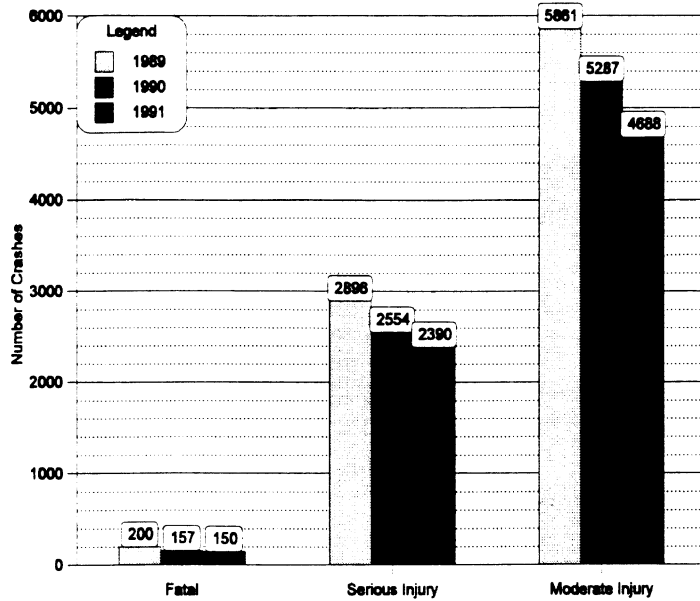
We now turn our attention to the traffic crash experience of young drivers.

Traffic Crashes -- How Many?



This chart shows that young drivers accumulate a large proportion of their age 15-18 crash experience at or before age 17. This is in direct conflict to the data on the earlier chart (page 3) showing the amount of driving increases with age. What this means is the risk of a crash per mile driven is decreasing rapidly from age 16-18. This finding suggests that through maturation, accumulated driving experience, changes in drive purpose, or some combination of these or other factor, young drivers change with respect to their objective risk of crash as they get older (their crash risk per mile driven decreases). This is consistent with the findings from driving convictions and psychological theories regarding youthful risk taking that will be discussed later in the paper.

Traffic Crashes -- How Severe?

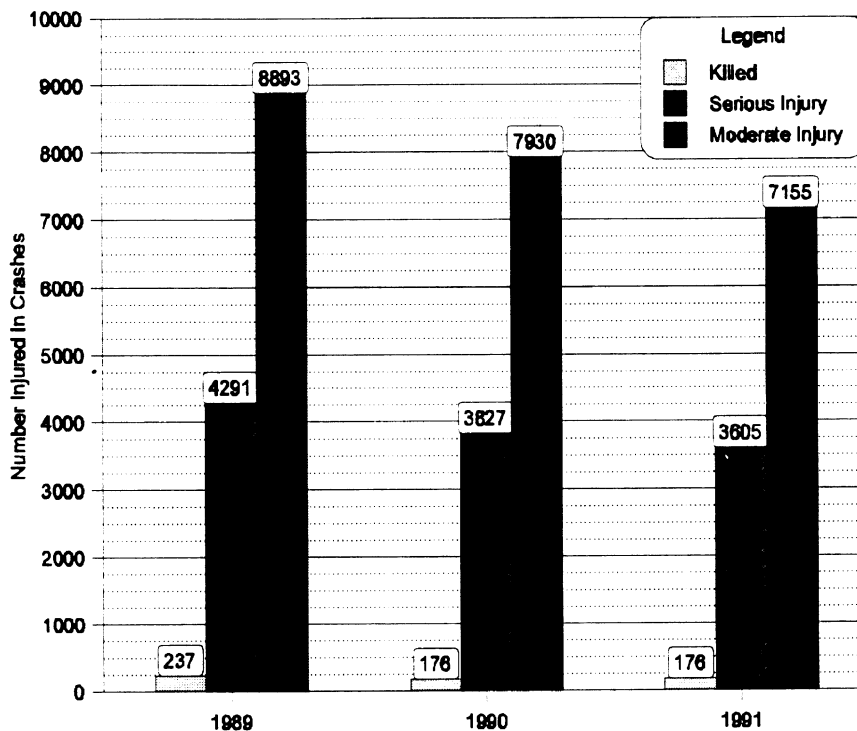


Source: Michigan Department of State Police

Number of crashes with indicated injury severity as the most severe in crash

The chart to the left shows that the number of severe crashes involving young drivers has declined steadily from 1989 to 1991 (the most recent year of complete crash data for Michigan). Although the trend is positive in terms of increased safety, there are still a considerable number of harmful crashes involving young drivers.

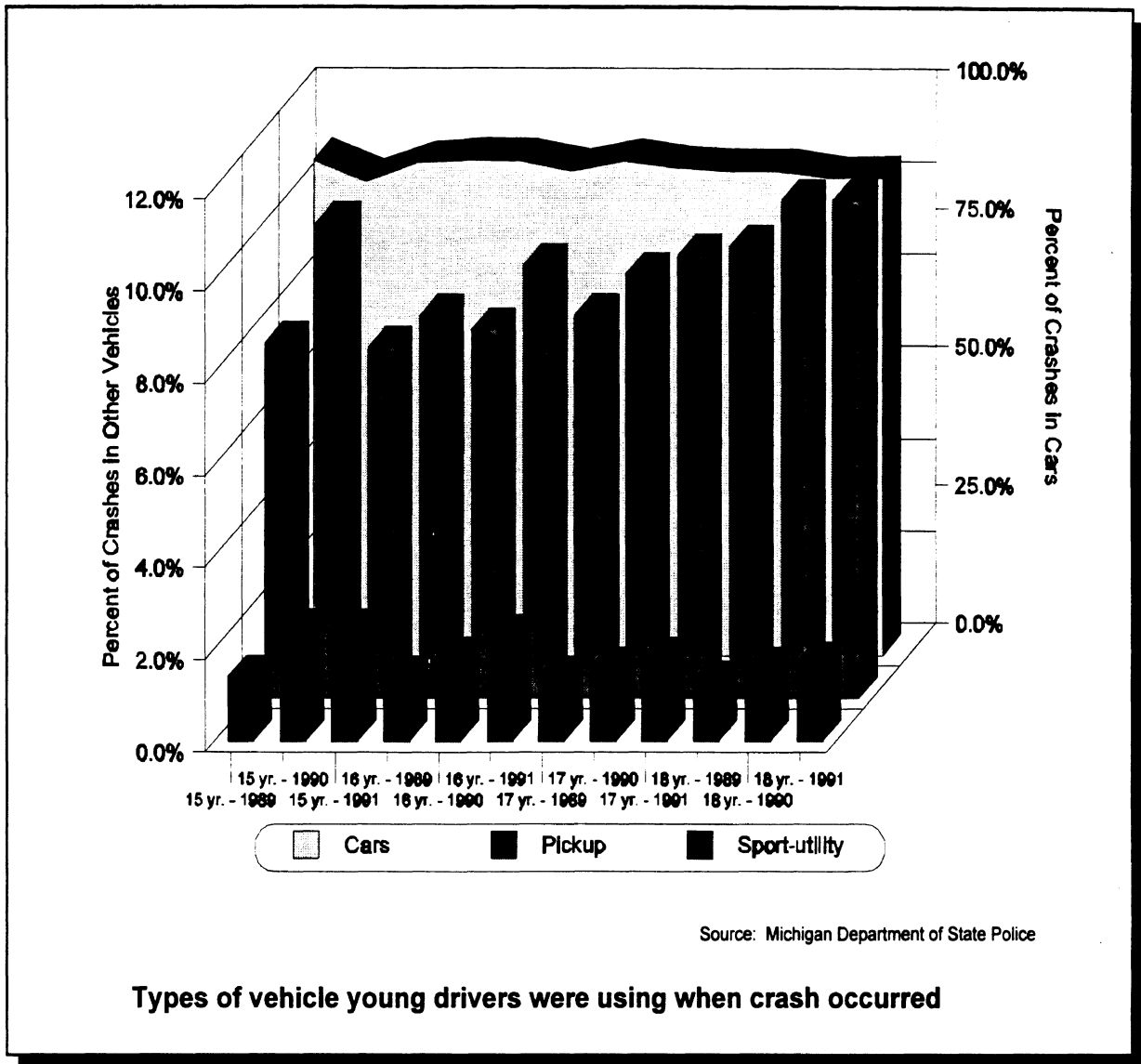
Indeed, as can be seen in the chart below, crashes involving this age group exact a large toll on Michigan's highways.



Source: Michigan Department of State Police

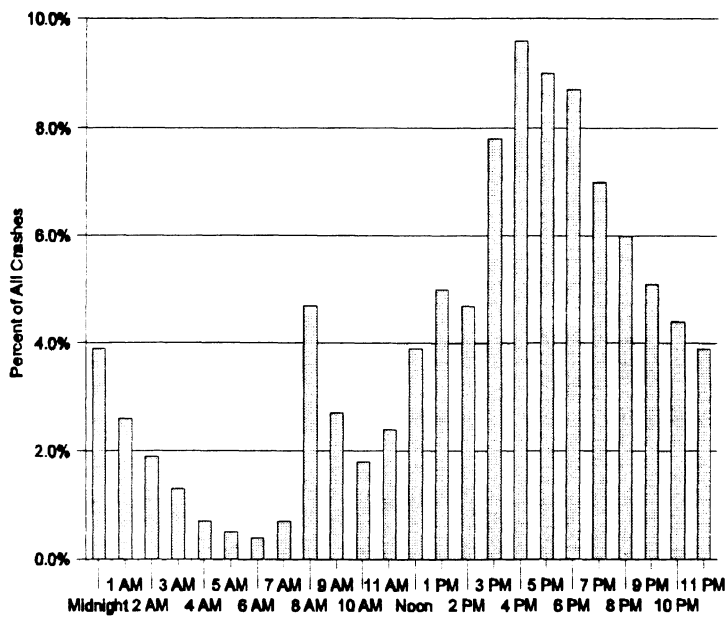
Number of persons injured in crashes involving at least one driver age 15-18

Traffic Crashes -- What Vehicles are Driven?



This chart shows that the majority of crash-involved drivers age 15-18 years old are driving passenger cars at the time of their collision (right vertical axis). There are some notable trends in these data, however. For each of the age groups, the proportion of collisions that young drivers were involved in while driving sport-utility ("Jeep-like") vehicles and pickup trucks has increased considerably over the last two years (left vertical axis). This is an important issue because these vehicle types have to meet different Federal motor vehicle safety standards than passenger cars. This has the potential to affect the severity of injuries inflicted on occupants of the vehicles. Some have also argued that these vehicles are less stable, and thus more prone to rolling over than the average passenger car (especially the sport-utility vehicles). While this issue is still under significant debate in the safety community at large and within the National Highway Traffic Safety Administration (NHTSA) vehicle safety standard rulemaking office, it is important to note the apparent trend in vehicle use.

Traffic Crashes -- When?

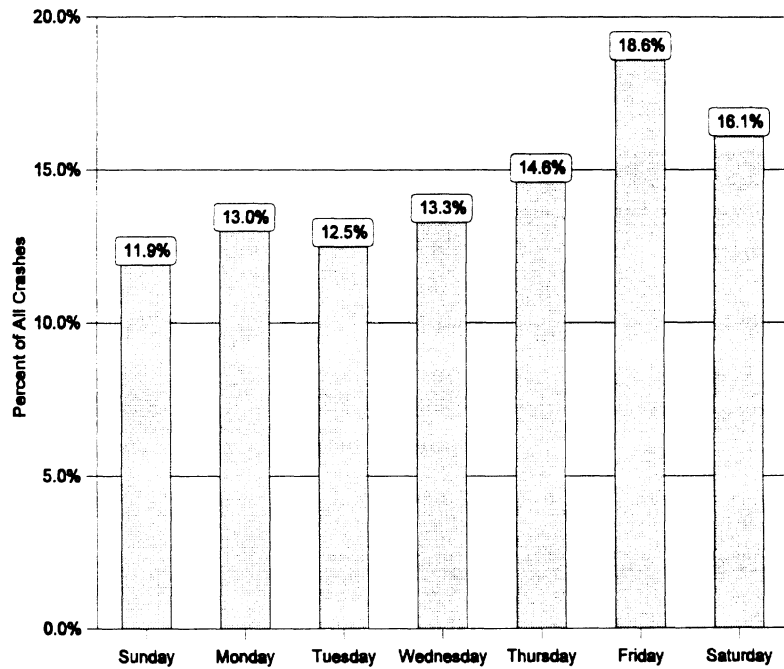


Source: Michigan Department of State Police

Percent of crashes involving drivers age 15-18 by time of day

The chart to the left shows that traffic crashes among the 15-18 year old age group peak at 8 a.m. and again at 4 p.m. The chart below shows that a larger proportion of crashes involving drivers in this age group occur on Friday and Saturday than other days of the week. Much of these differences are due to "exposure." That is, we see more crashes occurring during

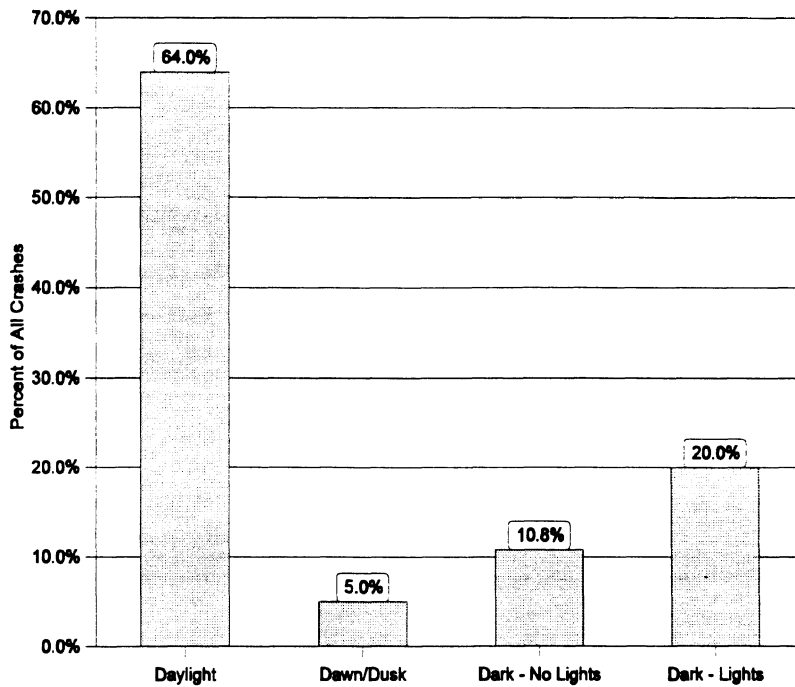
heavily traveled time periods. While it is true that much of the chronological pattern in crashes we see in these charts is caused by exposure, there are a number of factors contributing to these patterns in addition to amount of travel.



Source: Michigan Department of State Police

Percent of crashes involving drivers age 15-18 by day of week

Traffic Crashes -- Lighting Conditions



Source: Department of State Police

Percent of crashes involving drivers age 15-18 by lighting conditions

While nearly two-thirds of crashes occur during daylight for this age group, over 30% occur when it is dark. When one also examines the table below, it can be seen that while young drivers do only 16.3% of their driving at night (far bottom, right table cell), 30% of their crashes occur in dark conditions (almost twice as many as would be expected given how much they travel in dark conditions).

Darkness may affect driving in several ways. First, it is hard to see in the dark, complicating the driving task. Second,

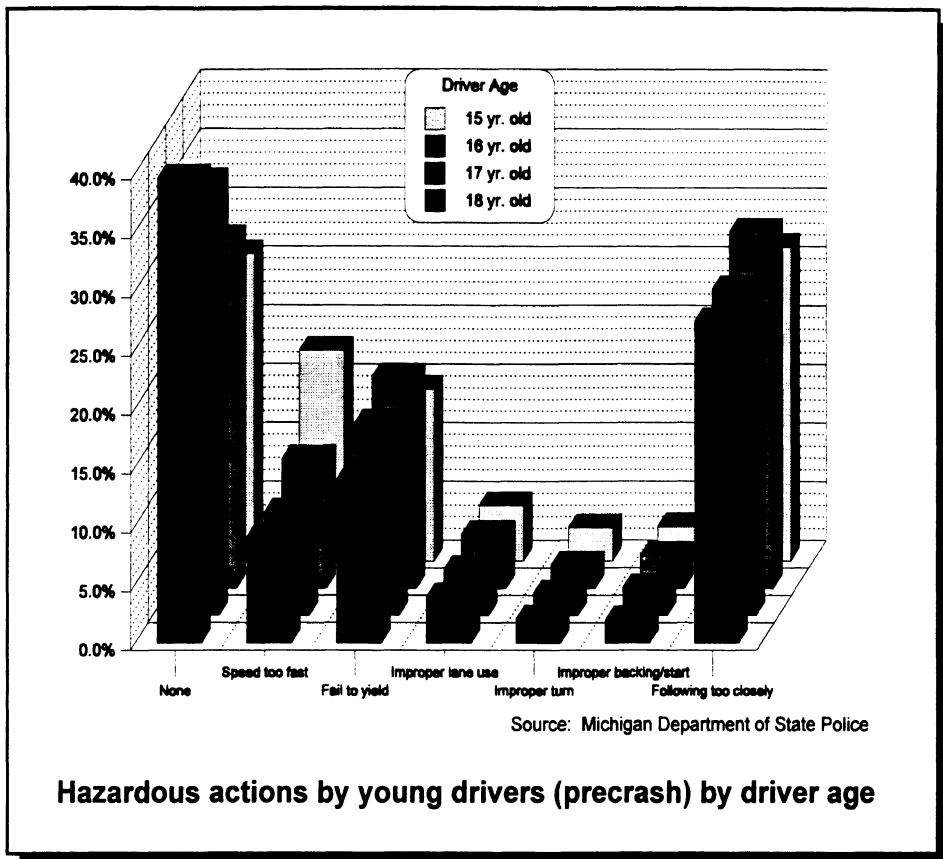
nighttime travel is made more hazardous by the types of drivers on the road (i.e., drunks). Third, it is not unreasonable to hypothesize that a significant proportion of night time driving among this age group is recreational driving with friends in the car. This factor only exacerbates the already complex environment for the young driver. Having examined environmental factors related to young drivers and traffic crashes, the discussion will turn to hazardous behaviors exhibited by young drivers that might help understand what young drivers do that puts them at risk of crashes.

Proportion of All Driving done in Nighttime

(Source: 1990 NPTS)

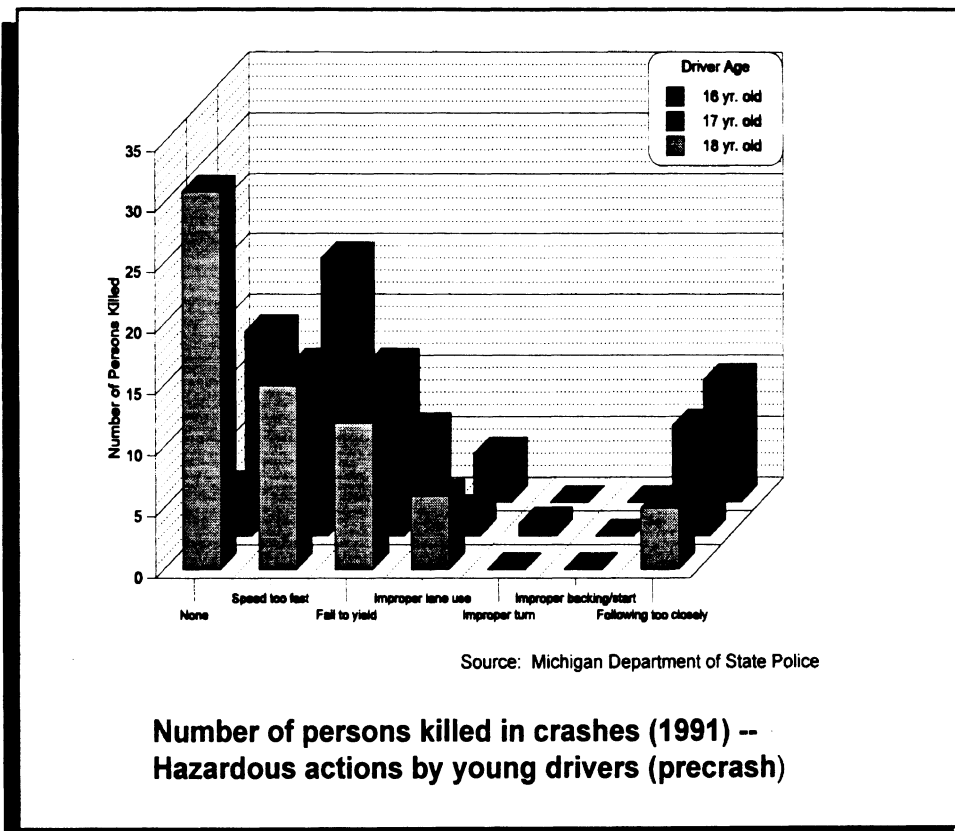
Driver Age	Male	Female	TOTAL
15	2.1%	23.6%	16.5%
16	19.8%	11.9%	17.3%
17	14.7%	7.6%	11.8%
18	18.9%	17.6%	18.3%
TOTAL	17.5%	14.8%	16.3%

Traffic Crashes -- What were they Doing?

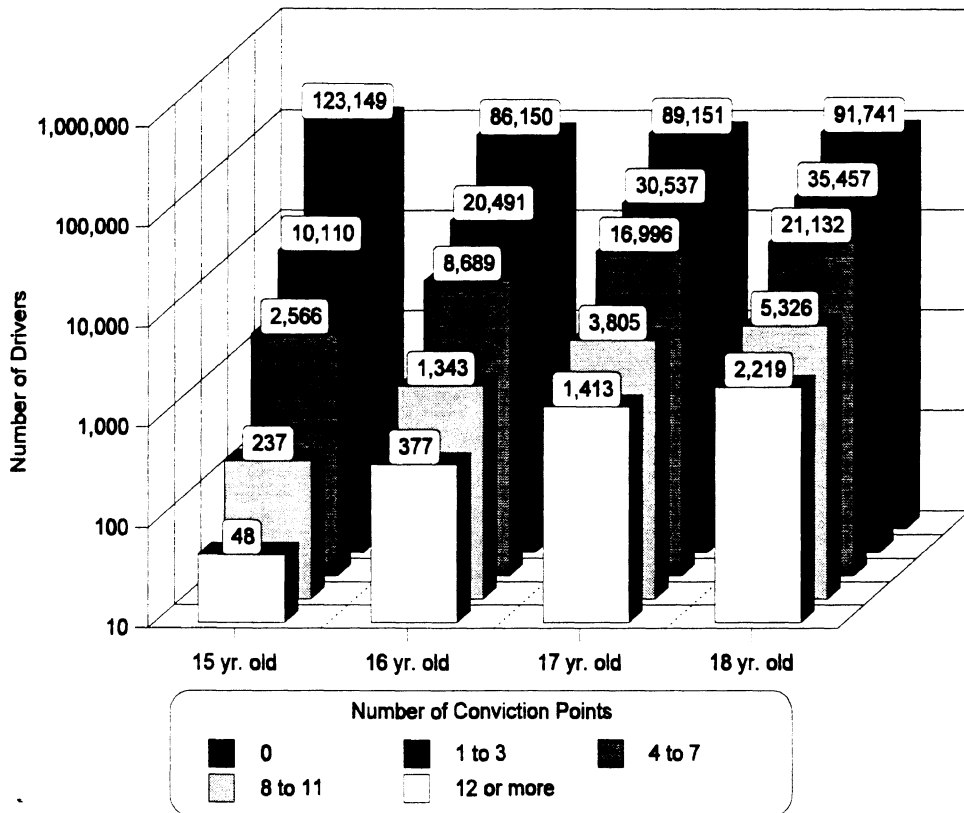


The chart to the left shows that the percentage of young drivers that committed no hazardous act leading to the crash increases with age. Following too closely is the most frequent hazardous action cited by police for crash-involved young drivers, followed by failure to yield and excessive speed. There is an apparent peak in the occurrence of failure to yield and following too closely crashes for the 16 year age group that may be associated with a large influx of first year young drivers.

In contrast to the simple crash frequencies presented in the chart above that show that following too closely was the most common hazardous action among crash-involved young drivers overall, the chart to the right shows that excessive speed is the most frequent hazardous action among young drivers involved in *fatal* crashes. Failure to yield is also a major factor in fatal crashes involving young drivers.



What Traffic Violations?



Source: Michigan Department of State

Number of driver license conviction points drivers have collected to date -- by driver age

This chart shows that conviction points accumulate quickly for these age groups. What is particularly troubling is the large increase in the number of drivers with four or more points (from 15 to 16 year olds), and a similar increase in drivers with eight or more points (from 16 to 17 year olds). This chart shows only how many conviction points young drivers accumulated over their driving life, the table on the next page itemizes the types of traffic convictions young drivers accumulate in a single year.

I Didn't See You Officer.

Number of Driving Convictions by Conviction Type and Driver Age (Single Calendar Year)				
	15 Yr. Old	16 Yr. Old	17 Yr. Old	18 Yr. Old
Speeding	6,231	26,507	54,174	69,213
Disobey traffic signal	723	2,572	5,203	6,996
Disobey stop sign	830	2,393	4,735	5,805
Drove with suspended license	17	346	1,866	4,677
Failure to yield	977	2,682	4,010	3,933
Careless driving	812	2,066	3,637	3,850
Illegal/Improper turn	386	732	1,364	1,721
Operate while impaired	15	164	704	1,626
Drove while unlicensed	2,351	1,799	1,850	1,570
Improper passing	104	402	837	1,014
Improper lane use	205	472	900	994
Failure to observe signal	101	323	628	813
Improper use of lights	116	364	680	772
Violated restricted license	5	59	341	760
Reckless driving	96	234	409	613
Followed too closely	85	259	435	499
Unlawful motorcycle rider	793	396	204	126

The preceding table shows the number of convictions that each age group accumulated in a single calendar year. No conviction type even approached the frequency of speeding violations. This should not come as a surprise given that speeding is probably the most commonly enforced traffic law among all age groups. The next most common convictions suggest there may be an opportunity for remediation through increased training or accumulation of driving experience. Specifically, disobeying traffic signals and stop signs, a failure to yield, and careless driving each may be the result of a lack of experience, knowledge, or motivation to drive properly.

In the following section, theory and research examining risk perception and risk taking behaviors among young drivers is examined in light of the findings described to this point.

Risks (Perceived and Real) and Behavior

When we examine the chart describing hazardous actions the drivers took prior to the collision or the number and types of traffic convictions drivers experience it is striking how much not only the *number* of events changes as these young drivers get older, but how the *types* of hazardous driving behaviors change as these drivers get older. What underlies these changes? The following discussion will examine briefly some possible answers for this question.

Studies show that basic vehicle control skills like turning and stopping are achieved quite quickly, but perceptual, judgement, and decision making skills take longer to acquire.^{2,3} For example, compared to more experienced drivers, novice drivers concentrate eye movements in a smaller area, refer to their rear view mirror less often and look closer in front and to the right of the vehicle. These behaviors have the potential of impairing a driver's ability to detect hazardous situations in time to prevent a crash.² More generally, research has shown that:³

- young drivers rate the statistical risk of driving in general as being higher than older drivers,
- young drivers rate the threat of particular driving behaviors as being lower than older drivers -- specifically speeding, following closely and impaired driving, and
- young drivers are slower to recognize potential road hazards.

Indeed, the authors pointed out that, "The paradox of high assessments of the risk of general driving may be that young drivers actually overestimate the hazardousness of most driving situations (i.e., those of low to medium risk) and only underestimate high risk situations."³

In a more positive light, it would seem that the identification and reaction to cues signalling possible hazards can be learned.³ Take, for example, a person who has little experience driving a car and is approaching a distant bus stop. This person may not perceive the *potential* hazard of pedestrians entering and exiting the bus as well as other vehicle traffic avoiding both the pedestrians and the bus before they become an *actual* hazard. In comparison, an experienced driver has developed expectancies from encountering similar situations and these expectancies of the hazard potential of a situation can provide critical reductions in perception and reaction to real hazards when they do occur. Recall that slower perception and reaction time reduces the amount of time available to act to avoid a crash.

The preceding discussion provides evidence that at least some of the problems young drivers experience are related to skills acquisition and inaccurate perceptions of risk. On the other hand, not every problem young drivers experience is due to misperceiving how risky the behaviors the drivers engage in really are. Young drivers may actually seek out demanding (risky) situations so they can test their skills and as a way to make driving more exciting and fun.

²Cvetkovich, G and Earle, T.C. (1988). Decision making and risk taking of young drivers: Conceptual distinctions and issues. *Alcohol, Drugs and Driving*, Vol.4(1), 9-19.

³Summala, H. (1987). Young driver accidents: Risk taking or failure of skills? *Alcohol, Drugs and Driving*, Vol. 3(3-4), 79-91.

As cited³, Zuckerman et al. found that the peak for "sensation-seeking" (or thrill-seeking) motives is between 16 and 19 years of age. There is considerable evidence that young drivers in the age group examined in this compilation may be satisfying their "sensation-seeking" needs through driving. For example, a study of high school juniors and seniors found that 60% of the male and 33% of the female students surveyed reported they, "engaged in risk-taking for fun while driving at least once or twice in the six months preceding the survey."⁴ A second study¹, found that 36% of 662 dangerous driving events reported by high school students involved "intent to engage in the dangerous driving behavior" with 72% of males and 28% of females reporting "reckless intent." The good news is that this use of driving to satisfy sensation-seeking needs may be relatively short lived.

Not only do many young drivers intend to engage in behaviors that are both objectively and subjectively rated as hazardous, most evidence indicates that young drivers overestimate their abilities to cope with the same hazardous situations the risk of which they underestimate². This isn't too surprising given that 77% of the high school students interviewed reported that their "dangerous driving" incidents resulted in no negative consequences, and in the majority of the remaining incidents, the only consequence was "trouble with parents/friends."³ In another set of questions to the same students, 47% of students reported being frightened by the incident, yet 68% of passengers reported they would ride again with the driver unconditionally. Thus, it would seem that these drivers may have some reason to both underestimate the risk of negative consequences and/or their skill in avoiding those consequences. However, their errors in risk and skill assessment all too often result in significant negative consequences (as evidenced by the traffic conviction and crash data presented earlier). Eventually sufficient experience accumulates (either personal or through reports from others) and these assessments change.

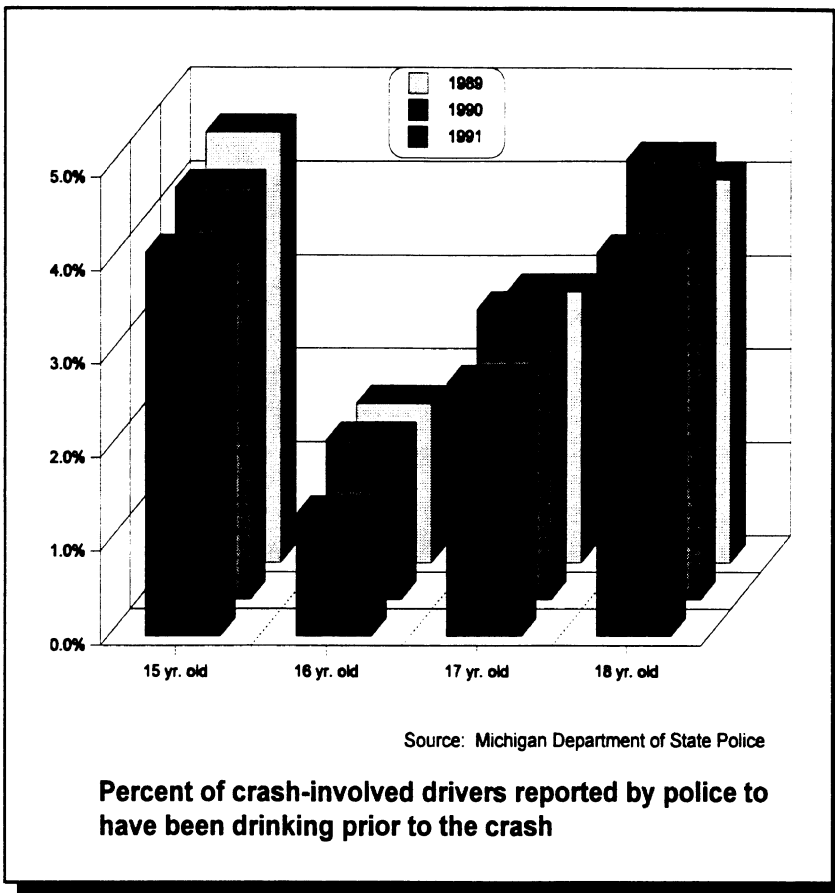
Unfortunately, these risk and skill assessments don't all change as much as one may want. Studies show that 80% of drivers report they are better than the average driver -- 1st year drivers judge they have less skill but take more care than other drivers -- but they soon shift to the belief that they are better than average in both care and skill -- behavior changes like driving faster and overtake more rapidly occur in parallel with beliefs about driving skill. Feelings of "invulnerability" may be due to a failure to consider that other people have the same coping abilities or skills or may have taken the same risk mitigation steps. When assessing threat to self, people conclude that they are in less than average danger because they compare themselves to the worst case they can imagine³.

In sum, young drivers misperceive risks compared to an objective criterion, often take risks for thrills, and overestimate their skill in driving safely.

One of the most hazardous driving behaviors and most frequently reported hazardous driving behavior among high school students is the consumption of alcoholic beverages before driving. Indeed, 61% of all dangerous driving events reported in a study of high school seniors involved alcohol¹.

⁴Jessor, R. (1987) Risky driving and adolescent problem behavior: An extension of problem-behavior theory. *Alcohol, Drugs, and Driving*, Vol.3(3-4), 1-11.

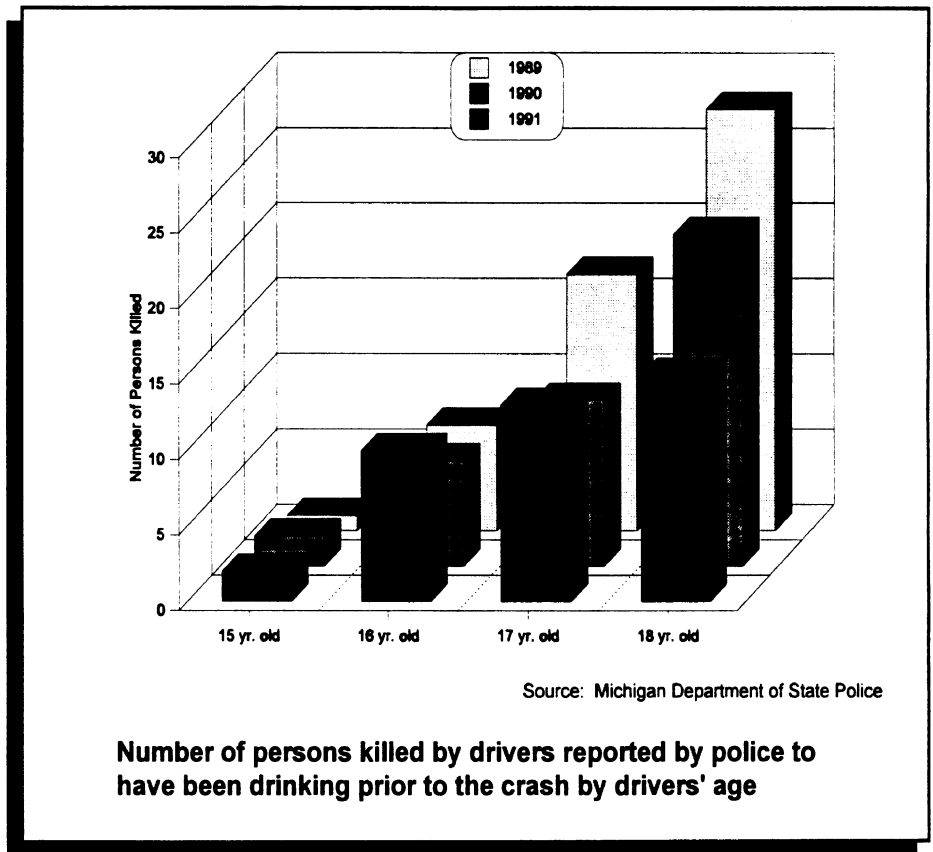
Traffic Crashes -- Alcohol-Involved?



The chart at the left shows that after a peak at age 15, the proportion of young drivers who were reported to have been drinking prior to their crashes increases linearly from age 16 to 18.

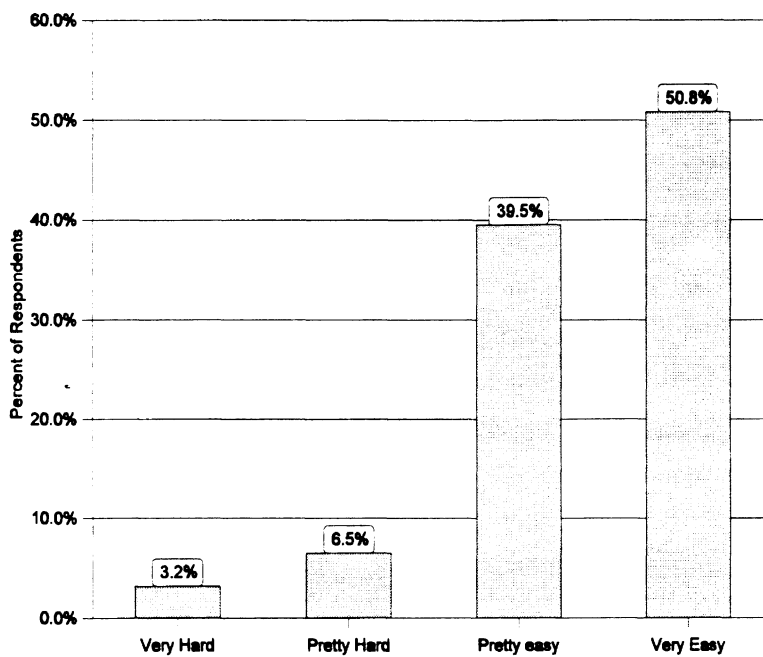
The chart to the right shows the number of persons killed in crashes where the young driver had been drinking.

Not only is driving after the consumption of alcohol dangerous because of its psychological and physiological effects, but these effects are particularly pronounced for young, inexperienced drinkers who are also young, inexperienced drivers. Indeed, drivers who by virtue of Michigan's drinking laws should not be able to obtain alcohol, let alone drink and drive.



High School Seniors and Alcohol -- Can you get it?

Surveys of high school seniors in a populous county of Michigan were conducted in 1992 and 1993 to assess alcohol related behaviors and attitudes. Results presented on the following pages represent data from approximately 1,000 seniors from the class of 1992.⁵ The title of each chart box is the exact wording of the question used to generate the responses described in the chart.

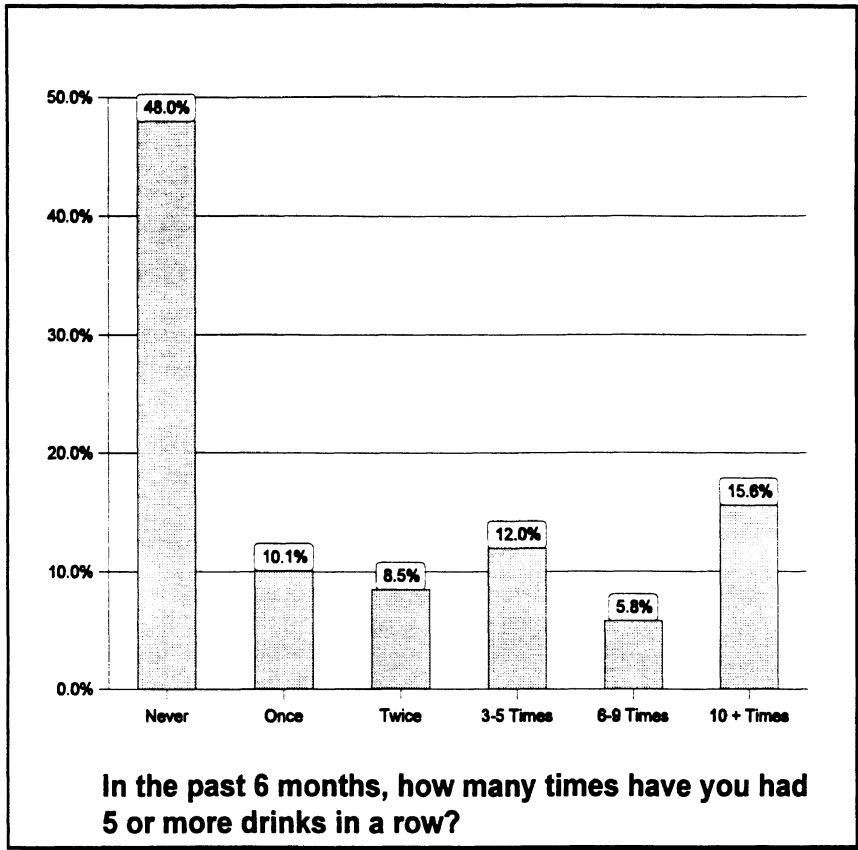


If you wanted it, how easy would it be for you to get alcohol (beer, wine, wine coolers, or liquor)?

The chart to the left shows that over 90% of high school seniors reported that it was "pretty easy" or "very easy" for them to get alcohol. There was no difference found between male and female seniors in the reported ease of access to alcohol.

⁵Waller, P. and Shope, J (1994). Adolescent Substance Abuse Prevention Project. Sponsored by the National Institute for Alcohol Abuse and Alcoholism.

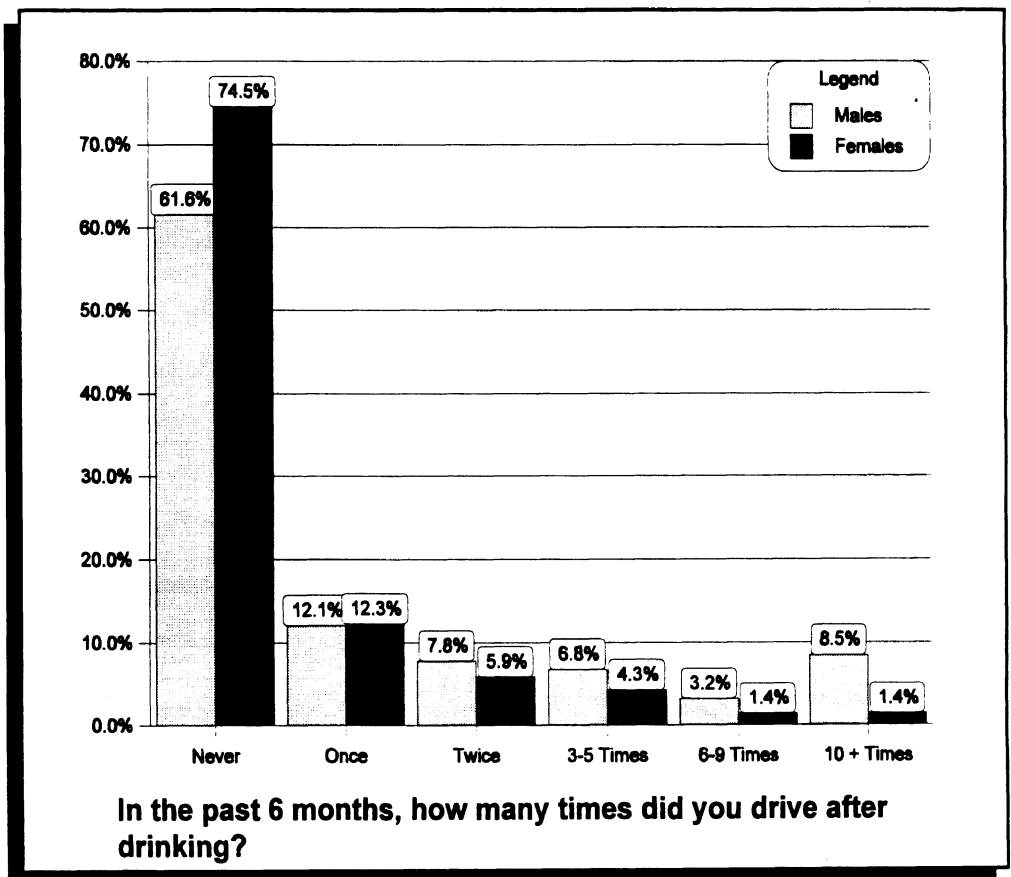
High School Seniors and Alcohol -- Have Another Drink?



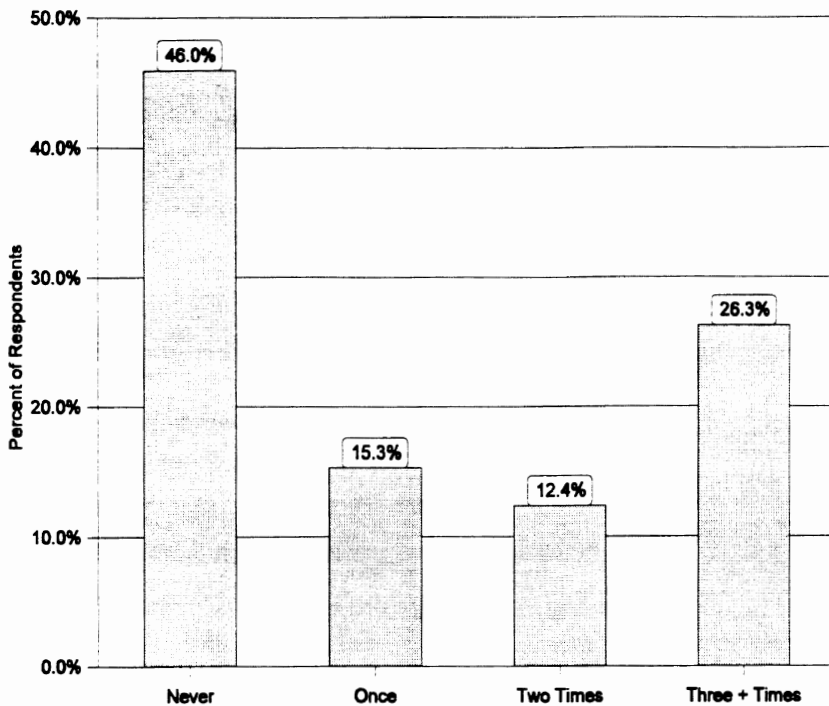
The chart to the left shows the number of "binge drinking" incidents students reported having in the six months preceding the survey. Binge drinking (defined as consuming 5 or more drinks "in a row") is particularly troublesome because of the high blood alcohol concentrations these incidents create. Over 50% of seniors reported at least one binge drinking episode in the preceding six months. Over 20% of the high school seniors reported six or more such episodes. There were no differences found in reported binge drinking between male and female students.

While nearly three-quarters of female seniors reported not having a drinking-driving incident in the preceding six months, only 61.6% of males say the same. Nearly 12% of male students reported six or more drinking-driving incidents over the preceding six months.

Obviously drinking as well as drinking and driving are fairly common in this age group. The next question is, "How often do these same people ride with a driver who had been drinking?"



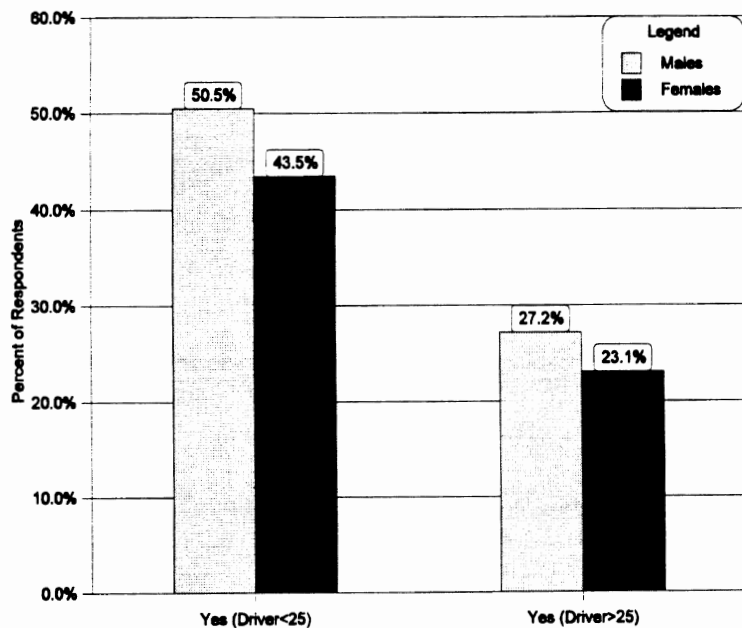
High School Seniors and Alcohol -- Riding with Drinking Driver?



In the past 6 months, how often did you ride with a driver who had been drinking?

The chart to the left shows that over half of high school seniors had ridden with a driver who had been drinking in the six months prior to the survey. There was no difference in riding patterns between males and females.

The chart to the right shows that about half of the male and about 43% of the female students reported riding with a driver under age 25 who had been drinking. Only about 25% of both genders reported riding with a driver over age 25 who had been drinking prior to the trip.



In the past 6 months, have you ridden with a driver (age <25 or age >25) who had been drinking?

Summary and Conclusions

- More males than females are licensed at each age (p.3).
- The number of licensed drivers increases with age.
- Annual vehicle miles of travel is higher for males than females for all ages.
- Annual vehicle miles of travel is increases with age.

- Work and business travel increases with age, as does visits with friends/relatives (p.4).
- "Pleasure drives" peak for 15 year olds and rapidly decline with age.
- Recreational travel is higher among 15-16 year olds than for 17-18 year olds.
- Almost 20% of all "dangerous driving actions" reported by young drivers occurred when "cruising."

- Drivers age 15-16 travel with others over 50% of the time, ridership declines to 30% for ages 17 and 18 (p.5).
- In 85% of dangerous driving events among youth there was one or more peers riding in the car with the driver.

- Young drivers accumulate a large proportion of their age 15-18 crash experience at or before age 17 (p.7)
- The risk of a crash per mile driven decreases rapidly from age 16-18.

- The number of severe crashes involving young drivers declined steadily from 1989 to 1991 (p.8).
- In 1991, crashes involving at least one driver age 15-18 killed 176 and injured another 10,765.

- About 80% of crash-involved drivers age 15-18 years old are driving passenger cars (p.9).
- For all age groups, sport-utility and pickup truck crash involvement increased considerably from 1989-1991.

- Traffic crashes among the 15-18 year old age group peak at 8 a.m. and again at 4 p.m. (p.10)
- A larger proportion of crashes (driver age 15-18) occur on Friday and Saturday than other days of the week.

- Young drivers do only 16.3% of their driving at night, yet 30% of their crashes occur in dark conditions (p.11)

- The percentage of young drivers that committed no hazardous act leading to the crash increases with age (p.13)
- Following too closely is the most frequent hazardous action cited by police for crash-involved young drivers, followed by failure to yield and excessive speed.
- Failure to yield and following too closely crashes peak with the 16 year age group and may be associated with a large influx of first year young drivers.
- Excessive speed is the most frequent hazardous action among young drivers involved in *fatal* crashes. Failure to yield is also a major factor in fatal crashes involving young drivers.

- The most frequent conviction type for drivers age 15-18 is speeding violations. Next most frequent are disobeying traffic signals and stop signs, a failure to yield, and careless driving (p.15).

- Basic vehicle control skills like turning and stopping are achieved quite quickly (p.17).
- Perceptual, judgement, and decision making skills take longer to acquire.
- Young drivers rate the statistical risk of driving in general as being higher than older drivers (p.17).
- Young drivers rate the threat of specific driving behaviors as being lower than older drivers, particularly speeding, following closely and impaired driving.
- Young drivers are slower to recognize potential road hazards.
- Young drivers may overestimate the hazard of most driving situations and only underestimate high risk situations.
- Identification and reaction to cues signalling possible hazards can be learned (p.17).
- While some of the problems young drivers experience are related to skills acquisition and inaccurate perceptions of risk, not every problem young drivers experience is due to misperceiving how risky the behaviors the drivers engage in really are (p.17)
- Young drivers may actually seek out demanding (risky) situations so they can test their skills and as a way to make driving more exiting and fun.
- Young drivers overestimate their abilities to cope with the same hazardous situations the risk of which they underestimate (p.18).
- Most "dangerous driving" incidents result in no negative consequences.
- Four out of five drivers report they are better than the average driver.
- First year drivers judge they have less skill but take more care than other drivers -- but they soon shift to the belief that they are better than average in both care and skill -- behavior changes like driving faster and overtake more rapidly occur in parallel with beliefs about driving skill.
- Feelings of "invulnerability" may be due to a failure to consider that other people have the same coping abilities or skills or may have taken the same risk mitigation steps.
- When assessing threat to self, people conclude that they are in less than average danger because they compare themselves to the worst case they can imagine.
- Over 60% of all dangerous driving events reported in a study of high school seniors involved alcohol (p.18)
- Over 90% of high school seniors reported it was "pretty easy" or "very easy" to get alcohol (p.20).
- Over 50% of seniors reported at least one binge drinking episode in the preceding six months, and more than 20% reported six or more such episodes (p.21)
- Almost 75% of female seniors reported not having a drinking-driving incident in the preceding six months, only 61.6% of males say the same.
- Nearly 12% of male students reported six or more drinking-driving incidents over the preceding six months.

So, given all that has been discussed to this point, what can be done to make it easier for the young driver to learn how to drive safely? The data presented suggest that a system of driver "education" that allows drivers to accumulate driving experience over an extended period of time, beginning with driving in relatively safe and simple circumstances and gradually moving on to increasingly complex and challenging driving situations may be useful in providing the training necessary for perceptual, decision making, and behavioral skills acquisition that appears to be lacking currently.

This concept is not new, and similar concepts are described under the umbrella name of "graduated licensing." Basically, a graduated licensing system uses several levels of licensing, each with its own level of privileges. Driving privileges could be first granted to allow for daytime driving with a parent or guardian as the sole passenger in the car. Next, drivers may be permitted to drive at night, once again only with a parent or guardian as the sole passenger. Driving privileges would then progress to driving alone at day, then night, followed by full licensure with the exception of a lower per se blood alcohol level than for drivers at or above age 21 (reflective of the fact that alcohol consumption is essentially prohibited for this age group).

An alternative that is occasionally discussed is a curfew prohibiting drivers below a certain age to drive after a specified time. While a curfew would reduce the amount of driving during the prohibited hours, it does nothing to provide for the supervised learning that is required to drive safely.

