

Limiting Death, Injury and Loss Due to Teen Drivers in Maryland:

A Policy Analysis

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Executive Summary

Too many teen drivers in Maryland are involved in automobile crashes resulting in death, injury, and property damage. Despite Maryland's leadership on the issue of Graduated Drivers Licensing (GDL) legislation, news of fatal and serious crashes involving teenage drivers remains a common concern throughout the state. This paper examines policy alternatives to reduce crashes, save lives, prevent injuries and avert costs attributable to crashes involving teen drivers.

In 2003, Maryland teens were involved in 22,354 automobile crashes resulting in 146 fatalities and more than 14,000 injuries. Teenage drivers represent less than nine percent of the total driving population in Maryland, but account for more than 13 percent of all fatal crashes. In Maryland, one in five teens is involved in an automobile crash during his or her first year of driving, and the crash risk per mile nationally for 16-year-olds is twice the risk it is for 18 to 19-year-olds. In addition to the obvious emotional devastation these crashes cause, there are huge financial costs, estimated at more than \$4 million per fatality.¹

In 2005, the Maryland General Assembly passed a number of changes to the GDL designed to limit the number of deaths and injuries teens suffer in crashes. There is every reason to believe that these newly enacted laws will improve safety in the coming years. Nonetheless, we believe that additional policy interventions can have incremental effects, saving the lives of even more teen drivers in the state of Maryland.

In this paper, we discuss possible alternatives to further reduce the number of crashes involving teen drivers, thereby saving lives and preventing injuries and property damage. Our analysis revealed that the two most promising actions that policymakers in Maryland could do are:

- > Expand Maryland's DWI checkpoint program; and,
- > Increase enforcement of seat belt and speeding laws by establishing a competitive process through which grants for effective enforcement strategies would be awarded to local jurisdictions.

In addition, we also recommend that Maryland decision makers consider four other strategies that could also reduce crashes involving teen drivers. These strategies include:

- ➤ Increase sanctions against underage drivers adjudicated or convicted of driving while impaired;
- ➤ Establish a tiered system of progressive sanctions based on Blood Alcohol Content (BAC) level;

¹ Maryland State Highway Administration. <u>Maryland Traffic Safety Facts 2003</u>. December 2004.

- > Launch a pilot project for driver's education students to receive supplemental driving training using advanced driving simulators; and,
- > Increase parental involvement and knowledge by requiring parents/guardians to attend an orientation to the driver's education program.

We arrived at these six policy alternatives after conducting a comprehensive review of the research and literature, examining data on traffic accidents and fatalities in Maryland, and meeting with experts and advocates on teen driving. Our information gathering, analysis and discussions helped us to structure our thinking about the problem.

We viewed the problem of teen driver safety as a process starting with the development of the teen's knowledge and attitudes about driving, and family and public policies that influence when and whether a teen has access to a car. We also examined the factors, both behavioral and environmental, that could contribute to the likelihood of a crash and the severity of a crash.

Using this model as a base, we identified the areas of teen driving that had not been addressed by the General Assembly during its 2005 legislative session. Our work focused on possible changes that would supplement or complement those laws. A brief description of each proposed alternative follows:

Alternative 1: Increase sanctions against underage drivers adjudicated or convicted of driving while impaired. Specifically, the "increased sanctions" alternative would suspend the driver's license of anyone under age 21 for three years, or until age 21, whichever is longer, for a driving while impaired (DWI) conviction or adjudication.

Alternative 2: Continue and expand Maryland's DWI checkpoint program. Specifically, the "checkpoints" alternative would expand Maryland's "Checkpoint Strikeforce" initiative by (a) doubling in 2006 the annual number of checkpoints conducted statewide, (b) increasing by 50 percent the budget for the program's public awareness component, and (c) maintaining a standard of 15 to 20 police officers per checkpoint.

Alternative 3: Establish a tiered system of progressive sanctions based on Blood Alcohol Content (BAC) level. Specifically, the "progressive sanctions" alternative would create new legal categories and increased sanctions for all DWI offenders at the .15 and .20 BAC levels, regardless of age.

Alternative 4: Fund a pilot study in which students would receive driving training using advanced driving simulators. Specifically, the "simulator" alternative calls for setting up and funding a two-year pilot study at three driver education sites to determine whether students who practice driving on advanced driving simulators perform better than their peers at similar schools.

Alternative 5: Require parents/guardians to attend driver's education orientation. Specifically, the "parental involvement" alternative calls for requiring a parent or guardian to attend a driver's education class in order to learn the risks associated with teen driving and to help them understand their responsibilities under the State's GDL system.

Alternative 6: Award speeding and seatbelt enforcement grants to local jurisdictions. The "enforcement" alternative allows for the state of Maryland to award enforcement grants to county jurisdictions. These grants could be complimented by additional funding aimed at creating innovative teen driver identification.

We judged each of the six policy alternatives against four criteria:

- 1. Effectiveness.² To what extent would the alternative reduce the total teen accident rate, save lives, prevent injuries and avert serious property damage?
- **2. Direct Cost to Government for Implementation.** How much would it cost the State to implement the alternative?
- **3. Indirect Consequences.** What would be the intended and unintended costs and consequences for parties other than the State, both positive and negative, that would result from implementation?
- **4. Feasibility.** What would it take to implement the alternative in Maryland? What is the potential for opposition?

In the table below, we show how each alternative scored in the categories of effectiveness and direct annual cost to the government. As the table shows, alternatives 2 and 6 have the highest total monetary benefit and the least direct annual cost to government.

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² In our calculations of effectiveness, we used data from 2003 as our baseline. We acknowledge that the 2005 legislation regarding changes in the GDL could affect these numbers; however, since the laws took effect on Oct. 1, 2005, we opted to rate the effectiveness of the alternatives based on pre-2005 legislation conditions.

Table 1: Assessment of Direct Effects Associated with Reduction of Teen Crashes and Direct Annual Cost to Government

	Effe	Direct	
	Number	Total	Annual
Alternative	of	monetary	Cost to
	Lives	benefit due to	Government
	Saved	effectiveness	
1) Increase sanctions against			
underage drinking drivers.	2	620:11:	6100 000
	3	\$20 million	\$100,000
2) Expand Maryland's DWI			
checkpoint program.	8	\$51 million	≈ \$ 0 net
3) Establish a Progressive BAC-			
Based Sanctions System.	<1	\$2 million	\$100,000
4) Fund a pilot study using			
advanced driving simulators.	+	unknown	\$418,000
5) Require parents to attend			
driver's education orientation.		0.00	
	6	\$69 million	\$555,000
6) Increase enforcement of seat			
belt use and speeding laws by			
awarding grants to local			
jurisdictions.	26	\$313 million	≈ \$ 0 net

Recommendations

We advise Maryland decision makers to carefully consider the six policy alternatives presented in this paper. All six alternatives hold some purpose with potential benefits to the citizens of Maryland. Having recently expanded the state's GDL system, lawmakers are poised to take action to further reduce the problem of teen caused car crashes.

Based on our analysis and the research currently available, we recommend that the State of Maryland expand Maryland's DWI checkpoint program (alternative 2) and increase enforcement of seatbelts and speeding (alternative 6). We are encouraged by the State's recent legislation, and hope that this analysis can be used to take further action on the important issue of teen driver safety.

Introduction

In this formal policy analysis, we examine the problem of teenage automobile crashes in Maryland. This project is a requirement for the Masters Degree in Public Policy (MPP) at the University of Maryland, Baltimore County (UMBC) and allows us to demonstrate our knowledge and skills in the area of public policy analysis.

We invited the Honorable James E. Malone, Jr., Delegate, to be our client and audience for this paper because of his long-time commitment to making Maryland roadways safer. A Democrat from District 12A, representing Baltimore and Howard Counties, Delegate Malone serves as Vice-Chair of the Environmental Matters Committee and Chair of the Motor Vehicles and Transportation Subcommittee. We hope that Delegate Malone will find our report useful.

Our investigation into the issue of teenage driver safety in Maryland began with a meeting with Delegate Malone in mid-September 2005. He provided valuable information about the 2005 Graduated Driver's Licensing (GDL) legislation in Maryland, explained to us where the state had been with regard to the issue of teenage driving, and commented on future state priorities in this area. Delegate Malone encouraged us to examine issues related to look at enforcement of current laws regarding safety belt use, speeding and impaired driving.

Next, we conducted a needs assessment to better understand the current problem of teen driver safety and to understand relevant policies in Maryland. We researched legislation and reviewed data from the Fatality Analysis Reporting System (FARS) database. We also reviewed best practices and looked at successful policies in the United States and abroad. In addition, we met with the Governor's Workgroup on Young Drivers in Annapolis to better understand what approaches Maryland is currently examining in this area.

We also met with an advocate who provided a personal perspective on the tragic problem of deaths involving teenage driving. Dr. Arturo Betancourt shared with us what it was like to lose his daughter to a car crash involving a teen driver. In addition, Dr. Betancourt explained how he has championed the issue of safer teen driving, testifying in Annapolis and working with school districts and individual schools to educate parents and teens on safer driving.

Later we met with Ted Miller, PhD., Director of the Public Services Research Institute of the Pacific Institute for Research and Evaluation. Dr. Miller instructed us on benefit-cost analysis as it related to teenage and impaired driving.

Our final formal presenter, Mr. Kevin Quinlan from the National Transportation Safety Board, provided information on the GDL system and other policies that are designed to improve teen driving. He also shared with us his experience advocating for state-level traffic safety legislation nationwide.

Equipped with knowledge gained from our presenters, we worked to enhance our understanding of the problems and policies associated with teen driving by conducting additional

research, meeting with other stakeholders, and analyzing data. Ultimately, we developed and evaluated the various policy alternatives outlined in this paper.

This formal report summarizes the analysis we have conducted over the semester. We begin by describing the problem and explaining why the problem merits government intervention. Second, we explain the criteria by which we judge each of our alternatives. Third, we describe six policy alternatives and evaluate against our four criteria. Finally, we present our final recommendations for policymakers in Maryland.

Problem Statement

Alicia Maria Betancourt was an honors student, an active member of her school community and a respectful family member. She understood that her parents' investigations into her life, although sometimes overbearing, were rooted in love, and she took comfort in that. She understood their need to question her about her plans on the night of September 24, 2004. Alicia and a friend of hers from school were planning to go to the mall that night, just three miles from her home in Silver Spring, Maryland. When her friend, a young man, arrived at her home, Dr. and Mrs. Betancourt questioned him about where he and Alicia were going, when they would be back and whether he was a safe driver. Alicia's curfew was 11:30 p.m., and she seldom missed it. That night, however, 11:30 p.m. came and went, as did midnight and 12:30 a.m. By 1:00 a.m., Dr. Betancourt had grown beyond worry and feared for Alicia's safety. Leaving his wife at home to answer the phone should it ring, Dr. Betancourt left to find the home of the young man. Upon arrival, the young man's parents told him they had just received a call that their son was being flown to Shock Trauma in Baltimore. Seeking information on the condition of his child, Dr. Betancourt could find no help. Call after call resulted in more and more uncertainty and increased fear. Finally at 4:30 a.m., Dr. Betancourt contacted someone who had information on Alicia's condition. He was told to stay where he was and that the police were on their way. Standing helplessly in the home of the young man, Dr. Betancourt watched as officers exited their car, and, for the first time, he knew his daughter was dead. After identifying Alicia, Dr. Betancourt called and spoke to his wife of the incident. On that night, Dr. Betancourt spoke the unspeakable: Alicia was dead.³

In 2003, thousands of teens were involved in automobile crashes in Maryland. While most of these accidents resulted only in property damage, nearly 9,000 caused injury, and 125 involved fatalities (See Table 1). In total, 146 people died and 14,373 were injured in crashes involving teen drivers on Maryland roads in 2003.

Table 2: Crashes Involving Teen Drivers, by Severity, 1998-2003⁴

Year	Fatal Crashes	Fatalities	Injury Crashes	Injuries	Property Damage Only Crashes	Total Crashes
1998	108	128	9,142	15,699	10,541	19,791
1999	135	156	9,134	15,771	11,346	20,615
2000	124	134	9,766	15,062	11,253	20,143
2001	121	135	9,029	15,059	12,038	21,188
2002	115	135	9,368	15,300	12,947	22,430
2003	125	146	8,855	14,373	13,372	22,354
Avg. Change						
(%)	1.7	-0.3	6.4	2.9	2.3	-1.5

³ Betancourt, MD, Arturo. Personal Telephone Interview by Patrick, Paul. 1 December 2005.

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⁴ Maryland State Highway Administration. Maryland Traffic Safety Facts 2003. December 2004.

According to Richard F. Healing, a member of the National Transportation Safety Board, in testimony to the Maryland House Environmental Matters Committee, teenage drivers make up less than nine percent of the total driving population in Maryland, but account for more than 13 percent of all fatal crashes.⁵ This disproportionate ratio of drivers to deaths clearly shows that major problems exist. The risks posed by teen drivers are even worse when one considers the rate of accidents per mile driven. Teen drivers are more likely to be involved in crashes, despite the fact that teens drive fewer miles in a year than adults.

Aside from the obvious emotional devastation these car crashes cause to family and friends, there are also huge financial costs. Estimates from the Federal Highway Administration and the National Safety Council put the lifetime cost to society for each traffic fatality at \$4 million (in current dollars). According to the Federal Highway Administration, these costs accrue from 11 components: property damage; lost earnings; lost household production; medical costs; emergency services; travel delay; vocational rehabilitation; workplace costs; administrative; legal costs; and the value associated with pain and lost quality of life. That amounts to a cost to the citizens of Maryland of more than \$585.5 million for fatalities involving a teen driver in 2003. The National Transportation Board approximates that those not directly involved in crashes pay for nearly three-quarters of all crash costs, primarily through insurance premiums, taxes and travel delay.

Of course this is not a new problem, and Maryland has already taken important steps to protect teenage motorists. In 1979, Maryland was the first state to adopt some features of the model graduated driver licensing (GDL) system. Such features included parental participation, restricted nighttime hours, driver's education requirements, and a provision period of six months without a crash or conviction before getting a full license (or waiting until 18 years old). The minimum age for the learner's permit was 15 years and nine months; 16 and one month was the lowest age for the provisional license. In 1983, Maryland reviewed the changes to the law and evaluated the successes of their policy changes. The numbers were promising: after successful implementation, Maryland experienced a 10 percent reduction in the number of total crashes for 16 and 17 year olds. In 1999, more GDL laws were passed to slowly phase in full licensing privileges. In 2004, Maryland again enacted more GDL features, which include lengthening the learner's permit time period, extending the conviction-free driving requirement from six months to one year, increasing nighttime restrictions, requiring more practice time, restricting cell phone use and prohibiting drivers under age 18 from driving with non-family passengers who are minors.

Concerns have been raised that there are factors that may contribute to teen driver safety that have not yet been addressed by current State policy. Even with this aggressive legislation, far too many teen drivers in Maryland are involved in automobile crashes resulting in serious injury, financial loss and death. This is a problem of fundamental concern in Maryland that warrants further government action.

⁵ Healing, Richard F. "Testimony before the House Environmental Matters Committee regarding HB 462," February 17, 2004. Mr. Healing is a member of the National Traffic Safety Board.

⁶ Motor Vehicle Accident Costs T7570.2. 31 October 1994.

http://www.fhwa.dot.gov/legsregs/directives/techadvs/t75702.htm.

Why Should the State of Maryland Address this Problem?

Before identifying and analyzing possible policy alternatives, we considered first whether this was a problem meriting further government intervention. In doing so, we considered matters of fairness, precedent, and whether the problem was likely to be resolved without government interference. We concluded that government intervention is warranted for the reasons outlined below.

States governs driving and traffic safety.

The State is already involved in many aspects of traffic safety. First, the Maryland Department of Transportation is responsible for issuing drivers' licenses, and is fundamentally interested in ensuring safe driving on the part of citizens given the right to drive. Indeed, to this end, the State of Maryland requires and certifies driver's education. Further, accidents occur on roads created, policed, controlled and maintained by federal, state and local governments. Limiting the risks drivers face on these roads is an inherent responsibility of both state and local governments.

Government has a moral obligation to protect its citizens, promote child welfare and provide general public safety.

The principal concern of the State is to promote and protect the wellbeing of its citizens. Obviously, motor vehicle accidents are tragic and often preventable threats to public welfare. Testimony by Dr. Arturo Betancourt, a father who lost his daughter because of a car crash involving a teen driver, made clear the impact of personal loss on Maryland roads and provided insight into ways which the State could act to protect citizens.

Additionally, the government has obligations to specifically protect children and minors. If children are being neglected the State removes the child from the neglectful setting, protecting the child. Further legislation enacted to protect drivers under the age of 18 years would be consistent with other government interventions to protect minors.

Crashes resulting from poor or reckless driving on the part of teens imposes costs on others, and often results from inability of teens and parents to assess risk.

Unintended consequences, or "externalities," exist when one person's actions affect other people in a positive or negative way. In the case of a motor vehicle accident caused by a teen driver, passengers, people in the other vehicle(s), pedestrians and the general public all experience externalities in the form of injuries, property damage and possibly even death. Increased car insurance premiums, higher medical bills, travel delays, lost wages, accident investigation expenses and diminished quality of life may also occur. Legislation controlling teen driving can reduce these negative externalities.

In addition, substantial evidence indicates that teens and their parents do not sufficiently understand the risks associated with teen driving. The current system does not enable parents to

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⁷ Weimer, David L. and Aidan R. Vining. <u>Policy Analysis: Concepts and Practice</u>. Upper Saddle River, NJ: Prentice-Hall, 1999. p. 94.

⁸ Miller, Ted. "Highway Crash Costs in the United States." UMBC, Baltimore. 11 October 2005.

adequately assess the risks their teens encounter as they drive. Parents often know very little about private driver's education schools, the quality of their instructors or the efficacy of their training. Parents make a conscientious effort to prepare their sons and daughters to drive safely, but they often lack the pedagogical and driving skills necessary to teach them. Therefore, the State of Maryland offers a graduated licensing program and coordinates curricula at 134 private driver's education schools statewide. With additional interventions, Maryland has an opportunity to further limit externalities and imperfect information associated with teen driving.

Maryland's laws regarding teen drivers are not consistent with those of neighboring states or national safety recommendations.

Maryland has reason to consider enacting traffic laws and regulations equivalent to those of neighboring states, so motorists across the region can enjoy the same levels of public safety. For example, 31 states and the District of Columbia have legislation that increases the severity of penalties depending on a driver's blood alcohol concentration (BAC) whereas Maryland does not. Such graduated sanctions also result in funding from the U.S. Department of Transportation's "410 Incentive Funding" program. Thus, Maryland would be justified in examining its regulations for teen drivers and drinking drivers of all ages in order to comply with recommendations promoted by the National Highway Traffic Safety Administration (NHTSA) and the National Transportation Safety Board. In addition, NHTSA has set forth initiatives that call for greater levels of enforcement. Finally, in 2005-2006, the National Transportation Safety Board (NTSB) listed youth highway safety among their "Most Wanted Transportation Safety Improvements" as a means of reducing crashes and saving lives. In the same same and saving lives.

States may take on a leadership role by enacting new, cutting edge legislation that guides other states, and leads the nation.

Since 1979, Maryland has been one of the leading states in adopting aspects of GDL legislation. In addition, Maryland has pioneered advancements in health care and the biosciences more generally. Therefore, it is consistent with Maryland's history that the State continues to research areas that could enhance the lives of its citizens.

http://www.ntsb.gov/events/boardmeeting.htm#20051115.

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⁹ Enhanced Sanctions for higher BACs: Evaluation of Minnesota's High BAC Law. 4 May 2004 http://www.nhtsa.gov/people/injury/alcohol/EnhancedSanctions.

¹⁰ Nationals Highway Traffic Safety Administration. NHTSA Initiatives to Address Safety Belt Use. July 2003.

¹¹ National Transportation Safety Board Meetings. 15 November 2005

Background Information

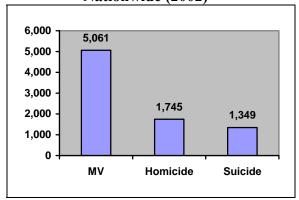
In the previous sections we introduced the problems associated with high crash rates among teen drivers and why it warrants government intervention. In this section, we will explain why teen drivers get into car crashes more often than drivers from other age groups. First, we present key facts about teen driving.

Key Facts About Teen Driving

1) More teens die from motor vehicle crashes than from any other cause.

Motor vehicle crashes are the leading cause of death for teens in the United States.¹² The graph below shows the distribution of teen deaths as they relate to motor-vehicle crashes (MV), homicides, and suicides.

Figure 3: Motor Vehicle Crashes Rank Highest Among Causes of Death for 16 to 19-year-olds Nationwide (2002)¹³



2) Teens are disproportionately represented in motor vehicle crash deaths.

In 2001, in Maryland, teens made up 9 percent of the driving population, however constituted more than 13 percent of the drivers involved in fatal crashes. This disproportionate relationship is also shown at the national level. In 2000, teen drivers constituted about 7 percent of the nations licensed drivers, but were involved in 14 percent of all highway fatalities. In 2001, almost 17 percent of the deaths on Maryland's roads occurred in crashes involving teen drivers. According to the National Safety Council, more than 3,800 young drivers age 15 to 20 are killed every year in traffic crashes.

15 National Transportation Safety Board, "We are All Safer: Lessons Learned and Lives Saved 1975-2005." 2005: 37.

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¹² Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS).

¹³ Centers for Disease Control and Prevention. WISQARS.

¹⁴ Healing, Richard F. 17 February 2004.

¹⁶ Healing, Richard F.. 17 February 2004.

3) Teen drivers have higher crash rates than drivers from any other age group.

Studies demonstrate that motor vehicle crash risk diminishes with age. ¹⁷ For example, as the table below shows, 16-year-olds have the highest crash rate of any age group nationwide. ¹⁸ In addition, 16 to 19-year-olds have more fatal crashes on average than any other age group. 19

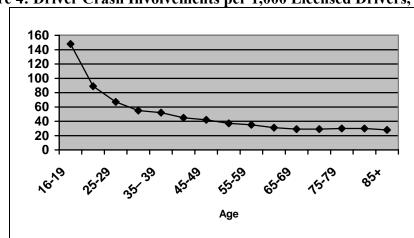


Figure 4: Driver Crash Involvements per 1,000 Licensed Drivers, 2000²⁰

Teen drivers also have the highest crash rates and fatalities per mile driven compared to any other age group.²¹

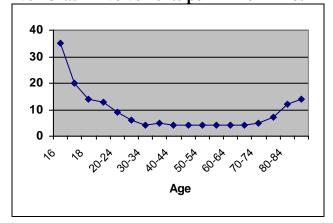


Figure 5: Driver Crash Involvements per Million Miles Driven, 1995²²

¹⁷ Williams, Allan F. "Teenage Drivers: Patterns of Risk," <u>Journal of Safety Research</u> 34 (2003): 7.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid, 9.

²¹ Ferguson, Susan A. "Other High-Risk Factors For Young Drivers—How Graduated Licensing Does, Doesn't, or Could Address Them." <u>Journal of Safety Research</u> 34 (2003): 75. ²² Williams, 8.

Modeling the Process Leading to Crashes Involving Teen Drivers

After familiarizing ourselves with the problem and the literature, we set out to create a model to help us and others understand why teen drivers are more likely to be involved in a crash than drivers from other age groups. We examined the process leading up to a crash involving a teen driver, including factors that affect the knowledge, skills and attitudes of the driver and a teen driver's access to a vehicle. We also examined factors that affect the crash likelihood and crash severity. For each step in the process we identified a variety of policy interventions that might influence the process, identified areas that have been addressed through previous legislation, and ultimately identified six alternatives that represent novel approaches.

After months of reviewing literature, collecting data, and speaking with experts, our first step in understanding what more might be done to limit the problems associated with teen driving in Maryland was to develop a conceptual model of the problem. Our aim was to both fully describe a complex problem, and to identify where interventions might be targeted to limit deaths, injury and property loss due teen driving.

Here we summarize the insights we developed in the process of modeling the problem. We believe the problem of teen driving is affected first by teens' knowledge, skills and attitudes about driving. How students are prepared for, and think about driving, are fundamental determinants of how they will behave and react once given the right to drive. Once given the right to drive and access to a vehicle, the problems associated with teen driving can be thought of as a function of factors that affect the likelihood teens will be involved in a crash, and then the severity of any crash should it occur. Below, we discuss each of these key aspects of the problem, in turn.

Factors Affecting Knowledge, Skills and Attitudes

A teen needs to learn the mechanics of driving, how to assess and avoid risky situations, and the laws and courtesies associated with driving. The teen learns these critical content areas and develops skills by observing how his/her parents and others drive, receiving instruction from his/her parent or guardian or another adult, and by attending driver's education classes.

Experience

Research shows that the crash rate immediately following licensure is much higher than the crash rate after the first few months of driving. For example, the <u>Journal of Safety Research</u> estimates that 20 percent of 16-year-old drivers will become involved in a crash during their first year of driving, with the highest risk of crash during the first month.²³ In addition, the more miles a teen drives, the less likely s/he is of becoming involved in a crash.²⁴

²³ McArdle, Nora C.. "Fiscal and Policy Note, Revised, House Bill 242." Department of Legislative Services. Maryland General Assembly. 2005.

Preusser, David F. and William A. Leaf, "Provisional License," <u>Journal of Safety Research</u> 34 (2000): 47. One study showed that the crash rate for the first 250 miles driven following licensure was 3.2 (per 10,000 miles), whereas the crash rate for the next 250 miles was 1.8, and the next 250 miles after that was 1.3

Ability to Assess Risk

Studies show that teen drivers tend to view dangerous situations as less risky than do older drivers.²⁵ A study conducted by the National Institutes of Health (NIH) suggests that teens fail to use caution because the region of the brain that inhibits risky behavior is not fully formed until age 25.²⁶

Driver's Education

Formal Driver's Education programs have been promoted by some as a mechanism to improve driver skills. However, research on the effectiveness of driver's education classes suggests mixed results. Three articles published in 2003, concluded that driver's education, in its current form, does not reduce the number of teen driver crashes.²⁷ Future research, however, may reveal that the quality of driver's education classes can affect teen driving crash rates.

Factors Affecting Motor Vehicle Access

A major factor in determining whether a teen is involved in a crash is motor vehicles access: whether, when, and where they are permitted to drive, and in what type of vehicle. This may be affected by public policy decisions through the GDL that affect curfew times or road restrictions, but are influenced primarily by family decisions about when a teen is permitted to use the family car. Family decisions may be based on availability of alternatives, such as a family member who can drive the teen or the availability and cost of public transportation, and the availability of a car that is deemed safe for the teen and is available. Clearly parent and family input is critical.

Factors Affecting Crash Likelihood

Distractions

Studies have shown that using a cell phone while driving is associated with increased crash risk. The National Safety Council has endorsed a ban on cell phone use for all drivers under the age of 18. Since 1997, the National Highway Traffic Safety Administration has reported that cellular phones and other forms of wireless technology create distractions that increase a driver's risk on roadways.

Passengers

Driving with passengers also increases the likelihood that a teen will be involved in a crash.³¹ The risk of crashing increases as the number of passengers increases.³² Researchers have found that teens are more likely to speed and tailgate when driving with other teens.³³

2:

²³ Ferguson, 72

Williamson, Elizabeth. "Brain Immaturity Could Explain Teen Crash Rate." <u>The Washington Post</u>. 1 February 2005: A01.

²⁷ Hedlund, et al. "What We Know, What We Don't Know, and What We Need to Know About Graduated Driver Licensing." <u>Journal of Safety Research</u> 34 (2003): 108. The authors of the three articles that concluded that driver education, in its present form, does not reduce the number of teen driver crashes include Susan A. Ferguson, Daniel R. Mayhew, and Patricia F. Waller.

²⁸ Ferguson, 75.

²⁹ Ibid.

National Highway Traffic Safety Commission. "Cellular Phones, other Wireless Devices Offer Benefits, Carry Risks." 10 January 1997. http://www.nhtsa.dot.gov/people/injury/research/wireless/nht0198.html>.

³¹ Williams, 7. Over 50 percent of all fatal crashes by 16 to 17 year old drivers occur when passengers younger than 20 are present and there is no adult in the vehicle (Williams & Ferguson, 2000). For additional information on deaths involving passengers of teen drivers, please see Appendix 2.

Speed

When a teen speeds, steering safely around curves or objects in the roadway becomes more difficult. In addition, speeding extends the distance needed to stop a vehicle, and increases the distance a vehicle travels while the driver attempts to react to a dangerous situation.³⁴ According to an NHTSA report, speeding is one of the most prevalent factors contributing to motor vehicle crashes.³⁵

Alcohol

Although consuming alcohol is illegal for teens, at the national level in 2004, 24 percent of 15 to 20-year-old drivers killed in automobile accidents had a blood alcohol level (BAC) of 0.08 or higher.³⁶ Research shows that teens who drive after drinking have a higher relative crash risk compared with older drivers in all BAC ranges.³⁷

In Maryland, in 2004, alcohol impairment was a factor in one out of every five fatal crashes involving teen drivers.³⁸ The National Safety Council ranked Maryland as one of the 10 worst states for alcohol-related traffic fatalities, noting that 45 percent of the state's fatal crashes involve alcohol.³⁹ Unlike other areas of the U.S. where the rate of alcohol-related crashes is decreasing, the number of drinking and driving crashes is increasing.⁴⁰

Consistent with national averages, teens in Maryland drive drunk less frequently than adults do, but they are much more likely than adults to crash while driving drunk. The University of Maryland, School of Medicine's National Study Center reports that, in 2002, the rate of alcohol use by Maryland drivers involved in crashes was more than twice as high for teen drivers (aged 15 to 19) than for adults. (The rate was 44 per 10,000 for teens and 20.9 for all drivers.)⁴¹ On average, teens that drink and drive have BAC levels that are three times higher than their adult counterparts.

In a 2002 Maryland State Department of Education survey, 70 percent of high school seniors reported using alcohol, 28 percent reported having driven at least once after drinking, and 14 percent reported having driven after drinking five or more drinks.⁴²

³² Hedlund, J. What we know, what we don't know, and what we need to know about graduated driver licensing. Journal of Safety Research 34 (2003): 108.

³³ Marin, Pilar S. and Brett V. Brown, "Are Teens Driving Safer?" Cross Currents 4 October 2005.

³⁴ The National Highway Safety Administration. "Traffic Safety Facts – 2004 Data." DOT HS 809 915.

³⁶ National Highway Transportation Safety Administration. "Traffic Safety Facts 2004." 2005: 3.

³⁷ Williams, 11.

³⁸ Burch, Cynthia. National Study Center for Trauma and EMS, University of Maryland, School of Medicine.

 ³⁹ Barrett, Greg. "Danger on State Roads." <u>Baltimore Sun</u>. 29 Nov 2005.
 ⁴⁰ MDSHA Highway Safety Program Information Aggressive Driving. 10 December 2005

http://www.sha.state.md.us/safety/alcohol driving statistics.asp>. Maryland Department of Transportation, Position Paper Supporting 2005 Senate Bill 207, Drunk and Drugged Driving – Young Drivers – License Suspension and Revocation – March 9, 2005.

⁴¹ National Study Center for Trauma/EMS. June 2004. http://nsc.umaryland.edu/index.htm.

⁴² Maryland Department of Transportation. Position Paper Supporting 2005 Senate Bill 207, Drunk and Drugged Driving – Young Drivers – License Suspension and Revocation. 9 March 2005.

Road Conditions

The condition of the road and traffic affect both the probability of a crash. ⁴³ Teens find that braking can become much more difficult on wet or icy pavements. A study by the National Center for Statistics and Analysis concluded that road conditions were highly significant in determining the injury severity of a crash. ⁴⁴

Factors Affecting Crash Severity

Speeding

Speeding affects the severity of a crash. Speed is a leading cause of fatal crashes. ⁴⁵ Compared with adults, teens are more likely to speed, resulting in more deaths, injuries and financial losses. ⁴⁶ For example, in 2004, speeding was a factor in 30 percent of all fatal crashes; however, speeding played a factor in 38 percent of fatal crashes involving young men, age 15 to 20.

Seatbelt Use

In 2002, only 37 percent of teen drivers involved in crashes in Maryland were wearing seatbelts.⁴⁷ This is substantially lower than the average driver in Maryland, 80 percent of whom wear a seatbelt regularly.⁴⁸

Our review of crash data revealed that a driver involved in a car crash is much more likely to die if s/he does not wear a seatbelt. Teens using seatbelts reduce their fatality risk by 45 percent. Information from the Maryland Automated Accident Reporting System (MAARS) compiled by the Maryland State Police, and citation data⁴⁹ from the District Court of Maryland also confirmed that teens in crashes wearing seatbelts sustained far less severe injuries than did teens not wearing seatbelts.

In Maryland in 2001, there were more than 101,000 police-reported car crashes involving over 265,000 people. Reports show that a majority (76 percent) of the people involved wore seatbelts; however, in fatal crashes only 31 percent did.⁵⁰

Vehicle Choice

Teens often drive older and smaller vehicles increasing their likelihood of severe injuries.⁵¹ Older cars may not have safety features such as front and side airbags,⁵² and smaller cars provide a lower level of protection.

⁴⁶ Jonah BA, Dawson NE. "Youth and risk: age differences in risky driving, risk perception, and risk utility." <u>Alcohol.</u> <u>Drugs and Driving</u> 3 (1987): 16.

⁴³ Stewart, Alan E. "Attributions of Responsibility for Motor Vehicle Crashes." <u>Accident Analysis and Prevention</u> 37.4 (2005): 681-688.

⁴⁴ Singh, Santokh, et al. "Patterns of Injury Severity and Its Likelihood in Two-Vehicle Crashes" (2003): 4. http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/esv/esv19/05-0252-W.pdf

⁴⁵ Ibid.

⁴⁷ University of Maryland National Study Center for Trauma, Traffic Fact Book 2002: 2003.

⁴⁸ Governor Ehrlich Seatbelt Announcement, November 2003.

⁴⁹ Burch, Cynthia. National Study Center for Trauma and EMS, University of Maryland, School of Medicine.

⁵⁰ Maryland Department of Transportation. "Maryland Awarded 157 Innovative Grant Fund."

Maryland Department of Transportation News Release. 2 June 2003.

⁵¹ Ibid. 74.

The National Highway Safety Administration reports that air bags provide fatality protection in potentially fatal crashes in "Effectiveness of Occupant Protection Systems and Their Use." (December 1996).

Developing Promising Alternatives to Limit the Problems Due to Teen Driving

One way to summarize the complicated processes that shape the problems associated with teen driving is by using a diagram. In Figure 1, we summarize this model. This model summarizes all of the factors just discussed. It also helps identify where action could be taken to limit the likelihood a crash occurs, and/or to mitigate the consequences of any accidents.

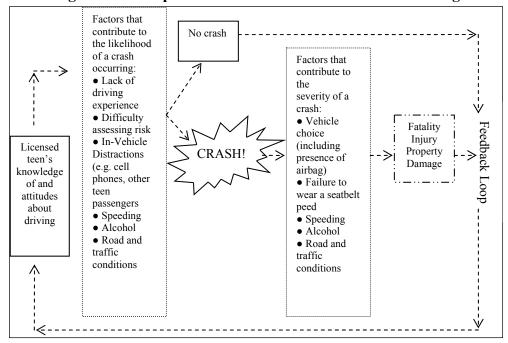


Figure 6: A Simple Model of Problems Due to Teen Driving

The model also helps identify how the 2005 GDL legislation is likely to affect the problem. GDP changes can both shape teens' knowledge and attitudes, and limit some of the factors that contribute to the likelihood of a crash. For this reason, we then focused on alternatives that supplemented these policy changes. We identified the six most promising alternatives to increase the knowledge, control access, reduce crash likelihood and minimize crash severity of teen drivers. Because of the significant action already taken regarding the GDL structure, we focused on detection and sanctions for driving while drug or alcohol impaired, education, and enforcement as primary areas for policy intervention.

Brief Description of the Policy Alternatives:

Based on our assessment of the problem of teen driving, we identified six alternatives with the potential to limit the likelihood and/or severity of a teen automobile crash. In the sections that follow, we describe and analyze each of these alternatives in greater detail. The following are alternatives we identified as possible supplements to the recent changes to GDL in Maryland:

- Alternative 1: Increase sanctions against underage drivers adjudicated or convicted of driving while impaired. Under the "increased sanctions" alternative Maryland would suspend the driver's license of anyone under age 21 for three years, or until age 21, whichever is longer, for a driving while impaired (DWI) conviction or adjudication. Current law provides for suspending the license of such drivers for six months on a first offense and for one year on a second offense. This alternative is modeled on 2005 House Bill 252/Senate Bill 207.
- Alternative 2: Continue and expand Maryland's DWI checkpoint program. Under the "checkpoint" alternative Maryland would expanded the State's activities under its existing "Checkpoint Strikeforce" initiative by (a) doubling the annual number of checkpoints conducted statewide, (b) increasing by 50 percent the budget for the program's multi-media public awareness component and (c) maintaining a standard of at least 15 to 20 police officers per checkpoint to minimize traffic delays. The initiative would be highly publicized to ensure maximum deterrent effects.
- Alternative 3: Establish a tiered system of progressive sanctions based on blood alcohol content (BAC) level. The "progressive sanctions" alternative would create new legal categories and increased sanctions for all DWI offenders at the .15 and .20 BAC levels. Existing laws already impose a .08 limit on adult drivers and a .02 limit on drivers under 21. Proposed sanctions for offenders at the higher BAC levels extended license suspension and revocation, extended ignition interlock requirements, conditional license refusal, and fines of up to \$2,000 plus up to 72 hours imprisonment.
- Alternative 4: Fund a pilot study in which students would receive driving training using advanced driving simulators. Under the "simulators" alternative, the State would issue a request for proposals to create a two-year pilot study at two or three sites across the state in order to help teens better prepare for adverse driving conditions. The simulators would be integrated into existing drivers' education programs, but be targeted for learning at the end of the probation period. The study would (1) test students' driving knowledge and abilities prior to enrolling in driver's education courses; and, (2) determine if students who experience supplemented time on advanced simulators perform better than their peers.
- Alternative 5: Require parents/guardians to attend driver education orientation. Under the "parents" alternative, Maryland would require that parents attend either a special orientation session of driver education or attend the first night of driver education class. Increased parental involvement can help reduce teen crash risks as parents learn more about the risks and determine when their children are ready to get a license, and once licensed when, under what conditions, and in what vehicle their children may drive.
- Alternative 6: Award program grants to local jurisdictions to increase enforcement of seatbelts and speeding laws, complimented by innovative teen driver identification. The "enforcement"

alternative would allow the State of Maryland to award competitive grants to county jurisdictions in order to increase enforcement regarding speeding and seatbelts. Bonus awards would be granted to jurisdictions that implement creative identification of teenage drivers. Through improved enforcement of seatbelts and speeding, fewer teens will be involved in car crashes.

In the next section, we introduce the criteria we chose by which to judge the alternatives. Later we evaluate each of the six alternatives against these criteria. To the greatest extent possible, the alternatives' potential to affect the status quo is assessed and quantified.

Criteria Used to Evaluate Each Alternative

To evaluate the alternatives proposed above, we assess each along four dimensions: 1) Effectiveness in reducing the problem; 2) Direct cost to Maryland state government for implementation; 3) Indirect consequences; 4) Feasibility of implementation. We selected these on the basis of their ability to capture the alternatives' relevance and potential to affect the problem. As will be clear below, the alternatives will each be assessed on these criteria, and ultimately compared to one another.

Criterion 1: Effectiveness⁵³

Effectiveness is the impact we expect each policy alternative to have in reducing teen crashes. To do this we first estimated the possible number of car crashes that could be averted by each alternative. We looked at this with respect to fatalities, injuries and property damage associated with crashes. It was important to make these distinctions so that we could estimate the full costs relating to automobile crashes. During our research we discovered that the cost estimates for alcohol and non-alcohol related crashes were slightly different. Therefore we used the National Highway and Transportation Safety Administration⁵⁴ and the State Highway Administration⁵⁵ for the estimates relating to alcohol related crashes and National Safety Council and the Federal Highway Administration for the non-alcohol related crashes. The values below take into account actual monetary costs as well as estimates for quality of life lost. These quality of life factors include: lost earnings, lost household production, medical costs, emergency services, travel delay, vocational rehabilitation, workplace costs, administrative and legal costs, and pain and suffering. All dollars are in 2005 terms.⁵⁶

• Fatality: \$4,010,350

Incapacitating injury: \$200,000

Non-incapacitating, evident injury: \$50,020

Average alcohol related injury: \$103,595

Property damage, alcohol related accident: \$12,119

Property damage, non-alcohol related: \$8,877

Criterion 2: Direct Cost to Government for Implementation

This includes all direct costs to implementing government agencies. Direct costs include both the cost of implementation as well as the cost of maintaining an alternative, such as administrative costs, labor costs, systems costs, capital costs and maintenance costs.

⁵⁴ Impaired Driving in Maryland. 10 December 2005.

http://www.sha.state.md.us/safety/alcohol driving thingsknow.asp>.

⁵³ Effectiveness was evaluated using literature and research on programs throughout the county and world. We applied these estimates to base-line data for Maryland 2003. We acknowledge that the recent legislation will help reduce the number of teen crashes and therefore our estimates may be over approximated.

http://www.nhtsa.dot.gov/people/injury/alcohol/impaired driving pg2/MD.htm.

⁵⁵ MDSHA Highway Safety Program Information Aggressive Driving. 10 December 2005

⁵⁶ All SHA values (fatality and alcohol-related injury and property damage accidents) are in real (2005) dollars, based on the Consumer Price Index

Criterion 3: Indirect Consequences

Policy alternatives must be evaluated against the intended or unintended consequences they will have, both on society as a whole and on individuals. These can be positive or negative, significant or minimal. Since direct economic costs cannot capture all of the effects a policy alternative may have, indirect benefits and anticipated burdens to others are considered as part of the evaluation. The following outlines the potential types of indirect benefits or burdens considered when evaluating a policy on young drivers.

Benefits: What positive consequences may occur as a result of the intervention? Does lowering the incidence of accidents and deaths of young drivers impact the safety of other drivers and pedestrians? If so, we measure the savings that occur due to a decrease in deaths, injuries and property damage in monetary terms similar to early measures.

Cost: What negative impacts result from the intervention, if any? Does the intervention place an undue burden on family members? Does the requirement place an undue burden on the young driver? Do the requirements of the intervention impede the mobility of the young driver to conduct necessary activities, such as work and after school activities? If the policy does negatively impact the ability of young drivers, we must measure that burden against any safety gain to society.

Criterion 4: Feasibility

To have broad support in the legislature, policy alternatives should appeal to urban, suburban and rural lawmakers, as well as to the Governor. Alternatives should identify the relevant government agency that will implement them, and any necessary guidance on how they should be implemented. In addition, they should attempt to measure the ease of implementation. Will the alternative require administrative changes, additional personnel, capital investments and legislative or regulatory changes to implement?

In the following sections, we evaluate each of the six alternatives against the four criteria described above. First, we describe the alcohol and drug impaired driving alternatives. Next, we discuss the education based alternatives. Finally, we detail and evaluate the enforcement based alternative. For each alternative, we provide (1) a description and background, (2) an evaluation and (3) a conclusion. A summary of our evaluation appears in the "Alternatives Matrix" on page 68.

DRUG AND ALCOHOL IMPAIRED DRIVING ALTERNATIVES

Introduction to Drug and Alcohol Impaired Driving Alternatives

Drug and alcohol impaired driving contributes significantly to the problem of too many young drivers in Maryland involved in automobile crashes resulting in serious injury, financial loss and death. As possible solutions, we outline in this section three policy alternatives that would (1) increase sanctions against underage drivers adjudicated or convicted of driving while impaired; (2) continue and expand Maryland's DWI checkpoint program; and (3) create a tiered system of progressive sanctions based on Blood Alcohol Content (BAC) level.

Drug and alcohol impaired driving crashes cost Maryland more than \$1.3 billion annually and almost \$223 million of this is due to teen drivers.⁶⁴ In 2003, teens accounted for almost 12 percent of impaired driving crashes, close to 14 percent of impaired driving injuries, and 19 percent of impaired driving fatalities. Also in 2003, police cited teens for impaired driving charges 5,649 times.⁵⁷ In Table 7, we present data on the impaired driving crash problem in Maryland and the extent to which teen drivers contribute to it:

Table 7: 2003 Data Shows Teen Driving as a Major Factor in Alcohol-Related Accidents, Fatalities, Injuries, and Property Damage in Maryland*

	All Alcohol and drug impaired crashes/effects	Teen Alcohol and drug impaired crashes/effects	Teen Percentage of total impaired crashes/effects
Accidents	9,089	1070	11.8%
Fatalities	179	34	19.0%
Injuries	5,187	719	13.9%
Property	5,426	639**	11.8%
Damage Only			
Accidents			

^{*} In Maryland, teens make up less than 9 percent of the driving population.

In 2003, 179 people were killed because of drinking and driving, making the cost of impaired driving fatalities \$626.5 million that year. In addition, the SHA reported that the average cost per injured survivor of an impaired driving crash was \$99,000. With 5,187 injuries attributed to impaired driving in Maryland in 2003, the total cost of impaired driving injuries was at least \$513.5 million that year. Thus, the combined cost of drinking and driving injuries and fatalities was \$1.14 billion in 2003

SHA does not separate out property damage associated with these accidents; however, Miller *et al.* calculated the average level of property damage per alcohol-related crash at \$9,855 in 1995.⁵⁹

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^{**} Estimated figure based on ratio of total accidents and total property damage only accidents.

⁵⁷ Burch, Cynthia. National Study Center for Trauma and EMS, University of Maryland, School of Medicine.

⁵⁸ MDSHA Highway Safety Program Information Aggressive Driving. 10 December 2005

⁵⁹ Miller, et al. "Highway Crash Costs in the United States by Driver Age, Blood Alcohol Level, Victim Age, and Restraint Use," <u>Accident Analysis and Prevention</u>, 30 (1998): 137.

Adjusting for inflation, we can estimate that the cost of property damage per alcohol-related crash was \$11,581 in 2003 and, with a total of 9,089 crashes, the costs of property damage associated with impaired driving accidents that year can be estimated at close to \$105.3 million.

The cost estimates and teen impaired crash data above enable us to assess the annual cost of teen impaired driving accidents in Maryland. The following table identifies costs associated with teen impaired driving accidents in Maryland. These 2003 estimates will be used to determine effectiveness for the first three alternatives.

Table 8: Teen Impaired Driving Accidents in Maryland Result in Fatalities, Injuries and Property Damages Totaling Close to \$223 Million Annually

	Frequency	Cost Per Incident	Cost
Fatalities	34	\$4,010,350	\$136,351,900
Injuries	719	\$103,595	\$74,484,805
Property Damage Only Accidents	639	\$12,119	\$7,744,041
TOTAL COST			\$222,591,130

ALTERNATIVE 1:

Increase sanctions against underage drivers adjudicated or convicted of driving while impaired.

Under the "increased sanctions" alternative, Maryland would enact legislation to require suspending the driver's license of anyone under the age of 21 for three years, or until age 21, whichever is longer, for a driving while impaired (DWI) conviction or adjudication. Current law provides for suspending the license of such drivers for six months on a first offense and for one year on a second offense. Aimed directly at underage drinking drivers, this alternative is modeled on 2005 House Bill 252/Senate Bill 207, titled Drunk and Drugged Driving – Young Drivers – License Suspension and Revocation, as amended by the Maryland House of Delegates.

Description and Background

This alternative continues a legislative effort left unfinished at the close of the 2005 Maryland General Assembly session. The House of Delegates passed its version of the above-mentioned teen drunk driving bill and amended the Senate version accordingly. After committee amendments, the House and Senate versions of the bill contained significant procedural and due process differences yet remained consistent on the issue of sanctions. In the final days of the 2005 legislative session, a conference committee was appointed to work out the differences between the two approaches, but no compromise version emerged.

Evaluation of Alternative

Effectiveness

License suspension and revocation are among the most effective measures for reducing accidents associated with drunk driving. Research indicates that this practice reduces fatal late night (the period of high alcohol involvement) crashes by 9 percent. Using our 2003 data as a baseline, a 9 percent reduction in fatal crashes among underage drivers translates into an estimated 3.06 lives saved annually. The 9 percent reduction, however, is based on national data and nighttime driving risk, thus, the effect in Maryland may differ. To accommodate this, we assumed that the effect in Maryland could differ by as much as 3 percentage points. We then ran sensitivity analyses again at both 12 and 6 percent estimated crash statistic reductions to predict a high estimate of 4.08 lives saved and a low estimate of 2.04 lives saved. Applying the same analyses for injuries (719 injuries) and property damage (639 crashes), produces the following possible effects:

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⁶⁰ National Highway Transportation Safety Administration. "NHTSA Sentencing and Dispositions of Youth DUI and other Alcohol Offenses: A Guide for Judges and Prosecutors." 10 December 2005. http://www.nhtsa.dot.gov/people/injury/alcohol/youthdui/section10.html>.

⁶¹ Zador, P.L., et al. "Fatal Crash Involvement and Laws Against Alcohol-Impaired Driving" <u>Arlington, VA:</u> Insurance Institute for Highway Safety. 1988.

⁶² Nichols, J.L., and H.L Ross. "The Effectiveness of Legal Sanctions in Dealing with Drinking Drivers." <u>Alcohol</u>, <u>Drugs</u> and <u>Driving</u>. 6 (1990): 33.

Table 9: "Increased Sanctions" Alternative Reduces Accidents That Cause Injury, Property Damage and Death; Results in Major Cost Savings

Description	Low	Main	High	Low End	Main Cost	High End
	End	Estimate	End	Cost	Savings	Cost Saving
	Estimate		Estimate	Savings		
Lives Saved	2.04	3.06	4.08	\$8,181,114	\$12,271,671	\$16,362,228
Injuries	43.14	64.71	86.28	\$4,469,088	\$6,703,632	\$8,938,177
Averted						
Property	38.34	57.51	76.68	\$464,642	\$696,964	\$929,285
Damage						
Accidents						
Avoided						
TOTAL				\$13,114,844	\$19,672,267	\$26,229,690
COST						
SAVINGS						

Based on the above analysis, the increased sanctions alternative has significant positive measures in terms of its potential effectiveness at reducing fatalities, injuries and property damages associated with teen impaired driving crashes.

Direct Cost to Government for Implementation

Based on Department of Legislative Services analysis of the 2005 proposal, the increased sanctions alternative would result in a minimal increase in State revenues. Since MVA would be revoking offenders' licenses for longer periods of time, offenders are assumed to be more likely to request a hearing at the Office of Administrative Hearings (OAH). For each hearing, OAH collects a fee of \$125 and charges back \$92 out of MVA's budget; thus, each hearing produces a net gain of \$33 to the state. While this does not take into account the time spent by staff processing cases, DLS concluded that no additional personnel would be needed at MVA or OAH to handle this workload.⁶³

Thus, under a best case scenario, the "increased sanctions" alternative can be implemented with no net increase in the State budget. To capitalize, however, on the alternative's deterrent effects, spending approximately \$100,000 in the first year to raise awareness of the increased sanctions, or \$200,000 as a worst case scenario, might be needed to achieve the projected effect. Because this alternative could result in a minimal state revenue increase and has a high benefit-cost ratio, the alternative appears favorable against our cost criterion even in the worst case scenario.

Indirect Consequences

Since the proposed legislation on which the "increased sanctions" alternative is based aims at drivers under age 21 only, this alternative has a high level of target effectiveness and is unlikely to have significant spillover benefits or burdens on other segments of the population. Moreover, negative economic effects will be negligible because license revocation programs have been shown to not "have a major impact on the DWI offender's job and income.",64

⁶³ Department of Legislative Services, Fiscal and Policy Note, 2005 Senate Bill 207.

⁶⁴ Knoebel, Kathleen and H. Lawrence Ross. "Effects of Administrative License Revocation on Employment." DOT HS 808 462. Washington DC: National Highway Traffic Safety Administration. May 1996.

There is a possibility, though, that gradual reductions in costs associated with teen driving accidents could have favorable effects on insurance rates overall, and SHA reports that alcohol-related crashes account for about 20 percent of auto insurance payments in Maryland. Thus, the "increased sanctions" alternative has slight positive indirect effects.

Feasibility

According to the Maryland Department of Legislative Services' (DLS) 2005 analysis of the above-mentioned bill, an average of 635 underage drivers are convicted or adjudicated for DWI annually. Moreover, proponents of the bill in 2005 supported it for its perceived high deterrence value, and will get some of Maryland's most potentially dangerous young drivers off the road and, when warranted into treatment and recovery programs. And the services of the road and the services of the services of the road and the services of the servic

The "increased sanctions" alternative is based on legislation that nearly passed during the 2005 Maryland General Assembly Session. Governor Ehrlich introduced Senate Bill 207 and it was a major part of his 2005 legislative package. The bill passed in the Senate with a 42-5 vote. In the House of Delegates, the bill was amended in the Judiciary Committee and ultimately passed unanimously, 135-0. Given the various amendments, the House and Senate versions of the measure contained significant procedural and due process differences yet remained consistent on the issue of sanctions. In the final days of the 2005 legislative session, time became a factor and no comprise bill was crafted. Widely supported by federal, state and local authorities, as well as by safety advocates and drunken driving opponents, passage of legislation based on the "increased sanctions" alternative during the 2006 session appears likely. Thus, the "increased sanctions" alternative appears highly feasible.

Conclusion

The "increased sanctions" alternative may prove effective in saving lives, reducing injuries and averting property damage. The measure results in significant cost savings, generates revenues for the state, and is a highly feasible policy alternative with positive direct and indirect effects.

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⁶⁵ State Highway Administration. 10 December 2005.

http://www.sha.state.md.us/safety/alcohol-driving-thingsknow.asp>.

⁶⁶ Department of Legislative Services, Fiscal and Policy Note, 2005 Senate Bill 207.

⁶⁷ Maryland Department of Transportation, Position Paper Supporting 2005 Senate Bill 207.

⁶⁸ Maryland General Assembly. Senate Bill 207. 2 December 2005.

http://mlis.state.md.us/2005rs/billfile/sb0207.htm.

ALTERNATIVE 2: Expand Maryland's DWI checkpoint program.

Under the "checkpoint" alternative Maryland would expand the State's activities under its existing "Checkpoint Strikeforce" initiative by (a) doubling the annual number of checkpoints conducted statewide, (b) increasing by 50 percent the budget for the program's public awareness component and (c) maintaining a standard of at least 15 to 20 police officers per checkpoint to minimize traffic delays. The initiative would be highly publicized to ensure maximum deterrent effects.

Description and Background

Relatively new in Maryland, Checkpoint Strikeforce is a Mid-Atlantic regional initiative set up to conduct and widely publicize the use of sobriety checkpoints. The SHA reports that under this program 135 sobriety checkpoints were conducted in 2004. According to SHA, there were more than 23,000 total DWI arrests last year, and 2,459 (11 percent) of the arrests were alleged offenders between the ages of 16 and 20. 69

The Checkpoint program aims to deter impaired driving through high profile enforcement promoted through a television, radio and print media campaign, funded at \$394,000 this year. A recent University of Maryland study compared perspectives of state residents who were aware of, exposed to and unaware of the program. Research concluded that people who had heard about the program also indicated they were seeing police on the street more frequently and believed they had a higher likelihood of getting caught if they drove drunk.

Maryland could increase the expected benefits of this program by more widely publicizing a decision to expand the program in 2006, doubling the number of checkpoints and, increasing police presence at each location. According to the Maryland State Police, conducting a checkpoint effectively requires about 15 to 20 officers at a minimum, and having more than that number helps reduce traffic delays.⁷² To increase the perception among Marylanders of a high probability of getting caught while driving drunk, the State would increase spending on mass media and work to obtain as much "free" publicity as possible and/or support from corporate and non-profit sectors. "Free publicity" includes press coverage, flashing road signs, and other existing ways of reaching Maryland motorists. In addition, checkpoints should be set up strategically at various times and locations, particularly targeting secondary roads and areas frequented by young drivers, as well as peak hours and months for teen accidents.

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⁶⁹ Offenders between the ages of 16 and 20 made up 10.69 percent of the arrestees. Rounding to the nearest whole number gives 11 percent. Information available at http://www.sha.state.md.us/safety/alcohol_driving_MHSO.asp.

⁷⁰ PR Newswire Association LLC 16 August 2005.

⁷¹ Beck, KH, et al. "Evaluating Public Impact of a Sobriety Checkpoint Campaign in Maryland: A Comparison of Two Survey Methods." 2005.

⁷² Telephone interview conducted by Lou Gieszl on December 14, 2004, with State Police general information line officer.

Evaluation of Alternative

Effectiveness

Sobriety checkpoints are among the most effective ways to reduce drunken driving crashes, and they work by both removing the impaired driver from the roads and by increasing drivers' perceived risk of arrest. In a review of several independent studies, a 2002 American Journal of Preventive Medicine article indicates sobriety checkpoint programs reduce fatal and non-fatal injury alcohol-related crashes by 23 percent, while other alcohol-related crashes drop by 35 percent. Considered highly reliable, these estimates are based on a detailed meta-analysis of 23 published evaluative studies of sobriety checkpoint programs across the country. Thus, we expect this to be a very good estimate of the potential effects of this alternative in Maryland, thus our sensitivity analyses reflect only a small (1 percentage point) variance above and below those expected 23 percent and 35 percent measures. Using our 2003 Maryland baseline data and cost estimates, we calculate the following:

Table 10: "Checkpoint" Alternative Reduces Accidents That Cause Injury, Property
Damage and Death: Results in Major Cost Savings

Description	Low	Main	High	Low End	Main Cost	High End
_	End	Estimate	End	Cost	Savings	Cost Saving
	Estimate		Estimate	Savings		
Lives Saved	7.48	7.82	8.16	\$29,997,418	\$31,360,937	\$32,724,456
Injuries	158.18	165.37	172.56	\$16,386,657	\$17,131,505	\$17,876,353
Averted						
Property	217.26	223.65	230.04	\$2,632,974	\$2,710,414	\$2,787,855
Damage						
Accidents						
Avoided						
TOTAL				\$49,017,049	\$51,202,856	\$53,388,664
COST						
SAVINGS						

Given estimated cost savings of more than \$53 million annually (from reducing teen crashes), the "checkpoint" alternative immediately appears highly effective. The Injury Prevention report confirms this estimating that the cost per checkpoint nationally is \$9,600, with each yielding \$73,000 in total benefits, a benefit-cost ratio of 7.5.⁷⁴ Based on this analysis, sobriety checkpoints appear to rate very highly in terms of effectiveness.

Direct Cost to Government for Implementation

This alternative would require State expenses on two fronts: one, the increased police force, and two, the increased media awareness. To successfully increase the number of checkpoints the State would have to assume the cost of additional police hours. For a minimum of 15 officers to cover 270 checkpoints annually for four hours the State would have to budget for \$291,600. The second area of expense associated with this alternative is the cost associated with increased media awareness.

⁷³ Schults, A., et. al. "Reviews of Evidence Regarding Interventions to Reduce Alcohol- Impaired Driving." <u>American Journal of Preventative Medicine</u> 21 (2001): p. 76.

⁷⁴ Children's Safety Network Economics and Data Analysis Research Center, 10.

Increasing spending by 50 percent on publicity will cost \$197,000 for one year, raising awareness and increasing the deterrence factor. This is a one-time expense, easily justifiable given this alternative's cost-saving potential. In subsequent years, the State may reassess the level of public awareness and budget for publicity as needed. Thus, the minimal cost of this alternative translates into a favorable review with respect to our cost criteria.

However, it is conceivable that the increased number of checkpoints will also lead to an increase in the number of ticketed drunk drivers. Therefore the State can forecast a zero net or minimal expense for this alternative.

Indirect Consequences

As an across-the-board initiative, the "checkpoint" alternative has a low level of target effectiveness and a very high level of spillover benefits because it affects drivers of all ages.

The National Highway Traffic Safety Administration commissioned a detailed study in 2001 to determine why alcohol impaired driving among young drivers had declined over the preceding 20 years. The study examined national trends in underage drinking, statutory changes and community-based prevention programs. Researchers found the top two factors were increasing the legal drinking age to 21 and establishing zero-tolerance (.02 BAC level) laws against underage drinking and driving; both already in place in Maryland. The study identifies a third and highly promising category -- "Drinking and Driving Measures Not Directed at Youth" – as a major factor. Thus, having increased youth-specific laws, across the board measures such as the "checkpoint" alternative might be the most promising approach.

Recall that in 2003, in Maryland, impaired driving crashes resulted in 179 total fatalities, 5,187 injuries, and 5,426 property damage only accidents. Using these figures, and our main estimates, the complete effects of the "checkpoint" alternative are as follows:

Table 11: "Checkpoint" Alternative Affects Teen and Adult Driving Habits, Saves Lives, Averts Injuries, and Avoids Property Damage and Results in Major Cost Savings

Description	Estimated Benefits (Teen Driving	Estimated Cost Savings (Teen	Estimated Benefits (Adult Driving)	Estimated Cost Savings (Adult Driving)	Estimated Total Benefits	Estimated Total Cost Savings
Livrag Cavad	7.92	Driving)	29.67	\$122 745 172	41.17	\$165 106 110
Lives Saved	7.82	\$31,360,937		\$133,745,173	41.17	\$165,106,110
Injuries	165.37	\$17,131,505	1,027.64	\$106,458,366	1,193.01	\$123,589,871
Averted						
Property	223.65	\$2,710,414	1,675.45	\$20,304,779	1,899.10	\$23,015,193
Damage						
Accidents						
Avoided						
TOTAL		\$51,202,856		\$260,508,318		\$311,711,174
COST						, ,
SAVINGS						

Thus, the expected savings associated with this alternative's spillover effects on adult drivers exceeds \$260 million. Overall, the alternative can be expected to save more than 41 lives per year and result in annual cost savings of close to \$312 million.

In addition, there are other significant positive spillover benefits associated with the "checkpoint" alternative. The SHA reports that 135 checkpoints last year yielded 579 drug arrests, 177 felony arrests and 32 stolen vehicles recovered. The negative side effect, however, is that many safe and sober drivers are delayed and inconvenienced by the checkpoints, a significant burden.

Given this analysis, we believe the benefits outweigh the burdens, resulting in a significantly positive measure against the indirect consequences criterion.

Feasibility

Expanding the checkpoints does not require any statutory or regulatory changes. Law enforcement already uses checkpoints, and with higher priority, the program may be expanded. Federal and State funds are being used to publicize the program, and an increase in spending is easily justified given the benefit-cost ratio of this alternative. The "checkpoint" alternative has significant positive measures for feasibility.

Conclusion

The "checkpoint" alternative appears highly effective at reducing the frequency and effects of both teen and adult impaired driving crashes. Given its minimal costs, tremendous cost saving potential and feasibility, the "checkpoints" alternative is a highly attractive alternative for further limiting the number of teens killed or injured in auto accidents.

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⁷⁵ MDSHA Highway Safety Program Information Aggressive Driving http://www.sha.state.md.us/safety/alcohol_driving_MHSO.asp.

ALTERNATIVE 3:

Establish a system of progressive sanctions based on blood alcohol content (BAC) level.

The "progressive sanctions" alternative would create new legal categories and increased sanctions for all DWI offenders at the .15 and .20 BAC levels. These new legal thresholds would be in addition to the existing .08 limit for adult drivers and .02 zero tolerance level for drivers under 21 years of age. Proposed sanctions for offenders at the higher BAC levels include but are not limited to extended license suspension and revocation, extended ignition interlock requirements, conditional license refusal, and fines of up to \$2,000 plus up to 72 hours imprisonment for a first-time high BAC offenders.

Description and Background

This alternative would make Maryland's statutory framework for DWI prosecution more consistent with other states. A total of 31 states and the District of Columbia have legislation providing for increased penalties against drivers with BAC levels significantly above the legal limit. States with such graduated BAC-based legal sanctions report dramatic benefits regarding increased penalties and decreased recidivism among hardcore drunk-driving offenders. Participating states may also qualify for "410 Incentive Funding" from the U.S. Department of Transportation if their sanctions increase at the 0.15 level. 18

Minnesota conducted a comprehensive evaluation of its BAC-based approach and reports positive results, even though the state has not seen a decrease in alcohol-related accidents or fatalities since adopting their tiered system in 1998. Sanctions used there, and in other states against higher BAC-level offenders, include extended license revocation, addiction assessment and treatment, extended ignition interlock requirements, vehicle impoundment and registration restrictions, home confinement, electronic monitoring and/or imprisonment. Other states also create new terminology for high BAC offenders such as "Driving Under the Extreme Influence" or "Aggravated Driving While Intoxicated."

http://www.nhtsa.gov/people/injury/alcohol/EnhancedSanctions/pages/3-Eval-MNHigh-BAC.html.

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⁷⁶ National Hardcore Drunk Driver. Sourcebook 2003, p.55, http://www.dwidata.org.

⁷⁷ Evaluation of Minnesota's High-BAC Law,

⁷⁸ Enhanced Sanctions for higher BACs: Evaluation of Minnesota's High BAC Law. 4 May 2004

 $<\!\!\!\text{http://www.nhtsa.gov/people/injury/alcohol/EnhancedSanctions}\!\!>\!.$

⁷⁹ National Hardcore Drunk Driver Sourcebook 2003, p.57.

The table below compares this alternative with current law in neighboring states that have BAC-based sanctioning systems:

Table 12: Progressive Sanctions Alternative Proposed for Maryland Compared with Neighboring States

State	Level One	Level Two	Level Three
Maryland (proposed)	0.08	0.15	0.2
Pennsylvania	0.08	0.16	0.2
Virginia	0.08	0.2	0.25
Washington D.C.	0.08	0.2	0.25

The next table outlines increases in sanctions corresponding to the proposed BAC levels. This is not a comprehensive list of possible sanctions and should be seen as a starting point for determining what sanctions to increase with a new BAC-based system:

Table 13: Possible Sanctions: Current Law/Practice Compared with Proposed Level 2 and Level 3 Enhancements

	Level One (.08)	Level Two (.15)	Level Three (.20)
License Suspension Pre- Conviction First Offense	60 days	120 days	180 days
License Suspension Pre- Conviction Second and Subsequent Offenses	120 days	240 days	360 days
Post-Conviction Suspension First Offense	6 months	One year	Two years
Post Conviction Suspension Second Offense	One year	Two years	Three years
Conditional License During Suspension with Ignition Interlock	Yes, with interlock for one year or more.	Yes, with interlock for two years or more	No conditional license.
Fines – First Offense	Up to \$500	Up to \$1000	Up to \$2000
Incarceration Mandatory Minimum – First Offense	None	48 hours	72 hours
Incarceration Mandatory Minimum – Second Offense	48 hours	One week	Two weeks

Research indicates that accident severity increases with a driver's BAC level. So Young drivers with high BAC levels tend to be among the most likely to have a crash. At increasing BAC levels, drivers become more and more impaired. A 160-pound man reaches the .15 level by drinking 6 to 7 drinks in one hour and, at that level, would likely experience but not recognize major physical and mental impairment. At the .20 level, he would have had about 9 drinks in an hour, might experience blackout, and would rarely be able to stand or walk without assistance.

Clearly, the physiological effects of alcohol, especially the impaired physical abilities and judgment, can have a direct effect on a person's ability to drive and his/her chances of being involved in a serious accident. This is especially pertinent with young people who have limited experience with alcohol, a major concern given SHA's assertion that underage drinking drivers tend to drive with BAC levels three times higher than their adult counterparts. Moreover, the Maryland State Department of Education reports that 14 percent of high school seniors have driven after drinking five or more drinks. ⁸³

Evaluation of Alternative

Effectiveness

The Century Council, a leading advocate of BAC-based sanctioning, reports that 58 percent of drunken driving fatalities result from drivers with BAC levels of .15 and higher. ⁸⁴ If this statistic applies in Maryland among teen drivers, we would expect that 19.72 out of the total 34 fatalities teen impaired driving fatalities would be attributable to a teen driving at or above the .15 level. Data from Maryland Shock Trauma indicates that of the 1,057 teens in impaired driving crashes in 2003, 279 (26 percent) had BAC levels of .10 or higher. Thus, a significant amount of impaired teen drivers may be at or above the .15 level, although that data are not available. Also unknown would be the number of them deterred by the higher standard or taken off the road earlier due to increased sanctions.

Given limited data regarding impaired driving by BAC levels in Maryland, we use 2003 data with cautious assumptions of a low "no effect" scenario, a high 2 percent reduction in teen impaired driving crashes, and a main estimate of a 1 percent reduction. These reduction estimates are low due to the fact that this alterative relies on a simple deterrent and not a forced behavior change. The estimates are represented in the chart below:

⁸⁰ National Hardcore Drunk Driver. 10 December 2005. http://www.dwidata.org.

For additional information regarding the physiological effects of alcohol, please see Appendix No. 3.

⁸² MDSHA Highway Safety Program Information Aggressive Driving.

⁸³ Maryland Department of Transportation, Position Paper Supporting 2005 Senate Bill 207/

⁸⁴ Fighting Drunk Driving – www.Century Council.org. 10 December 2005.

http://www.centurycouncil.org/main/drunkdriving.html.

Table 14: "Progressive Sanctions" Alternative – Estimated Effects Attributable to Reductions in Underage Drinking Drivers

Description	Low End Estimate	Main Estimate	High End	Low End Cost	Main Cost Savings	High End Cost Saving
	Estimate	Estillate	Estimate	Savings	Savings	Cost Saving
Lives Saved	0	.34	.68	\$0	\$1,363,519	\$2,727,038
Injuries Averted	0	7.19	14.38	\$0	\$744,848	\$1,489,696
Property Damage Accidents Avoided	0	6.39	12.78	\$0	\$77,440	\$154,881
TOTAL COST SAVINGS				\$0	\$2,185,807	\$4,371,615

Based on the above analysis, the progressive sanctions alternative may have minimal effectiveness regarding youth-related drunk driving accidents. Moreover, since sanctions already exist for all drivers affected, our assumption that high sanctions could reduce their accident rate by even one percent may be tenuous. Further, judicial discretion already provides for handling hard core and repeat offenders more harshly than other alleged impaired driving offenders.

There is a lack of evaluative data on this subject nationally and reliable assumptions may not be achievable. Benefit-cost studies of tiered BAC-based programs are also equally limited.

The above-mentioned Injury Prevention report, 85 however, does examine benefit-cost ratios for several repeat offender programs with similar penalty structures. That study identifies costs per case ranging from a low of \$890 to a high of \$1,560 with corresponding benefits per case ranging from a low of \$4,900 to a high of \$6,900. Based on this comparison, penalties triggered by the "progressive sanctions" alternative may be in the favorable three to seven benefit-to-cost range.

Only the Minnesota study takes a comprehensive look at tiered BAC-based sanctions. That study finds statistically significant increases in sanctions and decreases in recidivism, but it does not identify any resulting changes in accidents, injuries, property damage and death.

Based on the above analysis, the "progressive sanctions" alternative does not clearly have a positive effective on the outcome measures we employ.

Direct Cost to Government for Implementation

No detailed studies have estimated the potential fiscal effects of implementing this program in Maryland. However, given experiences in other states and the potential increase in federal funds, fines and fees, revenue neutral or revenue producing scenarios may be achievable. Thus, under a best case scenario, the "progressive sanctions" alternative can be implemented with no net increase in the State budget. To capitalize, however, on the alternative's deterrent effects, spending approximately

⁸⁵ Children's Safety Network Economics and Data Analysis Research Center, 10.

\$100,000 in the first year to raise awareness of the program, or \$200,000 as a worst case scenario, might be needed to achieve any results. Thus, the "progressive sanctions" alternative can be considered a zero cost measure with respect to the fiscal implications criterion.

Indirect Consequences

This alternative has potentially significant positive spillover benefits given its likely effects on frequent adult drinking drivers and its chances of getting problem drinkers into treatment and recovery programs. The alternative has a low level of target effectiveness because it affects teens and adults evenly. If, however, the 1 percent reduction assumption were to be realized on both teen and adult drivers the alternative overall effects would be as follows:

Table 15: "Progressive Sanctions" Alternative Has Minimal Effects on Teen and Adult Driving Habits, Saves Lives, Averts Injuries, and Avoids Property Damage and Results in More than \$12 Million in Cost Savings

Description	Estimated Benefits (Teen Driving	Estimated Estimated Cost Benefits Cost Savings (Adult Savings (Teen Driving) (Adult		Estimated Total Benefits	Estimated Total Cost Savings	
	,	Driving)	· · · · · · · · · · · · · · · ·	Driving)		
Lives Saved	.34	\$1,363,519	1.29	\$5,815,007	1.79	\$7,178,527
Injuries Averted	7.19	\$744,848	44.68	\$4,628,625	51.87	\$5,373,473
Property Damage Accidents Avoided	6.39	\$77,440	47.86	\$580,015	54.25	\$657,456
TOTAL COST SAVINGS		\$2,185,807		\$11,023,647		\$13,209,456

Overall, the primary benefit of this alternative lies in its potential to identify and respond with harsh sanctions and treatment for hardcore drunk drivers. Thus, we believe the "progressive sanctions" alternative has slight indirect positive effects overall.

Feasibility

The "progressive sanctions" alternative requires new legislation and has not been the subject of public debate among lawmakers in Maryland. The bill itself would be complex and seems unlikely to pass on its first year of introduction. With some statewide collaborative dialogue, such as a study commission or legislative task force, combined with a national review of effect this approach has had in other states, the General Assembly could likely develop and pass a workable progressive sanctions bill within three years. Many other states already have tiered BAC-based systems, helping increase the likelihood of the bill's eventual passage. Given this analysis, the "progressive sanctions" alternative deserves a slight negative measure against the feasibility criterion.

Conclusion

The "progressive sanctions" alternative is appealing as a way to make Maryland drunk driving laws consistent with those in other states and potentially to attract increased federal funding. The alternative, however, may have limited effectiveness, and it has not been subject to public dialogue in the way that our other alcohol-related alternatives have been. Based on our analysis, the alternative would likely have very minimal effects, if any, on teen drivers. Because of it's potential effects on hard core repeat offenders, however, the alternative may warrants further consideration as other states examine their programs over time.

Education Alternatives

Introduction to Education Based Policy Alternatives

Evidence has shown most accidents occur within the first 500 miles a teenager drives. Experience and knowledge play an important role in reducing teen accidents. By improving driver's education programs, teens can gain the experience and knowledge they need to become safer drivers.

Currently, Maryland driver's education does not provide teens with training in adverse driving conditions. Often, parents cannot incorporate a sufficient amount of exposure to potentially hazardous situations such as inclement weather, night driving or high-volume traffic into their child's in-vehicle instruction. Yet, according to the National Safety Council, "Driver education can help provide the foundation for safe behaviors through knowledge and practice of basic skills. Driver education should be viewed as the beginning of a process through which teens learn valuable driving skills and the experience necessary to make them safe drivers." Therefore we feel Maryland should alter the current structure of driver's education to allow for a more productive learning experience. The two methods proposed to do this are 1) to fund a pilot study to use advanced driver simulators, and 2) allow for more in-depth parental involvement in the driver's education program.

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⁸⁶ National Safety Council. 10 December 2005. http://www.nsc.org/issues/teensdriving

ALTERNATIVE 4:

Study the effects of driving training using advanced driving simulators.

According to the "simulator" alternative, the state would issue a request for proposals (RFP) to create a two-year pilot study at two driver education sites in order to help teens better prepare for adverse driving conditions. The sites would 1) obtain advanced driving simulator technology; 2) integrate its use with driver's education programs; and 3) evaluate the effects on participating students.

Description and Background

Under this alternative advanced simulators would help teens better prepare for adverse driving conditions. School districts, private driving schools and safety advocacy organizations may submit plans to administer the simulators and to evaluate their effects. The study will determine if students who learn on advanced driving simulators perform better than their peers, producing two cohorts of participants whom researchers would follow over a five-year period.

Advanced driving simulators provide students with a more realistic driving experience. Unlike traditional simulators, these offer individualized feedback, rather than a pre-programmed video shown at the front of the classroom. Students sit in a "cockpit" of a vehicle, often a Ford Crown Victoria, complete with pedals, steering wheel, turn signals and the ability to change gears. In front of them, a screen acts as a windshield and the student's actions and driving decisions are displayed. Instructors can use different driving scenarios such as snowy conditions or high-volume traffic and they can place cameras inside the simulator to monitor students' levels of distraction. Additionally, the screens wrap around the vehicle, offering perspective and depth to the driver. ⁸⁷

The organization selected to run the program will prepare a proposal that includes the cost of the simulator and any related technologies, participation costs for students in the pilot and traditional courses, facility rental, labor for driving instructors and the total cost of the five-year evaluation. Public schools with existing driver education programs and certified providers of private driver education courses would be eligible to serve as host sites for the pilot study. If benefits of the advanced driving simulators prove significant, then the state would support both public and private driving schools to fully integrate them into their curriculum.

Researchers implementing the pilot study and evaluating the effectiveness of the simulators will test students' driving abilities prior to enrolling in driver's education courses in both the pilot and traditional courses. Data from 400 randomly-selected students could be used to compare those at the pilot schools with those in traditional schools on such measures as: crash rates, injury rates, frequency of moving violations, stops or arrests for drunken driving, amount of property damages and age upon completion of the GDL system. Program administrators would measure students when they enroll in the driver education course, receive their provisional license, obtain their unrestricted license and at the

⁸⁷ Amount based on DriveSafety estimates. http://www.drivesafety.com/02teensafety/curriculum.htm.

age of 21. A complete longitudinal study would take five years for the first cohort and provide a comprehensive look at driver skill development.

Few states have examined the value of driving simulators through scientific research; thus, Maryland could take a pioneering role in this effort. If the research produces evidence of advanced simulator efficacy, other jurisdictions in Maryland and in neighboring states may take advantage of the technologies.

Evaluation of Alternative

Effectiveness

More highly developed driving simulators could alleviate the need for parents to take their teens driving in many situations across multiple seasons. By implementing this alternative, young drivers in Maryland who participate in the experimental group will learn to drive on the best simulators, giving them the advantage of driving in adverse weather conditions and challenging roadway scenarios. Better simulators could begin to address the following factors in teen driving safety: risk perception, tolerance and acceptance; vehicle control; detection of hazards; visual scanning; correction and over-correction; and, communication and speed choices.

Due to the lack of evidence of advanced driving simulators' impact on reducing the number of crashes, injuries and deaths, the success of students participating in the pilot study will largely determine effectiveness. Measures built into the pilot study will help researchers and lawmakers to decide over time if this policy alternative has proven valuable in making teens safer drivers.

Direct Cost to Government for Implementation

Maryland's Motor Vehicle Administration (MVA) would issue the RFP, manage the contract and oversee the evaluation. Since MVA certifies private-sector driver's education schools and provides curricula to both public and private schools, MVA is the appropriate lead agency. As mentioned above, entities who submit proposals would estimate total implementation costs, including: cost of the simulator and any related technologies, facility rental, hiring driving instructors and the total cost of the five-year evaluation. Students in both pilot and traditional settings would pay enrollment costs based on the price of courses not factoring in the cost of the advanced simulators.

Leasing the advanced simulator would likely cost approximately \$100,000⁸⁸ per site and each driving instructor will have an annual salary of \$30,000 per year. Rental of additional facility space for the courses would cost no more than \$4,000 per site. Finally, evaluation and administration of the five-year study would cost \$150,000 total. If implemented at two locations, this alternative will cost \$418,000.

The simulators can accommodate 300 to 500 students per year with Fall, Spring and Summer driving courses offered. Properly managed and marketed, this program could become a profit center for public and private schools that include advanced simulators in their driver education programs.

⁸⁸ Amount based on DriveSafety estimates. http://www.drivesafety.com/02teensafety/curriculum.htm.

⁸⁹ Amount based on estimate from Dr. Donald Norris, University of Maryland Baltimore County professor of public policy, December 2005.

DriveSafety, the Utah-based company producing the simulators used in the Jordan School District contracted with the schools to offer the simulators at a reduced cost. Currently, the company invites school districts nationwide to participate in their Teen-DASH (Driver Awareness Survey for High Schools) program at no charge. Maryland has an opportunity for tremendous savings since bringing the Teen-DASH curriculum to local schools for free may be a critical first step in implementing the pilot program at a lower cost to the state.

Indirect Consequences

Use of the advanced driving simulators will have a narrow focus during the initial year of the pilot study; therefore its inherent and unintended effects on the larger society will remain minimal. Parents of students who use the simulators may not have to take their children driving in dangerous conditions as often as someone who did not have this added training. Teen drivers will still need "real world" practice in rain, snow or high-volume traffic, but the whole of society can benefit from their experience. Participants who use the advanced driving simulators will likely decrease their levels of risky behavior, and they may perform better on driving tests, enabling them to have increased mobility once they receive their full licenses. The program does not inconvenience parents or force additional restrictions on teen drivers, nor does it substantially change the existing GDL or driving log systems.

There exists a possibility that even advanced simulators do not substantially affect the crash, injury, insurance and death rates of teens. However, if the study concludes that the simulators do, in fact, enhance teen driving safety, then the Department of Education and the Motor Vehicle Administration may decide to invest resources in purchasing simulators and in determining which sites across the state would receive them.

Feasibility

One significant advantage of this policy alternative is its small initial scope and the fact that it requires no change to Maryland statutes for the years of the pilot program. If the study demonstrates significant positive changes in teen driving behavior, then the state would decide whether or not to make a change in the GDL system to allow students to use their time in the simulator toward their 60 hours of mandated driving experience. The General Assembly may later decide that hours in the simulators, once broadly implemented, augment the learning process, but do not replace actual time on the road.

Since the policy stipulates the pilot study measure students at urban, suburban and rural educational sites, it does not favor one region of the state over another, thus enhancing its widespread acceptability within the legislature. Further, it builds on the strength of the five new laws passed in 2005 with its emphasis on early driver education and extensive training. Members of society would likely support statewide implementation and use of the advanced simulators, despite the initial investment, if the pilot study can prove measurable increases in safety and if the costs are passed onto consumers with higher-priced driver's education courses.

Conclusion

This alternative would give teen drivers an additional mode of instruction that may save lives, limit injuries and reduce financial losses, all at a minimal cost to the state of Maryland. By preparing young drivers more thoroughly for the realities of dangerous roadway conditions and the changing

seasons, this alternative could make our streets and highways safer. By adopting this alternative the state could act as a leader among states and work at the forefront of new technology. Parents, children, schools, instructors and the average driver on a snowy day would all benefit from better trained and more experienced teen drivers who learned with the help of advanced driving simulators.

ALTERNATIVE 5:

Require parents to attend driver education orientation.

Under the "parental involvement" alternative, Maryland would require parents to attend either a special orientation session of driver education or attend the first night of driver education class. Increased parental involvement can help reduce teen crash risks as parents determine when their children are ready to get a license, and once licensed when, under what conditions, and in what vehicle their children may drive.

Description and Background

Driver's education has been available for many years; however, little agreement exists on the benefits of driver education and training, what it should entail, and how it should be delivered. There are very few studies that evaluate driver education in order to determine the best way administer it. Since driver's education is imbedded in the current GDL system we choose to address its basic requirements. Currently, most driver education courses are devoted to teaching teens exclusively and do not include parents in the process. We propose that the state implement this requirement in one of two ways. The first way would be to require a parent or guardian to attend a driver education orientation, or the second way would be for the parent or guardian to attend the first night of driver education class along with their teen. In either case, parents will have the opportunity to be educated about the risks associated with teen driving and will better able to understand their responsibilities under the state's GDL system. The driver education instructor will be required to record attendance of the parent/guardian for the full session. The driver education providers must notify parents' that they are required by the State to attend one session at the time the teen is registered for the course. No student will be allowed to pass the driver education program unless their parents meet this requirement. The alternative will apply to all driving schools in Maryland since they all use a state-approved, standardized curriculum. The alternative would also involve state-produced advisements and educational materials to promote the new requirement.

Increased parental involvement could help reduce teen crash risks by teaching parents how to better judge their teen's readiness to drive in various situations. Research related to parenting and teen driving indicates that appropriate parent management practices are related to lower levels of risky driving behavior, traffic tickets and crashes among newly licensed teenage drivers. 90 Research has shown that it is possible to increase significantly parental restrictions during the first several months of independent driving. 91 Since a teen under the age of 18 must have written parental approval to obtain a driver's license, this alternative would ensure that parents know the risks and have the tools they need to guide their teen and help him/her become a responsible driver.

Parents with more exposure and knowledge can make better decisions about their teen's driving privileges, their access to vehicles, and their exposure to risky situations. In a study conducted by

⁹⁰ Simons-Morton, B.G. "Reducing Young Driver Crash Risk." Injury Prevention. 8 (2002): 1.

⁹¹ Simons-Morton,, BG, "Persistence of Effects of a Brief Intervention on Parental Restrictions of Teen Driving Privileges," Injury Prevention, 9 (2003): 144.

Hartos and colleagues, "low parental monitoring and control were related to risky driving behaviors, traffic violations, and more motor vehicle crashes among teens." 92

Evaluation of Alternative

Effectiveness

Studies show even minimal parental involvement can lead to safer teen driving. When parents are informed, they impose greater restrictions on their teens' driving. According to a study conducted by Bruce G. Simons-Morton, "parents are in the best position to affect behavior, judge their children's risk factors and control exposure to risky situations." With greater knowledge, parents can make appropriate decisions about their teen's driving privileges. They are also more likely to restrict those privileges (particularly driving in higher risk situations), thus leading to fewer deaths, injuries, and property losses.

Studies indicate that traffic violations are four times more likely, and crashes are seven times more likely, when restrictions are lenient. Teen drivers who reportedly engage in risky driving were three times more likely to report low parental monitoring and twice as likely to report low parental restrictions. Providing parents with knowledge on the risks and how best to support their child is an effective way to clarify expectations and promote additional control. Parents are true enforcers of GDL policies and other restrictions on teen driving because they can control access to the car."

As stated earlier, 2003 MSHA data indicates that 146 young drivers were involved in fatal accidents when a teen was behind the wheel in Maryland⁹⁶. Assuming that 20% of parents impose more restrictions on their teen drivers after attending a driver education orientation, we can infer that 20% of their teens are affected by these restrictions, therefore this population (teen drivers whose parents have attended driver's education class and as a result imposed more restrictions) is 14% less likely to be involved in a car accident.⁹⁷ Therefore, we anticipate that by implementing this policy we could save 4 lives, prevent 402 injuries and avert 374 property damage only accidents annually. Using sensitivity analysis, due to little research in this area, there is a possibility that the worst case scenario could produce zero effects. Using the main estimates in conjunction with the monetary values previous discussed we anticipate this alternative would create a net cost savings of \$48 million.

⁹⁵ Simons-Morton, 143.

⁹² Hartos, JL, "Do Parent-Imposed Delayed Licensure and Restricted During Reduce Risky Driving Behaviors Among Newly Licensed Teens?" Prevention Science 2 (2001): 112.

⁹³ Simons-Morton, 142.

⁹⁴ Hartos JL, 113.

⁹⁶ Maryland State Highway Administration. Maryland Traffic Safety Facts 2003. December 2004.

⁹⁷ The 14% is the product of exposing this population to the rule that these drivers will be 1/7 less likely to be involved in a car crash.

Table 16: Estimates of Effectiveness of the "Parents" Alternative

Description	High End	Main	Low End	High End Case	Main	Low End
	Estimate	Estimate	Estimate	Cost Savings	Estimate	Cost
					Cost Savings	Saving
Lives Saved	4	4	0	\$16 million	\$16 million	\$ 0
Incapacitating	95	55	0	\$19 million	\$11 million	\$ 0
Injuries						
Averted						
Non-	345	336	0	\$17 million	\$17 million	\$ 0
incapacitating						
Injuries						
Averted						
Property	401	374	0	\$4 million	\$3 million	\$ 0
Damage						
Crashes						
Avoided						
Total				\$52 million	\$47 million	\$ 0

Direct Cost to Government for Implementation

The costs of implementing a program such as this are minimal and are summarized in the table below.

Table 17: Parent Involvement Program Costs

Activity	Cost
Educational public service announcements70 commercial	
spots	500,000.00
Publishing educational print material and updating current	
curriculum	50,000.00
Monitoring of compliance (additional duty for Quality	
Assurance staff)	0.00
Total	\$550,000.00

Indirect Consequences

This alternative would require parents to devote additional time to their children. The driving schools must staff and have capacity to handle the parents, even for just one night. If the MVA did not provide additional funds for costs associated with parents attending driving school, the school would pass this cost onto the students. Another unintended cost would be the extra burden this would place on parents having to attend this school. This would also be a burden for teens with parents who will not cooperate with this requirement. Costs to parents remain minimal since class would be at generally after work.

Feasibility

Requiring parents or guardians to attend either an orientation or a driving class in order to learn effective teaching methods and driving risks would complement the 60 hours they must spend behind

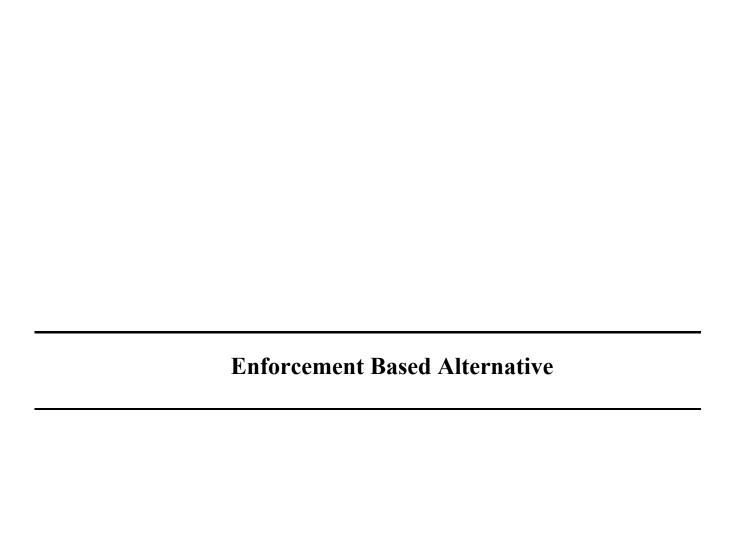
the wheel with their teens. Many parents, however, may not feel that they need the information and training; thus, advocates for this law may encounter opposition from a key stakeholder group.

Yet, the alternative has great political support from Delegate Adrienne A. Mandell, who suggested similar legislation during the September 2005, Governor's Workgroup meeting. Delegate Mandell suggested parents be required to attend a one-hour pre-licensing orientation at the time their teen receives his/her license.

Conclusion

Increased parental involvement can help reduce teen crash risks as they determine when their children are ready to get a license, and once licensed when, under what conditions, and in what vehicle their children may drive. Therefore, the state could reduce teen driving risks by mandating that a parent or guardian attend either an orientation session or the first night of driver's education class.

⁹⁸ Taken from the minutes of the September 6, 2005 Governor's Work Group meeting.



Introduction to the Enforcement Based Alternative

On October 1, 2005, new laws became effective in Maryland to enhance the state's existing Graduated Licensing System. These laws were enacted in order to create safer transportation for teens and all drivers in Maryland. However, this new legislation simply created more laws which need to be enforced. The focus of this alternative is not to create additional GDL laws, but rather to improve enforcement of existing statutes relating to speeding and seatbelts.

Maryland currently has laws in place to make driving safer for teens. Research shows that enforcement of traffic laws, such as speeding and seatbelt use, impacts drivers' behavior. Therefore as the enforcement increases, there will be a simultaneous decrease in risky driving behavior, eventually leading to a decline in teen crashes. Enforcement of specific GDL laws for teenagers is currently difficult due to law enforcement's inability to distinguish a driver under the age of 18 years from an adult. For this reason, a subset of this alternative is to foster innovative approaches to easily identify teen drivers.

Seatbelt restraints have the ability to save lives and reduce injuries dramatically. Seatbelts reduce a person's probability of dying in an automobile crash by 45 percent and being injured by 50 percent. Unbelted drivers' medical costs are 60 percent higher than the medical cost of a driver wearing a seatbelt. Based on the literature reviewed discussed in our description of alternatives section, we know that seatbelt usage is lower for teenagers than for adults, results in a higher rate of fatalities and injuries for this population.

According to NHTSA, speeding is also a major cause of fatal crashes. In 2003, speeding was associated with 31 percent of fatal accidents, resulting in 13,380 deaths. Data shows that speeding is especially a problem for teens; about one-fifth of teenage drivers aged 15 to 20 involved in fatal vehicle accidents had a previous speeding conviction. In 2004, 3,620 teenage drivers, nationally, aged from 15 to 20 were killed, and 303,000 were injured in vehicle accidents related to speeding. In Maryland, speed is specifically a problem for teens; in 2004, over 6,000 teen drivers received citations for speeding. The following section examines the current system and ways to improve enforcement of existing laws.

⁹⁹ Senserrick, Teresa and Narelle Haworth. "Review of Young Driver Training, Licensing and Regulatory Systems: Monash University Accident Research Centre" (June 2005) http://www.monash.edu.au/muarc/reports/muarc239.pdf>

¹⁰⁰ Gantz, Toni and Gretchen Henkle. "Seatbelts: Current Issues." <u>Prevention Institute</u> October 2002

National Transportation Safety Board, "We are All Safer: Lessons Learned and Lives Saved 1975-2005."

¹⁰² University of Maryland National Study Center for Trauma.

ALTERNATIVE 6:

Award program grants to local jurisdictions to increase enforcement of seatbelts and speeding laws, complimented by innovative teen driver identification.

Under the "enforcement" alternative, Maryland would use state funds to award competitive grants to county jurisdictions to increase enforcement regarding seatbelts and speeding. Bonus awards would be granted to jurisdictions who implement identification of teenage drivers on roads.

Description and Background

If adopted, this alternative would create a line item in the state budget for a block grant program available to counties that develop new initiatives to reduce teen driver deaths due to speeding and a lack of seatbelt use. These programs would work in coordination with existing state initiatives, such as the Maryland Chiefs' Challenge, which call for heightened enforcement of seatbelt violations at key times of the year. The grant program would have two enforcement subsets, one for seatbelt use, and one for speeding. Counties would be encouraged to apply for one or both of the enforcement subsets.

Implementation of grant-funded programs would be based on a New York State seatbelt enforcement program. The program is built on 20-day enforcement waves. Each wave contains a 10-day educational component and a 10-day enforcement component. The 10 days of education include a complete media saturation of the market, while the 10-day enforcement period involves a simple concentrated ticketing campaign. Each enforcement subset will have three 20-day waves. Counties are required to conduct the three 20-day waves in their jurisdictions; however, they have the flexibility to conduct the enforcement and educational campaign in a way that fits their county most appropriately. Ten days are required of increasing public awareness to increase the perceived risk of being detected for speeding or not using a seatbelt. The second set of ten days will include actual enforcement of the laws, for example: check points, mobile patrol vehicles, stationary vehicles, and the use of radar and laser speed monitoring equipment.

Grant proposals will be accepted and reviewed only for countywide law enforcement divisions, including county level police departments and sheriff's offices. Eligible counties must demonstrate they have completed sufficient planning to execute the program as envisioned by the state. An acceptable plan of implementation will include adequate explanation of how they plan to satisfy four criteria for successful implementation:

1) Regional planning – Each county would have to must prove that they have a strategy to create a county-wide effort to increase enforcement. They would demonstrate the partnerships they intend on creating and how those partnerships will increase the overall success of the program.

- 2) Community awareness The counties would need to show how they intend to disseminate the message throughout their communities. Counties will not need to provide specific examples of possible television commercials or billboard designs, but rather what methods they plan to use and to what extent they plan to use them.
- 3) Enforcement The counties would provide examples of their proposed enforcement methods, such as using more officers. The state would likely want to know how many more officers the county plans to use and where these officers will be dispatched.
- 4) Evaluation The counties would need to explain how they plan on measuring the effectiveness of their program. This would be a crucial aspect of the program and will be pivotal in determining recipients.

If the county clearly demonstrates their understanding of the program and has sufficient explanation of how they plan to follow the four criteria, then they could receive full funding. The grant making process would be competitive in nature and the counties with the most effective plan would receive awards. It is estimated that 36 grants, 18 for the seatbelt subset and 18 for the speeding subset would be made available. The program is built on a zero-cost basis given anticipated ticket revenues. The revenues generated from the ticketing process would pay in full for the grant awards, and while there may be a decline in the number of motorists not wearing seatbelts, the number of citations will still increase because of the stepped up enforcement, generating more revenue as seen with the Maryland Chiefs' Challenge. A total of \$13.5 million would be available for grant recipients as a result of the fact that all ticket revenues in the state are directed to the state Transportation Fund. Of that total, \$2.7 million, or \$144,000 per grantee, could go to the recipients of the seatbelt subset and \$10.8 million, or \$258,000 per grantee could go to the recipients of the speeding subset. From the total available grant funds \$250,000 would be taken out to provide central staff support. The central staff would provide the recipients with a range of services, and primarily be responsible for aiding the various counties in the creation of educational campaigns and providing the counties with previously tested media messages.

For those who apply for and are awarded both grant subsets they would also have the opportunity for a third subset and additional funding. This component of the grant would encourage creative approaches to identify teenage drivers, furthering enforcement of recently enacted GDL laws.

For example, counties would also be able to target teenagers who drive to school each day, by requiring them to display a red GDL sticker on their license plate to identify them as provisional license holders. The stickers would be similar to registration renewal tags. When the teen reaches 18 years of age and receives a full license, a white sticker could be issued to cover the GDL sticker. The stickers serve as parking permits at high schools and could ease the identification process for the police to better enforce GDL laws, creating safer roads for all drivers.

GDL identification stickers and plates are already mandatory for young drivers in various provinces in Canada, Australia and Northern Ireland. The Monash University Accident Research Centre recommends identification of GDL drivers because they alert others on the road to novice drivers and encourage people to exercise greater caution. The stickers enhance enforcement and may help limit risk-taking behavior of teens as they display their GDL status. ¹⁰³

Counties with this feature in their grant would receive incentive funding to use the stickers. Based on an estimate that 12 counties would receive this funding, the award would be \$500,000 each; half of the additional incentive money would be awarded for planning and implementation. If the county achieves successful implementation of the policies at more than half of the high schools in the district, they would receive the other half of the money for this feature as a bonus reward.

Possibilities of how counties may use their money to raise public awareness range from low costs to high costs depending on the media and its coverage network. We give examples of ways to raise public awareness and their costs in Maryland in the table below.

Table 18: Examples and Costs of Raising Public Awareness via Media in Maryland

•	9	done Awareness via wie	Length of
	Low End Estimate	High End Estimate	Time
		\$9,000; 30 second buy-	
Television	\$600; 30 second buy	-CSI, #1 rated show;	1
Spot ¹⁰⁴	WJZ 5:00 News	Thurs Prime Time	Commercial
	\$150; 60 second buy	\$200; 60 second buy	1
Radio Spot ¹⁰⁵	6:00 am to 7:00 pm	6:00 am to 7:00 pm	Commercial
	\$1,000; county non		
Billboard ¹⁰⁶	interstate	\$8,500; city interstate	4 Weeks
Taxi Tops ¹⁰⁴	\$3,500; 20 taxis	\$6,000; 50 taxis	4 Weeks
	\$500; small mall-		
Mall ¹⁰⁴	advertisement boards	\$885; Arundel Mills	4 Weeks
Newspaper ¹⁰⁷ ,	\$7,545; Baltimore Sun,		
108	1/2 pageWed, Thurs,	\$9,311; Baltimore Sun,	
	Fri or Stat	1/2 page—Sun	1 Day
	\$2,148; Hagerstown		
	Harold, 1/2 page		
	Mon, Tues, Wed,	\$2,482; Hagerstown	
	Thurs, Fir or Sat	Harold, 1/2 page—Sun	1 Day

¹⁰³ Senserrick, Teresa and Narelle Haworth. "Review of Young Driver Training, Licensing and Regulatory Systems: Monash University Accident Research Centre" (June 2005)

¹⁰⁵ 100.7 The Bay, Baltimore's Classic Rock Station

http://www.monash.edu.au/muarc/reports/muarc239.pdf

¹⁰⁴ WJZ Media/Advertising Department

¹⁰⁶ Clear Channel Advertising, Sheryl Phelps

¹⁰⁷ Baltimore Sun Advertising Department

¹⁰⁸ Hagerstown Harold Advertising Department

Evaluation of Alternative

Effectiveness

The original New York campaign began with seatbelt usage at nearly 80 percent (close to Maryland's current rate). After successful implementation of the Buckle Up New York campaign, seatbelt use increased by 10 percent. This provides a potential estimate for the results of Maryland's campaign. Data from more than 18 studies showed improved enforcement of seatbelts increased usage by a median of 16 percent. This increase in usage decreased fatal and nonfatal injuries between seven percent and 15 percent. We will use sensitivity analysis of the low and high numbers as well as the mean, 11 percent reduction in fatal and nonfatal injuries.

Due to only 18 out of the 24 counties receiving awards the grant we multiplied our estimates by 75% (18/24). The following table shows that using the main estimate we can expect that increased seatbelt use could save the lives of 12 teens and help avoid 166 teens from incapacitating injuries.

Table 19: Effectiveness Due to Seatbelt Enforcement

Description	High End	Main	Low End	High End Case	Main	Low End
	Estimate	Estimate	Estimate	Cost Savings	Estimate	Cost
					Cost Savings	Saving
Lives Saved	16	12	8	\$64 million	\$48 million	\$32 million
Incapacitating	226	166	106	\$45 million	\$33 million	\$21 million
Injuries						
Averted						
Non-	1391	1019	642	\$70 million	\$51 million	\$32 million
incapacitating						
Injuries						
Averted						
Property	0	0	0	\$0	\$0	\$0
Damage						
Crashes						
Avoided						
Total				\$160 million	\$132 million	\$85 million

Dinh-Zarr TB, et al. "Reviews of Evidence Regarding Interventions to Increase Use of Safety Belts."
American Journal of Preventive Medicine 21 (2001) 48.

Also shown in the table, the enforcement alternative would save money. Using the main estimates above, and the previous established monetary values, we can assume that this alternative could save \$132 million due to fatalities and injuries avoided.

Speed

In a speed controlled study, researchers found that a reduction in speed lead to a decrease in fatalities of 15 percent. A similar study conducted in Europe found enforcement of speeding would reduce crashes by 11.5 percent. Still further research showed that a lower estimate of a 9 percent reduction in the lives saved is possible due to speeding enforcement. Using these estimates as a high, low and main approximation we see the following results:

Table 20: Effectiveness Due to Speeding Enforcement

Description	High End	Main	Low End	High End	Main	Low End
2 cocraption	Estimate	Estimate	Estimate	Cost Savings	Estimate	Cost Saving
					Cost Savings	
Lives Saved	17	14	2	\$68 million	\$56 million	\$8 million
Incapacitating	226	181	136	\$45 million	\$36 million	\$27 million
Injuries						
Averted						
Non-	1,391	1,112	834	\$70 million	\$56 million	\$42 million
incapacitating						
Injuries						
Averted						
Property	5,015	5,015	5,015	\$45 million	\$45 million	\$45 million
Damage						
Crashes						
Avoided						
Total				\$228 million	\$193 million	\$122 million

The numbers of property damage only crashes are decreased when speeding is lessened. A study conducted in the United Kingdom demonstrated enforcement of speeding decreased crashes by 50 percent. According to the Maryland State Highway Administration, in 2003, teen drivers caused 13,372 property damage only crashes in Maryland. If this were reduced by 50 percent, multiplied by the grant ratio of 18/24 (.75), 5,015 crashes would be avoided. Property damage for a non-alcohol related crash is \$8,877. This number multiplied by the number of crashes avoided results in a savings of \$45 million.

Direct Cost to Government for Implementation

60

European Transport Safety Council. "Police Enforcement Strategies to Reduce Traffic Casualties in Europe." May 1999.

Auto and Road User Journal. "Photo Radar Slows Speeders" 17 March 1997.

<http://www.usroads.com/journals/aruj/9703/ru970303.htm>
² Chua C.S. and A. I. Fisher "Performance Measurements of Local Area"

Chua, C.S., and A. J. Fisher, "Performance Measurements of Local Area Traffic Management: A Case Study," <u>Australian Road Research</u> 21 (1991) 2.

¹¹³ Maryland State Highway Administration. Maryland Traffic Safety Facts 2003. December 2004.

Estimating the Costs of Unintended Injuries, 2003 – NSC. 23 September 2004.

http://www.nsc.org/lrs/statinfo/estcost.htm.

Throughout the state, many jurisdictions have already implemented these measures. Increased local revenues from the ticketing campaigns would offset higher costs of implementation. Counties would be expected to issue an average of 1,000 seatbelt citations and 2,500 speeding citations during each enforcement period, though there would be a clear range because of the size of each municipality and the capacity of their police department; smaller areas though would not be penalized for posting fewer citations than larger areas. Depending on the methods, these programs could become revenue streams for the police departments to fund additional initiatives. For example, Washington, D.C.'s \$6 million investment in speed cameras has generated \$28 million in revenues in one year. As this would be an ongoing campaign from year to year, these ticketing waves could provide regenerating revenues so that more counties each year could apply for new and innovative means to reduce noncompliance with seatbelt laws and speeding.

Table 21: Revenue Generated for the Seatbelt Enforcement Program

Number of counties awarded seatbelt grants	\rightarrow	Number of tickets issued by each county per wave	\rightarrow	Total number of tickets per wave for Maryland	\rightarrow	Number of waves in a year	\rightarrow	Total number of tickets in Maryland per year
18		1,000		18,000		3		54,000
Total				Total				
number of				Revenue				
tickets in	\rightarrow		\rightarrow	from all 3				
Maryland		Amount of		waves for				
per year		citation		Maryland				
54,000		\$50.00		\$2.7 million				

Table 22: Cost for the Seatbelt Enforcement Program

Total available for the program	\rightarrow	Central staff cost	\rightarrow	Money available to be awarded in grants to counties	\rightarrow	Number of counties awarded seatbelt grants	\rightarrow	Money available for each grant award	
\$2.7 million		\$100,000		\$2.6 million		18		\$144,000	

Total money expended on the seatbelt enforcement program \$2.7 million

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¹¹⁵ Lively, Tarron. "New York Ave. Camera a Top Earner." <u>Washington Times.</u> http://www.washtimes.com/metro/20040429-101731-8457r.htm.

Table 23: Revenue Generated by the Speeding Enforcement Program

Number of counties awarded speeding grants	\rightarrow	Number of tickets issued by each county per wave	\rightarrow	Total number of tickets per wave for Maryland	\rightarrow	Number of waves in a year	\rightarrow	Total number of tickets in Maryland per year
18		2,500		45,000		3		135,000
Total number of tickets in Maryland per year	\rightarrow	Amount of citation	\rightarrow	Total Revenue from all 3 waves for Maryland				
135,000		\$80.00		\$10.8 million				

Table 24: Cost for the Speeding Enforcement Program

		14010 = 11	0000	or the speeds		1101011111111	- -	
Total available for the program	\rightarrow	Central staff	\rightarrow	Money available for the creative identification program	\rightarrow	Money available to be awarded in grants to counties	\rightarrow	Number of counties awarded seatbelt grants
\$10.8 million		\$150,000		\$6 million		\$4.7 million		\$18
Money available for each grant award		Total money expended on the seatbelt enforcement program						
\$458,000		\$10.8 million	1					

As shown in the above tables, the design of this program is to be a zero sum, or self sustaining program. However, there will be variations from year to year and wave to wave on the amount money generated due to the flexibility of this program. Therefore, in some years the zero sum may not be realized.

Indirect Consequences

Waves of blanket enforcement would improve the behavior of all drivers on the road. Using our main estimates, the seatbelt portion of the grant would reduce 11 percent of fatalities and major injuries while the speed portion of the alternative would reduce fatalities and injuries by 11.5 percent. Fewer crashes would save society on money and time. Again using the monetary values previously identified we can cost out the savings for all drivers. In 2003, in Maryland, 528 adults over the age of 20 died on the roads and 59,466 adults were injured. Being optimistic and adding the total mean effects for both programs, there would be a 22.5 percent reduction in fatalities and injuries. Even if this program were to reach only 75 percent of the counties, the result would be 89 reduced fatalities and 10,034 reduced injuries. However, programs would most likely have an effect together and reduce the total outcome by some unknown percent. When these fatalities and injuries are put into dollars, there would be a savings of \$357 million due to reduced fatalities, and \$501 million for injuries, totaling

National Study Center for Trauma, Traffic. "Fact Book 2002." 10 December 2005. http://www.umm.edu/shocktrauma/trauma nsc.html>.

\$858 million. Even considering that is figure is most likely unattainable we can make an assumption that the total cost savings to Maryland would exceed \$500 million annually.

Additionally, enhanced enforcement of seatbelts and speeding may lead to increased arrests for other offenses, such as weapons, drugs, and licensing violations. In North Carolina, the Click It or Ticket program operated for three months and resulted in arresting 56 fugitives, stopping 2094 alcoholimpaired drivers and recovering 46 stolen vehicles.¹¹⁷ Similar results in Maryland could be assumed.

This policy could also have negative consequences, such as an increase in travel time, inconvenience because of additional police on the roads, the possibility of racial profiling, travel delays and a loss of workplace productivity. Though the exact negative costs of these factors are unclear, they would not outweigh the substantial gains to the public by implementation.

Feasibility

By avoiding the need to develop write or pass new legislation, implementing the New Yorkstyle program is highly feasible. We believe most legislators would agree with this approach, because it builds upon policies and activities used by state and local police departments while adding no new rules and focusing instead on thoroughly enforcing existing laws.

There may be some opposition to the use of certain types of cameras for traffic safety enforcement. Determining how much money from the state budget should go into this initiative, whether it would be a grant fund or a loan fund, and how much each locality must contribute to the projects funded could prove controversial. Jurisdictions receiving the grants would also have to address potential concerns with dispersal of funds, financial accountability and immediate and long-term project impacts.

Conclusion

By adopting this alternative the state could prevent 347 serious injuries and the deaths of 26 Marylanders due to teen driving (using the main sensitivity analysis rates). Citations will generate revenue, thus the net cost to implement this alternative is zero and there will be extremely high positive spillover effects to the rest of Maryland residents, with a minimal amount of burden. Simple implementation and accrued benefits for all communities involved are included in this enforcement alternative.

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¹¹⁷ Dinh-Zarr, 48.

Table 25: Alternatives Matrix

				E	ffective	ness			Indirect Consequen				
Alternatives	Type of Estimate	No. of Lives Saved	No. of incapacitating injuries avoided	No. of non-incapacitating injuries avoided	No. of alcohol related crash injuries avoided	No. of property damage crashes avoided	Total monetary benefit due to effectiveness	Direct Annual Cost to Government	Daniella (Feasibility	Net Effectiveness* excluding indirect consequences	Net Effectiveness including indirect consequences
Increase sanctions	Main Estimate	3	n/a	n/a	65	58	\$19,672,267	\$100,000	0	0	++	\$19,572,267	\$19,572,267
against underage drinking drivers.	High Estimate	4	n/a	n/a	86	77	\$26,229,690	\$0.00 net	+	0	++	\$26,229,690	\$26,229,690
4	Low Estimate	2	n/a	n/a	43	38	\$13,114,844	\$200,000	+	0	++	\$12,914,844	\$12,914,844
	Main	1	I										
	Estimate	8	n/a	n/a	165	224	\$51,202,856	\$0 net	\$260,508,318	-	++	\$51,202,856	\$311,711,174
Expand Maryland's DWI checkpoint program.	High Estimate	8	n/a	n/a	173	230	\$53,388,664	\$0 sustained	++	_	++	\$53,388,664	\$313,896,982
	Low Estimate	7	n/a	n/a	158	217	\$49,017,049	\$457,000	++	-	++	\$48,560,049	\$309,068,367
	Main												
3) Establish a Progressive	Estimate	<1	n/a	n/a	7	6	\$2,185,807	\$100,000	\$11,023,648	_	+	\$2,085,807	\$13,109,455
BAC-Based Sanctions System.	High Estimate	1	n/a	n/a	14	13	\$4,371,615	\$0.00 net	+	_	++	\$4,371,615	\$15,395,263
,	Low Estimate	0	n/a	n/a	0	0	0	\$200,000	+	0	_	-\$200,000	\$10,823,648
	Main												
4) Fund a pilot study using	Estimate	+	n/a	+	n/a	+	unknown	\$418,000	+	-	++	unknown	unknown
advanced driving simulators.	High Estimate	++	n/a	++	n/a	++	+	\$400,000	++		++	unknown	unknown
	Low Estimate	0	n/a	0	n/a	0	0	\$518,000	0	0		-\$518,000	-\$518,000
5) Require parents to	Main Estimate	4	57	336	n/a	374	\$68,997,172	\$555,000	+		0	\$68,442,172	\$68,442,172
attend driver's ed orientation.	High Estimate	4	95	345	n/a	401	\$113,845,334	\$300,000	++		+	\$113,545,334	\$113,545,334
SHOTILUIOTI.	Low Estimate	0	0	0	n/a	0	0	\$800,000	0	+	-	-\$800,000	-\$800,000
	Main	1											
6) Award grants to	Estimate	26	347	2,132	n/a	5,015	\$313,670,173	\$0.00 net	\$756,184,554	_	++	\$313,670,173	\$1,069,854,727
increase enforcement of seat belt use and speeding	High Estimate	33	453	2,781	n/a	5,015	\$388,733,422	\$0 sustained	++	_	++	\$388,733,422	\$1,144,917,976
laws.	Low Estimate	17	242	1,484	n/a	5,015	\$207,845,224	\$13,500,000 upfront	++	_	++	\$194,345,224	\$975,569,833

Code: Significantly Positive = ++; Potentially Positive = +; Neutral = 0; Potentially Negative = -; Significantly Negative = --.

^{*} Net effectiveness = Total monetary benefit due to effectiveness - direct cost to government

Recommendations

We recommend that decision makers in Maryland consider all six of the policy alternatives presented in this report; however, our analysis shows that alternative 2 "checkpoints" and alternative 6 "enforcement" are the most promising.

The alternatives described in this policy analysis are summarized in the Alternative Matrix to easily evaluate all six alternatives with the criteria chosen for assessment. The six alternatives may all potentially be considered as adequate policies to reduce injuries, death and property damage due to teen drivers in Maryland. All six policy alternatives are considered low cost policies to the state of Maryland, with some having possible revenue generation. Therefore the alternatives are evaluated and prioritized by looking at their effectiveness, indirect consequences and feasibility. When examining effectiveness (teen lives saved, injuries avoided and property damage avoided) one needs only to look at "Total monetary benefit due to effectiveness" because each component is monetized and summed into that column.

Taking into account sensitivity analysis, there are two alternatives where effectiveness is not clearly known through previous reliable evaluations, therefore there is the potential the alternative may be very effective, however there is also a chance that there could be zero effectiveness. These include alternative 3: "Progressive Sanctions," and alternative 5: "Parents".

Alternative 4: "Simulators", is another policy alternative where true estimates of effectiveness are unknown. This is a low cost alternative, and to better understand its possible value to alleviating the problem of teen driving, we recommend this alternative to be conducted as a pilot study. With new research generated, Maryland has the ability to become a leader among the nation, using technology to improve teen driver safety.

This leaves us with alternative one, two and six as remaining solid policy options. Alternative one, increase sanctions against underage drinking drivers has the ability to save lives, injuries and property damage with its best and worst case estimates. It results in cost savings, is feasible and has negligible indirect consequences.

Alternative two, expand Maryland's DWI checkpoint program is highly effective at its best and worst case estimates, it is low cost and feasible. In addition, this alternative would be effective in reducing the problems related to teen driving and reduce injuries, death, and property damage to all Maryland residents, producing an additional \$260 million benefit. Given these positive evaluations, the "checkpoints" alternative is the best alcohol-related alternative and recommended.

Last, alternative six has similar positive effects. Increasing enforcement of seatbelts and speeding has the effect of greatly reducing the number of lives, injury and property damage lost due to teen drivers. Using the main estimate, the total benefit due to effectiveness is \$374 million. Similar to the "check points" alternative, this policy would affect all drivers in Maryland, not just teens alone. This would produce an indirect consequence of saving adult lives and reducing injuries to save an estimated \$858 million. This alternative is also feasible, has low indirect costs and therefore is recommended.

All six alternatives serve a purpose and reduce the problem of teen driving, however alternative 6: "enforcement" and alternative 2: "checkpoints" are to be recommended when one considers their anticipated effectiveness, costs to the government, indirect consequences and feasibility score the highest. Therefore the UMBC 2005 Capstone Class recommends these two alternatives highly.

Summary Assessment of Each Alternative

Alternative 1—increase sanctions against underage drinking drivers—has the ability to save lives, injuries and property damage at its best and worst case estimates. The policy alternative results in cost savings, is feasible and has negligible indirect consequences. *We moderately recommend alternative one*.

Alternative 2—expand Maryland's DWI checkpoint program—is highly effective at its best and worst case estimates, has a low cost and is very feasible. In addition, this alternative would be effective in reducing the problems related to both teen and adult impaired driving, thereby reducing injuries, death, and property damage to all Marylanders. The "checkpoints" alternative produces an additional \$260 million annual benefit. We highly recommend alternative two.

Alternative 3—establish a progressive BAC-based sanctions program—does not appear to be effective and there is a lack of evaluative data. *We do not recommend alternative three*.

Alternative 4—fund a pilot study using advanced driver simulators—could be effective; however, as of December 2005, no research has been able to quantify its effectiveness. Advanced driver simulators could prove to be very effective, but it is equally likely that they could have no effect at all. We recommend revisiting this alternative once additional research becomes available. We do not recommend alternative 4 at the present time.

Alternative 5— require parents to attend driver education orientation—could also be effective. By our estimates, increasing parental involvement in this manner appears effective; however, there is a high level of uncertainty. **We moderately recommend alternative number 5.**

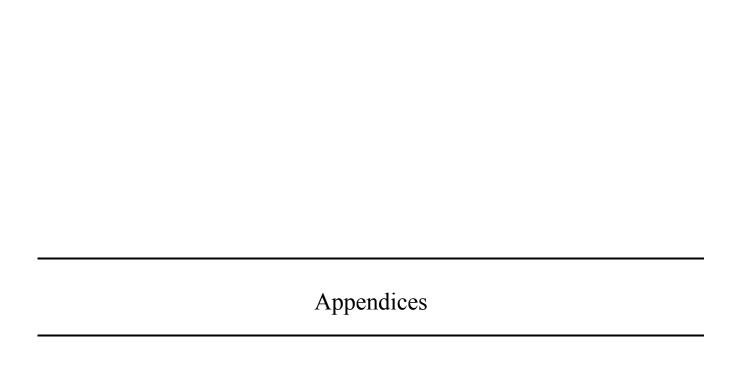
Alternative 6—increase enforcement of seatbelts and speeding—appears very effective. At its best case estimate, the total benefit due to effectiveness is \$395 million and at its worst case estimate the total benefit is \$233 million. Similar to the "checkpoints" alternative, this policy would affect all drivers in Maryland, not just teens, saving \$756 million annually. We highly recommend alternative 6.

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Appendix No. 1

Description of 2005 Teen Driver Bills

Legislation	Change in Law	Details	Type of Offense
SB 206; Chapter 452, Acts of 2005	Increases the penalty for seat belt or curfew violations.	18 month provisional license restarts if a provisional driver 1) Drives between midnight and 5 a.m., without a supervisor who is 21 years old or older (unless driving for work, school, or a school-sponsored event); or, 2) Does not wear a seat belt or one of his/her passengers does not wear a seat belt.	Primary
SB 209; Chapter 453, Acts of 2005	Extends from 4 months to 6 months the period of time required for a new driver to hold a learner's permit.	The earliest one can get a provisional driver's license is 16 years, 3 months (instead of 16 years, 1 month). The earliest one can hold a full license is 17 years, 9 months (instead of 17 years, 7 months).	Requirement
HB 393 (SB 57); Chapter 542, Acts of 2005	Outlaws a teen holding a provisional driver's license from having any minors as passengers (with some exceptions) for the first five months of the 18-month provisional period.	A minor may transport minors if the minor passenger(s) is related to the driver and/or if a licensed driver who is 21 years old or older is seated in the front passenger seat.	Secondary If caught: - Considered a moving violation; - Suspend license (no defined suspension period)
HB 394 (SB 50); Chapter 543, Acts of 2005	Prohibits a minor who holds a provisional license or a learner's permit from using a cell phone while driving.	Includes handheld and hands-free devices, or any other wireless communication device.	Secondary If caught: - Suspend license up to 90 days MVA may issue a restricted license to be used at work, to get to and from work, or to get to and from school.
HB 395; Chapter 545, Acts of 2005	Increases from 40 hours to 60 hours (including 10 hours of nighttime driving) the amount of mandatory practice hours required during the learner's permit stage.	New driver will not be permitted to obtain a provisional license unless 60 hours is completed and a log book is signed by the parent/guardian.	Requirement

Source: Maryland Department of Transportation. "2005 Young Driver Bills: A Status Report." Resource for the Governor's Work Group on Young Drivers.

Appendix No. 2

A majority of the people killed in crashes involving teen drivers were not the teen drivers, but passengers, occupants of other vehicles, and pedestrians.

Deaths in Crashes Involving Teen Drivers Nationwide (Ages 15 to 20 years old)

Year	Teen di	rivers	Passen teen dr	gers of ivers	Occupation other vehicle involve the cra	ed in	Non- occup	ants	Total fatalities	
2003	3,657	42%	2,384	27.5%	1,979	22%	646	7.4%	8,666	

Source: "Crash Stats," National Highway Traffic Safety Administration (November 2004)

Appendix No. 3

BAC Levels, Alcohol Consumption and Physiological Effects

BAC Level	Quantity Consumed in about One Hour	Effects
.0204	Intoxication begins at about one drink for a 160-pound man; about one-half drink for a 120-pound woman.	Slight intensification of existing moods; some impairment of judgment or memory. A driver's ability to divide attention between two or more sources of visual information can be impaired by BACs of .02 and lower.
.0506	About two drinks for a 160-pound man; a little over one drink for a 120-pound woman.	Feelings of warmth, relaxation, mild sedation, exaggeration of emotion and behavior; slight increase in reaction time, impaired judgment about continued drinking; visual and hearing acuity reduced; slight speech impairment. Loss of motor coordination begins at BACs as low as .05 and is probably due to disrupted activity in the brains cerebellum. Mild memory impairments such as forgetting someone's name after they've been introduced to you can begin around .06, due to altered activity in the brain.
.0709	About three drinks for a 160-pound man; less than two drinks for a 120-pound woman.	More noticeable speech impairment and disturbance of balance; impaired coordination; feeling of elation or depression; definite impairment of judgment and memory; major increase in reaction time; may not recognize impairment. The increased urination that begins after a few drinks is due to suppressed ADH (antidiuretic hormone) released from the brain. This effect is largely responsible for the dehydration that contributes to hangovers.
.1013	A little more than four drinks for a 160-pound man; less than three drinks for a 120-pound woman.	Noticeable disturbance of balance; uncoordinated behavior; major increase in reaction time; increased impairment of judgment and memory.
.1417	About six to seven drinks for a 160-pound man; less than four drinks for a 120-pound woman.	Major impairment of all physical and mental functions; difficulty in standing and talking; distorted perception and judgment; cannot recognize impairment. Blackouts are usually observed at BAC levels above .15; they can also occur at much lower BACs, however, depending on many factors.
.2025	Less than nine drinks for a 160-pound man; a little over five drinks for a 120-pound woman.	Confused or dazed; major body movements cannot be made without assistance.
.3035	More than ten drinks for a 160-pound man; about eight drinks for a 120-pound woman.	Minimal perception and comprehension; general suspension of cognitive abilities, At very high doses alcohol can suppress the activity of nuclei in the brainstem that control vital reflexes, like gagging and breathing. A common way for someone to die from the direct effects of alcohol is to drink enough to suppress the gag reflex. They then pass out on their backs, vomit, and choke on their own vomit. Enough alcohol can shut down breathing altogether. The exact level at which humans die from the direct effects of alcohol on the brain is not known, but evidence suggests that the LD1- the level at which 1 out of 100 people would die- is a BAC of about .35.
.40	About 15.5 drinks for a 160-pound man; a little less than 10 drinks for a 120-pound woman. (If consumption is spread over six hours, about 18.5 drinks for a man and 12 drinks for a woman.)	Unconscious/coma.
.41+	About 16 drinks for a 160-pound man; more than ten drinks for a 120-pound woman. (If consumption is spread out over six hours, about 19 drinks for a man, and about 12.25 for a woman.)	Deep coma/death

Source: Henry Wechsler, Ph.D. and Bernice Wuetrich. "Dying to Drink: Confronting Binge Drinking on Campuses." Available at http://www.therealproject.fsu.edu/BAC.html