

**Efficacy, National/International Practices, and
Motivational Factors of Lifelong Driver
Education for the Aging Population**

By

Richard Israels

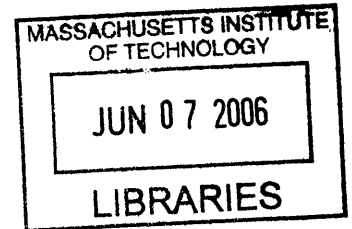
B.S., Computer Engineering
University of California at Davis (1998)

Submitted to the Department of Civil and Environmental Engineering in
Partial Fulfillment of the Requirements for the Degree of

Master of Science in Transportation
at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2006

© 2006 Massachusetts Institute of Technology. All rights reserved



Signature of Author

Department of Civil and Environmental Engineering
May 19, 2006

Certified by

Dr. Joseph F. Coughlin
Director, New England University Transportation Center
Center of Transportation and Logistics
Thesis Supervisor

Certified by

Dr. Joseph M. Sussman
JR East Professor of Civil and Environmental Engineering and Engineering Systems
Thesis Reader

Accepted by

Dr. Andrew J. Whittle
Chair, Departmental Committee on Graduate Students

BARKER

Efficacy, National/International Practices, and Motivational Factors of Lifelong Driver Education for the Aging Population

by

Richard Israels

Submitted to the Department of Civil and Environmental Engineering
On May 19, 2006, in Partial Fulfillment of the Requirements
For the Degree of Master of Science in Transportation

ABSTRACT

In a society facing a significant increase in its aging population, older driver education/training is emerging as a potential solution to help seniors drive more safely, thus maintaining their mobility and quality of life. Nonetheless, sufficient evidence has not emerged directly linking such programs to significant reductions in accident rates for seniors. But older driver education has produced certain outcomes that have been indirectly linked to driver safety. Among these secondary outcomes that led to significant reductions in crash rates are increases in self-regulation (i.e., modifying driving behavior to compensate for certain physical limitations) and a measure of visual/perceptual ability called Useful Field of View (UFOV).

Despite some questions surrounding the efficacy of these programs, older driver courses are offered in the United States and internationally among various countries of the Organization for Economic Cooperation and Development (OECD). Many of the courses address similar core topics such as the effects on driving from certain physiological, cognitive changes that accompany aging. On the other hand, the programs can vary more on structural/administrative factors. For example, many courses in Europe offer behind the wheel training to supplement the material learned in the classroom. For other courses, including those in the United States, the teaching approach is confined more to lectures.

Often, the primary incentive for attending the domestic classes is a reduction in auto insurance premiums upon graduating. But in other states like Massachusetts such a discount is not offered. To more closely examine the motivations of older drivers without such an incentive, a survey was conducted on two sets of adults: one group who enrolled in a senior driver course in Massachusetts and another that chose not to take the course. An analysis of the survey findings indicated the primary reason the first group took the course was to be a "safer driver". In addition, that there are significant differences between the two groups on several fronts, including levels, types of motivation, systematic factors such as demographics and health conditions, and their attitudes about driving and older driver education in general.

Based upon the findings on motivation, efficacy, and domestic/international programs in older driver education, some ideas have been formulated for potentially improving the safety benefit of older driver education. The proposals cover both structural/administrative (e.g., incentives offered to students, instruction fees), institutional (e.g., formation of public/private partnerships) and curriculum based

enhancements. The effectiveness of such courses with these recommended features in reducing crash rates, directly or indirectly through the secondary measures, is a topic for additional research.

Thesis Supervisor: Dr. Joseph F. Coughlin

Title: Director, New England University Transportation Center, Center of Transportation and Logistics

Thesis Reader: Dr. Joseph M. Sussman

Title: JR East Professor of Civil and Environmental Engineering and Engineering Systems

Acknowledgments

First of all, I would like to thank my thesis supervisor Dr. Joseph Coughlin for all his patience, feedback on draft revisions, and advice throughout the year. I also would like to thank Professor Joseph Sussman. While I never worked directly under his supervision for this project, I appreciated his feedback on my thesis and his advice during my years at MIT that helped me with establishing my research and career interests.

In addition, I would like to thank the staff of the Age Lab at MIT, for their technical expertise, overall support, great sense of humor, and encouragement during the challenging times. In no particular order of importance, they include Bryan Reimer, Michelle Pratt, Lisa D'Ambrosio, Rozanne M. Puleo, Paula Magliozzi, and others that I may have neglected to mention. I especially would like to thank Lisa D'Ambrosio, for her advice, for the countless hours she spent to meet with me and answer my questions, and for her expertise on the statistical analysis portion of the research.

Furthermore, without the help of a number of other people, within and outside of MIT, this project would not have been possible, especially for the study on the international courses. In particular, I would like to thank Birgit Kramer, who provided invaluable assistance with researching the older driver courses in the German speaking world. There are other professionals, students that assisted in this research effort who are too numerous to list. But I would like to thank these individuals in particular for their insight into the international programs of older driver education: Pascal Marmier (Switzerland), Klaus Christian Ottersen (Norway), Ole Peinow (Denmark), and Marlene Rishøj Kjær (Denmark). For the research on domestic courses, I would like to acknowledge the helpful information I received from these individuals: Bella Dinh-Zarr (AAA), William Van Tassel (AAA), and Joan Rich (Mature Driver Workshop, Michigan). I would also like to extend my gratitude to Gail Kutner of AARP for all of her assistance on conducting survey and all the other information she has provided on older driver education.

Back at MIT, I would like to thank my office mates, Jasmin Lau and Alex Narvaez, not only for their technical and moral support during the research project, but also for creating a more enjoyable, pleasant work environment back at the Age Lab. I think working with such talented individuals made for a more fun and memorable experience at MIT. In the Civil and Environmental Engineering department of MIT, I would like to give credit to my fellow classmates, Kenichi Hodota, Sophie Cariou, and Lucile Guillaud, who provided much assistance with the research on the international courses.

Finally, I would like to thank my family for all their encouragement and support throughout my years at MIT. They helped me overcome numerous challenges while in graduate school, including surviving my first real winter outside of my home state of California.

I dedicate this thesis to all current and incoming generations of senior drivers, especially to my grandfather who is still driving at the age 92 and my grandmother of age 91, who unfortunately was unable to renew her license. My hope is that the findings from this study can either make some difference in helping older adults to drive more safely (i.e. reduce their crash rates) or can help seniors realize when safe driving is no longer possible and inform them of practical transportation alternatives. In either scenario, seniors safely maintaining their mobility and independence would be the ultimate goal, during what some consider the best of years of their life

Table of contents

LIST OF FIGURES AND TABLES.....	8
FIGURES	8
TABLES	8
CHAPTER 1 - INTRODUCTION.....	9
<i>Objective.....</i>	<i>9</i>
<i>Motivations to Research Older Driver Education as a Potential Solution</i>	<i>10</i>
<i>scope of research, definitions</i>	<i>11</i>
<i>structure of thesis</i>	<i>11</i>
CHAPTER 2: DRIVER LONGEVITY: MAKING THE CASE FOR LIFELONG DRIVER EDUCATION	14
<i>Scope – Definition of Older Driver</i>	<i>14</i>
<i>More older licensed drivers.....</i>	<i>15</i>
<i>Moving into or Remaining in Suburbs.....</i>	<i>17</i>
<i>Greater number of trips – from increased income.....</i>	<i>18</i>
<i>Auto will be their primary mode of choice</i>	<i>18</i>
<i>Health Functions Affected by Aging.....</i>	<i>20</i>
<i>Crash Records of Older Drivers.....</i>	<i>21</i>
<i>Some Positive Trends with Aged Drivers.....</i>	<i>22</i>
<i>Change in Vehicle Technology</i>	<i>23</i>
<i>Changing Infrastructure</i>	<i>26</i>
THE ROLE OF DRIVER EDUCATION.....	27
CHAPTER 3 – LITERATURE REVIEW ON EFFECTIVENESS OF OLDER DRIVER EDUCATION	29
BACKGROUND.....	29
<i>What is older driver education?</i>	<i>30</i>
<i>Why offer older driver education in the first place?</i>	<i>31</i>
<i>What is driver training?</i>	<i>32</i>
A META ANALYSIS OF LITERATURE ASSESSING OLDER DRIVER EDUCATION.....	33
<i>Measuring Effectiveness</i>	<i>34</i>
<i>Secondary Factors in Measuring Effectiveness</i>	<i>35</i>
<i>Older Driver Education and Training Courses</i>	<i>36</i>
FINDINGS.....	37
<i>PRIMARY Finding: Not effective in Reducing Crash Rates</i>	<i>38</i>
<i>Impacts of secondary variables on crash rates</i>	<i>43</i>
SUMMARY OF FINDINGS	45
<i>Potential Flaws in Research Design?</i>	<i>45</i>
FURTHER RESEARCH NEEDS.....	48
CHAPTER 4 - OLDER DRIVER SAFETY EDUCATION IN THE UNITED STATES.....	51
METHOD.....	51
AUTO INSURANCE DISCOUNT - MOTIVATION TO TAKE COURSE	52
<i>Age Requirements.....</i>	<i>53</i>
<i>Disqualifying Conditions</i>	<i>54</i>
<i>Curriculum Requirements.....</i>	<i>54</i>
<i>General Findings</i>	<i>54</i>
<i>Motivations to Participate in Older Driver Education</i>	<i>57</i>
<i>Age.....</i>	<i>58</i>
<i>Direct Costs to Students.....</i>	<i>59</i>
<i>Pedagogy FOR cOURse Delivery</i>	<i>60</i>
<i>Duration of Courses.....</i>	<i>61</i>
<i>Geographic Scope of Courses.....</i>	<i>61</i>

<i>Content</i>	61
IMPLICATIONS AND FUTURE RESEARCH.....	66
<i>General Observations</i>	66
<i>Implications for public policy</i>	68
<i>Future Research</i>	68
CHAPTER 5 - A CROSS-NATIONAL EXAMINATION OF OLDER DRIVER SAFETY EDUCATION	70
<i>Research on international older driver education</i>	70
FINDINGS.....	72
<i>Sponsorship and Delivery</i>	73
<i>Motivations to Participate in Older Driver Education</i>	75
<i>Age</i>	76
<i>Cost and Fee Structure</i>	77
<i>Pedagogy, Course Delivery</i>	78
<i>Content</i>	79
IMPLICATIONS AND FUTURE RESEARCH.....	85
<i>Implications for safety</i>	86
<i>Implications for course development in highly motorized countries</i>	87
<i>Future Research</i>	88
<i>Implications on Public Policy</i>	88
CHAPTER 6 – DRIVER MOTIVATIONS TO PARTICIPATE IN OLDER DRIVER EDUCATION WITH AND WITHOUT AN INSURANCE DISCOUNT	89
BACKGROUND.....	89
<i>Purpose of study</i>	89
<i>Motivation without Insurance Discount as an Incentive</i>	90
<i>Intrinsic and Extrinsic Motivations</i>	91
<i>Motivational groups to survey</i>	92
<i>Information Objectives of Survey</i>	92
<i>Survey Design/Method</i>	94
RESULTS.....	95
ANALYSIS	96
<i>Analysis Method</i>	96
<i>Test Methods</i>	97
FINDINGS.....	100
<i>Motivation Levels</i>	100
<i>Consistency and Correlations among motivating factors</i>	102
<i>Results on Systematic Differences between strata</i>	103
<i>Unclear Causation Effects</i>	107
<i>Reason for taking Driver Safety Course</i>	107
<i>Motivating Factors</i>	108
CONFIDENCE.....	110
ANALYSIS OF FINDINGS	111
<i>On Content of Course</i>	111
<i>On Marketing of Course</i>	113
<i>Further Research</i>	115
CONCLUSION.....	117
CHAPTER 7 –SUGGESTED PRACTICES TO POTENTIALLY IMPROVE THE EFFECTIVENESS OF OLDER DRIVER EDUCATION	118
<i>Purpose/Scope of Chapter</i>	118
<i>General guidelines for recommendations</i>	119
POTENTIAL ENHANCEMENTS - CONTENT	120
ITS.....	120
<i>Infrastructure</i>	121
<i>Personal Health</i>	122

<i>Alternative Transportation, Transitioning from Driver Dependency</i>	123
STRUCTURAL FEATURES OF AN EFFECTIVE OLDER DRIVER EDUCATION PROGRAM	124
<i>Customization of Courses</i>	124
<i>Training Specific Skills Related to Safe Driving</i>	125
<i>Assessment Services</i>	125
<i>Pedagogical Enhancements</i>	126
<i>Teaching and Certification of Courses</i>	128
<i>Evaluation of Courses</i>	129
POTENTIAL PARTNERSHIPS, ROLES OF VARIOUS STAKEHOLDERS	130
<i>Partnerships for Advertising Course</i>	131
<i>Role of Health Professionals</i>	131
<i>Partnerships for Presenting Course Material</i>	131
OPTIONS FOR COURSE INCENTIVES	133
<i>Insurance Discount Incentive</i>	134
<i>Potential Alternatives to Insurance Discount Incentive</i>	134
<i>Influence of Public Policy on Incentives</i>	135
ANALYSIS OF POTENTIAL SOLUTIONS	135
<i>Potential barriers to overcome</i>	137
<i>Overcoming potential barriers</i>	139
CONCLUSION	142
BIBLIOGRAPHY	144
APPENDIX	153
LIST OF APPENDIX TABLES.....	153
LIST OF APPENDIX FIGURES.....	153
GLOSSARY (INCLUDES DEFINITIONS AND ACRONYMS)	182

List of Figures and Tables

Figures

Figure 1. Licensed Drivers by Age 1963-1995	16
Figure 2. Projected Licensed Drivers into 2020 - 70+	17
Figure 3. Fatality Rates from Auto Accidents for Various Age Groups 1996	22
Figure 4. Primary reasons respondents took their most recent AARP DSP Course	108

Tables

Table A. Paired Samples Test to Determine Significant Differences in Motivation Levels WITHIN each group.....	100
Table B. Independent Samples Test Comparing Levels of Motivation between Strata	101
Table C. Results of Probit Analysis on Potential Variables Affecting Decision to take Course –	102
Table D. Cross Tabulation of Taking Driver Safety Course with Motivation towards Insurance Discount.....	104
Table E. Cross Tabulation of Employment Status with having taken the AARP Driver Safety Course	115

Chapter 1 - Introduction

OBJECTIVE

With the aging of the baby boomer population, a surge in the amount of older drivers is expected in the coming decades. While many have substantial experience operating a motor vehicle and exhibit certain safe driving behaviors, they are likely to face difficulties behind the wheel due to the certain physical and cognitive changes that typically accompany the aging process. Primarily attributed to these changes, older drivers have one of the highest crash rates per mile driven of all age groups. Also, once they are involved in a collision, they are more likely to suffer fatal injuries compared to drivers in other age groups.

Of the many strategies available to address this growing problem, driver training and education is one approach that may enhance the safety of older drivers by reducing their crash rate. This thesis investigates this transportation safety measure in greater depth, focusing on the driver education programs for older adults that are being offered in some communities across the United States. The central questions that the study attempts to answer are the following:

- Is older driver education and training effective in terms of reducing crash rates?
- What older driver programs are being offered domestically and in other countries with senior populations that are living longer and driving more frequently?
- What are the motivations of seniors who take an older driver safety course and how do they compare with other older adults who do not participate in these driver education programs?
- If older driver education is not significantly reducing the collision risks of its students, what structural/administrative and curriculum-focused enhancements should be considered to improve the effectiveness of these programs in terms of safety?

MOTIVATIONS TO RESEARCH OLDER DRIVER EDUCATION AS A POTENTIAL SOLUTION

The strategy of driver education could be a viable approach, directly or indirectly, to reducing crash rates of senior drivers. For one thing, classes or other training programs could help seniors more effectively compensate when driving for the health changes they typically experience as they age. For another, older adults may need to refresh and update their knowledge on rules of the road. In addition, more external changes are taking place that could be addressed by older driver education. Within the cars many seniors drive, newer technologies are rapidly emerging like in-vehicle navigation or collision detection systems.

Driver education could play a vital role in helping older drivers understand the safe use of these devices. Furthermore, the roadways are being transformed as well not only in terms of changing configurations (e.g., roundabout intersections), but also with intelligent transportation system (ITS) technologies such as electronic toll collection and dynamic message signs. In essence, older driver education could help the aging population more successfully adapt to these changes, so they can continue to be mobile through their senior years, and thus maintain their quality of life.

Nonetheless, even with the increased training and knowledge, seniors may still be unable to drive safely. Older driver education could play a beneficial role in this scenario. Through covering topics such as self-assessment and even through providing assessment services, seniors may ultimately realize the costs of driving outweigh any potential benefits. At this point, older driver training could help further with informing its students on viable transportation alternatives and the proper, most effective use of such modes. With a considerably reduced VMT or a complete abstention from driving, the crash rates of seniors would significantly decrease.

Despite these potential benefits, there is apparently a lack of research on the topic of older driver education. On the other hand, many studies have been conducted on courses for novice drivers, which is associated with the more conventional notion of driver education. By contrast, many fewer studies have been conducted on the effectiveness of driver training for seniors, the current offerings of domestic and international courses in older driver education,

and the motivations for attending such programs. As seniors are driving on the roadways at unprecedented rates in the history of the automobile, this thesis attempts to make some incremental progress towards advancing knowledge in these areas.

SCOPE OF RESEARCH, DEFINITIONS

With varying driving regulations between states and countries, sometimes the definition of an older driver in terms of age is not entirely clear. For this thesis, however, the range will be set at relatively low threshold, especially with today's increasing lifespans. More specifically, an "older driver" for this study will be 50 years of age and above. While many adults still have almost half of their life ahead of them at this stage, often this is the decade of life when many individuals are eligible to begin taking an older driver education class. This definition will also apply to the international discussion, even though this driver training in some countries begins at much later ages.

Given the demographics of the students, older driver education is for already licensed, often experienced drivers. Yet, contrary to popular belief, the program is not just composed of a refresher course, involving a review of rules/concepts older drivers may have learned from previous classes in driver education. This form of training is also about updating skills like with continuing education, to better cope with changing context of driving and the physiological, cognitive changes of those behind the wheel.

While the geographic scope of this study extends outside of the United States, only a limited number of countries will be reviewed in this research project. In particular, the international studies on older driver education will focus on member states that are part of the OECD.

STRUCTURE OF THESIS

The structure of this thesis is primarily based on answering the central questions presented above on course effectiveness, domestic and international courses on older driver education, and the motivational characteristics of those who participate in these programs. The material in the following chapters supports these objectives:

In chapter 2, the discussion essentially presents an overview of driver longevity, which describes an aging population that is living longer and driving more frequently. Moreover, the various changes taking place within the driver, their vehicles, and the roadways are discussed as possible motivating factors for older driver education.

In chapter 3, the thesis addresses the effectiveness of such a program, in terms of whether older driver education can make a significant difference in lowering the crash rates of its students. While reviewing previous studies on this topic, the effectiveness of the program is also addressed in terms of outcome measures, which are more secondary indicators to crash rates. The chapter attempts to determine whether these less direct pathways to safety such as the knowledge gained from a course can ultimately reduce the students' collision risks.

In chapter 4, findings are presented on older driver courses that are offered in the United States. The programs are described not only in terms of the topics they cover, but also in terms of structural/administrative features such as the costs of taking the course and the incentives (if any) provided to students for graduating. With this latter aspect addressing motivation, the chapter also discusses the practice, in certain states, of offering auto insurance discounts to older drivers who take the course.

The structure of chapter 5 is nearly identical to the previous chapter, except in this section, findings are presented on international older driver education. The topics and structural aspects of the courses are covered, with much less emphasis on the motivations to participate in such programs. Apparently, very few international course offer incentives comparable to the auto insurance discount for mature driver programs in the United States.

The entire basis of chapter 6, however, is on the motivations to participate in older driver education. The discussion focuses on a survey conducted in the Commonwealth of Massachusetts, to examine the motivational factors and characteristics of seniors who took an older driver course in this state. These results are then compared to another group of older adults that did not take the class. Since Massachusetts is among a minority of states that do not require insurance companies to offer seniors a discount taking such a course, this case

study is a unique opportunity to gain further insight into the motivating factors behind older driver education.

Finally, in chapter 7, the thesis concludes by offering potential enhancements to the content and structural/administrative aspects (e.g., instruction fees, teaching methods) of older driver education in the United States. These ideas are presented with the ultimate aim to increase the effectiveness of the course, in terms of significantly reducing crash rates. Furthermore, additional research is proposed to determine the feasibility and the safety benefits such potential solutions could deliver.

Chapter 2: Driver Longevity: Making the Case for Lifelong Driver

Education

By the year 2030, the last of the baby boomers generation will turn 65, and the environment for older driver education at this time in the future will be transformed significantly, compared to 2006. Not only will older adults be living longer and be driving in greater numbers, but also their vehicles and roadways will change as well. Moreover, these developments will not just be occurring in the United States. Thus, determining the effectiveness and the keys to improving driver education for older adults may very well depend on how well such training addresses the changing context of the driver, vehicle, and infrastructure.

SCOPE – DEFINITION OF OLDER DRIVER

But just who is an older driver? From the literature reviewed for this report, there does not seem to be a universally accepted age on what makes an individual “old”. Some studies have indicated that older drivers are in the age range of 65 and older (Skinner & Stearns, 1999). But this threshold does not accurately reflect the point in life where age related health changes can impact driving. In particular, “risks associated with motor vehicle operation” increase “exponentially” at the age of 75 years (Skinner & Stearns, 1999).

Throughout the United States, the definition of an “older driver” varies state by state (Cobb & Coughlin, 1999). An age between 70 to 75 is most frequently chosen by the states to make this determination (Cobb & Coughlin, 1999). For California, age related restrictions begin when drivers are not eligible to renew their licenses by mail upon reaching 70 years old (National Academy on an Aging Society). In Arizona, similar regulations on drivers’ licenses are imposed at an even younger age when adults 65 and above are required to take vision tests to renew driver’s license (National Academy on an Aging Society).

For older driver education, the age definition is even younger. AARP, for example, recommends its driver education programs for those 50 years and older while other programs

in the United States have set the age threshold at 55(AARP, 2006). Certainly, with today's longer lifespans, classifying motorists in their 50s as "older drivers" is debatable.

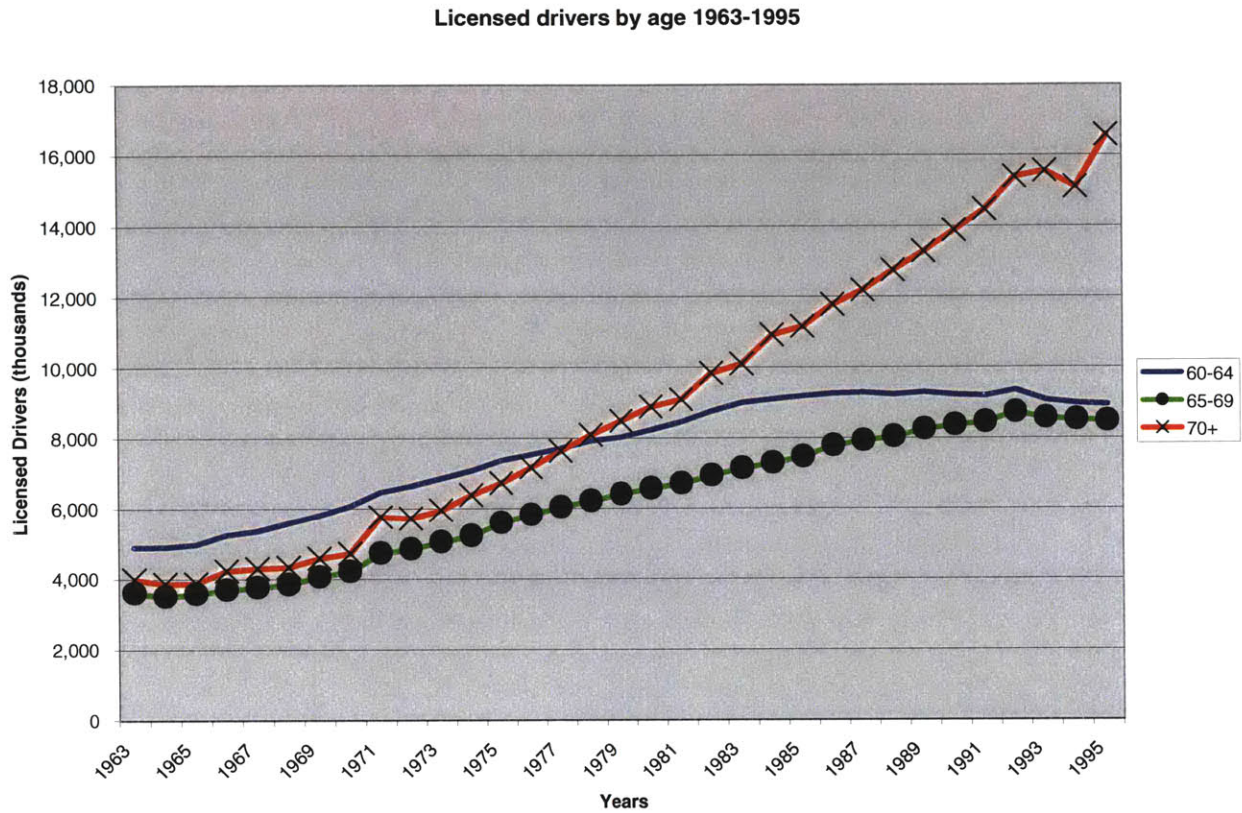
Given this ambiguity, a universally accepted definition of an aged driver seems not to be present among the relevant organizations, stakeholders of older driver education. Moreover, the age threshold of becoming "old" seems to depend more on the particular region (i.e. state) or the context (i.e. driver training) to which the standard is being applied. Nonetheless, to maintain some congruity in discussing older driver education, a specific age range will be defined in this research paper. An "older driver" in the chapters of this report will be any adult 50 years and older. While this arbitrary definition could generate considerable disagreement, it seems to be a reasonable choice, since the 50s is the decade of life when most adults are eligible to begin older driver education.

Also, unless otherwise noted, this study throughout most chapters will focus primarily on mature drivers in the United States, even though certain sections will cover drivers in other countries. Nevertheless, the changing demographics, travel patterns, health trends, and vehicles of this age group are likely to be similar in other highly motorized countries, especially those in the bloc of nations known as the Organization for Economic Cooperation and Development or the OECD. The OECD, comprising mainly industrialized, developed nations with "democratic government and market economies", tends to have higher automobile use rates than other countries of the world making older driver education a relevant issue (Organization for Economic Co-operation and Development). In later sections of this study, older driver education courses are reviewed to learn about international best practices in this field that could be applied to domestic programs in the United States.

MORE OLDER LICENSED DRIVERS

One such universal trend occurring within the OECD member states is the large increase of older drivers expected in the near future. Already, the dramatic rise in this population is occurring. In particular, between 1963 to 1995, the number of licensed drivers in the United States 70 years or older increased by around 300% as indicated in figure 1 below (Office of Highway Information Management, Federal Highway Administration, 1995).

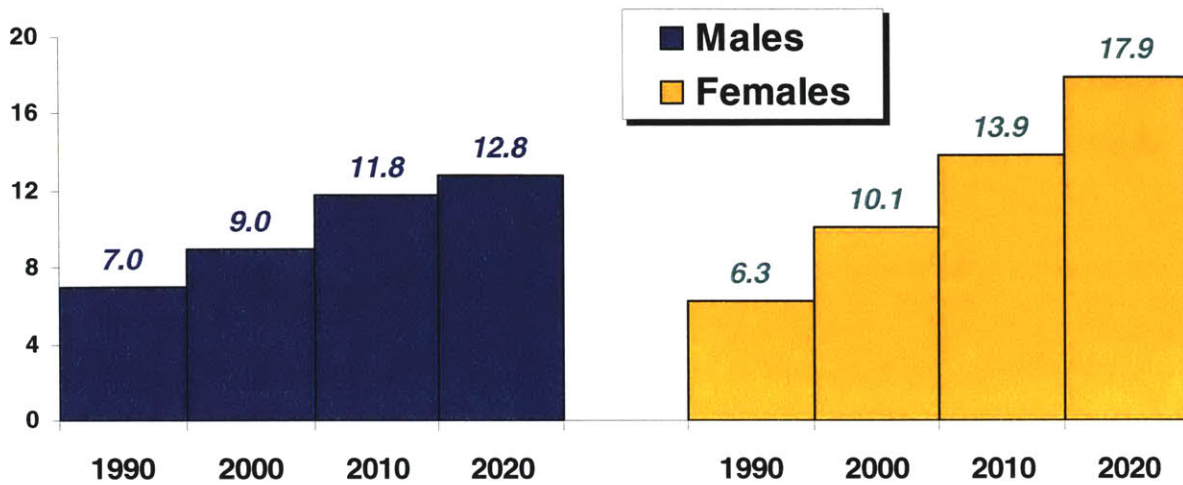
Figure 1. Licensed Drivers by Age 1963-1995



Source: (Office of Highway Information Management, Federal Highway Administration, 1995)

By 2004, around 13% of licensed drivers in the US originated from this age bracket (Wagner, 2004). By 2023, the percentage is expected to climb further to 23% when almost 1 in 4 drivers will be 70 and older (Wagner, 2004). In more absolute terms, the number of senior drivers will rise from 50 million in 2004 to around 82 million in 2020 (Royal, 2005). These future trends are further illustrated in figure 2 below.

Figure 2. Projected Licensed Drivers into 2020 - 70+



Source: (Wagner, 2004)

Outside the United States, within the OECD, the number of adults over 80 is expected to triple by 2050, from levels in 2001 (OECD). A similar increase in magnitude is projected to take place for the number of licensed drivers in the OECD age 65 and over. In some European countries including France, Finland, and Spain, at least one quarter of licensed drivers will be comprised of adults from this age group (OECD).

At least in the United States, part of this growth is attributed to the greater life expectancies of the aging population with advances in medical technology. "Americans are living longer" and can expect "period of health and activity" beyond age 80 (Office of the Assistant Secretary for Transportation Policy, U.S. Department of Transportation, 1997). Perhaps, older adults driving into their 90s is likely to become more prevalent in the coming decades.

MOVING INTO OR REMAINING IN SUBURBS

As older adults proliferate in numbers, many seniors will be moving to low density areas that include suburban and rural locations. In 2002, according to the Brookings Institution, around 79% of the US senior population resided in low-density neighborhoods (Rosenbloom, July 2003). Moreover, many "middle age people" in 2001 who will be older adults in the next few decades, are primarily living in such communities, which are not well suited for public

transportation (OECD). This trend with settlement patterns is expected to continue. Those in the aging population are expected to change residences less often and “age in place”, remaining in neighborhoods they have lived their whole life, which for many is the suburbs (OECD). At the same time, less transportation alternatives besides driving will be available in these communities and rural areas. Oftentimes, services such as buses or even light rail lack sufficient demand because people can often travel more efficiently and more comfortably in suburbs/rural areas with their cars.

GREATER NUMBER OF TRIPS – FROM INCREASED INCOME

At the same time of driving in the suburbs, a greater level of wealth is expected for America’s aging population of drivers. The older driver of the future is expected to command a larger portion of the nation’s disposable income, be more affluent than earlier generations (J. Coughlin & Tallon, Fall 1998-Winter 1999; OECD). Moreover, they will be better educated and healthier (from advances in modern medicine) than previous generations of older drivers (J. Coughlin & Tallon, Fall 1998-Winter 1999)

All of these factors that contribute to a higher quality of life can lead to increased motility or the desire to travel (Wachs, 1979). Already, with greater income, for example, America’s aging population is making more trips (Office of the Assistant Secretary for Transportation Policy, U.S. Department of Transportation, 1997). In the future, many are expected to be relatively active pursuing such activities as attending classes, exercising at the local gym, and visiting houses of worship. Many will be making visits more often to their family, “a trip type that increases in importance as people get older” (Rosenbloom, November 1999)

AUTO WILL BE THEIR PRIMARY MODE OF CHOICE

Given these mobility needs and most importantly, their living patterns, the automobile is likely to be their primary mode of choice. As many probably already discovered, in the suburbs “car ownership and use is essential to daily living” (OECD). In the United States, 90% of trips taken by older adults involved the use of the automobile, with seniors driving the vehicle for 70% of those trips (POTTS et al., 2004). According to another study, no “cohort of the elderly takes more than 2.3% of their trips by transit” (Rosenbloom, November 1999).

Perhaps what accounts for these usage rates is that suburbs cannot be easily served by public transportation, which currently “[does] not provide a level of mobility to match that [of the] car” (Ling Suen & Sen, 1999). Since housing is more dispersed, many senior adults do not live within a reasonable walking distance to bus routes or rail lines. In 1995, only 43% of the elderly of the suburbs reported their residence was within a half mile radius of transit services (Rosenbloom, 2003). Thus, outside of densely populated urban areas, the automobile is likely to be more appealing for such level of service factors as convenience and travel time. Others may find that this mode is more suited to their travel patterns. For example, older adults are likely use a car for trip chaining, visiting multiple stores and running numerous errands on a single trip (Alsnih & Hensher, 2003, p.1).

Nonetheless, some may argue that demand responsive services such as Paratransit or “Dial-a-Ride” or taxis could be deployed to serve the mobility needs of the older adults. Unfortunately, such services are “typically...underfunded and overwhelmed by...high operating costs” (Coughlin, 1999). Already, in many cities across the United States, paratransit services are strained by overwhelming demand and are not adequately meeting the standards of affordability, reliability that are “acceptable to older adults” (Cobb & Coughlin, 1999; O’Neill & Dobbs, 1999) . Many older adults who cannot drive often have to make reservations days or even weeks in advance to get a ride to such destinations as the doctor’s office or the grocery store.

Even if public transportation were to improve in travel time and availability, older adults may still remain with their automobiles. After all, switching to another mode like public transportation is less likely with increasing age (Alsnih&Hensher, 2003, p.3). At the same time, the automobile may simply be more compatible with the lifestyle of the growing senior population in the coming decades. In the suburbs and rural areas, “public transit and paratransit services cannot provide the spontaneity and independence desired by seniors” (Ling Suen & Sen, 1999). Moreover, older adults may also favor the automobile for its prestige and the “sense of dignity” they feel it provides them when they travel (Alsnih&Hensher, 2003, p.5). Finally, in some cities, fear of crime is another factor

discouraging seniors from taking public transportation (Blackman, 2000). They are mainly afraid of “quality of life” crimes that include “pushing and shoving”, “teenager rowdiness”, and “vandalism of transit property”. (Blackman, 2000)

HEALTH FUNCTIONS AFFECTED BY AGING

While the Vehicles Mile Traveled (VMT) is rising, certain health changes are likely to occur in many older adults that can negatively affect their ability to drive safely. These changes will become even more pronounced for those 75 years and older (Skinner & Stearns, 1999).

Declining vision is one such change that can make such trips as driving at night difficult and even unsafe. This is the case because older adults require greater illumination to see objects while at the same time they are more susceptible to glare, and they have greater difficulty focusing on distant objects due to increased near sightedness (Shaheen & Niemeier, 2001). Decreased peripheral vision also occurs, and as a result older drivers may have difficulty in seeing non-vehicle entities on the road such as pedestrians or bicyclists (Suen et al., 1998, p. 387). Moreover, with declining visual skills in depth perception, older adults may have difficulty judging the distance and speed of oncoming traffic (U.S. Department of Transportation, National Highway Traffic Safety Administration, 2001).

In addition to changes in their visual health, older drivers are also likely to experience reduced flexibility and strength from the onset of aging. In turn, senior motorists could have difficulty accomplishing important tasks like “turning [their head] to view traffic” or even fastening their seatbelts. With being restricted in cervical movements in particular, older adults may be unable to accomplish maneuvers such as driving in reverse or changing lanes safely (American Medical Association, 2003).

In parallel with these physical changes, the working memory of older drivers that is linked to information processing and short term memory may not be “as efficient” (U.S. Department of Transportation, National Highway Traffic Safety Administration, 2001). At the same time, more senior adults are likely to have difficulties with dividing and switching their attention among multiple stimuli (U.S. Department of Transportation, National Highway Traffic Safety

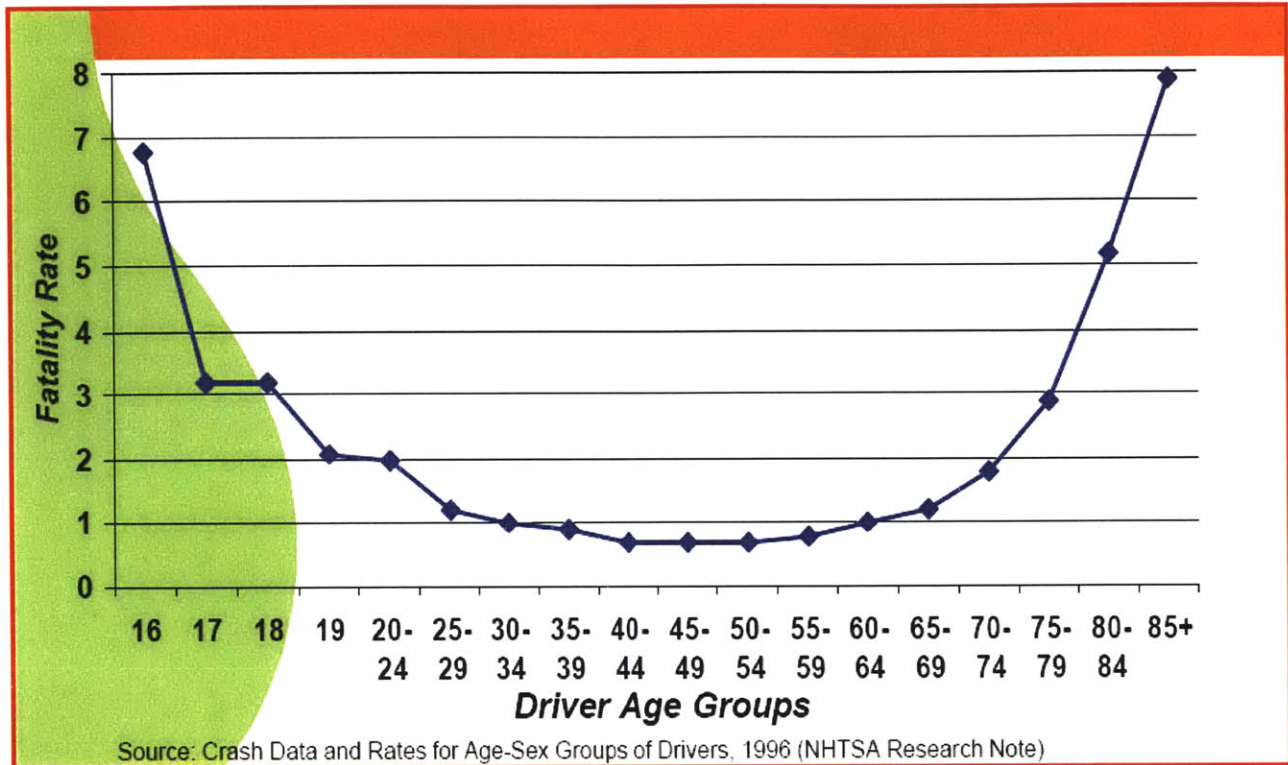
Administration, 2001). Such health affects may affect their ability to “multi-task” or “sort out multiple sources of sound” (Coughlin, 2005). For example, an older driver talking on a cell phone or having a conversation, might have difficulties recognizing such external sounds as ambulance sirens or horns emitted from other drivers, to avert a potential collision.

Cognitive abilities may also decline from the multiple prescription medications older adults are expected to be taking (American Medical Association, 2004). This scenario is another potential safety risk because research has found that drivers taking certain medications could increase their likelihood of being involved in an accident (Transportation Research Board, 2005).

CRASH RECORDS OF OLDER DRIVERS

Attributed to some of these physiological changes, seniors have one of the highest fatality rates per vehicle miles traveled as indicated in the figure below. What primarily accounts for this trend are older drivers having more fragile bodies (compared to younger drivers), which are less likely to recover when subjected to the forces of an accident (Transportation Research Board, 2005). Moreover, seniors face a greater collision risk by avoiding freeways, highways, which are typically the safest roadways (OECD).

Figure 3. Fatality Rates from Auto Accidents for Various Age Groups 1996



SOME POSITIVE TRENDS WITH AGED DRIVERS

Despite the health changes associated with aging that can negatively affect driver safety, there are some positive trends associated with older drivers. In the first place, many older adults, aware of their health difficulties, tend to self-regulate to some degree and proactively educate themselves about safe driving (National Center for Injury Prevention and Control, 2006). Self regulation involves limiting their “driving to particular times and places where they feel safe” (Transportation Research Board, 2005). For example, they might avoid such trips as driving in the evening, in unfamiliar territories, or in the midst of bad weather.

Perhaps attributed to their motivations to drive safely, of all motorists involved in accidents, senior drivers had the “lowest proportion of drivers” with BAC levels of .08 or greater (NHTSA, National Center for Statistics and Analysis, 2004). Furthermore, mature drivers have one of the highest restraint belt use rates of all age groups indicating the extent to which they value safety (Transportation Research Board, 2005). Furthermore, they have one of the lowest crash involvement rates “per licensed driver in any age group”, despite their high

fatality rate when involved in a crash (O'Neill & Dobbs, 1999). Outcomes such as the results above would suggest that seniors have substantial motivation to drive safely, another positive aspect of senior motorists.

Nonetheless, despite these favorable trends, there are still considerable safety risks from a much larger older adult population driving in the coming decades. After all, seniors will continue to drive in greater numbers given their desires to live in low density neighborhoods and choose the automobile as their primary mode of transportation. Practicing self regulation, refraining from alcohol, and even wearing a safety belt may all be necessary, but unfortunately these measures are not sufficient to ensure the safety of the older driver. In particular, such measures cannot guarantee that older drivers will safely merge into lanes of traffic or cross intersections, driving scenarios where seniors tend to have the most accidents (Suen et al., 1998, p. 387). Additional steps may be necessary such as driver education to prevent collisions, although accidents are still likely to be dangerous for seniors because of their fragile bodies, caused by the aging process. In other words, they are may still face a high fatality rate from auto accidents, but with effective safety measures, the probability for avoiding such an event can be increased.

CHANGE IN VEHICLE TECHNOLOGY

Another potential motivating factor for driver education is the transformations taking place that are internal to the vehicles, related to Intelligent Transportation Systems (ITS). In the first place, with the expansion of the Internet, advancements in electronics, and the unparalleled growth of the high tech sector, more vehicles are already being equipped with telematic systems. These will consist of in-Vehicle technologies such as Advanced Traveler Information Systems (ATIS) that can provide useful information like current traffic conditions, travel times on major roadways, and directions to the traveler's destination. This information might appear as a text message on a cell phone or as an image on a map indicating storm cells or congested corridors (Meyer & Coughlin, 2001, p.1). ATIS could also notify drivers about upcoming junctions and intersections so they will not have to suddenly change lanes and risk colliding with another vehicle (Suen et al., 1998, p. 387).

Interestingly enough, the prime market for these “intelligent” cars is not composed of - younger adult drivers, despite messages to the contrary by popular media. Compared with older adults, fewer younger drivers will have the necessary income to purchase the cars with the latest features (J. F. Coughlin, 2004). So, with a greater spending ability over their younger counterparts, older drivers are likely to be the owner of the vehicles with the “cutting-edge” technology. Thus, how the senior driver safely and efficiently utilizes in vehicle systems like ATIS could be addressed by older driver education. A summary of some of those key technologies follows below.

Advanced Vehicle Control Systems (AVCS) are another set of ITS applications such as Intelligent Cruise Control or Collision Warning systems that may become more prevalent in the cars of the future. One of the main functions behind such active cars is to aid motorist in “detecting, predicting, and intervening to avoid collisions” (Coughlin, 2005, slide6). In turn, these technologies may compensate for some of the hearing and vision difficulties that older drivers are likely experience. To assist with the “detecting” on a visual level on poorly lit roads, AVCS may include Heads Up Displays (HUDs) that can display messages and warnings on the windshield. Moreover, these ITS devices will display information such as current speed and even traffic warnings on the windshield (Coughlin, 2005).

A similar technology is In-Vehicle Signing, which projects images of road signs on the vehicle windshield. This could possibly assist senior drivers with reading upcoming street signs alerting drivers to approaching intersections or crossings for schoolchildren. Overall, In-Vehicle signing would have the advantage of compensating for the decreased peripheral vision and visual processing skills of older drivers.

Other AVCS technologies also consist of warning, sensors, and alerts to notify drivers of potential hazards or dangerous situations. The backup warning system is one such application that can emit an alarm sound or image if the driver’s car is too close to another vehicle when reversing (Suen et al., 1998, p. 389). If there is potential obstruction, such technology could provide a brief time window for the driver to take evasive action. Collision Warning or Crash Avoidance technologies also utilize sensors to warn drivers of obstacles, nearby vehicles, or

blind spots (Suen et al., 1998, p. 388). These devices could be vital in preventing unsafe lane changes, intersection crossings, or road departures where dangerous collisions might occur (Meyer & Coughlin, 2001).

Other AVCS monitoring systems focus more on internal factors through biometric devices, which measure the driver's vital physiological functions that can affect driving. Some devices can detect fatigue, for instance, and then alert motorists of their drowsy state while driving (Reimer et al., 2006). Other biometric technologies are available for monitoring heart rate, blood pressure, and other vital signs to notify drivers if their health is worsening (Reimer et al., 2006) (Coughlin 2005). Some of the more advanced systems in development can even detect stress, which tends to rise with encountering heavy traffic or aggressive drivers.

In addition to these passive monitoring and detection devices, other AVCS technologies play a more active role in the driving experience. One component is Intelligent Cruise Control, which can regulate the speed of the car according to its distance behind and in front of other vehicles (Suen et al., 1998, p. 389). This device will automatically adjust the vehicle's speed to maintain a safe headway between other cars when the highway's traffic volumes change. Moreover Voice recognition is another AVCS application that provides drivers with greater command of their vehicles. This technology can recognize a driver's voice to adjust such in-car amenities as the radio or air conditioning. On a more automated level, lane keeping assistance technology can prevent the vehicle from changing lanes unintentionally by "[applying] small forces to steering" (Suen et al., 1998, p. 389).

In addition to providing greater control over the car's velocity, some AVCS technologies allow for greater customization of the vehicle. Adaptable displays on the dashboard are one such application that enables the driver to more easily read such instruments as the speed indicator or fuel gauge. Moreover, some of the audio alerts that are part of AVCS warning systems can be customized according to the hearing abilities of the driver. These customizable features will become more ubiquitous as "displays become more computerized and software driven" (Meyer & Coughlin, 2001, p. 2).

To more effectively facilitate this customization, Smart cards or PDAs might become the means to store and transmit the personal preferences of the driver. For example, PDAs or smart cards could be connected to the vehicles computer system through a cradle interface, to communicate various personal settings for the seats and the climate controls. Moreover, these devices could store the configuration settings for the various ATIS or AVCS devices within the vehicle. At the same time, PDAs meanwhile, in conjunction with mobile phones, could dial numbers from a personal contact list or access certain web services such as email.

So, with the advents of “intelligent” vehicles and the rising senior population, primarily living in the suburbs, in-vehicle technologies and senior mobility will become a central issue in transportation on regional, statewide, and national levels (Israels, 2005). Overall, technologies such as AVCS and ATIS can significantly improve safety and mobility in transportation for their likely core consumers, retiring baby boomers in their golden years (Israels, 2005).

Despite these apparent gains, seniors may have difficulty in learning and safely operating the AVCS and ATIS technologies. As a result, these ITS devices could become a distraction, contributing further to the cognitive load seniors are already struggling to manage. In fact, some studies have found that seniors are vulnerable to a phenomenon known as Cognitive Capture. This can occur with utilization of a Heads Up Display preventing “detection of critical outside objects” (Suen et al., 1998, p. 389). In other words, seniors’ attention might become so fixated on the information displayed on the windshield instead of viewing the roadway outside of this narrow field of vision. To prevent such a scenario and other harmful cognitive effects, senior adults may need training on the safe operation and potential dangers of these devices.

CHANGING INFRASTRUCTURE

Finally, new developments to the transportation infrastructure are likely to take place as well, possibly another motivating factor for older driver education. Already in some parts of the United States such as Orange County, freeways are being transformed to include high occupancy toll (HOT) lanes. Motorists may optionally pay to use HOT lanes, which offer

“uncongested levels of service” by adjusting the toll to limit the number of vehicles traveling on this part of the roadway (PEREZ & SCIARA, 2003).

Another new type of feature on the roads that older drivers may face is the infrastructure associated with area wide congestion charging. Already deployed internationally in cities like London and Singapore, congestion charging is similar to HOT lanes in the sense motorists are charged tolls to limit traffic on the roadways. One main difference, however, is with area wide congestion charging motorists must pay to drive in a certain area of a city, most typically the downtown portion during peak travel hours, rather than a specific lane of the freeway. Already, this traffic control measure is being considered for some US cities such as San Francisco to discourage motorists from driving on the crowded streets of the city center (Gordon, 2005).

On the other hand, these infrastructural changes are not just exclusive to the larger cities. In various towns of all sizes, roadway intersections are changing with the emergence of roundabouts, which are enhanced and safer forms of traffic circles or rotaries (Federal Highway Administration, 2000). Many drivers, especially those in the older generations, may be unfamiliar with the traffic rules for safely approaching and turning within these circular intersections. For example, they may not realize that once they enter the roundabout they have the right of way over other traffic approaching the intersection (Federal Highway Administration, 2000)

The Role of Driver Education

With all of these internal and external changes in the roadway environment expected for the coming decades, driver education, traditionally associated with the novice driver, could play a key role in helping to ensure the safety and mobility of seniors. After all, the automobile is likely to be the mode of choice for the future generations of older adults who will be primarily living in low-density neighborhoods. In addition to providing advice on compensating for changes in health, driver education could help seniors on learning about some of the newer in-vehicle technologies or about the traffic rules for new features of the roadway such as HOT

lanes and roundabouts. To some degree, driver education could become “a lifelong endeavor that extends the safe driving of people throughout their lives” (J. Coughlin, May 5, 2006). Its effectiveness in terms of preventing collisions could be based on how well such training addresses these developments along with the overall needs and abilities of the future older driver.

Chapter 3 – Literature Review on Effectiveness of Older Driver

Education

Background

With older adults living and driving longer, some might argue strongly for an expanded system of older driver education. The primary justifications for this course of action would likely stem from the health changes seniors are experiencing due to the physical effects of aging. Some might also cite the changing roadways, vehicles, and traffic rules as another motivating factor for older driver education. And yet others may just claim that education is justified based on its past success. They may argue that in such fields as medicine, law, and commercial transportation operations, education and training have improved performance, safety, and efficiency of those who received that instruction.

Nonetheless, the question still remains: Is driver education the best solution for addressing with the challenges faced by a proliferation of seniors on the roadways? On the other side of the debate, the outlook is less optimistic as captured by this quote:

“...the education debate gets resurrected every day... A very large number of countries have safety messages on television, have put up billboards on thoroughfares, hold road safety weeks, distribute safety literature in schools, and have instituted safety committees and councils. This has been going on for two decades, but the carnage continues” (IIHS, 2001, p5).

This quote, while referring more to driver training in general, may very well summarize the current state of older driver education as well. Classes are taking place throughout the United States, but aging motorists still have one of the highest fatality rates for auto crashes. Their low survival rates in many accidents, which might only injure younger operators, are most likely attributed to their fragile bodies. Conversely, the incidence of crashes may be occurring because not enough seniors are participating in older driver training programs. Of course, in

this case, the assumption would be that such programs are effective in reducing actual crashes.

The aim of this chapter is to help resolve these underlying assumptions and thus answer the question of whether older driver education is effective. The chapter provides a literature review of the various academic studies, reports, and articles that evaluate the effectiveness of these programs for older adults. From reviewing these sources, evidence has not yet emerged that older driver education is effective in reducing crash rates and thus improving driver safety. On the other hand, these training programs have positively impacted certain factors affecting traffic safety such as number of citations or level of self-regulation that are secondary measures to driver safety (Coughlin, 2006). The primary measure, of course, would be crash rates. Moreover, there is some evidence that improvements in these indirect, secondary variables like visual/processing skills can reduce crash rates among older drivers.

WHAT IS OLDER DRIVER EDUCATION?

Before discussing the findings in detail on the effectiveness of driver education, certain fundamental concepts behind this issue need to be clarified. The first is the term “education”, which is defined as an “activity that imparts knowledge or skill” (Cognitive Science Laboratory, Princeton University). Such a definition is relevant in this context because in driver education the classes impart skills such as safely changing lanes, backing up, or safely applying anti-lock brakes.

In the context of the older driver, however, the more conventional notion does not apply of driver education being a “Rite of passage” or the class high school students took to receive their first license (Coughlin, 2006). On the other hand, older adults who enroll in a senior/mature driving class would already have their licenses and perhaps have been driving for most of their post-teenage lives.

While some may define driver education as a form of driver rehabilitation, this definition is not germane to this issue because older driver education is for seniors who can already drive. In rehabilitation, the subjects could be any age recovering from such ailments as stroke, which

at least temporarily has prevented them from driving. In this case, as opposed to senior driver education, they would receive focused retraining of specific physical and/or cognitive abilities to allow them to drive once again.

But for older adults, driver training involves a refresher course to review particular driving skills and knowledge that may have been declined over the years. At the same time, driver education could also include classes, training programs to impart new abilities and knowledge about safe driving that seniors may not have learned. A possible analogy would be the continuing education courses that professionals like attorneys or engineers take, to become proficient in the latest, most effective techniques remain effective in their changing professional environments. Similarly, in the aviation industry, pilots must update their knowledge of aviation technologies when flying new aircraft.

WHY OFFER OLDER DRIVER EDUCATION IN THE FIRST PLACE?

The above reference to continuing education alludes to one such motivating factor for an older driver course, which is to refresh and possibly update driving skills/knowledge. Some seniors may not have taken a driver education class since their teenage years, which could have been sixty years ago. Over such a time period, new techniques for safe driving may have emerged with the changing technologies of vehicles and infrastructure of the roadways. For example, in order to be safely protected by an airbag in a collision, seniors should know to place both hands at the bottom of a steering wheel to avoid getting injured from the deployment of the air bag.

At the same time, seniors will likely have a need to learn the impacts of the age related health changes and other medical conditions on driving. Unfortunately for some, certain diseases may become more prevalent in their older years such as high blood pressure, diabetes, or macular degeneration. A course could, for example, teach them adjustments they could make with their driving to compensate for the effects of these health conditions.

They might also want to take a course to learn about the new in-vehicle technologies that are emerging in the automobiles they drive. Some may need advice on safely operating these

devices while driving, especially if the user interface to these technologies is not intuitive. In certain cases, adjusting certain devices could become a significant distraction, to the point of affecting the older adult's ability to drive safely.

Motivations for an older driver class may lie outside the vehicle with helping motorists develop greater awareness of their roadway environment. Older adults often must be attuned to changing travel patterns of the highways due to events such as road construction or major accidents. In either of these scenarios, there could be greater traffic on the roadways senior drivers are accustomed to taking. A course could teach them how to drive more safely and effectively in these situations or how to take alternative transportation when road traffic becomes too congested.

In the long run, however, the end goal of any driver education program would be not just for the sake of gaining knowledge, as stimulating as some may find the experience of learning in general. The ultimate goal instead is to reduce and prevent auto collisions. Older driver education in essence serves as a traffic safety intervention measure, designed to affect driver behaviors before any potential collision occurs. In the context of the Haddon Matrix, a tool to formulate various safety countermeasures, this intervention would occur during the pre-crash phase (Traffic Safety Center - UC Berkeley, 2006).

WHAT IS DRIVER TRAINING?

To achieve the ultimate aim of preventing auto collisions some feel that such a program should include a more practical element, driver training, which is defined as an "activity leading to skilled behavior" (Cognitive Science Laboratory, Princeton University). In this sense, training would involve learning to apply the knowledge or skill that an individual acquired through education. For example, driver training may consist of on road sessions to practice techniques learned in a driver education class, such as maintaining the proper distance behind other vehicles or safely making 3 point turns.

While training can be considered distinct from education, as described above, in this chapter, the two terms will be used interchangeably, unless otherwise indicated. This choice was

made to simplify this literature review, since the aim of this discussion is to determine what the literature reveals about the effectiveness of older driver education as a whole.

Nonetheless, there will be one prominent exception to the rule on these two terms above. In particular, certain types of training, which are highly relevant to safe driving yet not included in the traditional older driver class, will not fall under the category of education. Examples of such training include practicing driving skills in a computer simulator or exercising specific visual/perceptual skills. These activities are often addressed in articles on older driver education. Moreover, since these specific forms of training affect certain skills/outcomes related to safe driving, they could become standard modules in future senior driving courses.

A Meta Analysis of Literature Assessing Older Driver Education

In reviewing the literature covering the effectiveness of older driver education and these specific training exercises, the research strategy focused more on relatively recent studies, but was less restrictive with the type and location of the programs that were studied. Only literature published between the years of 1995 and 2006 was considered in this review. Incidentally, many studies on older driver education were conducted before 1994 that form the basis of the work done on this topic in the past decade. Still, this earlier research was not reviewed, primarily to focus on the most recent discoveries in this transportation safety field and to work within the time constraints of this research project.

Studies on older driver education were not just limited to the United States. Literature from other countries was reviewed where older driver safety issues are also coming to the forefront of their transportation agenda. Nonetheless, this international research was confined to countries within the Organization for Economic Cooperation and Development or the OECD. With relatively high rates of auto use and fairly significant aging populations, the findings they produce on older driver education are likely to be relevant to programs in the United States.

To find the particular studies on the effectiveness of the specific training programs and more traditional forms of older driver education, several databases were searched. In particular, the primary search engines included among others, Transportation Research Information Services (TRIS), PubMed, AgeLine (from AARP), and TRANSPORT, which is a combination of other transportation related databases.

In utilizing these tools, a keyword search was conducted to obtain the relevant articles. During the initial stages of the research, the set of keywords were mainly confined to those terms that are relevant to assessing the effectiveness/safety value of older driver education. These keywords consisted primarily of the following terms: Driver education, Retraining, Aged drivers, training, driver improvement, safety, refresher course, curriculum, motivation, lifelong, senior drivers, driver program, driver screening, classes, driving skills, driving performance, mature driver, driver safety, older adults, and driver improvement programs.

Nonetheless, as the research proceeded, the keyword search was expanded to include driver education programs that were not just limited to older drivers. As a result, restrictive phrases such as “aged driver” or “elderly adults” were dropped from the search, and the more general terms remained such as "driver education" and “efficacy”.

The citations that emerged from these keywords included a fairly wide range of reference types. More general publication types were included in this literature review such as government reports, articles from conferences, and PowerPoint presentations. At the same time, the higher priority was to identify academic, peer-reviewed articles with possible control-intervention studies, evaluating the effectiveness of older driver education.

MEASURING EFFECTIVENESS

In the reviewed literature, the assessments focused on only one independent variable, driver education for older adults. A variety of dependent variables were analyzed to evaluate the effectiveness in terms of driver safety. The primary dependent variable or measure of effectiveness, among this multi-faceted set, is the driver’s crash risk. This parameter is

mainly represented in terms of the crash rate, usually defined as the number of fatal and/or injury crashes committed by the driver per miles driven. At the same time, though, this primary dependent variable has been somewhat controversial in its use as an effectiveness measure. For one thing, crash rates are often derived from self-reports or state records, which are not always based on the most reliable data, as will be explained further along in this chapter. For another, accidents tend to be rare events making it challenging on the researchers to find sufficient evidence to establish statistical significance. Moreover, researchers still may not be sure that education alone significantly affected the rise and fall of crash rates. There could be many other factors outside the influence of older driver retraining programs that could affect crash rates such as the "functional and medical characteristics of driver, highway design, other vehicles, fatigue, personality, [and] weather" (Owsley et al., 2004)

SECONDARY FACTORS IN MEASURING EFFECTIVENESS

Other than crash rates, some studies have measured the effectiveness of older driver education in terms of dependent variables that are more indirect measures of driver safety. These other outcomes are not direct indicators of collision risk, but are believed to be directly related to safe driving and some have even been associated with crash involvement. In the studies reviewed for this chapter, the following secondary dependent variables were frequently used to assess the effectiveness of older driver education:

- Citation Rates
- Knowledge of road rules, safe driving practices
- Attitude about driving
- Driving Performance
- Degree of Self-Regulation
- Visual Perceptual skills

While some of the above measures are self-explanatory, others may warrant further clarification. Citation rates is one such variable, which refers to the number of citations for drivers that took an older driver training class compared to those in a control group who did not receive the education. Another intermediate, indirect safety factor of effectiveness that

may require further explanation is the degree of self-regulation practiced by the older driver. This activity, which involves modifying driving behavior to enhance safety behind the wheel, consists of two types. One form of self-regulation is more strategic that involves avoiding technically challenging maneuvers like parallel parking or not operating a car during certain times of day like the evening or bad weather (De Raedt & Ponjaert-Kristoffersen, 2000). Another type of self-regulation is more tactical and involves such compensatory measures as looking more frequently when making a turn or increasing the space cushion behind another vehicle (De Raedt & Ponjaert-Kristoffersen, 2000).

Finally, the last dependent variable to be clarified is visual/perceptual skills, which include such measures as visual acuity, contrast sensitivity, depth perception, area of visual attention, susceptibility to glare, and visual pattern recognition. Acuity, for example, would demonstrate the driver's ability to read road signs; visual attention area would be the portion of a driver's visual field for detecting and processing visual stimuli such as pedestrians (POTTS et al., 2004). As briefly discussed earlier, the training of these visual/perceptual skills are not covered in a conventional older driver education program. Rather, they are addressed in specific training programs that are designed to improve these abilities and are often focused on reducing the crash risks of older drivers.

OLDER DRIVER EDUCATION AND TRAINING COURSES

Similar to the dependent variables above, a diverse set of driver education/training programs were studied in the reviewed literature. Some of the courses were the more traditional in-class sessions that focused on topics pertaining to older adult driving, ranging from the effects of prescription medication on driving to dealing with vehicle breakdowns. Other programs, however, focused on specific types of training that have been found to improve the secondary outcomes described above. As discussed previously, these activities such as exercises to improve visual/perceptual skills can affect certain outcomes that are relevant to safe driving and thus have the potential to extend driver longevity, which is a core objective of mature driver education.

Findings

Relatively few (i.e. around ten) peer-reviewed studies on older driver education, between 1995 to 2006, were identified. On the other hand, the non-peer reviewed publications like government reports, conference articles, and literature from NGOs appeared more frequently from the key word searches on older driver education. On the whole, however, virtually all of these sources along with the limited peer-reviewed studies reported a lack of conclusive evidence that driver education for older adults has significantly reduced crash rates, a direct indicator of safety. In more specific terms, the older adult subjects who received an intervention of driver training did not significantly differ in terms of their crash rates from the control groups. This finding is not just limited to mature drivers. One study concluded that there is “no evidence that post driver license education is effective in preventing road crashes or injuries” for all ages (Ker et al., 2004). Nonetheless, a few exceptions have been identified, not for the training programs of older adults, but rather for novice driver education in Europe (Carstensen, 2002).

However, among the studies reviewed, a subset of research has determined that older driver classes along with other educational interventions are effective in terms of the secondary dependent variables described above. These more indirect factors of crash risk, based on the dependent variables listed above, include the following measures related to driver safety:

- Number of citations
- Knowledge about traffic rules
- Attitudes about driving
- Driving Performance
- Degree of self-regulation (i.e., restricting driving to specific times of day or compensating for weaknesses with certain driving tasks)
- Perceptual/Visual Skills

While older driver education and/or specific training programs positively impacted all of these outcome measures, only a subset of the secondary factors have proven links to crash

risks. Among those that are correlated with this primary outcome variable include self-regulation and certain types of visual/perceptual skills, which will be described further in the chapter. With the other subset of dependent variables, perhaps running counter to intuition, the research reviewed in this chapter has not demonstrated the ability of factors like knowledge and skill or citation rates, to significantly mitigate crash risk

PRIMARY FINDING: NOT EFFECTIVE IN REDUCING CRASH RATES

In evaluating crash rates, one study assessed the California Mature Driver Improvement (MDI) program. This intervention, described in chapter 4 with greater detail, consists of various classes across the state teaching older adults about defensive driving and the behind the wheel effects of age-related health changes. The report, which was conducted by the California Department of Motor Vehicles, found that MDI did not significantly reduce crash risk (measured in terms of crash rates) for older adult drivers (Haroun, March 2000; POTTS et al., 2004). Owsley et al. (2004) confirmed this finding as well reporting that MDI did not reduce the crash rate for enrollees “compared with non-intervention groups” (p. 223).

For the AARP Driver Safety Program (DSP), a government report indicated as well that this older driver education course had “no [significant] impact on reduction of crash rates”-(TRB & NCHRP, 2005). This program, also described in chapter 4 with greater detail, is the first nationwide mature adult driver education course, is offered to adults 50 years and older.

One exception to the predominant trend of ineffectiveness (i.e., in terms of reducing crash rates) for this course is a study by the New York Department of Motor Vehicles. A 1998 fact sheet by AARP reported the outcome of this DMV study: For those taking the AARP course “overall accident rates were 15 percent lower and overall conviction rates were 56 percent lower in the 18 months following the course than in the 18 months preceding it” (Milton). Based on the research for this thesis, a similar finding has not been identified among any of the studies over the last ten years from peer-reviewed journals.

Finally, in agreement with the other prevailing research, a another driver educational intervention for senior drivers known as Knowledge Enhances Your Safety (KEYS) was

found to be ineffective in terms of driver safety. Developed specifically for research studies, KEYS consisted of one-on-one sessions with older adults 60 years covering such topics as defensive driving and the effects of age-related health changes on driving. The researchers determined that the KEYS program does not result in any significant differences with crash rates between control and the group of those who received the educational intervention (Owsley et al., 2004).

Despite the lack of direct safety benefits identified by the academic research on older driver education, there is one exception with a course in Denmark, except this program is oriented towards novice drivers. Carstensen (2002) reported that after changes were made to this driver education program, the accident rates decreased for younger drivers who participated in the course. These changes specifically included a greater emphasis on hazard perception and defensive driving, skills that involved detecting “potential dangers in traffic” and “reacting sensibly to them”, respectively (Carstensen, 2002). Moreover, drivers had the opportunity to practice on the road theory they had just learned in class (Carstensen, 2002). While the Denmark program does not address the targeted age group, the findings are still significant because driver programs have been found to be ineffective not just for older adults. Christie (2002) noted in a conference report: “conventional and traditional driver training has not been able to demonstrate statistically significant post-program reductions in crash involvement”. Perhaps if similar changes were made to an older driver course in the United States, the program could deliver more direct safety related benefits to its students.

SECONDARY OUTCOMES

For now, however, research only indicates that driver education and specific types of training for the older driver can improve certain secondary outcomes related to safety on the roads. As described previously, some of these intermediate variables) are correlated with a reduction in crash rates. In that sense, driver education/training may be effective in improving driver safety for older adults through these secondary factors.

Number of Citations

One safety factor influenced by education is the number of citations received by the course participants, although the results behind this outcome measure have been mixed. In a study on the California Mature Driver Improvement (MDI) program, those older adults who didn't receive citations within the prior 5 months of the study, showed no significant reduction in citation rates (per 100 drivers) after taking the MDI course in California (Berube, 1995, p. iii). The MDI program, described with greater detail in chapter 4, is administered by the California Department of Motor Vehicles and is designed for adults 55 years and older. The content of the program is centered on defensive driving techniques and strategies to compensate for physical changes related to aging. On the other hand, this education program was effective for those with recent citations, received within the past 5 months of the study, compared with a control group that had not taken course (Berube, 1995, p. iv). More specifically, those in the treatment group had significantly fewer citations than those in the control. A similar finding was also established for the AARP Driver Safety Program, which had demonstrated a significant effect with reducing traffic violations (TRB, 2005).

Knowledge Traffic Rules/Attitudes

In terms of knowledge of traffic rules and attitudes about driving, older driver education is effective as well. Driver safety programs such as those offered by AARP or AAA are credited with having increased participants' knowledge of safety facts (Owsley et al., 2001). A similar effect has been noted for the California MDI program as well (McGwin). Attaining a greater understanding of rules and facts related to driver safety can be especially beneficial among those who have not received formal education, in helping to resolve driving problems that were related to lack of knowledge (Eby et al., 1998). In addition, studies have demonstrated that the AARP Safety Program not only enhances a participant's understanding of safe driving, but also is credited with improving the seniors' general attitudes about driving, according to one study (TRB, 2005).

Driving Performance

The results of one indirect outcome measure (i.e., indirect to crash rates for assessing driver safety), driving performance, have been mixed from driver education and specific forms of

training. In a study conducted in Ontario, researchers found that a course offered in Canada similar to the AARP Driver Safety Program, does not significantly improve driving performance for older drivers. The specific program they evaluated was the Canadian “55 Alive Driver Refresher Course”, which is described further in Chapter 5. In particular, they found there were no significant differences in driving performance between control and intervention groups (Bédard et al., 2004). The evaluation measured the driver’s abilities in such areas as “crash prevention practices”, “route planning”, and “vehicle handling” (Bédard et al., 2004).

On the other hand, certain types of training have yielded more positive results. For example, with a group of older adults that practiced their driving skills in a computer simulator improved in specific measures of driving performance (Roenker et al., 2003). In particular, more seniors were able to turn into the correct lane and use turn signals properly after receiving the simulator intervention. Nonetheless, these improvements were more short-term persisting only 18 months after the training. (Roenker et al., 2003)

Self Regulation

On the whole, driver education is more successful with influencing the degree to which an older driver self-regulates, another indirect factor linked to driver safety. This finding was demonstrated in a study of the educational program known “Knowledge Enhances Your Safety” or KEYS, which focused on visually impaired older drivers. KEYS was designed primarily for a research study. The goals of the program were “to change self-perceptions about visual impairment” and “promote the avoidance of challenging driving situations” such as driving in bad weather or during the evening (Owsley et al., 2001). After these higher risk older drivers received the training intervention, they reported practicing greater strategic self-regulatory behavior over a control group that did not receive the educational treatment (Cynthia Owsley, Beth T. Stalvey, Janice M. Phillips, 2001). In particular, they compensated for their visual problems by driving less miles, avoiding certain maneuvers (e.g., left turns across traffic), and limiting their exposure certain challenging situations (e.g., driving during rush hour) (Owsley et al., 2004). Researchers also noted that older drivers "will compensate"

through self-regulation if made "aware of visual limitations", and building this awareness is one of the primary aims of KEYS (McGwin, 2004).

In addition to the KEYS driver training intervention, certain studies have credited driving simulators with encouraging the older drivers to practice greater self-regulation through such techniques as "visual scanning" (i.e., checking a side view mirror for blind spots) (University of Florida, 2003). Such an effect may be attributed to the feedback simulators provide to seniors, fostering a greater sense of awareness with potential flaws in their driving skills and habits (National Older Driver Research and Training Center - University of Florida 2003; Romoser et al., 2005). From this "change in their perception", older drivers reported they would self-regulate by taking "more primary and secondary looks toward oncoming traffic when in an intersection", after receiving simulator training (Romoser et al., 2005, pp. 458, 462). According to Stephens et al. (2005), simulators in older driver education have also been credited with fostering visual scanning skills related to safe driving (p. 111). Visual scanning involves maintaining one's awareness of the driving environment through such practices as looking in the rearview mirror or checking for blind spots (Stephens et al., 2005).

Perception/Visual Skills

Besides simulators, other non-traditional forms of driver education/training have also improved visual/perceptual skills, some of which have even been linked to crash involvement. One such training program focuses on a certain aspect of one's vision field called useful field of view or *UFOV*, which plays a vital role in visual processing abilities associated with driving. The *UFOV* is the portion of an individual's visual field that can detect and process information quickly enough, to enable the driver to effectively respond to a hazard (POTTS et al., 2004). Typically, this field declines or shrinks with age (Molnar, Eby, & Miller, 2003). Nonetheless, older adults, with some measurable reduction in *UFOV*, can improve or expand this part of their visual field through training, which in turn can enhance their "critical search and judgment abilities in visually cluttered and cognitively demanding situations" (National Highway Traffic Safety Administration, April 1999; Roenker et al., 2003). Examples of these situations include making turns across oncoming traffic or scanning the intersection for "traffic control devices" (Roenker et al., 2003).

A particular type of training for older adults that improves a “specific measure of UFOV” is speed of visual processing training, which involves practice with locating peripheral targets in a subject’s visual field. (Roenker et al., 2003, p.223). In fact, one study indicates that such exercises can significantly improve an older driver’s “visual processing speed” and performance in “visual attention tasks” (Skaar, Rizzo, Bateman, & Anderson, 2001; Staplin & Hunt). In turn, these outcomes can translate into driving more safely while “multitasking, using a cell phone, and engaging in conversation with a passenger.”(Skaar et al., 2001). Furthermore, speed of visual processing training resulted in fewer dangerous maneuvers with tasks such as making turns across oncoming traffic (Roenker et al., 2003). At the same time, studies have indicated that subjects receiving this intervention improved performance on a “reaction time” task in a driving simulator that involved scanning a visual scene for any changes and then “quickly reacting to those changes” (Roenker et al., 2003). Perhaps what accounts for such positive outcomes is the fact that, according to current research, visual processing training enhances situational awareness, which is measured by “number of hazards” detected in a “simulated driving task” (Roenker et al., 2003).

IMPACTS OF SECONDARY VARIABLES ON CRASH RATES

Despite the success of such training programs, their safety value is still uncertain without evidence linking the secondary outcomes like number of citations to the crash risk of the driver. With the literature reviewed for this chapter, however, there is some evidence that establishes this connection. Such a finding indicates the potential of training programs like UFOV or simulator training, included as modules in a mature driver education course, to deliver tangible benefits for the safety for older drivers and therefore, the public at large on the streets and highways of the nation.

With other secondary outcomes, however, like knowledge and skill, the literature reviewed for this chapter has not proven changes in these factors affect crash rates. The absence of proof does not indicate they are incapable of influencing crash risk. One would expect that reducing the number of citations would reduce a driver’s collision risk, but evidence indicating such an effect has not been produced by research to date.

On the other hand, certain studies have demonstrated that UFOV training has considerable implications for driver safety. In fact, researchers have affirmed that a deficiency in UFOV is strongly related, with high levels of sensitivity, to involvement with crashes (Goode et al., 1998). Moreover, in a study from the Journal of the American Medical Association, researchers found that individuals with an impairment of 40% in UFOV were 2.2 times more likely to be involved with a crash (Owsley et al., 1998).

Moreover, for those who are aware of their impairment and self regulate, they can significantly improve their level of driver safety as well. According to Ponjaert-Kristoffersen and De Raedt (2000), older drivers who self-regulate with "tactical compensation" (e.g., driving slower, increasing space cushion) can significantly lower their crash risks (p. 520). Strategic compensation (e.g., not driving in bad weather or during rush hour) also has a similar effect. According to a study from Age and Ageing, drivers who were "free of accidents" used "significantly more strategic compensation" than those with an "accident history" (Ponjaert-Kristoffersen & De Raedt, 2000, p.519).

Finally, similar to the case for UFOV, studies have established considerable links between visual attention and driver safety as well. According to Richardson and Marottoli (2003), researchers determined visual attention plays "an important role in driving risk among older drivers" and is significantly correlated with driving performance and safety behaviors like "scanning the environment, yielding right of way to traffic/pedestrians, maintaining adequate space cushions, and judging distance" (p. 836). Moreover, shrinkage with this portion of the visual field can significantly increase an older driver's risk of colliding with potential hazards as vehicles, bicyclists, and pedestrians (Staplin & Hunt, 1999). Thus, some researchers have found that older drivers with visual attention deficiencies may benefit from training that improves their scanning abilities (Richardson & Marottoli, 2003). In fact, one study found older commercial truck drivers who received "visual search and scanning training" performed better on driver tasks involving visual search and mirror checking (e.g., making turns, adhering to traffic signals) (Eby et al., August 1998).

Summary of Findings

Overall, for older driver education the researched literature examined for this chapter does not prove that training can directly impact crash rates. More specifically, there was no significant reduction in crash rates of those seniors who took classes or received such training. One exception, however, has emerged for a novice program in Denmark, where younger drivers had a lower accident risk after taking a course. This effect occurred after the program was enhanced to include a greater emphasis on hazard perception, on-road training, and defensive driving. Whether similar changes made to an older driver class could have the same safety benefit is still uncertain, according to the research addressed in this chapter.

On the other hand, what the literature does indicate is that older drivers can be trained/educated to the point of enhancing such intermediate outcome measures of driver safety like UFOV, visual attention, and the degree of self-regulation. All of these factors are significantly related to crash rates, as evidence previously cited in this chapter indicates. Nevertheless, one question still remains: Would an improvement in these secondary outcomes through a senior driver class/training program necessarily result in fewer accidents for the older driver?

Perhaps to better answer such a question requires a closer look at the potential reasons a direct link between crash rates and driver training has not been established through research. Through this insight, the limitations and capabilities of driver education to ultimately enhance the safety of the older driver can be more effectively understood.

POTENTIAL FLAWS IN RESEARCH DESIGN?

One explanation for the perceived ineffectiveness with older driver education may be attributed to the inherent limitations with the existing research studies on this issue. For one thing, it is often difficult to judge effectiveness of driver education based on crash rates, since accidents are rare events (Roemaker et al., 2003). In effect, with less data, establishing statistical significance could be more problematic.

Moreover, studies may be vulnerable to selection bias, thus preventing results/conclusions from being generalized to the overall aging population. For example, this bias may stem from naturally bad drivers taking the course in the first place. Therefore, their driving performance/crash rates are not likely to improve with education/training, even if such a measure can be an effective safety tool for older driver.

For the studies cited in this chapter, however, the research methods were not sufficiently evaluated to verify whether such flaws existed. Until additional validation is performed, flaws inherent within the experimental design of the studies could exist and thus account for the perceived lack of effectiveness with older driver education. In general, conducting a rigorous, direct experiment with pre and post-tests is major challenge along with assessing the effects of driver education on crash rates. For one thing, just measuring crash rates before the intervention could be problematic due to the rarity of accidents, as explained previously. Also, studies that effectively assess the role of crash rates on driver education most likely require a longitudinal data set, which can be costly in terms of time and financial resources.

On the other hand, if the research on the effectiveness of older driver education is based more on quasi experimental designs, then conclusions are limited more to correlations between variables, rather than on any causation effects. For example, post-only correlation tests could indicate significant reductions in crash rates of seniors after receiving the intervention of driver training. Nonetheless, without a longitudinal data set, the possibility that accidents could be influenced by other variables cannot be discounted. An experiment with a pre-test, for instance, would have accounted and controlled for such factors to more clearly understand how the intervention (driver education) affected the response (crash rates).

Even with greater clarity about the correlation vs. causation effects, another problem faced by researchers is the use of crash rates as a criteria measure. Not only is this outcome based on the rare occurrences of accidents, as discussed previously, but also the data is often based on driver records, which some claim do not always maintain the most reliable information. From a paper by Northport Associates (2005), driver records are characterized as being “highly imperfect” (p. 6). Furthermore, the report implies minor violations sometimes go unreported

or there is insufficient information on collision involvement (Northport Associates, 2005). If such records are not completely accurate, as the discussion paper suggests, then crash rates may not be a sufficiently reliable measure in gauging the effectiveness of driver education.

Finally, evidence indicating a safety benefit of older driver education may still not emerge due to overconfidence from the students. After taking a class, older drivers may be driving more miles and thus exposing themselves to more risks and challenging situations (Haroun, March 2000). The increase in VMT could stem from their greater degree of self-confidence older drivers experienced from the knowledge they gained about driver safety. At the same time, they would be increasing the probability of a collision from traveling on the roadways more frequently and/or driving greater distances with their vehicle (Haroun, March 2000).

Instead of being attributed to problems with student overconfidence, the ineffectiveness of older driver education may stem more from flaws within the actual courses. The pedagogy or teaching method could be one such defect. For example, training sessions conducted in class may be much less effective than on-road training for enhancing driver performance and skills required in safely handling challenging situations. Moreover, the content of a driver education may not be appropriate for the students' needs. For instance, older drivers with visual impairments may already have sufficient familiarity with driving rules, so focusing on visual/ perception skill training may be more relevant to the challenges they face.

More generally, driver education may be flawed due to its lack of influence over certain psychological factors, which play a significant role in collision risk. Some motorists, for example, may not have the necessary motivation to apply the lessons they acquired from taking a driver training class (Christie, November 2001). Christie (2002) also suggests improved knowledge and skills, typically gained in driver education, are unlikely to change driver behavior, a key factor behind "crashes and injuries" (p. 3). At the same time, the author notes that conventional driver education is unlikely to influence traits such as "underlying personal values" or "firmly established past learning", which can significantly influence driving behavior (Christie, 2002). For example, if older drivers are feeling rushed and

overwhelmed by anxiety at the thought of being late, they may speed or change lanes unsafely, even though they realize these are incorrect/inappropriate driving practices.

Perhaps given these findings, older driver education should place more of an emphasis on driver behavior rather than knowledge and skills. Moreover, evidence from the other research reviewed in this chapter, would suggest that additional changes to the content and pedagogy of these training programs should at the very least be considered. Older driver education could include modules on UFOV and visual processing training. At the same time, courses could place a greater emphasis on self-regulation since this intermediate outcome measure along with visual/processing skills, have been strongly linked to crash risk. Furthermore, in this ideal class theory would be supplemented by simulator training where students could develop a greater awareness of their driving abilities and a sense of confidence that is more in line with reality. On-road training could be included as well so older driver could practice the skills and knowledge they gained in more realistic conditions, like with the program in Denmark.

Further Research Needs

Finally, to revisit a question posed earlier, could such a training program with all of the above changes provide a tangible safety benefit to older adults by lowering their crash risk on the roadways? At this point, unfortunately, the answer is still uncertain that perhaps additional research could help to resolve. A controlled experiment or case-controlled study could be conducted testing the driving performance and possibly accident rates from older adults who enrolled in a program, like the ideal course described above. When measuring crash rates, though, researchers may want to consider the “limitations of official records as criterion measures” (Northport Associates, 2005). Perhaps they could use self-reports on crash involvement to verify the accuracy (to a reasonable extent) of the information from the driving records, although there are some complications with this approach of measuring crash rates (MCGWIN et al., 1998).

Another topic for future research, if one has not been implemented already, is to review all the literature on the motivations for older adults to attend such driver training courses. While this subject is not directly related to course effectiveness, motivation still plays a key role, in determining whether students will apply the skills and knowledge they learned from a driver training course. This specific point was discussed previously in this chapter as well. With a better understanding of the reasons older drivers attend such classes, programs could be designed to optimize learning and thus ensure maximum effectiveness for reducing crash risks. This will be addressed later in the study.

Finally, additional research should be conducted on the intermediate driver safety outcomes. As described earlier in this chapter, already some findings have emerged significantly linking UFOV, self-regulation, and visual processing/attention skills to crash risk. With the other factors such evidence has not yet been identified, at least with the literature reviewed for this chapter. In particular, further studies should attempt to ascertain whether a reduced number of citations along with enhanced skills and knowledge could ultimately lower the crash risk for the older driver. If research demonstrates such an effect, then older driver training classes may require fewer changes than originally thought to deliver a safety benefit to its older adult students.

In the end, however, seniors will eventually reach a point where driving will no longer be possible. Hopefully, at that stage in their life, they will have some options with alternative transportation, which they may have learned about from taking an older driver class. In a more optimistic scenario, medical technology could advance to the point of reversing the aging process or automated highway systems may become a viable mode of transport (perhaps some individuals may dread such a possibility), providing motorists with a “hands free driving” experience.

Until such developments occur, the safety of older drivers should be ensured not only for their benefit, but also for the general driving public who will be sharing the roadways with an increasingly active, mobile aging population. Lifelong driver education could help to make that vision a reality by reducing the likelihood of crashes. With additional research and

possible modifications to existing programs, older driver training could become a vital tool for ensuring safety on the roadways and a positive pathway toward driver wellness and longevity.

Chapter 4 - Older Driver Safety Education in the United States

Despite the uncertainty with respect to the safety benefits of these courses, older driver education exists in the US and continues to attract students. Of course, these programs differ substantially from novice driver classes both in terms of the students and the curriculum. For one thing, participants of older driver education will have gained substantial driving experience over their lifetimes. For another, seniors in general have a great deal of motivation to drive safely. Their rates of safety belt use are among the highest of all drivers, and they have one of the lowest incidences of driving under the influence of alcohol.

Given these trends and the unique set of problems older drivers face, senior driver education covers topics that are not typically addressed in novice classes. While most mature adult programs inform students on the core issues such as the effects of aging on driving performance, many vary based on course curriculum and other general features such as methods of teaching (i.e., pedagogy) and course fees.

The main goals of this study are to characterize these differences and identify the various older driver classes that are offered in the United States. To achieve these objectives, the research focused on the content and various administrative features of the courses such as the enrollment fees and the organizations teaching and/or sponsoring the courses. Through these efforts, 10 older driver classes were identified and serve as the focus of this chapter's discussion, although significantly more programs exist in the United States. These courses analyzed in this study are outlined in three matrices. One table describes the curricula of the programs and can be found on that can be found in Table A of the Appendix. The other table that describes the more administrative aspects (e.g., course fees, teaching methods) can be found in Table B of the Appendix. The third matrix, Table C, describes some of these features in greater detail.

M e t h o d

The research, conducted between December 2005 and April 2006, is based on a combination of online materials (e.g., websites, documents) and personal interviews of course staff and/or

administrators. In addition, some descriptions of the older driver programs may lack certain critical and relevant details, primarily because the information was unavailable from the sources investigated for this research effort. Additional time that was not available during the study period would have been required to investigate these details, which primarily concerned administrative aspects of the program or on the topics covered in the course.

The columns or fields in Table C of the Appendix include the key characteristics of the program such as the program's service area (e.g., nationwide, regional), class name, and the sponsoring organization. For this study, the column "Pedagogy" denotes the method for teaching the skills and knowledge students are expected learn. Some programs offer behind the wheel training to supplement in-class learning, but other courses are more confined to the classroom, teaching the concepts through lectures and/or group discussions. Another field to the right is "Incentives" that describes any possible insurance discounts students might receive for taking a particular course.

In further examining able, one may notice not only the variations noted earlier, but also the common features between the courses as well. One such similarity is the US older driver education programs identified in this study are optional. According to the research conducted for this chapter, no state has enacted a law requiring seniors to attend these classes for retaining their driving privileges.

Auto Insurance Discount - Motivation to take course

On the other hand, an external, more immediate reward is often the impetus for mature adults to participate in driver safety courses. In 35 states across America, seniors are granted a discount on their auto insurance premiums for taking an older driver education course. The existence of this incentive program arises from a law compelling the insurance companies to provide the discounts to their more senior customers. But in states like Massachusetts, Arizona, and Indiana, however, such a premium discount law does not exist (AARP, 2006). Thus, graduates from an older driver program from these states are unlikely to receive a

discount on their auto insurance. It is still possible, however, that some insurance companies may still offer the discount voluntarily to gain a competitive edge over other carriers. But only in the 35 states that have enacted an auto insurance premium discount law, can the rate reduction be guaranteed. Nonetheless, there are some notable differences among the statutes that various states have imposed.

Probably the most significant variation among the statutes is the particular discount rate that insurance companies must offer to graduates of older driver courses. In fact, the insurance discount law for many of the 35 states does not specify an exact number for a rate reduction. Instead, the insurance companies have the option to only offer an “appropriate discount” to graduates of older driver education classes. This lack of specificity is characteristic for the insurance premium discount laws of 28 states including Arkansas, California, and Colorado. On the other hand, 7 out of 35 states indicate a specific reduction in auto insurance for taking an older driver education class, although even that figure varies among those states. In Connecticut, for example, the law requires insurance companies to only offer a 5% discount on premiums. Yet in Delaware, New York, and Georgia that mandatory rate reduction is 10%.

AGE REQUIREMENTS

As necessary conditions to qualify for the discount, a student in most states must not only have graduated from an older driver course, but also should meet a certain age requirement. In Alaska and Pennsylvania, for instance, 55 years old is the age when a graduate is qualified to receive the insurance premium discount (AARP, 2005b). For other states, however, the discount is available to all licensed drivers, irrespective of their date of birth. Otherwise, In Ohio, for example, the adults 60 and over qualify for the discount while in Idaho, older adults must be at least 65 years of age to be granted the rate reduction.

Once older drivers qualify, the discount is valid for up to 2 or 3 years, depending on the particular state. In Minnesota, for example, graduates can receive a 10% reduction on their auto insurance premiums for up to 3 years, whereas in Connecticut that period is limited to 2 years.

DISQUALIFYING CONDITIONS

Nonetheless, the discount during the 2 or 3 year time is not guaranteed unconditionally. Certain events or conditions can disqualify a graduate of an older driver course, from receiving the rate reduction on their auto insurance (AARP, 2005b). Such events include receiving a citation or being involved in an accident (AARP, 2005b). The laws in states like Florida and Mississippi impose such conditions on the reduced insurance rate seniors can receive. At the same time, in other states like Wyoming and Minnesota, the rate reduction is unconditional, despite committing certain infractions.

CURRICULUM REQUIREMENTS

Furthermore, as a necessary condition for older driver courses that to offer such a discount, some states impose requirements on the curriculum of these programs. In Virginia and Florida, for instance, driver training programs offering an insurance discount must include certain topics. But such a requirement does not apply for the older driver courses in states like Pennsylvania and Maine. Examples of particular topics that some states require driving courses to cover include “the effects of...medications... on driving performance” or compensating for “health impairments” (AARP, 2005b).

GENERAL FINDINGS

Nevertheless, regardless of the particulars of the premium insurance discount law, this tool remains the incentive of choice that many older driver programs across the US provide. Of course, in states like Massachusetts without this statute, courses do not provide such an incentive, unless the insurance companies voluntarily offered the discount.

Besides motivations to participate in the course, programs can vary on the following factors pertaining to the course structure and curriculum:

- Sponsorship and Delivery

- Incentives (i.e., insurance discounts)
- Recommended or Required Age of Driver
- Cost of taking class
- Duration
- Pedagogy (i.e., teaching method)
- Geographic Scope of Courses
- Content

Table B in the Appendix summarizes course characteristics by program name in reference to the above factors. The courses identified in this study will be described in terms of these categories, which will be further explained. For Table B in the Appendix, each row of the table corresponds to a particular course and dots indicate whether a certain characteristic like being sponsored by a government agency is a feature of that program. As described earlier, blank entries do not necessarily indicate that a course lacks that particular feature. Most often, they are the result being unable to verify that feature through the existing research sources of this study.

Sponsorship and Delivery

For the first category, sponsorship and delivery, courses may have different arrangements on whether the organization/agency sponsoring (i.e., designing/planning the course and/or providing the financial resources for offering such programs) the course is also delivering or teaching of the course. Sometimes these functions are handled by different organizations, whereby a sponsor would essentially outsource the teaching of the course to another provider.

For the course Coaching the Mature Driver, the National Safety Council (NSC), which sponsors the program, is not involved with the delivery of the courses. Instead, the course is taught by instructors who are typically certified by the NSC, but nonetheless are independent of this organization, according to a staff member of NSC. (Personal Communication, 4/18/2006).

On the other hand, the Auto Club of Southern California is delivering the nationally sponsored course “Safe Driving for Mature Operators”, according to William Van Tassel, the National Manager of AAA Driver Training Programs (personal communication, 4/18/06). Officially named as the Mature Driver Improvement Course, the eight hour class helps older adults “brush up” on certain skills, but also introduces techniques/strategies to for seniors to compensate for their changing health when driving.

Also on a national scale is the Driver Safety Program offered by AARP, with a slightly different sponsorship and delivery scheme. For this case, the same organization, AARP that develops the course is also teaching the course, through volunteers. For a fee of \$10, adults 50 years and over can enroll in the program to learn about such topics as the effects of the physical changes from aging on driving.

Types of Sponsorship, Delivery Organizations

Nonetheless, not all older driver education classes are offered by non-profit establishments, although these types of organization often sponsor the most popular courses such as AARP’s Driver Safety Program or the course “Safe Driving for Mature Operators” offered by the AAA Traffic Safety Foundation. Some government agencies also sponsor courses. In Southern California, a law enforcement agency offers a program known as the Mature Driver Improvement Course. Classes take place in Monterey Park, CA (just east of Los Angeles) and are taught by current, on-duty officers of the city’s police department to older adults 55 years and over.

At the same time, this program and many others in California are approved and certified by the California Department of Motor Vehicles (DMV), through its Mature Driver Improvement program. According to an instructor who teaches the course in Monterey Park, CA, this certification is based, among other factors, on the curriculum and length of instruction offered by the course (personal communication, April 17, 2006). In California, a necessary condition to be certified by the DMV is that a program must provide at least 6 hours and 40 minutes of instruction (California Department of Motor of Vehicles, 2003). The Mature Driver Improvement course of Monterey Park meets this requirement since the total duration of the

class is 8 hours. The Monterey Park program is certainly not unique with its sponsorship and delivery scheme. There are numerous other courses offered throughout the country by various law enforcement agencies, although these programs are not covered in this chapter.

Besides police departments, other government agencies are involved in the sponsorship and delivery of older driver education. In the state of Illinois, the Secretary of State Department provides a course known as “Super Seniors Program”. This program includes a Rules of the Road Review Course on “safe driving techniques” and is primarily intended to assist seniors with the renewal of their driver’s license (Secretary of State Illinois).

Across Lake Michigan, one organization providing older driver education is neither from government or commercial sector. The non-profit Traffic Improvement Association delivers a course known as the Mature Driver Workshop, funded partially through grants and donations from various sponsors, according to the program coordinator Joan Rich (personal interview, 4/17/06). This 8 hour class, designed for those 55 and above, provides tips on improving defensive driving abilities, among other topics covered in the course. As an AAA certified course, the Mature Driver Workshop has evolved over the years, to incorporate certain modules and features that have differentiated this class from other older driver programs in the nation (personal interview, 4/17/06). These unique aspects are described further in the chapter.

In California, another non-profit agency, the Safety Center in Sacramento is teaching and sponsoring a course. The program, known as the “Mature Driver Course”, is also certified by the DMV like the Mature Driver Improvement Course in Monterey Park, CA.

MOTIVATIONS TO PARTICIPATE IN OLDER DRIVER EDUCATION

As described earlier in this chapter, the insurance discount is the primary incentive to participate in an older driver education. Such a rate reduction is offered, for instance, with the national course “Safe Driving for Mature Operators” sponsored by the AAA Foundation for Traffic Safety. This program, for adults 55 years and over, covers such topics as driving strategies to compensate for the “effects of aging” (Molnar, Eby, & Miller, 2003). Of course,

the discount can only be obtained in those states that have the insurance discount premium law, described earlier in the chapter. Otherwise, some insurance companies will offer such discounts voluntarily, perhaps to win business over from their competitors.

With the other nationwide course, for the Driver Safety Program sponsored by AARP, the insurance discount also serves as the motivational tool for encouraging aging drivers to enroll in the course. Advertised as the nation's largest and first driver refresher course for the elderly, the Driver Safety Program lasts for 8 hours (most frequently divided into two 4 hour sessions) covering such topics as defensive driving techniques (AARP, 2004). By the end of the day, those who graduate receive a discount on their auto insurance premiums, similar to the ones received in the AAA program "Safe Driving for Mature Operators" described above.

AGE

With many courses like the one above, the 50s age range is when older adults become eligible to enroll in these programs. To take the Mature Driver Course, offered by the non-profit organization Safety Center Incorporated, adults should be 50 years and above, one of the lowest minimum ages among the courses researched for this chapter. This 8 hour course, which takes place in Sacramento, CA, covers defensive driving techniques and techniques/strategies to compensate for some of the health effects related to aging (Safety Center Incorporated).

The threshold of 50 years old has also been adopted on a national scale with the Driver Safety Program (DSP) of AARP. The course is typically taught in-class but plans to release an online version that students can run from their home computers. Among the topics covered in this program is self-assessment, where seniors can judge their fitness to drive (AARP, 2006). This decision is based on such factors as their sense of difficulty with judging gaps in traffic or making left turns (AARP, 2005a). Senior drivers are also provided information on additional self-assessment tools, formal driving evaluations, and on alternative transportation options when driving may no longer be possible.

In southern California, with the Mature Driver Improvement Course taught in Monterey Park, the recommended age for the participants is 55 years and over. Older drivers who graduate from this DMV certified course are eligible for a discount on their auto insurance premiums as well.

The age of 55 is also the youngest recommended age for the nationwide NSC course “Coaching the Mature Driver”. This program runs between 6 to 8 hours in length depending on the particular class. Designed to address the “specific challenges” of adults 55 and over, the course offers instruction on such topics as road rage and the safe operation of SUVs and even RVs (National Safety Council, 2004).

DIRECT COSTS TO STUDENTS

To learn this material and other topics of older driver education, there are always indirect costs such as with the time demands of the class. But for some programs students incur more direct expenses with the fees required for enrollment/instruction. But compared with other international programs of older driver education, these costs were fairly reasonable for the classes identified in this chapter. Where such data was available, all courses requiring a fee all charged below \$25.

At the higher end of the price spectrum is the Mature Driver Course, offered by the Safety Center of Sacramento. Participants are charged \$23 to enroll in this DMV-certified class. Similarly, for the Mature Driver Workshop, offered by the TIA in Michigan, students pay a fee of \$20 to enroll in this course, which is taught by AAA certified instructors, many of whom are retired law enforcement officers. Even with this fee, the program coordinator Joan Rich reports that the savings are still significant, considering that the actual cost per student is \$125 (personal interview, 4/17/06). Such cost reductions are achieved through donations of corporate sponsors and other organizations (personal interview, 4/17/06).

Programs such as the Mature Driver Improvement Course of Monterey Park, CA charge a much lower fee to its students. In fact, the only cost is \$1 to cover the certificate of

completion graduates receive from the state DMV. In Illinois, there is no cost to attend the “Super Seniors” program, which is most likely subsidized by taxpayer funds.

PEDAGOGY FOR COURSE DELIVERY

Not every domestic older driver course was confined to the classroom. Some programs offer on-road, behind the wheel training on a test track or on normal roadways. One class identified is even taught exclusively online through “web seminars”.

An example of an older driver course with optional on-road, behind the wheel training is Mature Driver Workshop offered by the Traffic Improvement Association in Michigan, described previously in this chapter. Adults who enroll in the class can receive a confidential evaluation of their driving skills while operating their own car.

The Mature Driver Improvement course, sponsored by the Automobile Club of Southern California, also offers in-car training. This part of the course, which is “one-on-one with a state licensed driving instructor”, is optional (Auto Club of Southern California, 2006).

Most courses covered in this chapter, however, instruct students in a more traditional classroom setting. These include such programs as the Mature Driver Course in Sacramento, CA along with the nationwide AAA program “Safe Driving for Mature Operators”. But with the course in Sacramento, video is used extensively to reinforce course lessons and facilitate discussions on certain topics. Furthermore, with the national AAA program, lessons are not primarily conveyed through classroom lecturing, but more through group discussions, according to William Van Tassel, AAA’s national manager of driving training programs (personal interview, 4/18/06).

Still, another senior driver education program is relying more on the “virtual classroom”. Consisting of online web modules known as the “Motor Vehicle Safety Online Seminars”, this program is available at no cost through a partnership between the American Society of Aging and the National Highway Traffic Safety Administration (NHTSA). Each seminar is about an hour in duration.

DURATION OF COURSES

Similarly, the Senior Driver Awareness Program offered by the Michigan Area Agency on Aging 1-B consists of a series of one hour information sessions. Conversely, with the nationwide course “Safe Driving for Mature Operators”, sponsored by the AAA, more time is allocated towards instruction with the duration of the course ranging from 4 to 8 hours, depending on the geographic region of the particular class. From the research, the Mature Driver Improvement Course in Monterey, CA, was identified as requiring the one of the greatest time investments, with the course lasting 8 hours and consisting of 6.5 hours of instruction.

GEOGRAPHIC SCOPE OF COURSES

This course, typically lasting a full day, services a geographic region focused more around the city of Monterey Park, CA, in the Los Angeles metropolitan area. The Mature Driver Workshop in Michigan operates more regionally, primarily servicing southeast Michigan. At times, however, the course is offered in other parts around the state. On the other hand, Super Seniors offers courses throughout the state of Illinois, covering a more extensive geographic region.

At an even greater scale, other older driver education programs covered in this chapter provides service at the nationwide level. The AARP Driver Safety Program is one such example that offers its courses in communities across the United States. Similarly, the class “Coaching the Mature Driver”, sponsored by the National Safety Council” also has a similar geographic scope as does the course “Safe Driving for Mature Operators” offered by the AAA Foundation for Traffic Safety.

CONTENT

In addition to geography, another factor accounting for the variation of the courses is the content or curriculum of each program. While certain topics are common to most programs, which all address a similar audience (i.e., older drivers), other subjects are limited to particular classes. Table A in the appendix summarizes the main topics covered in each of the

10 courses. As described earlier, the course may still cover the particular topic, even if not indicated in the table. That particular aspect of the curriculum just may not have been verifiable through the existing research for this study.

The Aging Process and Impact on Driver Performance

One common topic that is often found in numerous older driver programs throughout the country is the health effects of aging or medication on driving performance. Unfortunately for some, certain diseases may become more prevalent in their older years such as high blood pressure, diabetes, or macular degeneration. One course in particular that covers such changes is “Coaching the Mature Driver” offered by the NSC. For example, the program would discuss effects from changes in vision that result in decreased peripheral views or depth perception, which can significantly impact driving performance.

The AAA course, Safe Driving for Mature Operators, also covers similar health issues. One topic addressed in particular is the effect of various medications on driving, since older adults are relying increasingly on prescription drugs to maintain their health. Oftentimes, certain medications can even have similar impacts on driving performance as being under the influence of alcohol.

Adaptive Driving Strategies for the Older Driver

Often in conjunction with discussing the effects of age related health changes on driving performance, many courses will teach seniors strategies to compensate for these changes. From this process, often known as self-regulation, older adults will modify their driving behavior. For example, they might drive less at night or avoid making left turns, unless absolutely necessary.

The Michigan course, “You Decide: Senior Driving Awareness Program”, covers this type of self-regulatory behavior one of its monthly seminars. The Mature Driver Improvement program offered by the Automobile Club of Southern California also teaches its students on “ways to compensate for the effects of aging” in the context of driving (Auto Club of Southern California, 2006). As illustrated in chapter 3 on the effectiveness of older driver education, self-regulation has been found to significantly reduce the risk of crashes.

Driver Awareness

At the same time of focusing on modifying their driving behaviors, seniors are also taught about improving their awareness of the roadway environment. This includes paying sufficient attention to non-vehicular traffic such as bicyclists and pedestrians. Meanwhile, being aware of changing traffic conditions due to such events such as road construction or major accidents is also critical. Such scenarios could snarl traffic, leading to an increase in aggressive drivers, whom seniors should also be aware of to avoid potentially dangerous confrontations. Meanwhile, with modern technology such as cell phones, PDAs, and in-car navigation systems, drivers may find staying attuned to these conditions more challenging than ever.

The AARP Driver Safety Program offers advice not just on improving driver awareness, but also on handling the various types of traffic and/or drivers that could arise. For example, the course provides information on properly “sharing the road” with bicyclists and pedestrians (AARP). Moreover, students are also trained on understanding and properly reacting to signals emitted by a school bus. This information can be especially critical to know when the bus is stopped and students are crossing. Furthermore, the course also covers road rage and driving safely with aggressive drivers on the roadways.

For the AAA nationwide program “Safe Driving for Mature Operators”, the issues of driver distraction are addressed from the use of such mobile devices such as cell phones or PDAs. Obviously, such activities are becoming increasingly common in the 21st century with greater advances in wireless technologies and availability of real time information. There is also a unit from the course on improving drivers’ awareness and understanding road signs. These predominantly “static” features may also be changing with the advent of Intelligent Transportation Systems and such technologies as dynamic message signs.

Rules of the Road (changing rules and infrastructure)

Older driver training also helps develop another type of awareness: familiarity with the latest rules and regulations of the roadways. Perhaps a new law was enacted not allowing drivers to

pass school buses when are stopped along the roadway in case children may be crossing. An older driver class could possibly inform them of this new regulation. The Mature Driver Improvement Course of Monterey Park, CA is one program addresses this general issue by helping to update seniors on the latest changes in the vehicle code. This part of the class may be one of its core strengths since current or retired police officers often serve as instructors.

In the state of Illinois, the Super Seniors program offers a “Rules of the Road Review Course”, as described previously. Through such measures, one of the program’s aims is to instill greater confidence within seniors when they renew or obtain a license (TRB&NCHRP, 2005).

Vehicle Operation and Maintenance - self-maintenance

Even with solid understanding the rules, there are times older driver (and even younger ones) may be unfamiliar with the proper use of certain vehicle safety systems such as ABS. They may not realize, for instance that in an emergency stop they should not be pumping the brake pedal. Perhaps they may need advice as well on checking fluid levels or the pressure in their vehicle’s tires.

The Driver Safety Program of AARP provides instruction in these areas with a section, for example, on the proper and safe usage of Anti Lock Brake (ABS) systems in the event of “emergency stops” (AARP). In addition, instruction is provided on maintenance checks and performing basic diagnostic measures such as checking the oil levels. Such vehicle inspection techniques are also covered in the Mature Driver Course offered by the Safety Center of Sacramento.

New Car Technologies

Another topic addressed by some older driver education programs is the new in-vehicle technologies emerging in many of the cars that older adults are driving. These devices may include such technologies as collision avoidance systems to warn drivers of unsafe lane changes, departures from the roadway, or potential collisions from crossing certain intersections (United States Department of Transportation Intelligent Vehicle Initiative,

2006). Older drivers make up the dominant segment of the premium car market, and thus are likely to be the first users of these new systems (Coughlin, 2005). At the same time, such on-board instruments could become a potential distraction while driving, especially with the physical and cognitive challenges seniors face. In addition, the user interface to these devices may not be intuitive to older adults, especially those less experienced in technology. Therefore, instructing older adults on the proper operation of in-vehicle technologies could significantly benefit the safety of their driving experience.

Unfortunately, relatively few courses cover the topic of ITS or new car technologies, as suggested by their online course descriptions and from personal interviews of the course staff members. With the course “Safe Driving for Mature Operators” offered by the AAA, the curriculum informs students on new vehicle technologies like smart airbags, which deploy with less force when sensors detect a more lightweight driver is present (AARP, 2005a). In the Driver Safety Program of AARP, a section of the class is devoted to some of the emerging devices in automobiles such as collision avoidance systems, adaptive cruise control, and navigation systems (AARP, 2005a).

Self-Assessment/Driving Evaluation

With the various health changes older adults are likely to experience, the need to self-assess driving skills is often critical, to check whether they can still safely drive under certain conditions. Some courses provide students with techniques and/or tools to help make this determination. With the program Safe Driving for Mature Operators by AAA, seniors taking the course receive a CD-ROM called Roadwise Review. This software program helps to assess drivers on various health areas such as working memory and head/neck flexibility.

With the Mature Driver Workshop in Michigan, offered by the Traffic Improvement Association, several evaluations are offered to ultimately assess the fitness and skills of the senior participants to drive safely. The Useful Field of View test is one such tool that measures their visual/perceptual abilities, on how quickly they respond to potential hazards on the road like crossing pedestrians. As Chapter 3 indicates, a UFOV deficiency is often

strongly related to involvement in crashes. The Mature Driver Workshop also measures break reaction time as well in evaluating the driver.

Alternative Transportation

Perhaps through this type of self-assessment and advice from others (i.e. friends, families, professionals), they may learn that driving an automobile safely is no longer possible. Since they will still have mobility needs, seniors will most likely have to utilize consider alternative transportation options. Thinking about and planning these options ahead of time, which may involve using public transportation systems or getting rides from family/friends, could help ease the transition.

One course that offers such assistance beyond the car is the Mature Driver Improvement Class of Monterey Park, CA. Instruction is provided on using such options as taxi, paratransit, and public transportation to keep the older driver mobile

The “You Decide: Senior Driving Awareness Program” also helps to familiarize older adults with alternative modes. The Michigan Area Agency on Aging, which sponsors the course, organizes field trips for mature drivers to better understand the public transportation system, for the eventual time when driving safely may no longer be possible.

Implications and Future Research

GENERAL OBSERVATIONS

Nevertheless, the aim of such education is to help older adults maintain their driving skills throughout their senior years, so they can remain independent, and thus maintain their quality of life. Many of the courses reviewed in this chapter seem to accomplish this objective by updating the drivers’ knowledge in certain critical areas related to safe driving. These include for example such topics as the age related health impacts on driving performance and compensatory measures seniors can take to offset these effects when driving.

On the other hand, relatively few courses identified through the research for this study offer behind the wheel training, as an integral part of their program. One exception to this trend, along with a few other programs, is the Mature Driver Workshop offered by the Traffic Improvement Association in Michigan. With this course, students can receive advice on the way they applied the theory of the course to their driving practices on the roadways. Moreover, older adults taking this course are evaluated in terms of their Useful Field of View (UFOV), the visual/perceptual ability to see and react to potential hazards while driving. Perhaps such evaluations may become more common in the future along with behind the wheel training, should these tools encourage seniors to take certain measures that lead to significant reductions in crash rates.

Still, there seems to be considerable value in emphasizing driving skills/knowledge. After all, some seniors may not have taken a driver education class since their teenage years, which could have been sixty years ago. Over such a time period, new techniques for safe driving may have emerged with the changing technologies of vehicles and infrastructure of the roadways. For example, in order to be safely protected by an airbag in a collision, seniors should know to place both hands at the bottom of a steering wheel to avoid getting injured from the deployment of the air bag (AAA, 2006).

At the same time, however, the overall benefits of increased skills/knowledge about driving are unclear. Perhaps, for example, some older adult students may assume since they learned about driving tips in adverse weather, they can now travel safely in such conditions. Such thinking could result in feelings of overconfidence and not taking the proper safety precautions.

On the other hand, older driver courses could make seniors more aware of their limitations. For example, through some self-assessment techniques they discover they are experiencing difficulties with making left hand turns. In this case, they learn of certain self-regulation strategies, which if properly applied are likely to reduce their crash risk.

IMPLICATIONS FOR PUBLIC POLICY

Nonetheless, if results indicate significant reductions in crash rates from such programs, older driver education may have a critical role to play with senior driver mobility in the 21st century. At the same time, ensuring the effectiveness of the courses will depend ultimately on the motivation of the students to participate and apply the lessons they learned when driving. Whether insurance discounts remain the best tool for raising enrollment levels remains an open question (at least among the research surveyed for this thesis) that is explored further in chapter 6.

At the same time, government may have a critical role to play in the administration and content of such courses. There may be a significant benefit from a public health perspective for government not only to regulate the curriculum of the programs, but also to subsidize those programs that have tangible benefits with safety of older drivers on the roadways. Perhaps, assuming such results are achieved, society may want to enact regulations requiring adults over a certain age to take such courses. Of course, the political feasibility of such a solution in the United States is highly dubious. In that case, government could perhaps play a more passive role with overseeing the courses and even certifying various programs, much like the DMV of California. Moreover, government or commercial entities want to provide certain incentives to participate and offer such programs if older driver education indicates any degree of considerable effectiveness and success in reducing collisions among the aging population.

FUTURE RESEARCH

To ultimately determine these public policy implications, additional research is necessary on older driver education in the United States. For one thing, more information could be collected on the courses already identified in this chapter and on other programs that may exist in the United States. More specifically, future research could focus on the already numerous classes offered by law enforcement throughout the country that were not completely covered in this study (National Highway Traffic Safety Administration, 2003). In addition, the program Mature Driver Workshop should be studied further because of its

unique features such as UFOV testing and behind the wheel training. Ultimately, the focus such future research efforts would be to determine the effectiveness of these classes in lower the crash risk of seniors, either directly or through more indirect pathways like self-regulation and/or visual/perceptual skills like UFOV.

Chapter 5 - A Cross-National Examination of Older Driver Safety

Education

Older driver education is not just a phenomenon unique to the United States. Particularly, in many highly motorized states of the world senior populations are growing and driving more often, due to advances in medicine and land-use patterns less amenable to alternative transportation. In some ways a response to the increasing challenge of driver longevity, older driver education has emerged in some of these nations. These international classes are in many ways similar to their US counterparts since many of same motivating factors exist across borders. In particular, the incentives to provide older driver education primarily stem from changes in the roadways, driver, and the vehicle; these developments are described further in chapter 2. On the other hand, certain aspects of the content and features of the international courses are unique, compared to the American programs.

RESEARCH ON INTERNATIONAL OLDER DRIVER EDUCATION

Despite such international developments, however, there seems to be a dearth of academic research on the content, delivery, and structure of older driver education in developed countries. From the research conducted for this chapter, not one study has been identified comparing older driver courses internationally. This state of the research contrasts with the considerable studies that have already been done on the efficacy and content of younger or novice driver education internationally.

This chapter is an attempt to help initiate that research effort on international older driver education by describing any courses or training programs outside the United States that are available for older drivers. To research these international trends, the nations that were surveyed were confined to the highly motorized industrial nations that comprise the Organization of Economic Cooperation and Development or OECD. Given higher personal income levels within the OECD, traveling by private cars tends to be more prevalent than in developing nations. Moreover, due to higher life expectancies on average and declining fertility rates, older adults are present in greater proportions within the OECD bloc than in

other parts of the world (OECD, 2001). Thus, based on these relatively high rates of motorization and larger senior populations, only countries within the OECD were surveyed to determine whether they offered any driver training programs for older adults.

As a starting point to the research, the embassies or consulates of various OECD member states were initially contacted by email and/or telephone. The staff members of these institutions were asked whether older driver education courses existed in their country. To help with establishing research leads, inquiries were also submitted about potential websites or other contacts in their home country that might have further information on this topic.

In addition to calling the embassies, an online search was conducted to identify any driving courses for older adults in OECD countries. Among many research leads, the primary websites reviewed were those of the national transportation departments or ministries, motor vehicle agencies, and the motor clubs. For countries where English was not the primary language, individuals with some fluency in that particular foreign language assisted in the research effort.

Partly attributed to the translation challenges, there were still considerable difficulties with the research of international older driver education that created certain limitations for this study. For one thing, language barriers significantly limited the breadth of data that could be researched. The strategy of calling the embassies was partially chosen to work around this issue, but embassies of English speaking countries were contacted as well to confirm certain information. Certain foreign offices quickly responded to the requests for information, but there was considerable delay or no responses from other embassies, perhaps due to the volume of calls they were already receiving. For embassies that did respond, the staff handling this matter were uncertain whether such programs existed, although they provided some promising leads. On the other hand, some embassies reported not having any programs for senior adults, but then through online research courses were indeed identified. Perhaps due to some language issues, some of the staff members may not have properly understood the questions they were asked about older driver education. Finally, due to time constraints, a remainder of OECD countries that included Greece, Hungary, South Korea, Luxembourg,

Mexico, Poland, Portugal, Slovak Republic, and Turkey were not surveyed for older driver education programs.

Given these complications, the programs described in this chapter may not accurately reflect the latest information on these courses. This information is only current up to January 2006, when the research was completed. Also, since information about certain programs was not in English, there may be certain errors with the translation of the various course descriptions. Of course, due to some of these language barriers, more coverage is extended in this chapter to courses from English speaking countries. Furthermore, most of this research is based on online materials (e.g., websites, documents) and from interviewing various individuals who were from the countries of interest. Due to time constraints, every sponsoring organization/agency could not be questioned to verify with absolute certainty the latest versions of the course are covered in this chapter. In addition, some descriptions of the older driver programs may lack specificity. This does not reflect the author's intention to be vague, but rather a lack of information about a particular course.

Also, the structure and organization of this chapter is extremely similar to that of chapter 4. While there are substantial differences, these international older driver courses are addressing similar issues such as the effects of aging on driving and rules of the road. They also are alike with certain operational aspects, such as with auto club organizations sponsoring the courses. Thus, the findings on these programs are presented using a similar approach to the previous chapter, with respect to curricula and administrative elements.

F i n d i n g s

From information gathered through the embassies and online research, older driver education has been identified for 12 nations of the OECD. Among those countries, there are a total of **25 driver training courses** were confirmed through the research. A summary of these findings is outlined in a matrix that can be found in the Appendix. For other member states, either their respective embassies reported having no such programs or not enough information

could be gathered (due to difficulties described later in this chapter) to reasonably conclude older driver training programs existed these countries.

In Table, the table columns or fields include the more obvious details of the program such as the program's country, class name, and the sponsoring organization. The field "Method of Delivery" denotes the pedagogy for conveying the information in the course such whether the material is presented online or in a classroom setting. Another column to the right is "Duration", which indicates the minimum hours required to complete the course.

In further examining the table, one may notice there is substantial variation and yet some similarities among these programs. This chapter characterizes these patterns of the international older driver education courses in the context of the following set of categories or factors:

- Sponsorship and Delivery
- Motivations to Participate in Older Driver Education
- Recommended or Required Age of Driver
- Cost and Fee Structure
- Pedagogy, Course Delivery
- Content

Another table in the Appendix provides a summary of course characteristics by country and program name in reference to the above factors. If a certain entry is left blank in the matrix characterizing the older driver programs, it does not necessarily mean that a particular characteristic does not apply to the course. It may also mean that the research was unable to determine if this feature is part of the course. What follows below are descriptions of the various older driver programs identified for the subset of OECD countries. The aspects of the courses described are based on the six categories specified above.

SPONSORSHIP AND DELIVERY

The first category for characterizing the courses is sponsorship and delivery, which describes whether the organization/agency providing or sponsoring the course is also delivering or

teaching of the course. The other situation would be where the course sponsor out-sources the delivery of the course to another partner organization or provider. In this discussion, a sponsor is an organization that provides the funding and/or planning for the course.

Unfortunately, not enough information was gathered from this research effort to make a conclusive determination on the sponsorship or delivery of each older driver education program. For many older driver education programs, it seems the sponsoring organizations also handle the delivery aspect.

Among the courses surveyed for this chapter, there is one exception, however, to this pattern. In New Zealand, the older driver education program “Safe with Age” has different organizations handling the sponsorship and delivery of the course. The course is provided by the country’s Land Transport Safety Authority, which is the road safety organization that is part of the ministry of transport. At the same, courses are taught by local “councils” of Age Concern, which is a non-profit organization for “promoting the quality of life” of the older person (Age Concern New Zealand).

A similar arrangement occurs with the “Drive Wise Seminar” in Canada, although for this program the sponsorship and delivery roles are reversed. The organization that manages and supports the course is the non-profit Canadian Centre for Community Safety or CCCS. On the other hand, a government agency assumes the delivery role. The course is taught by the Ontario Provincial Police who teach older adults for one to two hours on the “preventive measures against the most likely causes and circumstances of collisions” (Drive Wise).

Type of Sponsoring Agency

Perhaps with a greater degree of variation than the sponsorship schemes are the types of organizations that administer the international older driver courses. They vary across the 25 programs identified ranging from private industry to government, and some of those findings are described further below.

In Japan, driver refresher courses for the elderly are directed by the government agency National Public Safety Commission. The course, mandatory for older adults 70 years and over, involves a driving aptitude test administered on a computer simulator (Personal Interview, 3/12/06). Moreover, these senior motorists are provided with on-road training to enhance their practical driving skills.

In Germany, with the course “Mobility at Any Age? But Safe!”, the sponsoring agency is more independent of the government. This nationwide program is administered by the non-profit organization DVR. For two hours, seniors can learn about such topics as the psychology of driving and the operation of certain vehicle technologies like Electronic Stability Control (ESC).

An older drivers’ course, which also originates in Germany, is “Seniors Behind the Wheel”. But for this program the sponsor is the German Auto Club, ADAC, an organization from the private sector. One of the topics covered in this 4 day class is the medical and psychological factors of driving, in addition to other lessons, which will be described in later sections of this chapter.

MOTIVATIONS TO PARTICIPATE IN OLDER DRIVER EDUCATION

Other differences among these international programs are based on the students’ motivations to participate in the older driver courses. For some countries/regions, attendance of such programs is mandatory by government regulations; yet for many other OECD nations, attending older driver training programs is optional.

In Australia, for example, older adults are not obligated to attend a course called the Senior Driver’s Program, which is offered by the Royal Automobile Club of Victoria (RACV). The RACV is a motoring organization similar to the AAA in the States. The program, 1 hour in duration, offers “professional advice” on driving abilities (Royal Automobile Club of Victoria). Moreover, the class is “tailored to...individual needs” and covers driving on local roads or in “more complex...situations” (Royal Automobile Club of Victoria).

At the same time, for other courses attendance is still technically optional, but government driving regulations may indirectly provide very strong incentives to attend. In Switzerland, for example, a program called Courses for Seniors helps older adults prepare for a driving test given by the Swiss government every 2 years. Unless the driver receives a medical certificate from their doctor verifying their ability to drive, the test essentially becomes mandatory. Thus, the motivation to attend the “Course for Seniors” is considerably higher for those older adults who must pass the test to retain their driving privileges.

On the other hand, one course that is technically mandatory is the “Senior Driver Group Education Session” in Canada that is required for seniors 80 and older in the province of Ontario. Administered by the Ontario Ministry of Transportation, the course must be retaken by the 80+ driver every 2 years.

Compared to motivational factors, there was a shortage of data on the number of participants from each older driver program identified. By contrast, for the older driver courses in the United States, such information seems to be more widely available and more prominently advertised. For example, on the website for its driver safety course, AARP reports that it has taught more than 9 million older participants since the program’s “inception” (AARP, 2006).

Among all older driver courses identified, this type of information was found for only two Australian courses. The “Wiser Driver Course”, for example, indicated that it had 350 participants in 2002 (Elsworth, 2002). The program “Years Ahead - Road Safety for Seniors” provided by the RACV, reported that it had over 30,000 older Victorians participate in the Years Ahead presentation since its launch in 1997 (Royal Automobile Club of Victoria).

AGE

Another factor that characterizes international older driver courses is the recommended age of the participant. While some courses explicitly a certain minimum age level for their students, others are open to all “experienced drivers”. For courses with the specific requirements, the

minimum age level varies between 50 and 80 years old among the older driver education programs identified in this study.

Perhaps one of the lowest age thresholds for incoming students is the older driver course in Austria called “Driving technology and safety training for the generation 50 plus”, offered by the Austrian Auto Club. As specified by the title, this course is designed for those adults 50 years and over. In Japan, the minimum age for the participant of its older driver course is significantly higher at 70 years and over. This government-sponsored driver refresher program, offered by the National Public Safety Commission, is required for seniors in this age group. Meanwhile, in Denmark a course called “Touch Up Course for Experienced Drivers” does not specify a minimum age for its participants. This course is offered by the DanAge association, a national lobbying group for the aging population in Denmark.

COST AND FEE STRUCTURE

Cost is another factor that characterizes the international older driver education courses identified in this research effort. Some courses are free to participants, while others require a fee. For other courses, the cost has not been determined through the research so far. However, for the classes where cost data was available, the price to take these courses varied from free to around the equivalent of \$US 150.

On the higher end of the cost spectrum is the Swiss course “Driving Check for Seniors” offered by the Auto Club of Switzerland. This cost of taking this class is at 120 francs (\$US 100) for members of the auto club and 190 francs (\$US 160) for non-members. What might account for its higher cost, in contrast to the other older driver education classes, is the fact Driving Check for Seniors offers behind the wheel-training for older drivers. Moreover, the higher price may also be in response to demand from those seniors in Switzerland who must take a test to retain their driving privileges. As discussed in the previous section, this exam is essentially mandatory for older adults who cannot produce a medical certificate proving their roadworthiness.

At a much lower cost is the “Wiser Driver Course” that is offered in Australia’s southeast state of Victoria. For a fee of \$AUS 10 (\$US 7), older adults receive around 8 hours of instruction on various topics related to driver safety. The class is offered through the Hawthorn Community Education Project (HCEP) in Melbourne, Victoria.

Finally, some courses do not require any fee from the student to enroll. A course in Germany “Mobility at Old Age? But Safe!”, described earlier in this chapter, is free to older drivers or those over 60 years of age. This training program is sponsored by DVR, an organization in Germany that provides road safety advice

PEDAGOGY, COURSE DELIVERY

Just as the fees varied, so did the pedagogies of the international older driver courses that were identified. Some provided an on-road component that allowed drivers to practice their skills outside the classroom on a test track or on standard roadways. Other programs were just limited to conducting the training sessions just within an “in-class” or seminar setting.

An example of an older driver course with on-road training is the program known as the “Driver Refresher Course” of Funen County. Adults who are 65 years and older and who in enroll in the course practice driving exercises on dry and slippery roads in their own car. Also, some of the courses already mentioned thus far include on the road training such as the Senior Driver’s Program of Victoria, Australia, the “Touch Up Course for Experienced Drivers” in Denmark, or the “Driving technology and safety training for the generation 50 plus” offered in Austria.

On the other hand, examples of those programs that are taught exclusively within a classroom or seminar setting include some of the courses discussed above. These include such programs as Safe with Age in New Zealand, Wiser Driver Course in Victoria, Australia, and the Senior Driver Group Education Session in Ontario, Canada.

While many of the courses are taught in an in-class environment, there is considerable variation in the length of instruction. Some older driver education programs were relatively

short in duration only lasting up to 2 hours. The courses that were of “middle” levels of duration varied between 2 and 6 hours. Finally, those programs of the longest length had a duration magnitude greater or equal to 6 hours.

One such course on the shorter duration scale is the national program “Years Ahead - Road Safety for Seniors” taught in Australia. The length of instruction is only around 60 minutes covering topics on road safety issues. Moreover, this course, which is provided by Australia’s National Roads and Motorists’ Association (NRMA), is offered at no expense to organized groups of older drivers.

In New Zealand, however, a course offered to older drivers is longer in duration. The program “Safe with Age” is 4 hours in length, consisting of group and classroom sessions covering such topics as coping strategies to deal with the health effects of aging. These 4 hours of instruction can be divided between different days of the week or between different time periods (i.e., morning, afternoon) within a day.

Finally a program that requires considerably more time is the “Fitness Course for Elderly Drivers” offered in Finland. Marketed to adults 64 years and above, this course can vary in its duration between 6 and 9 hours, depending on the components selected to be covered in the course. The sponsoring agency for this program is Liikenneturva, which is The Central Organization for Traffic Safety in Finland.

CONTENT

With less variation than course length, the 25 programs identified cover a similar body of knowledge related to driver safety. Nonetheless, some exceptions exist among this pattern with less frequent issues such as new car technologies and alternative transportation. A third table in the appendix summarizes the topics covered in each of the courses offered in the 14 nations surveyed. A great deal of this material addresses the range of issues discussed below that are related to driver safety.

The Aging Process and Impact on Driver Performance

Numerous older driver courses outside the United States address the effects of health changes, associated with aging that can affect driver performance. The content of these courses ranges from addressing vision difficulties to the side effects of medication and cognitive declines such as slower reaction times. Most often, these health changes from the aging process results in declining driving performance that ultimately leads to less driver safety.

Among the courses that cover this issue of the aging process is the program called the “Mature Operators Workshop/Seniors Course” offered in Canada by the Canadian Automobile Association (CAA) of South Central Ontario. For three hours in a classroom setting, drivers are not just taught about the “physical effects of aging” (ref34), but also on such topics as new traffic regulations and “defensive driving tips”.

In addition, the Finish course already discussed above, also aids the participants' understanding of the effects of ageing on driving ability. These effects might include reduced strength and flexibility or impairment with cognitive functions like memory and attention that are essential for safe driving.

Beyond just covering the physical effects of aging, other courses also cover the impacts of prescription medication on driver safety. In the United Kingdom, for instance, the program “Arrive Alive Classic Scheme” provides advice to those drivers 50 years on this issue and other topics relevant to the “mature driver” (UK Central Office of Information, 2005). Sponsored by the Driver Standards Agency (DSA), this program consists of a one hour presentation taught by an “experienced or recently retired” DSA driving examiner (UK Central Office of Information, 2005). Besides the effects of medication on driving, others topics covered include recent legislation with highways and the increasing complexity of the road systems.

Adaptive Driving Strategies for the Older Driver

Along with covering the effects of age related health changes on driving, many of the 25 courses identified provide older drivers with strategies to adapt to these changes. They often

will instruct older adults on the necessary adjustments, to drive more safely under certain conditions. Examples of these adaptations include the practice of not driving during bad weather or avoiding difficult maneuvers such as parallel parking.

The “Safe with Age” course of New Zealand is one such program that offers adaptive driving strategies for the older driver. Participants 60 years and older collaborate in groups to discuss techniques for coping with their health changes in various driving scenarios.

In Canada, similar strategies are covered in the program “55 Alive Driver Refresher Course”, offered for adults 55 years and older. This course is provided by the non-profit/NGO Canada Safety Council, which focuses on safety education for "all aspects of Canadian Life" (Canada Safety Council). One of the topics addressed in the program are the declining vision and hearing seniors experience. The “55 Alive Driver Refresher Course” teaches seniors about ways of compensating for these physiological changes.

Driver Awareness

Just as courses instruct seniors on ways to compensate for changing health, some programs also help to make older drivers more aware of the roadway environment. This is important because roadways are constantly changing in terms of traffic conditions and types of drivers. Mature drivers should be attuned to their surroundings to ensure they can safely adapt to these dynamic conditions.

With the international courses that provide instruction in this area, most seem to focus on the interaction between cars/drivers in traffic. The German program “Mobility at Old Age? But safe!”, for example, covers potential conflicts such as lane changes that can occur between drivers while on the roadways. In Canada, the program “55 Alive Driver Refresher Course” also helps to strengthen driver awareness. The older adults are instructed on such topics as becoming more attuned to traffic hazards and anticipating the actions of other drivers.

A course in Norway called 65 Pluss also offers some instruction on driver awareness as well. Sponsored by the Norwegian Public Roads Administration, the program consists of 12 hours

of theory and 2 hours of behind the wheel the training that are usually taught over several days, according to a staff member of this organization (personal interview, 3/27/06). While students have considerable freedom in determining the content of the class, instructors typically emphasize such driver awareness topics as avoiding angry drivers and speed awareness (Ottersen, 2006).

Rules of the Road

This emphasis on driver awareness is also carried over to the less dynamic elements of driving. Some older driver education programs offered outside of the United States help to keep mature adults informed of the latest rules and regulations of the roadways. Such knowledge is important because the last driver safety class seniors took may have occurred when these new laws were not enacted or in existence. Knowing such the most current rules are often essential to safe driving and reducing the likelihood of conflicts with other drivers on the road.

One course that offers instruction on the rules of the road is the German Program “Seniors behind the wheel”, provided by the organization ADAC, which is the German automobile club. For four days, this course updates mature drivers on the current motor laws, but the in-class sessions also provide advice on self-assessment. This latter topic involves techniques for drivers to verify they are physically and mentally capable of driving

In Australia, an older driver course called “Years Ahead - Road Safety for Seniors” provides coverage on rules of the road as well. This program, offered by Royal Automobile Club of Victoria (RACV), is the original course that was adopted on a more national scale by National Roads and Motorists' Association (NRMA), which was discussed earlier in this chapter (Parliamentary Road Safety Committee, March 2002). One of the primary aims of the RACV program is to “revise knowledge of road rules” among older drivers (Royal Automobile Club of Victoria). Such topics are discussed along with others for 60 minutes where older drivers in the southeastern state of Victoria meet in a seminar setting.

Vehicle Operation and Maintenance - self-maintenance

In addition to enhancing seniors' knowledge of the laws of the road, some older driver education programs attempt to foster greater understanding among their participants of vehicle operations and maintenance. These issues are often integral to road safety. For one thing, knowing how to safely operate certain features of their vehicles like Antilock Brake Systems (ABS) could reduce their risk of injury. For another, being reasonably familiar with basic vehicle diagnostic skills such as checking the level of oil can avoid potential problems on the road that create a safety hazard for other drivers. Moreover, with more women performing vehicle maintenance from the incoming and future generations of aging adults, a greater number of older drivers will be practicing this skill.

Perhaps recognizing the value of these safety benefits, some older driver courses in the OECD bloc offer training in vehicle operation and/or maintenance. The course "50 Plus Driving Program" in Austria (described earlier in this section) provides instruction on the proper use of brakes when driving around curves or encountering other potential hazards. In Australia, the similar topics are covered, but the emphasis seems to be more on vehicle maintenance. The "Wiser Driver Course", covered earlier in this chapter, offers instruction in "car roadworthiness", which would suggest that maintenance is a key part of the curriculum.

New Car Technologies

Older driver education, at least with the courses identified for this study, is characterized by a lack of coverage on in-vehicle technologies, telematic systems such as route guidance and collision avoidance. On the other hand, the emphasis in this area seems to be more focused on mechanical safety systems such as air bags. Perhaps for the incoming generations of older drivers there could be greater coverage of in-vehicle technologies.

For now, however, the focus is more on the safety systems, rather than the emerging telecommunication devices inside the automobile. One course offered in Austria described in the previous section provides instruction on using such technologies as Electronic Stability Control (ESC), which enhances the handling of the vehicle in "critical driving situations" (Continental Teves, 2006). In addition, the mature driver program from Canada, the "55

Alive Driver Refresher course”, covers more of the conventional safety technologies such as anti-lock brakes and air bags, focusing on the operation and safety benefits of these devices (Canada Safety Council, 2005).

Self-Assessment: Driver Retirement and Cessation

Despite the value of such training and instruction on other topics, there may be a point in an older adult’s life when safe driving is no longer comfortable or safe. Recognizing the appropriate time through for driver retirement or cessation, even for only a temporary period, could be critical for avoiding potential accidents. After all, there is considerable value in knowing whether the many health changes older adults are experiencing will impact their ability to drive safely, either for a temporary or longer term period. Self-assessment is one such tool that can help make this determination.

One course that provides instruction on self-assessment is the program already described earlier, “Seniors Behind the Wheel” offered by German auto club ADAC. The Senior Driver Group Education Session in Ontario, Canada is another driver education class offering instruction on self-assessment. Enacted in 1996, this 90 minute program provides older drivers with “tools to assess” their driving and advises the students on any changes they should make to drive more safely (Ontario Ministry of Transportation). This course, which is mandatory for Ontario seniors 80 years and older, was described earlier in this chapter as well.

The course in New Zealand, “Safe with Age”, also covers the topic of self-assessment. This program, which in most cases is free to its participants of age 60 and over, provides students with “systems” to determine their driving capabilities.

Instead of just providing information on self-assessment, some older driver programs assess the student’s driving abilities directly. In Switzerland, experienced drivers can receive feedback on their driving skills in the course “Driving Check for Seniors”. In Denmark, a similar service is offered with the “Touch Up Course for Experienced Drivers”, which is the most common older driver course in the country. For \$125, the cost of enrolling in the

course, students can receive advice from the instructor on their driving skills that need improvement. In more extreme circumstances, mature drivers may even be advised to give up their license entirely.

In the United Kingdom, one service focuses more exclusively on assessment, but provides training at certain affiliated facilities. This program is called the Mobility Advice and Vehicle Information Service (MAVIS) that does not provide courses directly, but serve more as information clearinghouses or assessment centers for older drivers.

Alternative Transportation

If older adults have reached that stage of driving retirement and cessation, then alternative transportation can help to maintain their mobility. Most often, the transition can be less burdensome, if they have planned out ahead of time their mobility options if they lose their license. For example, senior drivers may want to develop a social network that could provide transportation when certain elderly adults are no longer able to drive.

Among the international programs identified, coverage on this topic is fairly sparse, at least from the information obtained on these courses. Nonetheless, one program in Australia provides information on mobility options after driving. For the course “Years Ahead - Road Safety for Seniors”, older drivers receive advice about alternative transportation services that are available, besides driving (Parliamentary Road Safety Committee, March 2002). This topic is covered at both the national level with the version of the program sponsored by Australia’s National Roads and Motorists' Association (NRMA), and regionally with the course that is provided by Royal Automobile Club of Victoria (RACV).

Implications and Future Research

From the 25 courses identified among the 14 OECD nations, there appears to be a commitment to offer older driver education among highly motorized countries. Nonetheless, many of these programs seem to be not as widely and intensely marketed as their US counterparts. For example some do not have dedicated websites with detailed information about the content or pedagogy of the course. This may be attributed to the fact the course

sponsor/provider does not have the web presence and/or connections of a large organization like AARP, which administers the largest older driver safety program in the United States.

At the same time, with those states in the OECD that offered older driver education, there is substantial variation among the courses. The differences are based on such factors as the course content, cost and fee structure, duration of classes, the administration of courses (e.g., government vs. public service organization, national vs. regional), and the age requirements of the “older adults”.

Nonetheless, many of the programs seemed to address the motivations for having older driver education in the first place. A substantial number of courses addressed such vital issues as learning about new tech, developing an awareness of roadway conditions, and compensating for age related health changes.

IMPLICATIONS FOR SAFETY

With these research limitations, there remains considerable uncertainty with certain implications of this study. On the issue of safety, whether international older driver programs are effective with improving driver safety (i.e., lowering accident rates among older drivers) is still an open question. With the research supporting this chapter, no findings have so far been identified that have proven significant reduction in crash rates from taking these courses.

Moreover, there is still a possibility that such programs may even cause a driver’s level of safety to deteriorate. Since no studies have been identified discounting this effect, seniors taking older driver education courses could become dangerously overconfident about their driving skills. This could lead to older adults to drive in more risky situations for which they are unable to safely handle. After all, certain literature has pointed to such an effect with novice driver education programs (Christie, 2002). At the same time, however, such programs could make seniors aware of their limitations. Perhaps through the knowledge and self-assessment techniques they learn, older drivers become cognizant of certain health deficiencies, resulting in diminished self-confidence with their ability to drive safely.

Somehow, driver educators will have to encourage more balanced, yet realistic attitudes from their students, towards their skills behind the wheel.

IMPLICATIONS FOR COURSE DEVELOPMENT IN HIGHLY MOTORIZED COUNTRIES

Nonetheless, if certain training programs are proven effective with ameliorating driver safety, these best practices could be incorporated in other courses among the highly motorized nations. At the same time, an international association of older driver education could be formed, if one does not already exist. Such an organization could serve to promote the best practices in the field internationally and establish quality standards for older driver courses worldwide.

Of course, to expect that such programs would become identical across the world does not seem reasonable. After all, there are likely to be certain elements of older driver courses that may always remain unique internationally. For example, coverage of alternative transportation options for seniors is likely to vary depending on the viability of this transportation mode within each country. The recommended age of the participants could be unique internationally because of the variation in life expectancies among the OECD nations.

By contrast, those elements that are more tied to human nature/behavior, and less influenced by the country/nation of the older driver program, could be more universal internationally. Pedagogy or the delivery method is one such factor. Perhaps, older driver education internationally may want to incorporate greater use of simulators with on-road training, if these delivery methods are proven more effective than just hosting in-class sessions. At the same time, it would seem reasonable that certain elements of the course content could be common across the OECD. Discussing such issues as compensating for age related health changes that can impact driving or learning about the safe operation in-vehicle technologies would seem relevant to many older drivers, regardless of their nationalities.

FUTURE RESEARCH

To identify the implications on course development and other issues more concretely, additional research is necessary on international older driver education. For one thing, more information is needed on the courses already identified. Additional studies should be conducted on such aspects such as the course content, participation rates, and the effectiveness of the programs in terms of enhancing driver safety. Perhaps such information can be obtained by directly communicating with the sponsoring agencies and organizations of the courses.

Beyond collecting additional data on these existing courses, further research should be conducted on identifying additional older driver programs. This study should focus not only in the countries already surveyed, but also on those nations, within the OECD that were not reviewed in this latest research effort.

IMPLICATIONS ON PUBLIC POLICY

From additional research, studies may be uncovered that demonstrate the effectiveness of older driver education. If such findings are confirmed, then governments should lend greater support through various means towards efforts to maintain and/or expand older driver education in their respective countries. Whether such programs should become mandatory for the aging driver would most likely depend on the politics of the individual country. Nonetheless, perhaps government may want to provide certain incentives to participate and offer such programs if older driver education indicates any degree of considerable effectiveness and success in reducing collisions among the aging population.

Chapter 6 – Driver Motivations to Participate in Older Driver

Education with and without an Insurance Discount

Background

PURPOSE OF STUDY

In devising strategies to improve the overall effectiveness of older driver education, one important factor to consider is the motivation of those mature adults taking the courses. For one thing, understanding at least the type of motivations behind those taking the course can help to ensure courses address seniors' needs and in turn, seniors can more effectively learn from the material (Milton). For another, if courses are modified to address such needs, individuals will most likely have the motivation to apply the strategies, techniques, and knowledge that they gained from an older driver class. In turn, the overall effectiveness of the course is likely to increase when seniors adopt driving behaviors that can enhance their safety on the roadways.

At the same time, comparing their motivations to those of older adults not taking a driver education class could also be useful. From the perspective of the course sponsor, understanding the needs of this non-participatory group could help with making certain changes to the course to increase enrollment levels of senior drivers.

This chapter attempts to provide some insight into these issues, by examining the motivational characteristics of those taking a particular older driver course, compared with those who don't take the course. The particular course of interest is AARP's Driver Safety Program (DSP). This program is offered to adults 50 years and over, and is the "largest driver refresher course" in the nation (AARP, 2004). For additional information about the class, please refer to chapter 4 in this report.

Oftentimes, the primary reason most AARP members across the United States take the AARP Driver Safety Program is to receive a discount on their auto insurance, which many view as a

monetary gain. This finding was validated by a 2003 survey conducted by the Hartford Group and the Age Lab. Among the survey respondents who were 50 years and older, the highest percentage, 52.3%, indicated the insurance discount was their top reason for attending the class.

In some states like Massachusetts, however, no such discount is offered for taking the class. The absence of this incentive is not attributed to a certain policy of the AARP Massachusetts chapter; but it essentially results from the absence of a state statute or regulation, compelling insurance companies to offer a reduction in their premium auto insurance rates to graduates from an older driver course. This mandatory discount law is described in further detail in chapter 4.

MOTIVATION WITHOUT INSURANCE DISCOUNT AS AN INCENTIVE

This scenario in Massachusetts of not offering an insurance discount presents a unique context for analyzing the motivation behind older driver education. When such a discount is not offered, those taking the class will be guided by other incentives such as the desire to improve driving skills or to follow the advice of family/friends to attend the class. Analyzing the motivating factors in this context is one of the primary objectives of this chapter.

In gathering the necessary data, the chapter will focus on two subpopulations in Massachusetts: those AARP members who have taken the Driver Safety Program (DSP) in Massachusetts and those AARP members who never took this course in this region. Therefore, the central questions this chapter attempts to answer regarding the motivations of these two groups of AARP members are the following:

1. In the absence of an insurance discount, are there significant differences in the levels and types of motivations between those who took the course and those who never took the driver safety course?
2. What type of motivation is more dominant or has a greater affect on the students' enrollment or non-participation in the course?

3. Are there systematic differences between the two groups on variables that could influence their motivations towards taking the course? If so, then what are those particular factors where significant differences exist? *For example, are the course takers of higher income levels compared with those who do not take the course?*
4. For those who took the course, what was their primary reason for enrolling in the driver safety program?
5. What motivating factors related to older driver education evoke the strongest level agreement from each of the two groups? For example, among those who never took the driver safety course, would they be more likely to enroll if a family or friend recommended the program?
6. How have seniors driving skills, level of confidence towards their driving changed since taking the course?

INTRINSIC AND EXTRINSIC MOTIVATIONS

For the questions one and two, the types of motivations applicable to taking an older driver education class fall under two categories: Intrinsic and extrinsic, which are relevant in the context of education (Vallerand et al., 1992). With intrinsic motivation, the activity itself and "the pleasure and satisfaction derived from participation" are the primary incentives (Vallerand et al., 1992). An example of intrinsic motivation is a student attending the class to experience the intellectual stimulation of an academic discussion (Vallerand et al., 1992).

On the other hand, extrinsic motivation is related to external incentives such as "rewards and constraints" (Vallerand et al., 1992). An illustration of extrinsic motivation would be studying for an exam to receive an external reward from parents or teachers. Another example, in this same scenario, would be students studying to increase their chances of being admitted into a highly competitive university.

To answer the central questions described above, a survey was conducted in the Commonwealth of Massachusetts, as part of a joint project between AARP and the MIT Age

Lab. Known as the 2005 Massachusetts AARP Member Driving Survey, a questionnaire was distributed to various AARP members in Massachusetts. The objective of this study was to assess the motivations of those taking the AARP Driver Safety Program, since Massachusetts does not have a mandatory insurance discount law for taking the class. A copy of the survey can be found in the Appendix of this study.

MOTIVATIONAL GROUPS TO SURVEY

The two subpopulations of interest in the survey correspond to the groups described for the central questions specified above. The first population subset consists of those individuals who took the AARP Driver Safety course. In this chapter, this group or stratum is known as the “course-takers”. In turn, the “non-course takers” are second group composed of those AARP members who never took the AARP Driver Safety Program.

INFORMATION OBJECTIVES OF SURVEY

Given these group definitions, the primary data to collect from the first two questions above revolves around the extrinsic and intrinsic motivations among the course takers and non-course takers. In particular, the main parameters of interest include the levels of these motivation types within each group. These indicators are primarily determined by the average level of agreement among each group with a set of statements, corresponding to one of the two motivational categories. For example, one survey item assessed respondents on their agreement with the statement: “I am interested in how I can improve my driving”, which is under the category of intrinsic motivation. Of course, the survey analysis is not reporting on the respondents' motivation types in general, only in the context of older driver education.

Other data of interest include the systematic differences between the two groups, ultimately to provide greater insights into other variables that could be related to their motivations. For example, one of those differences would be the driving concerns (e.g., making left turns, driving in unfamiliar places) between the course takers and those who didn't take the AARP Driver Safety Program in Massachusetts. If the course-takers were more concerned about driving, perhaps this factor may have played a greater role in their decision to take the course.

Other systematic differences are based on additional variables such as demographics and health conditions. One of the most important factors differentiating the groups' is their level of motivation towards a potential insurance discount. Such a finding could provide insight into the degree of influence such a discount has on their motivations to attend the class. For example, if this factor does not significantly affect an older adult's decision to participate, then offering an insurance discount may not be the most optimal incentive for maximizing the AARP course turnout, at least in Massachusetts.

For the central questions four and five above, the focus is less on the two groups' overall motivational characteristics, but more on their motivations and/or disincentives towards the AARP DSP course in Massachusetts and older driver education/training in general. For taking the AARP course, the data of interest is on the particular intrinsic and extrinsic factors that prompted the respondents to enroll in the program. For older driver education in general, the responses are analyzed in this context as well.

At the same time, however, information is being sought related to the samples' overall experiences with driving and learning, based on responses to the set of motivational statements described earlier. One example would be their level of agreement with the statement "I like going to places or doing things where I can meet new people". Another statement from the survey is "I don't have time right now to take a driver safety course", which indicates a possible disincentive to participating in such a program. Ultimately, the findings on such questions could provide helpful insights for creating/modifying an older driver course, which in the end is more motivating and effective for older adults.

The final central question above relates to the respondents' assessments of the knowledge they may have gained from a Driver Safety Program, confidence in their driving abilities, and change in driving skills. Perhaps if they feel there has been insufficient progress in these areas, they may be less inclined to take another driver safety class.

SURVEY DESIGN/METHOD

To satisfy these information objectives, the survey was designed as a non-experimental, observational study where participants were selected using a stratified random sampling technique. The sample population consisted of members age 50 and above from the Massachusetts section of AARP. From this sampling frame, the following two mutually exclusive strata were formed based on the groups described above: Those AARP members in Massachusetts who took the course and those AARP members that didn't take course. The "non-course taker" stratum was formed by random sampling. The group of "course-takers" included those Massachusetts AARP members who took the course at least once during the past 4 years prior to 2005. Each stratum is referred to as a motivational group in this chapter.

Sample

While the sample is limited only to Massachusetts AARP members, the survey could not be generalized to senior adults in the United States and not even to all AARP members. One reason for this limitation is that the demographics of this sample are significantly different from those of the overall US senior population. For example, some initial frequency tests on the survey data indicated that 93.5% of the respondents were white and 46% had income levels at \$40,000 or above. Moreover, Massachusetts AARP members taking the course are not motivated by the insurance discount, which is the primary incentive for enrolling in this program in other states.

On the other hand, the sample is representative to AARP members in MA and other states where an insurance discount is not offered for taking the course. In a state with a mandatory insurance discount, the survey could also be generalized to older adults who are intrinsically motivated. After all, if they derive "pleasure and satisfaction" from participating in the Drive Safety Program, the reward of an insurance discount should not influence their decision to take the course. Therefore, their motivations would be more similar to those members in Massachusetts not receiving the discounts on their premiums.

Parameters measured

The questions that the respondents answered in the survey were related to the overall information objectives of the survey, as described above. For the most part, they were intended to measure the following 5 parameters about the participants:

- Possible Motivations to participate in AARP DSP course
- Driving Concerns
- Demographics
- Driving record
- Health

To measure the first parameter from the list above, the survey presented the respondents with a series of statements on topics related to extrinsic and intrinsic motivations. The second parameter, driving concerns, was primarily gauged from a series of questions on certain driving situations like driving long distances or driving during the night. The fourth parameter above, driving record, was determined by such information (collected anonymously) as the frequency of moving violations or involvement with accidents. For additional information on the survey questions, please refer to Figure on page 174 in the Appendix for the copy of the 2005 Massachusetts AARP Member Driving Survey.

Delivery of Survey

Created from these design guidelines and information objectives, the survey or questionnaire was distributed on December 5, 2005 to Massachusetts AARP members, according to the sampling techniques described above. The base sample population was composed of 4,278 AARP members that included two strata: 1771 members who took course (within the past 4 years of 2005) and 2507 members (randomly selected) who did not take course.

RESULTS

By February 2006, the respondents returned the mail survey with their answers to the questionnaire. From the initial sampling frame consisting of 4,278 AARP members, around 1,151 individuals replied to the questionnaire resulting in a response rate of approximately 27%.

As discussed previously, bias was present in the sampling frame, primarily attributed to the lack of sample representativeness. Since the population was limited AARP members, the respondents were not representative of senior adults in the United States that would be eligible for older driver education. Instead, the sample was drawn from a population that tends to be predominantly white, with higher levels of income, as described previously.

In addition to sampling frame bias, some degree of response bias is likely to have existed in this survey as well. A subset of participants may not have understood questions correctly or accurately recalled events, to be able to provide valid answers. For example, a very small portion of the sample answered questions about the AARP driver safety course, when in a previous question they reported never having taken such a course.

A N A L Y S I S

ANALYSIS METHOD

Despite some bias in the sample, the survey data was still valuable because a reasonable percentage of answers were valid and results could still apply to a sizable portion of older adults. That segment of the aging population represented by the sample consisted of AARP members in states without insurance discounts and those who were intrinsically motivated, as described earlier in this chapter.

Data Preparation

In analyzing the survey, the first step involved assigning various questions and/or statements of the survey to their respective categories of extrinsic or intrinsic motivation. The determination was made primarily based on the definitions for these terms defined earlier in this chapter.

Furthermore, the survey data for some of these variables were rescaled to ensure all relevant statements/questions could be accurately compared for determining the respondents' motivations. This process involved recoding the answers to be on a 0 to 1 scale. According

to this range, 1 corresponded to the strongest level of motivation while those values at or near 0 indicated the weakest levels of motivation. Before the rescaling, the answers to some items ranged from 1 to 4 and while for others the possible responses could yield values of 1 through 5.

Based on the rescaled questions, two variables were created, one to represent the overall level of intrinsic motivation among respondents and another to represent the overall level of extrinsic motivation. This pair of variables was calculated for each of the motivational groups. In other words, the course takers and non-course takers had each their own set of intrinsic and extrinsic motivational variables.

Computing such a value for each respondent involved calculating the overall average response to the set of questions pertaining to a particular motivation category. Those respondents who did not answer a minimum number of questions were not factored into the determination of these variables for extrinsic and intrinsic motivation. For example, respondents who did not answer at least 6 of the questions/statements that corresponded to extrinsic motivation were not included in the analysis.

TEST METHODS

Following the derivation of these variables, summary statistics were computed for each stratum to obtain their motivation levels. For example, for the variable representing extrinsic motivation, a mean value of 1 would indicate that respondents on average are highly extrinsically motivated in the context of older driver education.

To more accurately assess the relationships of these motivational factors, Pearson correlation tests were run. The strength of the linear relationship between intrinsic and extrinsic variables was considered significant at the .05 level.

Tests on the variables themselves were conducted as well. In particular, to measure the internal consistency of the various questions pertaining to a particular motivation category, a reliability test was conducted based on the alpha model. This model was chosen because the

same questionnaire was only administered once to each respondent. Of particular interest was the standardized alpha value that was used to benchmark the general relationship among these questions. A standardized alpha value greater than .40 was considered acceptable for the purposes of this survey analysis.

After the variables were determined to be reasonably valid measures of motivation for this survey, the levels of extrinsic and intrinsic motivation were compared, testing for significant differences at the probability level of .05. In particular, a two-tailed “paired t” test was conducted within each stratum to determine whether there was a significant difference between the two types of motivation within each stratum. This test was selected because the means were compared within a single group of either the course takers or non-course takers. On the other hand, to measure motivation levels between the two strata, a two-tailed, independent samples T test was conducted at the probability level of .05. In conducting this test, it was assumed that the groups of course takers and non-course takers were independently sampled.

Beyond determining significant differences, a form of regression analysis was also performed to determine the relationships of motivational types (i.e., extrinsic, intrinsic) to the probability of taking the course. In other words, if participants had greater extrinsic motivation, would they be more likely to enroll in the driver safety program? A probit model was selected because the dependent variable, whether or not the respondents took the older driver course, produced a binary outcome. The independent or stimulus variables that were measured in this logistic regression analysis included the factors of age, health, motivational types (i.e., extrinsic, intrinsic), and gender. Each of these factors was hypothesized to have a statistically significant effect on the response, of whether the participant took the AARP driver safety course.

To identify possible factors that could have influenced the respondents’ motivations towards older driver education, the two strata were analyzed for systematic differences on various issues. For example, tests were run to determine whether course takers and non-course takers differed significantly on their level of motivation towards the insurance discount at the .05

level. To measure this two way association, the cross tab tables were generated. From this table, chi-square statistics at 2 sided significance levels were computed since the strata were formed based on the nominal variable of whether or not respondents took the course.

Finally, to assess the motivating factors (towards of the AARP Driver Safety Program and older driver education general) and confidence levels, cross-tabulation tests were conducted on the relevant variables. In particular, the response frequencies to each of the questions were categorized based on whether or not the participants took the AARP Driver Safety Course. With this testing approach, the percentage among each particular group that agreed with a certain statement could be determined. For example, these findings could indicate the greatest percentage of non-course takers would more likely take the course for an insurance discount. In turn, such a result would suggest this incentive is a prominent motivating factor towards older driver education for this stratum.

In determining the each groups levels of agreement with the motivational statements, two types of percentages were added. The first was the proportion of those **strongly agreed** and then the proportion that **somewhat agreed** with the driving related statements. For example, to calculate the total percentage of course takers who “feel satisfaction” when they learn new things, the percentage of those STRONGLY agreed with this statement were added to the percentage of those that SOMEWHAT agreed with the statement. This total percentage then indicated the overall agreement with the statement.

Limitations of Methods

For the Cross Tabulations used to measure systematic differences, however, chi-squared statistics could not control for other factors that may have more greatly affected the response variable. These factors may even be more influential than the independent variable in the cross tabulation table. For example, older adults may enjoy driving less (the dependent variable) not so much because of having taken a driver safety course, but because of the health changes associated with aging. In this case, age is the confounding variable that could have been controlled and measured through regression testing, which was not conducted in the survey analysis for this chapter. Another limitation of the chi-square test is with the type of

significant difference it indicates between the two groups. Since it was testing at a two sided level of significance, the result does not indicate the direction or specific nature of that relationship. For example, the chi-square test may report that course takers and non-course takers significantly differ in their income, but it does not indicate which group has the significantly greater income. This same limitation also applies to both t-tests measuring significant differences between the intrinsic and extrinsic motivations both within and between the strata. After all, the tests were two tailed indicating that the difference between the mean values could occur in either direction.

Findings

MOTIVATION LEVELS

Within each Group

From running the statistical tests described above, the initial results indicated significant differences with the levels of motivation within each stratum. For the group of adults who graduated from the AARP DSP in Massachusetts, paired t-tests demonstrated this stratum had significantly different levels of intrinsic motivation (.8854) over the levels of extrinsic motivation (.7928) for this same group. Tests produced a similar outcome for the group that did not take the DSP course in MA. The level of intrinsic motivation among the non-course takers was .7736 compared with a level of .6627 for their extrinsic motivation. The table below indicates those significant differences (in bold, larger text) within each group.

Table A. Paired Samples Test to Determine Significant Differences in Motivation Levels WITHIN each group

Strata		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	df	Sig. (2-tailed)
					Lower	Upper			
Non Course Takers	EXTRIN	-.1124	.17002	.00885	-.1298	-	-12.703	368	.000
	- INTRIN					.0950			
Course Takers	EXTRIN	-.0912	.14220	.00578	-.1026	-	-15.795	605	.000
	- INTRIN					.0799			

PLEASE NOTE: In the table above, EXTRIN represents a variable measuring the extrinsic motivations of the group while INTRIN represents the level of intrinsic motivation.

Motivation Levels between Strata

Between the strata, there were significant differences in motivation as well. With the independent samples t-test, results indicated the course takers had levels of intrinsic and extrinsic motivation (in the context of driver education) that were significantly different from those of the non-course takers. Intuitively, such an outcome seems reasonable with the absence of the insurance discount in Massachusetts. After all, without this incentive, course-takers were more likely to have been guided by internal motivating factors when choosing to enroll in the program. Once again, the table below indicates the significant differences between the strata in bold, larger text.

Table B. Independent Samples Test Comparing Levels of Motivation between Strata

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
EXTRIN	Equal variances assumed	37.03	.00	12.713	974	.000	.1301	.01023	.11001	.15018
	Equal variances not assumed			11.803	606.947	.000	.1301	.01102	.10845	.15174
INTRIN	Equal variances assumed	60.73	.00	13.592	1006	.000	.1118	.00822	.09564	.12792
	Equal variances not assumed			12.408	591.113	.000	.1118	.00901	.09409	.12948

PLEASE NOTE: In the table above, EXTRIN represents a variable measuring the extrinsic motivations of the group while INTRIN represents the level of intrinsic motivation.

Probit Analysis

As it turns out, from the probit analysis, both intrinsic and extrinsic motivations have significant positive effects with the respondents' choices to take the course, as the Table C below indicates. Within the model, the variable representing intrinsic motivation is statistically significant with a probit coefficient of 2.337. For the extrinsic factor, the value is slightly lower at 1.854, but still significant as well. Interestingly enough, from the probit analysis, age appears to have significant negative effects on the choice to take the course. For example, the coefficient for those adults between 55-64 is -1.86, much lower than the value for higher age ranges of senior adults. This indicates the possibility that age may be directly proportional to the probably of taking the driver safety course (i.e., the older the participants, the more likely they are to take the class). In the table below, variables that have significant effects on taking the course are highlighted in bold, larger text.

Table C. Results of Probit Analysis on Potential Variables Affecting Decision to take Course –

Variables	Coef.	Std.Err.	Z	P> z 	[95% Conf.Interval]	
Extrin	1.854324	0.338198	5.48	0	1.191469	2.517179
Intrin	2.337731	0.422648	5.53	0	1.509356	3.166105
Health	0.021802	0.058791	0.37	0.711	-0.09343	0.13703
Gender	-0.4643	0.100335	-4.63	0.66095	-0.26765	
Age:45-54	-2.83801	0.544317	-5.21	0	-3.90485	-1.77117
Age:55-64	-1.86186	0.243155	-7.66	0	-2.33844	-1.38529
Age: 65-74	-0.73281	0.230687	-3.18	0.001	-1.18495	-0.28068
Age: 75-84	-0.33793	0.231946	-1.46	0.145	-0.79254	0.116671
Constant Term	-2.00175	0.444579	-4.5	0	-2.87311	-1.13039

PLEASE NOTE: In the table above, EXTRIN represents a variable measuring the extrinsic motivations of the group while INTRIN represents the level of intrinsic motivation.

CONSISTENCY AND CORRELATIONS AMONG MOTIVATING FACTORS

In assessing the validity of the motivational assessments, additional tests revealed a moderate degree of reliability for each stratum. For the course takers, the consistency tests produced a standardized alpha of .5556 for the survey questions corresponding to the extrinsic motivation

and a standardized alpha of .5496. Thus the sets of questions to measure extrinsic and intrinsic motivations were around 55% reliable for this stratum, a reasonably consistent measure for a sociological study of this nature.

For the non-course takers, the standardized alpha values were higher with .6989 for intrinsic motivation and .7292 for the set of questions pertaining to extrinsic motivation. Such results would indicate that the tests assessing motivation among this stratum were around 70% reliable, approximately 15% higher than the course takers stratum.

Other statistical tests indicated significant correlations between the variables, representing the levels of extrinsic and intrinsic motivations within each stratum. Among those who took the course, the Pearson correlation coefficient was at .318 indicating a positive relationship between responses to extrinsic motivating factors and those of intrinsic motivating factors. For the stratum of non-course takers, the coefficient was higher at .505, indicating an even stronger relationship between responses corresponding to these types of motivations.

RESULTS ON SYSTEMATIC DIFFERENCES BETWEEN STRATA

Differences in Attitudes towards Insurance Discount

Besides differing significantly in motivation types and levels, there were also systemic differences between the motivational groups on various issues. One such factor is the incentive of an insurance discount to take the course. As noted above, however, other variables besides the insurance discount like age or income were not controlled in this test and could have significantly affected the dependent variable (choosing to take the driver safety class). Given these limitation, the survey analysis still revealed some interesting results about this incentive, which is the primary motivating factor for taking the course in other states besides Massachusetts. Treating the insurance discount as an independent variable, around 70% of respondents who strongly agreed with taking another driver safety course for an insurance discount, were composed of course-takers. On the other hand, when taking the course becomes the independent variable, test results indicate the insurance discount is a

significant incentive for the non-course takers sampled in this survey. For example, around 81% of non-course takers reported at least some level of agreement with the idea of taking a driver safety course for an insurance discount. Those results, which are highlighted in bold, larger text, are further detailed in the table below.

Table D. Cross Tabulation of Taking Driver Safety Course with Motivation towards Insurance Discount

		If I could get an insurance discount, I would be more likely to take a [or another] driver safety course				Total	
		Strongly agree	Somewh at agree	Somewh at disagree	Strongly disagree		
Have you ever taken a driver safety course offered by AARP?	Yes	Count	362	196	36	23	617
		% within Have you ever taken a driver safety course offered by AARP? – TAKING THE COURSE IS THE INDEPENDENT VARIABLE	58.7%	31.8%	5.8%	3.7%	100.0%
		% within who would take course for insurance discount – THE INSURANCE DISCOUNT IS INDEPENDENT VARIABLE	69.0%	55.5%	46.2%	56.1%	61.9%
		% of Total	36.3%	19.7%	3.6%	2.3%	61.9%
	No	Count	163	157	42	18	380
		% within Have you ever taken a driver safety course offered by AARP? (<i>Taking the course is the independent variable</i>)	42.9%	41.3%	11.1%	4.7%	100.0%
		% within who would take course for insurance discount (<i>independent variable</i>)	31.0%	44.5%	53.8%	43.9%	38.1%
		% of Total	16.3%	15.7%	4.2%	1.8%	38.1%

Table D (Continue). Cross Tabulation of Taking Driver Safety Course with Motivation towards Insurance Discount

Total	Count	525	353	78	41	997
	% within Have you ever taken a driver safety course offered by AARP? – TAKING THE COURSE IS THE INDEPENDENT VARIABLE	52.7%	35.4%	7.8%	4.1%	100.0%
	% within who would take course for insurance discount – THE INSURANCE DISCOUNT IS INDEPENDENT VARIABLE	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	52.7%	35.4%	7.8%	4.1%	100.0%

Other Systematic Differences

With demographics, no significant differences between the two strata emerged on the basis of race, gender, marital status, and education. There was an exception, however, with age. For instance, around 75% of individuals between 55-64 are composed of non-course takers. At the same time, approximately 67% of individuals between 65 to 74 and 81% of those between 75 to 84 took the course. Results seemed to suggest that those in the course taker stratum are not only significantly different in age, but also older than those who did not take AARP DSP. Nonetheless, since chi-square tests do not indicate the direction of the difference, additional statistical analysis would be needed to verify this relationship.

Income was another demographic where the two strata significantly differed. Chi Square tests confirmed that around 75% of those with less than \$25K in total household income (before taxes) took the course. On other hand, 67% of those respondents \$150,000 or more didn't take course. Such results confirm that wealthier individuals were more frequent in the non-course taker group.

Other significant differences emerged with the incidence of certain health problems reported by the strata. For arthritis, as an example, around 67% of those respondents who reported having this medical condition were course takers while the rate was approximately 32% for non-course takers. These differences were significant as were the incidences of degenerative eye conditions. In particular, around 72% of those who reported such eye diseases were the course takers. Chi square tests also indicated that significant differences with the incidence memory loss, since around 74% of those with this health problem were course takers. Perhaps related to these above medical conditions, rates of exercise differed significantly between the two motivational groups. Among those respondents who exercise at least 3 times per week, 67% are course takers, a significant difference with the non-course takers. Evidently, any of the differences identified with health status could have been attributed more to age, which was not controlled in the statistical analysis of this factor. Finally, with other medical conditions like high blood pressure or diabetes, the groups did not significantly differ.

Another response variable that could have been affected by confounding variables is the respondents' concerns about driving. Even without controlling for age and other variables like health conditions, significant differences emerged between the two strata on this characteristic. Overall, around 74 % of those respondents who did not enjoy driving, for example, have taken a driver safety course offered by AARP (i.e., course takers). Furthermore, around 75% of those respondents concerned with night driving are course takers as well. In fact, significant differences between the two stratum were identified for all other driving concerns, except with their concerns about the behavior of other drivers.

Finally, another significant difference between the groups is their interest in taking outside classes and participating in community activities, although other variables like age may have also accounted for this outcome. In particular, around 75% of those taking classes in community are course takers. Around 72% of volunteers are also from this same stratum. Most often, as people age, the level of participation in such activities increases, irrespective of whether they took a driver's education class.

UNCLEAR CAUSATION EFFECTS

With the possibility of such confounding variables like age, the role of predictor, response variables is uncertain in this analysis. In other words, certain causation effects are still unclear. For example, income may have a significant influence on driving concerns, since those unable to afford safer vehicles may be more apprehensive towards driving. In that case, a lack of income may be a more predictive factor than driving concerns in stimulating older adults to enroll in driver safety courses.

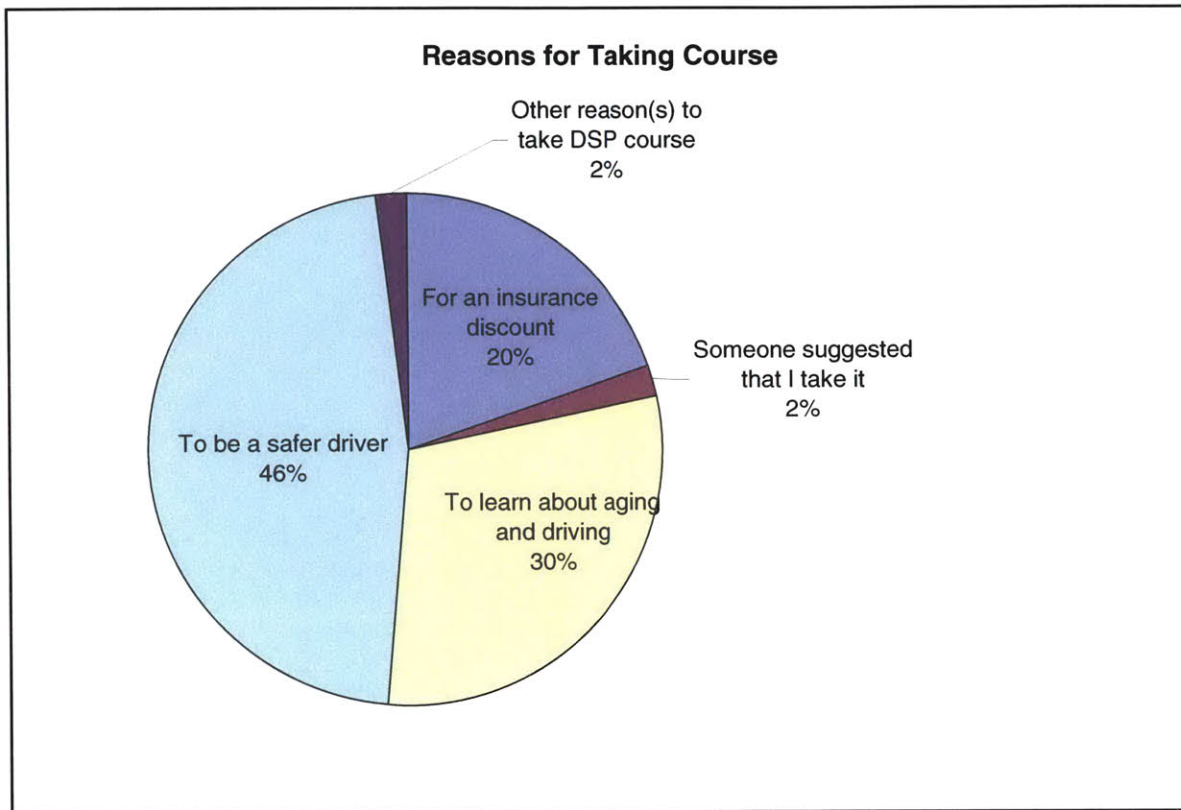
A similar uncertainty is faced with the relationships between extrinsic and intrinsic motivation. While the two are significantly correlated, this survey analysis has not established any causation between these two general types of motivating factors. Moreover, even if such a relationship exists, it is still unclear from the results of this survey which type of motivation would be the predictor or response variable relative to each other.

REASON FOR TAKING DRIVER SAFETY COURSE

But for the dependent variable of choosing to take the AARP DSP course, the main predictor appeared to be related to extrinsic motivation. Certainly, one factor that can be excluded from analysis is the insurance discount, since the commonwealth of Massachusetts does not have an insurance discount law, as described earlier in the chapter. Moreover, this state does not have any retesting requirements based on age when older adults renew license, thereby ruling out another potential factor motivating older adults to take the class.

As the pie chart indicates below, the largest percentage of course takers took the course to be a “safer driver”. This incentive is not intrinsic as one might suspect, since this factor relates to “past external contingencies” that have been internalized (Vallerand et al., 1992). In other words, wanting to become a safer driver may have been motivated by external events such as witnessing or being involved in a car accident.

Figure 4. Primary reasons respondents took their most recent AARP DSP Course



MOTIVATING FACTORS

Nonetheless, for both the course takers and non-course taker, their incentives were a combination of extrinsic and intrinsic factors. The cross-tabulation table below indicates the group's overall level of agreement (by adding the responses of those who strongly and somewhat agreed with certain statements, as described previously) with certain statements that revealed some interesting differences and similarities between the groups.

Factors Eliciting Highest Levels of Agreement from Both Groups

Apparently, both strata exhibited the highest levels of agreement with the same top three statements. They consisted of the following items that address both extrinsic and intrinsic motivational factors:

- I feel satisfaction when I learn new things.
- Being able to drive makes me feel independent.
- It's important for me to feel that I am doing what I can to make sure my driving skills stay sharp.

The last statement may be the most applicable to older driver education, although how the respondents interpreted the phrase “driving skills” is not entirely clear. Perhaps course takers were thinking more in terms of knowledge, while non-course takers associated this phrase with on-road skills such as driving in adverse weather conditions or making safer lane changes.

Motivating Statements Eliciting Highest Levels of Agreement from Course Takers

For other statements, however, the levels of agreement between the groups differed significantly. While the chi-square tests could not reveal the direction of that difference, a notably higher percentage of course takers seemed to share the following attitudes towards certain activities/events:

- I am interested in how I can improve my driving.
- I enjoy meeting others in group settings such as through taking courses or in doing volunteer work.
- Changes in health status or medications are important signs for me to think about taking a [or another] driver safety course.
- I am concerned about the impact my driving has on the safety of other drivers on the road.

Motivating Statements Eliciting Highest Levels of Agreement from Non-Course Takers

Once again, these statements above exhibit a combination of intrinsic and extrinsic motivations that relate to older driver education. On the other hand, those who have never

taken an AARP driver safety course had greater levels of agreement with a different set of statements. They consisted of the following items from the survey:

- I don't need to take a [or another] driver safety course; I'm a very safe driver.
- I don't have time right now to take a [or another] driver safety course.

The interesting aspect of the finding above is that non-course takers seem to exhibit greater disincentives towards older driver education. Of course, these reluctant feelings would not be too surprising since this group by definition has never taken a driver safety course.

CONFIDENCE

Meanwhile, these attitudes may be strongly related to another trend, which was confirmed by survey findings on the respondents' confidence levels in their driving skills and knowledge. In overall confidence on driving abilities, there were significant differences between the two groups. The frequency tests indicated that a notably (not necessarily significantly) higher percentage of non-course takers feel extremely confident about their driving. By contrast, a greater percentage of respondents who took the AARP Driver Safety Program were less assured about their driving abilities.

Another significant difference emerged with the groups' assessments on how their driving skills have changed over the last 5 years. From the cross tabs, a higher percentage of course takers felt their driving skills have improved, while for the majority of non-course takers they feel there has been no change.

For the course-takers such a result seems fairly reasonable in consideration of another interesting statistic from the survey analysis. Cross tab tests indicated that around 90% of respondents in this group feel the information they gained from the AARP DSP class has helped prevent them from being involved in a traffic accident. This finding would suggest that, although direct evidence is not confirming their assessment, course-takers found the program to be effective in terms of reducing crash risk.

Analysis of Findings

At the same time, this result is validating one of their primary reasons for taking the AARP DPS course in the first place, which was to be a safer driver. Still, the majority of course takers believe their driving skills have not changed over the past 5 years. At first, these findings may seem contradictory. But upon further examination, such a discrepancy could exist if course takers view that gaining knowledge reduces their crash risk, even though their driving skills are not improving. Yet as chapter 3 illustrates, gaining additional knowledge about safe driving, while possibly necessary, is not sufficient by itself for reducing crash risk.

One effect, however, that may result from the knowledge gain is indicated by the respondents' confidence levels. Perhaps by taking the AARP DSP course, they became more aware of their physical limitations when driving, and thus felt less secure behind the wheel. On the other hand, even without such knowledge, course takers could already have lacked confidence in their driving before taking the course. After all, they already differ significantly from non-course takers in terms of their driving concerns, which may have prompted them to enroll in the program. Of course the higher confidence levels among the non-course takers may have led to their lack of participation in the course. They may have believed that taking such a class was not worth the sacrifice, time commitment, if they considered themselves to be adequately safe drivers.

ON CONTENT OF COURSE

Despite the uncertainty of such causation relationships between confidence and course participation levels, there are still potential implications on content of older driver education from these findings on others, particularly on the motivational variables. As it stands, though, effects are limited to the subpopulations of AARP members that the sample represents. Furthermore, due to the limitations of the chi-square tests, any implication beyond just identifying significant differences such as indicating the direction of that difference is more speculative and requires further testing.

Nonetheless, for the subset of AARP members who are intrinsically motivated or live in states without the insurance discount, the survey results indicate that participation rates in the AARP Driver Safety Program could be affected by changing the content of the course to address the motivation of the participants. For example, if course takers are more intrinsically motivated the AARP Driver Safety Program may want to emphasize such aspects as the sense of enjoyment or independence that driving often evokes. On the other hand, with teaching to a more extrinsically motivated audience, more of the external benefits of the activity should be emphasized such as becoming a safer driver. The effects of addressing such needs may lead to increased motivation levels, which in turn are likely to increase the course effectiveness as discussed earlier in this chapter.

For the findings on systematic differences, there are implications as well. For example, given that the course taker stratum has health concerns that are significantly different from non-course takers, courses may want also to adjust the content in certain areas. For example, if the course takers have greater health problems, then the course should place greater emphasis on the physical limitations of driving.

As another example, with the significant differences in driving concerns between the two groups, providing more flexibility in customizing the course may be another option in enhancing motivation. As the survey demonstrated, course takers have concerns for driving that are significantly different than those who have not taken the driver safety program. Therefore, in addressing this systematic difference, perhaps greater time in the course could be allocated to topics such as left hand turns, if course takers have significant concerns about this driving maneuver. On the other hand, focusing on a different set of driving concerns may very well encourage more of the non-course takers to participate in the class.

Irrespective of the particular topics, both groups are likely to favor a course that “teaches them new things”, as indicated by their high level of agreement with the motivational statement corresponding to this idea. By contrast, older adults of both groups are likely to be

less motivated learning material they already know. Perhaps such a finding further supports the need to customize courses according to the learning needs of the students.

Finally, based upon the students' high levels of agreement with another motivational statement, older driver education might attract more students if the training modules are more focused on "keeping driving skills sharp". Further research should probe the students further on their interpretation of this statement. But if they are referring more to skills such as backing up safely or applying their ABS brakes correctly, then perhaps a behind the wheel module should be offered to strengthen the appeal of the course among older drivers.

ON MARKETING OF COURSE

Other implications from the survey analysis could extend towards the marketing of the program, particularly on how the courses are advertised. For example, already test results have confirmed significant differences with health trends between the two groups. If course takers have a significantly higher rate of medical conditions, then information about the AARP Driver Safety Program could perhaps be made available at hospitals and pharmacies. Health clubs could also serve as possible advertising forums. If for example, many of the course takers exercise at significantly greater rates than non-course takers, then pamphlets, information about the course should be made available at local gyms.

In "selling" the course to potential students, such brochures, literature should emphasize any direct or indirect safety benefits of older driver education. After all, as the above findings indicate, the primary reason that students are attending the course (at least in states that do not offer insurance discounts) is to be a "safer driver". Sponsors could then attract more students by appealing to this motivational factor. For example, older driver programs could highlight the fact that such courses can improve self-regulation skills, which in turn can reduce the probability of collisions.

In advertising such a message, however, the course sponsors should also be mindful of another group of the AARP members who have not taken the course. Many within this

stratum seem to believe they already are safe drivers from their high levels of agreement with the certain motivational statements in the survey. In this case, advertisements might emphasize that a course is needed to maintain their safe driving abilities. In particular, marketing materials should convey to potential students that certain abilities can decline through the aging process, and a course can help them to effectively compensate for such changes.

Besides health factors, the systematic differences in social factors suggest other options for marketing the course. With the results already indicating the two strata significantly differ in their volunteer rates, the driver safety program could more effectively reach its target audience at community, senior, or volunteer centers, assuming course takers volunteer more frequently. Perhaps offering the driver safety program through continuing education or community-based courses could increase its enrollment levels. This scenario assumes that course takers are taking a significantly greater amount of community classes, although only significant differences between the strata in this area have been confirmed by the analysis.

Finally, to increase participation of drivers from the non-course taker group, the program should be re-engineered to require less hours of instruction. After all, AARP members from this stratum indicated a high level of agreement with the statement: “I don’t have time right now to take a [or another] driver safety course”. Perhaps the course should be customized to present the students with the essential knowledge and skills that can help reduce their crash risk. In this way, instruction time could be minimized while increasing the likelihood that the students will more effectively retain material, since it is addressed to their needs.

One reality with the incoming aging population is that more adults will be working into their more senior ages. The sponsors and planners of older driver education should be more mindful of trend. In fact, among the non-course takers surveyed in this report, almost half of the individuals from this group are working in full or part-time positions, as indicated in the table below. Thus, older driver education programs in the future may have to cater more to working professionals who may be maintaining jobs way beyond the traditional retiring age.

Table E. Cross Tabulation of Employment Status with having taken the AARP Driver Safety Course

		Are you currently employed?			Total
		Yes, full-time	Yes, part-time	No, not employed (including retired)	
Have you ever taken a driver safety course offered by AARP?	Yes	3.0%	10.3%	86.7%	100.0%
	No	32.0%	14.5%	53.5%	100.0%
Total		13.9%	11.8%	74.3%	100.0%

FURTHER RESEARCH

While the results above indicate a significant difference in the level of employment between the groups, the findings do not reveal the direction of that difference. For that information, further research would be required to determine whether older adults who do not participate in such programs are working significantly more than their counterparts who take the course.

Such additional analysis could reveal insight into other differentiating factors. For example, further tests could determine whether course takers are significantly more active in volunteering than non-course takers, to better understand how this systematic difference affects their motivations towards older driver education.

At the same time, additional questions/variables could be included to produce more reliable measures of motivation. Perhaps even the wording of some motivational statements could be changed or new statements could be included to elicit responses that yield standardized alphas greater than .75 for the consistency of the test. Additional tests should also require students to clarify certain terms or phrases that may be open to multiple interpretations. For example, with the motivational statement on wanting to become a safer driver, students might briefly describe their understanding of this phrase. Perhaps a safer driver to some may drive more

cautiously on city streets and to others may drive exactly at the speed limit on major interstates.

Even with the improved reliability, further research could still be conducted on the systematic differences between the groups analyzed in this study. Regression tests, for example, could determine whether age is a better predictor (most likely) of taking an older driver education class, rather than other factors such as driving concerns and health conditions. Perhaps these additional studies could even account for the level of age-based testing states require for renewing drivers' licenses, as another predictor variable of participating in older driver education. Ultimately, the results of the additional analysis could lead to a greater understanding of level of influence such factors have on participants' motivations towards the driver safety class.

On the other hand, additional correlation tests could be conducted when the role of the predictor and response variables are not as clear (Tamhane&Dunlop, 2000). For example, such research could measure the correlation between levels of motivation and accident risks of course takers. The analysis might reveal that students with greater motivation towards driver education have significantly lower accident risks. Similarly, the correlation between the degrees of self-regulation (discussed previously in chapter 3) and motivation could be assessed as well. Perhaps older drivers who have greater levels of motivation towards such training classes are more likely to avoid certain challenging driving situations or compensate for certain physical, cognitive changes (that accompany aging) when driving.

On the whole, the value of such additional studies could be enhanced by expanding the representativeness of the sample. In the next survey, for instance, instead of just sampling AARP members in Massachusetts, the questionnaire could be sent out to all AARP members throughout the country. When conducted on this larger scale, the motivations of seniors can be assessed in states like California and New York that are already offering the insurance discount. In this way, the findings from this study could increase participation rates and effectiveness of the courses across the United States. Perhaps with more solid nationwide

data, the federal government may be more willing to support and even fund older driver education programs.

Conclusion

In the end, however, expanding the geographical scope of the survey may not be sufficient for enhancing motivation levels or improving the effectiveness of the courses. Perhaps even greater value can be realized from a study on motivation that could apply not just on a national scale, but also on a temporal scale. In other words, the central question to answer would be whether the findings on motivation are relevant to the seniors taking the older driver course in 2030. As described in chapter 2, this year is when the last of the baby boomers turn 65 and older drivers will be present on the roadways in unprecedented numbers. If older driver education is proven to ultimately reduce crash risk, either through secondary factors like self-regulation or by reducing accident rates directly, then maximizing participation in such training would be in society's overall interest, from a public safety point of view. Yet in 2030, the aging population at this time may not be motivated by insurance discounts; instead, they may value their time to a greater extent. In this case, understanding the motivations of this population would be essential. After all, offering an insurance discount may be a futile endeavor, rather than another incentive that will ensure older adults take driver safety classes to minimize their accidents on the roadways. Through further research and perhaps cross generational studies, more precise and accurate findings on motivation could emerge, for a sample that is demographically and temporally representative.

Chapter 7 –Suggested Practices to Potentially Improve the Effectiveness of Older Driver Education

Given that older driver education, in its present form, does not significantly reduce crash rates, according to most research studies, some may argue instead for other measures to enhance the safety of older adults behind the wheel. These alternative solutions might include some form of rehabilitation therapy to improve driving skills or guidance to seniors on determining viable transportation options besides the car, for ultimately reducing their VMT.

While proposing worthwhile alternatives for senior mobility, such an argument implies that either there are no significant benefits resulting from such programs or the costs outweigh any benefit from participating in older driver education. On the contrary, there are some positive effects from the program, as chapter three demonstrated, on certain indirect measures of crashes. For example, attending a course has been shown to significantly lower citations or increase the amount of self-regulation drivers practice. Other indirect pathways to safety such as enhanced awareness of the roadway environment and improved knowledge of driving seem to be other benefits of older driver education.

Given these results, at the very least, such an intervention should be considered as one strategy to better ensure the safe driving practices of older drivers in the coming decades. Moreover, even if overconfidence occurs among graduates of some courses, courses should not be disbanded, but rather modified to ensure seniors are aware of physical limitations in general that could affect driving. Other changes to older driver education could be made to achieve the ultimate goal of driver safety for seniors: reducing crash rates.

PURPOSE/SCOPE OF CHAPTER

The focus of this chapter is on potential features, practices that could make an older driver education program effective, in the terms of the above criterion, of significantly lowering accident risks for senior drivers. Some ideas may require changes like the one illustrated

above, if overconfidence is resulting from taking certain classes. Others are based on topics such as alternative transportation options or self-regulation that is already covered in some of the existing older driver programs described in Chapters 4 and 5. In either case, additional research would be necessary to prove that a program, with the ideas proposed in this chapter, could lead to a significant reduction in crash rates among seniors. **Thus, the proposals, which are based primarily on findings of previous chapters, are more potential solutions that should be further studied, rather than recommendations that should be immediately implemented.**

Partly attributed to the limited evidence behind the proposals, the chapter's discussions do not focus on a particular older driver course; rather, older driver education in GENERAL, for the United States, is targeted addressing such factors as content, pedagogy, and the incentives to participate in such a program. Some potential solutions cover funding issues to ensure future older driver classes have a sufficient level of quality instruction and content. Other ideas include offering assessment services or training specific skills relevant to safe driving like Useful Field of View (UFOV). As defined in Chapter 3, the UFOV is the portion of an individual's visual field that can detect and process information quickly enough, to enable the driver to effectively respond to a hazard.

GENERAL GUIDELINES FOR RECOMMENDATIONS

On the whole, the features to consider for a more effective older driver education reflect not just the changes taking place within the seniors themselves, but also those occurring within the cars and the roadways they traverse. Such internal and external developments are described in further detail in chapter 2. At the same time, any possible modification to older driver education should consider the needs of those taking the courses now and in the future. In other words, the motivations and driving concerns faced by today's aging drivers may be considerably different from those faced by future cohorts of older drivers. For example, the incoming generation of seniors may have a greater desire to learn about in-vehicle telematic systems, while the current aging population may be less interested in such devices. A course

that does not take such distinctions into account may not be effective in the coming years with maintaining or improving safe driving behaviors among its students.

The bottom line, however, is that any ideas or recommendations should be proposed with the intention of reducing crash rates among older drivers, irrespective of the particular generation. Currently, the model of many refresher courses is to refresh skills and knowledge while updating seniors about “new traffic laws and practices for defensive driving” (Molnar, Eby, & Miller, 2003). Certainly, there are merits to adopting this strategy. For example, drivers who gain such knowledge may have significantly fewer citations because they are aware of the new traffic laws. In fact, a similar outcome resulted from an older driver program in California, as chapter 3 illustrates. But in the long run, any knowledge that is introduced should directly or indirectly lead to driving behaviors that reduce seniors’ levels of risk on the roadways. Specific forms of training should also be evaluated in this context as well. In particular, if such measures as UFOV training or visual processing enhancement do not contribute to the over-arching goal of reducing crash risks for senior drivers, they should not be implemented.

Partly attributed to these challenging requirements, there are likely to be some initial barriers to some of the potential solutions described in this chapter. Such objections may not only be raised on account of their efficacy towards older driver safety, but also on political, economic, and social grounds as well. In the end, by developing innovative, cost effective solutions, by conducting further research to support recommendations, and by fostering greater cooperation among the stakeholders can the necessary changes be implemented, so that driver education becomes an effective tool in making older drivers safer drivers.

Potential Enhancements - Content

ITS

A first step towards achieving this overarching goal is to consider possible subjects or modules to include in an effective program of older driver education. One of these topics

originates from the changes taking place on the roadways and the vehicles older adults are driving, as described in chapter 2. This development is the advent of Intelligent Transportation Systems (ITS)/In-Vehicle Technologies, topics that are likely to become increasingly relevant to the driving experience for all ages in the 21st century.

As Chapter 2 describes, those in the prime market for in-vehicle technologies are likely to be older adults who could have difficulties with safely operating these devices, especially those dealing with any visual/perceptual limitations that may occur from aging. At the same time, seniors may need to be aware of certain compensations to take, like pulling over to the side of the road, when using a device like a navigation system. More generally, at an MIT-OECD symposium on transport technology for older people, it is argued that the “advent of new technologies in transport brings a need for ongoing education”, and older driver education could very well provide that training (OECD, 2003, p. 24). Besides navigation systems, the safe use of other technologies such as collision detection systems, intelligent cruise control, heads up displays (HUDs), and biometric devices, could be taught in an older driver course.

Equally important, a module on ITS should consider technologies along the roadway as well, although such a topic would probably be more relevant to students living in metropolitan areas. Older driver courses could offer instruction for safe driving with new types of traffic signals, electronic toll collection, and traveler information systems such as 511, among other roadway technologies. For example, classes providing information on managed or HOT (High Occupancy Toll) lanes could inform their students of the need for a transponder, a device that can be affixed to their windshield or dash. In addition, seniors could be taught that driving at the speed limit through electronic toll collection gates is permitted. At the same time, they would learn of the need to have a pre-established billing account with the toll authority, which could be debited each time they use the managed or HOT lanes.

INFRASTRUCTURE

Meanwhile, roadway configurations are changing around the country, and older drivers may need instruction on the rules, safe practices for driving within these structures. For example,

roundabouts are becoming more common at intersections around the United States, yet many drivers (even those in younger age groups!) may be unfamiliar with the rules for driving around these circular intersections. They might learn, through an older driver course, the proper behavior is to yield traffic that is already circulating in the roundabout, before proceeding through the intersection.

PERSONAL HEALTH

Of course, if seniors are taking any prescription medications, they may have more difficulty in adhering to such rules and driving safely in general. As chapter 2 described earlier, certain types of medications can increase the driver's probability of being involved in an accident. Some older driver programs have recognized this risk and are including this topic in their curricula, as described in chapter 4. Given the prevalence of prescription drugs, offering at least general information on the medications' effects may improve seniors' levels of safety, especially if they are unaware of these risks.

In addition to having information on the impacts of certain medications, self-assessment is another tool for older adults to judge their fitness to drive. In fact, many existing courses within and outside of the United States include this topic in their curriculum, as both chapters 4 and 5 indicate. Continuing to teach this subject is likely to improve the effectiveness of older driver education in the coming decades. Seniors, after all, could benefit from having a more accurate understanding of their driving fitness, particularly in preventing over-confidence, which is a concern of older driver education in general as described earlier. From the information such an assessment would provide, seniors could then make more sound decision on whether to modify or restrict their driving.

Nonetheless, some may not respond appropriately to the results from self-assessment. They may believe that their experience and "careful attitude" sufficiently compensates for any "physical limitations that may occur" (Elliot & Shanahan, 1995). An effective course, on the other hand, would teach them that additional compensatory measures are necessary by covering the topic of self-regulation. In many domestic and international courses this

subject is an integral part of the curriculum. For example, if they are apprehensive towards being on the roadway with heavy traffic, they may want to limit their driving to outside of rush hours. In fact, this type of behavior and other practices associated with self-regulation has led to significant reductions in seniors' crash risks, as chapter 3 describes. Continuing to offer instruction on self-regulation could enhance the overall effectiveness of older driver education.

ALTERNATIVE TRANSPORTATION, TRANSITIONING FROM DRIVER DEPENDENCY

In an urban region, a more effective course could provide information on alternative transportation, a mode especially needed when measures such as self-regulation are no longer effective, and thus safe driving is no longer be possible. Perhaps if seniors learn that viable options exist for their transport needs, they may restrict their driving, and thus significantly lower their crash risk. A course could provide information on such modes as bus rapid transit, light rail, or paratransit. To provide further training, some classes could follow the lead of Senior Driving Awareness Program in Michigan described in chapter 4 and possibly offer field trips to transit centers. From this learning experience, older adults can gain a better understanding of their public transportation system, from a user's perspective.

Even in a rural area that typically lacks sufficient transit service, older driver education could assist seniors with developing an alternative transportation plan when safe driving is no longer possible. These older adults may find that through the assistance of friends, relatives, and possibly community/religious organizations, alternative transportation is a feasible and safer mobility option in their region.

Structural Features of an Effective Older Driver Education Program

CUSTOMIZATION OF COURSES

Such differences in public transportation, between rural and urban regions, highlight another possible feature to include for a course to be effective. In particular, students may be more motivated to learn from an older driver education program, when the course applies more to their geographic region (Haroun, March 2000). For example, students taking the class in California may have significant concerns about a certain 5 points intersection (i.e., a junction of 5 roads) in their city. They may find greater value from a course that provides them with the strategies to cross or drive through this complicated intersection, and thus may have a greater incentive to apply the course lessons. On the other hand, for those students taking the course in Chicago, an older driver course could provide them with advice on using subways when driving is no longer possible. By contrast, if ITS technologies are taught in region where such devices rarely exist on the roadways seniors travel, then students may lack the necessary motivation to learn the material and thus drive more safely, on the rare occasion they encounter such devices.

With these differences in geography affecting the curriculum, customization of courses may be another feature to offer for enhancing the effectiveness of older driver education. Of course, adjustments in the content or structural aspects of the program could be based on other factors besides geography. In particular, courses could be adapted to certain characteristics of the older adult students such as their driving problems, average age levels, and the vehicles they own. For example, if most own vehicles with telematic systems, the course could offer greater coverage of the safe operation of these devices.

Perhaps to determine the particular customizations needed, a brief questionnaire could be distributed before the course starts. This survey might include items that assess older adults on the specific problems they are experiencing when driving, their knowledge of certain traffic safety regulations, or their motivations for taking the class. Of course, with computing

technologies, students could be polled just before the start of the class, and the content of the program could be customized shortly thereafter based on their answers. Ultimately, with a course that is more focused on their needs and particular driving concerns, students are likely to be more motivated to apply the lessons and make the necessary changes in driving behavior that a course promotes.

TRAINING SPECIFIC SKILLS RELATED TO SAFE DRIVING

To further enhance the effectiveness of older driver education, specific forms of training could be offered to possibly complement the knowledge students gained either through a customized or standard course. The focus of such a module could be on visual/perceptual skills vital for driving safely such as UFOV or speed of visual processing, which were described in chapter 3. For example, with sufficient funding, a course could provide the facilities and technology, for students to practice on expanding their UFOV. As illustrated in chapter 3, exercising such abilities has been linked to a significant reduction in crashes.

ASSESSMENT SERVICES

To determine whether such training is warranted in the first place, courses could provide assessment services primarily to measure skills related to safe driving. For example, a computer simulator could test the students' braking or reaction times when encountering pedestrians or other potential hazards along the roadway. Other equipment could measure an older adult's UFOV to indicate whether the training of this visual/perceptual skill is necessary.

At the same time, a student's automobile could be assessed as well, but not so much from a mechanical standpoint, although such service could be useful. Instead, an older driver education program could assess the ergonomics of the vehicle. For example, a student may be unable to reach the brake pedal or effectively grip the steering wheel. In this case, certain adaptive devices could be recommended that could help the student work around such limitations and still manage to drive safely.

A similar program is provided in the UK called MAVIS (Mobility Advice and information Service) that operates a center providing assessment services and recommendations on technologies for helping drivers adapt to their vehicles. The center also functions as an information clearinghouse on transportation. Perhaps older driver education in the United States could serve a similar role with not only offering assessment services, but also providing information on such programs as driving rehabilitation therapy or outside courses to enhance specific driving skills (National Highway Traffic Safety Administration, April 1999).

PEDAGOGICAL ENHANCEMENTS

Overall, a more innovative pedagogy or set of teaching methods could enhance the effectiveness of older driver education as well. These strategies may involve supplementing or possibly replacing the traditional in-class setting with more technology based approaches such as web-based seminars or CD-ROMs for teaching particular topics. In fact, the AAA offers a software tool called Roadwise Review, which seniors can run on their home computers to assess their driving skills. One course described in chapter 4, offers instruction on driver wellness through web-based seminars, provided by the American Society of Aging in partnership with the National Highway Traffic Safety Administration (NHTSA). Overall, computer based platforms may be more effective for particular topics than the traditional lecture format. This may be especially applicable to self-assessment since older adults are likely to value a more private setting (like their home) to receive feedback on their driving.

Already, evidence has emerged that one technologically-based teaching method, computer based driving simulators, has measurable impacts on safe driving behavior. For instance, as Chapter 3 illustrates, training with computer simulators has improved certain hazard perception skills and has encouraged greater amounts self-regulation, such as looking around more frequently when making turns. In turn, a greater degree of self-regulation has been linked to lower crash risk, according to chapter 3 as well. So, teaching and possibly assessing driving skills through the use of computer simulators could be another potential strategy to improve the overall effectiveness of older driver education.

Perhaps to complement this training in virtual reality would be on-road, behind the wheel driving that could have similar effects on improving driver safety. This portion of an older driver program might be conducted on a private track where seniors could practice certain maneuvers and skills that may be too dangerous to attempt with regular traffic. For example, a test track could provide students with a more protected, controlled environment for learning the safe operation of anti-lock brakes. Otherwise, if such a facility was not feasible, then students could practice their skills under the supervision of an instructor in parking lots or possibly on certain public roadways. Once they have developed fundamental skills, students should practice driving maneuvers in real traffic conditions, unless certain maneuvers are too dangerous to practice in this setting.

As chapters 4 and 5 describe, many courses already in the United States and in some countries of the OECD offer behind the wheel training. In fact, a certain program in Denmark, covered in chapter 3, has adopted this method for students to practice skills they just learned in class. While the program is for novice drivers, studies have indicated significant reductions in crash risk for those who participated in the course. Perhaps, when combined with in-class sessions, similar results could be achieved for senior driver programs that incorporate on-road training. Of course, providing the resources and facilities for this type of training may not be feasible for some providers/sponsors of older driver education. In this case, forming partnerships with certain stakeholders in the private sector may be necessary to offer behind the wheel practice. Such partnerships will be described in a latter section of the chapter.

When students return to the classroom, the effectiveness of older driver education could be further enhanced from having group discussions, rather than conveying the material only through a traditional lecture format. Already a core aspect of some courses described in chapter 4, the group approach could involve students formulating solutions to common driving problems, under the instructor's guidance. For example, seniors taking a course could develop an action plan together for avoiding road rage or driving more safely on freeways. In chapter 4, the Mature Driver Course in Sacramento uses this teaching method, but utilizes video not only for teaching some parts of the curriculum, but also for stimulating group

discussions. In turn, students exposed to this video based, group approach may become more engaged in the material, to effectively apply the safe driving practices on the roadways.

TEACHING AND CERTIFICATION OF COURSES

Even if they are only facilitating group discussions, instructors play a vital role in any older driver education program. After all, the teachers can not only better ensure the students understand the course material, but also can influence the students' levels of motivation for applying the lessons they learned. To ensure greater quality in meeting these objectives, instructors could receive a salary, which is the current practice of some older driver courses in the United States, as described in chapter 4. Of course, before expending the significant resources on this practice, additional research should be conducted to prove that salary can enhance quality of learning. In turn, the findings should validate improving this latter factor can increase course effectiveness (i.e., in terms of driver safety). Otherwise, a volunteer instructor may offer a sufficient level of quality for learning the material.

At the same time, individuals with specific backgrounds and experience could be recruited to teach the various modules of the course. Already, many courses across the United States and in the OECD are taught by current or retired law enforcement personnel, although they are providing instruction for the overall course as well. Perhaps in the same class, another instructor with a background in health care could provide insight into the physical effects of aging and compensation strategies when driving, in response to certain physiological and cognitive changes. Nevertheless, no evidence has been identified in this research project indicating that teachers with such experience could significantly enhance the overall effectiveness of the course.

Another possibility with respect to ensuring the quality of older driver education would be certification of courses. Perhaps at national and state levels, governmental agencies or other organizations can independently verify that senior driver programs are meeting certain minimum standards. In their evaluations, these authorities could address such issues as the topics covered by the course, fees of the class, the hours of instruction, and the qualifications

of instructors. Already, in California, the Department of Motor Vehicles (DMV) plays a similar role with granting approval to certain organizations to teach its Mature Driver Improvement Program.

At a national level, the organization ADTSEA (American Driver and Traffic Safety Education Association) could act as a course certification authority or certain government agencies such as the NTSB or NHTSA could assume this role as well (National Institute for Driver Behavior). Regardless of the particular organization, such a national association could introduce new standards based on current research and could ensure best practices are adopted more widely in older driver courses around the country. Moreover, by establishing links with similar organizations outside the United States, international best practices could even be included in the standards the certification authority establishes.

EVALUATION OF COURSES

Perhaps the most significant role for this organization would be to gauge the effectiveness of the older driver education programs in terms of driver safety. The primary criterion for such an assessment would be the crash rates of students who received the intervention compared with those of a control group. As chapter 3 suggested, however, such a comparison will most likely not yield any significant differences, thereby implying that older driver education may not be effective, at least on this criterion.

But relying on more secondary measures that are not direct indicators of crash risk could yield more favorable results for older driver programs. From the findings in chapter 3, courses may be judged “effective” based on these factors:

- Number of citations
- Knowledge about traffic rules
- Level of self-regulation (i.e., restricting driving to specific times of day or compensating for weaknesses with certain driving tasks)
- Driving performance

- UFOV level, visual attention skills

Moreover, the literature review for this thesis demonstrated that some of these secondary measures such as self-regulation and UFOV can even lead to significant reductions in crashes. Even beyond the criteria covered by chapter 3, older driver education could positively impact other less direct indicators of driver safety such as the number of attempts to pass renewal tests for drivers' licenses. Further research would be needed to validate whether such measures are significantly linked to crash rates and thereby influence the course effectiveness.

Potential Partnerships, Roles of Various Stakeholders

Achieving effectiveness, however, even on the secondary measures, could be too heavy a burden in terms of funding, technical abilities, and staff resources of most providers of older driver education. For example, some programs may not have the necessary instructors or facilities for on-road training or the funds for computer simulators. Lacking such resources could become especially problematic if these teaching methods are proven to significantly lower the crash risks of the students.

Given such limitations, senior driving courses could form partnerships with various organizations in the public and private sectors, to acquire the necessary funds, resources. With such combined support, course may become capable of delivering the knowledge and skills for significantly reducing a driver's crash risk. The partnerships could also prove beneficial for advertising/marketing and the motivation levels of senior adults to take the classes and apply the course lessons. Overall, the effects of these alliances would be not only more tangible safety benefits for older adults, but also greater participation rates in these programs. At the same time, however, there are certain drawbacks from these partnerships that will need to be mitigated or overcome to maintain any potential effectiveness of older driver education.

PARTNERSHIPS FOR ADVERTISING COURSE

One potential relationship is with the DMV, which could provide an advertising venue for the course. The agency's role could be to provide literature/pamphlets about various older driver training courses in their offices. Older adults could then learn about such programs when they visit the DMV and wait in line to have license renewed.

To further extend the advertising reach, partnerships can be formed with other stakeholders like NGOs, community groups, and any other organizations where seniors are likely to be present. For example, information could be made available on older driver education at senior centers, religious organizations, and hospitals where many older adults tend to volunteer. Meanwhile, health clubs/gyms could offer a driver training course as part of a senior "wellness" program. In return, the course provider could organize a "wellness fair" not only to provide information on the older driver programs they offer, but also to offer an advertising venue for the products, services of their partners.

ROLE OF HEALTH PROFESSIONALS

With older driver education becoming more associated with health issues, professionals such as doctors or physical therapists might have a role to play in older driver education as well. As part of a periodic physical exam, older adults could be evaluated on their fitness to drive safely. Then, doctors could confidentially report the results to instructors of driver training classes, to point out any weaknesses or deficiencies that could be addressed in the education program. For example, if one of the students had a vision deficiency, then the instructor could teach the student on strategies to compensate for the physical limitation. Nonetheless, if doctors were to adopt such a role, they should be aware of any legal repercussions that could arise from their actions (MAROTTOLI, 2000).

PARTNERSHIPS FOR PRESENTING COURSE MATERIAL

When it comes to the teaching course material, additional partnerships could be formed with the other organizations in the public or private sector. Perhaps company advertisements could be placed in the course handbook when covering certain topics relevant to a firm's product. For example, with the portion of the course covering the effects of medication on driving, ads from pharmaceutical companies would be presented addressing driver safety issues relevant to this topic. In turn, the course sponsor could earn revenue for placing the ad in their handbook and thus keep the costs minimal for the students.

Pharmaceutical firms could even play a more active role with producing video presentations or software training applications informing students on the effects of various medications while driving. With the computer programs, students might be exposed to various scenarios and must choose certain driving strategies or self-regulation measures, based on the side effects of certain prescription (and even over the counter) drugs. Then after the video presentation or software demonstration, the instructor could attempt to facilitate group discussions on the effects of medications while driving. In the process, pharmaceutical companies would help to financially sponsor the older driver course since they could advertise their products in the videos or software tools while teaching important lessons.

For the modules of the course on vehicle operations and technologies, car companies and/or dealerships could be potential partners as well. Their role might be simply placing ads in the course handbook on the safe use of telematic systems (i.e., computing, electronic, communication technologies) emerging in new vehicles. Once again, as with the pharmaceutical companies, the course sponsor would receive additional revenue from these advertisements.

Another role for auto firms in older driver education could be to produce videos or even software training applications (similar to the ones by the pharmaceutical companies above) on learning the safe operation of telematic devices. The course could even organize field trips to local dealerships where older drivers would receive basic instruction on the safe use of these technologies. If feasible, the dealerships could provide training facility with computer simulators and even a track where older adults could practice their driving skills behind the

wheel. The justification for this expense, from the perspective of the dealership and auto company, would be to showcase their vehicles, technologies, and various car accessories to the aging population. Essentially, older adults would have the opportunity to sample the dealer's products. Of course, these businesses could pursue a simpler method for sponsoring the older driver program, by placing ads in the course handbook when such topics as in-vehicle technologies are discussed. As described in chapter 2, the incoming generation of seniors is expected to comprise the primary consumers of these products based on their higher income levels and assets.

Other technologies they are expected to use frequently are cellular phones, and instruction most likely should cover the safe use of these devices while driving, as is the practice with some domestic and international older driver courses. Perhaps one partner to address this need may be the companies developing the mobile telephones or possibly the carriers that provide the cellular networks. In an older driver class, for example, these stakeholders could teach students on strategies to minimize their risk of being distracted from talking on the phone while driving, especially in more adverse conditions such as bad weather or heavy traffic. They could simply present this information through an advertisement in the course handbook. Another strategy might be similar to the approach described above for the dealerships and car companies; they could produce a video or an interactive software application illustrating lessons about driving safely while talking on the phone. From any of the methods, the cell phone carriers or manufacturers would have an opportunity to advertise their products such as accessories, potential upgrades to their services, or the latest technologies in mobile communications.

Options for Course Incentives

While necessary, focusing on course material is likely to be insufficient for attaining effectiveness in older driver education. In addition, students must have an adequate level of motivation to not only participate in the programs, but also to learn and apply the core strategies presented in class. This need for incentives in general is further described in chapter 6. For this section of the chapter, the focus is on ideas to potentially enhance the

types and delivery (i.e., organizations providing incentives) of incentives for older driver education, to ultimately increase participation rates and students' levels of motivation.

Nevertheless, there is still some uncertainty from the research studied for this thesis, on the particular aspects of the course and/or behaviors and actions of students that require external motivation. For example, should incentives be provided unconditionally just for attending the class? Or should the students only be rewarded when they proved sufficient knowledge to apply the course lessons in the field, perhaps by passing a "final exam"? On other hand, they could receive compensation or recognition for participating in an assessment, whether online or in-class, of their driving skills. Further research could possibly help to resolve these issues on the behaviors and skills from older driver education to reward.

INSURANCE DISCOUNT INCENTIVE

In the meantime, another question to address is on the particular types of incentives to offer. As it stands, the current practice for motivating students is to provide them with discounts on auto insurance for graduating from the class. Is this really the most optimal tool for motivation? If so, then perhaps a more effective approach can be found in working with the insurance industry to provide this incentive. At the present time, there seems to be some disagreement between the insurance companies and course sponsors on the effectiveness of older driver education and on the discount that is warranted for taking such a class. Perhaps additional common ground can be reached between the stakeholders when further research resolves these issues. With a more cooperative relationship between course sponsors and insurance providers, the discounts may become more universal across the nation and more substantial because there will be greater buy-in from the insurance companies.

POTENTIAL ALTERNATIVES TO INSURANCE DISCOUNT INCENTIVE

If this type of incentive is not the most optimal, possibly attributed to the difficulty of forming such partnerships, then perhaps the insurance discount should be supplemented or replaced by other types of awards for attending an older driver education class. Through partnerships

between certain businesses and the course sponsor, such alternative incentives could include discounts at car rental agencies, gasoline stations, auto repair shops, restaurants, and/or symphonies/cultural events. In turn, the companies, organizations that offer the discounted products/services could benefit from gaining additional clients, who were drawn to the business originally by the discount.

INFLUENCE OF PUBLIC POLICY ON INCENTIVES

Government could also provide incentives, especially if older driver education is found to significantly reduce crash rates. Transit agencies, for instance could offer discounts off their regular fares for regular services. Such an incentive would be particularly attractive to someone living in a city where such transportation is a viable alternative to driving. Moreover, at a statewide or national level, the government could provide tax deductions to older adults for attending such courses. Perhaps taxpayers could even subsidize the participation of seniors in the lower income categories, as a later section of the chapter will describe.

A more effective, yet less politically feasible incentive would be to enact laws compelling seniors to take older driver education. As described in chapter 5, such a requirement exists in the province of Ontario, Canada. Mature adults 80 years of age and over are required to attend group education sessions every two years when they renew their license. While information on participation rates has not been identified, the turnout to these seminars must be very high, given that attendance is mandatory. In the United States, if a similar law was proposed, the legislation would likely be met with formidable political resistance, especially given the lack of evidence on the safety effectiveness of older driver education.

Analysis of Potential Solutions

In fact, a similar challenge is likely to face virtually all solutions proposed in this chapter. In other words, if the measure does not significantly lower the crash rate of seniors either directly or indirectly, then the proposal may not be a worthwhile option to pursue. For

example, teaching older adults on the safe operation of vehicle telematic systems may not be essential if covering such a topic does not significantly affect accident rates.

On the other hand, the impact of a course may be on secondary measures of crash risk such as UFOV or citation rates. It may be, for example, that the quality of instructors positively influences the level of self-regulation, an indirect measure of driver safety linked to significant reductions in crash risk, according to chapter 3. In this case, course sponsors may want to recruit instructors with the necessary skills and experience for effectively teaching self-regulation to their students.

Nevertheless, with the lack of evidence on course effectiveness, all of the ideas described in this chapter are only recommended for consideration, and not necessarily for implementation, at least until a significant safety benefit from these measures is proven. With limited time and resources, however, certain proposals should be evaluated before others, based their probability for improving course effectiveness. For example, among the potential alternatives, course sponsors may want to focus their initial efforts on investigating the effects of UFOV training or testing. This measure is a research priority because, as chapter 3 indicates, of the strong relationship between UFOV and involvement with crashes. Thus, findings are likely to demonstrate that offering such training in older driver education would significantly lower crash rates. Similarly, on-road training should also be a priority in additional research. As earlier findings in this chapter have indicated, this training approach could also have a high probability of reducing crash risk.

Fortunately, some of these ideas proposed in this chapter are already in practice through some existing driver education programs, perhaps making the research easier to conduct. In particular, many of the courses described in chapter 4, 5 such as the Mature Driver Improvement Course in Southern California already provide behind the wheel training. Others such as the Mature Driver Workshop of Michigan offer UFOV assessment, although the program does not provide training on this visual perceptual skill. If peer reviewed studies have not already been conducted, then these older driver programs and others that are already

implementing the ideas proposed in this chapter should be researched further for their effectiveness.

POTENTIAL BARRIERS TO OVERCOME

Still, even after validating the safety benefit of such measures, there may still be other barriers to overcome, especially if these course practices, features proposed in this chapter are adopted on a national scale. Perhaps one potential objection would be raised on financial grounds with some arguing funding may not be sufficient to implement all the proposals. After all, purchasing the tools, equipment for such features as on-road training, UFOV testing, and computer simulator training could be prohibitively expensive for a single course provider. Certainly, just the practice of compensating instructors alone could be a significant financial burden as well. For these reasons, some may fear that the cost of providing all the features and implementing such practices could be passed onto the students as higher costs to take the course.

In turn, with older driver education becoming less affordable, further objections could emerge based on certain socio-economic issues. Some may argue that higher course fees could be unfair to those in the lower income brackets, especially if older driver education becomes necessary for maintaining/improving driver safety. Furthermore, if such driver training requires a computer based or online learning module, then those seniors with less income who cannot afford a computer may receive significantly fewer safety benefits. Some may perceive the scenario to be an injustice based on the notion that any driver deserves to be safe, regardless of their income level.

On a more social level, some may be apprehensive towards the course environment, thereby reducing their motivation to attend. For one thing, some older adults, especially those in the younger age ranges, may be uncomfortable being in a class designed for the older population. As described in chapter 2, the incoming, “baby-boomer” senior population will strive to maintain their “youthfulness”, and thus they are likely to be uncomfortable in an environment reminding them of old age.

Furthermore, students, especially those in the oldest age ranges, could have serious privacy concerns based on the certain topics or activities covered in class. With their driving skills being assessed, for example, they may fear that their results may be reported to DMV offices for retesting, or worse for revoking their license. By the same token, with the discussions about the effects of medication on driving, they may be concerned about their personal information being divulged on the prescription drugs they are taking. On the whole, such concerns may not be justified, but they should be addressed in order for students to be sufficiently motivated.

Other potential barriers or objections may be focused on perceived flaws with the course itself. At first, some may argue that the program would be less objective if certain modules are taught by companies. They may claim the information presented by these firms may be biased, particularly if the company's products are related to the driver safety issue being discussed. For example, companies lecturing on driver distraction may not inform students on all the drawbacks of their products while driving. Perhaps they may fear a full disclosure of the effects could result in a significant loss of sales.

Nevertheless, even if the material was fully accurate, implementing all the proposed modifications discussed in the chapter may result in an older driver class of an excessively long duration. This potential drawback could be a major issue, with the active, busy lifestyles expected of the incoming aging population. They simply may not be willing or capable to devote their time to learning all the topics discussed in this chapter ranging from ITS to self assessment. The time factor may also prevent them from participating in such beneficial training sessions that are behind the wheel or in a computer simulator.

Furthermore, should they possibly fit this older driver class into their busy schedules, seniors may experience "information overload" with all the material presented. While covering such topics as changing roadway features and alternative transportation could pay dividends in terms of safety benefits, seniors, especially those with cognitive difficulties, may not learn as effectively with inadequate time to process the material from the course. For some, having to

absorb such an overwhelming amount of information might feel like having to drink water from a fire hose!

Finally, there is the question of certification. Perhaps some may feel that obtaining approval from a national certification authority, may not allow flexibility in the course to address more local issues. For example, such an organization may require coverage of ITS features such as electronic toll collections or 511 systems, technologies less relevant in a rural area.

OVERCOMING POTENTIAL BARRIERS

Given such potential barriers, it may be tempting to abandon the proposed ideas of this chapter with less controversial ones. But such a response may not be necessary and even warranted, since some of the proposals could have significant safety benefits if implemented. Furthermore, certain countermeasures could overcome such barriers, although further research would likely be needed to determine whether these countermeasures are ultimately feasible.

First off, in response to concerns about rising course fees, government could provide subsidies for lower income seniors to take the course. The older adults receiving this financial assistance would then only pay the amount they could afford. Of course, such funding allocations would be justified on the assumption that there is a significant public safety benefit from older driver education.

Overall, costs could be reduced even further with the course sponsor forming partnerships with other agencies or companies, as discussed earlier in the chapter. Assuming such a business model was feasible, the partners like auto dealerships or cell phone companies could defray some of the costs by charging them advertising revenue. As discussed earlier, their involvement could range from placing ads in the course handbook to actively presenting lessons (e.g., through video) on the safe use of their products. At the same time, students would have the opportunity to learn more about the products/services the companies offer.

Nonetheless, even with more affordable, effective classes, students may still have certain apprehensions about attending. As discussed previously, their reluctance might stem from being reminded of their “old” age when attending such a program. This feeling may be even more prominent among the incoming, “baby-boomer” generations of seniors. To overcome such potential barriers that could reduce a student’s motivation, older driver education could be marketed more as lifelong, continuing education. *Eventually, there may come a time when the course would not just be for the aging population, but for all experienced drivers.* After all, many of the topics like alternative transportation, new vehicle technologies, and even self-regulation could apply to a whole range of experienced drivers. Perhaps learning about compensating for these physical changes through self-regulation, may help these younger adults drive more safely, even if they are temporarily affected by a health condition.

Unfortunately, creating a more “age-neutral” class for experienced drivers may still not allay certain privacy concerns about personal information. Initially, this issue can be partially addressed by informing the students of any personal information that may be discussed with the class and/or the instructor. At the same time, students should be reassured of the confidentiality of this information, especially for any course activities that involve assessment of driving skills. If feasible, any screening of their driving abilities should be conducted in a private setting. For example, with the course Safe Driving for Mature Operators, offered by the AAA Foundation for Traffic Safety, students can have certain driving skills assessed through a software program on CD-ROM that can be executed from their home computers.

In addition to conducting driving assessments in more private settings, discussions on topics that could involve personal information should be kept at a more general level. For example, with the module covering the effects of prescription medication on driving, no reference should be made about a particular student’s medication regimen. Sometimes, however, such information could be of value to some older drivers. In this case, they should receive this feedback in a more private setting, like in front of their home computer. As with the driving assessment, a software program could provide specific information on how their driving is affected from the prescription drugs they are taking.

At the same time, standards should be enforced to ensure the information that seniors receive is objective and accurate. Such a measure may be needed especially if third parties are providing content or assisting in any way with the teaching of the course. The particular agency or organization to perform this role is still uncertain, yet a possible candidate is the course certification authority discussed earlier. The regulatory agency could be at the state or federal level of government to ensure it has adequate resources and independence to verify the information.

Still, the agency should allow the program to be reasonably adapted to the needs, abilities, and geographic region of the students. Customization of the courses could help to achieve these objectives through such tools as the pre-course survey described earlier in this chapter. Adjusting the class in this way will not only increase students' levels of motivation, but also ensure that the overall class stays within reasonable time limits. More specifically, the information from the pre-course survey could highlight the topics instructors should emphasize and others that should be only minimally addressed. For example, if a class that does not own any vehicles with complex telematic devices, then the instructor would probably want to minimize the time spent on covering in-vehicle technologies. Still, teachers must convey the essential material for students to remain or become safe drivers. For example, the topic of self-regulation is likely to be universal since all seniors, regardless of their geographic origin, experience age related changes with their health that affect their driving.

Besides customization of courses, classes could be taught over a period of days to enable seniors to more easily process the information being presented on safe driving. By reducing the amount of time spent in the classroom on any particular day, seniors may be less likely to experience "information overload" and more likely to effectively learn the course material. Already, several courses reviewed in chapter 4 offer such a schedule including the Mature Driver Workshop and You Decide: Senior Driver Awareness Program, both conducted in the state of Michigan.

Conclusion

By the end of the day, with all these recommendations for older driver education, the ultimate goal is relatively simple: to reduce roadway crashes for an aging population expected to be driving in greater numbers in the coming years. Such an objective may be accomplished through enhancements in the course content by including such topics as ITS/telematic developments, changes in roadway infrastructure, and alternative transportation. Another strategy is to focus on more structural enhancements such as teaching methods, partnerships for sponsoring the course, and the services provided students like assessment of driving skills. Ultimately, however, further research would be needed to validate those particular elements, of each approach that should be included in an effective program of older driver education. Yet, the ideas proposed in this chapter like UFOV training/assessment that are more likely to significantly lower crash rates (according to chapter 3), perhaps should be studied first, to optimize limited time and resources.

Nonetheless, even with proving the safety benefits of such measures, stakeholders of older driver education should be aware of potential barriers to overcome when implementing their ideas. They may face challenges not just on a technical level, but on more political, social, and economic grounds that include such concerns as privacy issues and the affordability of the course with lower-income seniors. Nevertheless, through a multi-faceted, collaborative (i.e. between stakeholders) approach to improving older driver education, such challenges may be overcome by adopting various measures such as government subsidies, partnerships with private industry, and software tools that allow certain aspects of the course (e.g., driving assessment) to be conducted in more private settings.

As a first step in optimizing older driver education for the 21st century, more research should be conducted, based not only on the ideas proposed in this chapter, but also on the findings from the other chapters of the thesis. From chapter 3, for example, more studies could be conducted on improvements of intermediate safety outcomes such as UFOV, self-regulation, and visual processing/attention skills from senior driver training, and the link of these dependent variables to crash risk. From chapter 6, the focus is on motivational issues. For

example, from this chapter additional research could be conducted on the correlation of between course participants' levels and types of motivation towards older driver education and their corresponding accident rate.

At the same time of researching these additional issues, partnerships should be formed among the various stakeholders. Such collaboration could be especially beneficial if certain measures proposed in this chapter or by other sources are found to significantly enhance the effectiveness of older driver education. Perhaps the ideas of the various stakeholders can be solicited as the research is conducted and potential solutions are formulated. With greater cooperation and trust among the core interest groups like senior advocacy organizations, government agencies, and the aging driver population itself, institutional roadblocks are less likely to emerge that could prevent sound, optimal ideas from being implemented.

In reality, such a multifaceted approach may require considerable effort, time, and resources. But ultimately through these "investments" an older driver course/program may emerge that is effective, is motivating to students, and is reasonably supported by the necessary stakeholders. At that time, a new reality could emerge for the aging population of the 21st century. Essentially, a vision would be fulfilled in the not too distant future where seniors are driving safely, satisfying their mobility needs on the roadways, maintaining their independence, and thus enjoying a higher quality of life.

Bibliography

- AARP. (2004). AARP driver safety program volunteer and graduate survey report
- AARP. (2005a). AARP driver safety program (participant workbook)
- AARP. (2005b). *Insurance Premium Discounts for Graduates of State-Approved Driver Safety Programs. 2005 Survey of State Laws*
- AARP. (2006). *Driver education Course Outline*. Retrieved April 17, 2006 from http://www.aarp.org/families/driver_safety/driver_ed/a2004-06-21-course.html
- Age Concern New Zealand. <Home page>. Retrieved 4/17/06, 2006 from <http://ageconcern.org.nz/>
- Alsnih, Rahaf and Hensher, David A. The Mobility and Accessibility Expectations of Seniors in the Aging Population. Diss. The University of Sidney Institute of Transportation Studies, 30 May 2003
- American Automobile Association (2006). Safe driving for mature operators (student guide)
- American Medical Association. (2003). Physician's guide to assessing and counseling older drivers No. DOT HS 809 647)
- American Medical Association. (2004). *Why are older drivers at risk?* Retrieved 10/25/05 from <http://www.ama-assn.org/ama/pub/category/9115.html>
- Auto Club of Southern California. (2006). *Auto club driving school.*, Retrieved 4/17/06 from <http://www.aaa-calif.com/auto/safety/drvschool.asp>
- Bédard, M., Isherwood, I., Moore, E., Gibbons, C., & Lindstrom, W. (2004). Evaluation of a re-training program for older drivers. *Canadian Journal of Public Health, 95*, 295.
- Blackman, L. B. (2000). Older adult perceptions of transit security and their utilization of public transportation. Diss. Massachusetts Institute of Technology.

- California Department of Motor of Vehicles. (2003). *Mature driver improvement course*. Retrieved 4/17/2006 from http://www.dmv.ca.gov/vehindustry/ol/mature_drvr.htm
- Canada Safety Council (2005), *55 Alive Driver Refresher Course*, Retrieved 4/18/06 from <http://www.safety-council.org/training/55alive/55alive.htm>
- Canada Safety Council, *Mandate, Programs and Activities, Objectives*, Retrieved 4/18/06 from <http://www.safety-council.org/CSC/overview.htm>
- Carstensen, G. (2002). The effect on accident risk of a change in driver education in denmark. *Accident Analysis and Prevention*, 34, 111.
- Central Office of Information (UK). (2005). *About the arrive alive classic scheme*. Retrieved 2/15/06 from http://www.direct.gov.uk/Motoring/RoadSafety/RoadSafetyArticles/fs/en?CONTENT_ID=4022428&chk=CBBT3I
- Christie, Dr. Ron. (2002). *Road safety education and training from a public health perspective*. Paper presented at the Road Safety Research, Policing and Education Conference, Australia.
- Christie, R. (November 2001). The effectiveness of driver training as a road safety measure. Royal Automobile Club of Victoria.
- Cobb, R. W., & Coughlin, J. F. (1999). Transportation policy for an aging society: keeping older americans on the move.
- Cognitive Science Laboratory, Princeton University.
WordNet.<http://wordnet.princeton.edu/perl/webwn?s=education>
- Continental Teves. (2006). *Electronic stability control - ESC.*, 2006 from http://www.conti-online.com/generator/www/us/en/continentalteves/continentalteves/themes/products/electronic_brake_systems_folder/electronic_stability_program_en.html
- Coughlin, J. F. (2004). Not your father's auto industry? aging, the automobile, and the drive for product innovation. *Generations*, 28, 38.

- Coughlin, J., & Tallon, A. (Fall 1998-Winter 1999). Older drivers and ITS: Technology, markets, and public policy.
- Coughlin, J.. "Driving Digitally: The Future of the Car and Lifelong Driver Education." AARP Driver Safety Meeting. San Antonio, Texas, 23 February 2005.
- De Raedt, R., & Ponjaert-Kristoffersen, I. (2000). Can strategic and tactical compensation reduce crash risk in older drivers? *Age and Ageing*, 29, 517.
- Drive Wise. *What is drive wise?* Retrieved 4/18/06, 2006 from <http://www.drivewise.ca/display.cfm?cabinetID=164&libraryID=46&documentID=212>
- Eby, D. W., Trombley, D. A., Molnar, L. J., & Shope, J. T. (August 1998). The assessment of older drivers' capabilities: A review of the literature
- Elliot, & Shanahan. (1995). *Older driver risks and countermeasures* No. CR 163) Australian Transport Safety Bureau.
- Elsworth, Judith. (2002). An adult education program to promote road safety for older people
- Federal Highway Administration. (2000). *Roundabouts: an Informational Guide*
- Goode, K. T., Ball, K. B., Sloane, M., Roenker, D. L., Roth, D. L., & Myers, R. S. et al. (1998). Useful field of view and other neurocognitive indicators of crash risk in older adults. *Journal of Clinical Psychology in Medical Settings*, , 425.
- Gordon, R. (2005), London's traffic tactic piques interest in S.F. congestion eased by making drivers pay to traverse busiest areas at peak times . *San Francisco Chronicle*, pp. A-1.
- Haroun, A. (March 2000). *Senior drivers and road safety*. Paper presented at the 65th ROAD SAFETY CONGRESS, United Kingdom.
- Insurance institute for Highway Safety (IIHS) (2001). Education alone won't make drivers safer. *Status Report*,

Israels, Richard (2005). In-Vehicle Technologies and Senior Mobility. Reported Submitted to Department of Civil and Environmental Engineering, Massachusetts Institute of Technology

Ker, K., Roberts, I., Collier, T., Beyer, F., Bunnd, F., & Frost, C. (2004). Post-licence driver education for the prevention of road traffic crashes: A systematic review of randomised controlled trials. *Accident Analysis and Prevention*, 37, 305-313

Ling Suen, S., & Sen, L. (1999). **Mobility options for seniors**. *Transportation in an Aging Society: A Decade of Experience*, Baltimore, MD.

MAROTTOLI, R. (2000). The physician's role in the assessment of older drivers. *American Academy of Family Physicians*, 61

McGwin Jr., Gerald , M.S., Ph.D. Impact of an educational program on the safety of high-risk, visually impaired, older drivers.

McGwin, G., Owsley, C., & Ball, K. (1998) IDENTIFYING CRASH INVOLVEMENT AMONG OLDER DRIVERS: AGREEMENT BETWEEN SELF-REPORT AND STATE RECORDS. *Accident Analysis and Prevention*, 30, 781.

Meyer, Joachim & Coughlin, J. (2001) *Older Driver and New In-Vehicle Technologies: Promises and Changes* MIT AgeLab.

Milton, K. (1999) Impact of Public Information on Safe Transportation of Older People. Presented at the conference *Transportation in an Aging Society: A Decade of Experience*, Baltimore, MD.

Molnar, L. J., Eby, D. W., & Miller, L. L. (2003). *PROMISING APPROACHES FOR ENHANCING ELDERLY MOBILITY* University of Michigan Transportation Research Institute.

National Academy on an Aging Society. *Older driver relicensing laws: The states A-F*.<http://www.agingsociety.org/agingsociety/links/driverLicenseAF.html#CA>

National Center for Injury Prevention and Control (2006). *Older Adult Drivers: Fact Sheet, 2006* from <http://www.cdc.gov/ncipc/factsheets/older.htm>

National Highway Traffic Safety Administration. (2003). *A COMPENDIUM OF LAW ENFORCEMENT OLDER DRIVER PROGRAMS*
<http://www.nhtsa.dot.gov/people/injury/olddrive/LawEnforcementOlderDriver03/introduction.htm>

National Highway Traffic Safety Administration. (April 1999). *SAFE MOBILITY FOR OLDER PEOPLE NOTEBOOK*

National Institute for Driver Behavior. *Standards for a driver risk-management program*. Retrieved 4/17/06, 2006 from <http://www.nidb.org/standardsfrpp.html>

National Safety Council. (2004). *DDC-coaching the mature driver*. Retrieved 4/17/06 from <https://secure.nsc.org/train/course.cfm?id=88>

NHTSA, National Center for Statistics and Analysis. (2004). *Traffic safety facts 2004* No. DOT HS 809 910

Nicole Skaar, Matthew Rizzo, Kirk Bateman, Steven W. Anderson University of Iowa. (2001). *Effects of speed of visual processing training upon non-visual attention in "At-risk" older drivers* [Abstract].

Northport Associates. (2005). *GUIDELINES FOR EVALUATING DRIVER EDUCATION PROGRAMS (DISCUSSION PAPER)*

O'Neill, D., & Dobbs, B. M. (1999). Age-related disease, mobility, and driving. *Transportation in an Aging Society: A Decade of Experience*, Baltimore, MD.

OECD (2001). *Ageing and transport: mobility needs and safety issues*

OECD (2003). *NEW TRANSPORT TECHNOLOGY FOR OLDER PEOPLE - An OECD – MIT International Symposium*. Held in Cambridge, Massachusetts on 23-24 September 2003.

Office of Highway Information Management, Federal Highway Administration. (1995). *Highway statistics summary to 1995*. <http://www.fhwa.dot.gov/ohim/summary95/index.html>

Office of the Assistant Secretary for Transportation Policy, U.S. Department of Transportation. (1997). *Improving transportation for a maturing society*

Ontario Ministry of Transportation. Senior Driver Group Education Sessions (Brochure)

Organisation for Economic Co-operation and Development. *About OECD*. Retrieved 3/1/06 from http://www.oecd.org/about/0,2337,en_2649_201185_1_1_1_1_1,00.html

Ottersen, K. C. (2006). *Driver 65+*. Norwegian Highway and Roads Administration

Owsley, C., Ball, K., McGwin, G., Sloane, M. E., Roenker, D. L., & White, M. F. et al. (1998). Visual processing impairment and risk of motor vehicle crash among older adults. *Journal of the American Medical Association*, 279, 1083.

Owsley, C., McGwin, G., Phillips, J.M., McNeal, S.F., & Stalvey, B.T. (2004). Impact of an educational program on the safety of high-risk, visually impaired, older drivers. *American Journal of Preventive Medicine*, 26, 222.

Owsley, C., Stalvey, B.T., & Phillips, J.M. (2001). The efficacy of an educational intervention in promoting self-regulation among high-risk older drivers. *Accident Analysis and Prevention*, 35

Parliamentary Road Safety Committee. (March 2002). Inquiry into improving the safety of older road users. Royal Automobile Club of Victoria.

PEREZ, B. G., & SCIARA, G. (2003). *A GUIDE FOR HOT LANE DEVELOPMENT* (USDOT Pub No.: FHWA-OP-03-009) Federal Highway Administration.

POTTS, I., STUTTS, J., PFEFER, R., NEUMAN, T. R., SLACK, K. L., & HARDY, K. K. (2004). *Guidance for implementation of the AASHTO strategic highway safety plan volume 9: A guide for reducing collisions involving older drivers* (NCHRP REPORT 500)

Reimer, Bryan, Ph.D., Coughlin, Joseph, Ph.D., Mehler, Bruce, M.A., Roy, Nick, Ph.D., Bell, Avonne, B.S., Adams, Danielle, B.S., Dusek, Jeffery A., Ph.D. (2006), Assessing the impact of hands-free cellular phone conversations on physiological measurements and driving performance in older adults (working paper).

- Roenker, D. L., Cissell, G., Ball, K. K., Wadley, V., & Edwards, J. (2003). Speed of processing and driving simulator training resulted in improved driving performance. *Human Factors*, 45, 218.
- Romoser, Matthew R. E., Fisher, D. L., Mourant, R., Wachtel, J., & Sizov, K. THE USE OF A DRIVING SIMULATOR TO ASSESS SENIOR DRIVER PERFORMANCE: INCREASING SITUATIONAL AWARENESS THROUGH POST-DRIVE ONE-ON-ONE ADVISEMENT. 3rd International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design,
- Rosenbloom, S. (July 2003). The mobility needs of older americans: implications for transportation reauthorization. The Brookings Institution.
- Rosenbloom, S. (November 1999). Mobility of the elderly good news and bad news.
- Royal Automobile Club of Victoria. (a). *RACV senior drivers' program*. Retrieved 2/15/06, from <http://www.racv.com.au/safety/seniordrivers.asp>
- Royal Automobile Club of Victoria. (b). *Road safety for seniors*. Retrieved 4/17/06, from <http://journeys.racv.com.au/racvm/peacemind/safety.cfm?id=E7C17571-FC55-4864-9DB06E622477FC64>
- Royal, F. (2005), Designing cars (quietly) for aging drivers. *Boston Globe*, pp. J1.
- Safety Center Incorporated. *Mature driver course*
A defensive driving course for those 50 and over.. Retrieved 4/17/06, 2006 from <http://www.safetycenter.org/maturedriver.html>
- Secretary of State Illinois. *Super seniors program*. Retrieved 4/17/06, 2006 from http://www.cyberdriveillinois.com/services/services_for_seniors/superseniors.html
- Shaheen, S. A., & Niemeier, D. A. (2001). Integrating vehicle design and human factors: Minimizing elderly driving constraints. *Transportation Research Part C*, 155.
- Skaar, N., Rizzo, M., Bateman, K., & Anderson, S. W. (2001). Effects of speed of visual processing training upon non-visual attention in "At-risk" older drivers [Abstract].

Skinner, D., & Stearns, M. D. (1999). *SAFE MOBILITY IN AN AGING WORLD*

Staplin, L., & Hunt, L. Driver programs. Baltimore, MD. 69.

Stephens, B.W., McCarthy, D.P., Marsiske, M., Shechtman, Orit, Classen, S., Justiss, M., & Mann, W.C. (2005). International older driver Consensus Conference on assessment, remediation and counseling for transportation alternatives: Summary and recommendations. *Physical & Occupational Therapy in Geriatrics*, 23, 103.

Suen, S. Ling, Mitchell, C.G.B., & Henderson, S.. *Applications of Intelligent Transportation Systems to Enhance Vehicle Safety for Elderly and Less Able Travelers*. Proc. of the 16th International Technical Conference on the Enhanced Safety of Vehicles, Windsor, Ontario, 1998

Tahmhane, A. & Dunlop, D. *Statistics and Data Analysis: From Elementary to Intermediate*. Prentice Hall, 2000

Traffic Safety Center - UC Berkeley. (2006). *A look at the haddon matrix*. Retrieved 4/17/06, from <http://www.tsc.berkeley.edu/html/newsletter/Winter05-06/haddon.html>

Transportation Research Board (TRB) & National Cooperative Highway Research Program. (2005). *Improving the safety of older road users* (Conference No. 348)

Transportation Research Board. (2005). *Safe mobility for older americans*

U.S. Department of Transportation, National Highway Traffic Safety Administration. (2001). *Older road user research plan* (No. DOT HS 809 322)

United States Department of Transportation Intelligent Vehicle Initiative. (2006). *IVI - 8 major problem areas*. Retrieved 1/15/06, from <http://www.its.dot.gov/ivi/8MPA.html#RD>

University of Florida National Older Driver Research and Training Center (2003) *DRIVING ASSESSMENT, REMEDIATION AND COUNSELING FOR TRANSPORTATION ALTERNATIVES*. Summary report of international older driver consensus conference.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003.

Wachs, M. (1979). *Transportation for the elderly: Changing lifestyles-changing needs*. Berkeley, CA: University of California Press.

Wagner, E. (2004). In National Highway Traffic Safety Administration (Ed.), *Older Drivers – the Federal Perspective*

Appendix

List of Appendix Tables

Table A. Topics Covered in various US Older Driver Programs	154
Table B. Structural/Administrative Features of US Older Driver Education Courses.....	156
Table C. US Older Driver Courses – Details of Structural Features	159

List of Appendix Figures

Figure 1. Survey of AARP Members in Massachusetts Conducted 2005-2006	174
---	-----

Table A¹. Topics Covered in various US Older Driver Programs

Course	Sponsor	Service Area	Self-Assessment, Driving Cessation	Alternative Transportation	Road Rules	Vehicle Operation, Maintenance	Vehicle Technology	Effects of aging AND/OR medication	Adaptive Driving Strategies, Self-Regulation	Driver Awareness of Roadway Environment
Driver Safety Program	AARP	Nationwide	●		●	●	●	●	●	●
Mature Driver Workshop	Traffic Improvement Association	Michigan	●		●		●	●	●	
Safe Driving for Mature Operators	AAA Foundation for Traffic Safety	Nationwide	●			●	●	●	●	●
You Decide: Senior Driving Awareness Program	Michigan Area Agency on Aging 1-B	Select counties of Michigan	●	●	●		●	●	●	●
Coaching the Mature Driver	National Safety Council	Nationwide					●	●		●
Mature Driver Course	Safety Center Incorporated	Sacramento, CA				●	●	●	●	●
Mature Driver Improvement Course	Auto Club of Southern California	Southern California					●	●		
Mature Driver Improvement Course	Monterey Park Police Department	Monterey Park, CA		●	●			●		

¹ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. **In some cases**, research was unable to verify this feature as part of the course.

Course	Sponsor	Service Area	Self-Assessment, Driving Cessation	Alternative Transportation	Road Rules	Vehicle Operation, Maintenance	Vehicle Technology	Effects of aging AND/OR medication	Adaptive Driving Strategies, Self-Regulation	Driver Awareness of Roadway Environment
Mature Driver Improvement Program²	California Department of Motor Vehicles	California			●			●		
Motor Vehicle Safety online seminars	American Society of Aging, NHTSA	Nationwide		●				●		
Super Seniors	Illinois secretary of state	Illinois			●					

² This course is approved by the California Department of Motor Vehicles and taught by various providers throughout the state.

Table B⁴. Structural/Administrative Features of US Older Driver Education Courses

Course	Sponsor	Service Area	Sponsorship/Delivery			Duration			Pedagogy					Cost		Service Area		Incentives		Age	Sponsor Type	
			Sponsorship + Delivery	Just sponsors	Just delivers	Length <=2 hours	2 hours < length < 6 hours	Length >= 6 hours	Online/Computer	Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional/Statewide	National	Optional	Insurance Discount	Qualifying or Recommended Age?	Private/NGO	Public/Government
Mature Driver Improvement Program⁵	California Department of Motor Vehicles	California		●				●						●	●		●	●	●			●
Super Seniors	Illinois secretary of state	Illinois	●			●							●	●		●						●
Mature Driver Workshop	Traffic Improvement Association	Michigan			●		●		●				●	●		●		●		●		●

⁴ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. **In some cases**, research was unable to verify this feature as part of the course.

⁵ This course is approved by the California Department of Motor Vehicles and taught by various providers throughout the state.

Course	Sponsor	Service Area	Sponsorship/Delivery			Duration			Pedagogy					Cost		Service Area		Incentives		Age	Sponsor Type	
			Sponsorship + Delivery	Just sponsors	Just delivers	Length <=2 hours	2 hours < length < 6 hours	Length >= 6 hours	Online/Computer	Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional/Statewide	National	Optional	Insurance Discount	Qualifying or Recommended Age?	Private/NGO	Public/Government
Mature Driver Improvement Course	Monterey Park Police Department	Monterey Park, CA	●					●					●	●		●	●	●			●	
Driver Safety Program	AARP	Nationwide	●					●	●				●	●		●	●	●	●	●		
Safe Driving for Mature Operators	AAA Foundation for Traffic Safety	Nationwide		●			●	●	●				●	●		●	●	●	●	●		
Motor Vehicle Safety online seminars	American Society of Aging, NHTSA	Nationwide	●			●			●				●	●		●	●		●	●		

Course	Sponsor	Service Area	Sponsorship/ Delivery			Duration			Pedagogy				Cost		Service Area		Incentives		Age	Sponsor Type	
			Sponsorship + Delivery	Just sponsors	Just delivers	Length <=2 hours	2 hours < length < 6 hours	Length >= 6 hours	Online/Computer	Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional/Statewide	National	Optional	Insurance Discount	Qualifying or Recommended Age?	Private/NGO
Coaching the Mature Driver	National Safety Council	Nationwide		●				●					●	●		●	●	●	●	●	
Mature Driver Course	Safety Center Incorporated	Sacramento, CA	●					●					●	●	●		●		●	●	
You Decide: Senior Driving Awareness Program	Michigan Area Agency on Aging 1-B	Select counties of Michigan	●			●							●	●		●				●	
Mature Driver Improvement Course	Auto Club of Southern California	Southern California			●			●	●				●	●			●	●	●	●	

Table C⁸. US Older Driver Courses – Details of Structural Features

Program	Sponsor	Service Area	Age	Program Cost	Teachers of Course	Pedagogy	Duration	Incentives
Mature Driver Improvement Course⁹	California Department of Motor Vehicles	California	55 and over	\$23			6 hours, 40 minutes (minimum)	Insurance discounts on premiums
Coaching the Mature Driver	National Safety Council	Nationwide	55 and over	varies by training center		Classroom based	6-8 hours	Depends on state, insurance company
Driver Safety Program	AARP	Nationwide	50 and over	\$10	Volunteers	Classroom Based - looking to develop online version soon	Two 4 hour sessions	State mandated insurance depending on state where course is taken
Mature Driver Course	Safety Center Incorporated	Sacramento, CA	50 and over	\$23	NSC - certified instructors	Classroom Based	6 hours, 40 minutes of instruction	
Mature Driver Improvement Course	Auto Club of Southern California	Southern California	55 and over	\$21		Classroom Based	8 hours	May be eligible for discount of up to 1.8%
Mature Driver Improvement Course	Monterey Park Police Department	Monterey Park, CA	55 and over	Free - Except \$1 to receive certificate of completion	Police Officer	Classroom Based	8 hours	Insurance discount

⁸ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. **In some cases**, research was unable to verify this feature as part of the course.

⁹ This course is approved by the California Department of Motor Vehicles and taught by various providers throughout the state.

Program	Sponsor	Service Area	Age	Program Cost	Teachers of Course	Pedagogy	Duration	Incentives
Mature Driver Workshop	Traffic Improvement Association	Southeast Michigan	55 and over	\$20	Retired law enforcement professionals, AAA certified instructors		Two 4 hour sessions + optional 1/2 hour on the road session	
Motor Vehicle Safety online seminars	American Society of Aging, NHTSA	Nationwide		Free		Online	each seminar is 1 hour	
Safe Driving for Mature Operators	AAA Foundation for Traffic Safety	Nationwide	55 and over	Varies by state		Classroom Based - organized around class discussions	4-8 hours – depends on state where course is offered	Insurance Discounts
You Decide: Senior Driving Awareness Program	Michigan Area Agency on Aging 1-B	Select counties of Michigan	any age	Free		Seminar - organized group discussions, support groups	Series of 1 hour information sessions - meets each month and discusses various topics	
Super Seniors	Illinois secretary of state	Illinois		Free		Classroom Based	2 hours	

⁷Table D. Overview of International Older Driver Education

Country	Course/Program	Sponsor	Service Regions	Method/Format of Delivery	Duration	Recommended Age	Cost	Incentives to participate
AUSTRALIA	<i>RACV Senior Drivers' Program</i>	Royal Automobile Club of Victoria (RACV)	Victoria	On the Road component	1 hour		\$AUD 60 OR ~\$US 45 (2006)	
AUSTRALIA	<i>Wiser Driver Course</i>	Hawthorn Community Education Project in Hawthorn, Victoria	Victoria	Classroom Sessions	Consists of 2 hour/week courses held over 4 week period		\$AUD 10 OR ~\$US 7 (2006)	
AUSTRALIA	<i>Years Ahead - Road Safety for Seniors</i>	Royal Automobile Club of Victoria	Victoria	Seminar	60 minutes		Free	
AUSTRALIA	<i>Years Ahead - Road Safety for Seniors (national version)</i>	National Roads and Motorists' Association Limited	National	Seminar (taught by seniors)	60 minutes		Free to organized groups	
AUSTRIA	<i>Driving technology and safety training for the generation 50 plus</i>	Austrian Automobile Club	Niederösterreich (state in lower Austria)	On the Road component, in class portion	1 day (8:30AM-5:10PM)	50 years and Older	54 Euros ~\$US 69 (2006)	
CANADA	<i>55 Alive Driver Refresher Course</i>	Canada Safety Council – NGO	National	Classroom Sessions		55 years and older		

⁷ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. **In some cases**, research was unable to verify this feature as part of the course.

Country	Course/Program	Sponsor	Service Regions	Method/Format of Delivery	Duration	Recommended Age	Cost	Incentives to participate
CANADA	<i>Drive Wise Seminar</i>	Ontario Provincial Police, Canadian Association of Retired Persons (CARP)		Seminar - taught by Ontario Provincial Police (OPP)	1-2 hours		None	
CANADA	<i>Mature Operators Workshop/Seniors Course</i>	CAA (Canadian Automobile Association) of South Central Ontario	Ontario	Classroom Sessions	3 hours			
CANADA	<i>Senior Driver Group Education Session</i>	Ontario Ministry of Transportation	Ontario	Seminar	90 minutes	80 years and older		Mandatory for seniors 80+
DENMARK	<i>County of Funen Driver Refresher Course</i>	Traffic Safety Committee of Funen and the Danish Ministry of Transport.	County of Funen	in class training, on-road driving exercises		65+	\$US 80 (2004)	
DENMARK	<i>Touch Up Course for Experienced Drivers</i>	DaneAge Association and the Danish Union of Driving Instructors in collaboration with The Danish Road Safety Council		6 lessons at classroom and 1 private lesson in your own car with a driving instructor.	10 one hour lessons	No minimum age	\$US 125 (2006)	
FINLAND	<i>Fitness Course for Elderly Drivers</i>	Liikenneturva, The Central Organization for Traffic Safety in		Classroom Sessions	6-9 hours	64+		

Country	Course/Program	Sponsor	Service Regions	Method/Format of Delivery	Duration	Recommended Age	Cost	Incentives to participate
		Finland						
GERMANY	<i>Mobil im Alter? - Aber sicher! (Mobility at old age? But safe!)</i>	Deutscher Verkehrssicherheitsrat e. V. (DVR)	Nationwide	In class	1 day - consists of four 2 hour discussions	60+	Free	
GERMANY	<i>Senioren am Steuer (Seniors behind the wheel)</i>	German Auto Club – ADAC		in class	4 days - 2 hours		Free	
JAPAN		National Public Safety Commission				70+ (mandatory for those at or above this age)		Course is mandatory for those 70 years and older
NEW ZEALAND	<i>Safe with Age</i>	Land Transport Safety Authority, delivered by Age Concern local Councils	Nationwide	Classroom Sessions	4 hours, can be conducted in two 2-hour sessions over a morning and afternoon period, or over two days or even two weeks	60+	Depends on particular community based course	
NORWAY	<i>65 Pluss Program</i>	Norwegian Public Roads Administration	Nationwide	In-Class, On-the-Road sessions	12 hours in-class (3 hours per day), 2 hours with teacher	60	~ \$US 120 (2004)	No incentives

Country	Course/Program	Sponsor	Service Regions	Method/Format of Delivery	Duration	Recommended Age	Cost	Incentives to participate
SWITZERLAND	<i>Driving Check for Seniors</i>	Auto Club Switzerland	Thurgau (Canton in Switzerland)	On the road component, group discussion, can take class at home as well	1 day	Any driver with considerable experience	120 CHF (~\$US 100 (2006)) for members , 190 CHF (~ \$US 160 (2006)) to non-members	
SWITZERLAND	<i>Kurse für Senioren (Course for Seniors)</i>	lozza.ch - scola d'auto e moto		In-Class, On-the-Road option		70+	CHF 90 (~\$US 75 (2006)) - on the road, CHF 350 (~\$US 290 (2006)) - for classroom	
UNITED KINGDOM	<i>Arrive Alive Classic Scheme</i>	Driver Standards Agency (DSA)		Presentation format	1 hour	50+	Free	
UNITED STATES	<i>AARP - Driver Safety Course</i>	AARP	Nationwide	In class	Two 4 hour sessions	50+	\$US 10	State mandated insurance discount
UNITED STATES	<i>Safe Driving for Mature Operators</i>	AAA Foundation for Traffic Safety	Nationwide	In class		55+	Varies by state	Insurance Discounts

Table E⁸. Topics Covered in various International Older Driver Courses

Country	Course	Sponsor	Self-Assessment, Driving Cessation	Alternative Transportation	Road Rules	Vehicle Operation, Maintenance	New Technology/Telematics	Effects of aging	Adaptive Driving Strategies/Self-Regulation	Driver Awareness of Roadway Environment
Australia	<i>Wiser Driver Course</i>	Hawthorn Community Education Project in Hawthorn, Victoria		●		●		●		
Australia	<i>Years Ahead - Road Safety for Seniors</i>	Royal Automobile Club of Victoria (RACV)	●	●	●			●		
Australia	<i>Years Ahead - Road Safety for Seniors (national version)</i>	National Roads and Motorists' Association Limited		●						
Austria	<i>50 Plus Driving Program</i>	Austrian Automobile Club				●	●			
Canada	<i>55 Alive Driver Refresher Course</i>	Canada Safety Council - NGO	●				●	●		●
Canada	<i>Drive Wise Seminar</i>	Ontario Provincial Police			●					
Canada	<i>Mature Operators Workshop/Seniors Course</i>	CAA (Canadian Automobile Association) of South Central Ontario			●			●	●	

⁸ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. **In some cases**, research was unable to verify this feature as part of the course.

Country	Course	Sponsor	Self-Assessment, Driving Cessation	Alternative Transportation	Road Rules	Vehicle Operation, Maintenance	New Technology/Telematics	Effects of aging	Adaptive Driving Strategies/Self-Regulation	Driver Awareness of Roadway Environment
Canada	<i>Senior Driver Group Education Session</i>	Ontario Ministry of Transportation	●						●	
Denmark	<i>County of Funen Driver Refresher Course</i>	Traffic Safety Committee of Funen and the Danish Ministry of Transport.								
Denmark	<i>Touch Up Course for Experienced Drivers</i>	DaneAge Association								
Finland	<i>Fitness Course for Elderly Drivers</i>	Liikenneturva, (Central Organization for Traffic Safety in Finland)						●	●	
France		ANPER - advanced driving school								
Germany	<i>Mobility at old age? But safe!</i>	Deutscher Verkehrssicherheitsrat e. (DVR)			●		●			
Germany	<i>Senioren am Steuer (Seniors Behind the Wheel)</i>	German Auto Club - ADAC	●		●					
New Zealand	<i>Safe with Age</i>	Land Transport Safety Authority, Age Concern Council	●					●	●	
Norway	<i>65 Pluss Program</i>	Norwegian Public Roads Administration			●					●

Country	Course	Sponsor	Self-Assessment, Driving Cessation	Alternative Transportation	Road Rules	Vehicle Operation, Maintenance	New Technology/Telematics	Effects of aging	Adaptive Driving Strategies/Self-Regulation	Driver Awareness of Roadway Environment
Switzerland	<i>Driving Check for Seniors</i>	Auto Club Switzerland			●					
Switzerland	<i>Kurse für Senioren (Course for Seniors)</i>	lozza.ch - scuola d'auto e moto			●					
United Kingdom	<i>Arrive Alive Classic Scheme</i>	Department for Transport, Driver Standards Agency (DSA)			●			●		●
United Kingdom	<i>MAVIS - Mobility Advice and Vehicle Information Service</i>	Royal Automobile Club (RAC)							●	

Table F⁹. Structural/Administrative Features of International Older Driver Courses

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency	
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length ≥ 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional		Mandatory	Qualifying or Recommended Age?
Australia	<i>RACV Senior Drivers' Program</i>	Royal Automobile Club of Victoria (RACV)	●			●		●			●	●			●			●	
Australia	<i>Wiser Driver Course</i>	Hawthorn Community Education Project in Hawthorn, Victoria	●			●					●	●			●			●	

⁹ If an entry is left blank in the matrix above, it does not necessarily mean that a particular characteristic/feature does not apply to the course. In some cases, research was unable to verify this feature as part of the course.

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length >= 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional		
Australia	<i>Years Ahead - Road Safety for Seniors</i>	Royal Automobile Club of Victoria	●			●				●	●		●		●			●
Australia	<i>Years Ahead - Road Safety for Seniors (national version)</i>	National Roads and Motorists' Association Limited	●			●				●	●		●	●				●
Austria	<i>50 Plus Driving Program</i>	Austrian Automobile Club	●			●	●			●		●		●			●	●
Canada	<i>55 Alive Driver Refresher Course</i>	Canada Safety Council - NGO	●			●				●			●	●			●	●
Canada	<i>Drive Wise Seminar</i>	Ontario Provincial Police		●		●				●	●		●		●			●

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency	
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length >= 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional		Mandatory	Qualifying or Recommended Age? Private/NGO
Canada	<i>Mature Operators Workshop/Seniors Course</i>	CAA (Canadian Automobile Association) of South Central Ontario	●			●			●			●		●			●		
Canada	<i>Senior Driver Group Education Session</i>	Ontario Ministry of Transportation	●			●			●			●			●	●		●	
Denmark		Local Police Departments - particularly in the city of Grena	●									●						●	
Denmark	<i>County of Funen Driver Refresher Course</i>	Traffic Safety Committee of Funen and the Danish	●				●		●	●	●	●				●		●	

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency	
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length >= 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional			Mandatory
		Ministry of Transport.																	
Denmark	<i>Touch Up Course for Experienced Drivers</i>	DaneAge Association	●				●	●			●		●				●	●	
Finland	<i>Fitness Course for Elderly Drivers</i>	Liikenneturva, The Central Organization for Traffic Safety in Finland	●				●				●		●				●		●
France		ANPER - advanced driving school															●		

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency	
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length >= 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional		Mandatory	Qualifying or Recommended Age?
Germany	<i>Mobility at old age? But safe!</i>	Deutscher Verkehrssicherheitsrat (DVR)	●				●	●			●	●					●	●	
Germany	<i>Senioren am Steuer (Seniors Behind the Wheel)</i>	German Auto Club - ADAC	●				●			●	●		●		●			●	
Japan		National Public Safety Commission	●					●	●							●	●		●
New Zealand	<i>Safe with Age</i>	Land Transport Safety Authority, Age Concern Council		●		●				●	●			●	●		●	●	●
Norway	<i>65 Pluss Program</i>	Norwegian Public Roads Administration, National					●	●		●		●			●		●		●

Country	Course	Sponsor	Sponsorship Scheme			Duration		Pedagogy			Course Fee		Service Region		Motivation		AGE	Type of Sponsoring Agency	
			Sponsors and Delivers	Just sponsors	Just delivers	length < 6 hours	Length >= 6 hours	On-Road/Behind the Wheel	Simulation	At Home (OPTION)	In-Class/Seminar	Free	Fee required	Regional	National	Optional		Mandatory	Qualifying or Recommended Age?
		Resource and Qualification Centre																	
Switzerland	<i>Fahr-Check für Senioren (Driving check for seniors)</i>	Auto Club Switzerland	●			●	●		●	●	●		●	●		●	●		
Switzerland	<i>Kurse für Senioren (Course for Seniors)</i>	lozza.ch - scola d'auto e moto	●				●		●		●		●	●			●		
United Kingdom	<i>Arrive Alive Classic Scheme</i>	Department for Transport, Driving Standards Agency (DSA)	●						●	●			●	●		●			●
United Kingdom	<i>MAVIS - Mobility Advice and Vehicle Information Service</i>	Royal Automobile Club (RAC)	●		●	●			●	●			●	●			●		

Figure 1. Survey of AARP Members in Massachusetts Conducted 2005-2006



Dear AARP Member:

AARP Driver Safety Program and the MIT AgeLab are interested in attitudes about driving related issues. This brief survey will take a few minutes of your time to complete and will provide valuable information to improve the AARP Driver Safety Program course.

All your responses will be kept anonymous and confidential. Your participation is voluntary, and you may refuse to answer any and all questions. There are no adverse consequences from refusing to participate at any point.

Thank you very much for your invaluable help.

Rhonda Starr, Director, AARP Driver Safety & Mobility Options
Joseph F. Coughlin, Director, MIT AgeLab

2005 MASSACHUSETTS AARP MEMBER DRIVING SURVEY

Please answer the questions by checking the appropriate response boxes. When you complete this survey, mail it back to us in the enclosed return postage-paid envelope.

Before you saw this survey, did you know that AARP offered a driving safety course?

- Yes No

Have you ever taken a driver safety course offered by AARP (called either the AARP Driver Safety Course or AARP 55 Alive)?

- Yes No (GO TO Question 7)

How many times have you ever taken the AARP Driver Safety Course (DSP)?

- Once Twice Three or more times

In what year did you take your most recent AARP DSP course?

Year _____

What is the primary reason you took the most recent AARP DSP course? (*Please check ONE response.*)

- For an insurance discount To be a safer driver
 Someone suggested that I take it Other (Please specify:)
 To learn about aging and driving _____

Since taking the most recent AARP DSP course, do you feel that the information you learned has helped prevent you from being involved in a traffic accident?

- Yes No

Do you have a current, valid Massachusetts driver’s license?

- Yes No (GO TO Question 20)

Typically, how many days per week do you drive?

(Please check **ONE** response.)

- Every day 1 to 3 days
 4 to 6 days Less than once a week
 I no longer drive (**GO TO Question 20**)

Please rate your overall confidence in your driving abilities using a 7-point scale where “1” is not at all confident and “7” is extremely confident.

(Please circle **ONE** number.)

Not at Extremely
all confident confident
 1 2 3 4 5 6 7

Please rate your overall enjoyment in driving these days using a 7-point scale where “1” is not at all enjoyable and “7” is extremely enjoyable.

(Please circle **ONE** number.)

Not at Extremely
all enjoyable enjoyable
 1 2 3 4 5 6 7

How have your driving skills changed over the past 5 years?

- Have improved No change Have gotten worse

In general, how concerned are you about the following situations when you drive? (*Please check ONE response for each item in the table below.*)

Driving Situations	Very concerned	Somewhat concerned	Not very concerned	Not at all concerned
Night driving	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>
Making left turns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bad weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving long distances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being involved in an accident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Driving Situations	Very concerned ▼	Somewhat concerned ▼	Not very concerned ▼	Not at all concerned ▼
Merging on to highways or interstates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Behavior of other drivers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving in unfamiliar areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dealing with complicated controls in vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highway or interstate driving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In the table below are statements about driving related issues. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each statement? *(Please check ONE response for each topic in the table below.)*

Driving Related Statements	Strongly agree ▼	Some- what agree ▼	Some-what disagree ▼	Strongly disagree ▼
I feel satisfaction when I learn new things.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I could get an insurance discount, I would be more likely to take a [or another] driver safety course.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy meeting others in group settings such as through taking courses or in doing volunteer work.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am interested in how I can improve my driving.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being able to drive makes me feel independent.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changes in health status or medications are important signs for me to think about taking a [or another] driver safety course.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's important for me to feel that I am doing what I can to make sure my driving skills stay sharp.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Driving Related Statements	Strongly agree ▼	Some- what agree ▼	Some-what disagree ▼	Strongly disagree ▼
I like going to places or doing things where I can meet new people.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't need to take a [or another] driver safety course; I'm a very safe driver.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would be more likely to take a [or another] driver safety course if it included an on-road component.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned about the impact my driving has on the safety of other drivers on the road.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Here are some additional statements. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each statement? (Please check ONE response for each topic on the table below.)

Driving Related Statements	Strongly agree ▼	Some- what agree ▼	Some-what disagree ▼	Strongly disagree ▼
If a family member encouraged me to do so, I would be more likely to take a [or another] driver safety course.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't like having to depend on other people to provide me with rides.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would be more likely to take a [or another] driver safety course if my doctor suggested it.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't have time right now to take a [or another] driver safety course.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would be more likely to take a [or another] driver safety course if I received a discount as an AARP member.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Has anyone ever suggested that you cut back on driving in certain conditions, such as driving at night?

Yes No

Has anyone ever suggested that you stop driving all together?

Yes No

Have you had any moving violations or citations (not parking tickets) in the past twelve months?

Yes No

Have you been involved in any accident(s) in the past twelve months as a driver? (*Please check ONE response.*)

Yes, but I was found not to be at fault
 Yes, I was the at-fault driver for the accident
 No

Over the past 12 months, do you believe that the number of near-miss accidents you have avoided has....?

Increased in number Decreased in number
 Stayed about the same

Do you have adult children or other close family members who are licensed to drive and who live 15 miles or less away from you?

Yes No

In the past two months, have you used any of the following? (Please check ONE response for each item in table below.)

	Yes	No	Not available in area
a) Local bus service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Local subway or elevated train service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Taxi cabs/limos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Local van service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Ride provided by family/friends/neighbors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you live within walking distance (a quarter-mile) to your nearest: (*Please check ONE response for each item.*)

Yes No Don't know

- | | | | |
|---------------------|--------------------------|--------------------------|--------------------------|
| | ▼ | ▼ | ▼ |
| a) Grocery store | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Pharmacy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) House of worship | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

In the past two years have you taken any courses or other classes in your community offered by groups such as local colleges, senior centers, libraries, or others?

- Yes No

This last section asks for some information about you. All your responses will be kept anonymous and confidential.

How would you describe your overall health?

- Excellent Fair
 Very Good Poor
 Good

Do you have any of the following illnesses or conditions? (Please check ONE response for each item in the table below.)

- | | Yes | No |
|--|--------------------------|--------------------------|
| | ▼ | ▼ |
| a) High blood pressure | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Low blood pressure | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Diabetes | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Arthritis | <input type="checkbox"/> | <input type="checkbox"/> |
| e) Congestive heart failure | <input type="checkbox"/> | <input type="checkbox"/> |
| f) Eye diseases or degenerative eye conditions | <input type="checkbox"/> | <input type="checkbox"/> |
| g) Memory loss | <input type="checkbox"/> | <input type="checkbox"/> |
| h) Chronic back or neck pain | <input type="checkbox"/> | <input type="checkbox"/> |
| i) Cancer | <input type="checkbox"/> | <input type="checkbox"/> |

How often do you do physical exercise at least 3 times per week?

- Frequently Rarely
 Sometimes Never

Are you currently employed? *(Please check ONE response.)*

- Yes, full-time
- Yes, part-time
- No, not employed (including retired)

Have you ever retired?

- Yes No

In the past 12 months, have you volunteered, that is given your time or skills, for a nonprofit organization, a charity, a school, hospital, religious organization, neighborhood association, civic or any other group?

- Yes No

Are you....?

- Male Female

What is your marital status? *(Please check ONE response.)*

- Married Widowed
- Separated or divorced Living with partner
- Single never married

What is your age? *(Please check ONE response.)*

- Less than 45 65 to 74
- 45 to 54 75 to 84
- 55 to 64 85 or older

What is the highest level of education you have completed? *(Please check ONE response.)*

- Less than a high school diploma Bachelor's degree
- High school diploma or GED Advanced or professional degree
- Some college or an Associate's degree

What do you estimate your total household income to be, before taxes? *(Please check ONE response.)*

- Less than \$25,000 \$70,000 to \$84,999
- \$25,000 to \$39,999 \$85,000 to \$99,999
- \$40,000 to \$54,999 \$100,000 to \$149,999
- \$55,000 to \$69,999 \$150,000 or more

Are you....? *(Please check ONE response.)*

- White Hispanic or Latino
- Black/African American Asian/Pacific Islander
- Other

Thank you for your participation.

PLEASE RETURN THIS COMPLETED SURVEY WITHIN 5 DAYS OF RECEIVING IT.

Glossary (*Includes definitions and acronyms*)

DSP – Driver Safety Program. The nationwide course offered by AARP that was studied in Chapter 6 of this report.

OECD – Organization for Economic Cooperation and Development. Bloc of industrialized, developed nations with democratic governments and market economies.

Strata/Stratum – Sub-populations or Groups (plural form)/Sub-population or Group (singular form) – (Respectively)

UFOV – **Useful Field of View**. The area of one's visual field that can detect and recognize potential hazards along the roadway.