



Improving older driver knowledge and self-awareness through self-assessment: The driving decisions workbook

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Abstract

Purpose: This study aims to assess whether the *Driving Decisions Workbook*, a self-assessment instrument for older drivers, increased self-awareness and general knowledge. This study also assessed perceptions regarding its usefulness, particularly as a tool for facilitating discussions within families of older drivers. A secondary purpose of the study was to determine if problems identified by drivers in the workbook related to problems they had with actual driving. **Design and Methods:** The *Driving Decisions Workbook* was administered along with a questionnaire and a road test. A convenience sample of 99 licensed drivers aged 65 and above was used. **Results:** After completing the workbook, about three fourths of the participants reported being more aware of changes that could affect driving. Fourteen percent reported that they had discovered a change in themselves of which they had not been previously aware. All respondents found the workbook to be at least a little useful and thought the workbook could help facilitate family discussions. Workbook responses were positively correlated with overall road test scores. Significant correlations were also noted between the road test and a majority of workbook subsection responses. **Implications:** This study indicates that the workbook may be a useful first-tier assessment instrument and educational tool for the older driver. It may encourage an older driver to drive more safely and/or to seek clinical assessment, and help in facilitating discussions about driving within their families.

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1. Introduction

Following World War II, significant increases in birth rates, as well as increases in life expectancy, have contributed to a growing proportion of older people in the populations of many countries. In the United States, the proportion of people who are 65 years of age or older has grown from less than 10% in 1950 to about 13% currently. By 2030, the percentage of the U.S. population over 65 years of age is projected to reach 20% (U.S. Department of Commerce, 2001). In terms of absolute numbers, those over 65 years of age will increase from about 35 million currently to about 70 million in 30 years (U.S. Department of Commerce, 2001). While there are numerous benefits to an aging population, this demographic trend raises concerns in the area of traffic safety.

When adjusted for miles driven, it is clear that older drivers have a crash rate that is higher than for all other age groups, with the exception of the youngest drivers (e.g., McKenzie & Peck, 1998; National Highway Traffic Safety Administration [NHTSA], 2000). Even though older drivers adapt their driving to times and situations in which they feel safest (see e.g., Gallo, Rebok, & Lesikar, 1999; Kostyniuk, Shope, & Molnar, 2000), they have more crashes per mile driven than drivers in most other age groups. In addition, for a crash of given dimensions, older people have a higher probability of being seriously injured or killed (Massie & Campbell, 1993). This elevation in crash rates associated with increased age is most likely linked to declining abilities related to driving, as well as medical conditions that can impair driving by causing functional deficits. While there are large individual differences, increasing age in adulthood can lead to declining psychomotor, cognitive, and perceptual abilities (Eby, Trombley, Molnar, & Shope, 1998; Transportation Research Board [TRB], in press, 1988).

Safe and efficient mobility for older people has become a challenging social problem for the United States (TRB, in

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press, 1988) and other countries (Hakamies-Blomqvist & Peters, 2000), due to the increasing number of older drivers, their high crash rate per mile driven, and their increased likelihood of injury. Taking away the driver licenses of older people is not an effective solution to this problem for several reasons. First, there is great variability with respect to driving competence in the older driver group, in part because some have medical conditions that affect driving and some are healthy. Second, older drivers who perform inadequately can sometimes improve their driving performance to acceptable levels through education, remediation of physical or mental problems, self-regulation, and/or regulation by licensing authorities. Third, there is building evidence that the ability to drive may be an essential component of an older person's emotional well-being. According to Carp (1988), an important component of well-being is the ability of a person to satisfy those needs that give life an "acceptable and positive quality." These "high-order" needs, which include social interaction, usefulness, recreation, and religion, are typically satisfied outside of older people's homes. Because using public transportation, walking, or relying on family members may be impractical or undesirable for many older people (see, e.g., Shope & Eby, 1998), driving remains the primary mode of transportation for satisfying these needs. When driving ability is reduced, mobility is also reduced, leading to a potential decline in emotional well-being and quality of life. The resulting isolation from loss of driving privileges has been identified as a primary factor in death from all causes in this age group (Kaplan, 1995). Thus, taking away older people's driving privileges may reduce their risk of dying in a motor vehicle crash, but actually increase their risk of dying from other causes.

As solutions to the problem of maintaining safe older driver mobility are identified and investigated, there is general agreement among researchers that assessment of driver's abilities should play a key role (Staplin, Lococo, Stewart, & Decina, 1999; TRB, in press, 1988). As discussed by Staplin et al., assessment can be classified as either screening for gross impairment (first-tier) or specific impairment (second-tier). Older driver assessment can be further divided based on who administers the assessment instrument. First-tier assessment instruments can be either self-administered (called a self-assessment instrument) or administered by someone other than the older driver, but not necessarily a specialist. Depending upon the results of the first-tier assessment, the older driver may be advised to seek more specialized, or second-tier, assessment. Second-tier assessment is generally administered by someone who is a specialist in the field being assessed (such as a physician or a driving instructor).

While all types of assessment contribute to the safe mobility of older drivers, development and evaluation of self-assessment instruments have lagged behind the other types of assessment (see Staplin et al., 1999). This is unfortunate because self-assessment offers many potential

benefits to older drivers. The greatest potential benefit is that self-assessment is conducted in an environment chosen by the individual, providing both a confidential and nonthreatening source of information about the individual's ability to drive. As such, those who may be resistant to having their abilities assessed by someone else may be more willing to engage in self-assessment. As discussed in a recent focus group report (Shope & Eby, 1998), such a self-assessment process may also facilitate discussion within families about older driver mobility. Because self-assessment instruments must be easy to use without outside help, people may use the assessment instrument and get feedback more frequently, and thus be more likely to discover deficits at an earlier stage. Self-assessment instruments can also help people plan for their future transportation needs by providing individualized feedback concerning potential problems before they begin experiencing serious problems. Finally, by their very nature, self-assessment instruments can be easily distributed, either through handouts, the mail, or a website, allowing a large number of people to benefit from them.

However, as Staplin et al. (1999) pointed out, an important limitation to self-assessment is that individuals can only use a self-assessment instrument if they are free of serious cognitive impairment. Since cognitive impairment is likely to be related to elevated crash risk in the older population (Foley, Wallace, & Eberhard, 1995; Stutts, Stewart, & Martell, 1998), some people in need of assessment may not be able to self-assess. An additional limitation is that users must be motivated to answer the questions honestly and consider the feedback seriously. Lack of motivation could prevent self-assessment by many of those in need of assessment. Another limitation of self-assessment is that whenever people are asked to self-report about themselves, accuracy can be compromised for a number of reasons. Inaccurate responses can lead to inappropriate feedback from the self-assessment.

For older drivers who seek to independently examine their own skills, or are encouraged by family members or other concerned individuals to do so, only a handful of self-assessment instruments are available. The two most widely distributed self-assessment instruments are *Drivers 55 Plus: Check Your Own Performance* (based upon research by Malfetti & Winter, 1987, conducted for the AAA Foundation for Traffic Safety, 1994) and the *Older Driver Skill Assessment and Resource Guide: Creating Mobility Choices* (American Association of Retired Persons [AARP], 1992). Both are designed to increase self-awareness of driving abilities, and to educate and motivate drivers to adopt compensatory driving strategies, if necessary. The validity and effectiveness of these instruments in educating older drivers or improving traffic safety have never been evaluated.

Drivers 55-Plus is a 16-page booklet composed of three sections (AAA Foundation for Traffic Safety, 1994). The first section contains a self-assessment survey composed of

15 questions. The second section instructs drivers on how to compute a composite score for the survey and explains what the score means. The third section, the majority of the booklet, consists of suggestions older drivers can use to improve their driving performance. Discussion in these sections is organized around the 15 survey questions and includes several related safety tips. Also included are recommendations for restricting driving and warnings for older drivers to prepare for the day when they can no longer drive.

The AARP's (1992) self-assessment is a 24-page booklet that combines survey items and hands-on, self-administered tests. For example, visual search time is tested by a self-timed exercise (Trail Making A). The instrument is organized into sections that allow self-assessment of reaction time, attention, vision, near-crash experiences, and driving behavior. Throughout the instrument are educational statements that inform readers about automobile safety equipment and tips for safer driving. Also included are tips for vehicle maintenance, self-restriction suggestions, and safe driving-related behaviors. The booklet concludes with information about the AARP 55 *Alive* driver retraining course and a list of telephone numbers for transportation departments, motor-vehicle divisions, and agencies for the aging in each state.

The intent of developing a new self-assessment instrument, the *Driving Decisions Workbook* (Eby, Molnar, & Shope, 2000), was to improve upon existing instruments. First we wanted to expand the scope, covering not only vision, cognition, reaction time, crashes, and traffic citations, but also medical conditions and medication use, while providing more detail on driving-related issues. Second, we wanted to give users feedback based directly on their individual responses. To this end, we sought to develop a simplified format that avoided the need to calculate scores (as in AAA's instrument) or self-administer diagnostic tests (as in AARP's instrument). Our paper-and-pencil workbook format allows users to answer questions on various topics and receive immediate feedback, based on their individual answers. Finally, we wanted to organize questions to allow easy discovery of potential problems by grouping questions related to a certain assessment area together on a single page, as well as grouping related assessment areas in close proximity. In this way, people may be able to discover problem areas that would not be readily apparent through a different organizational structure.

Development of the workbook followed extensive background investigation in several areas. Full detail can be found elsewhere (Eby, Shope, Molnar, Vivoda, & Fordyce, 2000; Eby et al., 1998; Shope & Eby, 1998). A brief summary is provided here. A review of the literature on older drivers was conducted. Particular emphasis was placed on the effects of declining abilities, medical conditions, and medications on driving. Also reviewed were articles on existing driver assessment instruments and driver improvement programs. A series of focus groups with older drivers

was conducted to further identify issues related to self-assessment, and to capture the special emotions of, and language used by, older drivers. A panel of experts on older driver abilities and evaluation was convened. The panel helped identify specific abilities to be assessed and methods for assessing them. The panel also discussed feedback that would be useful to older drivers and appropriate formats for a self-assessment instrument.

Building on findings from these activities, a model of influences on driving decisions was developed as a framework for the workbook. As applied to older drivers, the model suggests three domains for assessing potential problems in driving safely (see Fig. 1): (a) health (e.g., presence of medical conditions such as heart disease, Alzheimer's disease, and stroke, and the medications used to treat these and other conditions); (b) driving abilities (i.e., vision, cognition, psychomotor); and (c) experiences, attitudes, and behaviors (e.g., experiences on the road including crashes and citations, family and friends' concerns about an older person's driving, attitudes toward driving under various circumstances, and current driving practices). Declines in these three domains can directly or indirectly lead to negative self-appraisal of one's driving, which in turn can influence driving decisions, such as the decision to engage in compensatory driving strategies. Driving skills, although included in the model as an additional influence, was excluded as an assessment domain because there is little evidence that these skills change with age, and it is not possible to assess these skills in a self-administered, paper-and-pencil instrument.

Within each domain, a number of areas were identified that were judged to be important for safe driving that also lent themselves to self-assessment through a paper-and-pencil format (see Fig. 1). Several areas that are clearly important for safe driving, such as reduction of the visual field under divided attention conditions (Ball, Owsley, Sloane, Roenker, & Bruni, 1993), were not included in the instrument because they cannot be self-assessed in the format selected for the instrument. In all, 37 assessment areas were selected for the three domains. In two of the domains, health and driving abilities, assessment areas were organized into subdomains to improve clarity.

Once the framework was finalized, a preliminary set of assessment items was developed including items adapted from existing documents (AAA Foundation for Traffic Safety, 1994; AARP, 1992; Coroni-Huntley, Brock, Ostfeld, Taylor, & Wallace, 1986; Haraldsson, Carenfelt, Diderichsen, Nygren, & Tingvall, 1990; Haraldsson, Carenfelt, & Tingvall, 1992; Health and Retirement Study, 1998; Lonerio et al., 1994; Ontario Ministry of Health, 1990; RAND Health Program, 1996; Reuben, 1993; Stewart, Hays, & Ware, 1988; University of Arizona Drachman Institute, 1999; Vision Laboratories of Northwestern University & the University of Calgary, 1999). When no appropriate existing items were available, original items were developed by project staff, based on the literature review and expert

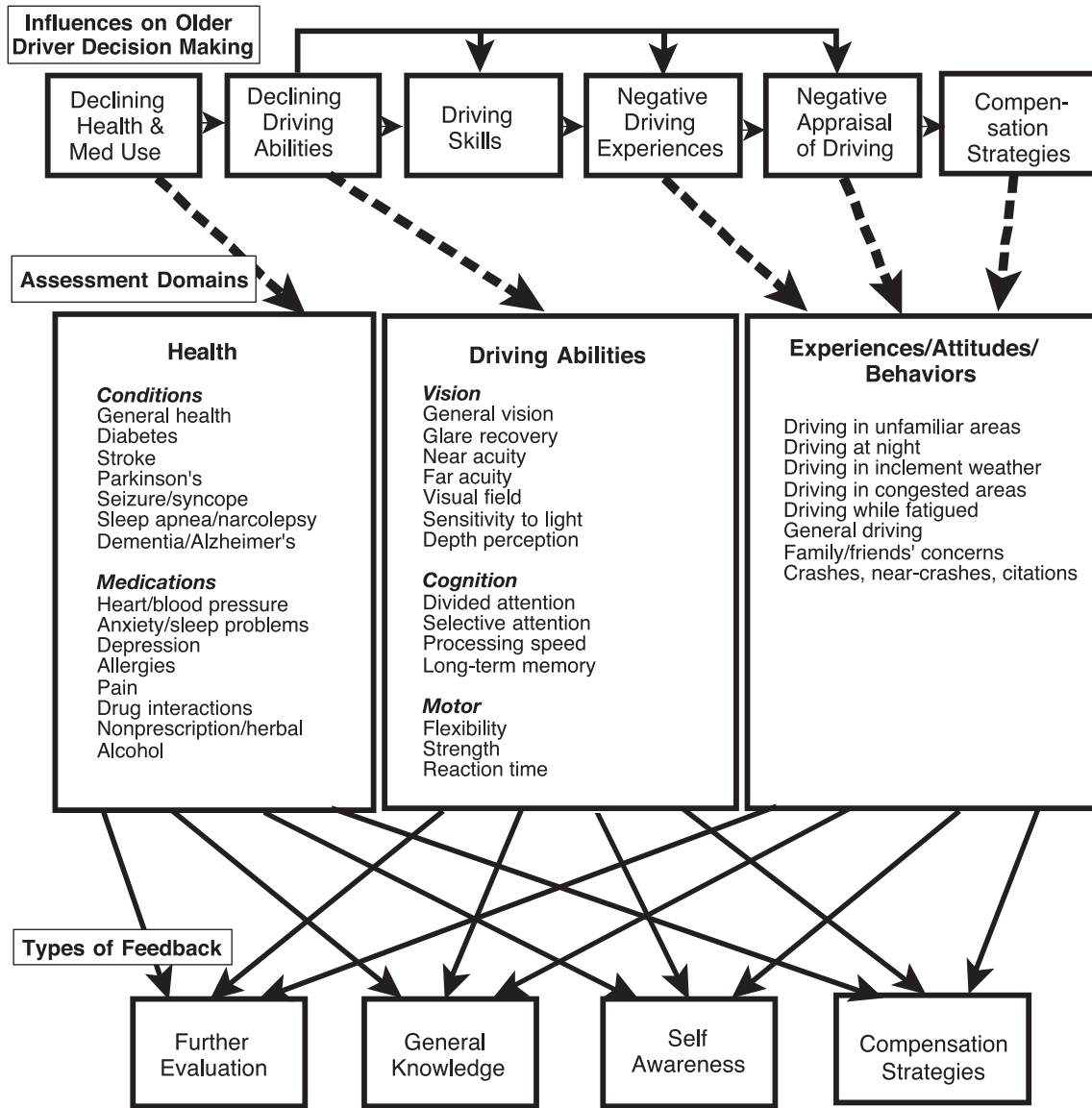


Fig. 1. Framework for development of the *Driving Decisions Workbook*.

judgement. All item responses were put in a multiple-choice format, comprised of two to four choices. After pilot testing the items in two structured group interview sessions with licensed drivers age 65–74 and 75 and older, respectively, the items were extensively revised to improve understanding and clarity.

For each assessment area, feedback was developed, consisting, to the extent possible, of information to increase self-awareness and general knowledge, followed by suggestions for further evaluation and compensatory driving strategies. Feedback was based on information from the literature review, focus groups, expert panel, professional judgement of project staff, and other sources (AAA Foundation for Traffic Safety, 1994; AARP, 1992; Austroads Incorporated, 1998; KCET-TV, 1997; Malfetti & Winter, 1987; Staplin, Gish, Decina, Lococo, & McKnight, 1998;

University of Arizona Drachman Institute, 1999; Wood, 1988).

A semifinal version of the workbook containing the feedback was pilot tested in two additional structured group interview sessions made up of 65- to 74-year-old and 75 and older licensed drivers, respectively, about half of whom had participated in the earlier pilot study. Revisions were made to both the questions and the feedback to improve clarity and ease of use of the instrument. Analysis of the readability showed that the entire *Driving Decisions Workbook* is written at the Flesch–Kincaid 8th grade reading level. When the necessary health-related terms, such as the names of drugs and medical conditions, and the names of defined concepts, such as *glare recovery*, were removed, the readability analysis showed a 7th grade reading level.

The *Driving Decisions Workbook* is intended for drivers who may be starting to experience declines in driving abilities or loss of confidence in certain driving situations. The workbook is designed to give people a source of information about themselves in addition to all of the other cues they receive about their current or future driving. The workbook has two purposes. First, for drivers willing and able to assess their own driving abilities, the workbook can give feedback for making good driving decisions by increasing self-awareness and general knowledge, and by suggesting appropriate driving restrictions and clinical evaluations. Second, it can increase general awareness of age-related declines in driving abilities for generating discussion with peers and within families.

The primary purposes of the study reported here were to assess, with a group of older drivers, whether the workbook (a) increased self-awareness and general knowledge; and (b) was perceived as useful by subjects, particularly as a tool for facilitating discussions within families of older drivers. A secondary purpose of the study was to assess how well responses on the workbook correlated with driving performance on a standardized road test, as a preliminary assessment of the workbook's validity.

2. Methods

2.1. Participants

Participants in the study were Michigan drivers, age 65 to 90, recruited from the University of Michigan Claude D. Pepper Older Americans Independence Center, as well as postings in Washtenaw County retirement communities, senior centers, health-care facilities, and supermarkets. Two groups of participants were recruited: 65- to 74-year-olds and those aged 75 years and older. A total of 99 participants were recruited, with 56% in the age group 65–74 (mean age 70.2) and 44% in the age group 75 and older (mean age of 80.2).

Of total participants, 56% were women. Most were White (94%) and lived in their own home or apartment (86%). Over half (54%) had completed some graduate work or had a graduate degree, 36% had completed some college or had a college degree, and the remainder had a high school degree or less. The majority were married or widowed (55% and 25%, respectively); 13% were divorced and 7% single. This convenience sample was highly educated and predominantly White and, thus, not representative of the population of older adults in the United States.

All participants had a valid driver license, up-to-date automobile insurance, and were current drivers. Two thirds reported driving 6 or 7 days a week, while 5% drove only 1 or 2 days per week. Of the remainder, similar proportions (about 9%) reported driving 3, 4, and 5 days per week. A total of 28% reported driving more than 100 miles per week, while 30% drove 51–100 miles, 38% drove 11–50 miles,

and 4% drove 10 or fewer miles. All participants possessed a personal vehicle in good working condition that they brought to the testing facility and used for the road test.

2.2. Design

The study, approved by the Institutional Review Board at the University of Michigan, involved completion of several measures: (a) the *Driving Decisions Workbook*; (b) a short questionnaire; and (c) a standardized road test. Subjects also completed the *Mini Mental State Exam* (MMSE; Folstein, Folstein, & McHugh, 1975), an 11-item, 30-point dementia-screening exam intended to identify any serious impairment in function that might interfere with subjects' ability to complete the road test. This paper compares subject responses on the *Driving Decisions Workbook* to responses on the questionnaire and driving performance on the road test.

2.2.1. Driving decisions workbook

The final workbook is organized around five broad sections (relating back to the domains shown in Fig. 1) and a total of 37 individual assessment areas. Each assessment area is presented on a separate page and contains between one and six question items. For each item, lines connect the response choices that suggest a potential problem with safe driving to appropriate feedback. Regardless of their particular responses, users of the workbook are encouraged in the introduction to read all feedback, to learn more about what specific changes could mean for their future driving or for the driving of other family members or friends. A question and answer section at the end of the workbook contains additional feedback that is more general than the feedback in any single assessment area.

2.2.2. Questionnaire

A 27-item questionnaire was developed to identify self-reported increases in self-awareness and general knowledge after completing the workbook, and perceived usefulness of the workbook. Items were also included to collect demographic and current driving information.

2.2.3. Road test

Development and scoring a 7-mile, on-road driving course was based on published recommendations from NHTSA (Staplin et al., 1999) and previous research (McKnight & McKnight, 1999). The course featured 28 structured maneuvers at specific locations (e.g., controlled right and left turns, uncontrolled right and left turns, and lane change) and took about 15 min to complete. For each maneuver, an examiner riding in the vehicle scored up to 17 performance tasks (e.g., use of signals, checking mirrors, vehicle speed, and lane positioning) associated with the maneuver using standardized scoring criteria. Failure to meet the scoring criteria for any given performance task

resulted in an error for that task. All three examiners conducting and scoring the road test trained together. Prior to administering the road test, interexaminer reliability on all performance tasks was achieved by a staff member driving the road test making choreographed errors while pairs of examiners scored the performance tasks. This procedure was continued until at least 85% reliability was achieved among all examiners.

2.3. Procedures

The study was conducted at the University of Michigan Transportation Research Institute (UMTRI) in December of 1999. Upon arrival, participants were asked by study staff to produce proof of a valid driver license and vehicle insurance. Only one person was unable to do so and did not continue with the testing. Remaining participants were given a brief description of the study and signed informed consent forms. Participants were then given instructions for completing the workbook and told to take as much time as they needed. The start and end time for each subject was recorded by study staff. Upon completion of the workbook, participants were asked to complete the questionnaire. After completion, participants were escorted by a second staff member to a laboratory, where the MMSE was administered. Feedback on participants' performance was provided only upon request.

Participants were then taken by an examiner to their personal vehicle in the parking lot and given instructions for the road test. After completing the road test, participants were paid US\$50 for their participation and given a debriefing form explaining the study. Feedback on driving performance was given only if requested and was limited to what had actually occurred on the course; information on organizations providing professional driving evaluations was also made available upon request.

When weather conditions were not conducive to administering the road test (e.g., snowy or icy conditions), participants were rescheduled. Six participants could not be rescheduled for various reasons, and one subject was excluded from participating in the road test because of his extremely poor score on the MMSE. Thus, driving data were collected for 92 of the 99 people who participated in the study.

3. Results

3.1. Duration

The mean duration for completing the workbook and standard deviation (in minutes) overall and by sex and age group are shown in Table 1. Respondents needed about 30 min to complete the workbook, with little difference between men and women. There was about a 7-min difference between the two age groups, showing that older respondents

Table 1

Mean duration (min) and standard deviation (*SD*) to complete the workbook

Category	Mean	<i>SD</i>
Overall	30.5	11.8
Men	31.1	11.5
Women	30.1	12.1
65–74	27.5	10.0
75–up	34.3	12.9

needed more time than younger respondents to complete the workbook.

3.2. Self awareness/general knowledge

One primary purpose of the study was to determine whether the workbook increased self-awareness and general knowledge. The questionnaire included seven yes/no questions designed to assess whether this purpose had been achieved. Percentages of respondents answering “yes” to each question overall and by sex and age group are shown in Table 2. About three fourths of respondents reported that the workbook made them more aware of changes that can affect driving. There was little difference by sex or age group. Among all respondents, about 14% reported that they discovered a change in themselves that they had not been aware of before completing the workbook. Women and respondents in the younger age group were more likely to answer “yes” to this question than men or those in the older age group. Nearly all respondents, regardless of sex or age group, thought that the workbook served as a useful reminder of things that they already knew and nearly all sometimes read the feedback even though their responses did not direct them to it. About 40% of respondents reported that completion of the workbook made them think more about the possibility of taking a driving refresher course. Both women and respondents in the older age group were more likely to answer “yes” to this question than men or those in the younger age group. Slightly more than a third of respondents reported that they would be more likely to have a physician check their vision, cognition, or psychomotor abilities after completing the workbook, with women and respondents in the older age group more frequently indicating “yes” to this question than men or respondents in the younger age group.

3.3. Usefulness

The other primary purpose of the study was to determine whether older drivers found the workbook to be useful, especially as a tool for facilitating discussions with their families. The questionnaire included three yes/no questions and one scale-based question designed to assess self-reported workbook usefulness. Percentages of respondents answering “yes” to the first three questions and percentages of respondents selecting each possible answer for the fourth

Table 2
Percentage of respondents answering “Yes” to questions about self-awareness and general knowledge

Question	Overall	Men	Women	65–74	75–up
Did the workbook make you more aware of changes that can affect your driving?	76.5	77.3	75.9	76.4	76.7
Did you discover any changes in yourself that you had not been aware of before?	14.1	11.4	16.4	16.4	11.4
Did some of the feedback serve as a useful reminder of things that you already knew?	96.9	97.7	96.4	94.6	100
Even if your answers to questions in the workbook did not point to the feedback, did you sometimes read the feedback just because you were curious?	99.0	97.7	100	100	97.7
Now that you have completed the workbook, are you planning to make any changes in the way you drive?	23.7	11.6	33.3	22.2	25.6
Did completing the workbook make you think more about the possibility of taking a driving refresher course or how such a course might benefit you?	41.4	36.4	45.5	36.4	47.7
Now that you have completed the workbook, do you think you will be more likely to have a doctor check your seeing, thinking, or movement abilities?	35.7	30.2	40.0	31.5	40.9

question, overall and by sex and age group, are shown in Table 3. Nearly three fourths of respondents reported that they would use the workbook in the future if it was available, with women considerably more likely to do so than men. Nearly all respondents, regardless of sex or age group, reported that they would recommend the workbook to older friends or family members who drive. All respondents reported that the workbook could be useful for helping older adults talk about driving concerns with their families. Finally, when asked to indicate the overall usefulness of the workbook on a 4-point scale, about one half of respondents indicated that the workbook was “very useful” while another 40% indicated that it was “somewhat useful.” No respondent indicated that the workbook was “not at all useful.” Women and respondents in the younger age group gave higher usefulness ratings than men or respondents in the older age group.

3.4. Workbook responses versus observed driving problems

A secondary purpose of the study was to determine whether responses on the workbook that indicated potential problems with driving correlated positively with observed problems during actual driving. We addressed this purpose by comparing responses on the workbook to performance on the road test. Scoring of the workbook involved calculating an overall score for the entire workbook and sub-

scores for each of the three domains (health, driving abilities, and experiences/attitudes/behaviors) and each of the five subdomains (medical conditions, medications, vision, cognition, motor). The overall score was derived by adding up, for each participant, the total number of the 37 assessment areas in which that participant had a potential problem, as indicated by their responses for which feedback was recommended. Participants were considered to have a potential problem in an assessment area if their response to any one item in that area indicated a potential problem. Workbook mean scores and standard deviations were: Overall ($M=9.6$; $SD=5.2$); men ($M=9.2$; $SD=5.4$); women ($M=9.9$; $SD=5.2$); age 65–74 ($M=9.1$; $SD=5.5$); and age 75 and over ($M=10.2$; $SD=4.9$). Subscores were derived by summing only those assessment area scores within the domain or subdomain of interest.

Composite scores were also developed for the road test. Each of the 17 performance tasks were scored as an observed problem if the participant made one or more errors on that task over the entire driving course. An overall score was calculated as the number of performance tasks in which the participant had observed problems. Road test means and standard deviations were: Overall ($M=4.4$; $SD=2.5$); men ($M=3.8$; $SD=2.2$); women ($M=4.9$; $SD=2.6$); age 65–74 ($M=4.1$; $SD=2.4$); and age 75 and over ($M=4.9$; $SD=2.5$).

Spearman correlations were calculated on these measures. Shown in Table 4 are correlations of scores on the

Table 3
Percentage of respondents answering “Yes” to questions about workbook usefulness and overall ratings of usefulness

Question	Overall	Men	Women	65–74	75–up
If it were publicly available, would you be likely to use the workbook in the future?	72.4	67.4	76.4	72.2	72.7
Would you recommend the workbook to older adult friends or family members who drive?	96.9	95.5	98.2	94.6	100
Do you think that the workbook could be useful for helping older adults talk about driving concerns with their families?	100	100	100	100	100
Overall, how would you rate the usefulness of the workbook?					
Very useful	53.5	43.2	61.8	52.7	54.6
Somewhat useful	40.4	52.3	30.9	43.6	36.4
A little useful	6.1	4.6	7.3	3.6	9.1
Not at all useful	0.0	0.0	0.0	0.0	0.0

Table 4
Spearman correlations between scores on the driving decisions workbook and the road test

Workbook	Overall	Men	Women	65–74	75–up
Overall	0.30*	0.55**	0.12	0.31*	0.21
Health	0.15	0.36*	–0.01	0.17	0.12
Health–Conditions	0.23*	0.46**	0.15	0.28*	0.21
Health–Medication Use	0.08	0.15	–0.01	0.09	0.06
Abilities	0.35**	0.52**	0.25	0.33*	0.29
Abilities–Vision	0.16	0.37*	–0.01	0.19	0.09
Abilities–Cognition	0.39**	0.52**	0.33*	0.37**	0.28
Abilities–Psychomotor	0.35**	0.32*	0.31*	0.29*	0.37**
Experiences/Attitudes/Behaviors	0.21*	0.45**	–0.03	0.31*	0.03

* Significant at $p < 0.05$.

** Significant at $p < 0.01$.

Driving Decisions Workbook with overall scores for the road test. As can be seen in this table, the correlation between the overall workbook score and the overall road test score of all of the participants together was positive and statistically significant. This finding indicates that as the number of potential problem areas identified by the workbook increased, the number of performance tasks with problems observed during the road test also tended to increase. Analysis of the workbook domains shows that both the abilities and experiences/attitudes/ behaviors domains correlated significantly with driving performance. The correlations for the abilities subdomains showed that the responses on the questions for both cognition and psychomotor were significantly related to driving performance. The correlation for the vision subdomain was not significant. We also found that the correlation for the health domain was not significant, but the conditions subdomain of health was significant.

As also shown in Table 4, correlations for the workbook and road test scores were calculated by sex and age group. There was a clear difference between men and women. All but one (medication) of the correlations for men were positive and highly significant, whereas, only the cognition and psychomotor ability subdomains were significant for women. The analysis by age group showed that the workbook correlated with driving performance better for those in the 65- to 74-year-old age group than for those who were 75 years of age or older.

4. Discussion

The two primary purposes of the study were to determine if the self-administered instrument reportedly increased self-awareness and general knowledge regarding driving abilities and to assess the workbook's usefulness, including whether it might serve as a tool for facilitating discussions within families of older drivers. These goals were investigated through a questionnaire administered to respondents after completing the workbook.

The results showed that this group of older drivers overwhelmingly thought highly of the workbook. Most

respondents reported that the *Driving Decisions Workbook* increased general knowledge, and for many, it increased self-awareness as well. A sizable proportion of respondents (about 14%) reported discovering a change in their abilities that they were unaware of before completing the workbook. This is surprisingly high considering that the subjects knew they were being recruited for a driving evaluation study, that only a subset of respondents would be expected to be experiencing a decline in ability, and that, of those people, only a subset would be previously unaware of their decline.

There is also strong support from the questionnaire for the workbook's intended usefulness. After completing the workbook, about one quarter of respondents reported that they were now planning to change the way they drove; about a third reported that they were now more likely to see a physician about some declining ability; and about 40% were now considering a driving refresher course. These results show that, at least by self-report, respondents made discoveries about themselves and their driving that they either had not thought about much or were unaware of before completing the workbook. Thus, the study showed that the instrument can be successful in increasing knowledge and self-awareness of changes in driving abilities related to aging and the effects of these changes on driving. The study also showed that, based upon feedback received in the workbook, people planned to pursue second-tier assessment. Taken together, study results show that the *Driving Decisions Workbook* is an effective first-tier assessment tool for older drivers.

The results also show that the *Driving Decisions Workbook* may be used as a discussion tool within families of older drivers. In the questionnaire, all respondents indicated that the workbook could be useful for helping older adults talk about driving concerns with their families. In addition, the most frequent spontaneous comment made by respondents during workbook completion was related to using the workbook within a family. In recently conducted focus groups, both older drivers and their families agreed that it was the families' role to discuss driving problems with the older driver, but that these conversations rarely took place or went well when they did (Eby, Molnar, Kostyniuk, & Shope, 1999). The adult children of older drivers tended to think that they were communicating their concerns, but that the older driving relative was not getting the message or reacting well when they did. Thus, the *Driving Decisions Workbook*, may be one tool to help both older drivers and their families discuss the sensitive topics of driving abilities and driving reduction or cessation.

A secondary purpose of this study was to assess how well responses on the *Driving Decisions Workbook* correlated with observed driving performance on a standardized road test. A positive, statistically significant correlation was found between overall scores on the *Driving Decisions Workbook* and overall scores on the road test. In addition, among correlations between workbook subscores and overall road test scores, five of eight were positive and statisti-

cally significant. While subscores for the health domain, and the subdomains of medication use and vision did not correlate significantly with performance on the road test, there are reasonable explanations for these findings. Phrasing of the questions about medication use was intended to discover whether participants had ever taken a certain medication, not if they were currently taking it—we wanted people to be directed to the feedback about medication that they might use again in the future. Thus, participants may not have been taking the medication when they participated in the road test. It is also reasonable to assume that some of the participants may have been taking a certain medication, but had not taken a dose recently enough to affect driving performance and some had been taking medication long enough to have adapted to its effects. Because one half of the score for the health domain is based on responses about medication use, it is not surprising that the score for the health domain was not significantly correlated with the road test score.

There are several possible explanations for the lack of a significant correlation between the vision subscore and overall performance on the road test. First, it may be that the workbook did not adequately assess the areas of visual function we selected. Second, the visual problems discovered in the workbook may not have produced decrements in driving performance because participants were tested under optimal driving conditions (good weather and daylight). Third, it is possible that visual function cannot be self-assessed. Fourth, it is also possible that other aspects of vision that cannot be self-assessed, such as dynamic visual acuity (Burg, 1966) or useful field of view (Ball et al., 1993), are much more important for safe driving than those aspects of vision that can be self-assessed. Whatever the reason, further exploration of this aspect of the workbook is warranted.

Analysis of the correlations by sex and age group showed great differences between men and women and between age groups. Positive and significant correlations were discovered for nearly all subscores for men and for the 65–74 age group, while weak correlations were found for women and for the 75–up age group. Thus, it appears that responses on the workbook in its present form may be more closely related to actual driving for men and for those who are in the 65- to 74-year-old age group than for others. Whether these findings result from a reluctance to reveal problems to the researchers on the workbook, an artifact of the participant pool, a response bias on the workbook, or a bias in the road test is open to future research.

In conclusion, findings from this study of the *Driving Decisions Workbook* indicate that the workbook may be a useful first-tier assessment instrument and educational tool for the older driver. We found that the workbook required only about 30 min to complete and could be quite useful as a tool for facilitating discussions about driving within families of older drivers. It is important to note that these results are preliminary because the sample tested is not representative

of the general population of older drivers. Therefore, similar studies utilizing more representative samples of older people, particularly with regard to education and race, should be conducted. Future research should also be conducted with a follow-up period of several months to determine if people actually engage in the planned second-tier assessment and change their driving behaviors as they self-reported that they planned to do in this study. These future studies could also assess sensitivity and specificity, as well as conduct actual clinical trials of the workbook as an intervention.

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