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Validation of Rehabilitation Training Programs for Older Drivers

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| 16. Abstract This project studied the effectiveness of four interventions designed to bolster safe performance among healthy older drivers: (1) Classroom driver education with supplemental behind-the-wheel instruction; (2) Computer-based exercises to improve speed of processing and divided attention; (3) Clinical occupational therapy-based exercises to improve visual skills and attention; and (4) Physical conditioning to improve strength, flexibility, and movement. Seventy-eight drivers 65 and older were randomly assigned to one of the four treatment groups or to a control group that completed activities unrelated to driver improvement. Training effects for each intervention were gauged in relation to the common control group using two types of measures. First, measures of effectiveness emphasized tactical driving skills demonstrated through on-road assessments conducted by a CDRS. Next, performance on a driving simulator was measured for various attention and divided attention tasks. Both types of measures were obtained before training, immediately following training, and three months post-training. For the on-road assessments, only the OT-administered training group demonstrated a significant gain relative to the control group in the percentage of drivers without skill deficits who maintained their skills from the pre-treatment drive to the post-treatment assessments. Both the OT-Administered training group and the classroom + BTW training group demonstrated a significant gain relative to the control group, in the percentage of drivers with skill deficits at the pre-treatment assessment who improved their skills on the immediate post-treatment assessment. None of the treatments demonstrated significant gains on the three-month post-treatment assessment, relative to controls. There were no significant gains for any of the treatment groups on post- versus pre-training performance in the simulator tasks. The positive findings for the OT-Administered visual skills training points to a new opportunity for those professionals <i>without</i> the relatively scarce “driver rehabilitation specialist” certification to enhance seniors’ safety behind the wheel. The development of on-road evaluation methods using scales with interval properties is also recommended. | | | | | |
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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| BRT | brake reaction time |
| BTW | behind-the-wheel |
| CDRS | certified driver rehabilitation specialist |
| d.f. | degrees of freedom |
| DHI | DrivingHealth Inventory |
| DRS | driver rehabilitation specialist |
| GHS | Greenville Hospital System |
| GPS | global positioning system |
| HIPAA | Health Insurance Portability and Accountability Act |
| Hz | Hertz |
| IRB | Institutional Review Board |
| NHTSA | National Highway Traffic Safety Administration |
| OR | odds ratio |
| OT | occupational therapist/occupational therapy |
| PI | principal investigator |
| RCP | Roger C. Peace Rehabilitation Hospital |
| RT | reaction time |
| s.d. | standard deviation |
| SSN | Social Security number |
| TRB | Transportation Research Board |
| UFOV | Useful Field of View |

EXECUTIVE SUMMARY

This research examined the effectiveness of four contrasting training techniques designed to enhance the driving performance of normally aging adults. Each technique is suitable for, or is marketed and sold to a broad cross-section of the older driver population. Training programs designed specifically for an individualized rehabilitation regime (e.g., a stroke recovery program) were not considered. The research team measured training program effectiveness by comparing the on-road and simulator performance of drivers 65 and older in each treatment group to a control group (that received a neutral intervention) before and immediately after training, and again after a 3-month delay. Thus, study results reflected planned comparisons between each treatment group and the control group, rather than one treatment group versus another.

The training activities examined in this research included (1) classroom driver education delivered in a group setting, supplemented by an hour of one-on-one, behind the wheel instruction; (2) computer-based exercises designed to improve speed of visual information processing and divided attention; (3) occupational therapy (OT)-based exercises to improve visual skills and attention; and (4) physical conditioning to improve strength, flexibility, and movement. Hospital staff or project consultants provided training to each group, which included 8 hours of direct contact with study participants; the providers identified driver improvement as an explicit goal of participation in the training activities. The control group participants received 8 hours of relaxation training or health and wellness counseling not associated with driver improvement.

Twenty volunteer older drivers recruited at the Roger C. Peace Rehabilitation Hospital in Greenville, South Carolina, were randomly assigned to each training group, as well as to the control group, for a total of 100 participants. Attrition over the course of the study reduced the number who finished the post-treatment assessments and were included in analyses of training effectiveness to between 15 and 17 participants per group. The mean age across groups ranged from 71.5 to 74.1 years.

A certified driving rehabilitation specialist (CDRS) conducted the on-road performance evaluations. The CDRS, who was blind to the group to which each study participant was assigned, developed different routes of equal driving difficulty to avoid repeated exposure by participants to the same conditions across successive assessments. The CDRS scored competence on 33 subscales comprising tactical and strategic domains of driving performance. The CDRS used an ordinal scoring system, a scale from 0 to 4, where ratings corresponded to approximately how often a driver demonstrated a particular skill or behavior, in relation to the number of opportunities to demonstrate it that were afforded during each on-road assessment. Normal variability in traffic conditions produced different numbers of opportunities from person to person, and from drive to drive for the same participant. The CDRS provided feedback to study participants about their driving only after the delayed post-treatment assessment (Drive 3), not after the baseline evaluation (Drive 1) or immediate post-treatment evaluation (Drive 2). The CDRS also conducted a feedback session to obtain participants' views regarding the validity and utility of the driving evaluation and training activities they were exposed to during the study.

Because the stated goal of each training activity was to preserve or enhance safe driving behavior, our research hypotheses were (1) each training group will have a higher percentage than the control group of drivers *without* deficits at baseline who *maintain* their performance at the immediate and/or delayed post-treatment assessments; and (2) each training group will have a higher percentage than the control group of drivers *with* deficits at baseline who *improve* their performance on Drive 2 and/or Drive 3.

Only the group that received the occupational therapy-based exercises to improve visual skills and attention demonstrated a significant gain relative to the control group in the percentage of drivers without performance deficits at baseline who maintained their skills on subsequent evaluations. This effect was significant at $p < .05$ on the immediate post-treatment assessment and at $p < .01$ on the delayed assessment. For the few drivers who demonstrated some deficiency on the baseline assessment, two training groups achieved significant ($p < .05$) gains relative to the control group in the percentage of participants who improved their performance on the immediate post-treatment evaluation – the OT-based exercises group and the classroom plus behind-the-wheel training group. None of the training activities were effective in producing such gains on Drive 3.

The apparent efficacy of the OT-based visual skills training is an important finding. This activity, which showed the strongest gains relative to the control group, points to an opportunity for those professionals *without* the relatively scarce CDRS credential to enhance seniors' safety behind the wheel. The curriculum and support materials described in this report and appendix certainly merit further research, potentially culminating in the broad implementation of this training in clinical settings across the country. Results for the classroom + behind-the-wheel training also demonstrated performance gains, and more study participants indicated perceived practical value in this intervention than in any other. With regard to the remaining treatments, physical conditioning of course holds the promise of health and wellness benefits well beyond improved driving performance; and computer-based training can be completed at home at the driver's own pace, providing a convenient and inexpensive training option.

The results of the simulator study, which included various response time measures under divided attention conditions, were equivocal: none of the training groups demonstrated significant gains in performance relative to the control group. However, on the most safety-critical measure, peripheral hazard detection latency, the groups with the strongest outcomes were the same as those meriting highest approbation in the on-road assessment—the OT-based visual skills training and the classroom + behind-the-wheel training groups.

There were clear limitations in this research due to sample size, and to the restriction in range of driving skill levels for all groups on the baseline assessment. In addition, the training protocols only assured that participants were engaged in the respective training activities for an equal amount of time across groups; performance on the training tasks themselves was not scored nor analyzed in relation to the measures of effectiveness. In addition, the CDRS rating system restricts the application of inferential statistics for data analysis, and its scores for isolated behaviors may not fully gauge how well a driver integrates these component skills for successful whole task performance. A future research goal is to develop a more standardized and

refined methodology for what is often cited as the “gold standard” for determining fitness to drive.

INTRODUCTION

OBJECTIVE

The objective in this project was to seek evidence that training techniques and approaches for older drivers could be effective in improving driving performance, in randomized clinical trials. The training approaches of interest were those designed for use by a broad cross-section of the older driver population, i.e., *not* customized training protocols tailored to an individual's needs following a stroke, trauma, or acute medical condition. Measures of effectiveness emphasized tactical driving skills demonstrated through on-road and simulator assessments completed pre- and post-training—including delayed measures to determine whether training effects are sustained.

BACKGROUND

The ability to maintain driving skills and abilities that typically decline with age, or perhaps to restore them to an individual's level of competency years earlier, would provide clear benefits for older persons and their families in a society where transportation alternatives to the personal automobile remain unavailable (and unappealing) to a vast majority. In recognition of such benefits, training programs and products aimed at the aging driver market have proliferated in recent years.

Older driver training programs can be divided into two categories. This study focuses on those programs offered to the general population that are applied in the same way by all users, with an expectation of equally broad-based benefits. The target market for this category of driver training programs is healthy older adults, who comprise the fastest growing segment of the driving population (U.S. Census Bureau, 2010) but are “at-risk” only in the sense that chronic conditions of normal aging, rather than acute conditions or trauma, have affected their vision, perception/cognition, and/or physical function. In contrast, training protocols administered by health care professionals, typically occupational therapists (OTs) or other driving rehabilitation specialists, are tailored to the specific deficits of patients who wish to return to driving after a stroke, traumatic brain injury, or other event or acute condition that has resulted in a significant impairment. Driver rehabilitation procedures in this latter category are, by definition, *not* standardized; rather they are customized to the patient's needs, abilities, and personal mobility goals.

One important question concerns the nature and strength of evidence that should be used to establish training program effectiveness. Any gains in training performance must be transferred to on-road driving performance, otherwise the training program is clearly insufficient. The most desirable outcome for people who complete a training program is a demonstrable reduction in crash experience (without a reduction in exposure) in the immediate post-intervention period and over time, versus matched controls. Prospective analyses of training effectiveness based on reduction in crash experience would, however, require large samples and entail considerable expense, because crashes are rare events and obtaining reliable exposure information for large (treatment and control) groups including an in-vehicle monitoring system

may be regarded as an unacceptable invasion of privacy. Therefore, this study measured driving performance obtained before and after completion of a training program, versus matched controls. The driving performance measures were selected based on the present understanding of pre-crash factors, where the strongest construct validity is associated with performance measures that denote competence at the *tactical* level of driving skills (cf. Michon, 1985). Such skills include speed and space management, anticipation and detection of hazards, and the timely initiation of vehicle control movements that are consistent with all traffic rules and regulations as well as the prevailing operational and geometric conditions at each instant.

An expert evaluator could potentially obtain such measures through direct observation under “real-world” conditions. Alternatively, these measures could be obtained through naturalistic observations using driver- and vehicle-based data collection systems; or potentially in a driving simulator, if an appropriate set of driving conditions can be presented without causing simulator adaptation syndrome (“simulator sickness”). There are strengths and weaknesses to each methodology. A demonstrated convergence between performance measures using multiple approaches may provide the most convincing evidence of the training program’s effectiveness.

In addition to the advantages of a within-subjects (repeated measures) research design, the performance measures of the training program’s effectiveness must be highly sensitive. A generally healthy cohort of older adults may be expected to exhibit generally high levels of driving competence, affording few opportunities to demonstrate performance gains after training. Therefore, the demands for attention and control in everyday driving should be supplemented with tasks that challenge peoples’ capacity to search and scan the environment, divide attention, and respond to unexpected safety threats, without imposing an increase in risks deemed unacceptable by an Institutional Review Board.

The standardized training programs identified and selected for this study were classroom education (with supplemental behind-the-wheel instruction); computer-based exercises; clinical occupational therapy based exercises; and physical conditioning (strength and flexibility). Research team members who carried out pre- and post-training performance measures were blind to each subject’s training (or control) group membership. While each selected training approach met minimum criteria for face validity and construct validity, as judged by the research team, the selections also were guided significantly by the willingness of their developers to adapt instructional protocols to logistical constraints of the research site; to agree that NHTSA holds data rights to the study’s findings; and, as necessary, to remove or obscure corporate logos and other identifying information that could influence a participant’s attitude toward the training program.

As described below, the team employed a research design in which training effects for each included technique were gauged not in relation to each other, but instead in relation to a common control group that participated in activities unrelated to driving performance or driving safety. This was not intended to yield results whereby one or more approaches may be deemed effective only at the expense of others, but to seek evidence of *all*—perhaps complementary—training activities that can help generally healthy older persons drive safely longer.

RESEARCH METHODS

The research methodology may be described in terms of the recruitment of the study sample; administration of treatment and control condition interventions; occupational therapist (OT)/certified driving rehabilitation specialist (CDRS) on-road performance evaluations; and simulator evaluation procedures.

SAMPLE RECRUITMENT

A research database of candidate subjects for this study was derived from an ongoing (unrelated) study at Roger C. Peace Rehabilitation Hospital (RCP) in Greenville, SC, to collect health and lifestyle information from approximately 400 community-dwelling patients over the age of 50. The RCP database was queried to identify candidates who met the following inclusion criteria for the present study. These were patients who:

- were 65 or older;
- held a current valid driver license;
- had a minimum of three years' driving experience;
- currently drive a minimum of six trips per week;
- had not had a driving evaluation administered by a CDRS within the previous year;
- had not been advised by a physician that s/he should not drive, for any reason; and
- had a Mini-Mental State Examination (MMSE) score of 25 or higher.

The RCP database was replenished periodically during the course of this research, and with each replenishment, it was queried to yield additional candidates for the present study.

A study participant registry was populated from candidates who met the inclusion criteria listed above and who, when contacted by members of the research team working at RCP, indicated interest in study participation. A research assistant contacted potential participants and described a pending study investigating different types of training with the potential to improve older driver safety. The research assistant noted that participants would commit to approximately 8 hours of time to participate in the study; and that multiple driving evaluations would be performed, including both simulator and on-road measurements. A stipend of up to \$60 was offered. People who declined to participate in the study cited recent health issues; too large of a distance to travel to the research site; too intensive of a commitment required for the training activities; a fear of computer training placement; or too many preexisting commitments, including travel plans.

Subjects in the participant registry compiled by research team members at RCP received informed consent materials per the research plan for this study reviewed and approved by the Institutional Review Board (IRB) at Greenville Hospital System (GHS) and Clemson University. They were de-identified at RCP, via assignment of subject numbers, and then this registry was transmitted electronically to the Principal Investigator for stratification and assignment of subjects to treatment and control conditions.

Stratification was based on functional status as determined by a battery of visual, physical, and perceptual-cognitive measures¹ that predict risk of (at-fault) crashes among older drivers; this battery was administered as part of the health and lifestyle study at RCP. Any subjects who evidenced a “serious impairment” in one of the measured abilities were designated as “high risk” (Staplin, Lococo, Gish, & Decina, 2003).² Our research design called for an equal number of “high risk” people to be (randomly) assigned to each study condition (described below). Such assignments were made using the initial participant registry; then the remaining participants (i.e., those without any evidence of serious impairment on the included functional measures) in the registry were randomly assigned to treatment and control conditions, as well. The target sample size was 20 subjects per each training and control group.

Because of limitations in classroom space, number of instructors, and/or availability of hardware used in the various training activities, the interventions in this study were administered over the course of six months (August 2010 – January 2011). Throughout this term, there was subject attrition due to factors ranging from personal or family health issues to a simple loss of interest after participating in the first sessions. Consequently, the replenished RCP database was tapped during the course of this research to augment enrollment in the various treatment and control conditions. As new subjects were enrolled from those older drivers in the replenished RCP database who expressed interest in research participation, they were assigned to study conditions such that the conditions with greatest attrition at any given time received priority for the assignment of new subjects from the replenished RCP database. This was done without regard to functional status. The resulting variability in the composition of each (treatment and control) group, vis-à-vis its functional profile, is reported in the Results section (see Sample Characteristics).

TREATMENT AND CONTROL GROUP INTERVENTIONS

Based on guidance from physicians and driving rehabilitation specialists about the behavioral countermeasures most likely to preserve and extend safe driving practices among older adults (Staplin, Lococo, Martell, & Stutts, 2012), four different types of training programs were selected as interventions in this study. Again, for each technique/approach listed below, this study sought evidence of post- versus pre-training improvements in driving performance, compared to the performance of those who did not receive any such intervention.

1. Classroom driver education with supplemental behind-the-wheel instruction
2. Computer-based exercises to improve speed of processing and divided attention
3. Clinical occupational therapy based exercises to improve visual skills and attention
4. Physical conditioning to improve strength, flexibility, and movement

A description of each training approach and its implementation in this research follows.

¹ The DrivingHealth Inventory was used to measure high- and low-contrast visual acuity; head-neck flexibility (rotation); leg strength (mobility); working memory (cued recall); visuospatial ability (visualizing missing information/visual closure); directed visual search with divided attention (Trail-making Part B); and speed of processing with divided attention (UFOV subtest 2).

² Cutoff scores denoting “serious impairment” reflect the performance decrements associated with the peak valid odds ratios measured in “Model Driver Screening and Evaluation Program” ((Staplin, Lococo, Gish, & Decina, 2003).

Classroom Plus Behind-the-Wheel Instruction

All study participants assigned to this treatment condition attended two, 4-hour training sessions held on successive days in a classroom at RCP. Approximately 3.5 hours were devoted to instruction, with a half-hour break, on each day.

The instructor for these classes was a staff member from the Traffic Safety Programs office at AAA National Headquarters in Heathrow, Florida, Rich Chidester. The instructional materials used by Mr. Chidester in the classroom portion of this intervention were taken from the “Safe Driving for Mature Operators” lessons contained in AAA’s Driver Improvement Program. It is important to note, however, that the instructor’s affiliation with AAA was not revealed to study participants, nor were there any AAA logos or other branding information on the lesson materials distributed to the older drivers; these were removed specifically for this project under the direction of Dr. William Van Tassel.

To complement the classroom instruction, each participant in this treatment group received 1 hour of one-on-one, behind-the-wheel instruction emphasizing specific skills and tactics from the AAA curriculum. This was completed within one week after the classroom instruction, for all subjects. The behind-the-wheel instructor was a local service provider, the *911 Driving School*, recommended by the AAA Carolinas Club. This State-certified instructor rode in the front passenger seat with each driver, with access to a dual brake, in a late-model sedan owned by the *911 Driving School*.

Each behind-the-wheel session began at RCP, with a pre-driving orientation to the training vehicle, followed by several “driving range” exercises in the hospital’s parking lot that lasted approximately 15 minutes. On-road training followed for roughly 45 minutes, on streets and highways in the Greenville vicinity. The details of the in-car training protocol are presented in Appendix A.

At the end of the on-road training session the instructor and driver returned to RCP. A member of the research team set an appointment time with the driver for his/her first post-training assessment. A certificate of completion was mailed from RCP to each subject after completion of all study assessments for all of the people in the group.

Computer-Based Training

Study participants assigned to this treatment condition completed eight hours of computer-based training sessions using the DriveSharp module of the Posit Science Insight cognitive training software.³ This product was not modified for use in this study; however, following discussions with Dr. Henry Mahncke, Vice President for Research at Posit Science Corporation, a training protocol was devised that skipped introductory segments containing product branding, and first presented study participants with an assessment screen where baseline performance was measured using a variation of the Useful Field of View (UFOV) test.

³ Detailed product information is available at www.positscience.com/our-products/drivesharp

After the assessment screen, the training program proceeded with a game-like version of the central and peripheral tasks associated with the traditional UFOV procedure. The tasks were presented repeatedly throughout the training protocol, modulating the difficulty of the central task by adjusting the similarity of “car” and “truck” icons the participant was instructed to discriminate between, and modulating the difficulty of the peripheral task by increasing the visual angle between the central and peripheral targets. Distractor stimuli (non-target objects) distributed throughout the participants’ field of view also increased task difficulty.

Research staff administered training to participants individually via touch-screen computers on an individual desk, and noise-reducing headphones. The training environment was designed to minimize distractions. Training areas were located in semi-private offices at RCP, separated by curtain dividers.

A research team member scheduled and oversaw the computer-based training sessions for all participants. Participants completed training in eight blocks of at least one hour each. Participants were encouraged to complete one-hour sessions at least twice a week until eight sessions were completed; however, due to scheduling constraints, some participants chose to complete more than one hour of training in one day. Trainees were offered a short break every 25 minutes while on the computer. The design was chosen to ensure that each hour-long training session included a minimum of 50 minutes of computer interaction, while avoiding fatigue.

The research team member overseeing the training procedure set up an account for each participant in the software, prior to the first training appointment. The training software stored the participant’s de-identified training data on the computer. All computers were maintained in locked offices and were secured by passwords. Upon completion of eight hours of computer-based training, each participant scheduled an appointment for his/her first post-training driving assessment.

Occupational Therapy (OT-Administered) Visual Skills Training

Study participants assigned to this treatment condition completed eight hours of training using a protocol designed by Cyndee Crompton, OTR/L, CDRS, with input from OTs and driving rehabilitation specialists on the staff at RCP, and guided by the principles outlined in the text *Disciplined Attention* (Mills, 2005). The training protocol was organized according to three main content areas – visual field expansion, simultaneous processing of multiple visual stimuli, and ocular skill (visual search routine) exercises – that were carried out both in a clinical setting and in a training vehicle. An OT, *not* a CDRS, conducted the training activities.

Each study participant was greeted in the lobby of RCP at his/her appointment time and escorted to a room where training exercises were conducted. The sessions in this training program were designed sequentially to build upon skills from one session to the next. In alternate sessions, training participants were escorted to a vehicle owned by the hospital in which training concepts introduced during exercises in the clinical setting were demonstrated under dynamic driving conditions.

The eight, one-hour individual training sessions were divided equally between in-clinic and in-vehicle settings. In three of the in-vehicle sessions the trainee sat in the front passenger seat position, to concentrate on practicing the designated skills. In these sessions, the OT either drove the car or sat in the back seat while a confederate drove the car. In the fourth and final in-vehicle session, the trainee drove the vehicle, attempting a full integration of the practiced skills while executing the demands of driving in everyday traffic. For this session only, a licensed driving instructor and a dual-brake vehicle were employed. In this session, the OT rode in the back seat, delivered instructions, observed the trainee’s behavior, and provided feedback. Table 1 below provides a description of the activities across the eight training sessions.

The complete curriculum utilized in this OT-administered training program is described in Appendix B, “Occupational Therapy-Based Visual Treatment Protocol for Maximizing Driver Safety”

Table 1. Overview of OT-Administered Training Program Activities

| <u>Subject In Clinic</u> | | <u>Subject As Front Passenger</u> | |
|---|-----------------------------------|-----------------------------------|---|
| Session One: | Field Expansion Exercises | Session Two: | Field Expansion training in a dynamic environment |
| Session Three: | Simultaneous Processing Exercises | Session Four: | Simultaneous Processing training in a dynamic environment |
| Session Five: | Ocular Skill Exercises | Session Six: | Ocular Skill training in dynamic environment |
| Session Seven: Review and integration of skills practiced in clinic, using a combination of exercises. | | | |
| Session Eight: Behind-the-wheel training session with integration of all learned skills. This session included the OT as a back seat observer, while a licensed driving instructor rode in the front seat with the trainee. The driving instructor was a silent participant in this session, being present only to intervene with a vehicle control action if necessary to insure the safety of the vehicle occupants. | | | |

Physical Conditioning

Study participants assigned to this treatment condition completed eight hours of training, in four two-hour group sessions, using the “Smart Wheels” protocol designed by Dr. Deborah Krotish and offered by Palmetto Health. This intervention was a combination of exercises and education. A GHS health fitness specialist led the exercises and explained how the benefits of each exercise (muscular strength, muscular power, adaptation, range of motion) in the lesson plan can transfer to improve driving safety. Equipment required for this program included soft squeeze balls, resistance bands, and soft Frisbees. Each participant engaged a partner, as a number of the exercises and conditioning activities were best performed in pairs.

At the beginning of training sessions participants engaged in flexibility exercises, as follows: head and neck rotations; shoulder stretches; shoulder rotations; finger stretches (extension and flexion); core rotations (using resistance bands for stability); lateral stretching with side bends (using resistance bands for stability); knee touch to resistance band, held between the hands as low as necessary; hip rotations; knee rotations; ankle rotations; and rock on heels and stand on toes. Strength exercises to improve power and stability followed. These included standing pushups on wall, to strengthen muscles used for steering, manipulating the seat belt, entering and exiting the car, manipulating the gear shift, and opening and closing the door and trunk; ball squeeze, to strengthen the (often arthritic) fingers for gripping the steering wheel, and manipulating the seat belt and gear shift; and lower body squats (seated to standing from a normal chair height), to strengthen the lower body for entering and exiting the car and operating the accelerator and brake pedals.

Dual task exercises in this training program addressed executive function as well as motor skills. These exercises required a participant to manipulate the squeeze ball with his/her foot while throwing the Frisbee to the partner. Routines changed over the course of the exercise. These activities were designed to improve motion perception; to improve movement time and response time; to improve dual tasking and divided attention; and to support coordinating motor skills with a neuromuscular response.

An additional set of exercises was characterized as supporting “defensive driving.” In these exercises, participants held the Frisbee like a steering wheel, in both hands, and used it to bat the squeeze ball thrown by their partner. Both the thrower and the batter in each pair of participants simultaneously engaged in conversation about directions to reach a familiar destination in the community named by the exercise leader. Also, the thrower could designate whether the ball was or was not to be batted by the other participant at any given time. This exercise was designed to challenge visual acuity; to improve hand eye coordination, movement time and response time, motion perception, dual tasking and divided attention, decision making; and to use memory storage systems.

The complete “Smart Wheels” Lesson Plan implemented in this intervention is presented in Appendix C.

Control Group Interventions

Study participants assigned to this study condition completed eight hours of activities that involved direct contact with the research team at RCP, in activities unrelated to driving performance or driving safety. These activities principally consisted of a series of relaxation and meditation sessions, with an option to substitute a CPR certification class and/or nutrition counseling. Three “cycles” of classes were held, for three groups of drivers, to accommodate all subjects assigned to the control group. All groups met two times per week for four weeks in a conference room at RCP. A GHS health fitness specialist led the meditation classes.

Every relaxation session began with a classroom-style discussion and sometimes included a writing activity. To begin meditation, participants were given the option to “reposition” themselves to find as much comfort as possible. Some chose to lie on mats on the floor, while a

majority remained seated. During meditation, the instructor dimmed the lights and played gentle music. Participants rested with their eyes closed while the instructor read meditation scripts. At the end of each session, participants were given the opportunity to share any thoughts or feelings they experienced during or as a result of the meditation practice.

The CPR class was taught by a registered nurse and certified CPR trainer on staff at RCP. The class met for one four-hour session that included an informational lecture and hands-on training in CPR. A CPR certification was mailed from RCP to each subject after completion of all of the study assessments for all of the people in the group.

The nutrition class was taught by a certified dietician on staff at RCP. One, two-hour class was held at RCP and was comprised of a lecture plus slides.

ON-ROAD PERFORMANCE EVALUATIONS

A CDRS employed as the rehabilitation coordinator in the Occupational Therapy Department of RCP conducted all on-road driver evaluations. Each evaluation began and ended at RCP. Each driver was evaluated before participating in the treatment or control group activity (Drive 1), and again immediately after the intervention was completed (Drive 2), and three months following completion of the intervention (Drive 3). Each of the three drives was conducted on a separate route. Appendix D contains route maps and detailed descriptions of the highway and operational conditions under which each maneuver was performed.

Drive 1 was conducted over a 23-mile route consisting of urban local roads (1 to 3 lanes in each direction, speeds of 35 to 40 mph, and low-volume traffic except during peak hours), urban collector streets (2 or 3 lanes in each direction, 40 mph speed limits, and moderate traffic volume), local roads (1 to 3 lanes in each direction, speed limits of 25 to 35 mph, and low to moderately high traffic volumes), and primary and secondary arterials (55 to 65 mph, 3 to 4 lanes in each direction, and moderately high to high volume). Drivers made right, left (permitted and protected), and through movements at 24 intersections (3- and 4-legged) with both shared and designated turning lanes. The route included school zones with pedestrian crossings, roads with horizontal and vertical curvature, and interchange ramps.

Drive 2 was conducted over an 11-mile route covering the same roadway types as Drive 1, with 8 signalized intersections. Participants made left, right, and through maneuvers at 10 signalized intersections, and negotiated an unsignalized intersection and an exit ramp. They also encountered a roundabout, speed humps, pedestrian and bicycle lanes, and were required to merge when two lanes transitioned into one lane for traffic moving in the same direction of travel.

Drive 3 was conducted over a 17-mile route including the same roadway types as in Drives 1 and 2, with 11 signalized intersections and 1 stop-controlled intersection. In addition to left, right, and through maneuvers, drivers made lane changes and responded to pavement width transitions when the number of lanes decreased.

The CDRS and the research coordinator greeted participants in the RCP lobby on the date of their first on-road assessment. The participants provided consent for their participation in the project and the CDRS answered any questions prior to entering the test vehicle. Participants

were taken outside by the CDRS and familiarized with the vehicle. The CDRS provided instruction for seat, steering wheel and mirror adjustments. Participants also received instruction about all necessary secondary vehicle controls such as the gear selector, lights, turn signals, wipers and push button starter. Each participant demonstrated ability to use all primary (gas, brake and steering) and secondary controls in the parking circle in front of RCP prior to advancement out of this secure environment. The CDRS provided instruction as many times as necessary to ensure participants' comfort with vehicle controls. This familiarization of the vehicle prior to proceeding with the evaluation drives occurred at the beginning of all three routes. The CDRS controlled the vehicle compartment temperature according to each participant's preference.

The CDRS then instructed participants on the path of travel during each of the three drives, providing specific instructions for each targeted destination including street name and number of landmarks. For example, "continue on Pleasantburg Drive to the third traffic light, where you will turn left on Antrim Drive." After receiving instructions, each participant was encouraged to participate in conversation at the level he or she felt confident while maintaining safety behind the wheel. Some participants specifically asked to avoid the distraction of conversation as this was their usual habit when driving. The CDRS encouraged a few participants to discontinue conversation due to the decline in their ability to maintain driving safety while conversing. Conversations usually centered on information that did not require problem solving abilities such as recounting their work history, family information, or current leisure and work pursuits.

The CDRS did not provide feedback on participants' driving abilities during or after the routes; however, she intervened with brake application or steering control during the routes if she believed the driver to be in imminent danger due to unsafe driving skills or choices. Some drivers asked specific questions about rules of the road or common practice. The CDRS kept a written log of such questions, and provided responses during the feedback session at the completion of the third Drive.

SIMULATOR ASSESSMENTS

Driving Simulator

The simulator used for data collection in this study was a DriveSafety CDS-250.⁴ It consisted of a partial cab including the driver seat, center console, dash, and standard vehicle controls. The participant controlled the simulated vehicle using the steering wheel, accelerator, and brake pedal. Input buttons used to record responses when multiple tasks were presented during data collection were located on either side of the steering wheel, at approximately the '9:00' and '3:00' positions. The turn signal control was located on the left side of the steering column. This same control also served as the high beam toggle when it was pulled toward the driver. The CDS-250 display configuration consisted of three 19-inch (diagonal) LCD screens. The left and right screens were 30° off-plane from the center screen such that each was orthogonal to the participant's line of sight.

⁴ Technical information and data sheets for this equipment are available from the vendor at www.drivesafety.com/HealthcareApplications/TechnicalInformation.aspx

Simulation Assessment Protocol

After participants completed their first, second, and third on-road evaluations, they proceeded to the research lab at RCP to meet with the research team member responsible for administering the simulator assessment appointments. Each of the three simulator assessment appointments consisted of a practice session, followed by three test sessions. Appointment 1 test sessions were labeled as Session 1, Session 2, and Session 3. Appointment 2 test sessions were labeled as Session 4, Session 5, and Session 6. Appointment 3 test sessions were labeled as Session 7, Session 8, and Session 9. These sessions included driving scenarios that in turn were divided into sections that corresponded to increasing demands on the driver's attention, due to changing roadway types, traffic conditions, and secondary task requirements (see Figure 1). *All three levels of demands were included at each appointment, i.e., pre-treatment, post-treatment (immediate), and three months delayed post-treatment.*

At the beginning of each simulator appointment, participants were prompted regarding the location and function of the steering wheel, gear shift, gas and brake pedals, turn signals, and red response buttons on the steering wheel. The research team member asked participants to always refrain from shifting the simulator into drive until instructed to do so.

Participants completed a motion sickness questionnaire. The questionnaire included 17 descriptors relating to feelings of discomfort. Participants would indicate the likelihood or frequency with which they were experiencing the feelings of discomfort using a 10-point scale, ranging from "not at all" to "extremely."

After completing the motion sickness questionnaire, participants completed a practice session in the simulator that involved maintaining lane position, maintaining a constant speed, and driving on straight and gently curvy roads, as well as stopping. After the practice session participants were asked to complete the motion sickness questionnaire again, then offered a short break that provided an opportunity to stretch, use the restroom, or get a drink of water and a small snack (crackers and/or peppermints).

Following the break, participants received instructions for Session 1. After Session 1 was completed, participants were given the motion sickness questionnaire again, and were offered another short break. The Session 2 and Session 3 drives were completed in the same manner.

After completing a simulator appointment, participants were paid twenty dollars in cash as compensation for both the on-road and simulator assessments completed at each appointment in the study (pre-treatment, post-treatment (immediate), and three months delayed post-treatment). Participants signed a receipt stating they had received compensation, were thanked for their participation, and were escorted to the main lobby of RCP Hospital.

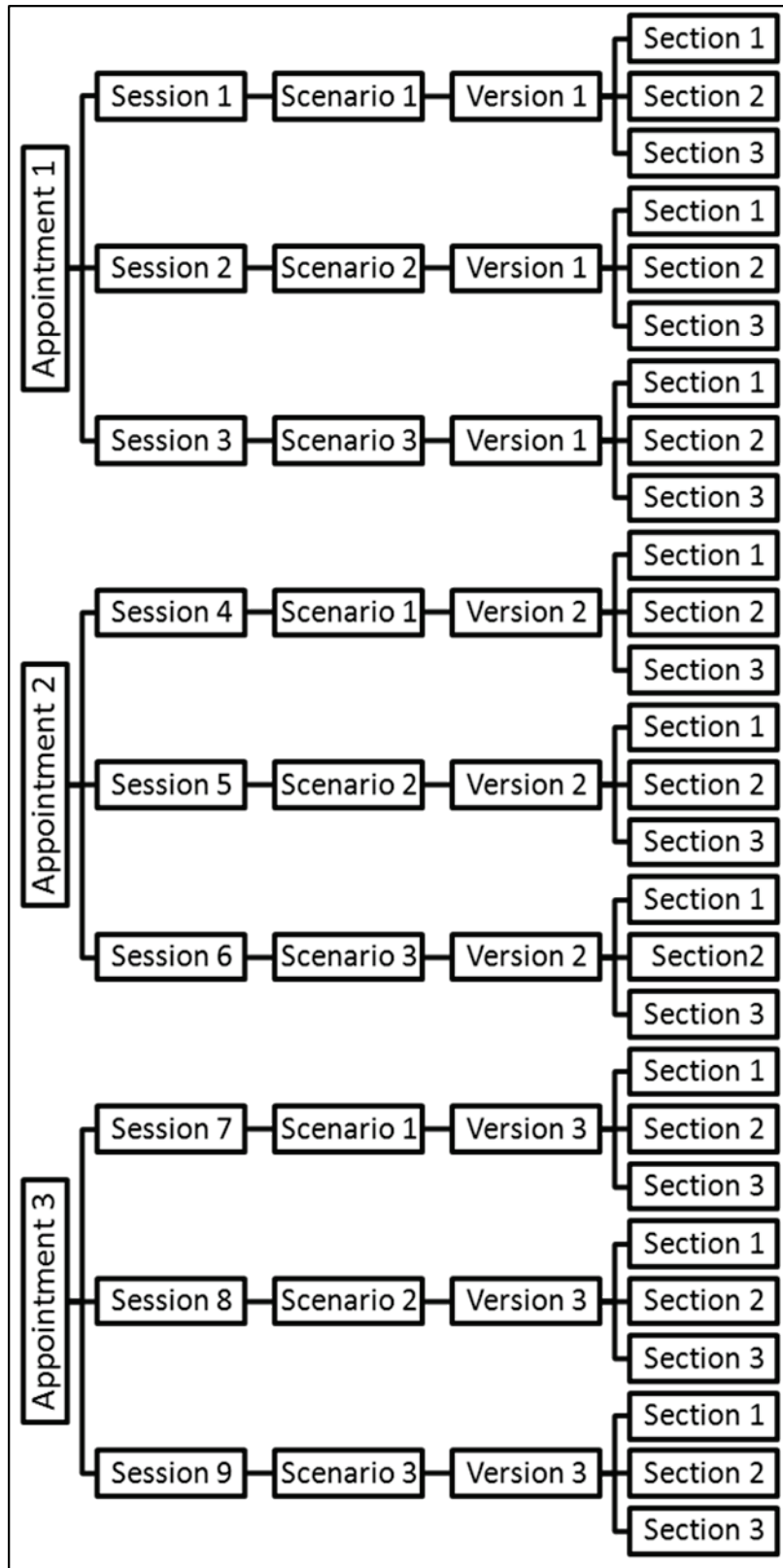


Figure 1. Flow Chart of Simulator Experience

If a participant crashed during any of the simulated sessions, the simulation stopped. The participant did not receive a second opportunity to complete the session. Instead, they completed the motion sickness questionnaire, and then were given instructions for the next session. If a participant felt sick at any time, simulation was stopped. The participant was helped out of the simulator and asked to sit down in a comfortable chair. Water, ginger ale, and crackers were offered. Fans were also available to blow cool air towards the participant. After a minimum of 15 minutes, the session continued if the participant felt well enough and agreed; if not, s/he was thanked and paid for the session.

Participants who stopped the evaluation because of motion sickness were held in a comfortable waiting area for a minimum of 30 minutes. After 30 minutes had passed they were allowed to leave once they reported no feelings of discomfort or motion sickness. They were also excused from participating in any of the remaining driving simulator assessments in this study.

Unfortunately, there were substantial missing data for the simulator assessments due to simulator sickness. Of 92 older adults enrolled as study participants who completed the first (pre-treatment) on-road evaluation by the CDRS, only 66 completed the first simulator appointment—a 28% attrition rate due to simulator sickness. These numbers dropped further, as only 61 participants completed the second (immediate post-treatment) simulator appointment, and only 58 completed all three simulator appointments.

Practice Scenarios

The first practice scenario began with a static picture of a driving scene with one straight single lane with a yellow edge line on the left and a white edge line on the right. The research team member showed the drivers a series of static pictures to explain their location within the lane. In addition, feedback was provided in the simulated environment through the use of five circles located above the roadway that changed in both color and location based on vehicle's lane position, where green was center, yellow was near the lane lines, and red was crossing the lane lines. After seeing examples of each category of the car's lane location, the participants drove on this straight road as many times as needed to feel comfortable with their lane positioning. Then, they drove within the lane at their own comfortable speed. The participants were required to stay within the lane without touching or crossing the lane boundary for 30 seconds before advancing. The simulator provided auditory feedback each time the participant crossed the boundary of the lane throughout the training scenarios. The participants completed the task a second time driving within 5 mph of the posted speed limit of 45 mph.

The second practice scenario was a single-lane, continuously curvy road. Participants had to drive without touching or crossing the lane boundaries for 60 seconds before advancing. The participants could complete this task as many times as necessary to meet the criteria. The participants completed the task a second time driving the posted speed limit of 45 mph.

In the last practice scenario, participants practiced driving in a town with several stop signs and traffic lights. Participants were encouraged to drive slowly and practiced bringing the vehicle to a complete stop at six intersections.

Driving Scenarios and Tasks in Simulator Assessments

Brief descriptions of the simulator driving scenarios and tasks are provided below. Appendix E (Table E-1) presents the roadway types, traffic environment, secondary tasks, dependent variables, and the duration of Scenarios 1, 2, and 3 that were completed in each simulator session.

Scenario 1. Scenario 1 took place on a two-lane road in a rural environment and was divided into three sections. In Section 1, the research team member instructed participants to maintain a speed of 55 mph while following a lead vehicle for approximately 2.5 minutes. The lead vehicle maintained a distance of approximately 80 feet from the participant vehicle's front bumper while a following vehicle maintained a distance of approximately 80 feet from the vehicle's rear bumper. This section ended at a stop light where the research team member provided instructions for section two.

The participant was told to press one of the steering wheel buttons to continue, at which point the traffic light turned green. In addition to the speed maintenance task in Section 1, the research team member instructed participants to tap the brake pedal as quickly as possible when the lead vehicle's brake lights illuminated. Each brake light presentation lasted 8 seconds and was presented every 3 to 10 seconds. The lead vehicle brake lights turned off after either the participant successfully responded to them or they timed out. Response times to the onset of the brake lights as well as number of hits, misses, and false alarms were recorded. This section also ended at a red light where the research team member provided instructions for Section 3. The traffic light turned green once the participant pressed a steering wheel button and they began the third section of the drive.

Along with the speed maintenance and brake response tasks presented in Section 2, the participant was also given a turn signal matching task. The research team member instructed participants to match the turn signal used by either the lead or following vehicle using their own turn signal. Each turn signal was presented for 8 seconds every 3 to 10 seconds. Flash rate of the lead and following vehicle turn signals was approximately 1 Hz (0.5 second on / 0.5 second off). Response times as well as the number of hits, misses, false alarms, and incorrect signals were recorded. Although the brake response task and turn signal matching task were performed concurrently, neither task's stimuli were presented simultaneously. That is, if the brake lights of the lead vehicle were illuminated, no turn signal would be presented and vice versa.

Section 3 ended with an incident on the right side of the roadway involving an emergency vehicle as well as passenger vehicles. The emergency vehicle's bumper extended into the right side of the roadway approximately 10 feet. In order for the participant to avoid collision, he or she was required to maneuver around the emergency vehicle and into the oncoming lane for a short period of time. The drive ended shortly after, at a red traffic light. This driving scenario lasted approximately seven minutes.

Three versions of Scenario 1 were created, one for each of the three simulator assessment appointments. They differed only in the order in which left and right turns were presented (see Figure E-1 in Appendix E).

Scenario 2. Scenario 2 was also divided into three sections. The participant's task consisted of following a target vehicle at a safe distance. The research team member told participants to consider the following distance seen in Scenario 1 as their "optimal" following distance. At times throughout this session a "ding" sound would play, indicating the target vehicle changed. The experimenter verbally presented the new target vehicle by saying, for example, "blue car" or "green SUV." The participant's task was to begin to follow the new target vehicle at the optimal distance as quickly as possible. Each target vehicle change required the participant to make one lane change.

Scenario 2 took place on a 6-lane divided highway with 3 lanes in either direction of travel and a 65-mph speed limit (see Figure E-2 in Appendix E). In the first section of this drive, the participant vehicle began in the center lane with no traffic other than a vehicle stopped 25 yards ahead. This was the first target vehicle. Once the session began, the target vehicle would accelerate up to 62 mph. The participant followed this first target vehicle along a straight roadway for approximately two minutes at which point they encountered an increase in traffic density. This began the second section of Session 2.

In Section 2, the participant was presented with four new target vehicles (see Table E-2 in Appendix E). These presentations occurred approximately every 15 to 25 seconds. The other vehicles in traffic were spaced with approximately 1.25 seconds of headway while traveling approximately 55 mph. There were also several gentle curves in the roadways in this and the third section of Session 2.

Section 3 began when the participant encountered another increase in traffic density. The other vehicles in traffic were now spaced with approximately 0.90 seconds of headway while traveling approximately 45 mph. Traffic speed then increased from 45 back up to 55 mph over a period of approximately 3 minutes. The participant was presented with four target vehicle changes. These presentations occurred approximately every 10 to 15 seconds. Scenario 2 ended with a merging of the three lanes into two leading to a red traffic light in an urban environment. This driving scenario lasted approximately seven minutes.

Three versions of Scenario 2 were created, one for each of the three driving simulator evaluations. Between versions, the target vehicle changed, although the location of the lane changes remained the same (see Table E-2, in Appendix E).

Scenario 3. Scenario 3 took place in an urban environment on a two-lane roadway with one lane in either direction of travel with a 25 mph speed limit (see Figure E-3 in Appendix E). The environment consisted of light traffic, intersections with traffic lights, vehicles parallel parked alongside the roadway, and pedestrians. Scenario 3 was also divided into three sections.

Section 1 began with the participant in the center of the lane with a lead vehicle stopped 15 yards ahead and light traffic in the oncoming lane. The lead vehicle maintained a tailway distance from the subject vehicle of approximately 65 feet throughout this driving session. The participant's task in this first section was to follow the lead vehicle through the environment and identify potential hazards on the left and right sides of the roadway using the steering wheel buttons. Five potential hazards were placed into this section of the drive, such as pedestrians,

dogs, and parked vehicles with their left turn signal on (indicating an intention to leave the parking space; see Table E-3 in Appendix E). This section ended at a red traffic light where the instructions for the task in the second section were read to the participant.

In addition to the hazard identification task, the research team member gave participants a word identification task in the second section. The lead vehicle contained a space above its bumper to present text to the participant. The participant's task was to flash the high beams if a word presented on the lead vehicle rhymed with "red," "green," or "blue." The participant was shown examples of the word presentation using several printed screen captures. A total of 35 words were presented, 9 of which were target words (see Table E-4 in Appendix E). Five potential hazards were also presented in this section of the drive.

The third section of the Scenario 3 began when the participant had reached the final intersection. Here, an emergency vehicle pulled out from the intersecting street and followed directly behind the participant. The participant was expected to pull over and come to a stop, ending the driving session. If the participant failed to stop, the scenario would end at this final red traffic light. Scenario 3 lasted approximately six minutes. Three versions of Scenario 3 were created, one for each of the three simulation assessment appointments. The order of roadside hazards as well as the order of the words presented in the word identification task differed (see Tables E-3 and E-4, in Appendix E).

PARTICIPANT FEEDBACK

After the third on-road evaluation (Drive 3) and third simulator assessment were completed, the driving evaluator provided verbal feedback to the participants and they discussed their experience in this study with the driving evaluator before leaving RCP. If the third on-road evaluation and third simulator assessment were completed on different days, the driving evaluator delayed feedback until both of these procedures were completed. In some circumstances, scheduling conflicts resulted in participants being contacted in follow-up telephone calls to discuss their experience in the study. These circumstances included: (1) when participants were scheduled back-to-back, the driving evaluator did not have time to talk with one participant before the next arrived; (2) the simulator assessment was completed in the evening after the driving evaluator had left for the day; (3) a participant needed to leave the premises immediately after completing his/her assessment, for personal reasons.

The feedback provided by the driving evaluator addressed the following points. The CDRS addressed areas of strengths and good driving habits first, and provided suggestions for ways to maintain these skills. Then, areas of weaknesses and risky driving behaviors were addressed with suggestions for improvements or modification of certain driving habits. Finally, the CDRS provided the study participants with a recommendation to discuss driving with their physician if driving skills were risky enough to place the participant or others in danger when behind the wheel. In several instances the CDRS made specific types of referrals to established programs; for example, one volunteer with arthritic deformations of both hands was referred to Occupational Therapy for orthotic appliances to preserve strength and residual range of motion

in her hands. Several participants scheduled an appointment for a CarFit session⁵ and were shown examples of adaptive equipment that could improve their safety and longevity behind the wheel. The CDRS answered specific questions that participants had posed during one or all of their routes. Most questions addressed specific rules of the road. The CDRS encouraged several study participants to participate in a formal driving safety course and provided information about AARP and AAA driving safety courses for mature drivers.

The discussion included participants' level of agreement with various statements addressing the validity and utility of the driving evaluation and training activities in the study. The CDRS asked participants to report and describe any other driver improvement activities in which they had engaged during the previous year, outside of study participation. The topics covered in this discussion between the driving evaluator and each participant are included in Appendix F.

⁵ CarFit is an educational program created by the American Society on Aging and developed in collaboration with AAA, AARP, and the American Occupational Therapy Association designed to help older drivers find out how well they currently fit their personal vehicles. The program reviews 12 key areas, such as knowing how to properly adjust mirrors to minimize blind spots; good foot positioning on the gas and brake pedals to avoid leg fatigue and slowed reaction times; and learning the dangers of sitting closer than 10 inches to the steering wheel/air bag.

RESULTS

The principal outcomes of this study are reflected in the results of the on-road performance evaluations, which are presented below. We also present the results of the assessments performed in the laboratory driving simulator, although as noted earlier there was a moderate degree of missing data due to subjects' discomfort with this measurement activity. In both cases, an extensive descriptive summary of the findings is followed by statistical tests of treatment versus control group differences, where applicable.

A detailed overview of sample characteristics opens this section, including demographic information, functional status, self-reported driving exposure, and health and technology indicators for each study group. Together with subjects' responses on an exit interview, reported at the end of this section, these data provide context for the interpretation of the present research findings.

SAMPLE CHARACTERISTICS

Demographics

Age and Sex. Eighty drivers participated in the study; they ranged in age from 64 to 85 years (mean = 72.5, s.d. = 5.63). Sixty-three percent of the participants were male (average age = 73.3 years) and 37% female (average age = 71.1 years). Table 2 presents summary statistics describing age within each study sample, while Table 3 presents the sex distribution by study sample.

Table 2. Summary Statistics Describing Participant Age, by Group

| Group | N | Minimum Age | Maximum Age | Average | Standard Deviation |
|-----------------------------|-----------|-------------|-------------|--------------|--------------------|
| Classroom + BTW Training | 15 | 65 | 83 | 74.13 | 5.85 |
| Computer-Based Training | 17 | 64 | 85 | 72.47 | 6.20 |
| OT-Administered Training | 16 | 65 | 84 | 72.13 | 5.38 |
| Physical Conditioning Group | 15 | 65 | 85 | 71.53 | 6.29 |
| Control Group | 17 | 66 | 81 | 72.17 | 4.80 |
| Total | 80 | 64 | 85 | 72.47 | 5.63 |

Table 3. Sex Distribution, by Group

| Group | N | Male (%) | Female (%) |
|-----------------------------|-----------|------------|------------|
| Classroom + BTW Training | 15 | 73% | 27% |
| Computer-Based Training | 17 | 65% | 35% |
| OT-Administered Training | 16 | 56% | 44% |
| Physical Conditioning Group | 15 | 53% | 47% |
| Control Group | 17 | 65% | 35% |
| Total | 80 | 63% | 37% |

Functional Status

MMSE. Scores on the MMSE ranged from 25 to 30, with a mean of 28.26 (s.d. = 1.61). Scores above 23 indicate that the sample was cognitively intact. Table 4 presents MMSE performance by study group.

Table 4. Performance Summary on the MMSE, by Group

| Group | N | Minimum Score | Maximum Score | Average Score | Standard Deviation |
|-----------------------------|----|---------------|---------------|---------------|--------------------|
| Classroom + BTW Training | 15 | 25 | 30 | 28.13 | 1.60 |
| Computer-Based Training | 17 | 25 | 30 | 27.35 | 1.69 |
| OT-Administered training | 16 | 25 | 30 | 28.63 | 1.89 |
| Physical Conditioning Group | 15 | 26 | 30 | 28.13 | 1.25 |
| Control Group | 17 | 26 | 30 | 29.01 | 1.14 |
| Total | 80 | 25 | 30 | 28.26 | 1.61 |

Acuity. As indicated in Table 5, virtually none of the participants in any of the groups evidenced a serious deficit on either the high- or low-contrast acuity measures. In fact, only one participant fell below this threshold for the high contrast acuity test, and another for the low contrast acuity measure; both were in the Classroom+ BTW Training group.

Table 5. Performance Summary for the Vision Measures, by Group

| Group | N | % of Group Passing | |
|-----------------------------|----|----------------------|---------------------|
| | | High Contrast Acuity | Low Contrast Acuity |
| Classroom + BTW Training | 15 | 93% | 93% |
| Computer-Based Training | 17 | 100% | 100% |
| OT-Administered Training | 16 | 100% | 100% |
| Physical Conditioning Group | 15 | 100% | 100% |
| Control Group | 17 | 100% | 100% |

Head/Neck Flexibility. The percentages of participants without impairment in head/neck flexibility are presented in Table 6, by study group. As shown by this table, only the Physical Conditioning treatment group had a smaller percentage of participants without impairment than the control group; the other treatment groups all included more participants without impairment than the controls, particularly the Classroom + BTW Training group.

Table 6. Performance Summary for the Head/Neck Flexibility Measure, by Group

| Group | N | % of Group Passing |
|-----------------------------|----|--------------------|
| Classroom + BTW Training | 15 | 66.67% |
| Computer-Based Training | 17 | 52.94% |
| OT-Administered training | 15 | 46.67% |
| Physical Conditioning Group | 14 | 21.42% |
| Control Group | 17 | 35.29% |

Visualizing Missing Information. Table 7 and Figure 2 present performance by group on the measure of visuospatial ability, Visualizing Missing Information (visual closure). As shown in Table 7, both the OT-Administered Training group and the Physical Conditioning group had a higher average error count compared to the control group. None of the participants in the control group exhibited a significant impairment in this ability (5 or more errors), whereas between one and four participants in the treatment groups exhibited significant impairment.

Table 7. Performance Summary for Visualizing Missing Information, by Group

| Group | N | Error Count (Total Possible = 11) | | | | N With Significant Impairment (>5 Errors) |
|-----------------------------|----|-----------------------------------|---------|---------|--------------------|---|
| | | Minimum | Maximum | Average | Standard Deviation | |
| Classroom + BTW Training | 15 | 0 | 8 | 1.93 | 2.19 | 2 |
| Computer-Based Training | 17 | 0 | 6 | 1.76 | 1.56 | 1 |
| OT-Administered Training | 16 | 0 | 9 | 2.88 | 2.83 | 4 |
| Physical Conditioning Group | 15 | 0 | 11 | 2.87 | 3.14 | 3 |
| Control Group | 17 | 0 | 4 | 1.94 | 1.19 | 0 |

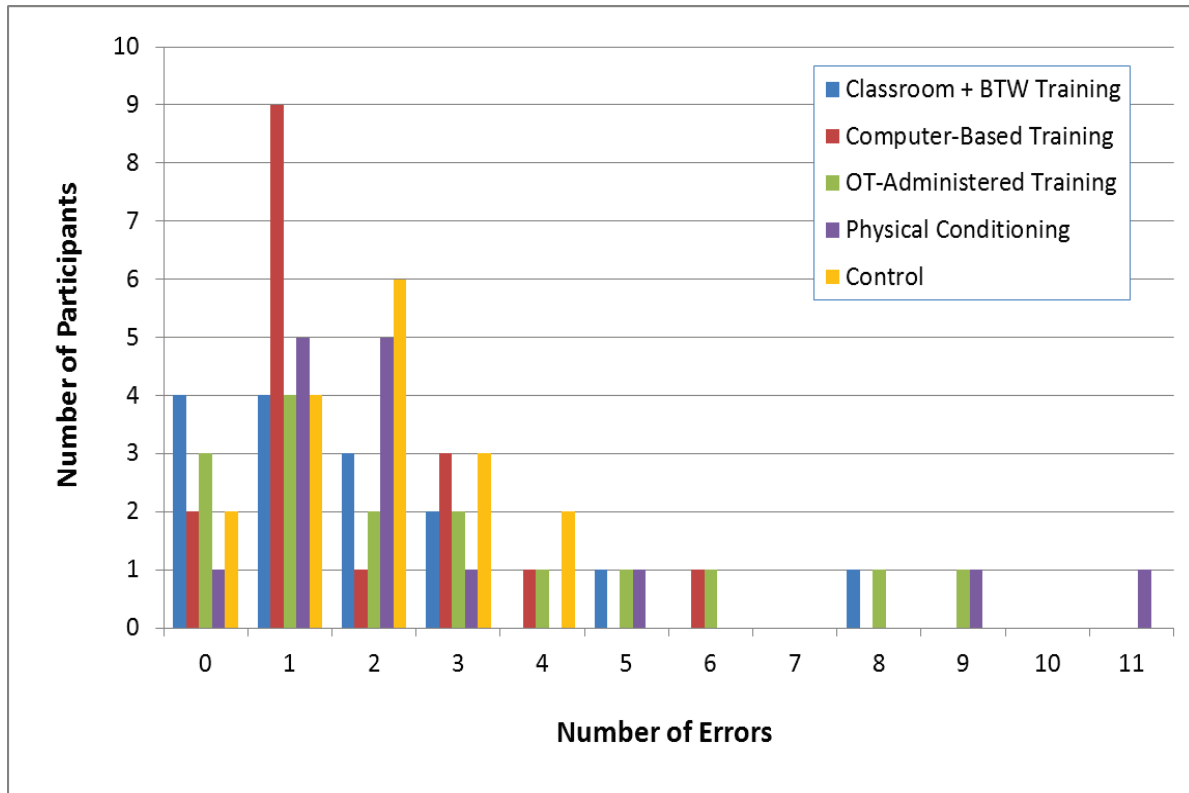


Figure 2. Number of Errors, by Group, for Visualizing Missing Information

Rapid-Pace Walk. Table 8 describes performance on the Rapid-Pace Walk measure, by study group. All four treatment groups exhibited faster walk times (on average) compared to the control group. The control group included one participant with a significant impairment in this ability (nine or more seconds to complete this measure). Two treatment groups (Classroom + BTW Training and Computer-Based Training) included a participant with a significant impairment in lower limb mobility. Figure 3 presents a scatter plot depicting individual performance on the Rapid-Pace Walk, within study group.

Table 8. Performance Summary for Rapid-Pace Walk Time, by Group

| Group | N | Minimum Score (sec.) | Maximum Score (sec.) | Average (sec.) | Standard Deviation (sec.) | N with a Significant Impairment (9+ sec) |
|-----------------------------|----|----------------------|----------------------|----------------|---------------------------|--|
| Classroom + BTW Training | 15 | 4.45 | 10.28 | 5.92 | 1.43 | 1 |
| Computer-Based Training | 17 | 3.22 | 11.34 | 6.16 | 1.82 | 1 |
| OT-Administered Training | 16 | 4.13 | 7.59 | 5.47 | 0.92 | 0 |
| Physical Conditioning Group | 15 | 3.88 | 8.66 | 5.81 | 1.13 | 0 |
| Control Group | 17 | 2.84 | 9.30 | 6.57 | 1.64 | 1 |

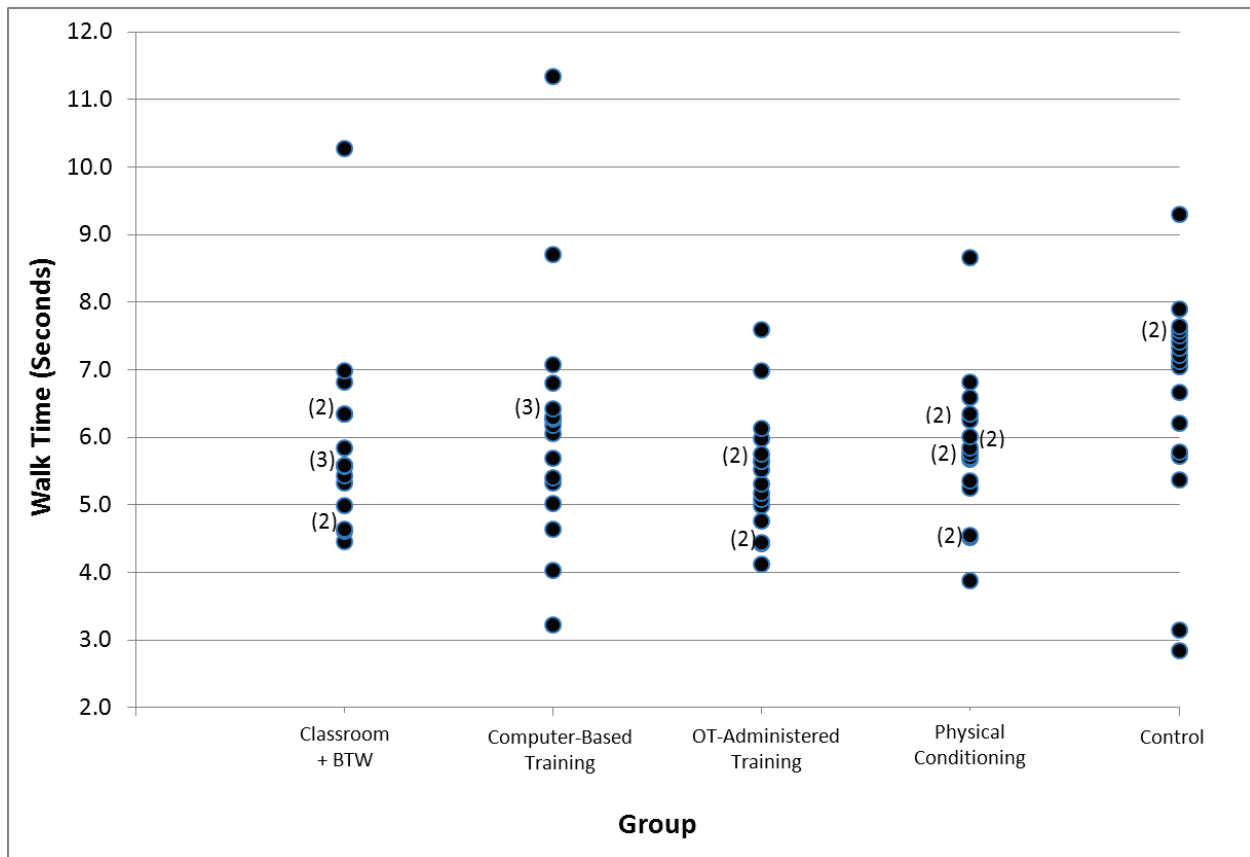


Figure 3. Performance Summary for Rapid-Pace Walk Time, by Group

Trail-Making Test (Part A). Table 9 and Figure 4 summarize performance on the Trail-Making Test (Part A), by study group. Participants in the Computer-Based Training group and the OT-Administered Training group exhibited similar performance to that shown by the control group. The other two treatment groups (Classroom + BTW Training and the Physical Conditioning Training groups) exhibited longer performance times compared to the control group, by approximately three seconds.

Table 9. Performance Summary for the Trail-Making Test (Part A) Measure, by Group

| Group | N | Minimum Score (sec.) | Maximum Score (sec.) | Average (sec.) | Standard Deviation (sec.) |
|-----------------------------|----|----------------------|----------------------|----------------|---------------------------|
| Classroom + BTW Training | 15 | 18.22 | 49.25 | 32.02 | 9.08 |
| Computer-Based Training | 17 | 20.66 | 42.67 | 30.41 | 7.66 |
| OT-Administered Training | 16 | 19.17 | 50.80 | 29.18 | 7.01 |
| Physical Conditioning Group | 15 | 17.83 | 52.91 | 32.52 | 10.57 |
| Control Group | 17 | 16.77 | 64.80 | 29.20 | 10.36 |

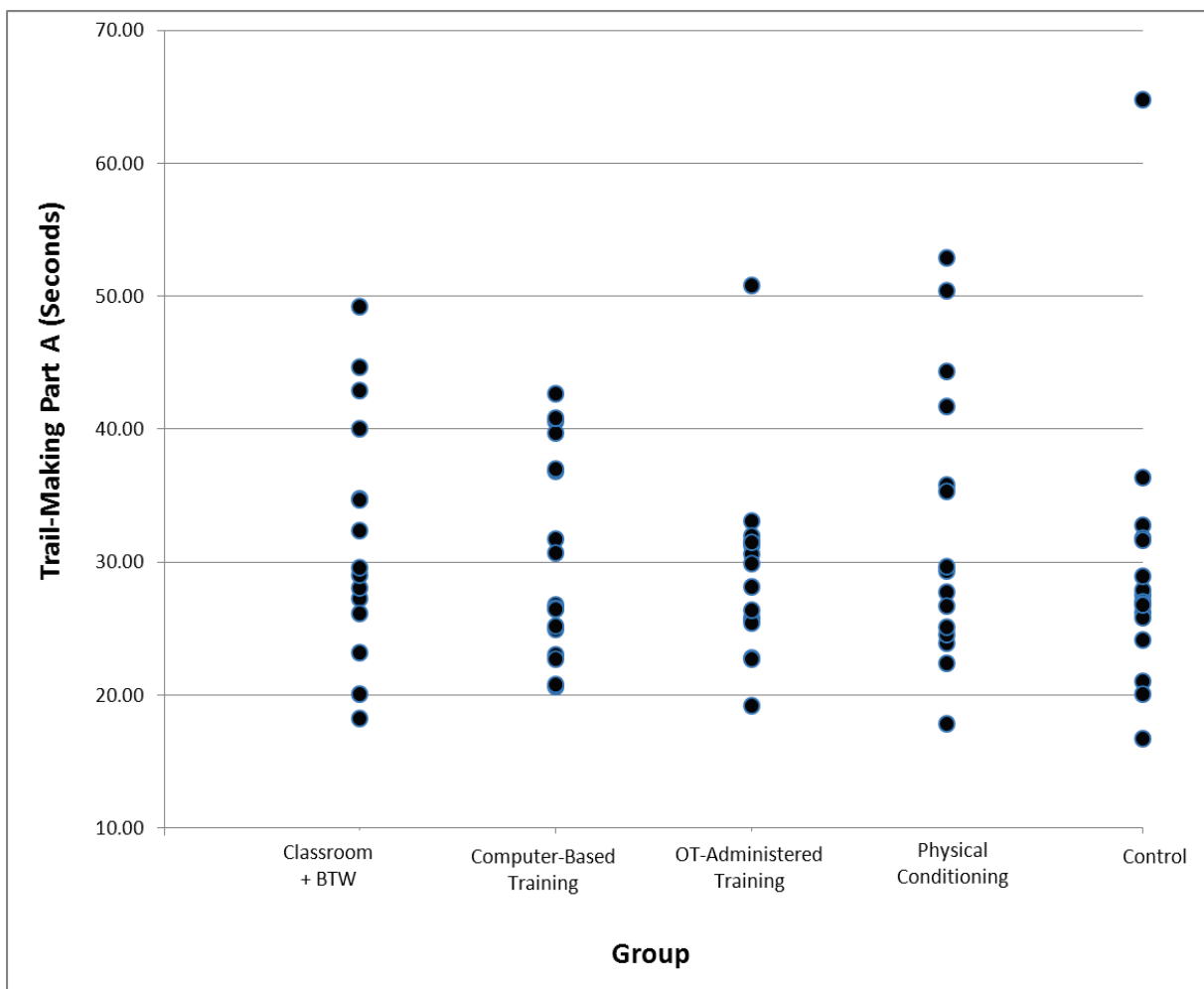


Figure 4. Distribution of Scores on the Trail-Making Test (Part A) Measure, by Group

Trail-Making Test (Part B). Table 10 and Figure 5 summarize performance on the Trail-Making Test (Part B), by study group. Similar to the Part A results, the control group exhibited the shortest average completion times of all five study groups, and the Physical Conditioning Treatment group the longest average completion time. The other three treatment groups showed average completion times ranging from two to six seconds longer than the control group. None of the study participants exhibited a significant impairment (i.e., completion time of 180 seconds or more) in the cognitive ability (visual search with divided attention) underlying this measure.

Table 10. Performance Summary for the Trail-Making Test (Part B) Measure, by Group.

| Group | N | Minimum Score (sec.) | Maximum Score (sec.) | Average (sec.) | Standard Deviation (sec.) | N with a Significant Impairment (>180 sec) |
|-----------------------------|----|----------------------|----------------------|----------------|---------------------------|--|
| Classroom + BTW Training | 15 | 51.31 | 162.50 | 89.85 | 28.71 | 0 |
| Computer-Based Training | 17 | 50.78 | 155.20 | 91.44 | 24.33 | 0 |
| OT-Administered Training | 16 | 49.42 | 156.77 | 87.22 | 30.00 | 0 |
| Physical Conditioning Group | 15 | 57.02 | 128.03 | 96.77 | 24.79 | 0 |
| Control Group | 17 | 47.36 | 153.28 | 86.10 | 30.59 | 0 |

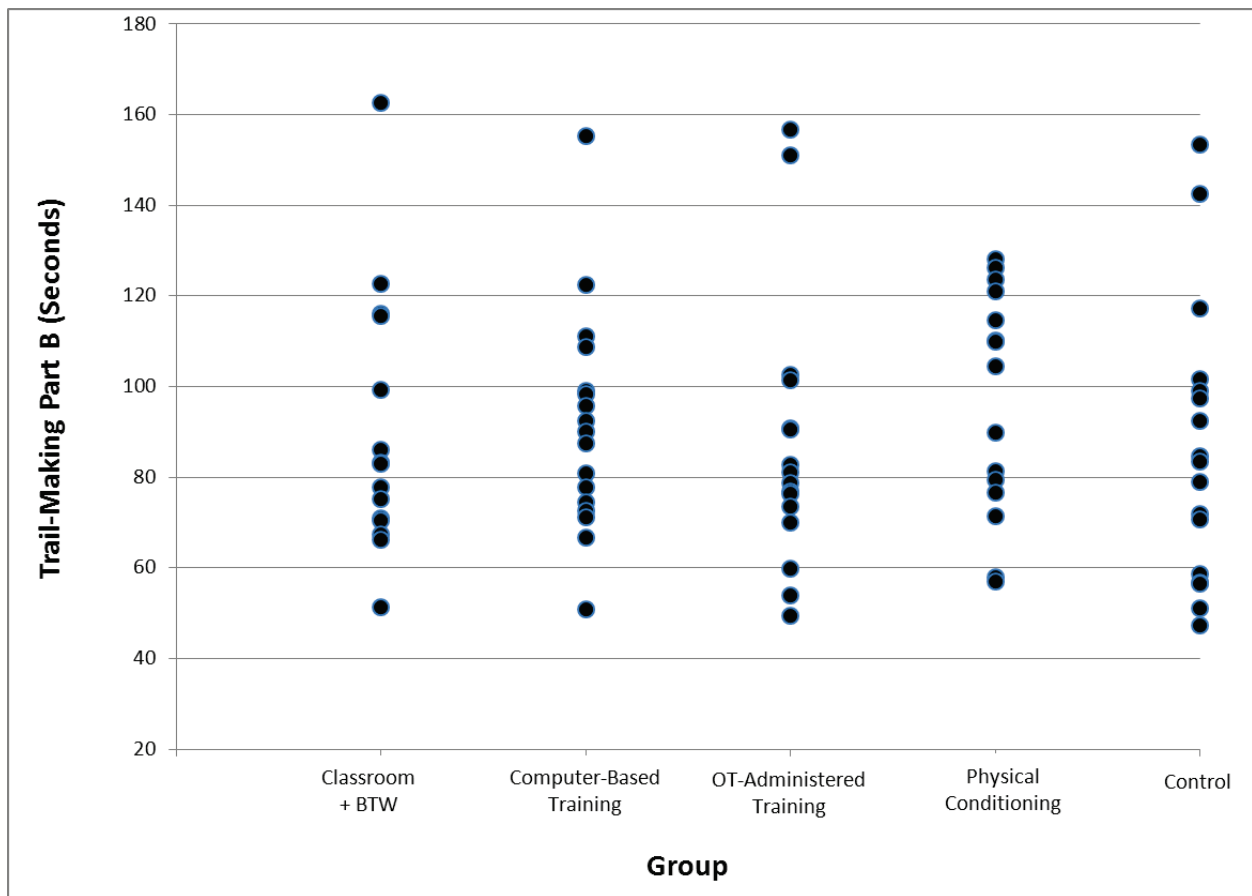


Figure 5. Distribution of Scores on the Trail-Making Test (Part B) Measure, by Group.

Useful Field of View (UFOV, Subtest 2). Table 11 and Figure 6 summarize performance on the Useful Field of View measure, by study group. Again, the control group participants exhibited the fastest performance and the Physical Conditioning Training group the slowest performance. Each study group included at least one participant with a significant deficit in this measure of speed-of-processing ability, with the control group exhibiting the smallest proportion of participants (1 of 18) and the Physical Conditioning group the largest proportion (4 of 15).

Table 11. Performance Summary for the Useful Field of View Measure, by Group.

| Group | N | Minimum Score (msec.) | Maximum Score (msec.) | Average (msec.) | Standard Deviation (msec.) | N with a Significant Impairment (≥ 300 msec) |
|-----------------------------|----|-----------------------|-----------------------|-----------------|----------------------------|--|
| Classroom + BTW Training | 15 | 100 | 347 | 172.87 | 91.57 | 2 |
| Computer-Based Training | 17 | 100 | 367 | 148.41 | 94.54 | 3 |
| OT-Administered Training | 16 | 100 | 367 | 175.88 | 93.78 | 2 |
| Physical Conditioning Group | 15 | 100 | 347 | 187.60 | 97.75 | 4 |
| Control Group | 17 | 100 | 347 | 134.06 | 71.92 | 1 |

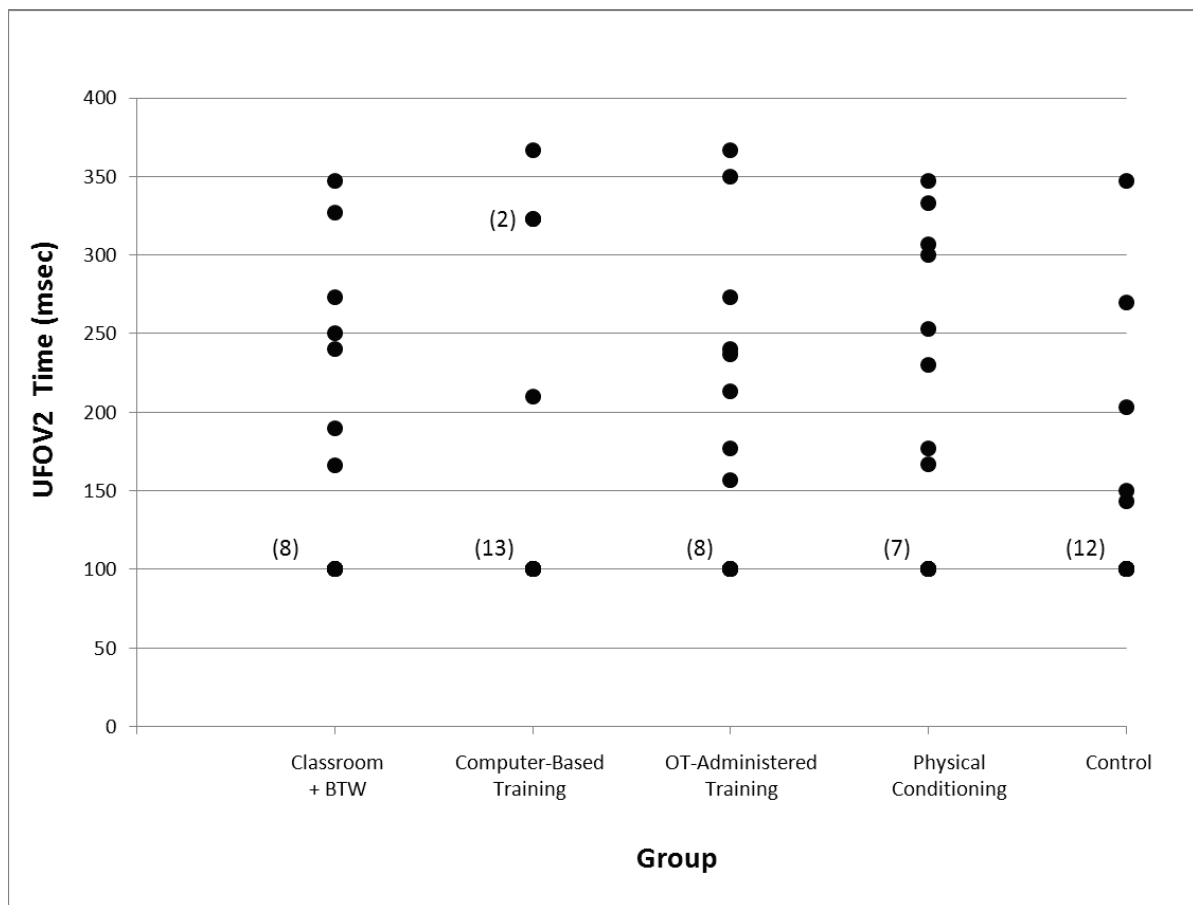


Figure 6. Performance on the Useful Field of View Measure, by Group

Delayed Recall. Figure 7 presents performance on the recall measure by group. A verbal prompt cued participants to try to recall the words learned earlier. This delayed recall task provided a measure of working memory. Two or more errors indicated a significant deficit in this capability. Only three study participants exhibited a significant deficit: one in the Classroom + BTW Training group and two in the Computer-Based Training group.

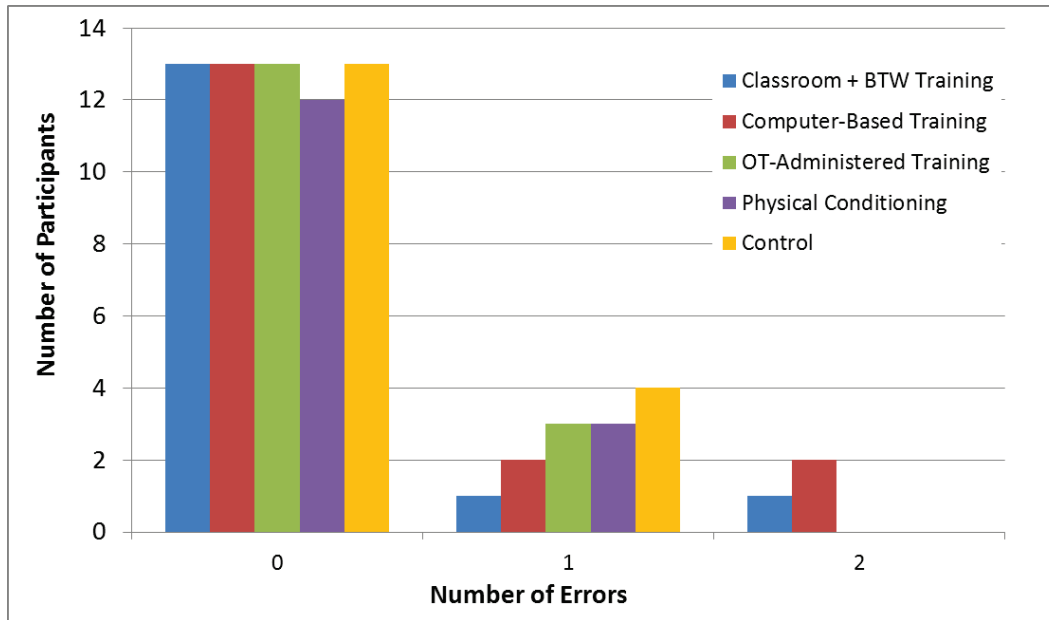


Figure 7. Number of Errors, by Group, for Recall Measure

Self-Reported Driving Exposure

Driving Days per Week. Table 12 summarizes the number of days that participants reported driving per week, by study group. Figure 8 presents the distribution of responses by group. As shown in Figure 8 the majority of participants in all study groups reported driving seven days per week. However, the control group and the Physical Conditioning group both included individuals who reported driving only two days per week.

Table 12. Number of Days Driven Each Week, by Group

| Group | N | Minimum | Maximum | Average | Standard Deviation |
|-----------------------------|----|---------|---------|---------|--------------------|
| Classroom + BTW Training | 15 | 4 | 7 | 6.27 | 1.10 |
| Computer-Based Training | 17 | 4 | 7 | 6.76 | 0.75 |
| OT-Administered Training | 16 | 4 | 7 | 6.25 | 0.93 |
| Physical Conditioning Group | 15 | 2 | 7 | 5.60 | 1.68 |
| Control Group | 17 | 2 | 7 | 6.23 | 1.52 |
| Total | 80 | 2 | 7 | 6.24 | 1.27 |

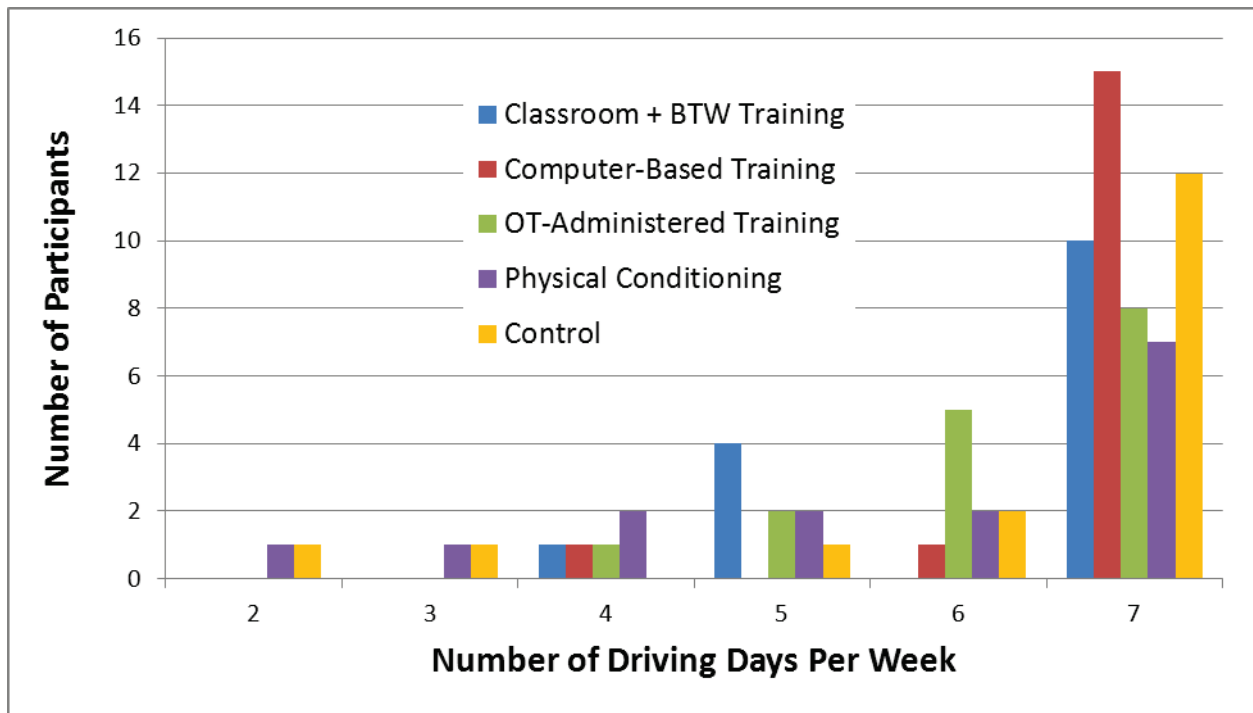


Figure 8. Number of Self-Reported Driving Days per Week, by Group

Number of Trips per Day. Participants were asked to choose one response alternative to indicate the number of trips they take each day. Table 13 presents the percentage of participants, by group, choosing each response. Across all study groups, the most prevalent response (44%) was two trips per day, followed by four trips per day (26%). A trip was defined as an individual drive from one place to another, not a round trip; i.e., each time the car is started begins a new trip. Figure 9 presents the distribution of responses by group.

Table 13. Number of Trips per Day, by Group

| Group | N | Trips per Day (Percentage of Group) | | | | |
|-----------------------------|----|-------------------------------------|-----|-----|-----|-----|
| | | 1 | 2 | 3 | 4 | 5+ |
| Classroom + BTW Training | 15 | 20% | 33% | 13% | 27% | 7% |
| Computer-Based Training | 17 | 12% | 53% | 6% | 17% | 12% |
| OT-Administered Training | 16 | 6% | 38% | 0% | 56% | 0% |
| Physical Conditioning Group | 15 | 13% | 47% | 7% | 20% | 13% |
| Control Group | 17 | 6% | 47% | 6% | 12% | 29% |
| Total | 80 | 11% | 44% | 6% | 26% | 13% |

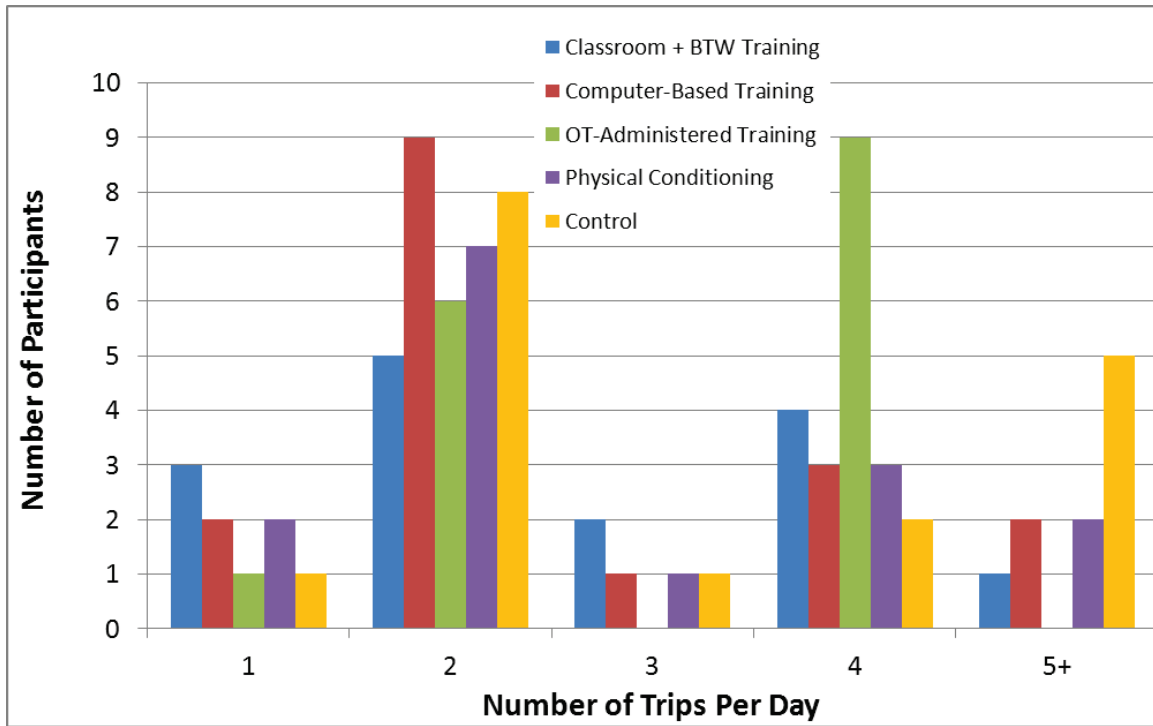


Figure 9. Number of Self-Reported Trips per Day, by Group

Average Trip Length (Miles). Participants were asked to choose a categorical response to indicate their average trip length. Table 14 shows the percentage of participants, by group, choosing each response. Across all study groups, the most prevalent response was 6 to 10 miles (35%), followed by 3 to 5 miles (30%).

Table 14. Average Trip Length (Miles), by Group

| Group | N | Trip Length (Percentage of Group) | | | | |
|-----------------------------|----|-----------------------------------|--------|---------|----------|--------|
| | | 1-2 mi | 3-5 mi | 6-10 mi | 11-20 mi | 20+ mi |
| Classroom + BTW Training | 15 | 0% | 40% | 33% | 13% | 13% |
| Computer-Based Training | 17 | 6% | 47% | 12% | 29% | 6% |
| OT-Administered Training | 16 | 0% | 19% | 50% | 25% | 6% |
| Physical Conditioning Group | 15 | 0% | 20% | 47% | 26% | 7% |
| Control Group | 17 | 12% | 24% | 35% | 24% | 6% |
| Total | 80 | 4% | 30% | 35% | 24% | 8% |

Avoiding Driving in the Rain. Participants were asked to report the degree to which they avoided driving in the rain, using the following five categories: never, rarely, sometimes, often, or always. The percentage of respondents selecting each level of avoidance, by group, is shown in Table 15. Across all study groups, the most prevalent response was “never” (38%) followed by “rarely” (30%). Larger percentages of participants in the Physical Conditioning group reported self-restricting under these conditions (20% chose “often” or “always”) compared to the other treatment groups. None of the control group participants reported this level of self-restriction.

Table 15. Percentage Avoiding Driving in the Rain, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 57% | 14% | 14% | 14% | 0% |
| Computer-Based Training | 17 | 35% | 35% | 24% | 6% | 0% |
| OT-Administered Training | 16 | 31% | 44% | 13% | 6% | 6% |
| Physical Conditioning Group | 15 | 33% | 33% | 13% | 20% | 0% |
| Control Group | 17 | 35% | 24% | 41% | 0% | 0% |
| Total | 79 | 38% | 30% | 22% | 9% | 1% |

Avoiding Driving at Night. Table 16 presents the level of avoidance of driving at night, by group. Across all groups, the most prevalent response was “never” (38%), followed by “sometimes” (28%). Similar to avoiding driving in the rain, larger percentages of participants in the Physical Conditioning group reported self-restricting at nights (20% chose “often” or “always”) compared to the other treatment groups. None of the control group participants reported this level of self-restriction.

Table 16. Percentage Avoiding Driving at Night, by Group.

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 43% | 29% | 14% | 7% | 7% |
| Computer-Based Training | 17 | 47% | 6% | 35% | 12% | 0% |
| OT-Administered Training | 16 | 31% | 31% | 25% | 6% | 6% |
| Physical Conditioning Group | 15 | 33% | 27% | 20% | 7% | 13% |
| Control Group | 17 | 35% | 24% | 41% | 0% | 0% |
| Total | 79 | 38% | 23% | 28% | 6% | 5% |

Avoiding Driving in Fog. Table 17 presents the level of avoidance of driving under foggy conditions, by group. Across all study groups, the most prevalent response was “rarely” (34%), followed by “sometimes” (27%) and “never” (25%).

Table 17. Percentage Avoiding Driving in Fog, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 29% | 29% | 29% | 14% | 0% |
| Computer-Based Training | 17 | 29% | 29% | 35% | 6% | 0% |
| OT-Administered Training | 16 | 25% | 50% | 6% | 19% | 0% |
| Physical Conditioning Group | 15 | 27% | 27% | 27% | 20% | 0% |
| Control Group | 17 | 18% | 35% | 35% | 12% | 0% |
| Total | 79 | 25% | 34% | 27% | 14% | 0% |

Avoiding Driving on Snow- or Ice-Covered Roads. Table 18 presents the level of avoidance of driving on ice- or snow-covered roads, by group. While the largest proportion of responses across all groups was “rarely” (33%), larger proportions of participants reported “often” avoiding these conditions (24%) than avoiding driving in the rain (9%), at night (6%), and in the fog (14%). Participants in three of the treatment groups (Computer-Based Training, OT-Administered, and Physical Conditioning) reported higher levels of self-restriction (i.e., “often” or “always”) under these conditions, than participants in the control group.

Table 18. Percentage Avoiding Driving on Snow- or Ice-Covered Roads, by Group.

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 21% | 21% | 43% | 14% | 0% |
| Computer-Based Training | 17 | 12% | 35% | 18% | 29% | 6% |
| OT-Administered Training | 16 | 13% | 13% | 44% | 25% | 6% |
| Physical Conditioning Group | 15 | 20% | 33% | 0% | 33% | 13% |
| Control Group | 17 | 0% | 59% | 18% | 18% | 6% |
| Total | 79 | 13% | 33% | 24% | 24% | 6% |

Avoiding Driving in Heavy Traffic. Table 19 presents the level of avoidance of driving in heavy traffic, by study group. The most prevalent response, across all groups, was “rarely” (44%). The lowest level of self-restriction under this condition was reported by the Computer-Based Training group, in which none of the participants reported either “often” or “always” avoiding this situation. In comparison, between 18% and 21% of the other study groups reported “often” or “always” avoiding driving in heavy traffic.

Table 19. Percentage Avoiding Driving in Heavy Traffic, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 36% | 29% | 14% | 21% | 0% |
| Computer-Based Training | 17 | 47% | 41% | 12% | 0% | 0% |
| OT-Administered Training | 16 | 19% | 50% | 13% | 13% | 6% |
| Physical Conditioning Group | 15 | 20% | 40% | 20% | 20% | 0% |
| Control Group | 17 | 24% | 47% | 12% | 18% | 0% |
| Total | 79 | 29% | 42% | 14% | 14% | 1% |

Avoiding Driving in Unfamiliar Areas. Table 20 presents the level of avoidance of driving in unfamiliar areas, by study group. Similar to avoiding heavy traffic, the most prevalent response, across all groups, was “rarely” (41%), and the lowest level of self-restriction under this condition was reported by the Computer-Based Training group, in which none of the participants reported either “often” or “always” avoiding this situation.

Table 20. Percentage Avoiding Driving in Unfamiliar Areas, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 43% | 29% | 21% | 7% | 0% |
| Computer-Based Training | 17 | 29% | 47% | 24% | 0% | 0% |
| OT-Administered Training | 16 | 19% | 50% | 19% | 6% | 6% |
| Physical Conditioning Group | 15 | 33% | 27% | 27% | 13% | 0% |
| Control Group | 17 | 24% | 47% | 24% | 6% | 0% |
| Total | 79 | 29% | 41% | 23% | 6% | 1% |

Avoiding Driving at High Speeds. Table 21 presents the level of avoidance of driving at high speeds, by study group. This situation was associated with higher levels of (reported) self-restriction by all study groups than the environmental and situational conditions described earlier. The highest level of self-restriction was reported for the Physical Conditioning group, with 47% of participants responding “often” or “always.” This was followed by the Computer-Based Training group (30%), the OT-Administered Training group (25%), the control group (24%), and the Classroom + BTW Training group (21%).

Table 21. Percentage Avoiding Driving at High Speeds, by Group.

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 29% | 21% | 29% | 14% | 7% |
| Computer-Based Training | 17 | 18% | 18% | 35% | 12% | 18% |
| OT-Administered Training | 16 | 25% | 19% | 31% | 25% | 0% |
| Physical Conditioning Group | 15 | 20% | 7% | 27% | 27% | 20% |
| Control Group | 17 | 18% | 41% | 18% | 12% | 12% |
| Total | 79 | 22% | 22% | 28% | 18% | 11% |

Avoiding Driving Distances of 100 Miles or 2 Hours. Table 22 presents the level of avoidance of driving distances of 100 miles or 2 hours, by study group. Across all study groups, 49% of the participants reported “never,” and 31% “rarely” avoiding driving 100 miles. The highest level of self-restriction under this condition (“often” or “always”) was reported by the Physical Conditioning group (27%), followed by the Classroom + BTW Training group (14%). None of the members of the Computer-Based Training group or the Control group reported “often” or “always” avoiding driving this distance, and only 6% of the OT-Administered Training group reported this level of self-restriction.

Table 22. Percentage Avoiding Driving Distances of 100 Miles or 2 Hours, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 71% | 7% | 7% | 7% | 7% |
| Computer-Based Training | 17 | 76% | 18% | 6% | 0% | 0% |
| OT-Administered Training | 16 | 38% | 50% | 6% | 0% | 6% |
| Physical Conditioning Group | 15 | 40% | 33% | 0% | 7% | 20% |
| Control Group | 17 | 24% | 47% | 29% | 0% | 0% |
| Total | 79 | 49% | 32% | 10% | 3% | 6% |

Avoiding Driving Distances of 200 Miles or 4 Hours. Table 23 presents the level of avoidance of driving distances of 200 miles or 4 hours, by study group. The pattern of responses was similar to that reported for avoiding driving distances of 100 miles, with the most prevalent response “never” (42%) followed by “rarely” (35%). Again, no participants in the Computer-Based training group reported “often” or “always” avoiding this situation, but 6% of the Control group, 12% of the OT-Administered Training group, 21% of the Classroom + BTW Training group, and 27% of the Physical Conditioning groups did.

Table 23. Percentage Avoiding Driving Distances of 200 Miles or 4 Hours, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 50% | 29% | 0% | 7% | 14% |
| Computer-Based Training | 17 | 65% | 29% | 6% | 0% | 0% |
| OT-Administered Training | 16 | 31% | 44% | 13% | 6% | 6% |
| Physical Conditioning Group | 15 | 40% | 27% | 7% | 7% | 20% |
| Control Group | 17 | 24% | 47% | 24% | 6% | 0% |
| Total | 79 | 42% | 35% | 10% | 5% | 8% |

Avoiding Driving on Limited Access Roads. Table 24 presents the level of avoidance of driving on limited access roads, by study group. The most prevalent response across all groups was “never” at 54%. This situation was associated with relatively low levels of self-restriction (7 to 12% reporting “often” or “always”) for all groups except the Computer-Based Training group, for which none of the participants reported “often” or “always” avoiding.

Table 24. Percentage Avoiding Driving on Limited Access Roads, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 71% | 14% | 7% | 7% | 0% |
| Computer-Based Training | 17 | 76% | 18% | 6% | 0% | 0% |
| OT-Administered Training | 16 | 44% | 44% | 0% | 6% | 6% |
| Physical Conditioning Group | 15 | 47% | 27% | 20% | 7% | 0% |
| Control Group | 17 | 35% | 29% | 24% | 12% | 0% |
| Total | 79 | 54% | 27% | 11% | 6% | 1% |

Avoiding Left Turns Across Oncoming Traffic. Table 25 presents the level of avoidance of turning left across oncoming traffic, by study group. Across all groups, the most prevalent response was “never” (44%). Relatively small proportions of participants in each group reported high levels of self-restriction (“often” or “always”) under this situation, ranging from 6% to 14%.

Table 25. Percentage Avoiding Left Turns Across Oncoming Traffic, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 14 | 50% | 36% | 7% | 7% | 0% |
| Computer-Based Training | 17 | 53% | 35% | 6% | 6% | 0% |
| OT-Administered Training | 16 | 44% | 25% | 19% | 13% | 0% |
| Physical Conditioning Group | 14 | 36% | 29% | 21% | 7% | 7% |
| Control Group | 17 | 35% | 24% | 29% | 12% | 0% |
| Total | 78 | 44% | 29% | 16% | 9% | 1% |

Avoiding Intersections Controlled by Stop Signs. Table 26 presents the level of avoidance of intersections controlled by stop signs, by study group. Across all groups, the most prevalent response was “never” (61%). While only 9% of the total sample indicated high levels of avoidance of this situation (“often” or “always”), it is interesting to note that 20% of the Physical Conditioning group reported doing so. None of the participants in the Computer-Based Training group reported “often” or “always” avoiding intersections controlled by stop signs.

Table 26. Percentage Avoiding Intersections Controlled by Stop Signs, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 15 | 73% | 20% | 0% | 7% | 0% |
| Computer-Based Training | 17 | 71% | 24% | 6% | 0% | 0% |
| OT-Administered Training | 16 | 63% | 25% | 6% | 0% | 6% |
| Physical Conditioning Group | 15 | 60% | 13% | 7% | 13% | 7% |
| Control Group | 17 | 41% | 35% | 12% | 12% | 0% |
| Total | 80 | 61% | 24% | 6% | 6% | 3% |

Avoiding Intersections Controlled by Yield Signs. Table 27 presents the level of avoidance of intersections controlled by yield signs, by study group. The pattern of responses to this question was similar to the previous question about avoiding intersections controlled by stop signs, with little self-restriction of such situations. However, relatively equal proportions of all treatment groups (with the exception of the Computer-Based Training group) and the control group reported “often” or “always” avoiding such intersections (6% to 7%). Again, no participants in the Computer-Based Training group reported “often” or “always” avoiding intersections controlled by yield signs.

Table 27. Percentage Avoiding Intersections Controlled by Yield Signs, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 15 | 47% | 47% | 0% | 7% | 0% |
| Computer-Based Training | 17 | 82% | 18% | 0% | 0% | 0% |
| OT-Administered Training | 16 | 63% | 25% | 6% | 0% | 6% |
| Physical Conditioning Group | 15 | 60% | 20% | 13% | 7% | 0% |
| Control Group | 17 | 41% | 35% | 18% | 6% | 0% |
| Total | 80 | 59% | 29% | 8% | 4% | 1% |

Avoiding Changing Lanes or Merging with Traffic. Table 28 presents the level of avoidance of lane changing and merging, by study group. Across all groups, the most prevalent responses were “never” (40%) and “rarely” (39%). This situation was associated with little self-restriction, with none of the Computer-Based Training group reporting “often” or “always” avoiding these maneuvers, and only 6% to 12% of the other study groups self-limiting at this level.

Table 28. Percentage Avoiding Changing Lanes or Merging With Traffic, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 15 | 20% | 67% | 7% | 7% | 0% |
| Computer-Based Training | 17 | 47% | 47% | 6% | 0% | 0% |
| OT-Administered Training | 16 | 56% | 25% | 13% | 0% | 6% |
| Physical Conditioning Group | 15 | 40% | 27% | 27% | 7% | 0% |
| Control Group | 17 | 35% | 29% | 24% | 12% | 0% |
| Total | 80 | 40% | 39% | 15% | 5% | 1% |

Avoiding Backing Out of a Driveway or Parking Space. Table 29 presents the level of avoidance of backing out of a driveway or parking space, by study group. Across all groups, the most prevalent response was “never” (49%) followed by “rarely” (29%). While there was little self-restriction across all participants (only 11% reported “often” or “always” avoiding), 20% of the Classroom + BTW group reported high levels of self-restriction. None of the Computer-Based Training participants indicated “often” or “always” avoiding backing maneuvers.

Table 29. Percentage Avoiding Backing Out of a Driveway or Parking Space, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 15 | 40% | 33% | 7% | 20% | 0% |
| Computer-Based Training | 17 | 76% | 24% | 0% | 0% | 0% |
| OT-Administered Training | 16 | 50% | 31% | 13% | 0% | 6% |
| Physical Conditioning Group | 15 | 47% | 7% | 33% | 7% | 7% |
| Control Group | 17 | 29% | 47% | 12% | 12% | 0% |
| Total | 80 | 49% | 29% | 13% | 8% | 3% |

Avoiding Driving in a Traffic Circle or Roundabout. Table 30 presents the level of avoidance of driving in a traffic circle or roundabout, by study group. This situation was associated with very little self-restriction, as indicated by the large proportion of participants responding “never” (48%) and “rarely” (38%), and the small proportions responding “often” or “always” (6%). However, 20% of the Physical Conditioning group indicated high levels of self-avoidance of this situation, versus none of the Classroom + BTW Training group, none of the Computer-Based Training group, none of the control group, and 6% of the OT-Administered Training group.

Table 30. Percentage Avoiding Driving in a Traffic Circle or Roundabout, by Group

| Group | N | Avoidance Frequency (Percentage of Group) | | | | |
|-----------------------------|----|---|--------|-----------|-------|--------|
| | | Never | Rarely | Sometimes | Often | Always |
| Classroom + BTW Training | 15 | 47% | 40% | 13% | 0% | 0% |
| Computer-Based Training | 17 | 71% | 29% | 0% | 0% | 0% |
| OT-Administered Training | 16 | 44% | 31% | 19% | 0% | 6% |
| Physical Conditioning Group | 15 | 40% | 33% | 7% | 13% | 7% |
| Control Group | 17 | 35% | 53% | 12% | 0% | 0% |
| Total | 80 | 48% | 38% | 10% | 3% | 3% |

Health and Technology Indicators

Home Computer Use. As shown in Table 31, nearly all participants in every study group indicated using a computer at home. Also, on average, participants used the computer at home approximately six days per week.

Table 31. Computer Use at Home, by Group

| Group | N | Use a Computer at Home | | Number of Days/Week | |
|-----------------------------|-----------|------------------------|------------|---------------------|-------------|
| | | NO | YES | Average | s.d. |
| Classroom + BTW Training | 15 | 13% | 87% | 5.07 | 2.81 |
| Computer-Based Training | 17 | 0% | 100% | 6.41 | 1.23 |
| OT-Administered Training | 16 | 0% | 100% | 5.63 | 2.42 |
| Physical Conditioning Group | 15 | 7% | 93% | 6.33 | 1.84 |
| Control Group | 17 | 6% | 94% | 6.40 | 1.06 |
| Total | 80 | 5% | 95% | 5.97 | 1.99 |

Responses to Health Questions. Table 32 presents the percentage of the sample, by study group, who had an affirmative response to 16 health-related questions on the Health and Technology Questionnaire. Appendix G presents examples of specific health-related issues described by participants in each group who responded affirmatively to these questions.

Table 32. Summary of Affirmative Responses to Health Questions, by Group

| Health-Related Statements | Percentage Answering “Yes” by Group | | | | |
|--|-------------------------------------|-------------------------|--------------------------|-----------------------|---------|
| | Classroom + BTW Training | Computer-Based Training | OT-Administered Training | Physical Conditioning | Control |
| “I have had a major health-related issue within the last 6 months.” | 7% | 18% | 6% | 13% | 12% |
| “I have had a serious injury within the last 6 months.” | 7% | 0% | 0% | 0% | 6% |
| “I have had surgery within the last 6 months.” | 7% | 29% | 13% | 20% | 18% |
| “I walk with the assistance of another person.” | 0% | 0% | 0% | 0% | 0% |
| “I walk using an assistive device (cane or walker).” | 7% | 0% | 0% | 7% | 6% |
| “I have had a serious medical condition that causes difficulty with my daily activities.” | 7% | 18% | 0% | 7% | 18% |
| “I have problems with my vision that are not corrected with glasses or contacts.” | 7% | 24% | 13% | 13% | 12% |
| “I get short of breath when I walk around or do my regular daily activities.” | 7% | 24% | 0% | 13% | 12% |
| “I had an amputation.” | 0% | 0% | 0% | 0% | 0% |
| “I have pain in my arms, legs, or back when I walk and/or do my regular activities that limits my ability to do things.” | 13% | 18% | 13% | 20% | 41% |
| “I have arm or leg weakness that causes difficulty with my daily activities.” | 7% | 12% | 0% | 7% | 18% |
| “I use supplemental oxygen.” | 0% | 6% | 0% | 7% | 0% |
| “I have a history of motion sickness.” | 0% | 12% | 13% | 7% | 18% |
| “I have migraine headaches.” | 0% | 0% | 0% | 7% | 6% |
| “I have balance problems.” | 33% | 12% | 0% | 20% | 12% |
| “I have trouble with dizziness.” | 0% | 6% | 0% | 0% | 0% |

ON-ROAD PERFORMANCE EVALUATIONS

This section presents results for the four treatment groups and for the control group according to criteria for driver performance scored by the CDRS during three on-road evaluations: (1) pre-intervention; (2) immediately post-intervention (typically within one week); and (3) delayed post-intervention (3 months after completing the treatment or control group activity). These evaluations are referred to below as Drive 1, Drive 2, and Drive 3, respectively.

The CDRS evaluation consisted of a scoring system from zero to four. These scores were used to indicate competence on specific subscales within four domains of driving performance. These domains fell under three *tactical* and one *strategic* sets of driving skills. A participant who had the opportunity to demonstrate the skill/behavior in question, but never did so received a score of 0. A score of 1 indicates that the participant demonstrated the skill/behavior in question on roughly 25% of the opportunities afforded during the on-road evaluation; a score of 2 on roughly 50%; and a score of 3 on roughly 75% of his/her opportunities. A score of 4 indicates that a study participant consistently performed the skill/ behavior in question when presented with the opportunity.

It is important to note that these scores represent only ordinal, not interval or ratio level data. Although fixed evaluation routes were used as described earlier, normal variability in traffic conditions across time of day, day of week, and weather condition produced different numbers of opportunities to demonstrate skills/behaviors—both between subjects on a given drive, and within subjects across drives. Thus, a 4 reliably connotes better performance than a 3, a 3 than a 2, and so on; but how *much* better one score is than another varies from person to person, and from drive to drive. The CDRS scoring analysis was completed with this constraint in mind.

Under the four domains of driving performance, the CDRS evaluation includes scores assigned under normal traffic conditions and under unusual, high-density conditions. The venue for these on-road evaluations, Greenville afforded very few high-density conditions, and the two roads in this city with the highest traffic densities were not included in the evaluation drives. As a result, virtually all of the CDRS scores for all of the driving skills/behaviors identified in Table 33 reflect normal traffic conditions for this community. The rare instances where CDRS scores were assigned under high-density conditions are noted in the summary tables that follow.

Eighty subjects completed Drive 1 (the pre-intervention evaluation) and Drive 2 (the immediate post-treatment evaluation). Due to attrition, only 78 subjects completed Drive 3 (the 3-month post-treatment evaluation). For every subject who completed the on-road evaluations, the CDRS was able to assign a score for all driving skill/behavior subscales *except* DA-Central Vision and DA-Peripheral Vision. As described earlier, these tasks were contrived by the research team to take advantage of opportunities during the on-road evaluations where the driver passed a target with some safety significance at the edge of the road or off-road, while compelled by traffic conditions to concentrate on a lead vehicle. However, such opportunities did not arise during all evaluations, due to prevailing traffic conditions.

Tables 33, 34, and 35 present the distributions of scores for all participants, aggregated across all treatment groups and the control group, on the pre-intervention, the immediate post-intervention, and the delayed post-intervention evaluations. As shown, with the exception of the DA-Peripheral Vision task, very high proportions of subjects initially achieved the highest score possible. While the high scores attained by subjects on Drive 1 were not surprising, given that good general health was an inclusion criterion for sample selection, this elevated baseline makes it more difficult to demonstrate a benefit of any of the interventions on driving performance in the post-treatment drives (Drives 2 and 3), using this scoring protocol.

Table 33. Distribution of Scores Across All Groups, for Drive 1 (Pre-Intervention)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number of Subjects With Scores of: | | | | | Total |
|--|-----------------------------|------------------------------------|---|---|----|-----|-------|
| | | 0 | 1 | 2 | 3 | 4 | |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | | | 4 | 11 | 65 | 80 |
| | Scans Environment | | | 2 | 8 | 70 | 80 |
| | Blind Spot Checks | | | 5 | 5 | 70 | 80 |
| | Identifies Signage | | | 3 | 5 | 72 | 80 |
| | Checks Cross Traffic | | | 1 | 1 | 78 | 80 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | | | | 4 | 76 | 80 |
| | Following Distance | | | 1 | 3 | 76 | 80 |
| | Stopping Distance | | | 3 | 9 | 68 | 80 |
| | Centered in Lane Position | | | 1 | 8 | 71 | 80 |
| | Drives in Proper Lane | | | 1 | | 79 | 80 |
| | Turns in Proper Lane (L) | | | 1 | 2 | 77 | 80 |
| | Turns in Proper Lane (R) | | | | 5 | 75 | 80 |
| | Lane Usage | | | 2 | 8 | 70 | 80 |
| | Lane Changes | | | 5 | 4 | 71 | 80 |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | | | 6 | 10 | 64 | 80 |
| | Smooth Steering | | | 1 | 6 | 73 | 80 |
| | Smooth Acceleration | | | 3 | 7 | 70 | 80 |
| | Smooth Braking | | | 5 | 4 | 71 | 80 |
| | Complete Stops | | | | 2 | 78 | 80 |
| | Right Turns | | | | 2 | 78 | 80 |
| | Left Turns | | | | 4 | 76 | 80 |
| | Yields Right of Way | | | 1 | | 79 | 80 |
| | Turn Signals | | | 2 | 8 | 70 | 80 |
| | Speed Maintenance | | | 2 | 5 | 73 | 80 |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (General) | | | 1 | 17 | 62 | 80 |
| | DA-Central Vision | | | | 3 | 60* | 63 |
| | DA-Peripheral Vision | 39** | 2 | | | 21 | 62 |
| | Anticipates Hazards | | | 3 | 7 | 70* | 80 |
| | Plans Ahead | | | 5 | 13 | 62 | 80 |
| | Decision Making | | | 4 | 11 | 65 | 80 |
| | Memory / Follow Directions | | | 4 | 7 | 69 | 80 |
| | Speed of Processing | | | 1 | 11 | 68 | 80 |
| Rules of the Road | | | | 2 | 78 | 80 | |

* One score in this cell was based on observations under 'high density' traffic conditions.

** Two scores in this cell were based on observations under 'high density' traffic conditions.

**Table 34. Distribution of Scores Across All Groups, for Drive 2
(Immediate Post-Intervention)**

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number of Subjects With Scores of: | | | | | Total |
|--|-----------------------------|------------------------------------|---|----|----|-----|-------|
| | | 0 | 1 | 2 | 3 | 4 | |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | | 1 | 2 | 5 | 72 | 80 |
| | Scans Environment | | | 2 | 11 | 67 | 80 |
| | Blind Spot Checks | | 1 | 2 | 5 | 72 | 80 |
| | Identifies Signage | | | 1 | 7 | 72 | 80 |
| | Checks Cross Traffic | | | | 3 | 77 | 80 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | | | | | 80 | 80 |
| | Following Distance | | | | | 80 | 80 |
| | Stopping Distance | | | 1 | 9 | 70 | 80 |
| | Centered in Lane Position | | | | 2 | 78 | 80 |
| | Drives in Proper Lane | | | | 3 | 77 | 80 |
| | Turns in Proper Lane (L) | | | | 3 | 77 | 80 |
| | Turns in Proper Lane (R) | | | | 1 | 79 | 80 |
| | Lane Usage | | | 1 | 3 | 76 | 80 |
| Lane Changes | | 1 | 1 | 4* | 74 | 80 | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | | | | 7 | 73 | 80 |
| | Smooth Steering | | | | 2 | 78 | 80 |
| | Smooth Acceleration | | | | 7 | 73 | 80 |
| | Smooth Braking | | | 1 | 7 | 72 | 80 |
| | Complete Stops | | | | 1 | 79 | 80 |
| | Right Turns | | | | 1 | 79 | 80 |
| | Left Turns | | | | | 80 | 80 |
| | Yields Right of Way | | | | | 80 | 80 |
| | Turn Signals | | 1 | 1 | 3 | 75 | 80 |
| | Speed Maintenance | | | | 1 | 79* | 80 |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (General) | | | 1 | 15 | 64 | 80 |
| | DA-Central Vision | 1 | 1 | 1 | 1 | 71* | 75 |
| | DA-Peripheral Vision | 52 | | 2 | | 20* | 74 |
| | Anticipates Hazards | | | 2 | 7 | 71 | 80 |
| | Plans Ahead | | | 3 | 9 | 68 | 80 |
| | Decision Making | | | 3 | 4 | 73 | 80 |
| | Memory / Follow Directions | | | 3 | 9 | 68 | 80 |
| | Speed of Processing | | | | 8 | 72 | 80 |
| | Rules of the Road | | | | 1 | 79 | 80 |

* One score in this cell was based on observations under high-density traffic conditions.

Table 35. Distribution of Scores Across All Groups, for Drive 3 (Delayed Post-Intervention)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number of Subjects With Scores of: | | | | | Total |
|--|-----------------------------|------------------------------------|---|---|----|-----|-------|
| | | 0 | 1 | 2 | 3 | 4 | |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | | 1 | 2 | 7 | 68 | 78 |
| | Scans Environment | | | 3 | 6 | 69 | 78 |
| | Blind Spot Checks | | 1 | 3 | 5 | 69 | 78 |
| | Identifies Signage | | | 1 | 4 | 73 | 78 |
| | Checks Cross Traffic | | | | 2 | 76 | 78 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | | | | 1 | 77 | 78 |
| | Following Distance | | | | 1 | 77 | 78 |
| | Stopping Distance | | | 2 | 6 | 70 | 78 |
| | Centered in Lane Position | | | 2 | 4 | 72 | 78 |
| | Drives in Proper Lane | | | | 1 | 77 | 78 |
| | Turns in Proper Lane (L) | | | | 1 | 77 | 78 |
| | Turns in Proper Lane (R) | | | | 1 | 77 | 78 |
| | Lane Usage | | | | 4 | 74 | 78 |
| | Lane Changes | | | | 3 | 75 | 78 |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | | | 1 | 8 | 69 | 78 |
| | Smooth Steering | | | | 3 | 75 | 78 |
| | Smooth Accelerator | | | | 1 | 77 | 78 |
| | Smooth Braking | | | 1 | 4 | 73 | 78 |
| | Complete Stops | | | 1 | | 77 | 78 |
| | Right Turns | | | | 1 | 77 | 78 |
| | Left Turns | | | | 1 | 77 | 78 |
| | Yields Right of Way | | | | | 78 | 78 |
| | Turn Signals | | | 1 | 3 | 74 | 78 |
| | Speed Maintenance | | | 1 | 3 | 74 | 78 |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (General) | | | 1 | 10 | 67 | 78 |
| | DA-Central Vision | | | | 1* | 50* | 51 |
| | DA-Peripheral Vision | 36* | 1 | | | 14* | 51 |
| | Anticipates Hazards | | | 2 | 6 | 70 | 78 |
| | Plans Ahead | | | 2 | 7 | 69 | 78 |
| | Decision Making | | | 1 | 8 | 69 | 78 |
| | Memory / Follow Directions | | | | 8 | 70 | 78 |
| | Speed of Processing | | | | 4 | 74 | 78 |
| | Rules of the Road | | | | | 78 | 78 |

* One score in this cell was based on observations under high density traffic conditions.

Figures 10 through 42 depict the percentage of each study group that received each score on each of the skills/behaviors observed by the CDRS, on each drive. As discussed below, inspection of these histograms reveals which group(s) showed a higher percentage of participants

with improved CDRS scores for post-, compared to pre-intervention, on-road evaluations. Appendix D provides descriptions of each of the specific skills/behaviors scored by the CDRS.

Tactical Skills: Visual Search and Scanning Tasks

Mirror Checks. As shown in Figure 10, the control group showed a general increase in performance from Drive 1 to Drive 2 (with the exception of one participant whose performance declined on Drive 2). However, the control group's performance on Drive 3 reverted back to the levels shown for Drive 1. All treatment groups, with the exception of the Computer-Based Training group, showed better performance on Drive 2 compared to Drive 1, with the largest increase shown by the Classroom + BTW Training group. The Computer-Based Training group showed a decline in the percentage of participants with scores of 4 from Drive 1 to Drive 2.

Looking at the Drive 3 results, only the OT-Administered Training and the Classroom + BTW Treatment groups maintained their performance improvements. Although performance of the Classroom + BTW Training group declined slightly from Drive 2 to Drive 3, Drive 3 levels were above those shown for the pre-intervention Drive. The Physical Conditioning group's performance on Drive 3 declined to the levels shown for Drive 1, similar to the performance of the control group.

Scans Environment. Figure 11 shows no change in the control group; nearly equal percentages of participants scored 3 and 4 on Drive 1, Drive 2, and Drive 3. Only one Treatment group (OT-Administered Training) showed improved performance on Drive 2. The other three Treatment groups showed declines in participant performance on Drive 2 as compared to Drive 1. The OT-Administered Training group maintained their performance improvements from Drive 2 to Drive 3. Although the performance of the Physical Conditioning group declined from Drive 1 to Drive 2, their performance on Drive 3 remained slightly above the levels shown for Drive 1.

Blind Spot Checks. Figure 12 shows that the control group performance declined somewhat on Drive 2 as compared to Drive 1, and stayed below Drive 1 levels at the Drive 3 evaluation. In comparison, all of the Treatment groups, with the exception of the Computer-Based Training group, showed slight improvements in performance from Drive 1 to Drive 2, with the Physical Conditioning group showing the largest increase. The Computer-Based Training group performance declined from Drive 1 to Drive 2, and stayed below Drive 1 levels during the Drive 3 evaluation. Of the three Treatment groups whose performance improved from Drive 1 to Drive 2, only the Classroom + BTW Training group and the OT-Administered Training group maintained their improvements during the Drive 3 evaluation. While the Physical Conditioning group showed a decrease in performance from Drive 2 to Drive 3, Drive 3 performance remained slightly better than the level shown for Drive 1.

Identifies Signage. As indicated in Figure 13, the control group's performance declined slightly on Drive 2 compared to Drive 1, and then improved on Drive 3 to pre-intervention drive levels. A similar pattern was shown for the Classroom + BTW Training group. Three treatment groups showed improved performance from Drive 1 to Drive 2: the Computer-Based Training

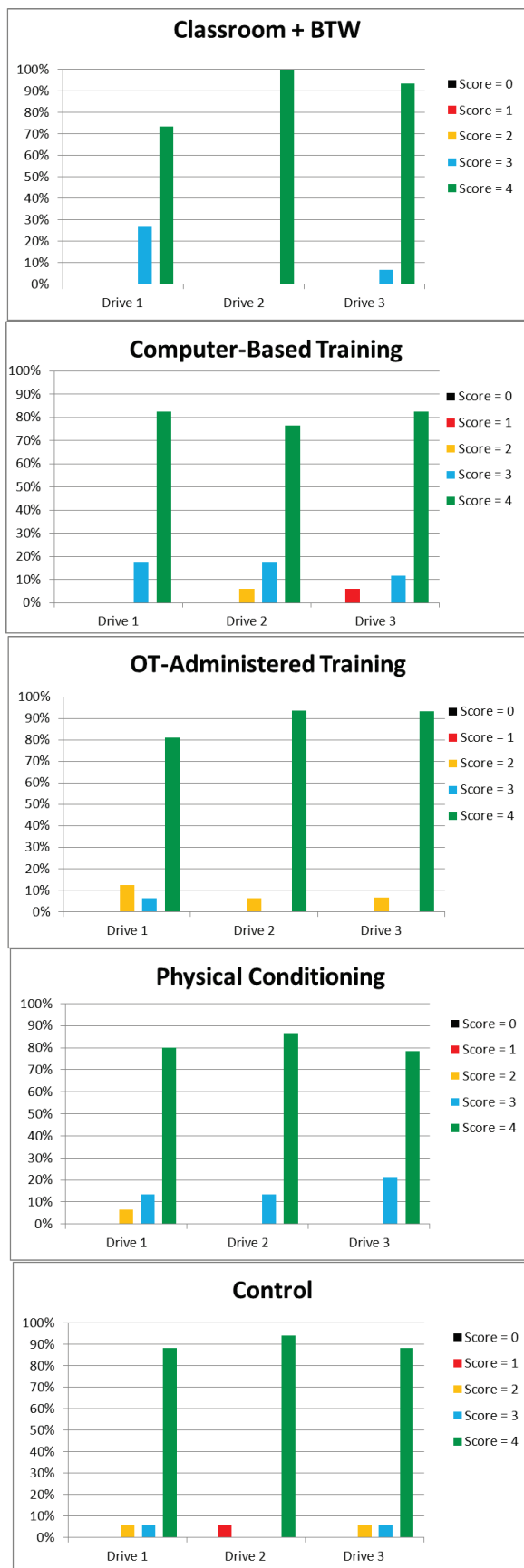


Figure 10. Visual Search and Scanning Task:
Mirror Checks

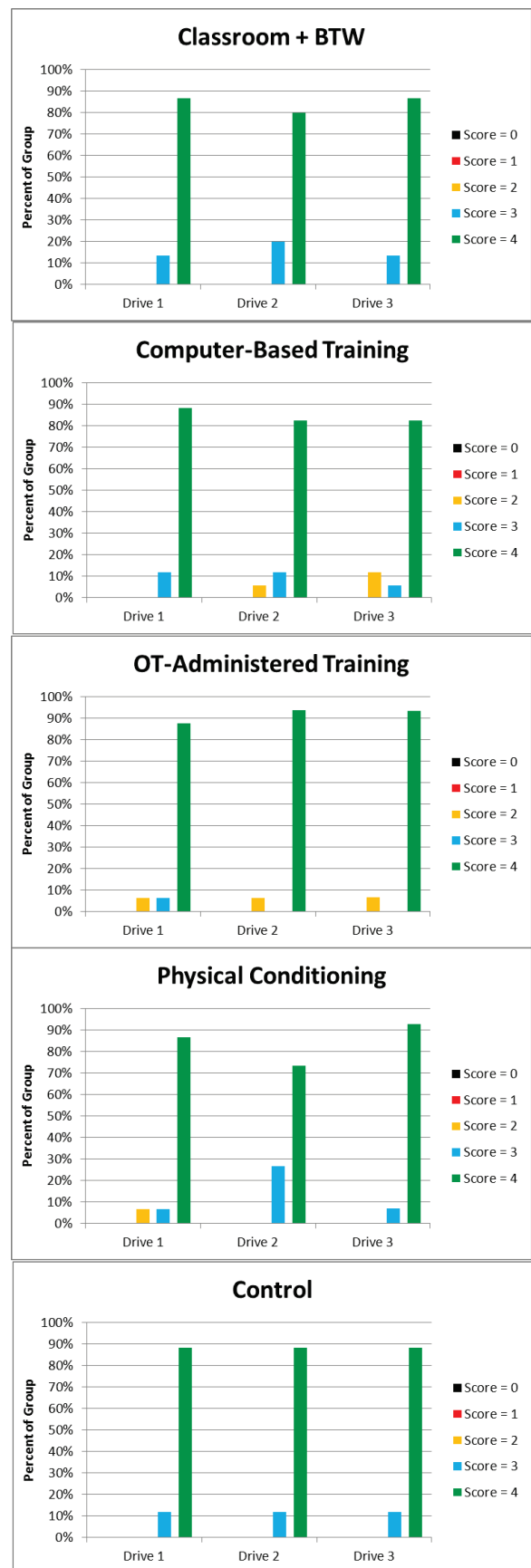


Figure 11. Visual Search and Scanning Task:
Scans Environment

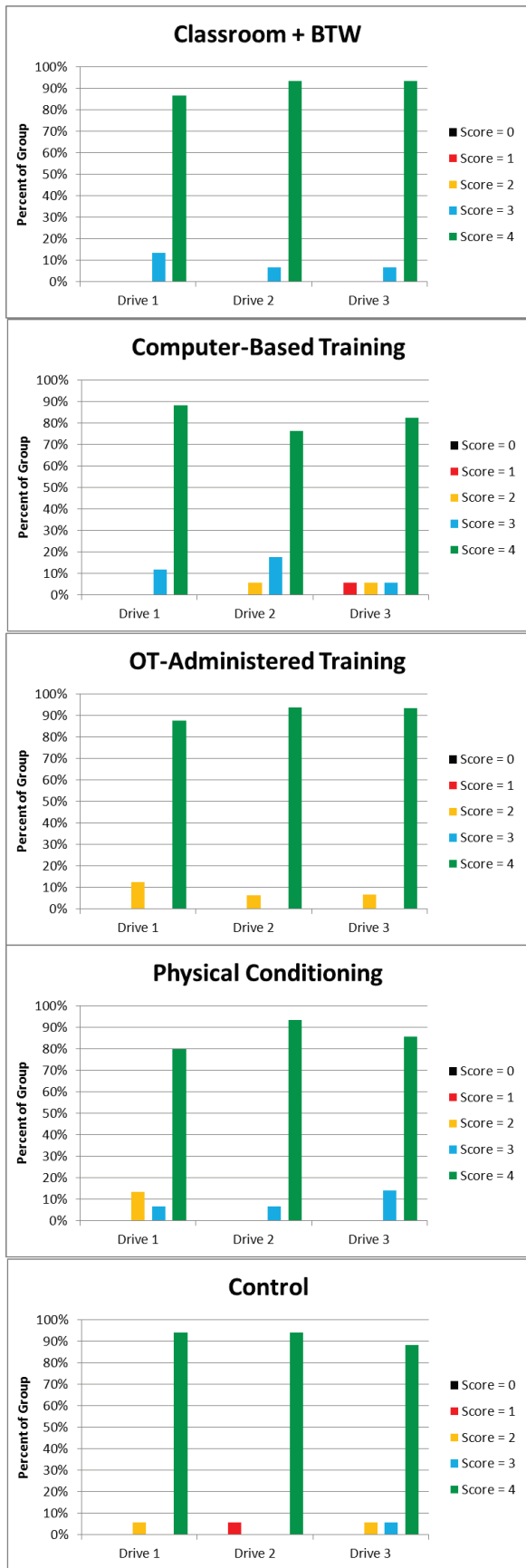


Figure 12. Visual Search and Scanning Task:
Blind Spot Checks

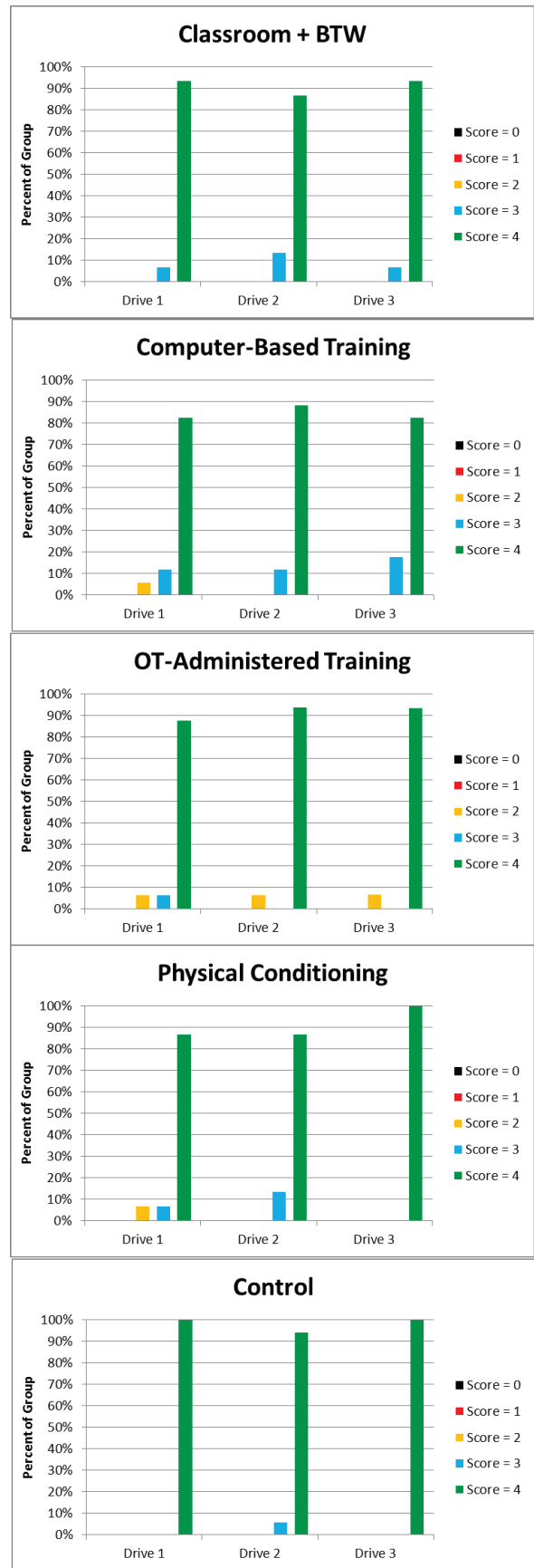


Figure 13. Visual Search and Scanning Task:
Identifies Signage

group and the OT-Administered Training group and the Physical Conditioning group. However, only the OT-Administered Training group and the Physical Conditioning groups maintained their improvements by the time of their Drive 3 evaluation.

Checks Cross Traffic. As shown in Figure 14, the control group showed a slight decline in performance on Drive 2 compared to Drive 1. A similar pattern of performance was shown for the Physical Conditioning group. Only the Classroom + BTW Training group and the OT-Administered Training group showed an increase in performance from Drive 1 to Drive 2. The Classroom + BTW Training group maintained their performance increase by the time they were evaluated on Drive 3, and the OT-Administered Training group showed further improvements on Drive 3. Training effects for the Computer-Based Training group could not be assessed at Drive 2, because all participants received scores of 4 on Drive 1 (a ceiling effect). There was, however, a decline in performance on Drive 3 for this group.

Tactical Skills: Vehicle Positioning Tasks

Gap Selection. As shown in Figure 15 both the control group and the Physical Conditioning group showed ceiling effects on all three Drives. The other three Treatment groups showed improvements in performance from Drive 1 to Drive 2, with the largest improvement shown for the Classroom + BTW Training group. However, the improvements were maintained on Drive 3 only for the Classroom + BTW Training and OT-Administered Training groups.

Following Distance. Figure 16 shows that performance by group was identical to performance in the gap selection task, with both the control group and the Physical Conditioning group showing maximum performance by all participants on all three Drives, and the other three Treatment groups showing improvements from Drive 1 to Drive 2. The largest improvement was shown for the Classroom + BTW Training group. And, like the gap selection improvements, only the Classroom + BTW Training and OT-Administered Training groups maintained their following distance improvements on Drive 3.

Stopping Distance. As shown in Figure 17, the Control group showed no increase in the percentage of participants who received a score of 4 from Drive 1 to Drive 2; however, fewer subjects received scores of “2” and more subjects received scores of “3” on Drive 2 compared to Drive 1 (indicating performance improvements). Further increases in the percentage of participants with scores of “4” were demonstrated on Drive 3 for the control group. No performance differences across Drives were shown in the Physical Conditioning group. Both the Classroom + BTW Training group and the OT-Administered Training group showed improved performance from Drive 1 to Drive 2, with the larger improvement shown for the OT-Administered Training group. Both groups maintained their improvements on the Drive 3 evaluation. The Computer-Based Training group showed steady declines in performance from Drive 1 to Drive 2, and from Drive 2 to Drive 3.

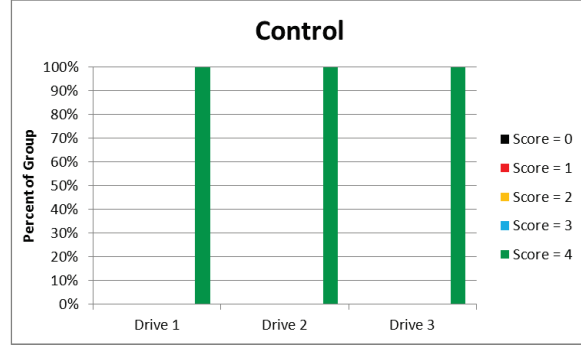
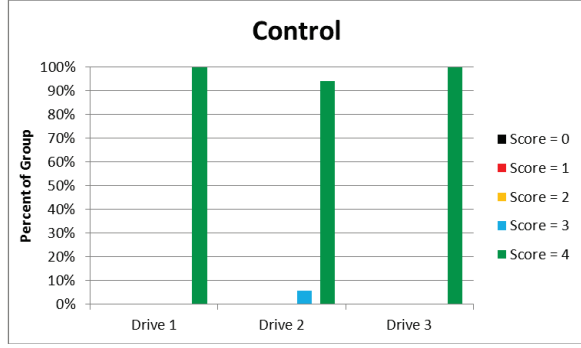
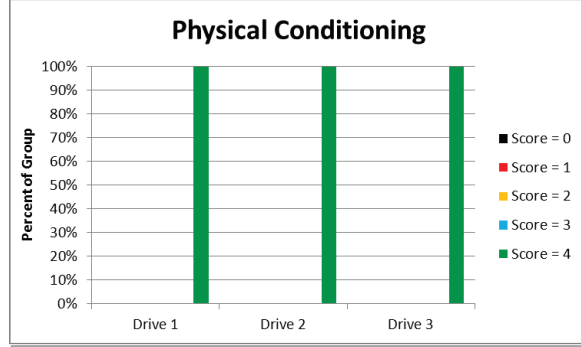
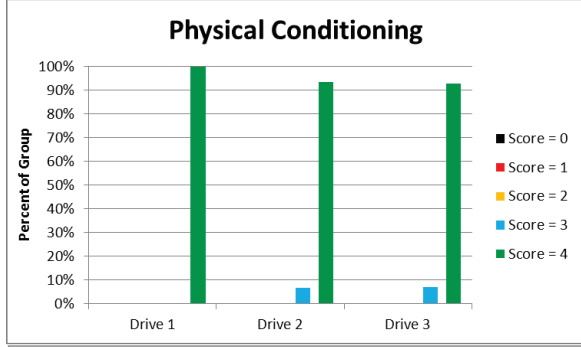
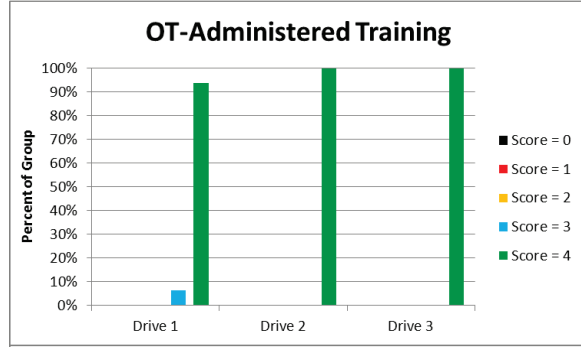
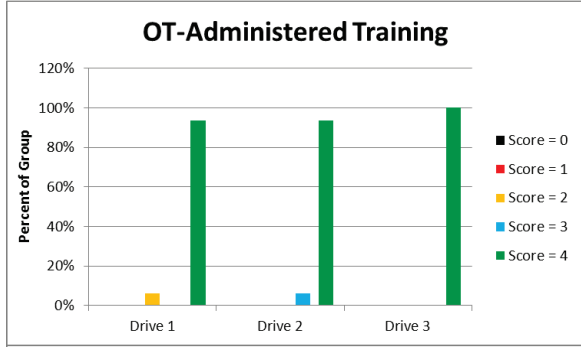
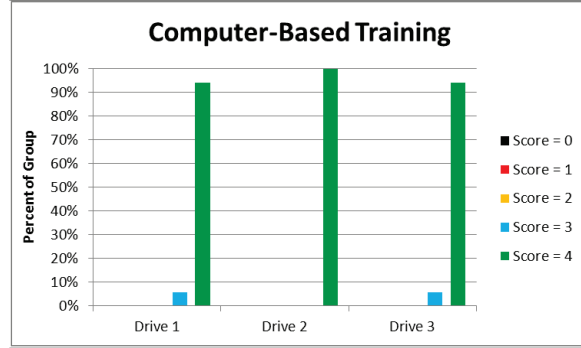
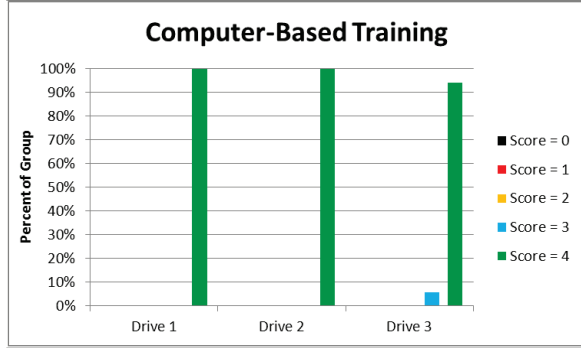
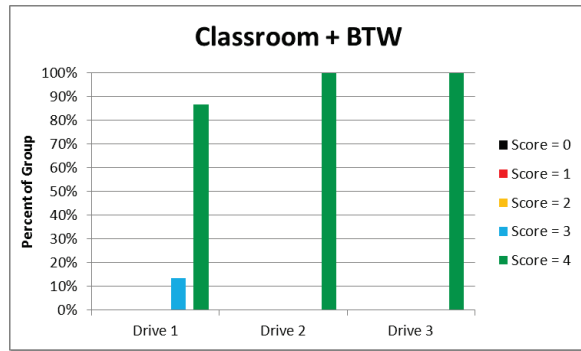
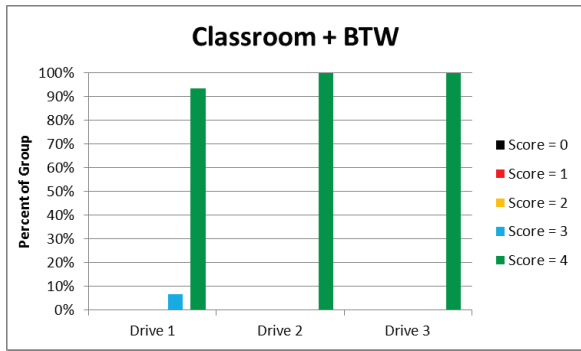


Figure 14. Visual Search and Scanning Task:
Checks Cross Traffic

Figure 15. Vehicle Positioning Task:
Gap Selection

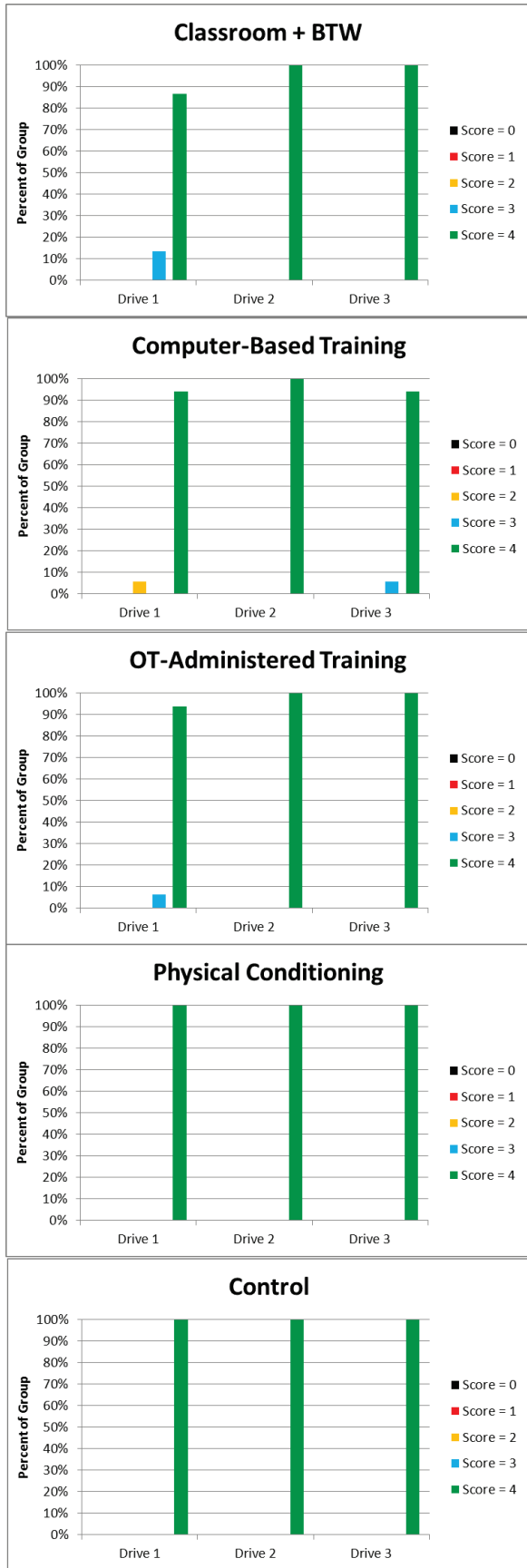


Figure 16. Vehicle Positioning Task:
Following Distance

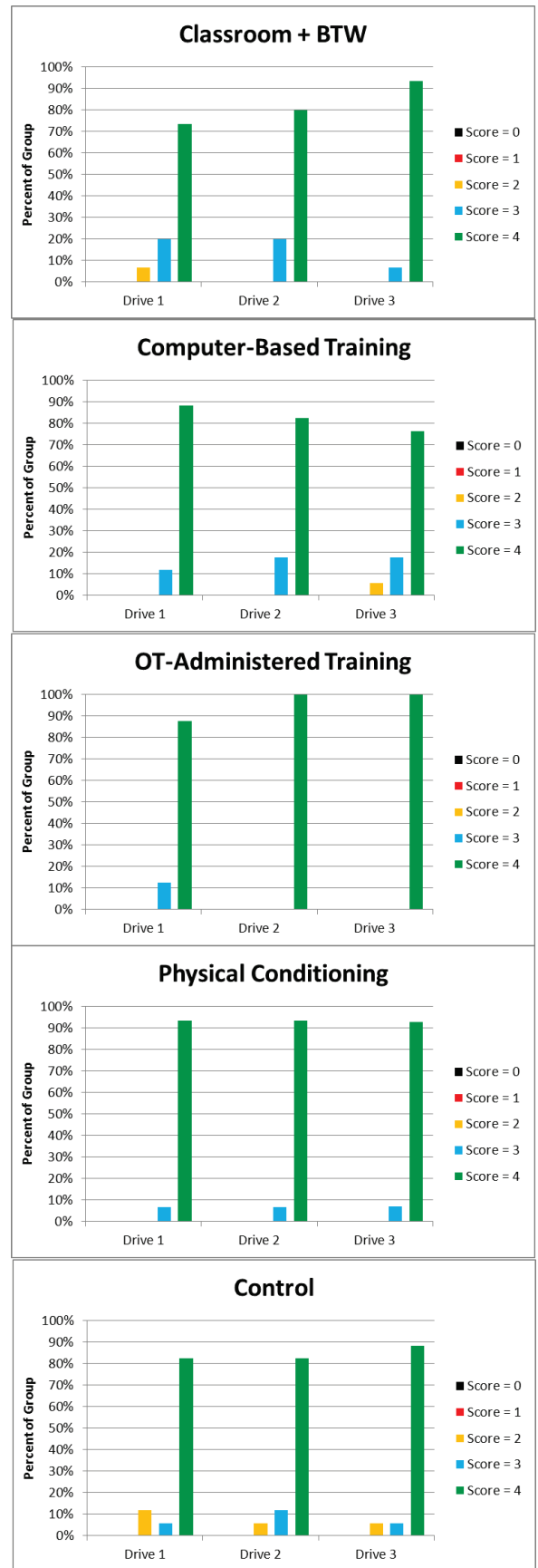


Figure 17. Vehicle Positioning Task:
Stopping Distance

Centered in Lane Position. As shown in Figure 18, the control group showed a ceiling effect on Drive 1. Performance did not change for Drive 2, but declined for Drive 3. All four treatment groups showed an improvement in performance from Drive 1 to Drive 2, but only the Classroom + BTW Training group, the OT-Administered Training group, and the Physical Conditioning group maintained performance on Drive 3 at levels above their Drive 1 performance. The Classroom + BTW Training group showed further improvements from Drive 2 to Drive 3, while the OT-Administered Training and Physical Conditioning groups showed slight declines from Drive 2 to Drive 3. The improvements shown by the Computer-Based Training group on Drive 2 vanished on Drive 3, with Drive 3 performance slightly lower than that shown on the pre-intervention drive.

Drives in proper lane. Figure 19 shows ceiling performance for the control group on all three Drives. While the Classroom + BTW Training group showed maximum performance on Drives 1 and 2, performance declined on Drive 3. Both the Computer-Based Training group and the Physical Conditioning group showed a slight decrease in performance from Drive 1 (maximum performance) to Drive 2, and then an increase at Drive 3 equal to the level at Drive 1. Only the OT-Administered Training group showed an increase in performance from Drive 1 to Drive 2, and the increase was isolated to the percentage of participants who increased from a score of 2 on Drive 1 to a score of 3 on Drive 2. However on Drive 3, the OT-Administered group showed maximum performance by all participants.

Turns in Proper Lane (Left). Figure 20 shows that all participants in the control group received a maximum score on Drives 1, 2, and 3. The Classroom + BTW Training group was the only Treatment group that showed improvement in the percentage of participants with scores of 4 from Drive 1 to Drive 2. The OT-Administered Training group showed an improvement resulting from scores of 2 on Drive 1 increasing to scores of 3 on Drive 2. The Classroom + BTW Training group maintained their improvement from Drive 2 to Drive 3, while the OT-Administered Training group showed continued improvements from Drive 2 to Drive 3. In comparison, both the Computer-Based Training group and the Physical Conditioning Training group showed a slight reduction in performance from Drive 1 to Drive 2.

Turns in Proper Lane (Right). As shown in Figure 21 the control group, as well as the Physical Conditioning and Computer-Based Training groups showed maximum performance on all three Drives (100% of participants with scores of 4). The Classroom + BTW Training group showed an increase in performance from Drive 1 to Drive 2 that was maintained at the Drive 3 evaluation. The OT-Administered Training group showed no change in performance across the three Drives.

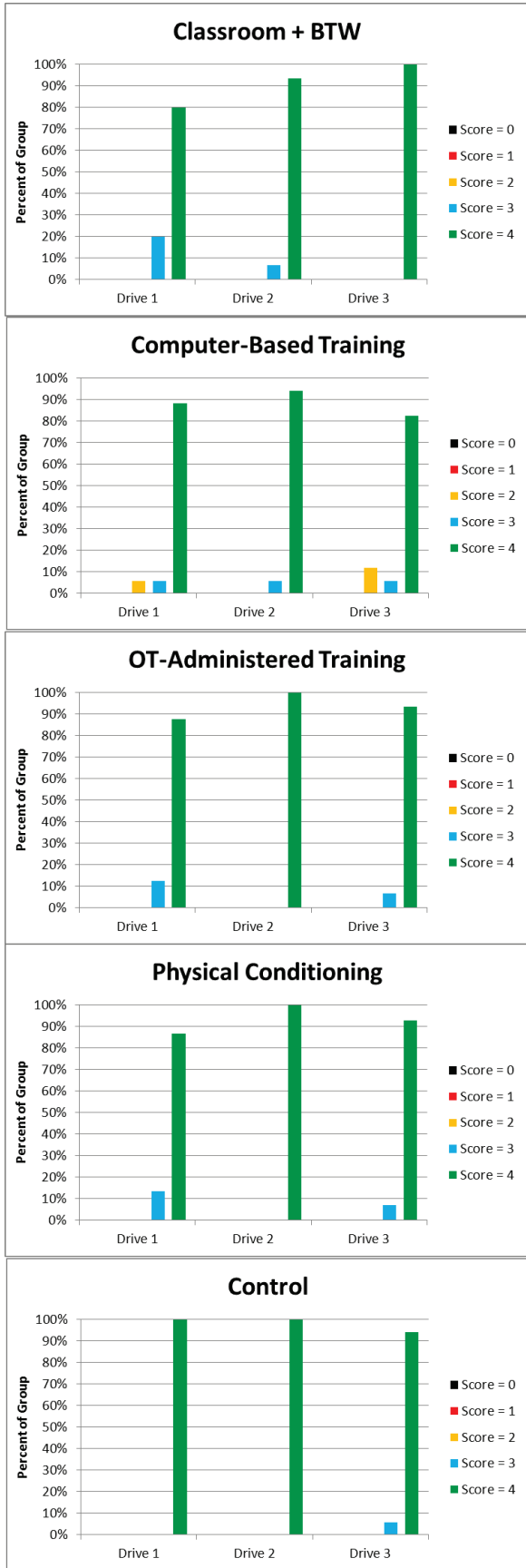


Figure 18. Vehicle Positioning Task:
Centered in Lane Position

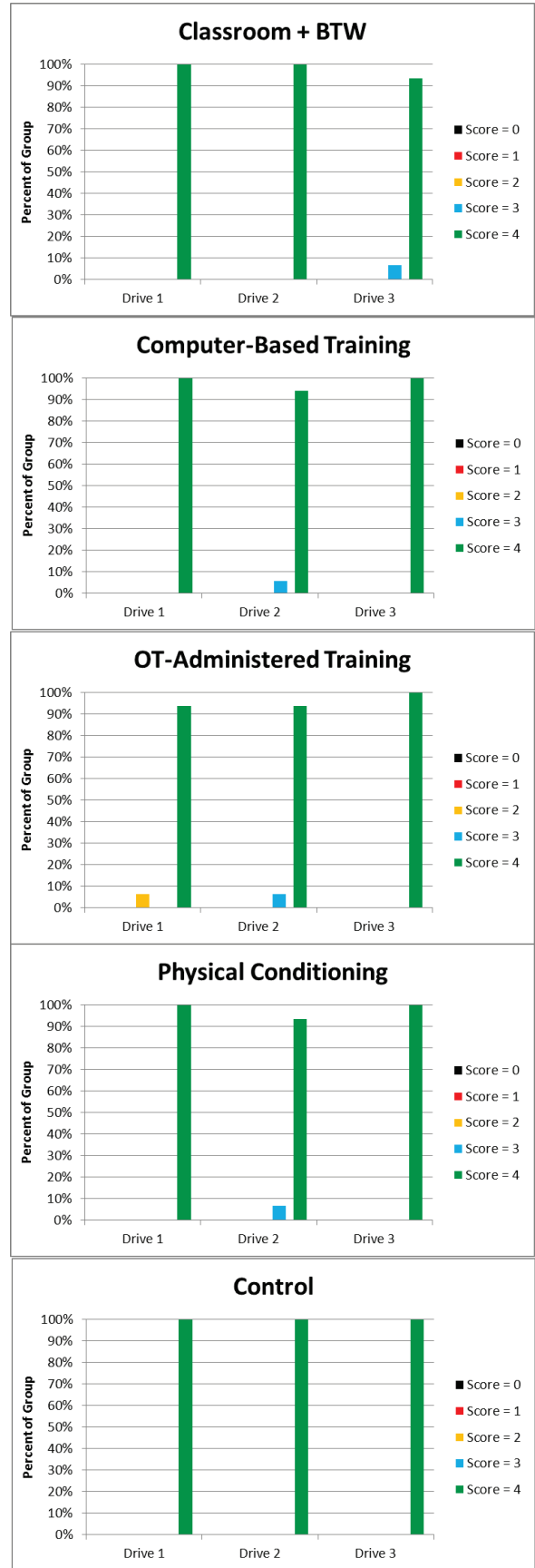


Figure 19. Vehicle Positioning Task:
Drives in Proper Lane

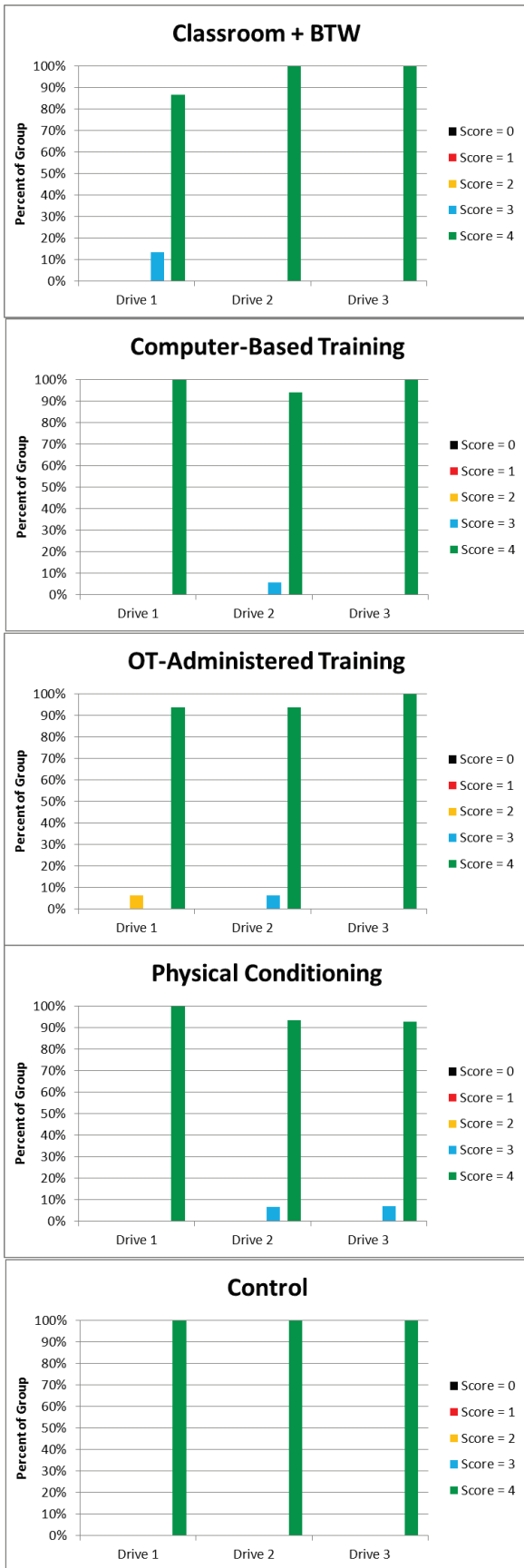


Figure 20. Vehicle Positioning Task:
Turns in Proper Lane (Left)

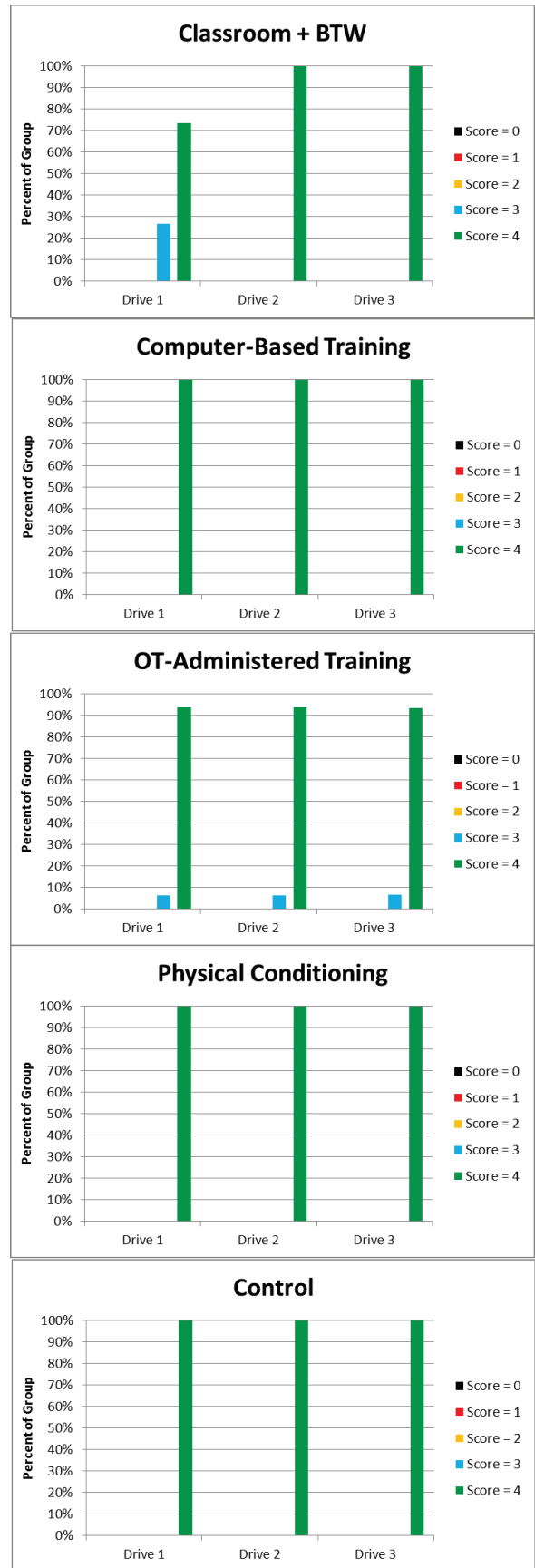


Figure 21. Vehicle Positioning Task:
Turns in Proper Lane (Right)

Lane Usage. Figure 22 shows that control group performance improved steadily from across all three Drives, reaching maximum performance by the entire sample by the Drive 3 evaluation. The Computer-Based Training group was the only treatment group to show improvements at Drive 2 that were maintained or increased at Drive 3. While the Classroom + BTW Training group showed increased performance from Drive 1 to Drive 2, performance on Drive 3 declined to the levels shown at Drive 1. The Physical Conditioning group showed no change in performance from Drive 1 to Drive 2, but a slight increase at Drive 3. The OT-Administered Training group showed a decrease in the percentage of participants with scores of “4” from Drive 1 to Drive 2, but also reduction in scores of 2 and an increase in scores of 3 (considered as an improvement). The Drive 3 performance of the OT-Administered group was slightly above that shown for Drive 2.

Lane Changes. As shown in Figure 23, the control group showed no change in the percentage of participants with scores of 4 across all three Drives; however, the one participant with a score of 2 on Drive 1 was replaced by a participant with a score of 1 on Drive 2 (a decline in performance). The OT-Administered Training group showed a steady increase in performance across all three Drives, reaching maximum performance by all subjects on Drive 3. The Physical Conditioning group showed an increase in the percentage of subjects with scores of “4” from Drive 1 to Drive 2 which was maintained at Drive 3. While the Classroom + BTW Training group showed no change in the percentage of participants with scores of 4 from Drive 1 to Drive 2, the participant with a score of 2 on Drive 1 was replaced by a participant with a score of 3 on Drive 2, and by Drive 3, all participants in this group had reached maximum performance. The Computer-Based Training group showed no difference in performance from Drive 1 to Drive 2, but a slight increase from Drive 2 to Drive 3.

Tactical Skills: Vehicle Handling Tasks

Appropriate Speed. As shown in Figure 24, the control group’s performance decreased from Drive 1 to Drive 2; however, the baseline percentage for the control group (Drive 1) was the highest of all five groups. The Drive 3 performance for the control group showed no change from the Drive 2 performance. In comparison, all four treatment groups showed increases in performance, with the largest increases in the Classroom + BTW Training group, followed by the OT-Administered Training group, the Physical Conditioning group, and the Computer-Based Training group. However, improvements were not sustained on Drive 3 for the Computer-Based Training group. The Classroom + BTW Training group showed continued improvements in performance from Drive 2 to Drive 3; the Physical Conditioning group maintained performance from Drive 2 to Drive 3; and the OT-Administered group showed a slight decline from Drive 2 to Drive 3, but Drive 3 levels still exceeded those shown for Drive 1.

Smooth Steering. As shown in Figure 25, the control group showed maximum performance by all participants on Drive 1 and a slight decrease in performance on Drive 2, followed by an increase to baseline performance by Drive 3. The Physical Conditioning group also showed maximum performance by all participants on Drive 1, but unlike the control group, maintained this level of performance at Drive 2 and Drive 3. Although the remaining three treatment groups showed increases in performance from Drive 1 to Drive 2, only the Classroom + BTW and the OT-Administered Training groups showed improved performance on Drive 3 compared to Drive 1. While the Computer Based Training group showed an increase in performance from Drive 1 to Drive 2, the Drive 3 performance declined to the baseline level.

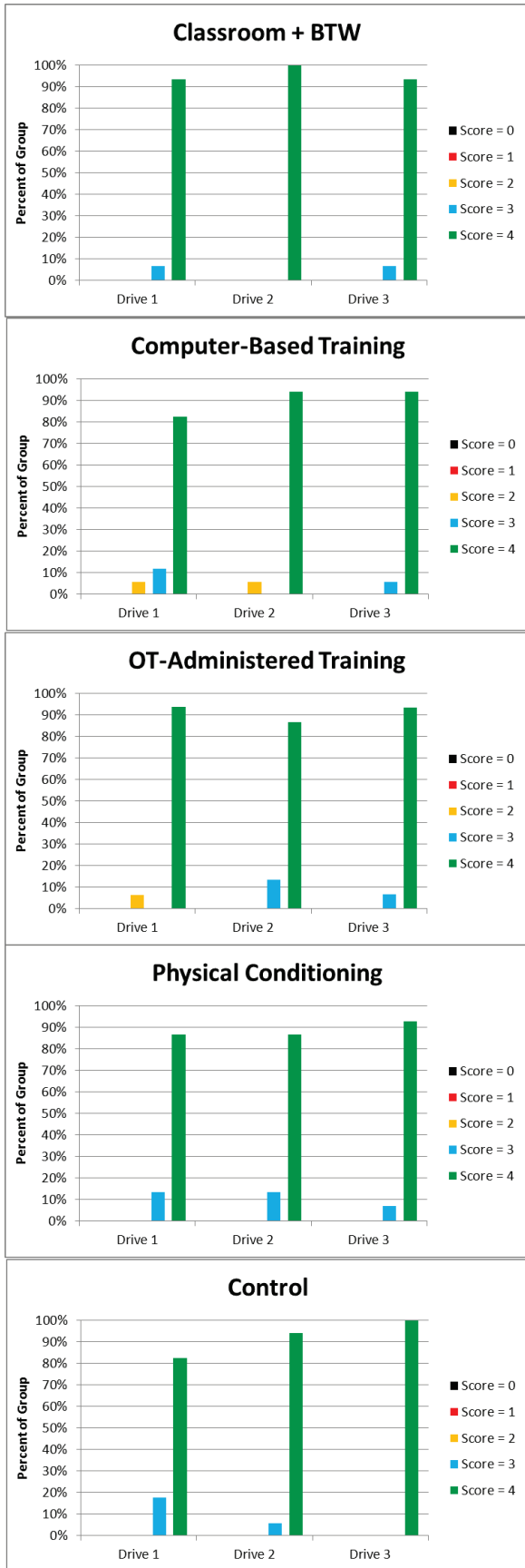


Figure 22. Vehicle Positioning Task:
Lane Usage

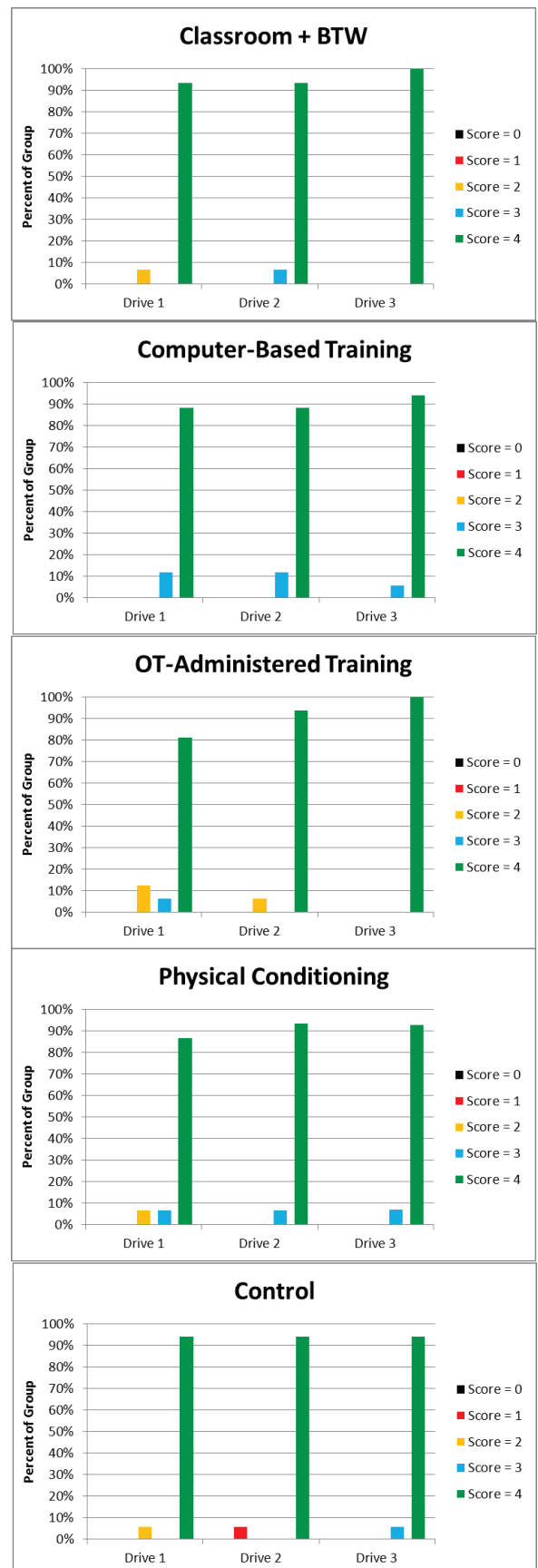


Figure 23. Vehicle Positioning Task:
Lane Changes

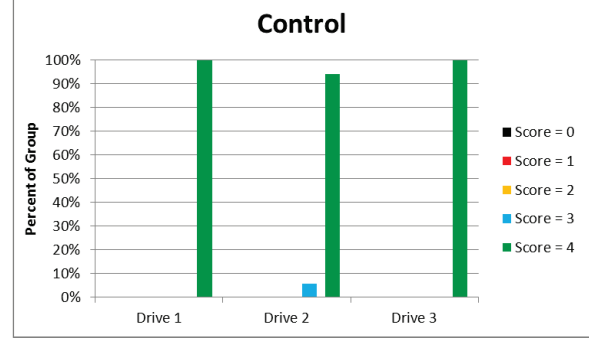
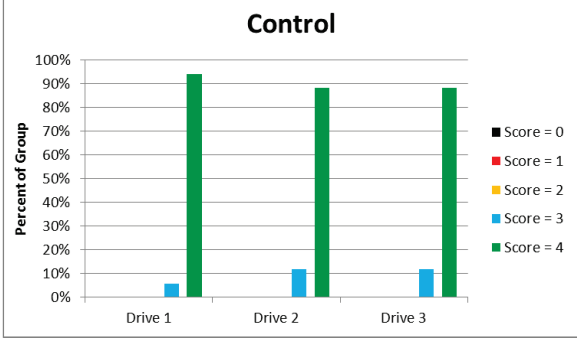
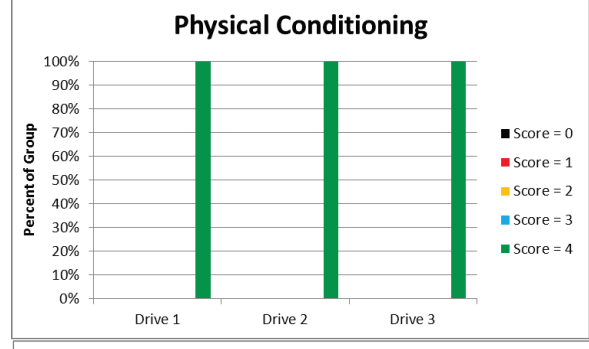
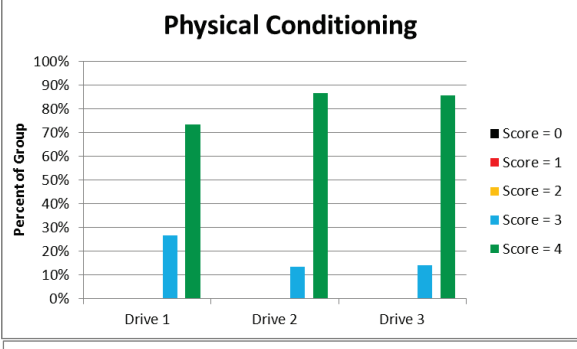
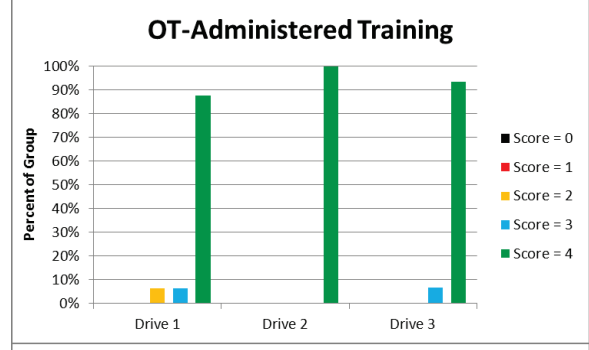
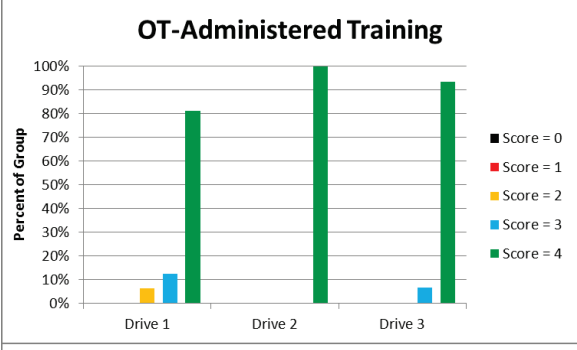
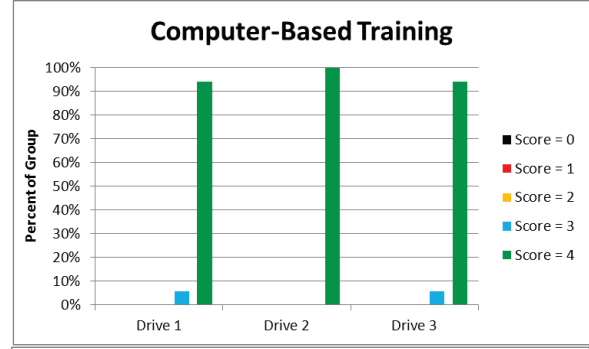
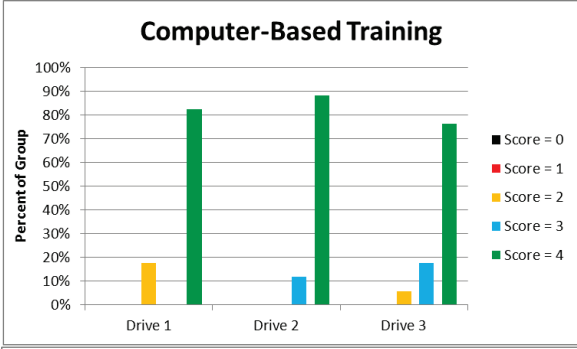
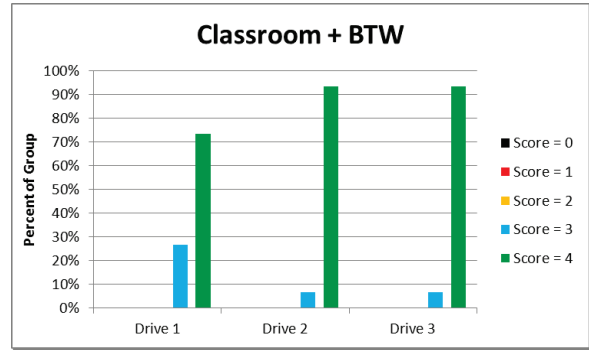
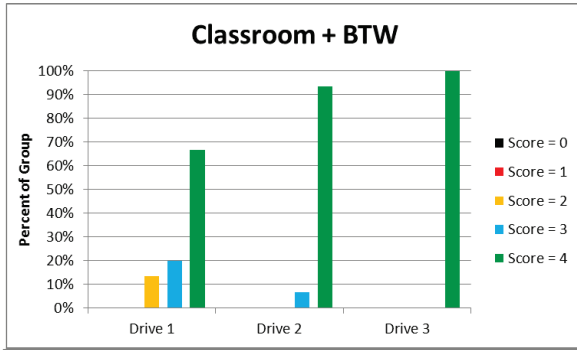


Figure 24. Vehicle Handling Task:
Appropriate Speed

Figure 25. Vehicle Handling Task:
Smooth Steering

Smooth Acceleration. As shown in Figure 26, all participants in the control group received a maximum score on Drive 1, but on Drive 2, slightly fewer than 90% of the participants displayed this skill level. By Drive 3, performance increased back to baseline levels. The Classroom + BTW Training group and the OT-Administered group showed increases in performance from Drive 1 to Drive 2, and either maintained these increases or showed further improvements on Drive 3. The Computer-Based Training group showed no change in the percentage of participants with scores of 4, but an increase was shown for participants with scores of 3 on Drive 2, up from scores of 2 on Drive 1. Further improvements for this group were shown for Drive 3. The Physical Conditioning group showed a decline in performance from Drive 1 to Drive 2, and like the control group, showed an increase from Drive 2 to Drive 3, with 100% at maximum performance.

Smooth Braking. As shown in Figure 27, the control group showed no change in performance from Drive 1 to Drive 2, and the only change on Drive 3 was the replacement of a driver scoring “2” with a driver scoring “3.” The Physical Conditioning group showed no change in performance across the three Drives. The OT-Administered Training group was the only treatment group that showed an increase in the percentage of participants with scores of 4 from Drive 1 to Drive 2, with 100% of the sample demonstrating this skill level on Drive 2, and maintaining this level of performance at Drive 3. The Classroom + BTW Training group showed a decline in the percentage of participants with scores of 4 from Drive 1 to Drive 2, but an increase in the percentage of the group with scores of 3 on Drive 2, up from scores of 2 on Drive 1. By Drive 3, the Classroom + BTW Training group showed an increase in the percentage of participants with scores of 4 compared to the percentage at Drive 1. While the Computer Based Training group showed no change from Drive 1 to Drive 2 in the percentage of participants with scores of 4 (and a decrease in this percentage at Drive 3), improved performance was described by one driver with a score of 3 on Drive 2 replacing a driver with a score of 2 on Drive 1.

Complete Stops. As shown in Figure 28, the control group as well as the Physical Conditioning group showed ceiling performance across all three Drives. The OT-Administered and the Classroom + BTW Training groups showed an increase in the percentage of participants with maximum scores from Drive 1 to Drive 2, with both groups reaching 100% by Drive 2, and maintaining this level at Drive 3. The Computer-Based Training group showed maximum performance by all participants on Drive 1, but a slight decline in this percentage on Drive 2, and a further decline in performance at Drive 3 (i.e., replacement of a driver with a score of 3 on Drive 2 with a score of 2 on Drive 3).

Right Turns. As shown in Figure 29, the control group showed a slight decrease in performance from Drive 1 to Drive 2, followed by an increase back to baseline levels at Drive 3. The Physical Conditioning and Computer-Based Training groups showed ceiling performance on all three Drives. While the Classroom + BTW Training group demonstrated maximum performance on Drives 1 and 2, performance declined slightly on Drive 3. The OT-Administered Training group showed an increase in the percentage of participants with scores of 4 from Drive 1 to Drive 2, reaching 100% on Drive 2; this treatment group maintained this level of performance on Drive 3.

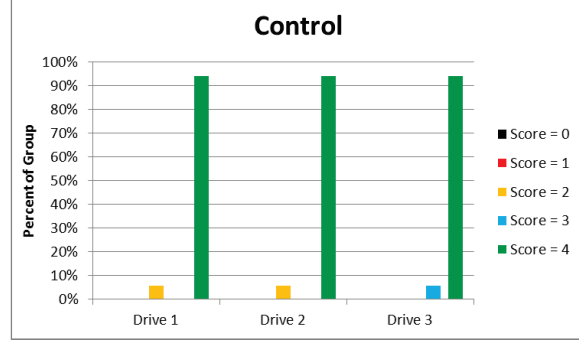
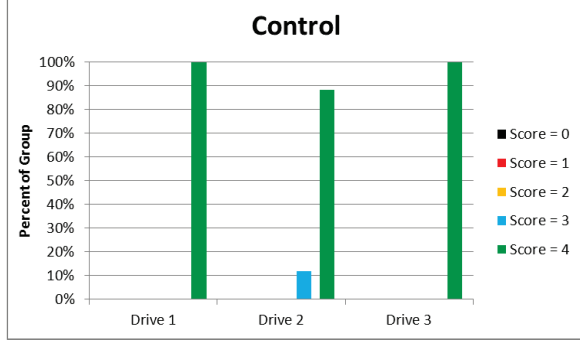
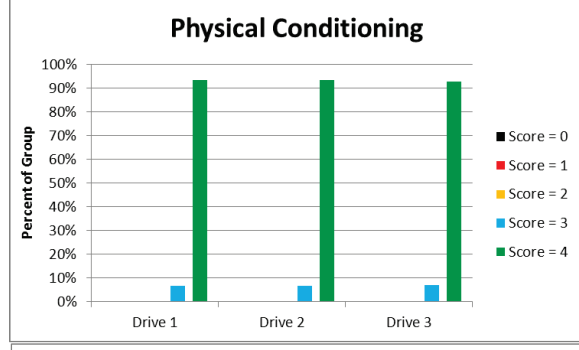
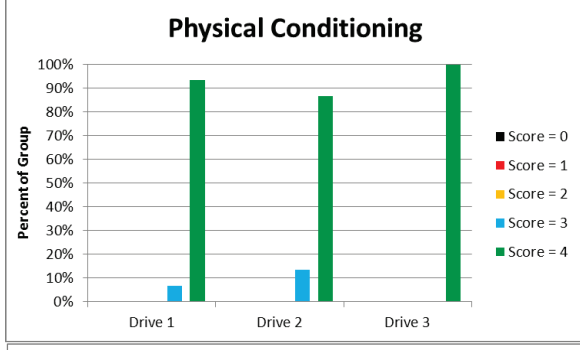
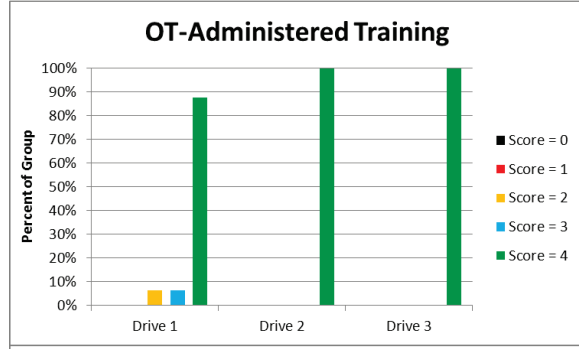
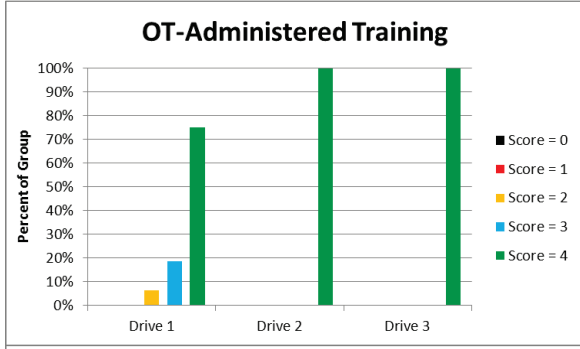
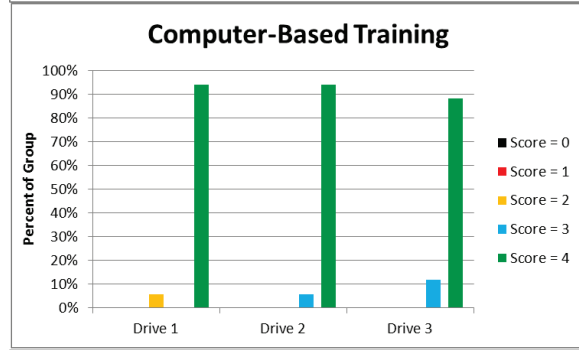
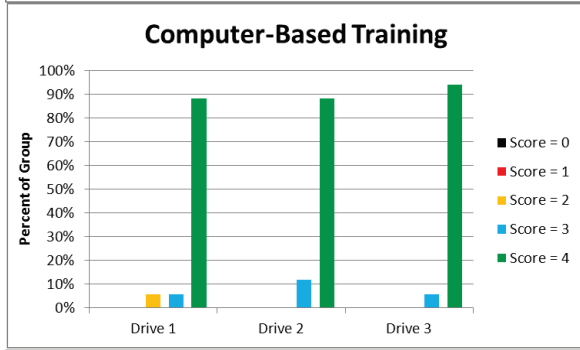
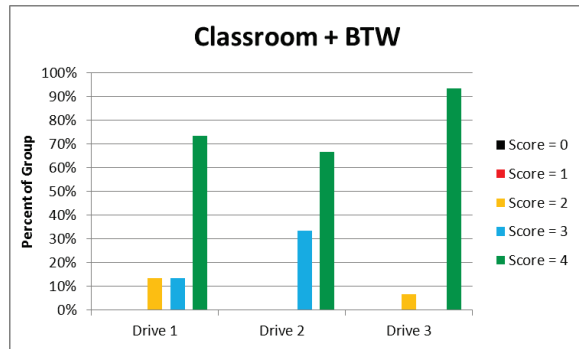
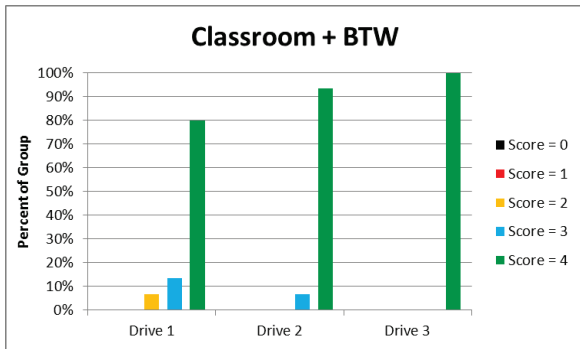


Figure 26. Vehicle Handling Task:
Smooth Acceleration

Figure 27. Vehicle Handling Task:
Smooth Braking

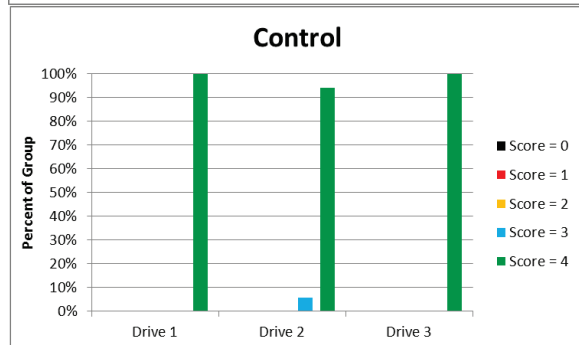
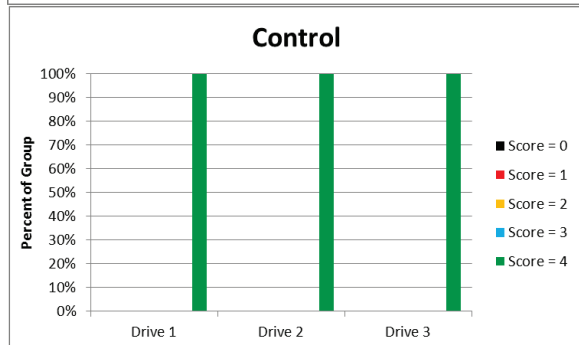
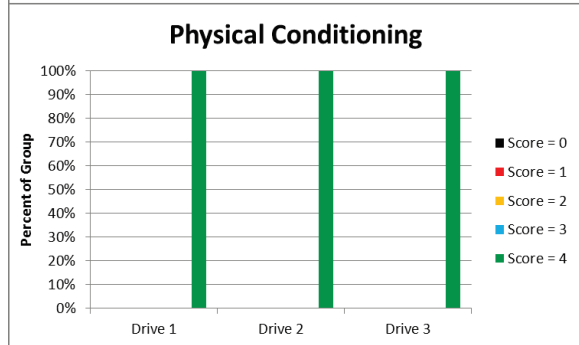
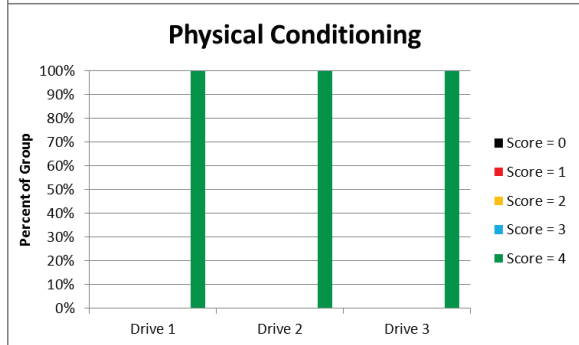
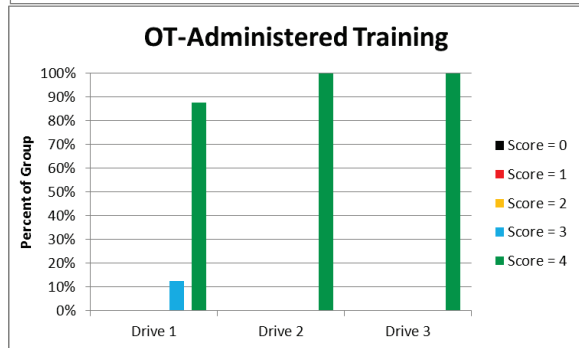
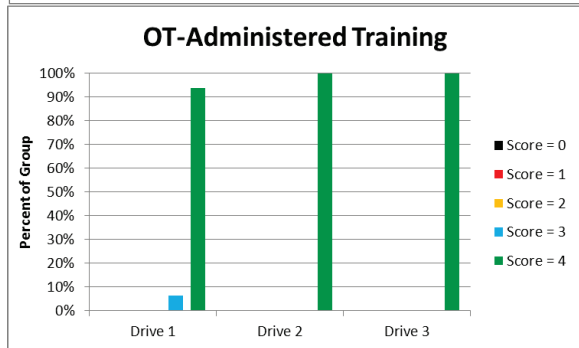
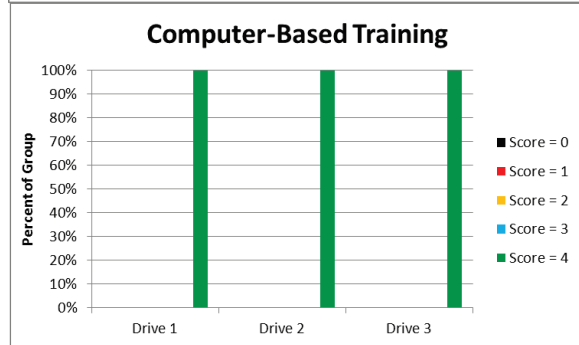
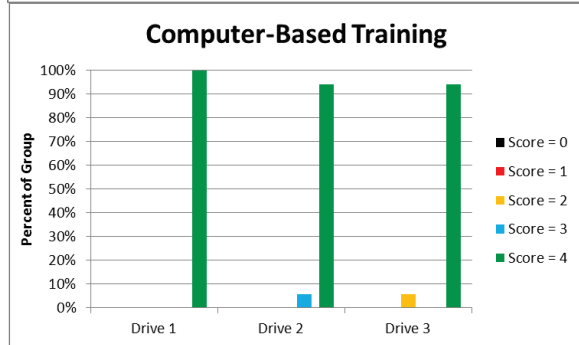
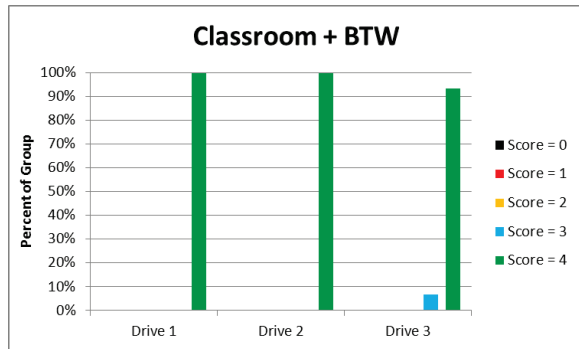
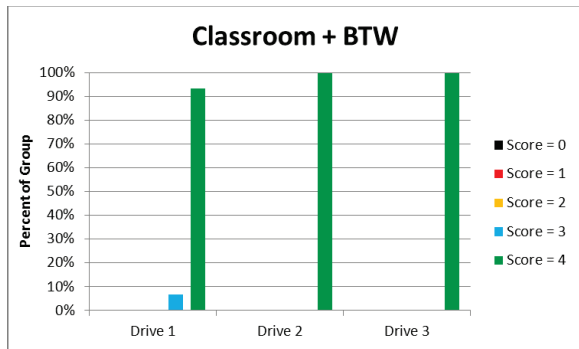


Figure 28. Vehicle Handling Task:
Complete Stops

Figure 29. Vehicle Handling Task:
Right Turns

Left Turns. As shown in Figure 30, the control group showed ceiling performance across all three Drives. The Classroom + BTW Training group showed maximum performance on Drives 1 and 2, however, performance declined slightly from Drive 2 to Drive 3. The Computer-Based Training, OT-Administered Training, and the Physical Conditioning groups each showed an increase in the percentage of participants with scores of 4 from Drive 1 to Drive 2, reaching 100% at Drive 2; these three groups maintained this level of performance at Drive 3.

Yields Right of Way. As shown in Figure 31, the control group and all Treatment groups with the exception of the OT-Administered Training OT-A group demonstrated maximum performance by 100% of the participants on all three Drives. The OT-Administered Training OT-A group showed an increase in performance from Drive 1 to Drive 2, reaching 100% of participants at maximum performance at Drive 2 and maintaining this level of performance at Drive 3.

Turn Signals. As shown in Figure 32, the control group showed a slight decrease in performance from Drive 1 to Drive 2, followed by a slight increase back to baseline level for the majority of participants on Drive 3. By comparison, all four treatment groups showed increases in performance (i.e., percentage of participants with scores of 4) from Drive 1 to Drive 2, with the largest increase displayed by the Classroom + BTW Training group. This was followed by the Computer-Based Training group, the Physical Conditioning group, and the OT-Administered Training OT-A group. On Drive 2, 100% of the participants in the Physical Conditioning and the Computer-Based Training groups received scores of “4.” However, the improvements in performance were maintained on Drive 3 only for the Classroom + BTW Training group and the OT-Administered Training OT-A group.

Speed Maintenance. As shown in Figure 33, performance on this task showed the same pattern as described for the turn signal task (Figure 23), with increases by all four treatment groups from Drive 1 to Drive 2, and a decrease by the control group. All treatment groups reached maximum performance by all participants on Drive 2. However, for the speed maintenance task, improvements in performance were maintained (or at least were above baseline level) for all treatment groups with the exception of the Computer-Based Training group, which showed a decline in performance at Drive 3.

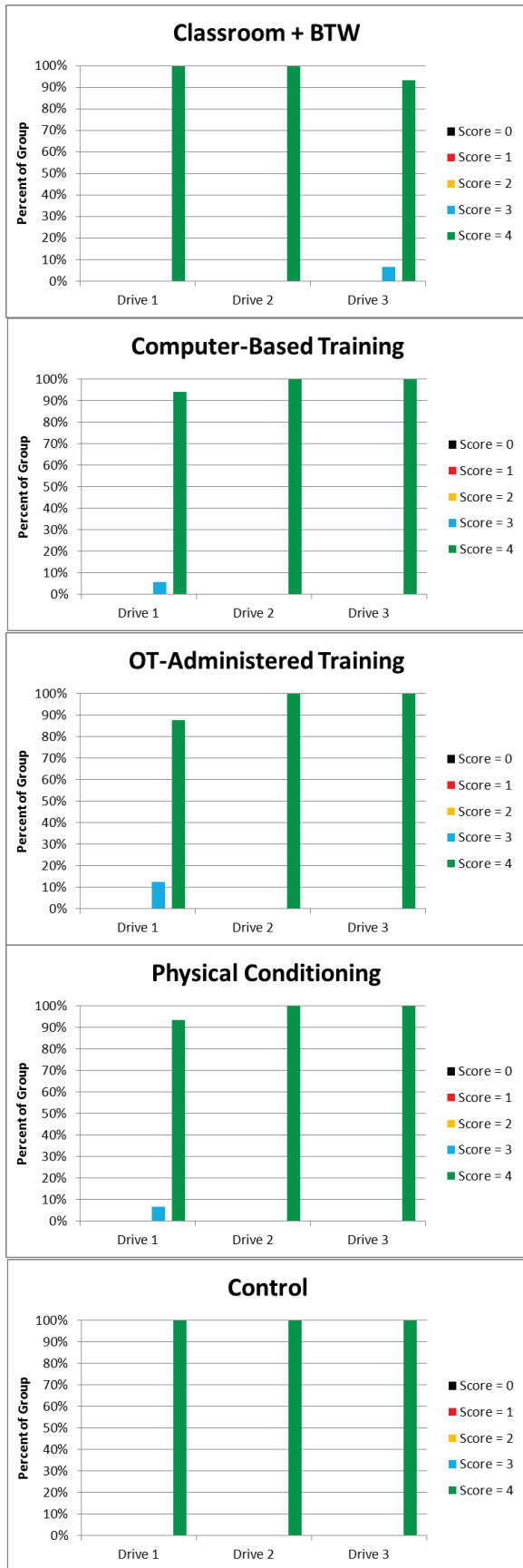


Figure 30. Vehicle Handling Task:
Left Turns

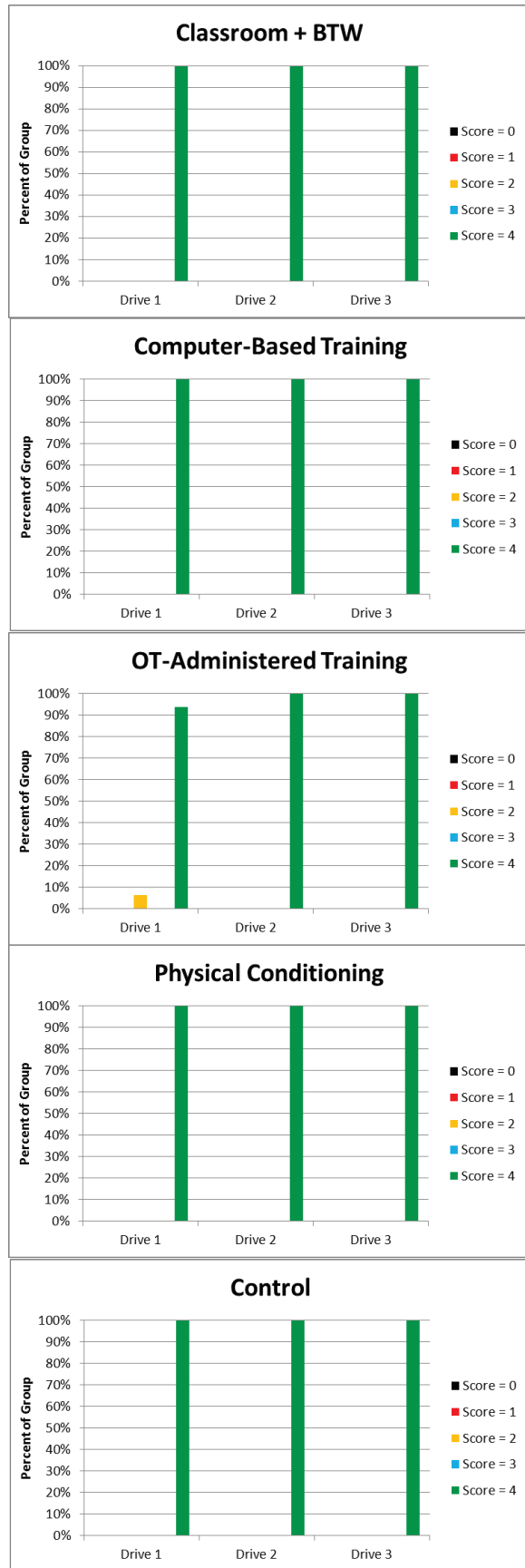


Figure 31. Vehicle Handling Task:
Yields Right of Way

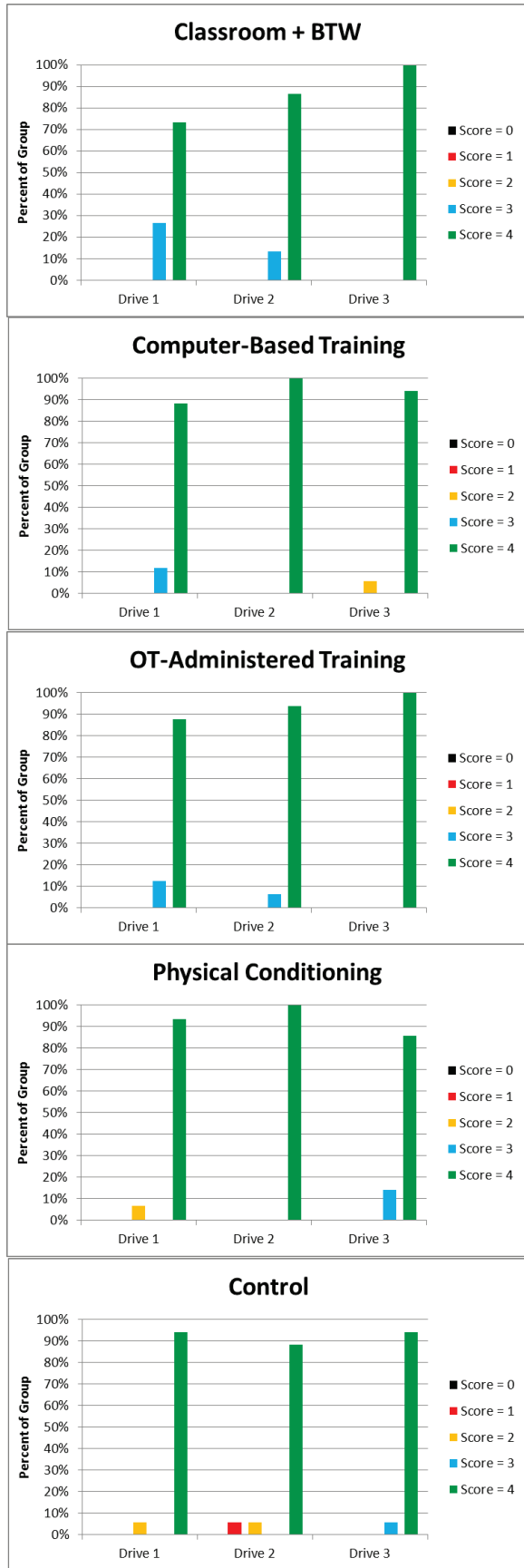


Figure 32. Vehicle Handling Task:
Turn Signals

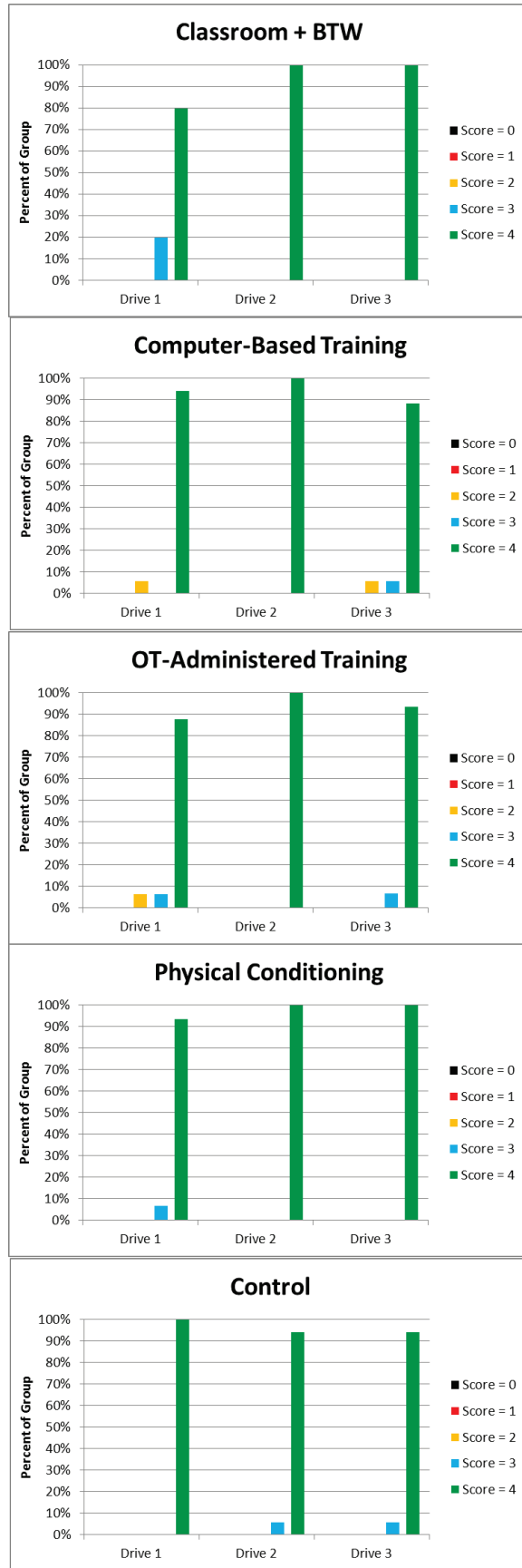


Figure 33. Vehicle Handling Task:
Speed Maintenance

Strategic Skills: Cognitive and Executive Function Tasks

Divided Attention (General). As shown in Figure 34, the control group showed a decrease in the percentage of participants with scores of 4 from Drive 1 to Drive 2, and a slight increase on Drive 3. In comparison, the Classroom + BTW Training group, the OT-Administered Training OT-A group, and the Physical Conditioning group showed improvements in performance from Drive 1 to Drive 2, and further improvements on Drive 3. The increases in performance for the Classroom + BTW Training group and the Physical Conditioning group were the result of participants increasing scores from 3 to 4. While the percentage of participants with scores of 4 remained constant from Drive 1 to Drive 2 in the OT-Administered Training OT-A group, the OT-Administered Training group showed an increase in the percentage of drivers receiving scores of 3 on Drive 2, up from scores of 2 on Drive 1, and increases in the percentage of drivers with scores of 4 on Drive 3. The Computer-Based Training group showed a decline in performance across the three Drives, with scores dropping from 3 on Drive 1 to 2 on Drive 2, and from 4 on Drive 2 to 3 on Drive 3.

DA-Central Vision. As shown in Figure 35, the control group plus three treatment groups (Classroom + BTW Training, Computer-Based Training, and Physical Conditioning) showed maximum performance on Drive 1. Of these four groups, only the Control group and the Physical Conditioning group maintained this level of performance on Drive 2 and Drive 3; the Computer-Based Training and Classroom + BTW Training groups showed a decline in the percentage of participants who obtained scores of 4 from Drive 1 to Drive 2. The OT-Administered Training group showed an increase in performance from Drive 1 to Drive 2 (100% of participants), which was maintained on Drive 3.

DA-Peripheral Vision. As shown in Figure 36, the control group showed a slight increase in the percentage of participants with scores of 4 from Drive 1 to Drive 2, followed by a slight increase on Drive 3. None of the treatment groups showed an improvement in the percentage of participants with scores of 4 from Drive 1 to Drive 2. This task resulted in lower percentages of participants with scores of 4 on Drive 1 than any of the other 32 scored tasks, meaning that it had the most room for improvement on Drive 2. The performance of the Classroom + BTW Training group was static from Drive 1 to Drive 2, and showed a very slight improvement on Drive 3. The Computer-Based Training and the OT-Administered Training groups both showed a slight decline from Drive 1 to Drive 2, and further declines on Drive 3. The Physical Conditioning group showed the largest decline in the percentage of participants receiving scores of 4 from Drive 1 to Drive 2. The Computer-Based Training group showed the smallest percentage of participants with scores of 4 on Drive 3 of all study groups.

Anticipates Hazards. As shown in Figure 37, the control group showed a slight decrease in the percentage of participants who received a score of 4 from Drive 1 to Drive 2; Drive 2 performance was maintained at Drive 3. The Classroom + BTW and the Computer-Based Training groups showed increases from Drive 1 to Drive 2 in the percentage of participants with scores of 4; however, performance improvements were only maintained on Drive 3 by the Classroom + BTW Training group. While the Physical Conditioning group showed a decrease in the percentage of participants with scores of 4 from Drive 1 to Drive 2, the percentage with scores of “3” increased on Drive 2, up from scores of 2 on Drive 1.

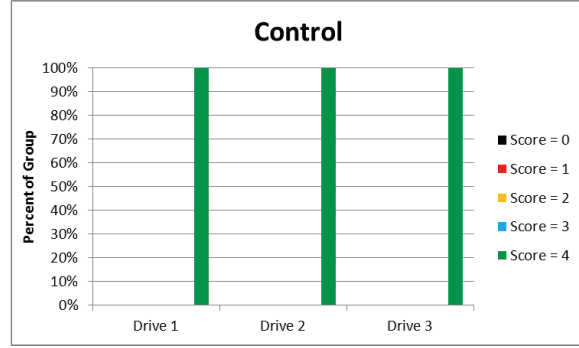
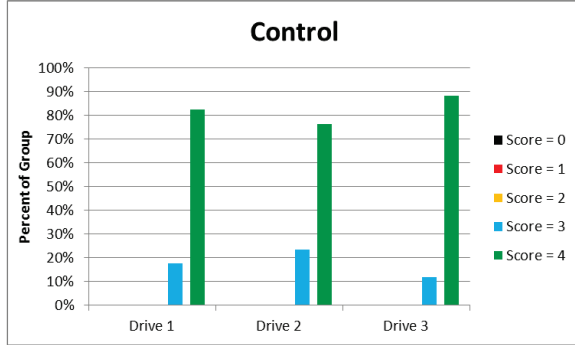
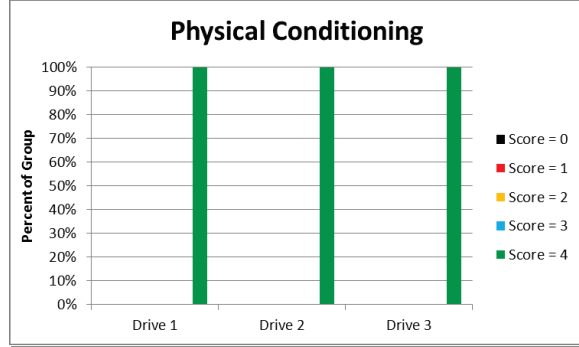
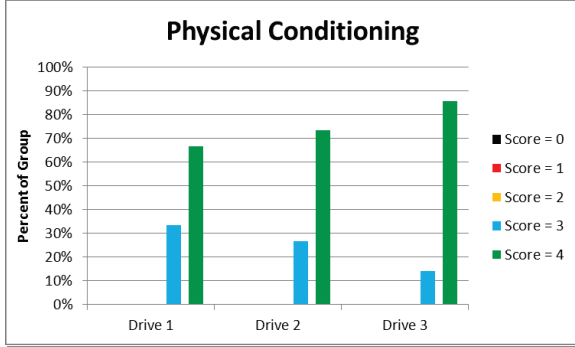
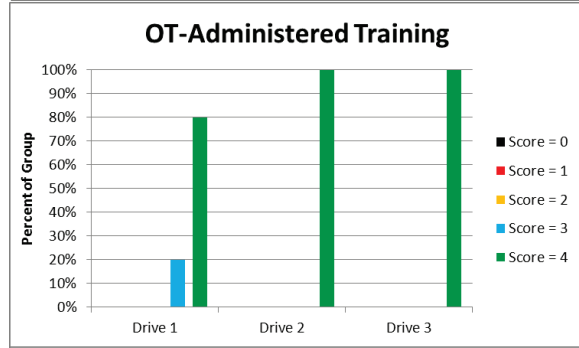
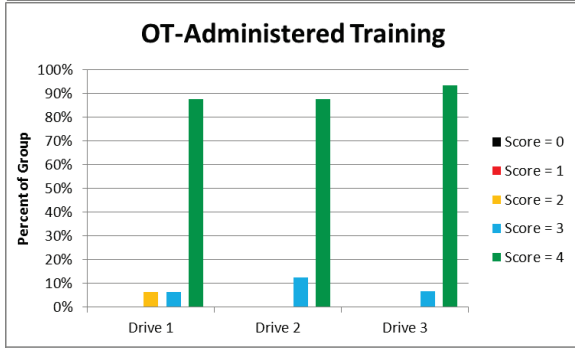
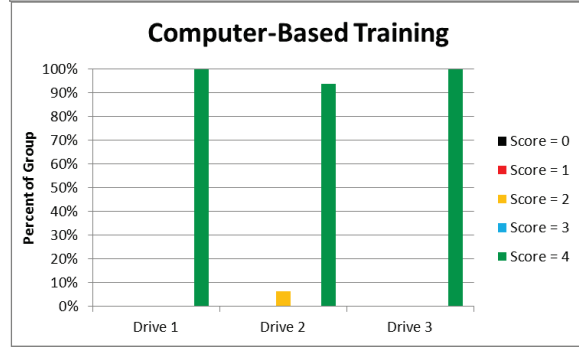
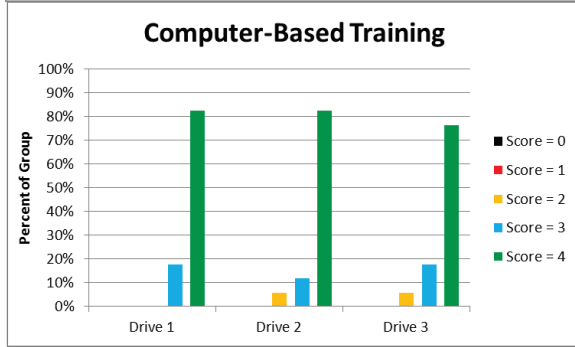
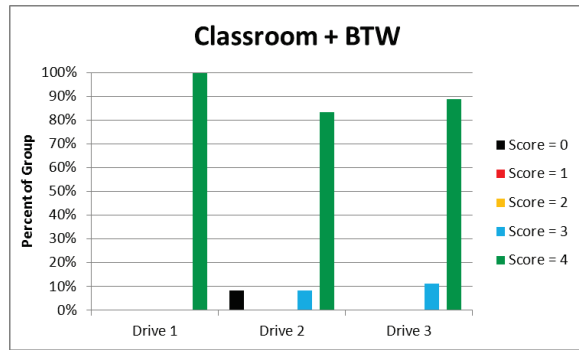
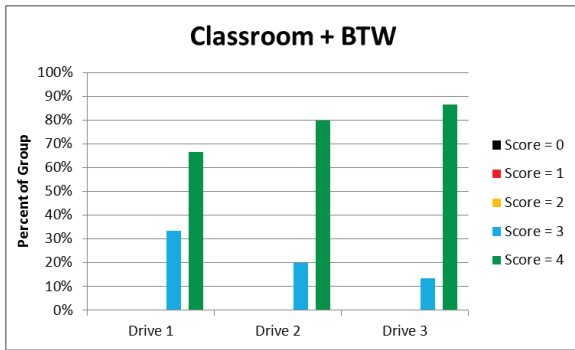


Figure 34. Cognitive/Executive Function Task:
Divided Attention (general)

Figure 35. Cognitive/Executive Function Task:
DA-Central Vision

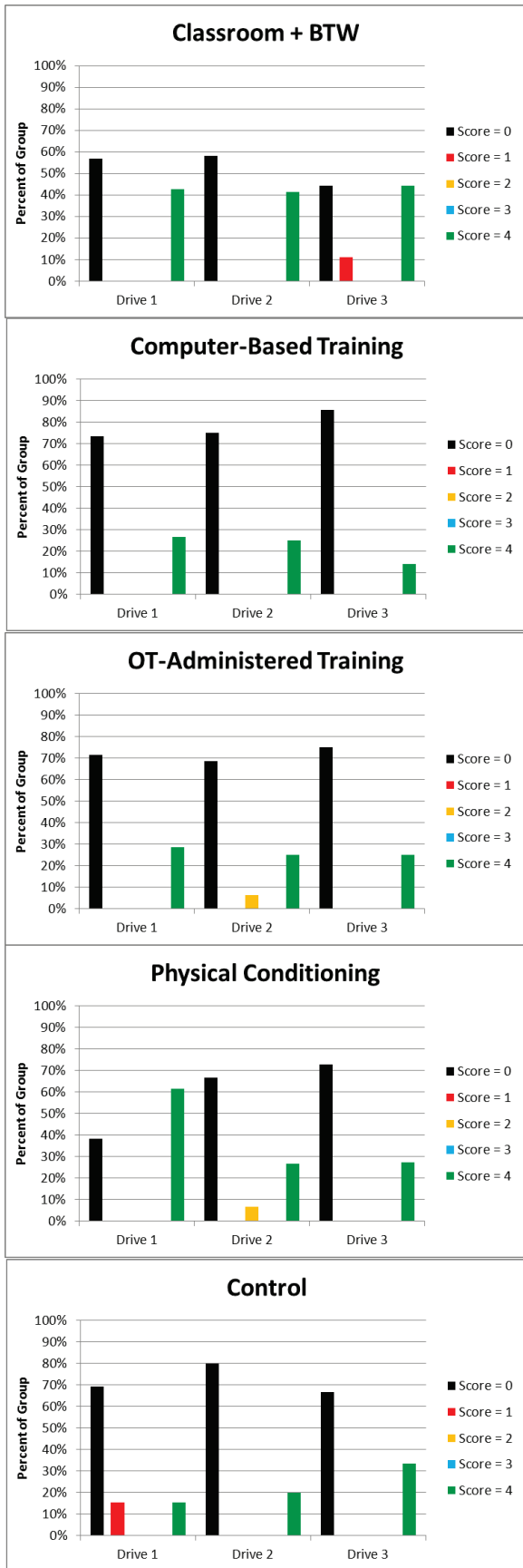


Figure 36. Cognitive/Executive Function Task:
DA-Peripheral Vision

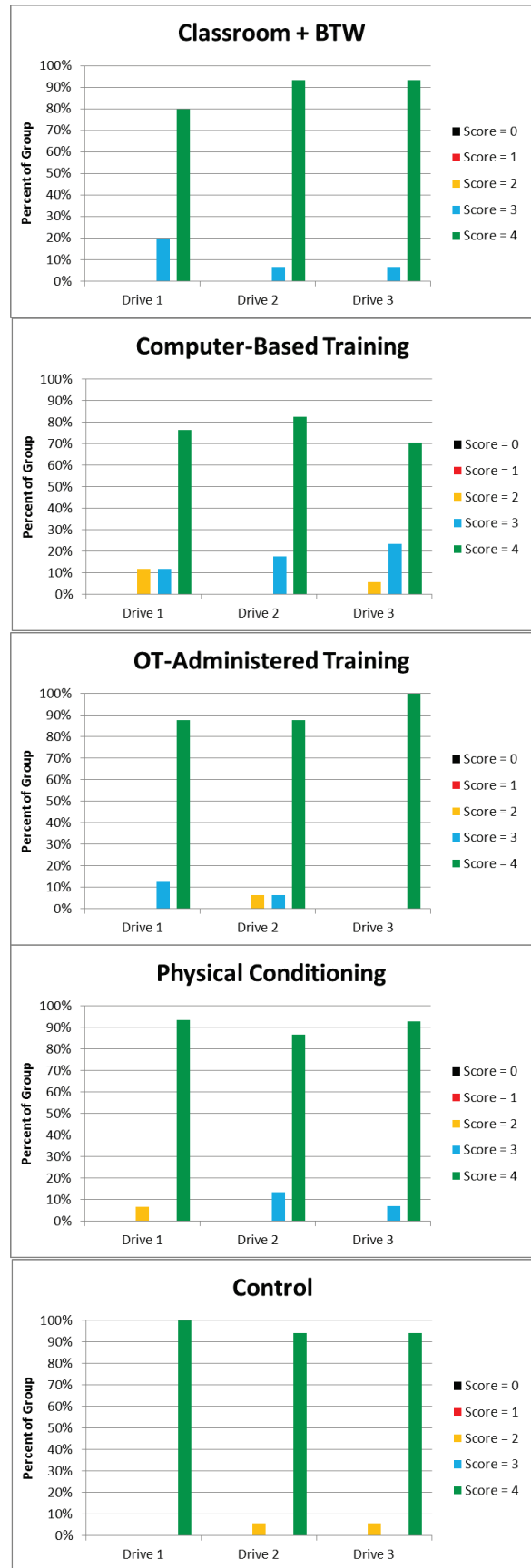


Figure 37. Cognitive/Executive Function Task:
Anticipates Hazards

The OT-Administered Training group showed a constant percentage with scores of 4 from Drive 1 to Drive 2, but a slight decrease in the percentage of participants with scores of 3 and an increase in those with scores of 2 on Drive 2. Although the OT-Administered Training group experienced a decline in performance from Drive 1 to Drive 2, it was the only group that showed maximum performance by 100% of its participants on Drive 3.

Plans Ahead. As shown in Figure 38, the control group showed an increase in performance from Drive 1 to Drive 2, but a decrease on Drive 3. The OT-Administered Training and the Classroom + BTW Training groups showed performance increases from Drive 1 to Drive 2, and further increases on Drive 3. By Drive 3, The Classroom + BTW Training group displayed maximum performance by 100% of the participants and the OT-Administered Training group showed maximum performance by over 90% of participants. While the Physical Conditioning and the Computer-Based Training groups remained constant in the percentage of participants with scores of 4 across all three Drives (approximately 80%), both groups showed an increase in the percentage of participants with scores of 3 on Drive 2 (up from scores of 2 on Drive 1).

Decision Making. As shown in Figure 39, the control group showed a slight increase in the percentage of participants with scores of 4 from Drive 1 to Drive 2, but performance declined on Drive 3 to the baseline level. Larger increases were shown for the Classroom + BTW group and the Physical Conditioning group, with both groups reaching 100% on Drive 2. Although performance declined slightly from Drive 2 to Drive 3 for the Classroom + BTW Training and the Physical Conditioning groups, performance was above baseline levels at Drive 3. The percentage of participants with scores of 4 in the Computer-Based Training group remained constant from Drive 1 to Drive 2, with the percentage of participants with scores of 3 increasing on Drive 2 (from scores of 2 on Drive 1); this performance increase was maintained on Drive 3. While the OT-Administered Training group showed a slight decrease in the percentage of participants with scores of 4, from Drive 1 to Drive 2, there was a slight increase in the percentage with scores of 3 on Drive 2, up from scores of 2 on Drive 1, and by Drive 3, 100% of the participants in this group had achieved the maximum score.

Memory/Following Directions. As shown in Figure 40, the control group showed an increase in performance from Drive 1 to Drive 2, reaching 100% on Drive 2, and maintaining this level of performance on Drive 3. The only treatment group that showed an increase in performance was the Classroom + BTW Training group; this group also maintained the performance increase on Drive 3. The OT-Administered Training group showed no change in performance from Drive 1 to Drive 2. The Computer-Based Training and Physical Conditioning groups showed a decrease in performance from Drive 1 to Drive 2.

Speed of Processing. As shown in Figure 41, the control group showed no change in performance on this task from Drive 1 to Drive 2, nor did the Computer-Based Training group. Both the Classroom + BTW Training group and the OT-Administered Training group showed an increase in performance on Drive 2, and further increases on Drive 3. The Physical Conditioning group showed a decrease in performance from Drive 1 to Drive 2, followed by a slight increase on Drive 3, similar to the pattern shown by the control group.

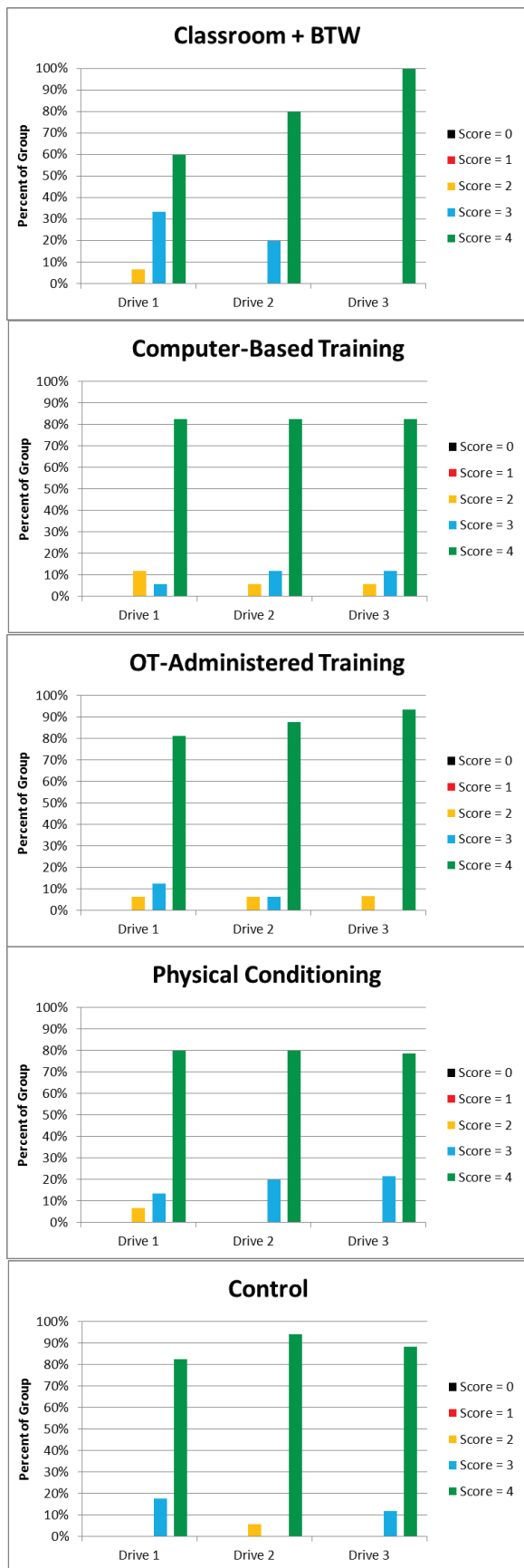


Figure 38. Cognitive/Executive Function Task:
Plans Ahead

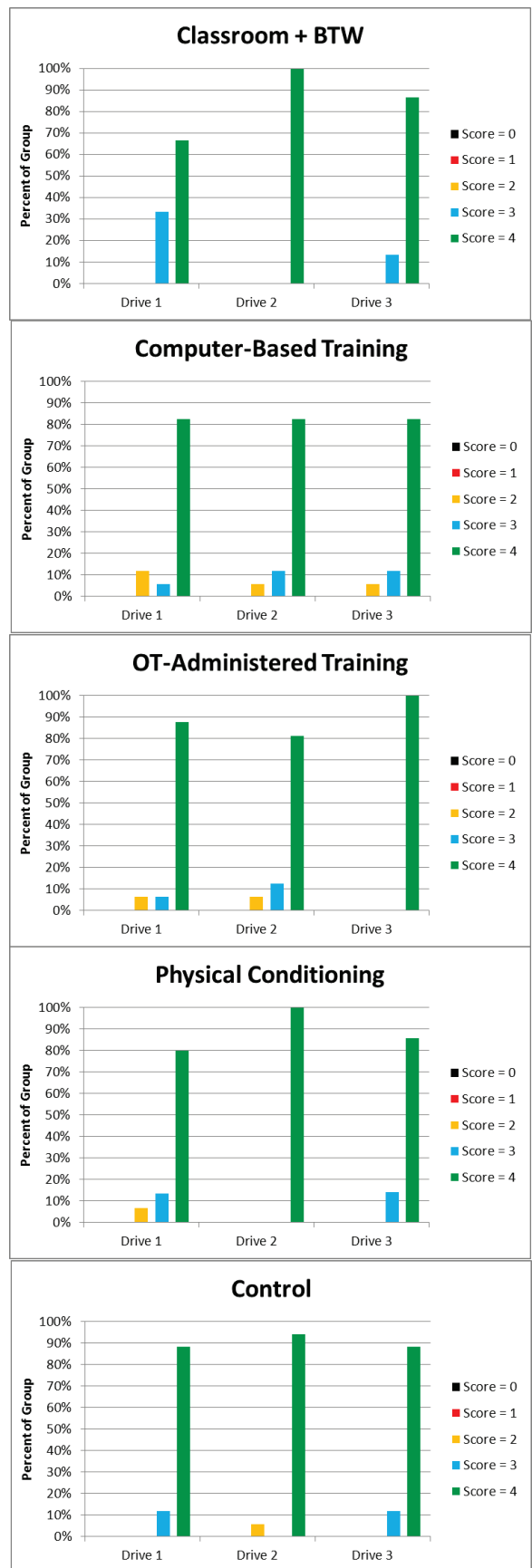


Figure 39. Cognitive/Executive Function Task:
Decision Making

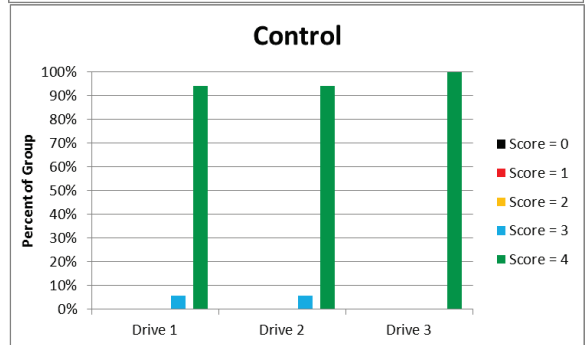
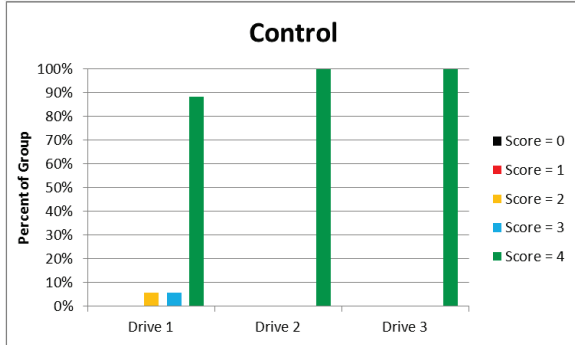
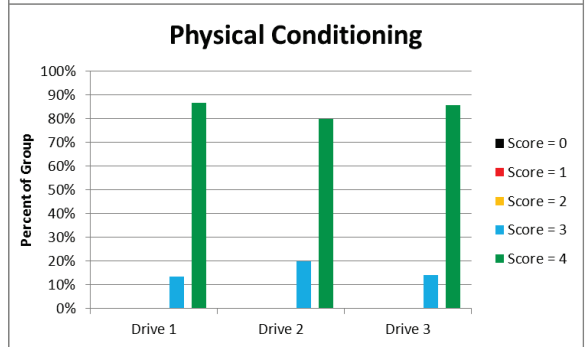
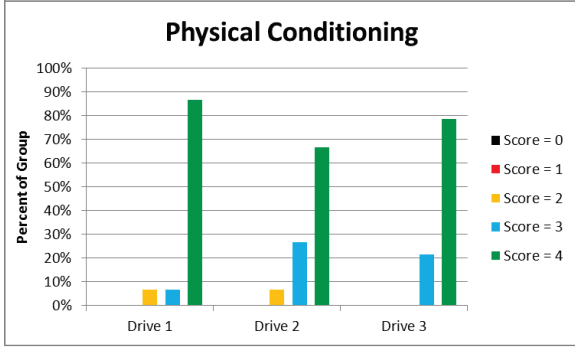
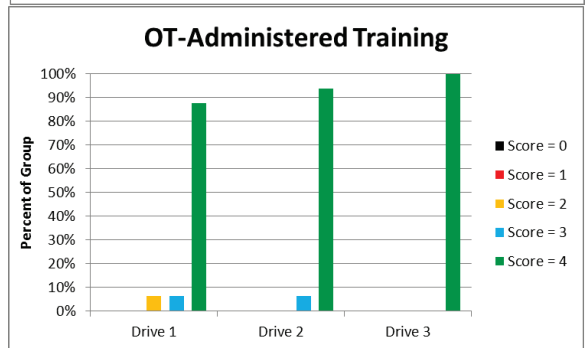
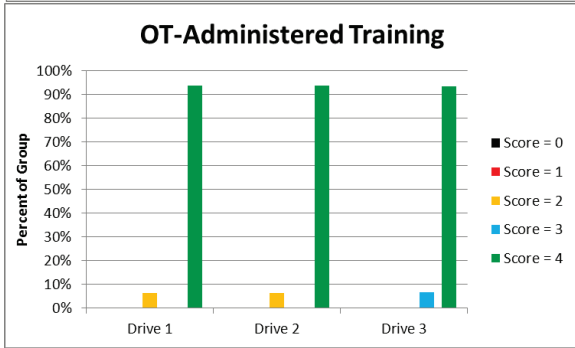
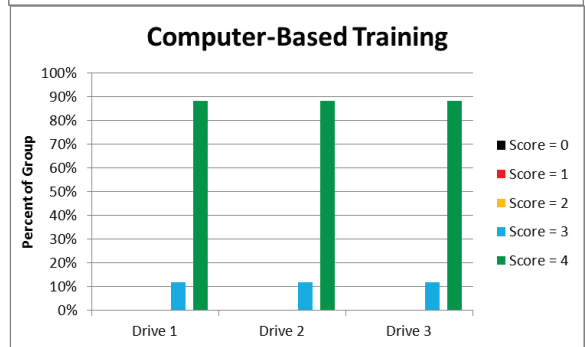
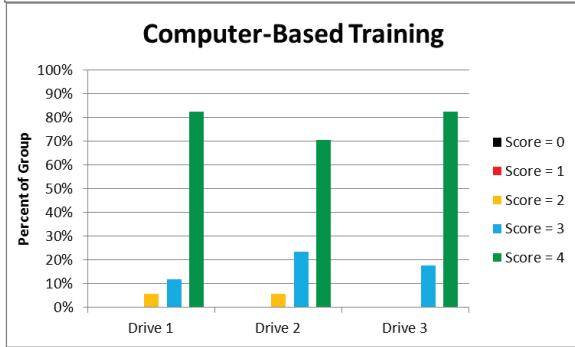
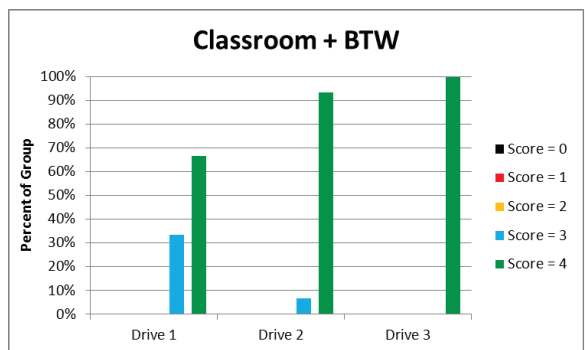
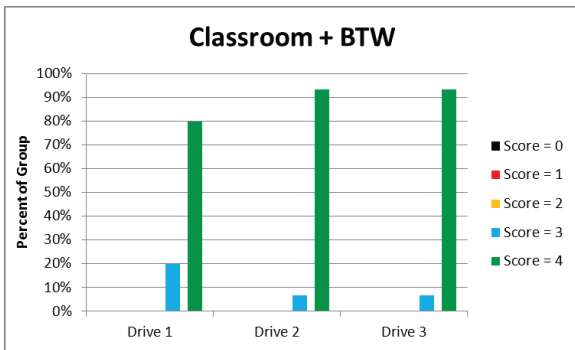


Figure 40. Cognitive/Executive Function Task:
Memory / Following Directions

Figure 41. Cognitive/Executive Function Task:
Speed of Processing

Rules of the Road. As shown in Figure 42, the control group, as well as the Classroom + BTW and the Computer-Based Training groups demonstrated maximum performance by 100% of the participants on all three Drives. The OT-Administered Training group showed an improvement in performance from Drive 1 to Drive 2 (100% at maximum performance), which was maintained on Drive 3. The Physical Conditioning group showed no change in performance from Drive 1 to Drive 2, but on Drive 3, 100% of participants showed maximum performance.

Summary

To analyze the change in performance of participants in each treatment group with that of control group participants, from their pre-treatment assessment to their immediate post-treatment assessments, we began by sorting the numbers and proportions of each group who demonstrated the following evaluation results:

- Scored at highest level on Drive 1 (versus scored below highest level) and maintained skills at Drive 2.
- Scored at highest level on Drive 1 (versus scored below highest level) and showed a decline in skills at Drive 2.
- Scored below highest level on Drive 1 and showed improved skills at Drive 2.
- Scored below highest level on Drive 1 and maintained skills at Drive 2.
- Scored below highest level on Drive 1 and showed a decline in skills at Drive 2.

The tabulations listed above are presented in Appendix H in a separate table for each treatment-control group comparison (Tables H-1 to H-4). Each table reports these data for every skill/behavior evaluated by the CDRS.

We tabulated the evaluation results for Drive 1 versus Drive 3 in an identical fashion. These data are presented in Appendix H in Tables H-5 through H-8, for each treatment-control group comparison.

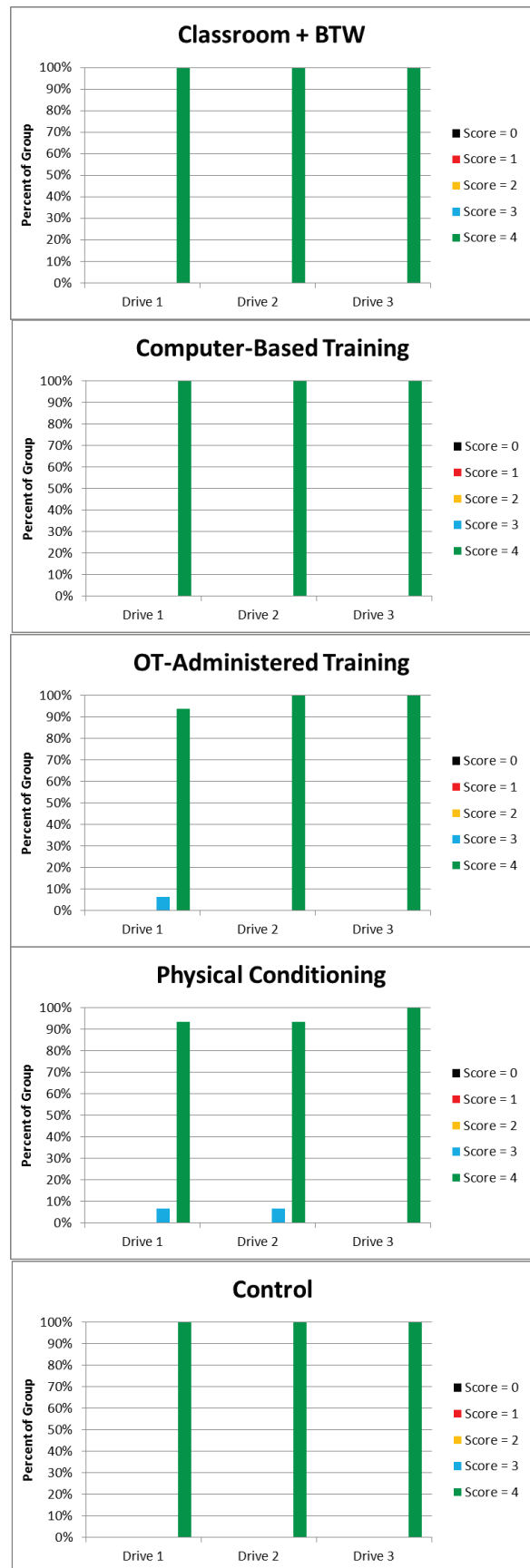


Figure 42. Cognitive/Executive Function Task:
Rules of the Road

Tables H-1 through H-4 reinforce the evidence from the preceding Figures 10 to 42, that a large majority of participants in each group achieved the highest possible score from the CDRS on their initial assessment. Nevertheless, it is possible to contrast differences between Drive 1 to Drive 2 based on changes in the *percentage of participants in each treatment group* who demonstrate a particular outcome of interest, *relative to the change in the percentage of participants in the control group* who demonstrate that same outcome. Beginning with the premise that each of the study treatments was designed to preserve and/or enhance safe driving behavior among healthy older adults, the following “desirable outcomes” were selected as criteria to gauge the relative efficacy of each intervention: the direction and magnitude of changes in the relative (treatment versus control) percentages of participants who *a)* scored at the highest level on Drive 1 and maintained their skills on Drive 2, and *b)* scored below the highest level on Drive 1 then demonstrated improved skills on Drive 2.

Table 36 contrasts the performance of the participants in each treatment group with the control group according to the criteria stated above; note that these results are *not* meant to provide a direct comparison between treatment groups. In this table, cells with dark shading indicate a decline in performance for a treatment group relative to the control group, for a given skill/behavior evaluated by the CDRS. Cells with light shading indicate improved performance for a treatment group relative to the control group. In both cases, where there was a difference in the percentage of participants in the treatment versus control group exhibiting the outcome described in the column header, the magnitude of this difference is also entered in the cell. Where “n/d” is entered in a cell in Table 36, there was no difference between treatment and control group participants with respect to their performance on Drive 1 versus Drive 2.⁶ An “n/d” entry does not necessarily mean that performance was better, worse, or unchanged from one assessment to the next, only that (any) changes in treatment group outcomes were mirrored by the control group.

For example, for the behavior “Mirror Checks,” among those participants in the Classroom + BTW Training group and in the control group who scored at the highest level on Drive 1, there was no relative change in how they scored on Drive 2; thus, “n/d” is entered in this cell. But for the Computer-Based Training group and the Physical Conditioning group, respectively, seven percent and eight percent fewer drivers maintained top scores for this behavior on Drive 2, compared to drivers in the control group. For the behavior “Checks Cross Traffic,” higher percentages of participants in all treatment groups except Physical Conditioning who scored at the highest level on Drive 1 maintained their skills on Drive 2, relative to those control group participants who also scored at the highest level on Drive 1 — and all by the same amount (6% of each group).

⁶ Two proportions that are not mathematically equivalent but reflect the same number of participants with changed outcomes in one group versus another, e.g., 11/12 and 12/13, are interpreted herein as “no difference” (n/d).

Table 36. Differences Between Drive 1 and Drive 2 in the Percentage of Participants in Each Treatment Group With Desirable Outcomes, Relative to Control Group Outcomes

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Scored at Highest Level on Drive 1 and <i>Maintained</i> Skill | | | | Scored Below Highest Level on Drive 1 and <i>Improved</i> Skill | | | |
|--|-----------------------------|--|-------------------------|--------------------------|-----------------------|---|-------------------------|--------------------------|-----------------------|
| | | Classroom + BTW | Computer-Based Training | OT-Administered Training | Physical Conditioning | Classroom + BTW | Computer-Based Training | OT-Administered Training | Physical Conditioning |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | n/d | -7 | n/d | -8 | +50 | -50 | +17 | +17 |
| | Scans Environment | -8 | n/d | +7 | -16 | n/d | -50 | n/d | n/d |
| | Blind Spot Checks | -8 | -13 | n/d | -8 | +100 | n/d | +50 | +100 |
| | Identifies Signage | n/d | +6 | +6 | -9 | <i>n/d</i> | +67 | +50 | +100 |
| | Checks Cross Traffic | +6 | +6 | +6 | n/d | +100 | <i>n/d</i> | +100 | <i>n/d</i> |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | n/d | n/d | n/d | n/d | +100 | +100 | +100 | <i>n/d</i> |
| | Following Distance | n/d | n/d | n/d | n/d | +100 | +100 | +100 | <i>n/d</i> |
| | Stopping Distance | n/d | -6 | +14 | +14 | +33 | +33 | +33 | -67 |
| | Centered in Lane Position | -8 | n/d | n/d | n/d | +100 | +100 | +100 | +100 |
| | Drives in Proper Lane | n/d | -6 | -7 | -7 | <i>n/d</i> | <i>n/d</i> | +100 | <i>n/d</i> |
| | Turns in Proper Lane (L) | n/d | -6 | -7 | -7 | +100 | <i>n/d</i> | +100 | <i>n/d</i> |
| | Turns in Proper Lane (R) | n/d | n/d | n/d | n/d | +100 | <i>n/d</i> | <i>n/d</i> | <i>n/d</i> |
| | Lane Usage | n/d | n/d | n/d | -15 | +33 | n/d | +33 | +33 |
| Lane Changes | -7 | n/d | n/d | -8 | +100 | n/d | +67 | +100 | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | n/d | n/d | +6 | +6 | +100 | +100 | +100 | +50 |
| | Smooth Steering | +6 | +6 | +6 | +6 | +75 | +100 | +100 | <i>n/d</i> |
| | Smooth Acceleration | +12 | +5 | +12 | +5 | +67 | +100 | +100 | <i>n/d</i> |
| | Smooth Braking | -9 | n/d | n/d | -7 | +50 | +100 | +100 | +100 |
| | Complete Stops | n/d | -6 | n/d | n/d | +100 | <i>n/d</i> | +100 | <i>n/d</i> |
| | Right Turns | +6 | +6 | +6 | +6 | <i>n/d</i> | <i>n/d</i> | +100 | <i>n/d</i> |
| | Left Turns | n/d | n/d | n/d | n/d | <i>n/d</i> | +100 | +100 | +100 |
| | Yields Right of Way | n/d | n/d | n/d | n/d | <i>n/d</i> | <i>n/d</i> | +100 | <i>n/d</i> |
| | Turn Signals | +6 | +6 | +6 | +6 | +50 | +100 | +50 | +100 |
| Speed Maintenance | +6 | +6 | +6 | +6 | +100 | +100 | +100 | +100 | |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | +11 | +14 | +21 | +11 | -7 | -34 | -17 | -27 |
| | DA-Central Vision | -33 | -7 | n/d | n/d | <i>n/d</i> | <i>n/d</i> | +100 | <i>n/d</i> |
| | DA-Peripheral Vision | n/d | +25 | n/d | +37 | -8 | -13 | +7 | -13 |
| | Anticipates Hazards | n/d | +6 | n/d | n/d | +100 | +75 | +50 | +100 |
| | Plans Ahead | n/d | n/d | n/d | n/d | -33 | -33 | -33 | -33 |
| | Decision Making | n/d | -7 | -14 | n/d | +50 | +17 | n/d | +50 |
| | Memory/Follow Directions | -8 | -21 | n/d | -23 | n/d | -67 | -100 | -100 |
| | Speed of Processing | n/d | n/d | n/d | -15 | +80 | n/d | +100 | +50 |
| Rules of the Road | n/d | n/d | n/d | -7 | <i>n/d</i> | <i>n/d</i> | +100 | +100 | |

Note: If cell entry is italicized, control group participants achieved the best possible score on Drive 1 and had no opportunity to improve their scores on Drive 2.

Table 36 shows that, with respect to the various tactical skills evaluated by the CDRS, the OT-Administered Training participants who scored a 4 on Drive 1 showed the strongest performance in maintaining their skills on Drive 2, relative to the control group drivers who similarly a 4 on Drive 1. In descending order, for this same criterion, were the Computer-Based Training group and Physical Conditioning group (tied), followed closely by the Classroom + BTW Training group. At the same time, the OT-Administered Training group had the fewest instances of failure to maintain their level of performance from Drive 1 to Drive 2, relative to the control group. The Classroom + BTW Training group, Computer-Based Training group, and Physical Conditioning group followed, in that order, according to this metric.

The size of the change in the percentage of participants scoring differently for each treatment group versus the control group across assessments ranged from -16 to +14 for maintenance of the various tactical skills. However, given the small sample sizes this translates to a difference of only a few people, and these outcomes reflect only ordinal differences in the classification of driving performance; thus, the absolute magnitude of changes does not warrant the same attention as the *direction* of change from one assessment to the next.

With regard to strategic skills, the percentage of participants in every treatment group who scored a 4 initially and then maintained their level of skills for “Divided Attention” exceeded the percentage of control group participants who did so. This was not true for any of the treatment groups for the subscale devoted to “Central Vision,” however. Performance by participants in both the Physical Conditioning group and the Computer-Based Training group was superior to the control group for the “Peripheral Vision” subscale. With a single exception (“anticipates hazards” for the Computer-Based Training group), all treatment groups fared the same as or worse than the control group in maintaining all other “strategic” skills/behaviors from Drive 1 to Drive 2.

Considering now how the treatment groups compared to the control group in terms of improved performance for those who demonstrated skill deficits on Drive 1, a somewhat different picture emerged. Again, the OT-Administered Training group most often demonstrated gains relative to the control group in the percentage of drivers whose CDRS scores for “tactical” skills improved from Drive 1 to Drive 2. There was not a single instance where the change in the percentage of control group participants who improved their skills was superior to this treatment group. As shown in Table 36, the relative gains for the Classroom + BTW Training group were nearly as impressive.

With regard to strategic skills, every treatment group demonstrated a smaller percentage of participants who initially demonstrated a deficit in their “Divided Attention” skill then improved performance on Drive 2 than did the control group. For the specialized subscales devoted to “Central Vision” and “Peripheral Vision” only the OT-Administered Training group showed performance gains relative to the control group. Overall, the results for this outcome – an improvement in strategic driving skills as defined by the CDRS, following any of the interventions in this study – can best be described as mixed. Every treatment group manifested a lower percentage of participants (relative to the control group) showing desirable outcomes, for multiple skills/behaviors. Notably, however, all treatment groups showed gains relative to the control group for the CDRS’s score for “Anticipates Hazards” on Drive 2.

The same caution about attaching too much importance to the magnitude of the group-level “difference scores” mentioned earlier applies even more so to these results because so few control group participants showed skill deficits on Drive 1. Control group drivers had no opportunity to improve their scores for over half of the skills/behaviors evaluated by the CDRS. This resulted in no (0%) improvement from Drive 1 to Drive 2, so if any participants showed improvement in a treatment group, a relative gain is indicated in Table 36. Indeed, another artifact of this constraint – i.e., no control group drivers with an opportunity to improve their scores – was that any time *all* eligible participants in any treatment group improved their scores on Drive 2, whether 1 of 1, 2 of 2, etc., it resulted in a +100% relative gain. It is important when interpreting the results summarized in Table 36 to take note of skills for which no control group drivers had the opportunity to improve their scores; these cell entries appear in italics.

Next, Table 37 presents the difference scores representing relative change between the performance of each treatment group and the control group on Drive 3, compared to their performance on Drive 1. Drive 3 was the “delayed assessment” carried out three months after each participant completed the training intervention. The results in this table reflect data presented in Tables H-5 through H-8 (see Appendix H).

As before, cells in Table 37 with dark shading indicate a decline in performance for a treatment group relative to the control group, while light shading indicates better performance for a treatment group relative to the control group. The magnitude of such differences, where they exist, is also entered in the cell. Again, “n/d” denotes “no difference” between treatment and control group participants with respect to their performance on Drive 1 versus Drive 3 – not that their performance was better, worse, or unchanged from one assessment to the next, but only that (any) changes in treatment group outcomes were mirrored by the control group.

Relative gains for treatment versus control group participants demonstrated at the three-month mark would suggest a sustained benefit for a given intervention. This benefit could be evidenced either through greater preservation of skills for those who scored a 4 on Drive 1, or an improvement (i.e., greater than shown by controls) in skills where a deficiency was indicated in the pre-treatment on-road evaluation.

The results summarized in Table 37 describe the preservation of tactical skills on Drive 3 for participants who scored a 4 on Drive 1. The OT-Administered Training group again maintained the greatest number of tactical skills from Drive 1 to Drive 3, followed closely by the Physical Conditioning group, and then the Classroom + BTW group. The OT-Administered Training group also showed no instances where tactical skills were degraded on Drive 3, for participants who scored a 4 on Drive 1. The Computer-Based Training group displayed the fewest instances of maintained performance and the most instances of a decrement in performance, relative to the control group.

With regard to maintaining strategic skills on Drive 3 for those who scored a 4 on Drive 1, the OT-Administered Training group showed superior performance as compared to the control group, maintaining skills on over half of the subscales scored by the CDRS. The other three treatment groups showed superior performance relative to the control group on only 1 or 2 strategic skills subscales. All four treatment groups showed improved performance relative to the control group for the strategic skill “plans ahead.” The OT-Administered Training group showed

no decrements in the maintenance of scores from Drive 1 to Drive 3, relative to the control group, while the other three treatment groups showed decrements in 3 to 4 subscales.

Table 37. Differences Between Drive 1 and Drive 3 in the Percentage of Participants in Each Treatment Group With Desirable Outcomes, Relative to Control Group Outcomes.

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Scored at Highest Level on Drive 1 and <i>Maintained</i> Skill | | | | Scored Below Highest Level on Drive 1 and <i>Improved</i> Skill | | | |
|--|-----------------------------|--|-------------------------|--------------------------|-----------------------|---|-------------------------|--------------------------|-----------------------|
| | | Classroom + BTW | Computer-Based Training | OT-Administered Training | Physical Conditioning | Classroom + BTW | Computer-Based Training | OT-Administered Training | Physical Conditioning |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | +7 | +7 | +7 | +7 | +25 | -50 | n/d | -17 |
| | Scans Environment | n/d | n/d | +7 | +7 | n/d | -50 | n/d | n/d |
| | Blind Spot Checks | +6 | n/d | +6 | +6 | +50 | n/d | +50 | +67 |
| | Identifies Signage | -7 | n/d | n/d | n/d | +100 | +33 | +50 | +100 |
| | Checks Cross Traffic | n/d | -6 | n/d | -7 | +100 | n/d | +100 | n/d |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | n/d | -6 | n/d | n/d | +100 | +100 | +100 | n/d |
| | Following Distance | n/d | -6 | n/d | n/d | +100 | +100 | +100 | n/d |
| | Stopping Distance | n/d | -13 | +7 | n/d | +33 | n/d | +33 | +33 |
| | Centered in Lane Position | +6 | n/d | +6 | +6 | +100 | n/d | n/d | +50 |
| | Drives in Proper Lane | -7 | n/d | n/d | n/d | n/d | n/d | +100 | n/d |
| | Turns in Proper Lane (L) | n/d | n/d | n/d | -7 | +100 | n/d | +100 | n/d |
| | Turns in Proper Lane (R) | n/d | n/d | n/d | n/d | +100 | n/d | n/d | n/d |
| | Lane Usage | -7 | -7 | n/d | -8 | n/d | n/d | n/d | n/d |
| Lane Changes | +6 | +6 | +6 | +6 | n/d | -50 | n/d | n/d | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | +12 | n/d | +12 | +12 | n/d | -33 | n/d | -50 |
| | Smooth Steering | n/d | n/d | n/d | n/d | +75 | n/d | n/d | n/d |
| | Smooth Acceleration | n/d | n/d | n/d | n/d | +100 | +50 | +100 | +100 |
| | Smooth Braking | n/d | -6 | n/d | -8 | -25 | n/d | n/d | n/d |
| | Complete Stops | n/d | -6 | n/d | n/d | +100 | n/d | +100 | n/d |
| | Right Turns | -7 | n/d | n/d | n/d | n/d | n/d | +100 | n/d |
| | Left Turns | -7 | n/d | n/d | n/d | n/d | +100 | +100 | +100 |
| | Yields Right of Way | n/d | n/d | n/d | n/d | n/d | n/d | +100 | n/d |
| | Turn Signals | n/d | -7 | n/d | -15 | n/d | n/d | n/d | n/d |
| Speed Maintenance | +6 | n/d | +6 | +6 | +100 | n/d | +100 | +100 | |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | n/d | -7 | +7 | -29 | n/d | -34 | +33 | -7 |
| | DA-Central Vision | -20 | n/d | n/d | n/d | n/d | n/d | +100 | n/d |
| | DA-Peripheral Vision | -50 | -17 | +50 | -33 | +34 | -22 | -13 | +17 |
| | Anticipates Hazards | n/d | -9 | +6 | +6 | +100 | +50 | +100 | +100 |
| | Plans Ahead | +14 | +7 | +14 | +5 | n/d | -33 | -50 | -33 |
| | Decision Making | n/d | n/d | +7 | n/d | n/d | n/d | +50 | +50 |
| | Memory/Follow Directions | -8 | -7 | n/d | -8 | n/d | -67 | n/d | -50 |
| | Speed of Processing | n/d | n/d | n/d | n/d | n/d | -100 | n/d | -100 |
| Rules of the Road | n/d | n/d | n/d | n/d | n/d | n/d | +100 | +100 | |

Note: If cell entry is italicized, control group participants achieved the best possible score on Drive 1 and had no opportunity to improve their scores on Drive 3.

For cases where participants demonstrated tactical skill deficits on Drive 1, the Classroom + BTW Training group and the OT-Administered Training group showed improvement on Drive 3 on the greatest number of subscales (relative to the control group). The Physical Conditioning group, and the Computer-Based Training group, showed improvement relative to the controls on fewer subscales measuring tactical skills. The OT-Administered Training group showed no declines in performance from Drive 1 to Drive 3 and the Classroom + BTW Training group showed only one subscale with a deficit in performance, relative to the control group. Overall, the number of subscales showing a relative improvement for treatment versus control group comparisons from Drive 1 to Drive 3 was smaller than from Drive 1 to Drive 2, for all four treatment groups. There was an apparent decay in the benefits of training three months after the “dose” was administered.

For the strategic skills where there was room for improvement from Drive 1 to Drive 3, all four treatment groups showed improvements relative to controls in the subscore for “anticipates hazards;” but all control group participants achieved a 4 on Drive 1. Overall, the OT-Administered Training group showed improvements in the largest number of strategic skill subscores while the Computer-Based Training group showed the largest number of subscores with decrements in performance, relative to the control group. The Physical Conditioning group showed mixed results, with equal numbers of subscales showing improvements and decrements in performance, relative to the control group. While the Classroom + BTW Training group displayed no decrements on any subscale from Drive 1 to Drive 3, relative to controls, these participants showed improvements for only two strategic skills subscales.

Significance Testing

The preceding, descriptive summary of results has provided a general indication of which treatment groups demonstrated gains relative to the control group, for how many measures of driving skill, during both the immediate and delayed assessments. Opportunities are limited to test which, if any, of these observed differences are statistically significant, due to the ordinal nature of the on-road evaluation scores. As stated above, we feel justified only in assuming that differences in driving skill measures between the matched groups (each treatment group and the control group) are a valid indication of the direction—but not necessarily the magnitude—of the difference. Given this assumption, the only viable option for significance testing is the Sign Test.

This nonparametric test for ordinally-scaled variables is based upon a null hypothesis that any differences between matched groups have an equal probability of being in one direction (+) versus the other (–) across pairs of observations. Critical values at $\alpha = .05$ and $\alpha = .01$ reference rejection regions in the binomial probability distribution for either a one- or two-tailed test (see Runyon and Haber, 1980). We are interested in one-tailed tests for the hypotheses that (1) a specific treatment group has a higher percentage than the control group of drivers *without* deficits at the initial assessment (Drive 1) who *maintained their performance* on the immediate (Drive 2) and/or delayed (Drive 3) post-treatment assessments; and (2) a specific treatment group has a higher percentage than the control group of drivers *with* deficits at Drive 1 who *improved their performance* on Drive 2 and/or Drive 3.

Table 38 shows the direction of differences in each treatment–control group comparison for the maintenance of skills by drivers who received a 4 on Drive 1, on both post-treatment

assessments. Cells with gray shading denote no difference from Drive 1 to the later assessment; these cells are disregarded in the Sign Test. As shown, the number of measures on which a difference was demonstrated range from a low of 13 for the comparison between the OT-Administered Treatment group and the controls (on Drive 3), to a high of 21 for the comparison between the Physical Conditioning group and the controls (on Drive 2). These values of N determine the critical values to reach statistical significance at a given probability level; the proportion of observations in a particular direction that is required to reject the null hypothesis becomes more and more stringent with smaller values of N . A valid test requires an N of at least 5.

As indicated in this table, only the OT-Administered Treatment group demonstrated a significant gain relative to the control group in the percentage of drivers without skill deficits who maintained their skills from Drive 1 to the post-treatment assessments. This apparent training effect reached significance at $p < .05$ on the immediate post-treatment assessment and at $p < .01$ on the delayed assessment.

Next, Table 39 shows the direction of differences in each treatment–control group comparison for improvement in skills on both post-treatment assessments by drivers who demonstrated some deficiency during the pre-treatment assessment (scores of <4). Cells with gray shading again denote no difference from one observation to the next. Measures of driving skill for which control group drivers scored a 4 on Drive 1 were removed from this table, since relative gains cannot be calculated when no controls are eligible to improve. In this table, the number of measures on which a difference was demonstrated range from a low of 5 for the comparison between the Classroom + BTW Treatment group and the controls (on Drive 3), to a high of 14 for the comparison between the Physical Conditioning group and the controls (on Drive 2).

As indicated in this table, both the OT-Administered Treatment group and the Classroom + BTW Treatment group demonstrated a significant ($p < .05$) gain relative to the control group, in the percentage of drivers with skill deficits at the pre-treatment assessment who improved their skills on the immediate post-treatment assessment. None of the treatments achieved significance in producing such gains on Drive 3, three months after the intervention was completed. The Classroom + BTW treatment most closely approached significance for this comparison.

Table 38. Comparison Showing Whether Each Treatment Group Demonstrated a Higher (+) or Lower (–) Percentage Than the Control Group of Drivers Without Deficits at the Initial Assessment Who Maintained Their Performance on Drive 2 and/or Drive 3, for Every Included Measure of Driving Skill

| Measures of Driving Skill | Classroom + BTW Training vs. Control | | Computer-Based Training vs. Control | | OT-Administered Training vs. Control | | Physical Conditioning vs. Control | |
|--|--|--|--|--|--|--|--|--|
| | Drive 2 | Drive 3 | Drive 2 | Drive 3 | Drive 2 | Drive 3 | Drive 2 | Drive 3 |
| Mirror Checks | | + | – | + | | + | – | + |
| Scans Environment | – | | | | + | + | – | + |
| Blind Spot Checks | – | + | – | | | + | – | + |
| Identifies Signage | | – | + | | + | | – | |
| Checks Cross Traffic | + | | + | – | + | | | – |
| Gap Selection | | | | – | | | | |
| Following Distance | | | | – | | | | |
| Stopping Distance | | | – | – | + | + | + | |
| Centered in Lane Position | – | + | | | | + | | + |
| Drives in Proper Lane | | – | – | | – | | – | |
| Turns in Proper Lane (L) | | | – | | – | | – | – |
| Turns in Proper Lane (R) | | | | | | | | |
| Lane Usage | | – | | – | | | – | – |
| Lane Changes | – | + | | + | | + | – | + |
| Appropriate Speed | | + | | | + | + | + | + |
| Smooth Steering | + | | + | | + | | + | |
| Smooth Acceleration | + | | + | | + | | + | |
| Smooth Braking | – | | | – | | | – | – |
| Complete Stops | | | – | – | | | | |
| Right Turns | + | – | + | | + | | + | |
| Left Turns | | – | | | | | | |
| Yields Right of Way | | | | | | | | |
| Turn Signals | + | | + | – | + | | + | – |
| Speed Maintenance | + | + | + | | + | + | + | + |
| Divided Attention (General) | + | | + | – | + | + | + | – |
| DA-Central Vision | – | – | – | | | | | |
| DA-Peripheral Vision | | – | + | – | | + | + | – |
| Anticipates Hazards | | | + | – | | + | | + |
| Plans Ahead | | + | | + | | + | | + |
| Decision Making | | | – | | – | + | | |
| Memory/Follow Directions | – | – | – | – | | | – | – |
| Speed of Processing | | | | | | | – | |
| Rules of the Road | | | | | | | – | |
| Critical Value for Significance (One-Tailed Sign Test) | 11 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 12 (<i>p</i> <.05) 13 (<i>p</i> <.01) | 14 (<i>p</i> <.05) 15 (<i>p</i> <.01) | 12 (<i>p</i> <.05) 13 (<i>p</i> <.01) | 11 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 10 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 15 (<i>p</i> <.05) 17 (<i>p</i> <.01) | 13 (<i>p</i> <.05) 14 (<i>p</i> <.01) |
| Significant Treatment Effects | n.s. | n.s. | n.s. | n.s. | <i>p</i> <.05 | <i>p</i> <.01 | n.s. | n.s. |

Table 39. Comparison Showing Whether Each Treatment Group Demonstrated a Higher (+) or Lower (-) Percentage Than the Control Group of Drivers With Deficits at the Initial Assessment Who Improved Their Performance on Drive 2 and/or Drive 3, for Every Applicable Measure of Driving Skill

| Measures of Driving Skill | Classroom + BTW Training vs. Control | | Computer-Based Training vs. Control | | OT-Administered Training vs. Control | | Physical Conditioning vs. Control | |
|--|--|--------------------|---|--|--|--------------------|--|---|
| | Drive 2 | Drive 3 | Drive 2 | Drive 3 | Drive 2 | Drive 3 | Drive 2 | Drive 3 |
| Mirror Checks | + | + | - | - | + | | + | - |
| Scans Environment | | | - | - | | | | |
| Blind Spot Checks | + | + | | | + | + | + | + |
| Stopping Distance | + | + | + | | + | + | - | + |
| Lane Usage | + | | | | + | | + | |
| Lane Changes | + | | | - | + | | + | |
| Appropriate Speed | + | | + | - | + | | + | - |
| Smooth Braking | + | - | + | | + | | + | |
| Turn Signals | + | | + | | + | | + | |
| Divided Attention (General) | - | | - | - | - | + | - | - |
| DA-Peripheral Vision | - | + | - | - | + | - | - | + |
| Plans Ahead | - | | - | - | - | - | - | - |
| Decision Making | + | | + | | | + | + | + |
| Memory/Follow Directions | | | - | - | - | | - | - |
| Speed of Processing | + | | | - | + | | + | - |
| Critical Value for Significance (One-Tailed Sign Test) | 10 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 5 (<i>p</i> <.05) | 9 (<i>p</i> <.05) 10 (<i>p</i> <.01) | 8 (<i>p</i> <.05) 9 (<i>p</i> <.01) | 10 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 6 (<i>p</i> <.05) | 11 (<i>p</i> <.05) 12 (<i>p</i> <.01) | 9 (<i>p</i> <.05) 10 (<i>p</i> <.01) |
| Significant Treatment Effects | <i>p</i> <.05 | n.s. | n.s. | n.s. | <i>p</i> <.05 | n.s. | n.s. | n.s. |

SIMULATOR ASSESSMENTS

Simulator hardware and software problems resulted in a complete loss of data for five subjects who participated in the baseline assessment and two subjects who participated in the immediate post-treatment assessment. As a consequence, the number of subjects included in the simulator data analysis was reduced from the levels reported earlier. Tables 40, 41, and 42 display the sample size and characteristics, by group, for all drivers who contributed at least partial data to the present analyses. It should be noted, however, that the numbers of subjects available for any given analysis may be further reduced below what is shown in these tables, if one or more subjects failed to respond on a particular measure.

Table 40. Sample Characteristics for Baseline Simulator Assessment

| Group | N | Minimum Age | Maximum Age | Average Age | Standard Deviation | % Male |
|-----------------------------|-----------|-------------|-------------|-------------|--------------------|------------|
| Classroom + BTW Training | 14 | 65 | 83 | 74 | 6 | 79% |
| Computer-Based Training | 12 | 66 | 85 | 74 | 6.3 | 83% |
| OT-Administered Training | 13 | 65 | 84 | 72 | 5.7 | 62% |
| Physical Conditioning Group | 8 | 65 | 85 | 72 | 7.9 | 50% |
| Control Group | 14 | 68 | 81 | 73 | 4.4 | 71% |
| Total | 61 | 65 | 85 | 73 | 5.9 | 70% |

Table 41. Sample Characteristics for Immediate Post-Treatment Simulator Assessment

| Group | N | Minimum Age | Maximum Age | Average Age | Standard Deviation | % Male |
|-----------------------------|-----------|-------------|-------------|-------------|--------------------|------------|
| Classroom + BTW Training | 14 | 65 | 83 | 74 | 6 | 79% |
| Computer-Based Training | 11 | 66 | 85 | 75 | 6.3 | 82% |
| OT-Administered Training | 13 | 65 | 84 | 72 | 5.7 | 62% |
| Physical Conditioning Group | 7 | 65 | 85 | 70 | 7 | 57% |
| Control Group | 14 | 68 | 81 | 73 | 4.4 | 71% |
| Total | 59 | 65 | 85 | 73 | 5.8 | 71% |

Table 42. Sample Characteristics for Delayed Post-Treatment Simulator Assessment

| Group | N | Minimum Age | Maximum Age | Average Age | Standard Deviation | % Male |
|-----------------------------|-----------|-------------|-------------|-------------|--------------------|-----------|
| Classroom + BTW Training | 14 | 65 | 83 | 74 | 6 | 79% |
| Computer-Based Training | 11 | 66 | 85 | 75 | 6.3 | 82% |
| OT-Administered Training | 11 | 65 | 80 | 71 | 4.8 | 64% |
| Physical Conditioning Group | 8 | 65 | 85 | 72 | 7.9 | 50% |
| Control Group | 14 | 68 | 81 | 73 | 4.4 | 71% |
| Total | 58 | 65 | 85 | 73 | 5.8 | 71 |

Summary of Performance Differences

The analyses of performance in the simulator examined response times to four types of events: brake reaction time; response time to “turn signal” events; response time to “word” events (central stimulus in divided attention task); and response time to “hazards” (peripheral stimuli in divided attention task).

The analyses were based on the change in response times from the baseline assessment (SIM1) to the immediate post-treatment assessment (SIM2), and from baseline to the delayed post-treatment assessment (SIM3), for each treatment group (separately) versus the control group. Specifically, the key dependent variable was the difference score, Δt (in seconds), between the amount response times changed from one assessment to the next for the treatment groups, relative to the change observed for the control group. An effective treatment would result in a greater reduction in response time from baseline to the immediate post-treatment assessment (and to the delayed post-treatment assessment as well) for that treatment group than any corresponding reduction for the control group.

Because an improvement in performance was hypothesized to result from the interventions, the differences SIM2-SIM1 and SIM3-SIM1 were expected to be negative numbers, i.e., response times should be shorter at each of the post-treatment assessments than at baseline. Hence, if a treatment group performs better than the control group, the following results should be observed:

$$\begin{aligned} \text{SIM2-SIM1 for treatment group} &< \text{SIM2-SIM1 for control group} \\ \text{SIM3-SIM1 for treatment group} &< \text{SIM3-SIM1 for control group} \end{aligned}$$

Tables 43 through 46 summarize the mean differences for each treatment-Control group comparison, for SIM2 and SIM3.

Table 43. Mean Difference in Response Times (Δt) Between the Classroom+BTW Training Group and the Control Group.

| Measure | Δt (sec) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 0.204 | 0.223 |
| Response to “turn signal events” | -0.065 | 0.001 |
| Response to “word events” | -0.190 | 0.101 |
| Hazard detection | -0.514 | -0.696 |

Table 44. Mean Difference in Response Times (Δt) Between the Computer-Based Training Group and the Control Group

| Measure | Δt (sec) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 0.181 | 0.004 |
| Response to “turn signal events” | 0.519 | 0.450 |
| Response to “word events” | 0.013 | 0.519 |
| Hazard detection | -0.288 | -0.581 |

Table 45. Mean Difference in Response Times (Δt) Between the OT-Administered Training Group and the Control Group

| Measure | Δt (sec) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 0.113 | 0.030 |
| Response to “turn signal events” | 0.296 | -0.255 |
| Response to “word events” | 0.048 | 0.086 |
| Hazard detection | -0.436 | -0.816 |

Table 46. Mean Difference in Response Times (Δt) Between the Physical Conditioning Group and the Control Group

| Measure | Δt (sec) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 0.212 | 0.111 |
| Response to “turn signal events” | -0.291 | -0.686 |
| Response to “word events” | 0.279 | 0.168 |
| Hazard detection | -0.856 | -0.391 |

As shown in these tables, *all* treatment groups evidenced performance gains relative to the control group on the most safety-critical measure, response time for peripheral hazard detection. Further, this improved performance was evident at both the immediate and the delayed post-treatment assessments. The Classroom+BTW treatment also improved performance on the central attention task (response to “word events”) at SIM2, though this result was not sustained at SIM3.

None of the treatment groups improved on the brake reaction time measure, relative to the control group, at either post-treatment assessment. Results for the turn signal response task were mixed, with only the Physical Conditioning group showing improved performance at both post-treatment assessments.

Significance Testing

Analysts conducted two-sample one-tailed t-tests to determine if any of these differences were statistically significant. This statistical analysis included the following steps:

1. For each time period (i.e., baseline, immediate post-treatment, delayed post-treatment) for each subject, we calculated the average value of the response times.
2. SIM2–SIM1 was calculated for each subject for comparison between baseline and immediate post-treatment. Similarly, SIM3–SIM1 was calculated for each subject for comparison between baseline and delayed post-treatment.
3. These differences were examined using multiple comparisons, i.e., a separate two-sample t-test between each treatment group and the control group. Analysts first conducted an F test to determine if there were significant differences in the variance between the treatment and control group. Depending on the results of the F test, the appropriate t-test (assuming equal or unequal variance) procedure was carried out.

As noted above, analysts performed one-tailed t-tests since the intent was to test the following hypotheses:

SIM2–SIM1 for treatment group < SIM2–SIM1 for control group
versus

SIM2–SIM1 for treatment group = SIM2–SIM1 for control group

SIM3–SIM1 for treatment group < SIM3–SIM1 for control group
versus

SIM3–SIM1 for treatment group = SIM3–SIM1 for control group

Since multiple comparisons (i.e., 4 comparisons) were performed with the same control group, it was appropriate to reduce the comparison-wise (CW) error rate for this inferential statistical test to be lower than the experiment-wise (EW) error rate. Based on the Bonferroni inequality, if the EW error rate is set at 0.05, then the CW error rate should be $0.05/4 = 0.0125$.

Tables 47-50 show the *t* values and *p* value for one-tailed tests. Negative *t* values indicate a performance improvement; a reduction in response time for the treatment group that was larger than the corresponding reduction for the control group.

Table 47. Results of t-Tests Between the Classroom+BTW Training Group and the Control Group

| Measure | t value (p value) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 1.72 (0.9469) | 2.57 (0.9890) |
| Response to “turn signal events” | -0.19 (0.4242) | 0.00 (0.5014) |
| Response to “word events” | -0.80 (0.2158) | 0.46 (0.6737) |
| Hazard detection | -1.38 (0.0893) | -2.08 (0.0241) |

Table 48. Results of t-Tests Between the Computer-Based Training Group and the Control Group

| Measure | t value (p value) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 1.36 (0.9055) | 0.03 (0.5115) |
| Response to “turn signal events” | 1.78 (0.9544) | 1.33 (0.8989) |
| Response to “word events” | 0.05 (0.5200) | 2.61 (0.9913) |
| Hazard detection | -0.65 (0.2603) | -1.44 (0.0823) |

Table 49. Results of t-Tests Between the OT-Administered Training Group and the Control Group

| Measure | t value (p value) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 1.02 (0.8369) | 0.32 (0.6239) |
| Response to “turn signal events” | 1.20 (0.8790) | -0.82 (0.2116) |
| Response to “word events” | 0.18 (0.5726) | 0.36 (0.6405) |
| Hazard detection | -1.04 (0.1531) | -1.85 (0.0387) |

Table 50. Results of t-Tests Between the Physical Conditioning Group and the Control Group

| Measure | t value (p value) | |
|----------------------------------|--|--------------------------------------|
| | At immediate post-treatment assessment | At delayed post-treatment assessment |
| Brake reaction | 1.47 (0.9200) | 0.99 (0.8324) |
| Response to “turn signal events” | -0.72 (0.2401) | -1.92 (0.0363) |
| Response to “word events” | 0.92 (0.8164) | 0.63 (0.7322) |
| Hazard detection | -1.64 (0.0584) | -0.79 (0.2199) |

As indicated in the preceding tables, none of the p values is less than the criterion of 0.0125. With these results, there is no reliable evidence that any of the treatments was effective in reducing the response time to the different events in the driving simulator. It may be noted, however, that these comparisons yielded p values that were less than .05 on the most safety-critical measure (hazard detection) for two treatment groups, Classroom+BTW training ($p = 0.024$) and OT-Administered training ($p = 0.039$), at the delayed post-treatment assessment. The performance gains for the Physical Conditioning group in response time for turn signal events at the immediate post-treatment assessment also approached significance ($p = 0.036$).

PARTICIPANT FEEDBACK

The driving evaluator discussed participants’ experience in this study by asking them to indicate their level of agreement with five different statements. To do this, they used a rating scale response ranging from 1 (strongly disagree) to 5 (strongly agree). The statements, which could vary in order of presentation from one participant to another, were:

1. Overall, my *on-road* drives accurately reflect my strengths and weaknesses during everyday driving.
2. Overall, my *driving simulator* drives accurately reflect my strengths and weaknesses during everyday driving.
3. The training activity I participated in will help me be a safer driver.
4. I would recommend this training activity to a friend or family member.
5. If I started this training activity on my own, outside of any research study, I would have completed all of my training sessions.

The 78 participants who completed all three on-road driving evaluations provided responses for Statements 1, 3, 4, and 5. Only 64 participants provided responses for Statement 2, those who completed at least the first Simulator appointment.

Table 51 presents summary statistics describing responses for Statements 1 through 5, collapsed across study groups. As shown in Table 51, there was little variability in the responses for the first statement; 96% of study participants either agreed or strongly agreed that the on-road drives accurately reflected their strengths and weaknesses during everyday driving. This was not the case with responses for the simulator drives, however; participants' responses showed the greatest variability for this item. In fact, Statement 2 was associated with the lowest level of agreement and the highest level of disagreement of all five statements. Generally high levels of agreement with Statements 3 through 5 were also shown, with the majority of participants across study groups indicating that the training activity would help make them a safer driver; that they would recommend the training activity to a friend or family member; and that they would have completed all training sessions had they not been enrolled in the research activity.

Table 51. Summary Statistics Describing Responses Across Study Groups

| Exit Survey Statement | Minimum Response | Maximum Response | Average | Standard Deviation | % in Agreement (Responses of 4 or 5) | % in Disagreement (Responses of 1 or 2) |
|-----------------------|------------------|------------------|---------|--------------------|--------------------------------------|---|
| 1 | 3 | 5 | 4.67 | 0.55 | 96% | 0 |
| 2 | 1 | 5 | 3.28 | 1.21 | 45% | 23% |
| 3 | 1 | 5 | 4.44 | 0.97 | 83% | 5% |
| 4 | 1 | 5 | 4.53 | 1.10 | 86% | 9% |
| 5 | 1 | 5 | 4.28 | 1.19 | 78% | 11% |

Next, analysis of variance (ANOVA) was applied to determine whether there were significant differences between study groups in how participants responded to each statement. No significant differences between groups were demonstrated in their responses for Statements 1, 2, and 5. Significant differences between study groups were found for Statements 3 and 4, as described below.

As shown in Table 52 and Figure 43, the majority of participants in each of the treatment groups strongly agreed (provided responses of 5) with the statement "*The training activity I participated in will help me be a safer driver.*" In comparison, only 47% of the control group participants strongly agreed, and only control group participants indicated disagreement with this statement (responses of 1 or 2).

An ANOVA found a significant difference $F(4,77) = 3.3, p < 0.015$, between groups on this statement. One-tailed t -tests between each treatment group and the controls isolated the source of the differences to contrasts between the control group and each of the following three treatment groups: Classroom + BTW Training ($\alpha=.01$); OT-Administered Training ($\alpha=.05$); and Physical Conditioning ($\alpha=.05$).

Table 52. Summary Statistics Describing Responses for Feedback Session Statement 3

| Group | N | S.3: “The training activity I participated in will help me be a safer driver.” 1=strongly disagree; 5=strongly agree | | | |
|-----------------------------|----|---|---------|---------|--------------------|
| | | Minimum | Maximum | Average | Standard Deviation |
| | | Classroom + BTW Training | 15 | 4 | 5 |
| Computer-Based Training | 17 | 3 | 5 | 4.29 | 0.85 |
| OT-Administered Training | 15 | 3 | 5 | 4.67 | 0.62 |
| Physical Conditioning Group | 14 | 3 | 5 | 4.71 | 0.73 |
| Control Group | 17 | 1 | 5 | 3.76 | 1.48 |

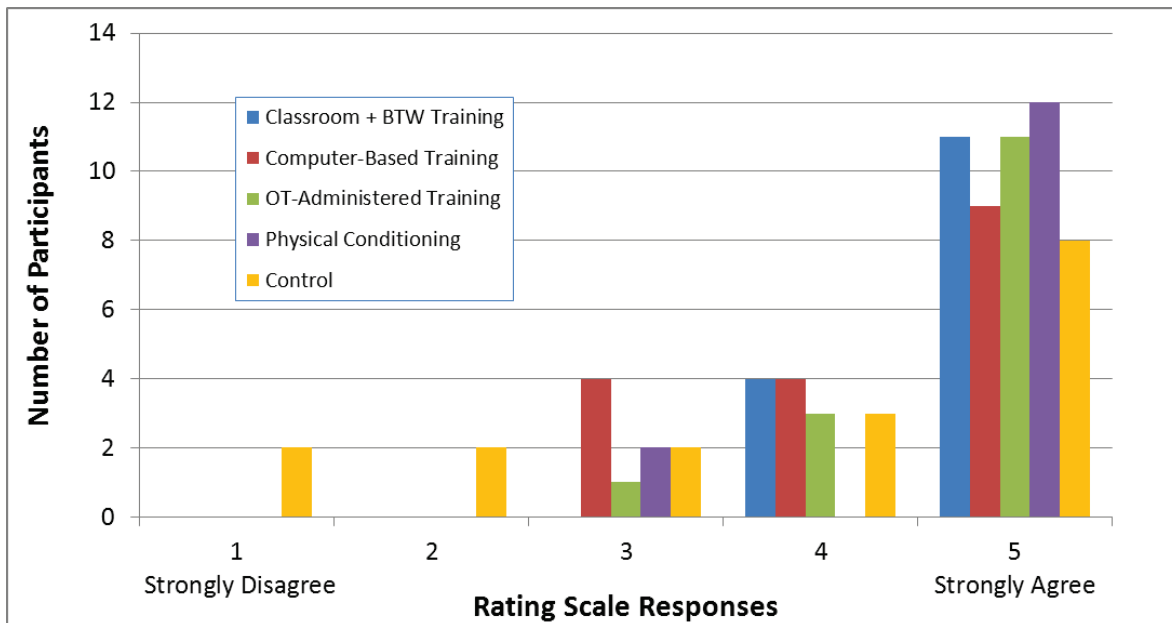


Figure 43. Responses for Feedback Session Statement 3, by Group

As shown in Table 53 and Figure 44, there was strong agreement across groups with the statement, “I would recommend this training activity to a friend or family member.” The Classroom + BTW Training group provided the largest percentage of “strongly agree” responses of all groups (100%), followed by the OT-Administered Training group (87%), the Physical Conditioning group (86%), the Computer-Based Training group (65%), and the control group (53%). Disagreement with this statement was registered only by participants in the Computer-Based Training group (12% of the participants) and the control group (29% of the participants).

An ANOVA found a significant difference, $F(4,77) = 4.60$, $p < 0.002$, between groups on this statement. One-tailed t -tests between each treatment group and the control isolated the source of the differences to contrasts between the control group and each of the following three treatment groups: Classroom + BTW Training ($\alpha=.01$); OT-Administered Training ($\alpha=.01$); and Physical Conditioning ($\alpha=.05$).

Table 53. Summary Statistics Describing Responses to Feedback Session Statement 4

| Group | N | S.4 “I would recommend this training activity to a friend or family member.” 1=strongly disagree; 5=strongly agree | | | |
|-----------------------------|----|---|---------|---------|--------------------|
| | | Minimum | Maximum | Average | Standard Deviation |
| Classroom + BTW Training | 15 | 5 | 5 | 5.0 | 0 |
| Computer-Based Training | 17 | 1 | 5 | 4.24 | 1.25 |
| OT-Administered Training | 15 | 4 | 5 | 4.87 | 0.35 |
| Physical Conditioning Group | 14 | 3 | 5 | 4.79 | 0.57 |
| Control Group | 17 | 1 | 5 | 3.71 | 1.65 |

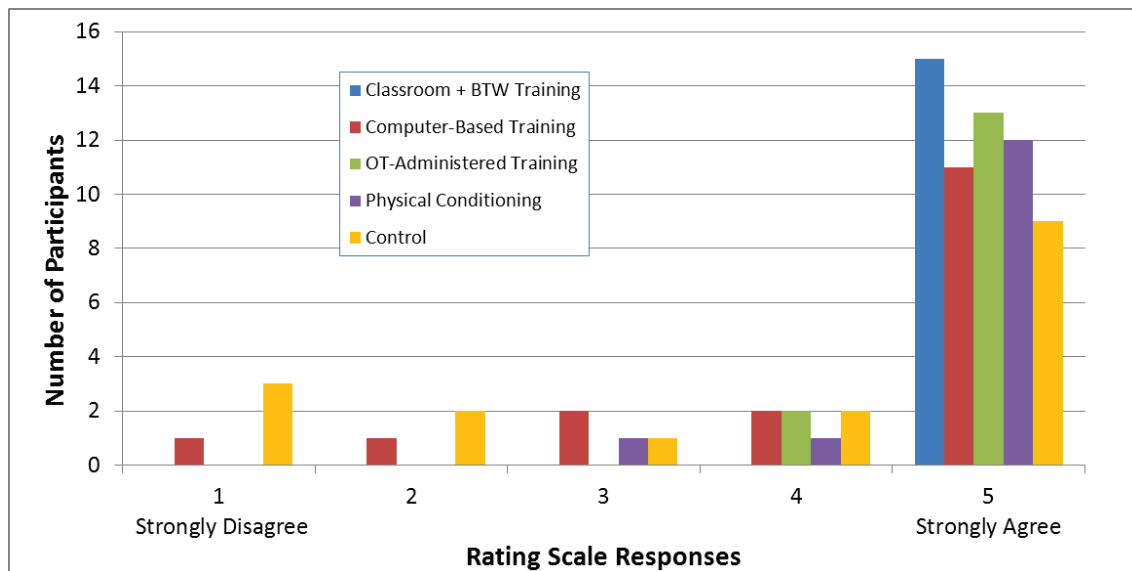


Figure 44. Responses for Feedback Session Statement 4, by Group

Finally, the driving evaluator asked whether participants had completed any other activity within the past year designed to help them be a safer driver, and if so to briefly describe it. Three of the 78 participants indicated involvement in such activity. These drivers (one from the Computer-Based Training group and two from the Physical Conditioning group) all reported having taken an AARP Driver Safety Program (DSP) class.

CONCLUSIONS AND DISCUSSION

This project has provided evidence of the effectiveness of selected examples of four broad categories of interventions designed to bolster safe performance among older drivers, using on-road assessments conducted by a CDRS both immediately following training, and three months later. The CDRS was blind to the type of training received by each study participant. Evidence from this research that such training could improve performance on a driving simulator was only marginally significant.

It is important to note that this was *not* a between-subjects research design with treatment condition as an independent variable. Rather, training effectiveness was gauged using planned comparisons between a particular intervention group and a matched control group, examining the relative difference scores between each pair of groups on the included performance measures as observed at the baseline (pre-training) assessment versus the immediate post-training assessment, and also the baseline assessment versus the delayed post-training assessment.

Neither was this research designed to evaluate the potential benefits of training for those older drivers who are most impaired – cognitively or otherwise – and pose the highest risks to themselves and others if they remain behind the wheel. The types of training programs examined in this study, both generically and specifically, are typically marketed to “normally aging” older drivers as a means of “extending the safe driving years,” i.e., conveying a message that, although the effects of aging on a range of abilities needed to drive safely may not be negated, they can be attenuated as key functional abilities improve through training, and these improvements then transfer to the driving task. This premise guided sample selection as well as the definition of measures of effectiveness in this study.

The study sample was drawn from a pool of active, healthy drivers 65 and older who were randomly assigned to one of the four treatment groups or to the control group. Not surprisingly, a large majority of the drivers in every group scored perfectly during the baseline assessment on a high proportion of the 33 dimensions of driving skill scored by the CDRS. The only exception was for the driving skill “divided attention—peripheral vision,” where the CDRS observed that most drivers with the opportunity to demonstrate this skill during the initial on-road evaluation failed to do so. The peripheral hazard detection task under divided attention conditions in the driving simulator targeted this same behavior.

The present measures of effectiveness were chosen to reflect the gains hypothesized to result from training activities undertaken by “well elderly” drivers, namely (1) a maintenance (with reinforcement) of skills for those already performing at the highest level, or (2) an improvement in performance for those (relatively few) who evidence deficits in driving skills during their pre-training assessment. More precisely, this research was designed to answer these questions: “*Will more drivers in a designated treatment group who earned the highest scores (4s) on their baseline assessments maintain this score on subsequent assessment(s) than control group drivers with comparable baseline scores?*” and, “*Will more drivers in a designated treatment group with skill deficits on their baseline assessments improve their scores on subsequent assessment(s), than control group drivers with deficits at baseline?*” A paired comparison of the relative percentages of drivers in each treatment-versus-control-group

combination whose scores changed as hypothesized above thus determined whether a training effect (benefit) was demonstrated in the on-road evaluations. In the driving simulator, relative gains in response latency for treatment groups versus the control group were hypothesized at each post-treatment assessment, compared to baseline measurements.

The four training approaches selected for the present study all offered sufficient construct validity to support an expectation of training benefits as defined herein; but questions remained about the transfer of training to driving. In this study, the measured outcomes were solely related to driving. While the research design called for participants in every training group and in the control group to receive an equal level (8 hours) of contact with staff on the research team, this only assured that people were actively engaged in training activities for comparable periods of time. Their performance on the training tasks themselves was not scored or analyzed.

While acknowledging clear limitations of sample size – only between 14 and 17 subjects in the various groups completed both the immediate and delayed on-road assessments – this evaluation produced several encouraging results. The OT-Administered Visual Skills Training, which showed the strongest gains relative to the control group, points to a new opportunity for those professionals *without* the relatively scarce ‘driver rehabilitation specialist’ certification to enhance seniors’ safety behind the wheel. The curriculum and resource materials as described in this report and appendices could support implementation of this training in clinical settings across the country. Results for the Classroom + BTW Training were nearly as impressive; and study participants saw practical value in this intervention more than in any other, based on comments during feedback sessions. This is important in a time when fewer and fewer seniors are enrolling in (classroom only) driver improvement courses, and those who do appear motivated not by safety gains so much as by discounts on auto insurance.

Though most effective, using the criteria applied in the on-road evaluation, it may be noted that the OT-Administered program is an intensive, one-on-one regimen that required the administering therapist to undergo special training to implement the protocol. And both this intervention and the Classroom + BTW Training required a driver education professional with a dual-brake car plus State-required certifications and insurances. These options accordingly are the most expensive among the training approaches examined in this study, which could limit access and therefore the potential benefits of these approaches.

The Physical Conditioning treatment was a less effective approach than either the OT-Administered Training or the Classroom + BTW Training, and it also requires special expertise and access to an appropriate facility. But, it can be delivered more cost-effectively, on a group basis. These exercises may merit special consideration for use in wellness programs for seniors because of a potential for broader health benefits in addition to maintaining or improving driving performance.

The Computer-Based Training approach was the least expensive and also the most convenient in the sense that older drivers could complete such training in a self-paced, self-administered program in their own homes rather than coming to a clinical setting, as they were required to do in this research. But apart from mixed results describing the effectiveness of this intervention, only the Computer-Based Training approach failed to elicit responses significantly

different from the control group during feedback sessions in terms of participants' agreement with the statements, "*The training activity I participated in will help me be a safer driver,*" and "*I would recommend this training activity to a friend or family member.*"

The simulator performance measures were largely equivocal across all treatment – control group comparisons. However, where results most closely approached statistical significance, on the most safety-critical behavior (hazard detection latency) measured in the simulator, the OT-Administered Training and Classroom + BTW Training groups showed the strongest improvements relative to the control group. At least some degree of convergent validation may be associated with these findings.

There are some important caveats when drawing conclusions from this study. It is possible that only those people who perform the best on a given training task will exhibit transfer-of-training to driving; we did not test this hypothesis in this work. It is also fair to question whether data from a 3-month follow-up evaluation provides a sufficient basis upon which to draw conclusions about the persistence of training effects. If a consumer invests eight hours of time in a training program, perhaps at substantial cost, it seems reasonable to expect a benefit lasting not months but years. Perhaps most critically, the present findings do not support conclusions about the potential for these training approaches to remediate serious deficits in driving skills, due to the generally strong competence of the study sample at baseline. Conversely, where gains have been indicated for a particular training approach in this research, the value of such training may be limited to those already performing at a very high level.

Finally, limitations must be acknowledged not only in terms of the restriction of range in driving skills in the study sample measured at baseline, but also with respect to the instruments used to measure them. The attrition of the study sample during the simulator study is a common problem that limits the usefulness of this methodology. The efficacy of the task demands contrived to manipulate allocation of attention in the simulator is not well documented. But shortcomings with the methods used to evaluate on-road performance are the most pressing concern.

The evaluation of on-road performance by a Driving Rehabilitation Specialist (DRS) has gained wide acceptance as the ultimate arbiter for determining fitness to drive. Investigations in the fields of traffic safety and injury prevention rely on DRS evaluations to test hypotheses about the significance of driver, vehicle, and environmental variables as factors in crash causation. The efficacy of interventions to allow persons with disabilities to drive is gauged by the results of a DRS evaluation. And, the license status of people recovering from disease or trauma, or suffering the effects of progressive decline in visual, physical or cognitive function, is often contingent upon their referral to a DRS. The aging of our population means that the demand for and reliance upon DRS evaluations will only increase in future years.

Performance behind the wheel is commonly scored by a DRS by first identifying broad domains of driving skill, such as *vehicle handling*, that in turn are comprised of specific behaviors including *smooth acceleration*, *smooth braking*, *smooth steering*, *comes to complete stops*, *maintains appropriate speed* and so forth. Cognitive domains, such as *visual search*, receive equal if not greater emphasis. In each case, the level of skill demonstrated for every

“component behavior” in the domain may be scored either dichotomously, e.g., *satisfactory* or *unsatisfactory*, or according to how frequently or consistently it is demonstrated, e.g., *none of the time*, *some of the time*, *most of the time*, or *all of the time*. More rarely, a DRS may generate scores for each performance domain through some arithmetic operation on the component behavior scores like summing or averaging; and, in similar fashion, generate a global score for the entire evaluation drive.

The evolution and proliferation of this type of scoring system attests to its value for translating the training and experience a DRS brings to a real world situation where driving task demands vary both predictably and randomly, into a structured set of observations with sufficient face validity and construct validity to support licensing decisions. However, there are also considerable limitations inherent in this approach.

One concern is that merely tabulating how often a “safe” behavior is evidenced over the course of an on-road evaluation obscures the importance of context. Does a driver who comes to a complete stop “most of the time” deserve a higher score (or connote a higher level of safety) than one who does so “some of the time,” if only the latter performs flawlessly at those particular intersections where design variables combine with operational or environmental conditions to produce the highest risk of conflicts? Or, does the rare but egregious driving error (e.g., running a red light), committed under mitigating circumstances (e.g., sun glare that reduces visibility), indicate lower competence than chronic, habitual failure to maintain a safe gap from a lead vehicle in traffic (following too closely)?

Equally problematic are the limitations that apply to data analysis, when driving performance is gauged in this manner. This type of measure is designed to, ultimately, produce an ordered set of outcomes, where the performance of one driver versus another is differentiated according to a monotonic scale: *safe* > *marginally safe* > *unsafe*. As noted earlier in this report, such a scale has only *ordinal* properties. A median value can be calculated for scores along this scale, and performance can be described in terms of percentiles. But statistics including the mean and standard deviation have no meaning on an ordinal scale, which precludes correlation or regression analyses, or analysis of variance. This is a major impediment when attempting to judge whether one type of training intervention is significantly better than another, based on the results of a DRS evaluation. A performance measurement scale with *interval* properties is needed to support inferential statistical tests.

One could envision a Likert-type scale that a DRS could use to rate “whole task” – or more specifically – “whole maneuver” performance. For example, as a driver approaches and enters an intersection to make an unprotected left turn, the DRS will certainly be sensitive to the latency and duration with which the driver’s attention was directed to threats/hazards that have a higher versus lower priority at every instant—priorities that change with every driver, at every intersection. While the DRS cannot be expected to quantify observations of this nature, they surely must shape the evaluator’s judgment about how a driver plans and executes the maneuver, evidencing appropriate “situational awareness” as s/he *integrates component skills* for successful whole task performance.

There is ample precedent, in the discipline of ecological psychology (cf. Barker, 1968), for a focus on a completed maneuver as the most meaningful unit of observation and analysis when evaluating driver performance. In this perspective, the same behaviors at the *molecular* level may, at different times, and/or in different situations, combine in ways that describe entirely different behaviors at the *molar* level. Consider another example: a driver's approach to and negotiation of a stop sign-controlled intersection. This is a "behavior setting" where each person interacting within the setting operates not only according to formal rules but also to informal rules or expectancies that are peculiar to that setting. A fraction of a second difference in the time that one driver versus another arrives at the intersection can have a profound effect on such expectancies. Many other examples could be cited where safe driving is more appropriately characterized at the molar than at the molecular level; that is, in terms of the flexible integration of whatever actions are required to successfully complete a maneuver without a violation of situational proprieties instead of (or in addition to) a score derived from a checklist of discrete, component behaviors.

What would be required to put this into practice? A starting point would be to define an inventory of maneuvers that encompass a large majority of situations encountered in everyday (noncommercial) driving, that are practical for a DRS to include in an on-road evaluation. These maneuvers would be described in terms of roadway geometric variables (e.g., number of lanes), operational variables (e.g., speed limit), traffic control devices (signs, signals, and markings), and maneuver intent. It is possible that a core set of driving situations could be defined that are common in virtually all urban/suburban locations, which would introduce a degree of standardization into evaluation procedures. At the same time, certain features such as roundabouts that are present in some communities but not others clearly indicate the need for a DRS to adapt this methodology to local conditions. What is important is that the DRS identifies a number of driving situations where "whole maneuver" performance can be assessed using a common scale. Responses that are aggregated across situations could be treated as interval data, and parametric statistical tests such as the analysis of variance could be applied. Considerable benefits for research and program evaluation would accrue from methodological advances in the scoring of driver performance.

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APPENDIX A

PROTOCOL FOR BEHIND-THE-WHEEL EXERCISES TO SUPPLEMENT CLASSROOM TRAINING

| Pre-Driving Orientation (not included in 60-minute BTW training) | | | | |
|---|-------------|-----------------------|--|---|
| Exercise | Loc. | Approx. Length | Objective(s) | Description |
| Ergonomic positioning in the vehicle | Range | 4-5 min | Allow students to properly position themselves in the training vehicle | Student should properly adjust seat, safety belt, mirrors, head restraint, and steering wheel. |
| Vehicle orientation | Range | 5-7 min | Allow student to become comfortable with training vehicle | Instructor should allow student to practice accelerating, braking and steering in a closed parking lot to get comfortable with the “feel” of the vehicle |
| Ready-set-go | Range | 1 min | To clear the mind of potential distractions before driving | <p>Step 1: Ready – When driver receives the car keys they say ready. (As if they are ready to start to drive)</p> <p>Step 2: Set – As the driver unlocks the door they say set</p> <p>Step 3: Go – As the driver inserts the key into the ignition and starts the car, they say go.</p> <p>This sequence of statements can be very effective in helping to clear the mind and prepare the driver for safe driving.</p> |

| Range/Parking Lot Exercises | | | | |
|--|-------------|-----------------------|--|--|
| Exercise | Loc. | Approx. Length | Objective(s) | Description |
| Establish a 20-30 second sightline (static) | Range | 2 min | Looking ahead down the range (road): Raise awareness of a 20 -30 second visual sight distance | From the driver's seat, student will identify an object that is 20 – 30 seconds away from a static position. This will be a pre-established point that the instructor will guide the student to look at/focus on. |
| Establish a 10-15 second sightline (static) | Range | 2 min | Looking ahead down the road: Raise awareness of a 12-15 second visual control zone | From the driver's seat, student will identify an object that is 12-15 seconds away from a static position. This will be a pre-established point that the instructor will guide the student to look at. |
| Figure -8 (look and steer) | Range | 10 min | Allow students to practice visual targeting- the eyes leading the hands and feet | Students will drive a low-speed (10-25 mph) figure eight course in a closed parking lot. Students will practice the concepts of targeting and looking and steering where they want the vehicle to go rather than looking at an object they might collide with. Sequence (approx. 2 minutes each): Orientation drive Focus on smooth steering Focus on smooth braking and accelerating Focus on looking where you want to go (not where you are) Focus on steering, braking, accelerating, and looking ahead |

| On-Road Exercises | | | | |
|---|---------|----------------|--|--|
| Exercise | Loc. | Approx. Length | Objective(s) | Description |
| Pre-drive exercises | Range | 3 min | Enhance attention and ability to engage in the training exercises | Blood flow enhancement exercises. Approx 35-40 seconds each: Physical movements Cross-arm rotations Arm windmills Cognitive engagement Opposing hand/knee exercise Figure-8 thumb tracking exercise Collarbone massage exercise |
| Establish a 20-30 second sightline | On-road | 2 min | Looking ahead down the road: Raise awareness of a 20 -30 second visual sight distance | Driver should establish a rolling 20 – 30 second visual lead time. Driver should explain to the instructor what they are looking at so driver may determine if it is a proper visual lead time |
| Commentary Driving 1 | On-road | 3-5 min | Enhance ability to Detect relevant events and situations Ignore irrelevant events and situations | Driver should provide instructor with commentary driving feedback: Verbally identify any condition or situation that might require the participant to alter the vehicle's (a) speed and/or (b) position. Stop vehicle for at least 1 minute after each commentary driving session <i>Note: This is different from traditional "commentary driving" which asks the driver to verbally describe everything in the driving environment, whether relevant to safe driving or not</i> |
| Basic Vehicle Control | On-road | 10 – 12 min | Assess and enhance participants' abilities to understand and execute basic maneuvers | Basic maneuvers would include, for example: Smooth acceleration Smooth braking Proper lane position Proper use of signals Smooth turning of steering wheel Examples of corrective instruction could include: Instructor directs participant to look further down the road Instructor provides feedback toward enhancing tracking (lane maintenance) |
| Commentary Driving 2 | On-road | 3-5 min | Raise awareness of traffic control devices | Driver should provide instructor with commentary driving feedback: Verbally identify any traffic control device that might require the |

| On-Road Exercises | | | | |
|-----------------------------|---------|----------------|--|---|
| Exercise | Loc. | Approx. Length | Objective(s) | Description |
| | | | | <p>participant to alter the vehicle's (a) speed and/or (b) position.</p> <p>Stop vehicle for at least 1 minute after each commentary driving session</p> |
| Commentary Driving 3 | On-road | 3-5 min | Raise awareness of other vehicles' influence on a drivers' speed and/or position | <p>Driver should provide instructor with commentary driving feedback: Verbally identify any other vehicle's movements that might require the participant to alter the vehicle's (a) speed and/or (b) position.</p> <p>Stop vehicle for at least 1 minute after each commentary driving session</p> |
| Commentary Driving 4 | On-road | 3-5 min | <p>Enhance ability to Detect relevant events and situations</p> <p>Ignore irrelevant events and situations</p> | <p>Repeat Commentary Driving 1</p> <p>Driver should provide instructor with commentary driving feedback: Verbally identify any condition or situation that might require the participant to alter the vehicle's (a) speed and/or (b) position.</p> <p>Stop vehicle for at least 1 minute after each commentary driving session</p> <p>Note: <i>This is different from traditional "commentary driving" which asks the driver to verbally describe everything in the driving environment, whether relevant to safe driving or not</i></p> |
| Review/ Feedback | On-road | 3 – 5 min | Provide feedback and recommendation on information obtained during the driving lesson | Instructor should provide feedback to the driver regarding performance on the lesson and make recommendation (if needed) for areas needing improvement |

APPENDIX B. OCCUPATIONAL THERAPY BASED VISUAL TREATMENT PROTOCOL FOR MAXIMIZING DRIVER SAFETY

Slide 1

**Occupational Therapy
Based Visual Treatment Protocol
For Maximizing Driver Safety**

**Validation of Training Programs
for Older Drivers**

Contract DTNH22-07-D-00049, Task Order 0005
from the National Highway Traffic Safety
Administration

(c) Driver Rehabilitation Services, P.A. 2010

Slide 2

Therapist Reminders

- This protocol is designed as a treatment intervention.
- This means that you should use your therapy skills to educate, train, encourage, and motivate those you are leading through the exercises.
- You should grade the activities if needed to best challenge and help your subjects develop skill.
- The protocol should be followed, but you should not forgo the skills inherent to any good OT treatment which include: understanding of the science behind the treatment, trained observation, therapeutic use of self, and client education.
- Develop rapport and make the tasks relevant to the subject. Help the person understand how each exercise is designed to optimize their driving safety.

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Slide 3

Use of the Cue Cards

- Black = Information for the therapist
- Red = General script to use with the subject
- Green = Supplies required (or to be eliminated) for each exercise

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Slide 4

General Overview of Protocol

- You are chosen to be a part of a treatment protocol that is aimed to maximize your visual skills for driver safety.
- Vision directs your movements, your learning, your social interactions and effects your emotions. Your vision is your most far reaching sense and can be cast ahead of you to gather information vital to your decision making and safety. This is especially vital for driving.
- These 8 sessions are Occupational Therapy based treatment protocols that work on your visual skills.
- 4 of the sessions will take place here, in a clinic based environment.
- The other 4 sessions will apply what you learned and practiced in the clinic setting to driving. In 3 of the sessions, I will drive and you will practice the skill from the passenger seat. On the final session, you will be the driver.

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General Overview of Protocol

- Athletes are a group of individuals that often work on maximizing their vision to perform athletic pursuits more effectively.
- Like these athletes, we are going to help you to work on your vision. Vision is not just seeing an image clearly. It is taking in information through your eyes in the most efficient manner and then processing this information with your brain to execute a task.
- Your brain makes sense of this information to help you carry out your tasks. In this case, your task is driving.
- Occupational Therapists have education in the visual system and understand the many ways your eyes work. Your two visual systems should work together with your “focusing system” gathering detailed information and your “peripheral system” regulating information related to movement and position.

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Session One and Two

Switching Attention

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Slide 7

Switching Attention Session One – In Clinic

Overview of Session with Subject

- The intent of the exercises for this session are to work on the ability to shift visual attention quickly and efficiently.
- This is required for safe driving. For example, quickly shifting your attention to the vehicle pulling onto the road and the car in front of you putting on it's brakes; or the light changing to yellow and the car beside you lane changing in front of you.
- Safe driving requires the ability to shift your attention quickly. It also demands that you are attending to information in your side or peripheral vision at the same time you are paying attention to your central vision or "focused" vision.
- Too often we get "tunnel" vision when driving.
- These 5 exercises require that you avoid tunnel vision and respond to multiple visual inputs.

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Slide 8

Switching Attention Session One – In Clinic

Exercise 1 – Divided Attention With Puppets

- Therapist has 2 stimuli (**Finger Puppets**) using one with each hand.
- Therapist sits directly across from subject and states:
 - I have two different colored puppets. I want you to maintain your vision on the red colored puppet until I call for you to switch to the green colored puppet.
 - Maintain your vision on the puppet I request until I ask you to switch.
 - Each time you switch correctly, you will earn a point. Each time I spot you moving your eyes too soon to the other stimulus, a point goes to me.
- Therapist moves both stimuli simultaneously keeping within the peripheral field of the non-focused stimulus and then requests the subject to "switch".
- Start **Timer**. Complete task for 3 repetitions of 2 minutes each. Ask subject to "beat" their previous score.

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Switching Attention Session One – In Clinic

Exercise 2 – Flashlight tracking

- Therapist has **2 flashlights with different color (red/green)** cellophane over the lenses.
- Therapist stands next to subject – 4” from wall in a room with a clean wall. Subject has **flashlight (no color)**.
 - I have a green and a red flashlight beam. Do you see the color differences on the wall?
 - You have a clear beam. I want you to track my red beam with your flashlight as I move the light beams on the wall.
 - Maintain your clear beam on my red beam until I ask you to switch to the green beam.
- Therapist moves both stimuli simultaneously keeping within the peripheral field of the non-focused stimulus and then requests the subject to “switch”.
- **Start Timer.** Task is performed for 2 minutes at a time for 3 repetitions.

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Switching Attention Session One – In Clinic

Exercise 3 – Rabbit Chase (PowerPoint “Rabbit Chase”)

- Subject stands 5 ½ feet from the screen.
- **Variety of songs provided from 40’s and 50’s** are playing
 - You will see a rabbit jumping across the screen. I want you to move your eyes to the rabbit, tracking its movements. I also want you to point to the rabbit as it jumps.
 - You need to switch your attention quickly when you are driving and this is a task that helps you practice this.
 - I hope you will hear one of your favorite “hits” as I am going to play some music while you do this task.
- **Start Timer.** Perform task for 3 minutes. Repeat after a break.

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Switching Attention Session One – In Clinic

Exercise 4 – Tom and Jerry (DVD – Tom and Jerry cartoon; PowerPoint “Tom and Jerry Central Objects – Random Timing”)

- The front of subjects chair is placed 12’ from the screen. A laptop computer is placed 24-28” in front of the client on a table.
- Therapist has Tom and Jerry episode set to start of cartoon on screen.
 - You are going to watch a cartoon of Tom and Jerry. You know the silly cat, Tom, who is always outwitted by the little mouse, Jerry.
 - I want you to focus on the cartoon and I am going to ask you to tell me about the content of the cartoon when it is over.
 - You also have a computer screen in front of you. There are randomly timed objects that will flash on the screen. I want you to move your vision to the computer screen only when the object changes and then to call out the object to me. Immediately switch your vision back to Tom and Jerry.
 - I am going to note if you miss any objects on the screen. But don’t forget, I also have some questions to ask you about the cartoon when it is over.
 - This is a skill you need for driving. It is the ability to switch your attention to other information while still maintaining the “big picture” of directing your vehicle to your destination.
- Therapist determines if the concept of the cartoon activities remains captured when the demand for switching attention increases.

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Switching Attention Session One – Home Exercises

- Think about the concept of switching your visual attention throughout the week.
- When you find yourself in a place with simultaneous movement - practice these concepts.

For example:

- The Ballgame: Focus on one player and their movement, while keeping track of other players movements. Then “switch” your visual focus to a different player. Keep switching between players.
- The Fireflies: At night, watch for fireflies. Keep your visual attention on one until it’s light goes out. Then switch to another firefly.
- Passenger: When riding as a passenger, keep your focus on another moving vehicle, while paying attention to your peripheral movement – then “switch”.
- People Watching: At the mall, park or other area where there are people moving, perform this task. Focus on one person and their movement while keeping track of one to two other people’s movement. Then switch between people.

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Switching Attention Session One – In Clinic

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Switching Attention Session Two – In Vehicle

Overview of Session with Subject

- The intent of this session is to put into practice the skill of switching attention when in a moving vehicle.
- Remember the exercises that we practiced in the clinical session:
 - The finger puppets where you moved your eyes to the other puppet when requested.
 - Flashlight tag where you chased my beam with yours and then I asked you to switch.
 - The Rabbit Chase where we played some fun music and you switched your eyes to the jumping rabbit.
 - The Tom and Jerry cartoon with the objects changing in front of you.
- Did you have a chance to practice these skills with your home exercises? How did it go?

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Switching Attention Session Two – In Vehicle

Overview of Session with Subject (continued)

- Now we are going to implement these skills in the vehicle.
- I will ask you to quickly shift your attention to pertinent information.
- I will lead you in where to shift your attention at first. Then I will ask you to continue the skills as we progress to more complex environments.
- This skill will help avoid getting tunnel vision when driving.

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Switching Attention Session Two – In Vehicle

Exercise 1 - Switching Attention for Straight-aways

- We are starting in this city area. I want you to switch your attention to information in front of the vehicle, then closer in. Switch your attention between any light changes, traffic signs, pedestrians, intersections and other vehicles. Call out to me where you are moving your vision. I am going to model it for your first.
- Every 5-8 seconds switch your attention quickly to your **rear view mirror** and then switch back to the front.
- Now it is your turn.


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Switching Attention Session Two—In Vehicle

Exercise 2 –Switching for Panel Information

- You also need to switch your attention to your control panel. We are going to practice this with the use of a **GPS** set to monitor speed.
- When I request, glance to the GPS positioned for your view to report posted speed and actual speed.
- Return your vision out the window.

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Switching Attention Session Two – In Vehicle

Exercise 3 - Switching Attention for Backing

Pull into a busy parking lot and park

- Now we are going to practice switching your attention when you back
- One of the most common crashes for the aging driver is a backing mishap. It might be fairly minor like striking a trash can or mail box when backing out of a driveway or side swiping another vehicle when backing out of a restaurant.
- Even so, this can be a sign that the person is not switching their full attention to the rear of the vehicle.

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Switching Attention Session Two – In Vehicle

Exercise 3 - Switching Attention for Backing (continued)

- So we are going to practice. Put gear selector in reverse
 - I am going to back up the car facing toward _____ (the store, the road, etc)
 - I want you to switch your attention by looking first in your rear view mirror to get an overall view of what appears to be behind you.
 - Then shift your attention to each side of the vehicle by turning your head.
 - Finally look behind the vehicle and maintain your attention there the entire time I am backing.
 - Put gear selector back in drive.
 - Now switch your attention back to the front of the vehicle.
- Practice at least 3-4 times. If possible park where there are pedestrians or other vehicles moving around your vehicle. This will aid in having the client identify hazards when backing and communicating the need to “wait” or “go”.

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Switching Attention Session Two – In Vehicle

Exercise 4 - Switching Attention on the Interstate to the rear and side of the vehicle

- Prepare to merge onto the interstate.
- We are getting ready to get on the interstate. I want you to work on switching your attention to the rear view mirror, side mirrors and turning your head to approaching vehicles from each side.
- As we merge onto the interstate, I want you to switch your attention to the vehicles whose path we will be entering on our left and the roadway in front of you.
- Practice switching your attention to vehicles to the left as I merge to the left.

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Switching Attention Session Two – In Vehicle

Exercise 4 - Switching Attention on the Interstate to the rear and side of the vehicle (continued)

- Once successfully on the interstate, provide the following instruction.
- Every 5-8 seconds glance in your **rear view and side mirrors**.
- Every time a vehicle approaches from behind on either the right or left side of your vehicle, switch your attention by turning your head and looking toward that vehicle.
- Then switch your attention back to the front of the vehicle.
- Call out to me where you are looking so I know you are actively switching your attention.
- Practice until you exit the interstate.

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Switching Attention Session Two – Home Exercises

- Think about the concept of switching your visual attention throughout the week.
 - When you are in a moving vehicle (driver or passenger) practice these techniques.
- For example:
- The stoplight: Switch your attention between stop lights, traffic in front of you and the speedometer.
 - The road signs: Quickly switch your glance to road signs, being aware of signage information.
 - The Straight away: Switch your attention between information far out, closer in, close by and to the right and left. Include switching attention to your mirrors.

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Switching Attention Session Two– In Vehicle

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Session Three and Four

Expanding Field of View

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Expanded Field of View Session Three – In Clinic

Overview of Session with Subject

- Did you have a chance to complete your home exercises from last session where we worked on switching attention? How did it go?
- The intent of the exercises for this session are to work on the ability to be aware of a larger visual space or having increased attention to your side vision.
- This is required for safe driving. If you are only focusing on what is directly in front of you, you are at high risk for a crash. You must be aware of what is happening 360° around your vehicle.
- Safe driving requires the ability attend to information in your side or peripheral vision at the same time you are paying attention to your central vision or “focused” vision. We worked on that some during the session on switching attention.
- These 8 exercises require that you avoid tunnel vision and respond to a larger visual surrounding.


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Bill Bradley

- Let me tell you a story.
- If you are a sports fan, you may remember Bill Bradley. He played basketball from 1967 to 1977 for the New York Knicks.
- He went on to become a U.S. senator.
- Bill Bradley was known for his outstanding peripheral visual skills.
- It turns out he'd been working on these skills for a long time.
- He told NBA fans in an online interview that "As a kid, I would walk the streets downtown with my eyes facing forward while trying to use my peripheral vision to see what was in the store windows,"
- His great peripheral vision skills helped him to be an excellent ball player.
- Today we are going to exercise your peripheral vision, just like Bill Bradley.

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Expanded Field of View Session Three: In-Clinic




Exercise 1 – Slow Peripheral Stop Signs

- Subject is 3' from the screen
- Utilize **Slow Peripheral Stop Signs** from provided PowerPoint. The small middle stop sign should be near eye level to the subject.
- **Instructions:**
 - Focus at all times on the small stop sign in the middle. It will change colors.
 - Using your peripheral or side vision, identify and reach toward the peripheral stop sign to each side that matches the color of the changing smaller middle stop sign.
 - Do not move your eyes to search for the correct response.
 - It is better to miss a few than “cheat” by moving your eyes.
 - Remember we are working on developing better side vision.
 - **Start Timer:** Complete for 2 minutes. Repeat after break.

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Expanded Field of View Session Three: In-Clinic



Exercise 2 –Fast Peripheral Stop Signs

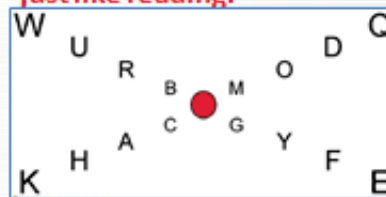
- Subject is 3' from the screen
- Utilize **Fast Peripheral Stop Signs** from
- Provided PowerPoint. The small middle stop sign should be at eye level to the subject.
- **Instructions:**
 - Focus at all times on the small stop sign in the middle.
 - Using your peripheral or side vision, identify and reach toward the peripheral stop sign to each side that matches the color of the changing smaller middle stop sign.
 - **Start Timer:** Complete for 2 minutes. Repeat after break

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Expanded Field of View Session Three: In-Clinic

Exercise 3 –Peripheral Expansion Chart

- **Subject is 3' from the screen**
- **Utilize Charts from Provided PowerPoint – Peripheral Expansion Chart**
- **The chart should be near eye level to the subject.**
- **Instructions:**
 - Focus at all times on the circle in the middle.
 - Using your side vision, call out the first four letters closest to the circle.
 - Work left to right, top to bottom - just like reading.
 - Then move out one range to the next four letters, and so on.
- **Complete each seat of charts .**



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Answers

- Slide 1:
 - B, M, C, G, R, O, A, Y, U, D, H, F, W, Q, K, E
- Slide 2:
 - U, Y, A, F, B, M, H, P, W, D, E, G, R, Q, C, K
- Slide 3:
 - V, C, K, B, G, E, Q, O, F, H, J, T, P, C, M, D
- Slide 4:
 - D, P, X, H, C, Q, W, O, L, F, T, D, J, C, M, X
- Slide 5:
 - V, C, K, B, W, O, N, S, X, D, W, P, Q, P, M, R

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Answers

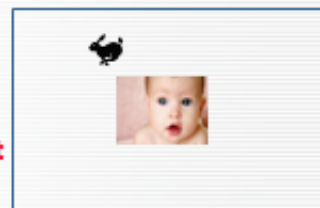
- Slide 6:
- Y, N, C, G, H, O, A, Y, E, J, I, F, R, K, K, D
- Slide 7:
 - U, Y, A, F, B, M, H, P, W, R, E, X, M, Q, Y, K
- Slide 8:
 - S, C, K, B, G, P, Q, O, F, H, I, T, P, A, M, D
- Slide 9:
 - D, P, L, H, C, Q, W, A, S, U, T, D, E, C, M, X
- Slide 10:
 - V, C, I, B, E, O, N, S, L, A, W, P, Z, P, T, R

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Expanded Field of View Session Three: In-Clinic

Exercise 4 – Rabbits with Central Image

- Subject is 3' from the screen
- Utilize Provided PowerPoint **Rabbit Chase with Central Object.**
- The central image should be at eye level to the subject.
- Instructions:
 - **Focus at all times on the central image.**
 - **Call out the name of the image as it changes. If you miss a name of an object that is ok. Move on to the next object.**
 - **At the same time, using your side vision, point your finger to the location of the moving rabbit.**
 - **Set Timer. Perform task for 2 minutes. Break. Repeat.**



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Expanded Field of View Session Three: In-Clinic

Exercise 5 – Peripheral Ball Toss - Throwing and catching exercises to train and develop peripheral visual skills

- Therapist stands 15 feet in front of subject.
- Therapist places a **sticker** on their nose or forehead and asks subject to maintain visual focus on the sticker.
- Therapist has **small foam balls**.
- Set **timer** for 3 minutes.



Instructions:

- **Keep your eyes on the sticker that I placed on me.**
- **While keeping your eyes there, I am going to throw a ball to either your right or left side.**
- **I want you to “see” the ball out of your side vision and attempt to make contact with the ball. You do not need to catch the ball. You may have to move just a little.**
- **Start timer and complete activity.**

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Expanded Field of View Session Three: In-Clinic

Exercise 6 – BALL TO WALL Throwing and catching exercise

Mark a spot on the wall just above eye level with a sticker.

Set **timer** to 3 minutes.

Provide subject with a **ball**.



Instructions:

- **Using only your peripheral vision, throw the ball against the wall above or to the side of the sticker such that it is in your side vision.**
- **Catch the ball as it bounces back to you off the wall.**
- **We will do this exercise for 3 minutes.**
- **Remember that this is working on your side vision. You should not focus on the ball but be able to watch it out of your side vision. This is working on the skill you need to see vehicles, pedestrians and other vital information out of your side vision when you are driving.**


Start timer and instruct to begin.

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Expanded Field of View Session Three: In-Clinic

Exercise 7 – The Bradley with Vision Rod

- Utilize the **vision rod with a sticker of an object on the ball** to provide a **fixed visual point** to capture the subject's central vision while exercising their peripheral awareness.
- **Road signs taped on wall of hallway.**
- **Have cold water available** in case this causes the subject to feel nauseous.



Therapist places a hat on their head to demonstrate and aid in subject feeling more comfortable.

Instructions:

- This exercise attempts to isolate and exercise your side vision.
- To do this, I have a fixed visual point to capture your central or focused vision.
- I want you to put on this hat like mine and "lock" your eyes on the picture at the end of the rod. This way, you are relying only on your peripheral vision to navigate your movement.
- Let's get a feel of it. While focusing on the picture at the tip of the rod, turn your head from side-to-side. Now move forward. Make sure subject is ok and not dizzy or nauseous.
- We are going to walk down this hallway. I have pictures of a road signs on the wall, both on the left and right.
- Keep your eyes on the sticker, but out of your side vision note and call out what type of sign you are passing. For example, a stop sign or a speed limit sign.
- Repeat 2-3 times.
- If the subject is tolerating well, you can also do this outside.

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Expanded Field of View Session Three: In-Clinic

Home Exercise: Park your Eyes by Nelson Zink

Review the below Home Exercise with the Subject and request that they carry this out prior to next session.

- **1. Get comfortable.** Turn on your television, it doesn't make any difference what program. If you normally wear glasses, you can put them on or leave them off, whichever is more comfortable (peripheral vision is unaffected by corrective lenses).
- **Step 2. Good distance.** Sit in a chair positioned about 15 feet from the television set and watch whatever is on.
- **Step 3. Eight minutes.** Without taking your eyes off the screen, start moving your attention around in the peripheral visual field.
- Concentrate on taking in the periphery. Do not move your eyes. The objective is to use your mind to see rather than the muscles in your eyes.
- Spend about one minute on each of the eight visual fields-top, bottom, top-right, bottom-left, middle-right, middle-left, bottom-right, top-left.

Notice the edge of the rug on the floor, the plant on the table by the window, the books on the shelf to the left.



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Expanded Field of View Session Three: In-Clinic

Home Exercise: (Continued)

- The important thing is to keep your eyes parked and focused on the screen. You don't have to stare at the screen, it's just a place to park your eyes and let your central vision settle. Quietly observe or attend to the colors and textures in the room, the bright spots and the shadows. The closer to the edges of the peripheral field an object is, the less definite its form will be, but you'll be surprised at how clearly you'll know what objects are without focusing on them.
- **Step 4. Seven minutes.** Still looking at the television, hold your arms out straight to the side from your shoulders, hands up, and slowly move your arms forward until you can see both hands at the extremes of your peripheral vision.
- Concentrate on placing equal and simultaneous attention on both hands. You might find it helps to wiggle your fingers and open your eyes a little wider than usual. Watch your hands for a minute or so and pay attention to the way you feel when seeing this way. Notice any changes in breathing and mood.
- Now concentrate again on the eight visual fields and try to focus your awareness simultaneously on more than one field. With practice, you will become aware of multiple peripheral visual fields. Start with two fields and work your way up to three, four, five and ultimately all eight fields. **Conclusion:** If, when you lock your attention solidly on the periphery, you sense a subtle but pronounced click that something is different, you've just entered the realm of peripheral awareness.

(<http://www.navaching.com/hawkeen/nwalk.html>)

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Expanded Field of View Session Three: In-Clinic

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Expanded Field of View Session Four– In Vehicle

Overview of Session with Subject

- The intent of this session is to put into practice the skill of expanding your field of view when in a moving vehicle.
- Remember the skills that we practiced in the clinical session:
 - Slow/Fast Peripheral Stop Signs
 - Peripheral Expansion Chart
 - Rabbit Chase with Central Images
 - Peripheral Ball Toss
 - Hallway walking with the Vision Rod to capture your focused vision and let you use your peripheral vision.
- Did you complete the home exercises for your peripheral vision? (discuss)
- Now we are going to implement these skills in the vehicle working on the ability to be aware of a larger visual space for increased attention to your side vision when driving.

} Review and discuss

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Expanded Field of View Session Four– In Vehicle

Overview of Session with Subject (continued)

- Good awareness of your side vision is required for safe driving. If you are only focusing on what is directly in front of you, you are at high risk for a crash. You must be aware of what is happening 360° around your vehicle.
- Safe driving requires the ability to attend to information in your side or peripheral vision at the same time you are paying attention to your central vision or “focused” vision.
- I will lead you in peripheral expansion practice in the vehicle. We will progress to more complex environments.
- This skill will help avoid getting tunnel vision when driving.

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Expanded Field of View

Session Four: In-Vehicle

Exercise - The Bradley (In-Vehicle) Use hat with central vision rod with sticker to aid in maintaining central fixation and request subject to maintain peripheral awareness.

- Starting in low congestion areas, vehicle moves with passenger "subject" maintaining vision "open". Identify passing by other vehicles, store fronts, pedestrians, etc. without turning head to identify specifics.
- Progress to increasing congested traffic environments and to increasing speeds.
- Coach by using verbiage such as "keep your vision soft and open"
- You should not be able to tell detail about what you are seeing. Just tell me general information such as "pedestrians, cross traffic, speed sign, etc."

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Slide 42

Expanded Field of View

Session Four: – Home Exercises

- Think about the concept of expanding your field of view throughout the week.
- When you are in a moving vehicle (driver or passenger) practice being more aware of what is happening to the sides of you. Try to be aware of this information while your maintaining a face forward position.

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Slide 43

Expanded Field of View Session Four – In Vehicle

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Session Five and Six

Clean Visual Routines (Ocular Motor Control)

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Clean Visual Routines Session Five– In Clinic

Set-up for exercises 1- 4

- For this session, subject is seated in front of television screen.
- Mock rear view and side mirrors are set as noted below to mimic vehicle. Use provided tri-pods and clamps to hold mirrors.**

Height of side mirrors from floor to top of mirror = 37"

Height of Rear View Mirror from floor to top of mirror = 46"

Chair has 17" floor to seat height

- Subject adjusts mirrors appropriately to mimic vehicle mirrors as noted in above diagram.

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Clean Visual Routines Session Five– In Clinic

Overview of Session with Subject

- The intent of the exercises for this session are to work on visual movements for most effectively analyzing your driving scene or to aid in making a particular driving maneuver.
- Maximizing your eye movement is beneficial for safe driving. If you know where to look and when to look, you will use your vision more effectively, thus increasing your safety. Looking at the wrong place at the wrong time could result in a crash.
- Safe driving requires the ability to use your vision to direct your driving decisions and maneuvers.
- These 4 exercises require that you avoid tunnel vision and respond to a larger visual surrounding.

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Clean Visual Routines Session Five– In Clinic

Exercise 1 –Straight Path of Travel Visual Routine

- There is a driver's education system called the Smith System. This system guides the driver in analyzing their driving environment. I am going to teach you the principles of the Smith System. They are:
 - Aim High
 - Keep Your Eyes Moving
 - Get the Big Picture
 - Leave yourself an Out
 - Make sure other roadway users see you (communication)

Extrapolate and give examples of these principles

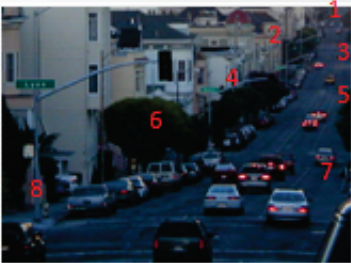
- Using traffic scenes provided in PowerPoint **Street Scenes** have subject practice these principles. For each scene ask:
 - What is the "big picture"?
 - Are there any events in this picture may influence the driver's next actions?
 - Will cars moving in your direction be affected if the driver changes direction suddenly?
 - Identify your "out".
- Acknowledge that in real environment subject must also scan rear view and side mirrors.
- Switch through 20 traffic scenes

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Clean Visual Routines Session Five– In Clinic

Exercise 2 - Visual Sweeping. Use PowerPoint **Street Scenes Sweeping Exercise (Remove Rear View Mirror to avoid screen obstruction)**

- Provide large traffic scenarios on screen.
- Instruct participant to visually sweep the scene starting out the farthest and working close up.
- Sweep visual gaze left to right, right to left
 - As you sweep identify information at each number:
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
- Switch through provided traffic scenes



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Clean Visual Routines Session Five– In Clinic

Exercise 3 – Visual Routine for Lane Changes/Merges from Power Point Lane Changes-Merges

- Subject is seated with therapist seated behind subject.
- Therapist reviews principles for safe lane changes/merges as follows:
 - We are going to practice the visual routine changing lanes and merging. You need to visually scan as follows:
 - First check your middle mirror for traffic
 - Then check your side mirror in the direction you wish to lane change or merge
 - Turn your head in that same direction looking over your shoulder to assess the blind spot
 - Determine if you are clear to go or not.
 - I will hold up a card that says “go” or “no/go” for you to observe in your mirror or with your blind spot.
- Therapist notes a right or left lane change or merge based on picture. Therapist randomly holds up a picture of a clear roadway or of a car to indicate if it is clear to proceed or if there is a vehicle in the path of travel. The picture is held such that the client can see it in the rear view or side mirror and the client says “yes” or “no” regarding if they can proceed with intended “lane change”.
- Switch through slides provided.

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Clean Visual Routines Session Five– In Clinic

Exercise 4 – Visual Routine for a turn, using PowerPoint “Turns”

- We are now going to review the principles for visual routines when turning:
 - Prepare for a turn by scanning ahead. Determine the type of turn such as a 4-way stop, a light controlled intersection, etc. Determine the path of travel for other vehicles that can affect your turn.
 - Scan ahead for destination lanes for path of travel.
 - Scan your rear view and side mirror as you approach the intersection.
 - What moving events are going to influence your next actions?
 - Will cars moving in your direction be affected if the driver changes direction suddenly?
 - Check over shoulder into blind spot area as you initiate the turn.
 - Check Rear view mirror as you come out of the turn.
- Using slides of turns, practice these visual routines with therapist initiating dialogue of the above questions.

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Supplemental Notes

At intersections:

Look both ways even if other traffic has a red light or a stop sign:

Look to the left first, since vehicles coming from the left are closer to you than vehicles coming from the right.

Look to the right.

Take one more look to the left in case there is a vehicle or a pedestrian you did not see the first time.

Do not rely on traffic signals. Some drivers do not obey traffic signals so before you enter an intersection, look left, right, and ahead for approaching traffic.

Clean Visual Routines Session Five– Home Exercises

- Think about the concept of keeping clean visual routines throughout the week.
- Ask at least one person where they look when making a:
 - Merge
 - Turn
 - Backing
- Explain the Smith System and Visual Sweeping techniques to another person.

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Clean Visual Routines Session Five– In Clinic

Wrap–up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Clean Visual Routines Session Six – In Vehicle

Overview of Session with Subject

- The intent of this session is to put into practice the skill of clean visual routines when in a moving vehicle.
- Remember the skills practiced in the clinical session:
 - The Smith System
 - Visual Sweeping
 - Visual Routine for Lane Changes or Merges
 - Visual Routine for Turns

} Refer back to session 5 cue cards for details

- Did you carry out your homework and explain this principles to another person? How did it go? (Discuss with subject. Record any feedback on feedback sheets)

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Clean Visual Routines Session Six – In Vehicle

Overview of Session with Subject (continued)

- Now we are going to implement these skills in the vehicle working to develop consistent visual routines for maneuvers.
- This is required for safe driving. If you are limiting your visual scanning when performing a maneuver such as changing lanes, turning or backing you are at a high risk for a crash.
- You must stay alert to what is happening around your vehicle.

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Clean Visual Routines Session Six– In Vehicle

Exercise 1 –Straight Path of Travel Visual Routine

- Provide rear view mirror for client's position in passenger seat.
- Let's review the principles for the Smith System and for Visual Sweeping. The Smith System teaches to:
 - Aim High
 - Keep Eyes Moving
 - Get the big picture
 - Leave yourself an out
 - Make sure they see you (communication)
- When visually sweeping you are looking far ahead and sweeping your vision left to right to gather information about your driving environment.
- Let's incorporate these 2 principles now. I am going to travelling straight. I want you to sweep your vision across the environment and tell me:
 - What is the "big picture"?
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
 - What moving events may influence my next actions?
 - Will cars moving in our direction be affected if the driver changes direction suddenly?
 - What moving cues not in your direct line of sight are grabbing your attention? Is this relevant information or not?
 - Where is our "out".

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Supplemental Notes:

Watch for Hazards-Look beyond the vehicle ahead of you. Do not develop a "fixed stare." Keep scanning. Check your rear view mirrors every five to eight seconds so you know the position of vehicles near you.

On the freeway, be ready for changes in traffic conditions. Watch for signals from other drivers. Expect merging vehicles at on-ramps and interchanges. Be prepared for rapid changes in road conditions and traffic flow. Know which lanes are clear so you can use them if necessary.

Clean Visual Routines Session Six – In Vehicle

Exercise 2 - Scan through a turn

- Pull over and review the principles for visual routines when turning with subject.
- **Let's review our visual routine for turning.**
 - Prepare for turning by scanning ahead and analyzing the type of intersection such as a light controlled intersection or a 4 way stop or a side street. Determine your path of travel for yourself and for other vehicles that may affect your turn.
 - Scan ahead for how you are going to direct your vehicle in the turn.
 - Scan your **rear view and side mirror** as you approach the intersection.
 - What moving events are going to influence my next actions?
 - Will cars moving in our direction be affected if the driver changes direction suddenly?
 - Check over your shoulder into the blind spot area as you initiate the turn.
 - Check the rear view mirror as you come out of the turn.
- Practice these visual routines for all turns encountered.

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Supplemental Notes:

At intersections:

Look both ways even if other traffic has a red light or a stop sign:

Look to the left first, since vehicles coming from the left are closer to you than vehicles coming from the right.

Look to the right.

Take one more look to the left in case there is a vehicle or a pedestrian you did not see the first time.

Do not rely on traffic signals. Some drivers do not obey traffic signals so before you enter an intersection, look left, right, and ahead for approaching traffic.

Clean Visual Routines Session Six– In Vehicle

Exercise 3 – Visual Routine for Lane Changes/Merges

- Let's review our visual routine for lane changes and merges.
 - You need to visually scan as follows:
 - First check your middle mirror for traffic
 - Then check your side mirror in the direction you wish to lane change or merge
 - Turn your head in that same direction looking over your shoulder to assess the blind spot
 - Determine if you are clear to go or not.
 - Let me know if it is clear to execute the lane change.
- Practice these visual routines for lane changes. Therapist should request some lane changes when it would NOT be safe to proceed in order for subject to identify “no-go” situations.

Clean Visual Routines Session Six – In Vehicle

Exercise 4 – Visual Routine for backing

Pull over and review Principles for visual routines when backing with subject.

We are going to work on the visual skills for backing. This skill was addressed during the first session of switching attention. However this task was not practiced in the clinic during our last session on visual routines as there would have only been conference tables and chairs to look at when we moved our vision to behind us. In the real world of driving we have information 360° around the vehicle. The routine for backing is critical to driver safety.

- One of the most common first “accidents” for an older driver is associated with backing. It may be a minor bump up with a mailbox or trash can. However, we want to avoid any mishap.
- Here are the steps:
 - Prepare for backing by scanning ahead and to the rear view and side mirrors to assure that it is clear to proceed.
 - After shifting the vehicle into reverse, look over your shoulder in the direction you are backing. Begin to move the vehicle and keep your eyes to the rear until you come to a complete stop.
 - Shift into “drive” and direct vision back out of front windshield.
 - As you proceed quickly glance in rear view mirror again.
- Practice the visual routine in several situations (backing out of parking spot, backing for a right and left side turn-around)

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Supplemental Notes:

At intersections:

Look both ways even if other traffic has a red light or a stop sign:

Look to the left first, since vehicles coming from the left are closer to you than vehicles coming from the right.

Look to the right.

Take one more look to the left in case there is a vehicle or a pedestrian you did not see the first time.

Do not rely on traffic signals. Some drivers do not obey traffic signals so before you enter an intersection, look left, right, and ahead for approaching traffic.

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Clean Visual Routines Session Six – Home Exercises

- Think about the concept of keeping clean visual routines throughout the week.
- When you are in a moving vehicle (driver or passenger) practice clean visual routines for:
 - Merges
 - Turns
 - Backing
- Practice the Smith System and Visual Sweeping on straight-aways.

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Clean Visual Routines Session Six– In Vehicle

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Session Seven and Eight

Multi-tasking Vision

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Review of Skills – Multi-tasking Vision

Session Seven– In Clinic

Overview of Session with Subject

- Did you carry out your home exercises? How did it go?
- The intent of the exercises for this session is to remind you of all the different visual demands of driving and the techniques we used to enhance your eye movements and vision. We have really been working on how your eyes and brain work together.
- We are going to repeat select exercises that you have done in previous sessions. I will give you feedback regarding if you have improved, declined or stayed the same in your performance.
- We will add some extra demands to some of the tasks because driving requires the ability to multi-task visual, cognitive and physical skill simultaneously.
- These 5 exercises demand that you use a multi-tasking approach to the activities, just like when you are driving.

Review of Skills Session Seven– In Clinic

Multi-tasking – Putting it Together

I want to show you a video that proves my point. Listen carefully to the instructions at the beginning of this video and do what you are instructed to do.


Provide example by playing video of Moonwalking Bear.

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Expanded Field of View Session Seven: In-Clinic

Exercise 1 –Fast Peripheral Stop Signs

- Utilize **Fast Peripheral Stop Signs** from
- **Provided PowerPoint.** The small middle stop sign should be at eye level to the subject.
- **Instructions:**
 - **Focus at all times on the small stop sign in the middle.**
 - **Using your peripheral or side vision, identify and reach toward the peripheral stop sign to each side that matches the color of the changing smaller middle stop sign.**
 - **Set Timer. Perform task for 2 minutes. Break. Repeat.**




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Expanded Field of View Session Seven: In-Clinic

Exercise 2 –Peripheral Expansion Chart

- Utilize Charts from Provided PowerPoint – **Peripheral Expansion Chart**
- The chart should be near eye level to the subject.
- Instructions:
 - Focus at all times on the circle in the middle.
 - Using your side vision, call out the first four letters closest to the circle.
 - Work left to right, top to bottom - just like reading.
 - Then move out one range to the next four letters, and so on.
 - This time there are also balls hanging to your right and left. I want you to keep this moving by lightly tapping them while you perform this exercise
- Complete each seat of charts .

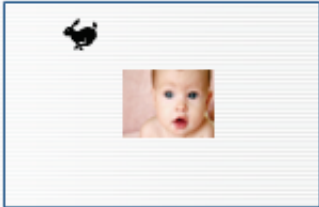


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Expanded Field of View Session Seven: In-Clinic

Exercise 3 – Rabbits with Central Image and Auditory Distraction

- Utilize Provided PowerPoint **Rabbit Chase with Central Object.**
- Play **provided songs from 40's and 50's.**
- The central image should be at eye level to the subject.
- Instructions:
 - Focus at all times on the central image.
 - Call out the name of the image as it changes. If you miss a name of an object that is ok. Move on to the next object.
 - At the same time, using your side vision, point your finger to the location of the moving rabbit.
 - **Set Timer. Perform task for 2 minutes. Break. Repeat.**



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Switching Attention Session Seven– In Clinic

Exercise 4 – Tom and Jerry (DVD – Tom and Jerry cartoon; PowerPoint Tom and Jerry Central Objects – Random Timing on two computers)

- The front of subjects chair is placed 12’ from the screen. A laptop computer is placed 24-28” in front of the client on a table.
- Therapist has Tom and Jerry episode set to start of cartoon on screen.
 - You are going to watch a cartoon of Tom and Jerry. You know the silly cat, Tom, who is always outwitted by the little mouse, Jerry.
 - I want you to focus on the cartoon and I am going to ask you to tell me about the content of the cartoon when it is over.
 - You also have 2 computer screens on each side of you. There are randomly timed objects that will flash on the screen. I want you to move your vision to the appropriate computer screen only when the object changes and then to call out the object to me. Immediately switch your vision back to Tom and Jerry.
 - I am going to note if you miss any objects on the screen. But don’t forget, I also have some questions to ask you about the cartoon when it is over.
 - This is a skill you need for driving. It is the ability to switch your attention to other information while still maintaining the “big picture” of directing your vehicle to your destination.
- Therapist determines if the concept of the cartoon activities remains captured when the demand for switching attention increases.

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Review of Skills Session Seven– In Clinic

Exercise 5 – Road Scenes with Peripheral Challenge

- Subject is standing 4-5’ in front of screen with two balls attached from ceiling on a string to each side of the subject.
- Use power point Alternating Smith System and Visual Scanning
- One the screen you will see road scenes. I want you to practice the
- Smith System and Visual Sweeping Principles. Let’s review them:
 - Aim High
 - Keep your eyes moving
 - Get the big picture
 - Leave yourself an out
 - Make sure they see you (communication)

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Review of Skills

Session Seven– In Clinic

Exercise 5 – Road Scenes with Peripheral Challenge (continued)

- Visual Sweeping is moving your vision from far out to closer in moving in a left to right, right to left sweeping pattern.
- These slides are randomly placed so some of them are cued for the visual sweeping activity and some I will ask you questions related to the Smith system.
- While we do this activity, I want you to keep the balls moving by gently batting them with each hand as they swing. Let the subject practice this skill.
- Progress through slides.

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Putting It All Together

Session Seven– Home Exercises

- Think about the concepts of:
 - Switching attention – Ahead of vehicle to dash panel, to mirrors, etc.
 - Field Expansion – Awareness of peripheral vision information
 - Clean Visual Routines: Smith System, Visual Sweeping, visual routines for turns, backing and lane changes.
- Review Previous Home Exercises and do those that are most challenging for you.

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Review of Skills

Session Seven– In Clinic

Wrap-up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Putting It to Use

Session Eight– Behind the Wheel

Multi-tasking – Putting it Together

- You have come a long way on developing good visual skills for increasing your safety behind the wheel. Today's session is an opportunity to integrate the skills that you have learned and practiced in previous sessions and to use these simultaneously for the task of driving
- Let's review the concepts of:
 - Switching Attention
 - Field Expansion
 - Clean Visual Routines

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Putting It to Use

Session Eight– Behind the Wheel

Review Switching Attention:

- Let's talk about the need to switch your attention.
- When driving you need to switch your attention quickly to look ahead of the vehicle, to other traffic, to signs and lights, to your dash panel, to mirrors, etc.
- It is important that you are able to switch readily and easily. For example, it is easy to let your vision stop as you approach an accident or observe the new store going up in your neighborhood. However, you must not let your vision stop there, but you must be able to switch it back to the road.

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Putting It to Use

Session Eight– Behind the Wheel

Review Field Expansion:

- Let's review the importance of keeping a wide open visual awareness.
- If you look too hard or overly focused, you will miss a great deal of vital information.
- Keeping your vision "soft and open" is important to having a full awareness of what is going on around you. You do not want to be surprised by a car passing you or someone crossing the street as you approach an intersection. A wide open view will provide this important information.

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Putting It to Use

Session Eight– Behind the Wheel

Review Clean Visual Routines:

- Let's review the importance of Clean Visual Routines.
- We know that good habits reap good rewards. Good visual habits for straight-aways and maneuvers reap the rewards of increased safety. Remember the Smith System, Visual Sweeping, and our visual routines for turns, backing and lane changes. These established patterns of eye movements for gathering important information will help you remain a safe driver for a longer time.

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Putting It to Use

Session Eight– Behind the Wheel

- Ok, you are the driver.
- Let's start in low traffic.
- We will progress to heavier traffic.
- I want to integrate the skills you have been working on in this real task of driving.

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Putting It to Use

Session Eight– Behind the Wheel

Low Traffic:

- **Verbalize the techniques you are using when driving.** If they need prompting use the following questions:
 - What is the “big picture”?
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
 - What moving events are going to influence your next actions?
 - Will cars moving in your direction be affected if you change direction suddenly?
 - Are you keeping your peripheral vision “soft and open” What moving cues not in your direct line of sight are grabbing your attention? Is this relevant information or not?
 - Identify your “out”.
 - Ask them to identify their visual routine for maneuvers such as lane changes, backing, turns.

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Putting It to Use

Session Eight– Behind the Wheel

Moderate Traffic:

- **Verbalize the techniques you are using when driving.** If they need prompting use the following questions:
 - What is the “big picture”?
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
 - What moving events are going to influence your next actions?
 - Will cars moving in your direction be affected if you change direction suddenly?
 - Are you keeping your peripheral vision “soft and open” What moving cues not in your direct line of sight are grabbing your attention? Is this relevant information or not?
 - Identify your “out”.
 - Ask them to identify their visual routine for maneuvers such as lane changes, backing, turns.

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Putting It to Use

Session Eight– Behind the Wheel

Congested Traffic and High Speed Traffic:

- Ask client to verbalize techniques they are using when driving. If they need prompting **Verbalize the techniques you are using when driving.** If they need prompting use the following questions:
 - What is the “big picture”?
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
 - What moving events are going to influence your next actions?
 - Will cars moving in your direction be affected if you change direction suddenly?
 - Are you keeping your peripheral vision “soft and open” What moving cues not in your direct line of sight are grabbing your attention? Is this relevant information or not?
 - Identify your “out”.
 - Ask them to identify their visual routine for maneuvers such as lane changes, backing, turns.

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Review of Skills

Session Eight– Behind the Wheel

Wrap–up(record answers on provided feedback form):

- Do you believe these skills will influence your safety when driving?
- Were there any skills that you would not use when driving?
- Which specific skills/techniques were most beneficial or did you like the most and why?
- Which specific skills/techniques were most difficult or you did not like and why?

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Putting It to Use Behind the Wheel

Remember these techniques you are using when driving.

- What is the “big picture”?
 - Signs and Signals
 - Roadway features
 - Motorized vehicles
 - Non-motorized highway users
- What moving events are going to influence your next actions?
- Will cars moving in your direction be affected if you change direction suddenly?
- Are you keeping your peripheral vision “soft and open” What moving cues not in your direct line of sight are grabbing your attention? Is this relevant information or not?
- Identify your “out”.

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FINAL THOUGHTS

- I hope that you will continue to think about and use these strategies to maintain safe driving practices.
- These exercises were designed specifically to address areas of concern for drivers as we age.
- They are intended to help you be vigilant in your visual awareness and scanning in order to make safe decisions and protect your safety and the safety of other road-way users.
- I am providing you with some cards to add to your homework assignments that review the main ideas we have addressed in this treatment protocol.
- Provide homework information cards for Switching Attention, Field Expansion, Clean Visual Routines

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Physical Motor Driver Enhancement and Rehabilitation Manual

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Physical Motor Driver Enhancement and Rehabilitation

Overview

Session Organization. Organization of the eight classes will include: (1) warm-up activities; (2) muscular strength and power exercises; (3) seated and standing endurance/balance activities and (4) moving balance/endurance and dual task activities. The session will conclude with a cool down activity followed by a period with time for participants to ask questions informally.

Activity Content. Based on the overall health and physical status of participants, the researchers will determine an appropriate beginning level of activity. Within a general framework of activities and to the extent possible, researchers will tailor activity progressions to meet the needs of all individuals. Activities and challenges will increase in difficulty throughout the four-week (8 hour) program and contribute to the overall progression of the group. Challenges will increase in volume and/or in intensity as needed throughout. Examples of the types of activities are described below.

Warm-ups will include a variety of active stretching and other simple movements. Participants will use stretch bands in the warm up activities. Muscular strength and power activities will focus on upper and lower extremities along with the core muscle groups. Strength activities will involve resistance in the form of weights moved at a moderate to slow velocity; power activities will involve lighter resistance moved at a faster velocity. Light aerobic activities will be incorporated into dynamic and static balance tasks by using simple neuromuscular coordination routines. The intensity and duration of the aerobic activities will be increased gradually as the program progresses.

Dynamic dual tasks will include performing two motor-based tasks simultaneously and/or performing cognitive and motor tasks simultaneously.

Exclusion Criteria

Lower extremity impairment

Neurological disorders

Visual impairment

Orthopedic issues

Recurrent dizziness or unsteadiness

Any medical conditions that interfere significantly with daily activities

Free from medications that may affect balance

Score of less than 25 on the Folstein Mimi Mental State Exam (MMSE)

Driver Physical Motor Enhancement/Rehabilitation

Areas of Focus:

The main areas of focus for Physical Motor Driver Enhancement and Rehabilitation are visual and tracking skill, dual tasks, cognition, and physical motor abilities. All activities are task specific and transferrable for driving. The program is adaptable so that each activity can be individualized, depending on the capabilities of each participant. The program progresses in volume and intensity, and can be continued at home.

Visual and tracking skill

Objectives:

- To Increase Visual Attention
- To Increase Visual Processing
- To Improve Tracking Skill
- To Improve Neck Range of Motion

Dual Tasks

Objectives:

- Increase the Ability to Divide Attention
- Increase the Ability to Selectively Attend
- Increase the Ability to Inhibit Distractions
- Increase the Ability to Switch Tasks
- Increase Vigilance
- Practice Simultaneous Physical Motor and Cognitive Tasks

Cognition

Objectives:

- Increase Ability to Inhibit Distractions
- Increase Ability to Switch Tasks
- Increase Vigilance
- Increase Ability to Navigate and Plan
- Impress the Importance of Decision Making

Physical Activity

Objectives:

- Increase Movement Speed
- Increase Range of Motion of:
 - Neck and spine
 - Arms and shoulders
 - Core
 - Knee
 - Hip
 - Ankle

Increase Flexibility and Stability of:

- Neck and spine
- Arms and shoulders
- Fingers
- Lower body
- Ankle
- Core

Increase Strength and Power of:

- Upper body
- Core
- Lower body
- Fingers
- Increase visual acuity

Driver Intervention: Lesson Plan 1

Introduction

Welcome and introductions. Let each person give a brief introduction and tell a fun or interesting fact about themselves.

Explain the purpose of the intervention—to work on physical motor and cognitive components that will transfer to driving in the car. Site the example of being able to see oncoming traffic over your left shoulder as you merge. Explain how range of motion of the neck, the ability to rotate the torso, and adequate leg strength are important in that moment to be able to successfully merge. Also explain how driving incorporates the ability to dual task. The driver must be able to read and process the road signs or glean information (especially directions) from a passenger while performing the motor component of driving.

Reveal what the sessions will include: flexibility, strength, power, response time, and cognitive dual tasks. Tell how each component is important to driving and how the improvement in each area may help driving skills, citing an example.

1. Flexibility refers to the range of motion about a specific joint. The ability to turn the neck helps a driver look over the shoulder to see traffic, while flexibility to reach over your shoulder allows a driver to put on the seat belt.
2. Strength is the ability to exert force on an object using muscles. Strength allows a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.
3. Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.
4. Cognitive dual tasks involve performing two tasks simultaneously. These may include a physical motor task and a cognitive task. For example, turning the steering wheel while activating the turn signal, or getting directions from your GPS while steering to stay in your lane.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase. For example, one must increase the number of repetitions or use additional weight.

Encourage the participants to engage a partner to do these exercises. Suggest that they minimize distractions. They should work on blocking out unimportant “noise” or distractions to concentrate on the important task at hand, just as they will do while driving.

Give each participant an exercise guide to encourage and reinforce home participation.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is that standing requires more stabilization muscles and greater range of motion.*

1. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
2. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
3. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
4. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
5. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse direction and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
6. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.
7. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
8. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
9. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
10. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
11. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
12. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
13. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as

comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.

1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

14. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 5 times.
15. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 5 times.
16. Sit to Stand—Begin in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 5 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions.
17. Knee Extensor—Begin in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 5 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
18. Pushups—Face a wall; maintain a distance of 12 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position.
19. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 5. Repeat 5 times.

Power Activities

20. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 15 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.
21. Pushups—Face a wall; maintain a distance of 12 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 15 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.

Dynamic Dual Tasks

Stop and Go

Have the participants pair up with one person sitting in the chair and the other standing 6 to 8 feet in front. Place a green yarn ball on the floor directly in front of the seated participant's right foot and a red yarn ball six inches to the left of the green one. Tell the participants that the green is the accelerator (GO) and the red is the brake (STOP). Have them practice pressing the gas pedal until you say stop, and then they should change to the red yarn ball (the brake).

Add the second component. Let the partner throw yarn balls to the person. Have several in different colors, but only one red ball. The "driver" or seated person should press the gas pedal until the red ball is thrown. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Have the "driver" tell their partner the directions to get from their house to the location where they are now. Continue to change the directions so that they must drive to the nearest grocery store, church, drug store, etc. from their house. During this time, the yarn balls continue coming, with the "driver" switching from the gas to the brake as the red ball is thrown.

Have the two partners switch places, making the standing partner the "driver."

Driver Intervention: Lesson Plan 2

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other. It prevents embarrassment.

Remind them that they are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how one's body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated standing requires more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. The ability to turn the neck to see traffic, even the flexibility to reach over your shoulder and put on the seat belt is important.

22. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
23. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
24. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
25. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
26. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
27. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift

- the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.
28. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
 29. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
 30. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
 31. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
 32. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
 33. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
 34. Runner’s Stretch (right)—Stand and directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 35. Runner’s Stretch (left)—Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

Remind the participants:

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

1. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 8 times.
2. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 8 times.
3. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 8 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this second session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
4. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 8 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
5. Pushups—Face wall, maintain a distance of at least 15 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
6. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 8. Repeat 6 times.

Power Activities

7. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 20 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.
8. Pushups—Face a wall; maintain a distance of 12 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 20 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.

Dynamic Dual Tasks

Cognitive dual tasks involve performing two tasks simultaneously. These may include a physical motor task and a cognitive task. For example, turning the steering wheel while activating the turn signal, or getting directions from your gps while steering to stay in your lane.

Road Trip

Have the participants sit in chairs in a circle at least 12 feet in diameter. Have each of the participants put a red ball between their feet and approximately 3 inches in front to simulate a brake, and place a green ball under the right foot as the gas. Let them practice putting their right

foot on the gas until you say the word, “stop.” When they hear the word, “stop,” they should move their right foot from the green ball to cover the red ball.

Add the second component. Throw the green ball to someone in the circle. Instruct the participants that when they catch the green ball, they should keep their foot on the gas. Let them practice throwing the ball at least once each so that they are comfortable throwing and catching the ball. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Tell the participants as they catch the green yarn ball, they must name a city, town, or country that they have visited or would like to visit. Let them practice with the green yarn ball several times, reciting the name of somewhere fun to visit as they each have a turn to practice.

Add an additional red ball and task. Add the red ball to the group so that two balls are being thrown at the same time. When they catch the red ball, they must switch to the brake (red ball), covering it with the foot. Remind them to continue naming a fun place if they catch the green ball, but that they must stop if they catch the red ball.

After the group has been successful at the red ball and green ball tasks, add an additional set of red and green balls to speed up the pace, if appropriate. Laugh with them and remind them to have fun.

Driver Intervention: Lesson Plan 3

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

9. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
10. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
11. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
12. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
13. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
14. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift

- the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.
15. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
 16. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
 17. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
 18. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
 19. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
 20. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
 21. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

1. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.
2. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.
3. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this session, add weights to the participants if they ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
4. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
5. Pushups—Face a wall; maintain a distance of at least 17 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
6. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 7 times.

Power Activities

7. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.
8. Pushups—Face a wall; maintain a distance of 12 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.

Dynamic Dual Tasks

Cognitive dual tasks involve performing two tasks simultaneously. These may include a physical motor task and a cognitive task. For example, turning the steering wheel while activating the turn signal, or getting directions from your GPS while steering to stay in your lane.

Street Search

Have the participants pair up and sit, facing one another, in chairs approximately 6 to 8 feet apart. Place a bucket or laundry basket between the two participants. Give each participant four different colored balls, but only one red for each participant. Give each participant one green and one red ball for their “pedals.” Have each participant place one green ball in front of their right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, then they should change to the red yarn ball or the brake.

Add the second component. Let the partners throw yarn balls into the basket (four balls, only one red, each). The “drivers” should press the gas pedal (green yarn ball) until the red ball is thrown. When their see their partner throw the red ball, drivers should switch from the gas pedal (green) to the brake (red), and they should throw their red yarn ball in the basket.

Add the third task. Have the “drivers” alternate giving the names of local streets while the yarn balls are still coming, and the “driver” switching from the gas to the brake when the red ball is thrown.

Driver Intervention: Lesson Plan 4

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

9. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
10. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
11. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
12. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
13. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
14. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift the left knee to touch the band, and return to a normal stance. The band can begin as low

- as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.
15. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
 16. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
 17. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
 18. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
 19. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
 20. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
 21. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

22. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.

23. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.
24. Sit to Stand—Begin in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this third session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
25. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
26. Pushups—Face a wall; maintain a distance of at least 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
27. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 8 times.

Power Activities

28. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity).
 1. After reaching a plateau in repetitions, increase the time in 10 second increments.
29. Pushups—Face a wall; maintain a distance of 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity).
 1. After reaching a plateau in repetitions, increase the time in 10 second increments.

Dynamic Dual Tasks

Stop and Go

Have the participants pair up with one person sitting in a chair and the other standing 6 to 8 feet in front. Place a green ball on the floor directly in front of the seated partner's right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, and then they should change to the red ball (the brake).

Add the second component. Let the partner throw yarn balls to the seated person. Have several different ball colors, but only one red one. The "driver" or seated person should press the gas

pedal until the red ball is thrown. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Have the “driver” tell their partner the directions to get from their house to the location where they are now. Continue to change the directions so that they must drive to the nearest grocery store, church, drug store, etc. from their house. They are to do this while the yarn balls are still coming, and the “driver” switching from the gas to the brake as the red ball is thrown.

Have the partners switch places so that the standing partner becomes the “driver.” Repeat for more fun!

Road Trip

Have the participants sit in chairs in a circle at least 12 feet in diameter. Have each of the participants put a red ball between their feet and approximately 3 inches in front as a brake, and place a green ball under the right foot as the gas. Let them practice putting their right foot on the gas until you say, “stop.” When they hear the word, “stop,” they should move their right foot from the green ball to cover the red ball.

Add the second component. Throw the green ball to someone in the circle. Instruct the participants that when they catch the green ball, they should keep their foot on the gas. Let them practice throwing the ball at least once each so that they are comfortable throwing and catching the ball. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Tell the participants as they catch the green yarn ball, they must name a city, town, or country that they have visited or would like to visit. Let them practice with the green ball several times, reciting the name of somewhere fun to visit as they each have a turn to practice.

Add an additional red ball and task. Add the red ball to the group so that two balls are being thrown at the same time. When they catch the red ball, they must switch to the brake (red ball) on the floor, covering it with the foot. Remind them to continue naming a fun place if they catch the green ball, but that they must stop if they catch the red ball.

After the group has been successful at this red ball, green ball task, add an additional set of red and green balls to speed up the pace, if appropriate. Laugh with them and remind them to have fun.

Driver Intervention: Lesson Plan 5

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

30. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
31. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
32. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
33. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
34. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
35. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift

- the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.
36. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
 37. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
 38. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
 39. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
 40. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
 41. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
 42. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

43. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.
44. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.
45. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
46. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
47. Pushups—Facing a wall, maintain a distance of at least 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
48. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 9 times.

Power Activities

49. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.
50. Pushups—Begin by facing a solid wall, maintain a distance of 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity). After reaching a plateau in repetitions, increase the time in 10 second increments.

Dynamic Dual Tasks

Road Trip

Have the participants sit in chairs in a circle at least 12 feet in diameter. Have each of the participants put a red ball between their feet and approximately 3 inches in front as a brake, and place a green ball under the right foot as the gas. Let them practice putting their right foot on the gas until you say, “stop.” When they hear the word, “stop,” they should move their right foot from the green ball to cover the red ball.

Add the second component. Throw the green ball to someone in the circle. Instruct the participants that when they catch the green ball, they should keep their foot on the gas. Let them

practice throwing the ball at least one each so that they are comfortable throwing and catching the yarn ball. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Tell the participants as they catch the green yarn ball, they must name a city, town, or country that they have visited or would like to visit. Let them practice with the green ball several times, reciting the name of somewhere fun to visit as they each have a turn to practice.

Add an additional red ball and task. Add the red ball to the group so that two balls are being thrown at the same time. When they catch the red ball, they must switch to the brake (red ball on the floor), covering it with the foot. Remind them to continue naming a fun place if they catch the green ball, but that they must stop if they catch the red ball.

After the group has been successful at this red ball, green ball task, add an additional set of red and green balls to speed up the pace, if appropriate. Laugh with them and remind them to have fun.

Street Search

Have the participants pair up and sit, facing one another, in chairs approximately 6 to 8 feet apart. Place a bucket or laundry basket between the two participants. Give each participant four different colored yarn balls, but only one red for each participant. Give each participant one green and one red yarn ball for their “pedals.” Have each participant place one green ball in front of their right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, when they should change to the red yarn ball or the brake.

Add the second component. Let the partners throw yarn balls into the basket (four balls, only one red, each). The “drivers” should press the gas pedal (green ball) until the red ball is thrown. When they see their partner throw the red ball, they should switch from the gas pedal (green) to the brake (red), and they should throw their red ball in the basket.

Add the third task. Have the “drivers” alternate giving the names of local streets while the balls are still coming, with the “driver” switching from the gas to the brake when the red ball is thrown.

Driver Intervention: Lesson Plan 6

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

51. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
52. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
53. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
54. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
55. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
56. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift

the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.

57. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
58. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
59. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
60. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
61. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
62. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
63. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

64. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.

65. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.
66. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
67. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
68. Pushups—Face a wall; maintain a distance of at least 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
69. Core—Stand with backs against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 10 times.

Power Activities

70. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!
71. Pushups—Face a wall, maintain a distance of 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!

Dynamic Dual Tasks

Stop and Go

Have the participants pair up with one person sitting in the chair and the other standing 6 to 8 feet in front. Place a green ball on the floor directly in front of the participant's right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, and then they should change to the red yarn ball or the brake.

Add the second component. Let the partner throw yarn balls to the person. Have several balls in different colors, but only one red ball. The "driver," or seated person, should press the gas pedal until the red ball is thrown. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Have the “driver” give their partner directions to get from their house to the location where they are now. Continue to change the directions so that they must drive to the nearest grocery store, church, drug store, etc. from their house, while the yarn balls are still coming, and the “driver” switching from the gas to the brake when the red ball is thrown.

Have the two partners switch places so the standing partner now becomes the “driver.” Repeat for more fun!

Street Search

Have the participants pair up and sit, facing one another, in chairs approximately 6 to 8 feet apart. Place a bucket or laundry basket between the two participants. Give each participant four different colored yarn balls but only one red for each participant. Give each participant one green and one red ball for their “pedals.” Have each participant place one green ball in front of their right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, when they should change to the red yarn ball (the brake).

Add the second component. Let the partners throw balls into the basket (four balls, only one red, each). The “drivers” should press the gas pedal (green ball) until the red ball is thrown. When they see their partner throw the red ball, they should switch from the gas pedal (green) to the brake (red), and they should throw their red ball in the basket.

Add the third task. Have the “drivers” alternate giving the names of local streets while the balls are still coming, and the “driver” switching from the gas to the brake when the red ball is thrown.

Driver Intervention: Lesson Plan 7

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

72. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
73. Shoulder Shrugs—Shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
74. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
75. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
76. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
77. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.

78. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
79. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
80. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
81. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
82. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
83. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
84. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

1. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.
2. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.

3. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
4. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
5. Pushups—Facing a wall; maintain a distance of at least 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
6. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 10 times.

Power Activities

1. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!
2. Pushups—Face a wall, maintain a distance of 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!

Dynamic Dual Tasks

Stop and Go

Have participants pair up with one person sitting in the chair and the other standing 6 to 8 feet in front. Place a green ball on the floor directly in front of the participant's right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, and then they should change to the red ball (the brake).

Add the second component. Let the partner throw yarn balls to the person. Have several in different colors, but only one red yarn ball. The “driver” or seated person should press the gas pedal until the red ball is thrown. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Have the “driver” tell their partner the directions to get from their house to the location where they are now. Continue to change the directions so that they must drive to the nearest grocery store, church, drug store, etc. from their house while the yarn balls are still coming, and the “driver” switching from the gas to the brake as the red ball is thrown. Have the partners switch places so the standing partner now becomes the “driver.” Repeat for more fun!

Road Trip

Have the participants sit in chairs in a circle at least 12 feet in diameter. Have each of the participants put a red ball between their feet and approximately 3 inches in front as a brake, and place a green ball under the right foot as the gas. Let them practice putting their right foot on the gas until you say the word, “stop.” When they hear the word, “stop,” they should move their right foot from the green ball to cover the red ball.

Add the second component. Throw the green ball to someone in the circle. Instruct the participants that when they catch the green ball, they should keep their foot on the gas. Let them practice throwing the ball at least once each so that they are comfortable throwing and catching the ball. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Tell the participants as they catch the green ball, they must tell a city, town, or country that they have visited or would like to visit. Let them practice with the green ball several times, reciting the name of somewhere fun to visit as they each have a turn to practice.

Add an additional red ball and task. Add the red ball to the group so that two balls are being thrown at the same time. When they catch the red ball, they must switch to the brake (red ball on the floor), covering it with the foot. Remind them to continue naming a fun place if they catch the green ball, but they must stop if they catch the red ball.

After the group has been successful at this red ball, green ball task, add an additional set of red and green balls to speed up the pace, if appropriate. Laugh with them and remind them to have fun.

Street Search

Have the participants pair up and sit, facing one another, in chairs approximately 6 to 8 feet apart. Place a bucket or laundry basket between the two participants. Give each participant four different colored balls, but only one red ball per participant. Give each participant one green and one red ball for their “pedals.” Have each participant place one green ball in front of their right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, then they should change to the red ball (the brake).

Add the second component. Let the partners throw balls into the basket (four balls, only one red, each). The “drivers” should press the gas pedal (green ball) until the red ball is thrown. When

their see their partner throw the red ball, they should switch from the gas pedal (green) to the brake (red), and they should throw their red ball in the basket.

Add the third task. Have the “drivers” alternate giving the names of local streets while the yarn balls are still coming, and the “driver” switching from the gas to the brake when the red ball is thrown.

Driver Intervention: Lesson Plan 8

Introduction

Welcome everyone and call them by name. You can use name tags if the participants do not know each other.

Remind them that we are going to work on physical motor and cognitive components that will transfer to driving in the car.

Explain how the body will adapt to a stimulus, so that doing the exercises will become easier. To continue to improve, intensity must increase by, for example, increasing the number of repetitions or using heavier weights.

Remind them to try to engage a partner to do these exercises with them and to minimize distractions.

Ask how many are using their exercise guide at home and encourage doing the exercises at home.

Warm ups (Flexibility)

**Although most of these flexibility exercises will be done standing, they can also be seated exercises. The rationale for standing rather than seated is the use of more stabilization muscles and greater range of motion.*

Remind the participants: Flexibility is important to increase range of motion about a specific joint. Explain that the American College of Sports Medicine (ACSM) recommends that they stretch every day so that they can remain flexible and mobile.

3. Head and Neck Rotations—Stand with feet shoulder width apart without locking the knees (behind a chair, for support, if dizzy or unsteady). Slowly roll head around in a circle, beginning at the front, then to the right, back to the front then to the left. Repeat 5 times.
4. Shoulder Shrugs—shrug shoulders up, push them gently back, and relax the shoulders down. Repeat 5 times.
5. Body Rotations—Grip stretch band with hands shoulder width apart. Hold band in front of the body and slowly rotate to the right, center, and left. Repeat 5 times.
6. Lateral Flexion—Hold stretch band in hands shoulder width apart. Raise the band overhead. Bend right, return to an upright position; bend left, and return to an upright position. Repeat 5 times.
7. Hip Rotations—Starting position: normal stance, knees easy, feet shoulder width apart, hands on hips or on the back of a chair. Rotate hips slowly to the right side, to the front, to the left side, and to the back in a circular motion as far and as comfortable. Repeat 5 times.
 1. Reverse directions and rotate hips slowly to the left side, to the front, to the right side, and to the back in a circular motion as far and as fast as comfortable. Repeat 5 times.
8. Balance—Hold the stretch band in hands shoulder width apart in front of the body at a comfortable height. Lift the right knee to touch the band, return to a normal stance, lift

the left knee to touch the band, and return to a normal stance. The band can begin as low as the arms will allow, but should be raised each session up to the waist as their balance, strength, and flexibility increases. Repeat 5 times for each leg.

9. Side Stepping—Stand with feet shoulder width apart and with hands on hips. Step with the right leg laterally as wide as comfortable and bring the left leg to the right ending in a normal stance. Step with the left leg laterally as wide as comfortable and bring the right leg to the left ending in a normal stance. Repeat 5 times.
10. Eversion—Stand with feet together, and move the toes outward as far as comfortable, leaving the heels together. Bring them back together. Hold onto the back of the chair if necessary for balance. Repeat 5 times.
11. Inversion—Stand with feet comfortably shoulder width apart, and move the toes inward as far as comfortable or until they touch. Return to starting position. Repeat 5 times.
12. Shoulder Stretch—Pull left arm across your chest. Grab left elbow with right hand and help stretch this shoulder gently. Relax and repeat. Pull right arm across chest. Grab right elbow your left hand and help stretch this shoulder gently. Relax and repeat.
13. Wrist Stretch—Interlace your fingers and stretch your arms out in front of you with thumbs pointing to the floor. Relax arms and repeat.
14. Finger and forearm stretch—Bend right hand backward. With the left hand, grab the fingers and pull backward gently. Relax, and then repeat. Change hands. With right hand, grab the fingers and pull backwards gently. Relax, and then repeat.
15. Runner’s Stretch—Stand directly behind a chair with the left side facing the chair. Extend the right leg with knee slightly bent. Keep the right heel on the floor and point the right toes to the ceiling. Slowly bend at the waist sliding the right hand down the leg as far as comfortable. Hold for a count of 5. Leave the left hand on the back of the chair for balance. The right leg should feel a slight tension along the back of the leg. Repeat 5 times.
 1. Switch legs with the right side facing the chair. Extend the left leg with the knee slightly bent. Keep the left heel on the floor and point the left toes to the ceiling. Slowly bend at the waist sliding the left hand down the leg as far as comfortable. Hold for a count of 5. Leave the right hand on the back of the chair for balance. The left leg should feel a slight tension along the back of the leg. Repeat 5 times.

Strength Activities

Strength is the ability to exert force on an object using muscles. Strength and agility allow a driver to get in and out of the car easily, or be able to press and release the gas pedal repeatedly.

Response time and power are related. Power is being able to exert force (strength) on an object using muscles quickly. Improving power improves your response time. An example would be pressing the gas pedal quickly to get out of the way of oncoming traffic, or changing from the gas pedal to the brake to avoid an unexpected cat in the road.

****NOTE:** Persons with knee/hip replacements or other joint injuries need to participate in strength and power training as recommended by their primary care physician.

1. Rockers—Place feet shoulder width apart with hands on hips or on the back of the chair. Rock back on the heels and hold. Return to normal. Repeat 10 times.
2. Raises—Place feet shoulder width apart with hands on hips or on the back of the chair. Rise up on the tips of the toes slowly and hold. Repeat 10 times.
3. Sit to Stand—Beginning in a seated position, stand up and return to sitting position. Try to stand independently without using the hands to push off the chair. Repeat 10 times.
 1. As the activity becomes easier, add weights to the thigh in ½ pound increments each week. Maintain progressive movements toward more weight and increasing repetitions. For this session, add weights if participants ask or complain that it is too easy. Don't press anyone to add weight unless they feel comfortable.
4. Knee Extensor—Beginning in a seated position, extend the right leg out until it is straight, and then bring it back to a normal seated position. Repeat 10 times.
 1. Repeat using the left leg.
 2. Add weights to the ankle in ½ pound increments each week as tolerated. Maintain progressive movements toward more weight and increasing repetitions.
5. Pushups—Face a wall; maintain a distance of at least 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance, keeping contact with the wall. Repeat 10 times.
 1. Progression includes moving the feet away from the wall a few inches at a time per week as comfortable, lowering toward a push up position. If a participant has trouble, do not increase the distance, and remember to accommodate for body size and structure.
6. Core—Stand with back against the wall. Pull the belly button to the spine and hold for a count of 10. Repeat 10 times.

Power Activities

1. Sit to Stand—Begin in a seated position, stand up and return to sitting position, AS FAST AS POSSIBLE. Try to stand independently without using the hands to push off the chair. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!
2. Pushups—Facing a wall; maintain a distance of 20 inches from the base of the wall to the toes. Put both hands against the wall at shoulder height, bending at the elbows until the shoulders are close to the wall. Push back to a normal stance as fast as possible, keeping contact with the wall. Do as many as possible in 30 seconds (time this activity). Ask how many repetitions they completed the session before and challenge them to do more!

Dynamic Dual Tasks

Stop and Go

Have the participants pair up with one person sitting in the chair and the other standing 6 to 8 feet in front. Place a green ball on the floor directly in front of the seated participant's right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO) is the gas and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, and then they should change to the red yarn ball (the brake).

Add the second component. Let the partner throw yarn balls to the person. Have several balls in different colors, but only one red ball. The “driver” or seated person should press the gas pedal until the red ball is thrown. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Have the “driver” tell their partner the directions to get from their house to the location where they are now. Continue to change the directions so that they must drive to the nearest grocery store, church, drug store, etc. from their house. At the same time, the balls are still coming, with the “driver” switching from the gas to the brake as the red ball is thrown. Have the partners switch places so the standing partner becomes the “driver.” Repeat for more fun!

Road Trip

Have the participants sit in chairs in a circle at least 12 feet in diameter. Have each participant put a red ball between their feet and approximately 3 inches in front as a simulation brake, and place a green ball under the right foot as the gas. Let them practice putting their right foot on the gas until you say the word, “stop.” When they hear the word, “stop,” they should move their right foot from the green ball to cover the red ball.

Add the second component. Throw the green ball to someone in the circle. Instruct the participants that when they catch the green ball, they should keep their foot on the gas. Let them practice throwing the ball at least one each so that they are comfortable throwing and catching the ball. When they see the red ball coming, they should switch from the gas pedal (green) to the brake (red).

Add the third task. Tell the participants as they catch the green yarn ball, they must name a city, town, or country that they have visited or would like to visit. Let them practice with the green ball several times, reciting the name of somewhere fun to visit as they each have a turn to practice.

Add an additional red ball task. Add the red ball to the group so that two balls are being thrown at the same time. When they catch the red ball, they must switch to the brake (red ball), covering it with the foot. Remind them to continue naming a fun place if they catch the green ball, but they must stop if they catch the red ball.

After the group has been successful at this red ball, green ball task, add an additional set of red and green balls to speed up the pace, if appropriate. Laugh with them and remind them to have fun.

Street Search

Have the participants pair up and sit, facing one another, in chairs approximately 6 to 8 feet apart. Place a bucket or laundry basket between the two participants. Give each participant four different colored balls but only one red for each participant. Give each participant one green and one red ball for their “pedals.” Have each participant place one green ball in front of their right foot and a red ball six inches to the left of the green one. Tell the participants that the green (GO)

is the accelerator and the red (STOP) is the brake. Have them practice pressing the gas pedal until you say stop, then they should change to the red yarn ball or the brake.

Add the second component. Let the partners throw yarn balls into the basket (four balls, only one red, each). The “drivers” should press the gas pedal (green ball) until the red ball is thrown. When they see their partner throw the red ball, they should switch from the gas pedal (green) to the brake (red), and they should throw their red ball in the basket.

Add the third task. Have the “drivers” alternate giving the names of local streets while the balls are still coming, and the “driver” switching from the gas to the brake when the red ball is thrown.

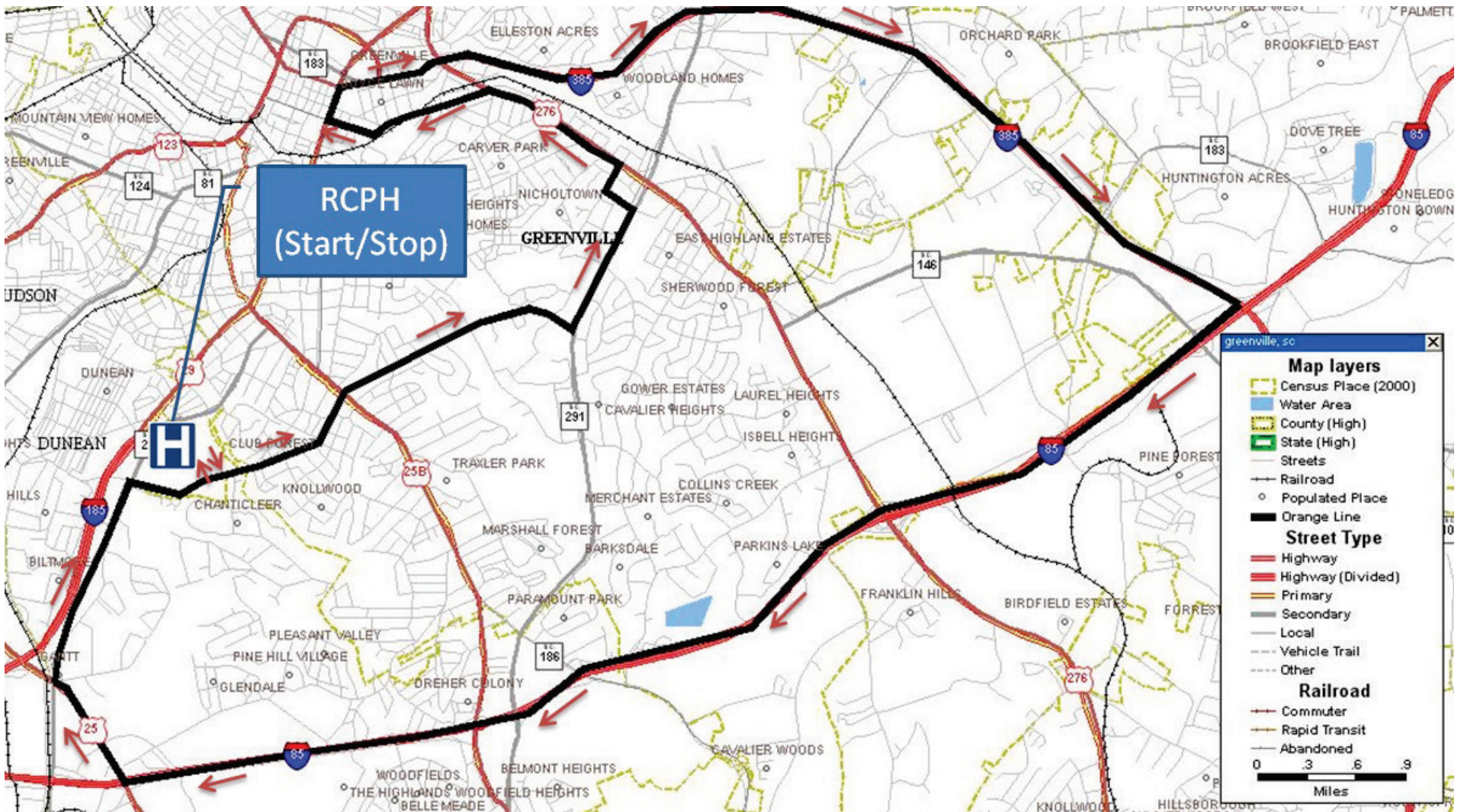
Test 1

Recommendations for Chair Stands per age bracket and sex

| Age | below average | average | above average |
|--------------|---------------|----------|---------------|
| Men | | | |
| 60-64 | < 14 | 14 to 19 | > 19 |
| 65-69 | < 12 | 12 to 18 | > 18 |
| 70-74 | < 12 | 12 to 17 | > 17 |
| 75-79 | < 11 | 11 to 17 | > 17 |
| 80-84 | < 10 | 10 to 15 | > 15 |
| 85-89 | < 8 | 8 to 14 | > 14 |
| 90-94 | < 7 | 7 to 12 | > 12 |
| Women | | | |
| Age | below average | average | above average |
| 60-64 | < 12 | 12 to 17 | > 17 |
| 65-69 | < 11 | 11 to 16 | > 16 |
| 70-74 | < 10 | 10 to 15 | > 15 |
| 75-79 | < 10 | 10 to 15 | > 15 |
| 80-84 | < 9 | 9 to 14 | > 14 |
| 85-89 | < 8 | 8 to 13 | > 13 |
| 90-94 | < 4 | 4 to 11 | > 11 |

**APPENDIX D: ON-ROAD EVALUATION TEST ROUTES AND TASK
DESCRIPTIONS, SCORING FORM, AND SPECIFIC SKILLS/BEHAVIORS
UNDERLYING EACH SUBSCALE**

ON-ROAD DRIVE 1



| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|----------------------------------|----------------------------|--------------|---------------------------|-------------------|------------------------------|----------------------------------|---|---|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 1 | Make a left turn onto W Faris RD | Hospital RD to W Farris RD | | Drive-Way to Local Street | 15 to 35 | 3 | 4 legged signalized intersection | Make permissive left turn (yield for through traffic) | - | Left on W Faris road, at traffic light with turn lane but no arrow (School zone, curve with mph restrictions, 2 way traffic on narrow road.) Yield to the thru traffic coming from the neighborhood |
| 2 | Drive straight on W Faris RD | W Farris RD | 0.885 | Urban Local Road | 35 | 1 | - | - | Low volume road but traffic density increases during peak hours | The lanes are very narrow and the visibility is low due to tree canopy. Hilly terrain, need to accelerate/decelerate and break properly to maintain speed limit. The route has school zone with pedestrian crossing signs. The road has some tight horizontal curves with reduced speed limit. Road side clear zone is smaller and there are electric poles located at regular intervals so need to be very careful while traversing the horizontal curves. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-------------|--------------|------------------|-------------------|------------------------------|----------------------------------|--|---|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 3 | Make a thru movement at Augusta St/W Faris RD intersection | W Farris RD | | Urban Local Road | 35 | 3 | 4 legged Signalized Intersection | Make thru movement on green. No turn on red signal | - | Straight at intersection of Augusta and Faris (must decide which lane out of three goes straight-road marking and signage on right). If in far right lane must merge immediately after intersection, signage indicating lane ending). If the participant gets on right turn lane by mistake then he/she has to note that it's a "no turn on red" signal. |
| 4 | Straight on to W Farris Road | W Farris RD | 0.861 | Urban Local Road | 35 | 1 | - | - | Low volume road but traffic density increases during peak hours | This stretch of the road is on a hilly terrain with a combination of some tight vertical crest and Sag curves. The sight distance on some crest curves is low and participant may get surprised with sudden decline in the gradient after traversing a crest vertical curve. The participant needs to maintain the speed limit by accelerating/decelerating and breaking properly. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|---|-------------|--------------|------------------|-------------------|------------------------------|----------------------------------|---|---|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 5 | Make a thru movement at Cleveland St/W Farris Rd Intersection | W Farris RD | | Urban Local Road | 35 | 3 | 4 legged signalized intersection | Make a thru movement on green. | Low volume road but traffic density increases during peak hours | This is an easy signal for a participant to pass through. There is one protected left turn lane, one through lane and one thru/right turn lane. |
| 6 | Drive straight on W Faris RD until S Pleasantburg DR. | W Farris RD | 0.674 | Urban Local Road | 40 | 2 | - | There are two signalized intersections until you reach S Pleasantburg DR. Both are at 0.34 miles and 0.523 miles from past signal (i.e. W Faris RD/Cleveland ST intersection) | Moderate traffic volume | The speed limit increases from 35mph to 40mph and number of lanes from 1 to 2 after crossing the intersection. Looks like the lane width increases slightly. The participant will encounter two signalized intersection and will have to make thru movements on each of them until he/she reaches S Pleasantburg drive. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-------------------------------|--------------|------------------------|-------------------|------------------------------|----------------------------------|--|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 7 | Take left turn at W Faris RD/S Pleasantburg Drive intersection | W Farris RD/S Pleasantburg RD | | Urban Collector Street | 40 | 2 | 3-legged signalized intersection | This is a T-intersection with two lanes. A dedicated left turn and a shared lane for left, thru and right movement of traffic. | Low-Moderate | Left on Pleasantburg Rd. (HWY 291). Both turn left and the right lane can also go straight or right. The participant is moving from low volume local street to moderately high volume collector street thus, must cope with the increased traffic volume. The road (W Faris Rd) is joining S Pleasantburg road at an angle, the participant may have to make a tight left turn and need to be cautious as there are two lanes turning left. There is a danger of crawling into adjacent lane while making turn (caution required). |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|---|-------------------------------|--------------|------------------------|---------------------|------------------------------|----------------------------------|--|--------------------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 8 | Drive straight onto S Pleasantburg Drive | S Pleasantburg RD | 0.82 | Urban Collector Street | 40 | 3 | - | There is one signalized intersection before you reach W Antrim Drive located at 0.413 miles from past signal (i.e. W Faris RD/S Pleasantburg DR) | Moderate-Moderately high | S Pleasantburg DR is a busy road. The participants need to cope with traversing from low volume local street (W Faris RD) to moderately high volume collector street (S Pleasantburg DR). There are pedestrian crossings at signals and the participant should cautious to give them right of way. |
| 9 | Left turn at S Pleasantburg DR/W Antrim DR intersection | S Pleasantburg RD/W Antrim DR | | Local Road | 40 | 3 | 4-legged signalized intersection | The intersection has dedicated left turn lane with protected left turn signal | Moderate-Moderately high | Left on Antrim Drive. Left turn arrow and left turn lane available. The participants need to change lanes safely amidst high traffic to get on to dedicated left turn lane. |
| 10 | Drive straight on W Antrim DR | W Antrim DR | 0.357 | Local Road | No speed Limit Sign | 2 | - | - | Low | The road has an approximately 90 degree horizontal curve midway with advisory speed limit sign. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|----------------------------|--------------|------------|-------------------|------------------------------|----------------------------------|---|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 11 | Left turn at W Antrim DR/Laurens RD Intersection | W Antrim DR/Laurens RD | | Local Road | | 2 | 3-legged signalized intersection | This is a T-intersection with two lanes. A dedicated left turn lane with protected left turn signal and a shared left/right turn lane. | Low-Moderate | Left onto Laurens RD. Two turn lanes. One on right turns left and right. This intersection has protected left turn and protected/permissive right turn movement, making it a less risky intersection. |
| 12 | Drive Straight on Laurens RD | Laurens RD | 0.913 | Local Road | 35 | 2 | - | A signalized intersection will be encountered before reaching E Washington street at 0.268 miles (approx) from W Antrim DR/Laurens RD Intersection. | Low-Moderate | The speed limit decreases to 35mph on this road. The participant will come across signalized intersection on Ackley RD and has to drive straight until E Washington RD is reached. |
| 13 | Left turn at Laurens RD/E Washington ST Intersection | Laurens RD/E Washington ST | | Local Road | 35 | 3 | 3-legged signalized intersection | This intersection has a dedicated left turn lane, and a two through movement lanes | Low-Moderate | Right on to Washington RD. When it splits. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-------------------------|--------------|------------|-------------------|------------------------------|----------------------------------|---|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 14 | Drive Straight on E Washington ST | E Washington ST | 1.27 | Local Road | 35-25 | 2.0-1.0 | - | This stretch of the road has 4 signalized intersections before reaching Main Street. The participant has to travel straight at all the intersections. The signals are located at 0.285, 0.668, 0.786 and 1.163 miles respectively from the Laurens RD/W Washington ST intersection. | Low | - |
| 15 | Turn right at E Washington ST/Main ST intersection | E Washington ST/Main ST | | Local Road | 25 | 1 | 4-legged signalized intersection | - | low | Right onto main street. Pedestrian crossing and pedestrian control lights |
| 16 | Turn right at Main ST/E North ST Intersection | Main ST/E North ST | 0.207 | Local Road | 25 | 1 | 4-legged signalized intersection | - | low | Right onto East North Street. Street is one way. Traffic starts to increase heavily prior to merging into I-385 |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|---------------------------------|----------------|--------------|--------------------|-------------------|------------------------------|----------------------------|--------------------|----------------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 17 | Travel straight onto E North ST | E North Street | 0.846 | Local Road | unknown | 3 | - | | Moderately high-High | - |
| 18 | Continue Straight onto I-385 | I 385 | 5.63 | Secondary Arterial | 55-65 | 3.0-4.0 | - | - | moderately high-high | Continue straight onto I-385. 3-4 lanes of traffic. Right lanes designated for particular exits. |
| 19 | Merge onto I-85 | I385-I85 | | Secondary Arterial | | | - | - | Moderate | Merge onto entrance ramp for I-85. This entrance ramp is in combination with an exit ramp. Must yield for exiting traffic while preparing to enter interstate. Heavily travelled by 18 wheeled vehicles. |
| 20 | Travel straight on I-85 | I-85 | 7.5 | Primary Arterial | 65 | 3 | - | - | moderately high-high | - |

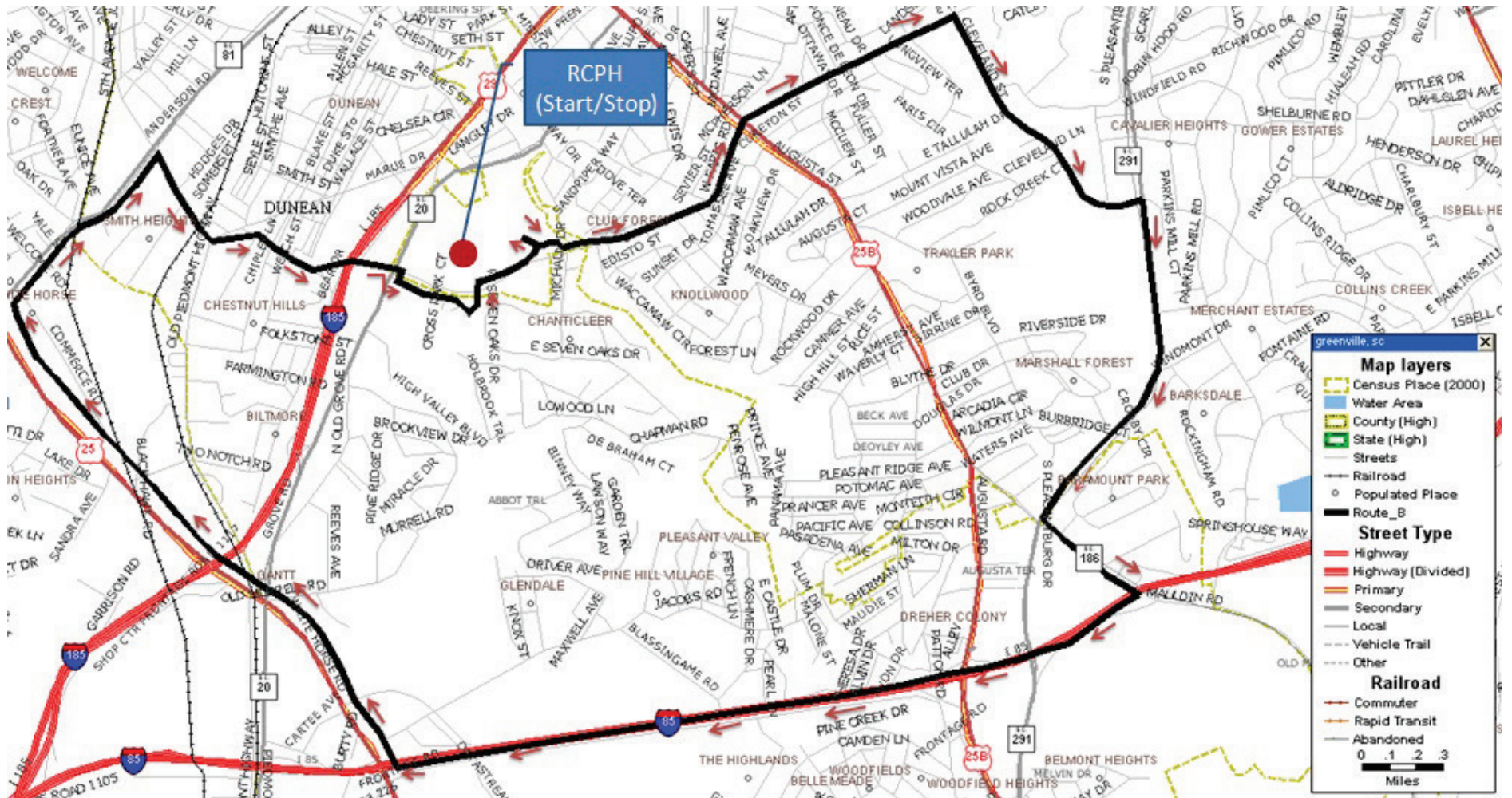
| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-----------------|--------------|-----------|-------------------|------------------------------|----------------------------------|--|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 21 | Take Exit 44 and turn right on to White Horse Road | Exit 44 on I-85 | 0.493 | Exit Ramp | - | 3 | 3-legged signalized intersection | This is a T-intersection with two dedicated left turn lanes and one dedicated right turn lane. | Moderate | The exit ramp has 2 lanes initially and increases to 3 lanes as intersection is approached. The lane has a dedicated right turn lane which merges to a separate lane on White Horse Road. Thus, there is no need for the participant to yield to other vehicles while making a right turn. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|-------------------------------------|------------------|--------------|------------------------|-------------------|------------------------------|----------------------------|--|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 22 | Travel straight on White Horse Road | White Horse Road | 0.666 | Urban Collector Street | 40 | 4.0-3.0 | - | A signalized intersection will be encountered (Frontage RD/White Horse Road) before reaching Grove Road at 0.181 miles (approx) after taking right from the exit ramp. | Moderate | This stretch of the road has four lanes initially and reduces to 3 lanes after crossing intersection between Frontage Rd/White Horse Road. The lane on the extreme right ends and the participant has to merge onto left. Merging to the left has to be done with extreme caution as the traffic is high and the lane ends very quickly after crossing the intersection. If the participant is waiting at the signal on the extreme right lane and there are vehicles waiting on the adjacent left lane then, the participant has to accelerate fast once the signal turns green to go ahead and then merge to the left or has to wait to let all the vehicles pass and then merge when appropriate gap is available. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-----------------------------|--------------|------------------|-------------------|------------------------------|----------------------------------|--|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 23 | Turn Right at intersection between White Horse Road/Grove RD | White Horse Road/Grove Road | | Urban Local Road | 35 | 2 | 4-legged signalized intersection | This intersection includes one dedicated left turn and right turn lanes with three dedicated thru lanes. | Moderate | The intersection leg has dedicated right turn lane. The participant can make right turn when the signal is green. But has to yield when making turn on red (this intersection is not a "no turn on red" signal) |
| 24 | Travel straight on Grove Rd | Grove Road | 1.3 | Urban Local Road | 35 | 2.0-1.0 | - | This stretch of road has 2 signalized intersections before reaching W Faris Road. Each one is located at distances of 0.36 miles and 0.964 miles respectively from White Horse Rd/Grove Rd intersection. | Moderate | This road stretch requires some merging and diverging. The number of lanes in each direction reduces from 2 lanes to 1 lane and increases again to 2 lanes when the W Faris road approaches nearer. The lane width on the two lane road is relatively less. |

| ON-ROAD DRIVE 1 | | | | | | | | | | |
|-----------------|--|-----------------------|--------------|------------------|-------------------|------------------------------|----------------------------------|---|-----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 25 | Turn Right at Grove RD/W Faris Rd intersection | Grove Road/W Faris Rd | | Urban Local Road | 35 | 2 | 4-legged signalized intersection | This intersection has a dedicated left turn lane, two through lanes and one dedicated right turn lane. | Low | This intersection has a dedicated right turn lane with a median separator. The participant has to yield to the traffic while making the right turn. |
| 26 | Travel straight on W Faris Rd | W Faris Road | 0.6 | Urban Local Road | 35 | 2 | - | This stretch has one signalized intersection (located at 0.6 miles from Grove RD/W Faris RD intersection) before reaching Hospital RD | Low volume road | This stretch of the road returns back on to the Roger C Peace Hospital. The participant has to make a lane change to the left lane before approaching the hospital road signal. |

ON-ROAD DRIVE 2



| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|--------------|--------------|---------------------------|-------------------|------------------------------|----------------------------------|---|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 1 | Leave from Roger C Peace Hospital and make a left turn on W Faris Rd. | W Faris Road | | Drive-Way to Local Street | 15 to 35 | 3 | 4 legged signalized intersection | Make permissive left turn (yield for through traffic) | - | Left on W Faris road, at traffic light with turn lane but no arrow (School zone, curve with mph restrictions, 2 way traffic on narrow road.) Yield to the thru traffic coming from the neighborhood |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|--|--------------|--------------|--------------------|-------------------|------------------------------|----------------------------------|--|---|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 2 | Make a thru movement at Augusta St/W Faris RD intersection | W Faris Road | 0.9 | Urban Local street | 30 | 1 | 4 legged Signalized Intersection | Make thru movement on green. No turn on red signal | Low volume road but traffic density increases during peak hours | Straight at intersection of Augusta and Faris (must decide which lane out of three goes straight-road marking and signage on right) If in far right lane must merge immediately after intersection, signage indicating lane ending). The lanes are very narrow and the visibility is low due to tree canopy. Hilly terrain, need to accelerate/decelerate and break properly to maintain speed limit. The route has school zone with pedestrian crossing signs. The road has some tight horizontal curves with reduced speed limit. Road side clear zone is smaller and there are electric poles located at regular intervals so need to be very careful while traversing the horizontal curves. If the participant gets on right turn lane by mistake then he/she has to note that it's a "no turn on red" signal. |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|----------------------------|--------------|--------------------|-------------------|------------------------------|----------------------------------|---|---|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 3 | Right turn at W Faris Rd/Cleveland Ave intersection | W Faris Road/Cleveland St. | | Urban Local street | 30 | 3 | 4 legged Signalized Intersection | This intersection has a dedicated left turn lane, one thru movement lane and one shared thru/right turn lane. | Low volume road but traffic density increases during peak hours | The participant has to come on to extreme right lane to take a right turn. The participant can make an easy right turn if the signal is green but, has to yield to the traffic on red. |
| 4 | Drive straight on Cleveland Ave | Cleveland Ave | 0.865 | Urban local street | 35 | 1 | - | - | Low volume road | College, daycare with pedestrian and bike lanes. This stretch of the road is a local road with one lane on each side. The area includes educational institution and day care. Thus the participant has to keep a keen watch on the roadside pedestrians and bikers while driving in order to avoid any incident. |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|------------------------------------|--------------|------------------------|-------------------|------------------------------|----------------------------------|---|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 5 | Right Turn at Cleveland Ave/S Pleasantburg Drive intersection | Cleveland Ave/S Pleasantburg Drive | | Urban collector street | 35 | 3 | 4 legged Signalized Intersection | This intersection has a dedicated left turn lane, one thru movement lane and one right turn lane. | - | Right at traffic light onto Pleasantburg Drive (Highway 291). 6 lanes of traffic, requires a lane change to middle lane. The participant is moving from a low volume Cleveland Avenue onto high volume Pleasantburg Drive. The participant has to cope with the sudden increase in traffic density and has to react fast to make required maneuver |
| 6 | Drive straight on S Pleasantburg Drive | S Pleasantburg Drive | 1.05 | Urban collector street | 40 | 3 | - | - | - | S Pleasantburg driver is one of the very busy roads in Greenville with 3 lanes in each direction and a two way left turn lane. The participant needs to keep knowledge of the position of the surrounding vehicles while making lane change to the middle lane, amidst heavy traffic (blind spot checks important). |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|---------------------------------|--------------|------------------------|-------------------|------------------------------|----------------------------------|--|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 7 | Left turn at S Pleasantburg Drive/Mauldin Rd intersection | S Pleasantburg Drive/Mauldin Rd | | Urban collector street | 35 | 6 | 4 legged Signalized Intersection | The intersection has two dedicated left turn lanes, three thru movement lanes and one dedicated right turn lane. The participant needs to choose to be in appropriate turn lane before approaching the stop line at the signal | Medium-High | Left on to Mauldin Road, (requires another left lane change and decision as to which turn lane of the two to be in). This intersection has two dedicated left turn lanes. The participant needs to move to the two extreme left lanes to before approaching the signal. |
| 8 | Drive straight on Mauldin Rd | Mauldin Rd | 0.45 | Urban collector street | 35 | 2 | - | - | Medium-High | This stretch of the road has two lanes in each direction with two way left turn lane. This is a short stretch of road and participant has to keep in the left most lane before approaching the immediate intersection to make a left turn. |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|------------|--------------|------------------|-------------------|------------------------------|----------------------------------|--|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 9 | Left onto entrance ramp of I-85 South (towards Atlanta) | Entry Ramp | | Exit Ramp | - | 1 | 3 legged signalized intersection | This is a T-intersection with dedicated left turn lane and two thru movement lanes | Medium-High | Left onto entrance ramp of I-85 going south (requires decision of which lane to be in, traffic light with turn signal). This intersection has a dedicated left turn lane. The participant has to move to extreme left lane before approaching the signal. |
| 10 | Merge and drive straight on I-85 south | I-85 | 2.81 | Primary Arterial | 60 | 3 | - | - | Medium | Merge onto multi-access ramp, must choose which lane to be in to merge onto I-85 south (far right lane). The participant is moving from a low speed collector streets to a high speed primary arterial road. Need to accelerate rapidly to the platoon speed and merge after finding appropriate gaps. The participants need to keep watch on vehicles that are merging at interchanges. |

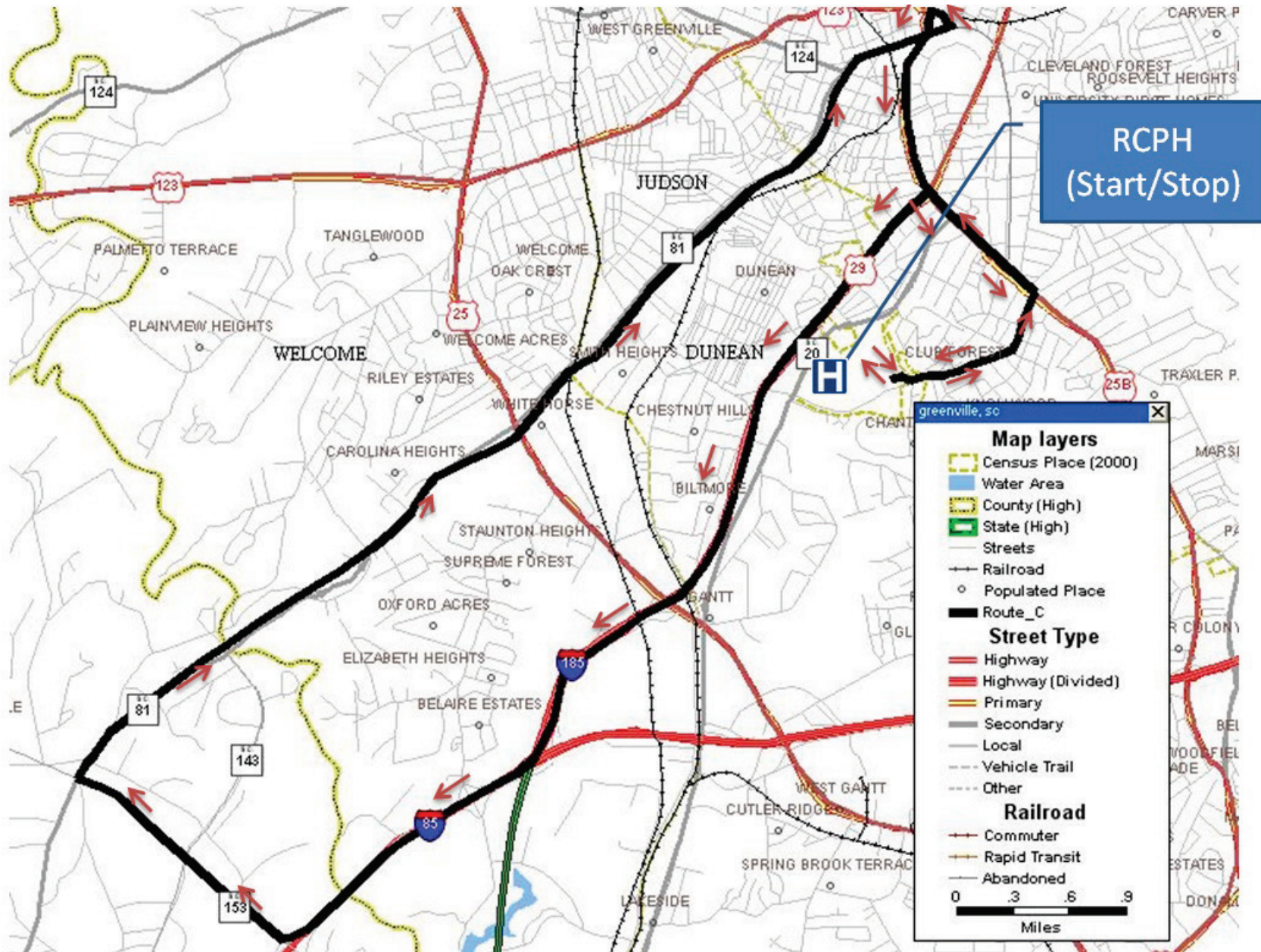
| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|---|------------------|--------------|------------------|-------------------|------------------------------|----------------------------|---|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 11 | Take exit 44B and turn right on to White Horse Road | White Horse Road | | Exit ramp | - | - | - | The intersection has two dedicated left turn lane and one dedicate right turn lane with median separator. | - | Take Exit 44 for White Horse Road (Hwy 25) must choose which lane to head north |
| 12 | Drive Straight on White Horse Road | White Horse Road | 0.784 | Collector street | 40 | 3 | - | - | Medium-High | Merge lane does not require a yield or stop, however lane eventually ends and requires lane change to left after approximately 3/10 of a mile. Signage twice. This is an easy right turn for the participant with dedicated right turn lane along with median separator. However, the right most lane ends after certain distance as such, the participant needs to make lane change to the left after finding appropriate gaps between vehicles. |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|--|------------------|--------------|------------------|-------------------|------------------------------|----------------------------------|---|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 13 | Make a Thru Movement at White Horse Road/Grove Road intersection | White Horse Road | | Collector street | 40 | 5 | 4 legged Signalized Intersection | A signalized intersection will be encountered at approximately 0.2 miles (Frontage Road/White Horse road) from the intersection between White Horse Road/Exit 44B) before reaching Grove road | medium-high | This stretch of the road has four lanes initially and reduces to 3 lanes after crossing intersection between Frontage Rd/White Horse Road. The lane on the extreme right ends and the participant has to merge onto left. Merging to the left has to be done with extreme caution as the traffic is high and the lane ends very quickly after crossing the intersection. If the participant is waiting at the signal on the extreme right lane and there are vehicles waiting on the adjacent left lane then, the participant has to accelerate fast once the signal turns green to go ahead and then merge to the left or has to wait to let all the vehicles pass and then merge when appropriate gap is available. |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|--|--|--------------|------------------------|-------------------|------------------------------|----------------------------------|--------------------|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 14 | Drive Straight on White Horse Road | White Horse Road | 1.41 | Collector street | 40 | - | - | - | medium | Hwy 25 North 6 lanes with Railroad crossing |
| 15 | Turn Right at White Horse Road/Anderson Road intersection | White Horse Road/Anderson Road | | Urban collector street | 50 | 4 | 4 legged Signalized Intersection | - | medium | Right onto Hwy 81 (4 lanes of traffic) |
| 16 | Drive Straight on Anderson Road | Anderson Road | 0.76 | Urban collector street | 50 | - | - | - | medium | - |
| 17 | Turn Right at Anderson Road/S Washington Avenue/W Faris Road | Anderson Road/S Washington Avenue/W Faris Road | | Urban Local street | 50 | 3 | 4 legged Signalized Intersection | - | medium | Right on Faris Rd. (railroad crossing and steep curve) Signage for all |
| 18 | Drive straight on S Washington Avenue/W Faris Road | S Washington Avenue/W Faris Road | 1.11 | Urban Local street | 40 | - | - | - | medium | - |
| 19 | Turn Right at W Faris Rd/Grove Road intersection | W Faris Road/Grove Road | | Urban Local street | 40 | 3 | 4 legged Signalized Intersection | - | medium-high | Right on Grove Rd at large traffic light controlled intersection, right turn lane. |
| 20 | Drive Straight on Grove Road | Grove Road | 0.05 | Urban Local street | 35 | - | - | - | medium-high | - |

| ON-ROAD DRIVE 2 | | | | | | | | | | |
|-----------------|--|---------------------------|--------------|--------------|-------------------|------------------------------|----------------------------|--------------------|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS NOTES |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 21 | Left turn at Grove Road/Park Creek Dr | Grove Road/Park Creek Dr | | Local street | 25 | 1 | Un-Signalized intersection | - | low | Must immediately merge over to left lane to take next left into Park Creek complex, no turn signal, turn lane |
| 22 | Drive Straight on Park Creek Dr | Park Creek Dr | 0.42 | Local street | 25 | 1 | - | - | low | Travel through complex with multiple speed humps and a traffic circle |
| 23 | Turn Left at Park Creek Dr/Doctors Dr. intersection | Park Creek Dr/Doctors Dr. | | Local street | 25 | 1 | - | - | - | - |
| 24 | Drive Straight into Greenville Hospital Systems campus | Doctors Dr | | Local street | 25 | - | - | - | low | Straight at traffic light onto GHS campus. Must choose correct lane. Road markings |
| 25 | Return back to Roger C Peace Hospital | Drive way | 0.5 | Drive way | 15 | 1 | - | - | - | - |

ON-ROAD DRIVE 3



| ON-ROAD DRIVE 3 | | | | | | | | | | |
|-----------------|--|---------------------------|--------------|--------------------|-------------------|------------------------------|----------------------------------|---|---|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 1 | Leave from Roger C Peace Hospital and make a left turn on W Farris Rd. | Drive-Way to Local Street | | Drive way | 15 to 35 | 3 | 4 legged signalized intersection | Make permissive left turn (yield for through traffic) | - | Left on W Farris road, at traffic light with turn lane but no arrow (School zone, curve with mph restrictions, 2 way traffic on narrow road. Yield to the thru traffic coming from the neighborhood. |
| 2 | Drive Straight on W Farris Road | W Farris Road | 0.89 | Urban local street | 35 | 1 | - | - | Low volume road but traffic density increases during peak hours | The lanes are very narrow and the visibility is low due to tree canopy. Hilly terrain, need to accelerate/decelerate and break properly to maintain speed limit. The route has school zone with pedestrian crossing signs. The road has some tight horizontal curves with reduced speed limit. Road side clear zone is smaller and there are electric poles located at regular intervals so need to be very careful while traversing the horizontal curves. |

ON-ROAD DRIVE 3

| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
|--------|--|------------------------------|--------------|--------------------|-------------------|------------------------------|--|--|----------------|---|
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 3 | Left turn at Augusta Street/W Farris Road intersection | Augusta Street/W Farris Road | | Urban local street | 35 | 3 | 4 legged Signalized Intersection | Make thru movement on green. No turn on red signal | - | Left at intersection of Augusta and Farris. Road marking and signage on right. The intersection leg has one left, thru and right turn lane. Participant has to make a decision to get onto left turn lane. |
| 4 | Drive Straight on Augusta Street | Augusta Street | 0.784 | Urban local street | 30 | 2 | - | Before reaching Mills Avenue the participant will encounter 4 signalized intersections each approximately at 0.125 mile (Augusta Rd/McDaniel Avenue), 0.301 mile (Augusta Rd/St Lewis Plaza), 0.374 miles from the W Farris Road | Medium-High | This stretch of road leads to the downtown Greenville. In addition it has many fast food restaurants. The traffic is usually high as such the participant needs to be very cautious. This stretch of road also has lot of intermediate signalized intersection with pedestrian crossings. |

| ON-ROAD DRIVE 3 | | | | | | | | | | |
|-----------------|---|-----------------------------|--------------|------------------------|-------------------|------------------------------|----------------------------------|--|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 5 | Left turn at Augusta Street/Mills Avenue | Augusta Street/Mills Avenue | | Urban Collector Street | 30 | 3 | 4 legged Signalized Intersection | This intersection has dedicated left turn lane, and a thru movement lane and a shared thru and right turn lane | Medium-High | Left on Mills Avenue with turn lane and signal (4 lanes turn into 6 lanes then back down to 4 lanes), hilly topography requiring constant speed modulation. The participant has to change lanes to the extreme left lane to make a turn onto Mills avenue. |
| 6 | Drive Straight on Mills Avenue | Mills Avenue | 1 | Urban Collector Street | 40 | 2 | - | - | Medium | Continue straight on to I-185. This stretch of the road is located on a rolling terrain as such, the participant needs to do speed modulation to stay within the speed limit. The number of lanes increases from 2 lanes to 3 lanes and then back to 2 lanes and the speed limit gradually increases. |
| 7 | Continue straight on I-185 | I-185 | 2.78 | Secondary Arterial | 55 | 3 | - | - | Medium-High | |
| 8 | Take Exit 14B to merge on to I-85 South (towards Atlanta) | I-85 | | Principal Arterial | 60 | 3 | - | - | - | Merge onto entrance ramp of I-85 south towards Atlanta (requires lane decision prior to entrance ramp) |

| ON-ROAD DRIVE 3 | | | | | | | | | | |
|-----------------|--|--|--------------|--------------------|-------------------|------------------------------|----------------------------------|--------------------|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 9 | Continue straight on I-85 | I-85 | 1.63 | Principal Arterial | 60 | 3 | - | - | Medium-High | Merge on to I-85 with merge lane |
| 10 | Take Exit for highway 153 towards Easley | Exit Ramp | | Exit ramp | - | 2 | - | - | - | Take exit for highway 153 towards Easley (Merge lane) |
| 11 | Right turn on Earle Morris Junior Highway (Highway 153) | Earl Morris Junior Highway | | Local Street | 45 | 2 | - | - | Medium | |
| 12 | Drive Straight on Earle Morris Junior Highway (Highway 153) | Earl Morris Junior Highway | 1.38 | Local Street | 45 | 2 | - | - | Medium | |
| 13 | Turn right at Earle Morris Junior Highway/Anderson Road intersection | Earl Morris Junior Highway/Anderson Rd | | Local Street | 45 | 5 | 4 legged Signalized Intersection | - | - | Right on Highway 81/Anderson Road. Right turn lane at light |
| 14 | Drive Straight on Anderson Road | Anderson Road | 3.08 | Collector Street | 50 | 2.0-1.0 | - | - | Medium | Continue straight over long stretches of rolling hills, requires speed maintenance as limit changes throughout this stretch. Go through school zone, cross over White horse road at large congested intersection controlled by traffic light. Lane decision required. |

| ON-ROAD DRIVE 3 | | | | | | | | | | |
|-----------------|---|---------------------------------|--------------|------------------------|-------------------|------------------------------|----------------------------------|--------------------|----------------|---|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 15 | Make a thru movement at Anderson Road/White Horse Rd Intersection | Anderson Road | | Collector Street | 40 | 3 | 4 legged Signalized Intersection | - | Medium-High | Continue through intersection at Farris Rd/Washington Ave. Traffic light. |
| 16 | Drive Straight on Anderson Road | Anderson Road | 2.61 | Urban Collector Street | 40-30 | 2.0-1.0 | - | - | Medium-High | This route has two way left turn lane. The number of lanes changes from 2 to 1 as you approach the down town. |
| 17 | Right turn at Anderson Road/S. Main Street Intersection | Anderson Road/S. Main Street | | Urban local street | 30 | 1 | Stop controlled Intersection | - | Medium | |
| 18 | Drive Straight on S. Main Street | S. Main Street | 0.4 | Urban local street | 30 | 1 | - | - | Low-Medium | |
| 19 | Left turn on W Camperdown Way/S. Main Street | W Camperdown Way/S. Main Street | | Urban local street | 30 | 2 | - | - | Low-Medium | |
| 20 | Drive Straight on W Camperdown Way | W Camperdown Way | 0.158 | Urban local street | 30 | 1 | - | - | Low-Medium | |
| 21 | Left turn at River Street/W Camperdown Way intersection | River Street/W Camperdown Way | | Urban local street | 30 | 1 | - | - | Low-Medium | Left on Camperdown, no turn lane, traffic light. |
| 22 | Drive Straight on River Street | River Street | 0.128 | Urban local street | 30 | 1 | - | - | Low-Medium | |

| ON-ROAD DRIVE 3 | | | | | | | | | | |
|-----------------|---|-----------------------------|--------------|--------------------|-------------------|------------------------------|----------------------------------|---|----------------|--|
| TASK # | TASK | ROAD NAME | MILES DRIVEN | ROAD TYPE | SPEED LIMIT (MPH) | NUMBER OF LANES IN EACH DIR. | INTERSECTION DETAILS | | TRAFFIC VOLUME | CDRS Notes |
| | | | | | | | SIGNALIZED/STOP-CONTROLLED | INTERSECTION NOTES | | |
| 23 | Make a thru movement at River Street /Augusta Rd Intersection | RiverSt/ Augusta Rd | | Urban local street | 30 | 3 | 4 legged Signalized Intersection | Thru lane to Augusta Rd actually is at an angle bearing right but is not a right hand turn. | Medium | River street becomes Augusta Street. 2 lane road widens to 4 lanes however lanes are narrow. Frequent traffic lights requiring divided attention to traffic flow near and at next traffic light to best regulate speed. Heavily congested area requiring cross checks of intersection prior to proceeding through. |
| 24 | Drive Straight on Augusta Street | Augusta Street | 1.64 | Urban local street | 30 | 2 | - | - | Medium-High | |
| 25 | Right turn at Augusta Street/W Faris Road Intersection | Augusta Street/W Faris Road | | Urban local street | 30 | 2 | 4 legged Signalized Intersection | - | Medium-High | Right onto Faris Rd. Rd narrows quickly from 4 lanes to 2 lanes. Narrow rolling hills with limited line of sight. |
| 26 | Drive Straight on W Faris Rd | W Faris Road | 0.9 | Urban local street | 35 | 1 | - | - | Medium-High | |
| 27 | Right turn at W Faris Rd/ Michaux Drive into Greenville Hospital Campus | Drive Way | | Drive way | 15 | 2 | - | - | Low | |

ON-ROAD EVALUATION SCORE SHEET

| | | | |
|--|----------------------------------|--|---------------------|
| Behind-The-Wheel Road Assessment | | | |
| 1. Patient: _____ | <u>Weather Conditions</u> | | |
| 2. Therapist: _____ | 8. Sun/Glare: | Y | N |
| 3. Date: _____ | 9. Precipitation: | Y | N |
| 4. Time: _____ | <u>Adaptive Equipment</u> | | |
| 5. Vehicle: _____ | 10. Hand controls | Y | N |
| 6. Physician: _____ | 11. Spinner knob | Y | N |
| 7. Diagnosis: _____ | 12. Turn signal extensions | Y | N |
| (diagnosis cont.) _____ | 13. Pedal guard | Y | N |
| | | | |
| <u>Operational Skills</u> | | | |
| Y = Yes N = No E = Educated RD = Return demonstration NW = Needs Work | | | |
| <u>Adjusts Seat :</u> | | <u>Locates Secondary Controls:</u> | |
| 14. Height | Y N E RD NW | 20. Lights | Y N E RD NW |
| 15. Distance | Y N E RD NW | 21. Turn signals | Y N E RD NW |
| 16. Tilt | Y N E RD NW | 22. Wipers | Y N E RD NW |
| <u>Adjusts Primary Controls:</u> | | 23. Gear selector | Y N E RD NW |
| 17. Steering Wheel | Y N E RD NW | 24. Identify gear position | Y N E RD NW |
| <u>Adjusts Mirrors :</u> | | 25. Identify speedometer | Y N E RD NW |
| 18. Rear View | Y N E RD NW | 26. Adjust parking brake | Y N E RD NW |
| 19. Side Mirrors | Y N E RD NW | | |
| | | | |
| <u>Comments/Summary</u> (see page 2 for additional info): _____ | | | |
| _____ | | | |
| _____ | | | |
| _____ | | | |
| _____ | | | |
| _____ | | | |
| _____ | | | |
| <u>Recommendation:</u> | | | |
| a. ___ Successful completion of driving program | | e. ___ Further Assess | |
| b. ___ Adequate vehicle control on all levels of traffic | | f. ___ Re-assess at later date. | |
| c. ___ Proficient use of adaptive equipment | | g. ___ Unsuccessful completion of program. | |
| d. ___ Appropriate vehicular control & driver interactions in familiar areas. | | | |
| | | | |
| The recommendations noted previously are based on the medical information available at the time of this report and the client's performance during the period of the evaluation. If patient's medical status changes, subsequent to this report, so that they may affect patient's driving status, this report is no longer valid. The recommendations, upon discharge, are valid for 1 year, however, should not be relied on as an absolute prediction of future performance. All results and recommendations have been developed based on education and experience of the evaluator and client's experience using existing equipment at Roger C. Peace Rehabilitation Hospital. | | | |
| (Page 1 of 2) | Therapist _____ | Date _____ | Time _____ |

| Skill demonstrated: 0 = 0%; 1 = 25%; 2 = 50%; 3 = 75%; 4 = 100%; No = No opportunity to observe | | | | | | | | | | | | | |
|---|---------------------|---|---|---|---|----------------------|---|---|---|---|----------|----|--|
| <u>Tactical Skills</u> | | | | | | | | | | | | | |
| <u>Visual Skills:</u> | Low Density Traffic | | | | | High Density Traffic | | | | | Comments | | |
| 27 Mirror checks | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 28 Scans environment | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 29 Blind spot checks | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 30 Identifies signage | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 31 Checks cross traffic | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| <u>Vehicle Position:</u> | | | | | | | | | | | | | |
| 32 Gap selection | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 33 Following distance | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 34 Stopping distance | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 35 Centered in lane position | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 36 Drives in proper lane | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 37 Turns in proper lane (L) | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 38 Turns in proper lane (R) | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 39 Lane usage | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 40 Lane changes | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| <u>Vehicle Handling:</u> | | | | | | | | | | | | | |
| 41 Appropriate speed | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 42 Smooth steering | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 43 Smooth accelerator | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 44 Smooth braking | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 45 Complete stops | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 46 Rights turns | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 47 Left turns | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 48 Yields right of way | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 49 Turn signals | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 50 Speed maintenance | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| <u>Strategic Skills</u> | | | | | | | | | | | | | |
| 51 Divided attention | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 52 Anticipates hazards | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 53 Plans ahead | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 54 Decision making | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 55 Memory / Follow direction | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 56 Speed of processing | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| 57 Rules of the road | 0 | 1 | 2 | 3 | 4 | No | 0 | 1 | 2 | 3 | 4 | No | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| (Page 2 of 2) | Therapist | | | | | Date | | | | | Time | | |
| | | | | | | | | | | | | | |

Description of CDRS-Scored Driving Skills

TACTICAL SKILLS

| Visual skills | Behavior expected |
|----------------------------|---|
| Mirror checks | Performs quick routine mirror checks (side and rear) to check for presence of objects and maintain awareness of traffic pattern, checks mirror prior to any type of lane change, checks rear view mirror prior to stopping. Picks a safe time to perform mirror checks and look away from road ahead. |
| Scans environment | Scans the intended path of travel 20-30 seconds ahead. Keep eyes moving in a constant sweep pattern from near to far and side to side. Performs this scan quickly. Scanning includes ground viewing of space around objects, road surface, mirror checks, blind spot checks. Searches for information that could affect path of travel. |
| Blind spot checks | Turns head to perform over the shoulder checks after mirror check and prior to lane change or at anytime information is needed about the space around the vehicle. |
| Identifies signage | Able to modify driving behavior as directed by signage. Can use the critical information such as color or shape at a distance to prepare for driving behavior changes until within distance to read printed information. Examples: Changes speed when directed by limit change, makes a lane change when directed by merge sign, slows and does a visual check of environment at a railroad crossing sign, chooses appropriate exit or entrance ramp for destination intended, slows speed and performs more frequent and directed visual search of environment for a school zone sign. |
| Checks cross traffic | Does quick visual check straight, left and right of entire intersection and all roads leading into the intersection prior to entering and traveling through intersection. Scans for areas of blocked vision. If plan is to turn at intersection again checks straight, left, right and back to path of oncoming traffic prior to turn. If traveling past uncontrolled driveways, performs quick sweeping scan of environment to assure no vehicles are entering driver's path of travel. |
| Vehicle position | Behavior expected |
| Gap selection | Maneuvers vehicle into/through a space allowance that depends on the time required to cross the intersection or make a turn. To travel through from a stopped position, a minimum of 4 second gap; if traveling through, 6 second gap; to make a right turn, 8-9 seconds (where traffic is moving at 30mph) up to 11 seconds if turning right onto open highway (55mph traffic). |
| Following distance | Follows preceding vehicle at appropriate distance for speed, a minimum of one car length in stop-go downtown traffic up to several car lengths when traveling at high speeds on interstate. Following distance also depends on factors such as driver's attention level, decision-making capability, fatigue and experience level. Minimum distance: 3 second rule. |
| Centered in lane position | Maintains centered lane position or position that allows the most amount of clear space to the sides at all speeds. Shifts left or right with curves and turns, or slightly shifts left or right prior to lane change; in addition may shift left or right to enhance visibility. If habit position is left or right of center, maintains consistently without weaving in lane. |
| Drives in proper lane | Drives in appropriate lane for direction of travel, not oncoming lane or in turn median or on shoulder. Drives in lane with the smoothest flow of traffic. |
| Turns in proper lane-left | In a multiple lane situation, remains in lane of travel (i.e. Inside vs outside lane). |
| Turns in proper lane-right | In a multiple lane situation, remains in lane of travel (i.e. Inside vs outside lane). |
| Lane usage | Drives in appropriate lane for travel. Chooses lane to allow for the best zone management (uses 1 car length/width of space to all sides of vehicle) |

| | |
|--------------|---|
| Lane changes | Moves vehicle smoothly without hesitation from lane to lane. Just prior to lane change is able to move left or right of centered lane position to prepare for lane change. Adjustment in speed may be required to perform smoothly without affecting the flow of traffic. |
|--------------|---|

TACTICAL SKILLS (Cont'd)

| Vehicle handling | Behavior expected |
|---------------------|---|
| Appropriate speed | Maintains speed within 5 mph of legal limit. Adjusts speeds to accommodate for weather or traffic pattern difficulties such as work zones. No pumping of gas. Right or left turning speed should not exceed 15 mph. |
| Smooth steering | Performs steering in a smooth fluid movement, no jerking or over steering. Makes corrections as soon as vehicle moves from its straight path. Holds steering wheel in a position to provide smooth, continuous steering control. After a turn, allows wheels to return automatically to straight position by slipping through a loose grip on the wheel. |
| Smooth accelerator | Accelerates from a stopped or reduced speed with steady, even increasing speed. No pumping gas to increase speed in intervals. |
| Smooth braking | Decelerates or stops vehicle with a steady slow application of brake. Vehicle should come to smooth stop without forward movement of passenger or driver. |
| Complete stops | Brings vehicle to a complete stop where indicated by signage or traffic signals prior to proceeding forward. |
| Right turns | Signals 150 feet in advance. Reduces speed and performs turn smoothly while maintaining centered lane position or slightly right of center. After a turn, allows wheels to return automatically to straight position by slipping through a loose grip on the wheel. After turn increases speed as appropriate. |
| Left turns | Signals 150 feet in advance. Reduces speed and perform turn smoothly while maintaining centered lane position or slightly left of center. After turn increases speed as appropriate. |
| Yields right of way | Able to determine right of way and do so per written laws and the commonly known rule to exercise due care to avoid collision. Right of way is applicable to the following situations: Entering unmarked or open intersections; entering roadways from driveways, alleys and parked positions; lane ends or is obstructed; vehicle turning left across traffic; entering intersections with sign and flashing red lights; intersections controlled by traffic signal lights; pedestrian crossing situations; freeway merge; entering and passing through traffic circles; authorized emergency vehicles; funeral processions; and school bus stops. |
| Turn signals | Applies turn signal at a minimum of 100 feet prior to turn. 150-200 feet is recommended. Turns off signal if it does not time out. |
| Speed maintenance | Maintains a consistent speed and adjusts as signage or traffic pattern indicates. Maintains consistent speed despite distractions. |

STRATEGIC SKILLS

| Behavior expected | |
|--------------------------|--|
| Divided attention | Maintains attention to signage, traffic patterns, speed, and rules of road while handling distractors both internal (such as pain or thoughts) and external (such as conversation with a passenger, cell phone or radio). Driving skills are consistent either with or without distractions. In times of increased demands on divided attention, reduces demands by eliminating extraneous distractors such as radio or conversation to focus on essential driving activities. |
| Central vision | Driver is given a central object or task to do such as look for a manhole cover or read the license plate of vehicle ahead. Asked to verbally report. |
| Peripheral Vision | Driver expected to identify some peripheral information that was available when performing the central vision task. (“What was the sign we just passed when you were looking for the manhole cover?”) |
| Anticipates hazards | Prepares for possible evasive maneuvers (i.e. covers brake, slows down, changes lanes) prior to possible hazards such as vehicle stopped in road ahead, active playground in a school zone, or advance warning signage for a work zone. |
| Plans ahead | Uses destination, signage and route instructions to prepare for vehicle position, lane usage, speed maintenance, route chosen, etc. May use maps or GPS to assist in planning. May use route planning devices such as maps or GPS prior to travel and/or during travel. |
| Decision making | When presented with new information requiring a change in driving behavior, determines plan of action quickly, chooses safest option and then executes decision. |
| Memory/Follow directions | Able to follow directions obtained auditorily, or visually. May use signage, maps, GPS, word of mouth or written direction. May use own topographical orientation skills. Able to retain information long enough to execute the route without getting lost. If wrong turn is taken can reorient to correct route. |
| Speed of processing | This relates to information processing of the whole task: Overall ability to take in all information pertinent to the driver’s environment and perform the SIPDE process in a safe time frame. (S-Search, I-Identify, P-Predict, D-Decide, E- Execute) |
| Rules of the road | Conforms to formal laws and regulations, (e.g., adjusts speed to posted limit). Also able to consider and adjust to informal rules of behavior (e.g., moves right to allow faster drivers to pass, or moves left to allow merging drivers to safely enter the highway). |

**APPENDIX E: SUPPLEMENTAL TABLES AND FIGURES FOR SIMULATOR
DRIVES**

Table E-1. Summary of Simulator Scenario Characteristics Affecting Attentional Demand at Sections 1, 2, and 3.

| Scenario 1 | | | | | | |
|------------|----------|--|--|--|--|---|
| Section | Duration | Road types | Environment | Secondary Task | Dependent Variables | Notes |
| 1 | ~3 min | Country roads – one lane of traffic each direction. Primarily straight road but include a few gentle curves. | Some trees, light traffic – leading cars 25 m ahead so they do not influence the speed of the driver & following cars 25 m behind. | Maintain speed of 55 mph. | Center position, SD of center position, forward speed, SD of forward speed, for (1) straight sections and (2) curvy sections (drop the first 30 seconds to allow driver to get up to speed). | Same number of turns in each segment; 9 turns in each drive, 4 left, 5 right. Lead car stays at constant distance; as <u>S</u> speeds up/slow down, lead car also speeds up/slow down. |
| 2 | ~2 | Country roads – same general pattern as above. | Same as above plus add some houses, barns, buildings, entities | Tap brakes pedal every time lead vehicle’s brake lights are illuminated. | Same as above plus reaction times, misses, and false alarms for the brake tasks. | |
| 3 | ~2 | Same as above but have an obstacle in the road such as a broken down car w/ police assisting – need to watch for traffic to safety pass. | More houses, buildings, and trees, transition to a two lane neighborhood. | Watch lead car & following car. If either turns on blinker, turn on your same blinker for 2 blinks. Plus braking task. | Same as above plus reaction times misses, and false alarms for the blinker tasks. | Blinker task and brake task can’t happen at same time. |

Table E-1 (Cont'd). Summary of Simulator Scenario Characteristics Affecting Attentional Demand at Sections 1, 2, and 3.

| Scenario 2 | | | | | | |
|------------|----------|--|---|--|--|--|
| Section | Duration | Road types | Environment | Task | Dependent Variables | Notes |
| 1 | ~3 min | Six-lane interstate (3 lanes each direction) – start with straight interstate | Some trees, light traffic, encounter a few slow cars that driver needs to pass. | Find and follow a lead vehicle at a constant following distance (similar to distance from Scenario 1). As it periodically slows and accelerates (vary period of these changes, and their rates). | Center position, SD of center position, forward speed, SD of forward speed, for (1) straight sections and (2) curvy sections (drop the first 30 seconds to allow driver to get up to speed), plus reaction times for button tasks, misses, false alarms Measure(s) of the subject's difference from the target 3-second separation from lead vehicle, e.g., total time on target (defined as +/- x% of nominal [3-sec] separation). | |
| 2 | ~2 | Six-lane interstate (3 lanes each direction) with turns, gentle hills. | Moderate traffic, increase traffic density. | At times, change the lead vehicle. Once behind for 15-20 seconds, then at a new location spot the new target car, then change lanes to follow it, attaining and holding the same "optimum" following distance from Scenario 1. | Same as above. | Instructions, "now follow the new target vehicle". |
| 3 | ~2 | Three lanes turn to two lanes and leads to an interstate going through a city. Straight or gentle curving roads. | Environment is more complex. Lots of cars but lane maintenance should not be difficult. Tasks are now challenging. Lane changes required. Scenario ends as a stoplight. | | | |

Table E-1 (Cont'd). Summary of Simulator Scenario Characteristics Affecting Attentional Demand at Sections 1, 2, and 3.

| Scenario 3 | | | | | |
|------------|----------|--|---|--|--|
| Section | Duration | Road Types | Environment | Task | Dependent Variables |
| 1 | 1 min | Urban. Start with more than 2 lanes, narrow into 2 lanes. All streets straight with perpendicular intersections. No curves or less than 90 degree intersections. Speed limit 25 mph. | Lots of stimuli. Cars parallel parked on the side and some Pedestrians and bicyclists. Traffic initially light but increasingly heavy stop and go. Cross walks both at the light and in middle of block. Buildings close together. | Maintain following distance of a constant distance. Stopping at traffic lights and for pedestrians at the crosswalks. Press button on steering wheel corresponding to side of road of any of 5 potential hazards (e.g., dog, pedestrian, parked car with turn signal on). | Same as all other routes, plus latency to respond to peripheral threats/hazards. |
| 2 | 3 | Continue in urban environment. | Same as above. Start having parked cars, back out or pulling out of spaces. Cars and bikes emerging from locations where subject's view is restricted (e.g., alleys), pedestrians emerging from behind parked cars (as well as walking on sidewalks), bicyclists crossing at intersections as well as traveling in bike lanes both sides of street). | Braking or otherwise avoiding pedestrians / bicyclists / cars. Press button on steering wheel corresponding to side of road of any potential hazard. Word identification task: flash your lights for words on the placard that rhyme with red, green, or blue. | Same as above, plus latency and accuracy of word identification task. |
| 3 | 2 | Continue in urban environment. | Emergency vehicle (with siren) pulls out from intersecting road and follows participant. | Participant should pull over to allow emergency vehicle to pass. | Same as above, plus latency to signal intent to pull over following onset of emergency signal (siren). |

Table E-2. The Target Vehicles presented in Drive 2 along with their Trigger Names.

| DOT Drive 2: Lane Changing | | |
|----------------------------|-----------------------|------------------------|
| v1 | Target Vehicle | Trigger Name |
| | White Car | N/A - Starting Vehicle |
| | Green SUV | T1 |
| | Blue Car | T2 |
| | Yellow SUV | T3 |
| | White Car | T4 |
| | Purple Car | T5 |
| | Blue Car | T6 |
| | Red Car | T7 |
| | White Car | T8 |
| | | |
| v2 | Target Vehicle | Trigger Name |
| | Green SUV | N/A - Starting Vehicle |
| | White Car | T1 |
| | Red SUV | T2 |
| | Blue Car | T3 |
| | Green SUV | T4 |
| | Yellow Car | T5 |
| | Red SUV | T6 |
| | Green Car | T7 |
| | Black SUV | T8 |
| | | |
| v3 | Target Vehicle | Trigger Name |
| | Blue Car | N/A - Starting Vehicle |
| | Red Car | T1 |
| | Green SUV | T2 |
| | White SUV | T3 |
| | Blue Car | T4 |
| | Red SUV | T5 |
| | Green SUV | T6 |
| | Yellow Car | T7 |
| | White Car | T8 |

Table E-3. Roadside hazards presented in Level 3 Sections 1 and 2, the side of the roadway it was presented, the Y-coordinate value, and when the hazard was presented (in time from subject).

| Level 3: Hazard Detection | | | | | |
|---------------------------|-------------------|-------------|---------------------|----------------|-------------|
| v1 | Hazard | Side | Trigger Name | Y value | Time |
| Section 1 | Pedestrian | Right | T_1ped_right | 1392 | 8 |
| | Car leaving space | Right | T_1park_right | 1800 | 2 |
| | Dog | Left | dog_left | 2092 | 8 |
| | Pedestrian | Left | T_2ped_left | 2648 | 8 |
| | Bike | Right | T_bike1_right | 2753 | 6 |
| Section 2 | Pedestrian | Left | T_3ped_left | 3624 | 8 |
| | Car leaving space | Right | T_2park_right | 3802 | 8 |
| | Pedestrian | Right | T_5ped_right | 3944 | 7 |
| | Bike | Left | T_2bike_left | 4194 | 8 |
| | Pedestrian | Left | T_6ped_left | 4684 | 8 |
| | | | | | |
| | | | | | |
| v2 | Hazard | Side | Trigger Name | Y value | Time |
| Section 1 | Pedestrian | Right | T_1ped_right | 1392 | 8 |
| | Dog | Left | dog_left | 1794 | 8 |
| | Car leaving space | Right | T_1park_right | 2042 | 2 |
| | Pedestrian | Left | T_2ped_left | 2546 | 8 |
| | Bike | Right | T_bike1_right | 2835 | 6 |
| Section 2 | Car leaving space | Right | T_2park_right | 3558 | 8 |
| | Pedestrian | Left | T_3ped_right | 3617 | 8 |
| | Bike | Left | T_2bike_left | 3795 | 8 |
| | Pedestrian | Right | T_5ped_right | 4018 | 7 |
| | Pedestrian | Left | T_6ped_left | 4684 | 8 |
| | | | | | |
| | | | | | |
| v3 | Hazard | Side | Trigger Name | Y value | Time |
| Section 1 | Car leaving space | Right | T_1park_right | 1305 | 2 |
| | Pedestrian | Left | T_2ped_left | 1749 | 8 |
| | Pedestrian | Right | T_1ped_right | 2032 | 8 |
| | Dog | Left | dog_left | 2388 | 8 |
| | Bike | Right | T_bike1_right | 3017 | 6 |
| Section 2 | Pedestrian | Left | T_3ped_left | 3586 | 8 |
| | Bike | Left | T_2bike_left | 3795 | 8 |
| | Car leaving space | Right | T_2park_right | 3971 | 8 |
| | Pedestrian | Right | T_5ped_right | 4150 | 7 |
| | Pedestrian | Left | T_6ped_left | 4284 | 8 |

Table E-4. Level 3 words used in word game in each version and their target/distractor status.

| Level 3: Word Game | | | | | | | | |
|--------------------|------|------------|----|------|------------|----|------|------------|
| v1 | Word | Status | v2 | Word | Status | v3 | Word | Status |
| | slow | Distractor | | bean | Target | | slid | Distractor |
| | shut | Distractor | | shoe | Target | | deaf | Distractor |
| | seen | Target | | meat | Distractor | | shoe | Target |
| | heal | Distractor | | sail | Distractor | | slow | Distractor |
| | slid | Distractor | | clod | Distractor | | heat | Distractor |
| | clod | Distractor | | slow | Distractor | | said | Target |
| | head | Target | | deaf | Distractor | | seek | Distractor |
| | slaw | Distractor | | shop | Distractor | | shop | Distractor |
| | bean | Target | | paid | Distractor | | dead | Target |
| | club | Distractor | | hear | Distractor | | bead | Distractor |
| | deaf | Distractor | | bead | Distractor | | clod | Distractor |
| | mean | Target | | bear | Distractor | | been | Distractor |
| | dear | Distractor | | slid | Distractor | | slew | Target |
| | shop | Distractor | | beat | Distractor | | meat | Distractor |
| | bead | Distractor | | dead | Target | | slaw | Distractor |
| | shoe | Target | | slew | Target | | shut | Distractor |
| | bear | Distractor | | clue | Target | | paid | Distractor |
| | seed | Distractor | | mean | Target | | clad | Distractor |
| | sail | Distractor | | club | Distractor | | mane | Distractor |
| | clue | Target | | seen | Target | | deal | Distractor |
| | heat | Distractor | | deal | Distractor | | club | Distractor |
| | meat | Distractor | | clad | Distractor | | bean | Target |
| | seek | Distractor | | mane | Distractor | | heal | Distractor |
| | deal | Distractor | | dear | Distractor | | laid | Distractor |
| | paid | Distractor | | heat | Distractor | | seed | Distractor |
| | been | Distractor | | seed | Distractor | | bear | Distractor |
| | clad | Distractor | | head | Target | | sail | Distractor |
| | said | Target | | heal | Distractor | | seen | Target |
| | beat | Distractor | | slaw | Distractor | | head | Target |
| | laid | Distractor | | been | Distractor | | mean | Target |
| | meal | Distractor | | laid | Distractor | | clue | Target |
| | dead | Target | | shut | Distractor | | meal | Distractor |
| | hear | Distractor | | seek | Distractor | | dear | Distractor |
| | mane | Distractor | | meal | Distractor | | beat | Distractor |
| | slew | Target | | said | Target | | hear | Distractor |

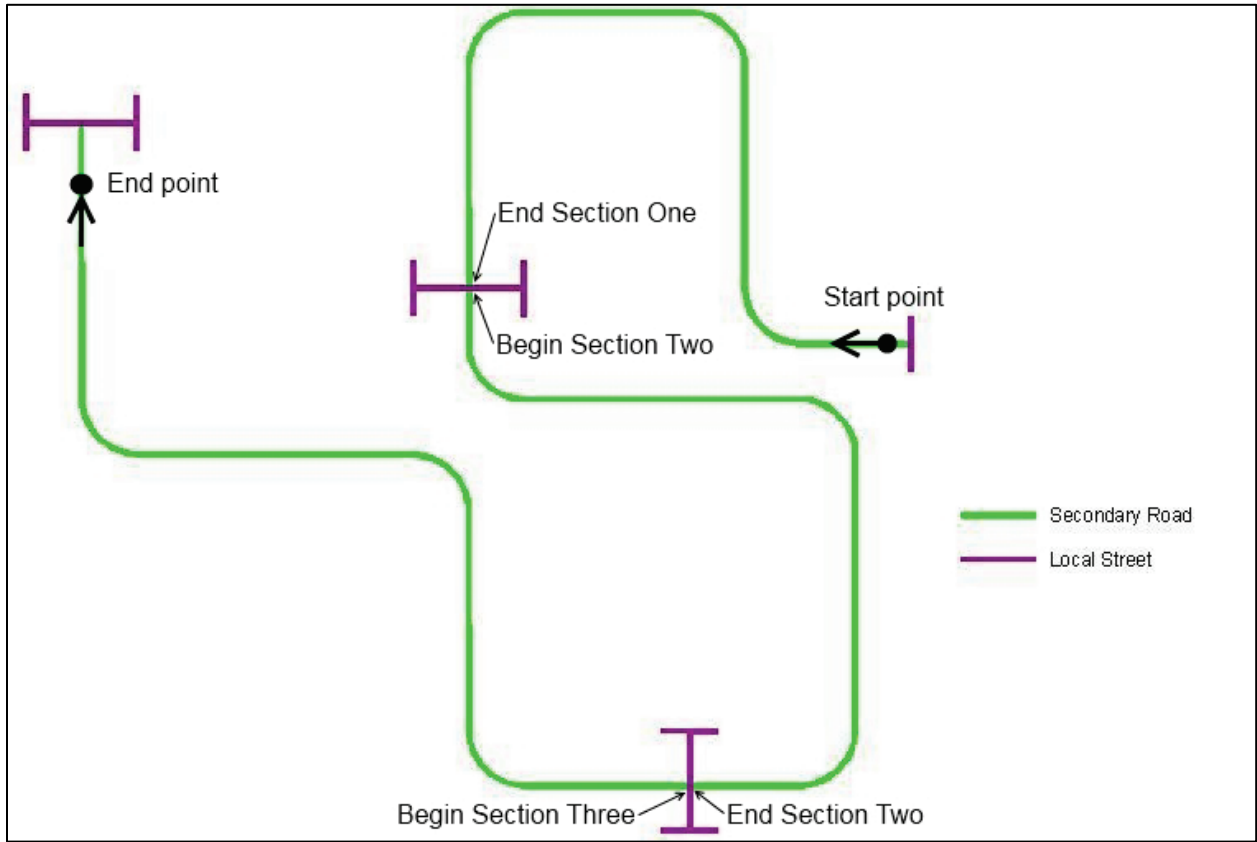


Figure E-1. Schematic of Level 1, Version 1.

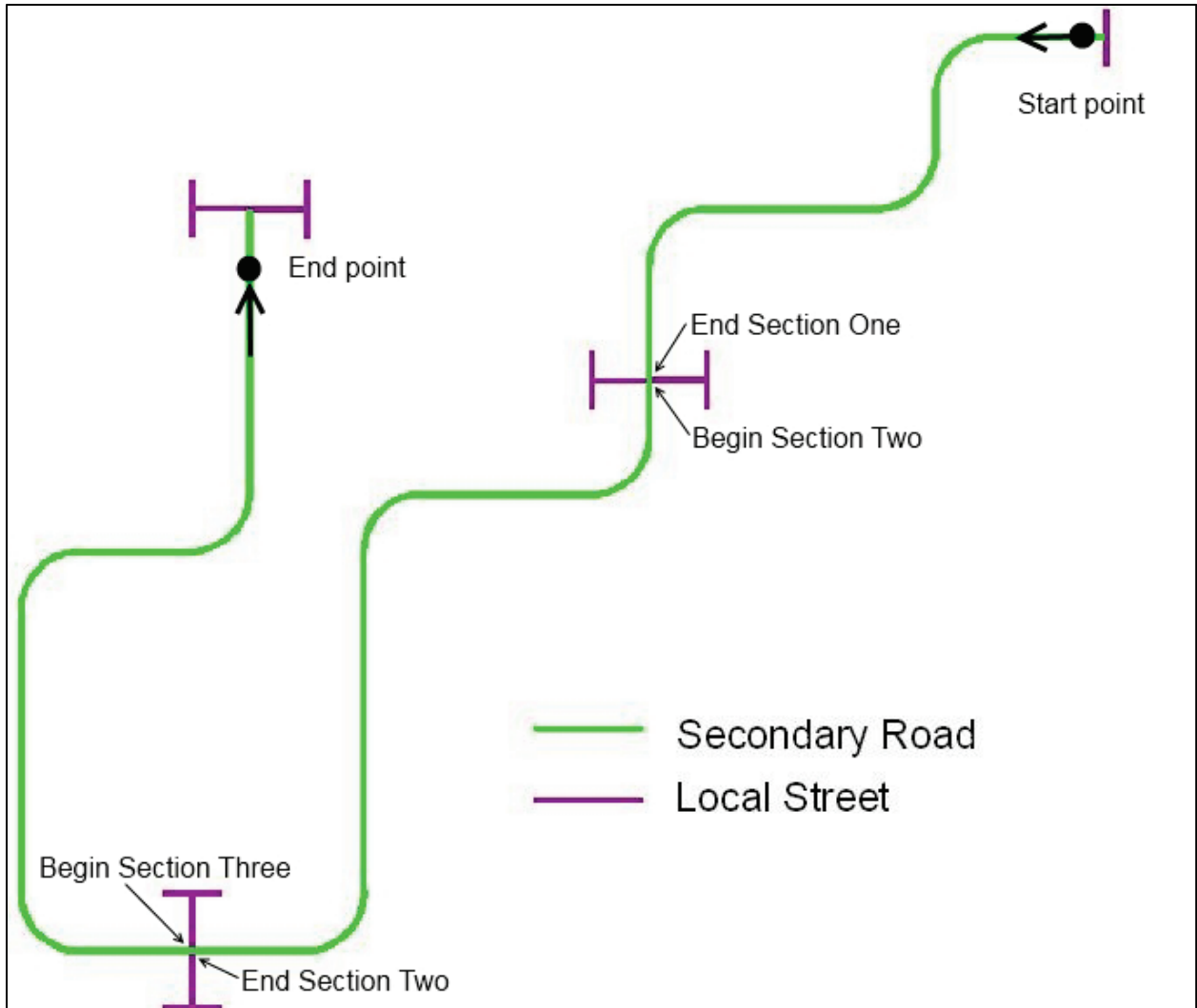


Figure E-2. Schematic of Level 1, Version 2.

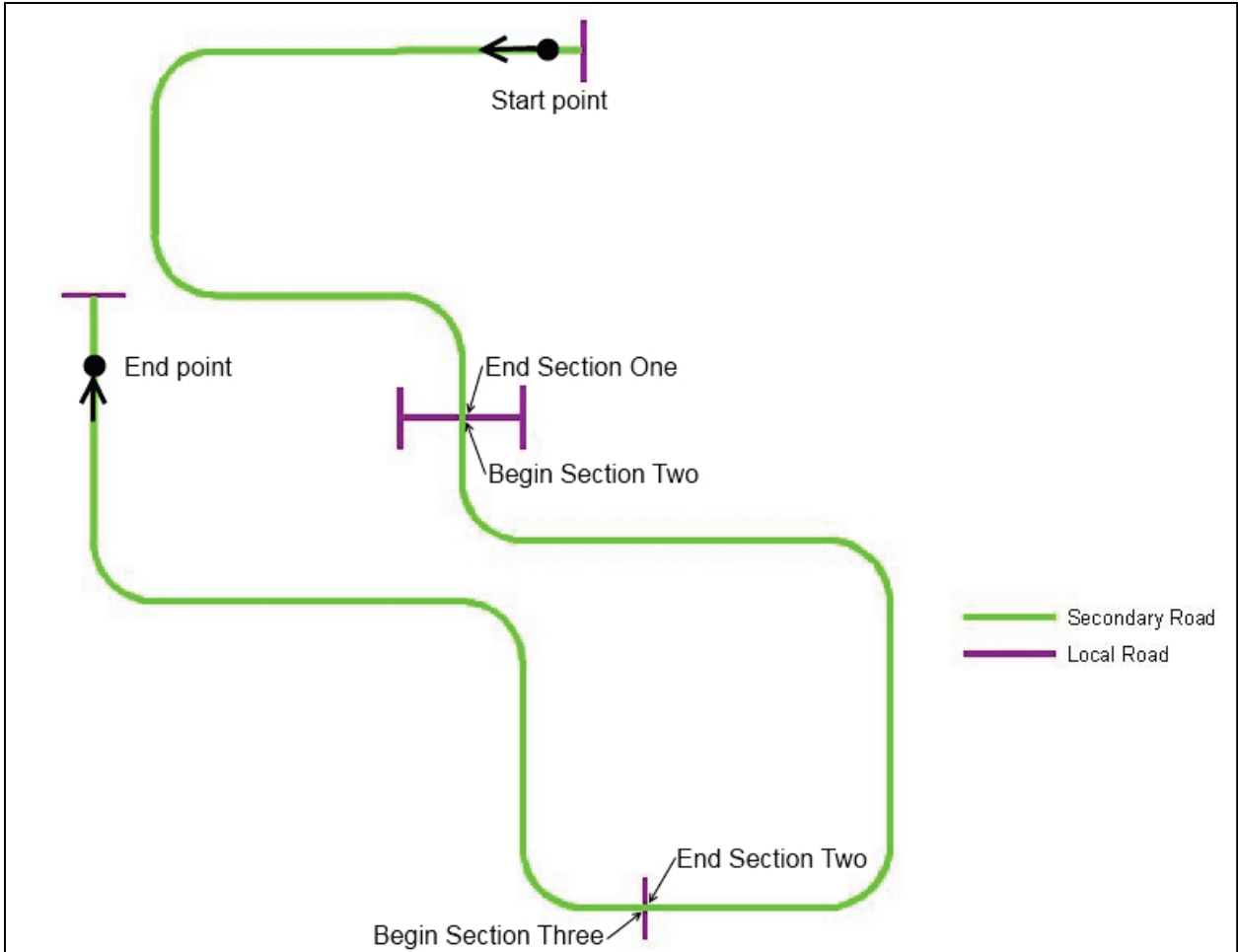


Figure E-3. Schematic of Level 1, Version 3.

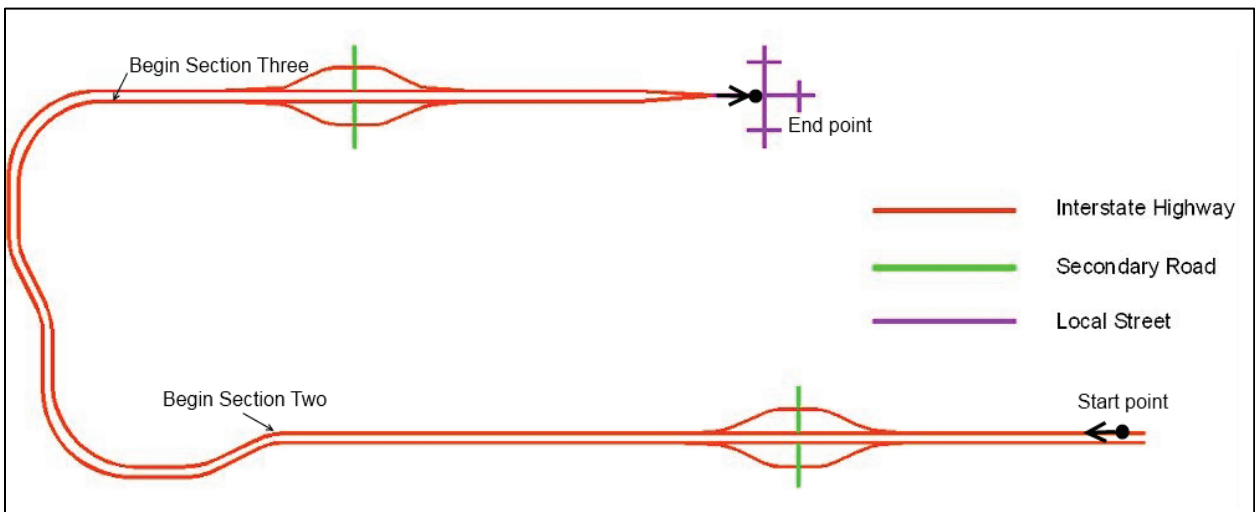


Figure E-4. Schematic of Level 2.

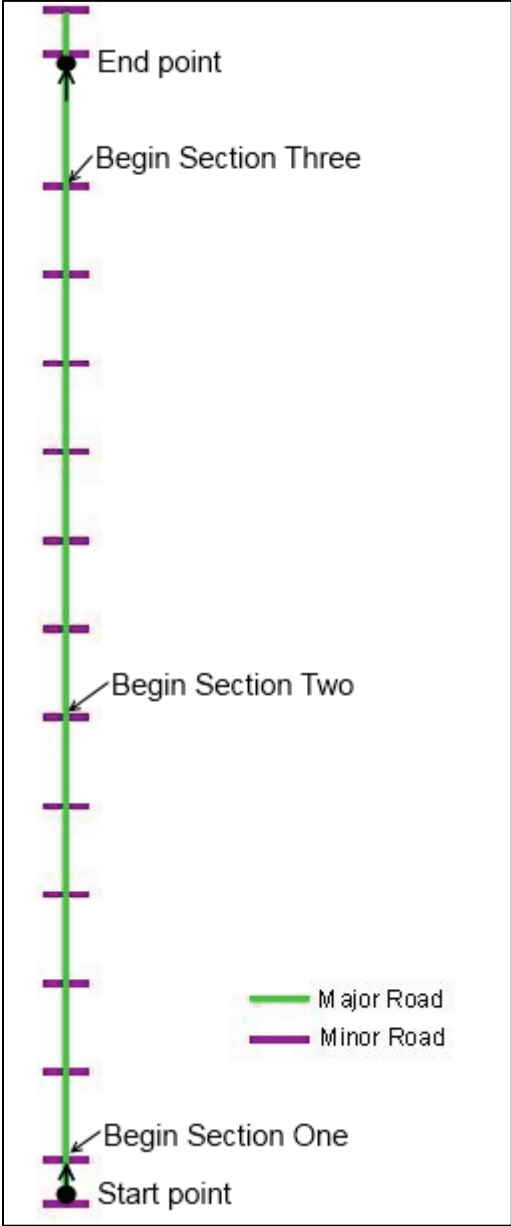


Figure E-5. Schematic of Level 3.

APPENDIX F: PARTICIPANT FEEDBACK DISCUSSION MATERIAL

Please choose a number from 1 to 5 using this scale to indicate how strongly you agree or disagree with each of the statements below.

| | | | | |
|-------------------|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |
| Strongly Disagree | | | | Strongly Agree |

- _____ 1. Overall, my *on-road* drives accurately reflect my strengths and weaknesses during everyday driving.
- _____ 2. Overall, my *driving simulator* drives accurately reflect my strengths and weaknesses during everyday driving.
- _____ 3. The training activity I participated in will help me be a safer driver.
- _____ 4. I would recommend this training activity to a friend or family member.
- _____ 5. If I started this training activity on my own, outside of any research study, I would have completed all of my training sessions.

Thank you! Before leaving, please tell us if you have participated in any other activity **within the past year** designed to help you be a safer driver. If so, briefly describe it.

- _____ NO, I have not participated in other safe driver training or education activities.
- _____ YES, I have participated in the following training or educational activity:

APPENDIX G. HEALTH-RELATED ISSUES SELF-REPORTED BY PARTICIPANTS

Examples of specific health-related issues cited by study participants who responded affirmatively to the following questionnaire items:

| Health-Related Statements | Group | | | | |
|---|---------------------------------|---|--|--|---|
| | Classroom + BTW Training (n=15) | Computer-Based Training (n=17) | OT-Administered Training (n=16) | Physical Conditioning (n=15) | Control (n=18) |
| I have had a major health-related issue within the last 6 months. | depression | heart surgery, knee replacement | defib/pacemaker | ruptured disk, 2 stents | blood sugar regulation (medication change), back surgery |
| I have had a serious injury within the last 6 months. | slipped: laceration shin bone | | | | broken nose |
| I have had surgery within the last 6 months. | cyst cut off finger | cataract surgery and hip replacement, heart, cataract, right knee replacement, pacemaker | defib/pacemaker, colonoscopy | spinal fusion, stents, Mohs micrographic surgery (skin cancer) on nose | broken nose, bone removed left thumb, back surgery |
| I have had a serious medical condition that causes difficulty with my daily activities. | diabetes | diabetes, COPD, CHF, knee hurts | | asthma | Pacemaker, restriction superior vena cava, bursitis in hips |
| I have problems with my vision that are not corrected with glasses or contacts. | cataracts | blind right eye, cataracts color blind, lazy right eye | slight problem with side vision, some night problems | cataract, surgical implants | cataracts, 1 eye sees at higher level than other |
| I get short of breath when I walk around or do my regular daily activities. | overweight | COPD, emphysema climbing stairs, varies with weather + amount of activity, strenuous situations | | emphysema, going up stairs, bending | sometimes: yard work, sometimes: due to superior vena cava syndrome |

| Health-Related Statements | Group | | | | |
|--|---|--|---|---|--|
| | Classroom + BTW Training (n=15) | Computer- Based Training (n=17) | OT-Administered Training (n=16) | Physical Conditioning (n=15) | Control (n=18) |
| I have pain in my arms, legs, or back when I walk and/or do my regular activities that limits my ability to do things. | back: tired feeling, chronic back pain | pain lower back + knee, pain when over exerted, legs + childhood polio, normal aging arthritic pain | slight pain lower back, minor arthritis | sometimes: back pain, right knee pain from excessive walking, pain in leg limits tennis | occasional hip + back pain, bone spur in foot causes difficulty walking long distances + standing long time, bad back, left knee pain: replacement scheduled, arthritis, 2 hip replacements, 1 knee replacement, back surgery |
| I have arm or leg weakness that causes difficulty with my daily activities. | 2 rotor cuffs shot" | knee problems, right knee weakness | | 2 knee + 1 hip replacement | weak right leg, circulation probs in leg, night cramps if on ladder long time |

APPENDIX H.

TREATMENT-CONTROL COMPARISONS OF SKILLS/BEHAVIORS EVALUATED BY CDRS

Table H-1. Outcomes for Classroom + BTW Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

Table H-2. Outcomes for Computer-Based Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

Table H-3. Outcomes for OT-Administered Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

Table H-4. Outcomes for Physical Conditioning Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

Table H-5. Outcomes for Classroom + BTW Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

Table H-6. Outcomes for Computer-Based Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

Table H-7. Outcomes for OT-Administered Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

Table H-8. Outcomes for Physical Conditioning Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

Table H-1. Outcomes for Classroom + BTW Group versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|---------------------------|------------------------------|-----------------|-----------------------------------|-----------------|---------------|-----------------|--------------------------------------|-----------------|---------------|-----------------|--------------|-----------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 11/15 (73%) | 15/15 (100%) | 11/11 (100%) | 0 | 0 | 0 | 0 | 1/2 (50%) | 0 | 1/2 (50%) | 4/4 (100%) |
| | Scans Environment | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 11/13 (85%) | 1/15 (7%) | 2/13 (15%) | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 13/15 (87%) | 16/16 (100%) | 12/13 (92%) | 0 | 1/13 (8%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 2/2 (100%) |
| | Identifies Signage | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 13/14 (93%) | 1/17 (6%) | 1/14 (7%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Checks Cross Traffic | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Following Distance | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Stopping Distance | 14/17 (82%) | 11/15 (73%) | 12/14 (86%) | 9/11 (82%) | 2/14 (14%) | 2/11 (18%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 4/4 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 12/15 (80%) | 17/17 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Drives in Proper Lane | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Turns in Proper Lane (R) | 17/17 (100%) | 11/15 (73%) | 17/17 (100%) | 11/11 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4/4 (100%) |
| | Lane Usage | 14/17 (82%) | 14/15 (93%) | 14/14 (100%) | 14/14 (100%) | 0 | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 1/1 (100%) |
| | Lane Changes | 16/17 (94%) | 14/15 (93%) | 16/16 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 1/1 (100%) |

Table H-1. (Cont'd)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|--|-----------------------------|------------------------------|-----------------|-----------------------------------|-----------------|---------------|-----------------|--------------------------------------|-----------------|--------------|-----------------|---------------|-----------------|
| | | Control | Classroom + BTW | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 10/15 (67%) | 15/16 (94%) | 9/10 (90%) | 1/16 (6%) | 1/10 (10%) | 1/1 (100%) | 0 | 0 | 0 | 0 | 5/5 (100%) |
| | Smooth Steering | 17/17 (100%) | 11/15 (73%) | 16/17 (94%) | 11/11 (100%) | 1/17 (6%) | 0 | 0 | 1/4 (25%) | 0 | 0 | 0 | 3/4 (75%) |
| | Smooth Accelerator | 17/17 (100%) | 12/15 (80%) | 15/17 (88%) | 12/12 (100%) | 2/17 (12%) | 0 | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) |
| | Smooth Braking | 16/17 (94%) | 11/15 (73%) | 16/16 (100%) | 10/11 (91%) | 0 | 1/11 (9%) | 1/1 (100%) | 2/4 (50%) | 0 | 0 | 0 | 2/4 (50%) |
| | Complete Stops | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Right Turns | 17/17 (100%) | 15/15 (100%) | 16/17 (94%) | 15/15 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Left Turns | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Yields Right of Way | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turn Signals | 16/17 (94%) | 11/15 (73%) | 15/16 (94%) | 11/11 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 2/4 (50%) | 0 | 0 | 0 | 2/4 (50%) |
| | Speed Maintenance | 17/17 (100%) | 12/15 (80%) | 16/17 (94%) | 12/12 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 10/15 (67%) | 11/14 (79%) | 9/10 (90%) | 3/14 (21%) | 1/10 (10%) | 1/3 (33%) | 2/5 (40%) | 0 | 0 | 2/3 (67%) | 3/5 (60%) |
| | DA-Central Vision | 11/11 (100%) | 6/6 (100%) | 11/11 (100%) | 4/6 (67%) | 0 | 2/6 (33%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | DA-Peripheral Vision | 2/11 (18%) | 2/6 (33%) | 0 | 0 | 2/2 (100%) | 2/2 (100%) | 6/9 (67%) | 3/4 (75%) | 0 | 0 | 3/9 (33%) | 1/4 (25%) |
| | Anticipates Hazards | 17/17 (100%) | 12/15 (80%) | 16/17 (94%) | 11/12 (92%) | 1/17 (6%) | 1/12 (8%) | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Plans Ahead | 14/17 (82%) | 9/15 (60%) | 13/14 (93%) | 8/9 (89%) | 1/14 (7%) | 1/9 (11%) | 0 | 2/6 (33%) | 0 | 0 | 3/3 (100%) | 4/6 (67%) |
| | Decision Making | 15/17 (88%) | 10/15 (67%) | 15/15 (100%) | 10/10 (100%) | 0 | 0 | 0 | 0 | 1/2 (50%) | 0 | 1/2 (50%) | 5/5 (100%) |
| | Memory / Follow Directions | 15/17 (88%) | 12/15 (80%) | 15/15 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 0 | 0 | 0 | 2/2 (100%) | 3/3 (100%) |
| | Speed of Processing | 16/17 (94%) | 10/15 (67%) | 16/16 (100%) | 10/10 (100%) | 0 | 0 | 1/1 (100%) | 1/5 (20%) | 0 | 0 | 0 | 4/5 (80%) |
| | Rules of the Road | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table H-2. Outcomes for Computer-Based Training Group versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|---------------------------|------------------------------|-------------------------|-----------------------------------|-------------------------|---------------|-------------------------|--------------------------------------|-------------------------|---------------|-------------------------|--------------|-------------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 14/17 (82%) | 15/15 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 2/3 (67%) | 1/2 (50%) | 1/3 (33%) | 1/2 (50%) | 0 |
| | Scans Environment | 15/17 (88%) | 15/17 (88%) | 14/15 (93%) | 14/15 (93%) | 1/15 (7%) | 1/15 (7%) | 1/2 (50%) | 1/2 (50%) | 0 | 1/2 (50%) | 1/2 (50%) | 0 |
| | Blind Spot Checks | 16/17 (94%) | 15/17 (88%) | 16/16 (100%) | 13/15 (87%) | 0 | 2/15 (13%) | 0 | 1/2 (50%) | 1/1 (100%) | 1/2 (50%) | 0 | 0 |
| | Identifies Signage | 17/17 (100%) | 14/17 (82%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) |
| | Checks Cross Traffic | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 16/16 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Following Distance | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 16/16 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Stopping Distance | 14/17 (82%) | 15/17 (88%) | 12/14 (86%) | 12/15 (80%) | 2/14 (14%) | 3/15 (20%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 2/2 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 15/17 (88%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Drives in Proper Lane | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 0 | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 0 | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (R) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 14/17 (82%) | 14/14 (100%) | 14/14 (100%) | 0 | 0 | 1/3 (33%) | 1/3 (33%) | 0 | 0 | 2/3 (67%) | 2/3 (67%) |
| | Lane Changes | 16/17 (94%) | 15/17 (88%) | 16/16 (100%) | 15/15 (100%) | 0 | 0 | 0 | 2/2 (100%) | 1/1 (100%) | 0 | 0 | 0 |

Table H-2. (Cont'd)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|--|-----------------------------|------------------------------|-------------------------|-----------------------------------|-------------------------|---------------|-------------------------|--------------------------------------|-------------------------|--------------|-------------------------|---------------|-------------------------|
| | | Control | Computer-Based Training | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 14/17 (82%) | 15/16 (94%) | 13/14 (93%) | 1/16 (6%) | 1/14 (7%) | 1/1 (100%) | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Smooth Steering | 17/17 (100%) | 16/17 (94%) | 16/17 (94%) | 16/16 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Smooth Accelerator | 17/17 (100%) | 15/17 (88%) | 15/17 (88%) | 14/15 (93%) | 2/17 (12%) | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Smooth Braking | 16/17 (94%) | 16/17 (94%) | 16/16 (100%) | 16/16 (100%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Complete Stops | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 0 | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Right Turns | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Left Turns | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 16/16 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Yields Right of Way | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turn Signals | 16/17 (94%) | 15/17 (88%) | 15/16 (94%) | 15/15 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Speed Maintenance | 17/17 (100%) | 16/17 (94%) | 16/17 (94%) | 16/16 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 14/17 (82%) | 11/14 (79%) | 13/14 (93%) | 3/14 (21%) | 1/14 (7%) | 1/3 (33%) | 1/3 (33%) | 0 | 1/3 (33%) | 2/3 (67%) | 1/3 (33%) |
| | DA-Central Vision | 11/11 (100%) | 14/14 (100%) | 11/11 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | DA-Peripheral Vision | 2/11 (18%) | 4/14 (29%) | 0 | 1/4 (25%) | 2/2 (100%) | 3/4 (75%) | 6/9 (67%) | 8/10 (80%) | 0 | 0 | 3/9 (33%) | 2/10 (20%) |
| | Anticipates Hazards | 17/17 (100%) | 13/17 (76%) | 16/17 (94%) | 13/13 (100%) | 1/17 (6%) | 0 | 0 | 1/4 (25%) | 0 | 0 | 0 | 3/4 (75%) |
| | Plans Ahead | 14/17 (82%) | 14/17 (82%) | 13/14 (93%) | 13/14 (93%) | 1/14 (7%) | 1/14 (7%) | 0 | 1/3 (33%) | 0 | 0 | 3/3 (100%) | 2/3 (67%) |
| | Decision Making | 15/17 (88%) | 14/17 (82%) | 15/15 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 1/3 (33%) | 1/2 (50%) | 0 | 1/2 (50%) | 2/3 (67%) |
| | Memory / Follow Directions | 15/17 (88%) | 14/17 (82%) | 15/15 (100%) | 11/14 (79%) | 0 | 3/14 (21%) | 0 | 1/3 (33%) | 0 | 1/3 (33%) | 2/2 (100%) | 1/3 (33%) |
| | Speed of Processing | 16/17 (94%) | 15/17 (88%) | 16/16 (100%) | 15/15 (100%) | 0 | 0 | 1/1 (100%) | 2/2 (100%) | 0 | 0 | 0 | 0 |
| | Rules of the Road | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table H-3. Outcomes for OT-Administered Training Group versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|---------------------------|------------------------------|--------------------------|-----------------------------------|--------------------------|---------------|--------------------------|--------------------------------------|--------------------------|---------------|--------------------------|--------------|--------------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 13/16 (81%) | 15/15 (100%) | 13/13 (100%) | 0 | 0 | 0 | 1/3 (33%) | 1/2 (50%) | 0 | 1/2 (50%) | 2/3 (67%) |
| | Scans Environment | 15/17 (88%) | 14/16 (88%) | 14/15 (93%) | 14/14 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 14/16 (88%) | 16/16 (100%) | 14/14 (100%) | 0 | 0 | 0 | 1/2 (50%) | 1/1 (100%) | 0 | 0 | 1/2 (50%) |
| | Identifies Signage | 17/17 (100%) | 14/16 (88%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Checks Cross Traffic | 17/17 (100%) | 15/16 (94%) | 16/17 (94%) | 15/15 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Following Distance | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Stopping Distance | 14/17 (82%) | 14/16 (88%) | 12/14 (86%) | 14/14 (100%) | 2/14 (14%) | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 2/2 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 14/16 (88%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Drives in Proper Lane | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turns in Proper Lane (L) | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turns in Proper Lane (R) | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 15/16 (94%) | 14/14 (100%) | 15/15 (100%) | 0 | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 1/1 (100%) |
| | Lane Changes | 16/17 (94%) | 13/16 (81%) | 16/16 (100%) | 13/13 (100%) | 0 | 0 | 0 | 1/3 (33%) | 1/1 (100%) | 0 | 0 | 2/3 (67%) |

Table H-3. (Cont'd)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | | |
|--|-----------------------------|------------------------------|--------------------------|-----------------------------------|--------------------------|---------------|--------------------------|--------------------------------------|--------------------------|--------------|--------------------------|---------------|--------------------------|---------------|
| | | Control | OT-Administered Training | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | | |
| | | | | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 13/16 (81%) | 15/16 (94%) | 13/13 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Smooth Steering | 17/17 (100%) | 14/16 (88%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Smooth Accelerator | 17/17 (100%) | 12/16 (75%) | 15/17 (88%) | 12/12 (100%) | 2/17 (12%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4/4 (100%) |
| | Smooth Braking | 16/17 (94%) | 14/16 (88%) | 16/16 (100%) | 14/14 (100%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Complete Stops | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Right Turns | 17/17 (100%) | 14/16 (88%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Left Turns | 17/17 (100%) | 14/16 (88%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Yields Right of Way | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turn Signals | 16/17 (94%) | 14/16 (88%) | 15/16 (94%) | 14/14 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 1/2 (50%) | 0 | 0 | 0 | 0 | 1/2 (50%) |
| | Speed Maintenance | 17/17 (100%) | 14/16 (88%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 14/16 (88%) | 11/14 (79%) | 14/14 (100%) | 3/14 (21%) | 0 | 1/3 (33%) | 1/2 (50%) | 0 | 0 | 2/3 (67%) | 1/2 (50%) | |
| | DA-Central Vision | 11/11 (100%) | 12/15 (80%) | 11/11 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | |
| | DA-Peripheral Vision | 2/11 (18%) | 4/14 (29%) | 0 | 0 | 2/2 (100%) | 4/4 (100%) | 6/9 (67%) | 6/10 (60%) | 0 | 0 | 3/9 (33%) | 4/10 (40%) | |
| | Anticipates Hazards | 17/17 (100%) | 14/16 (88%) | 16/17 (94%) | 13/14 (93%) | 1/17 (6%) | 1/14 (7%) | 0 | 0 | 0 | 1/2 (50%) | 0 | 1/2 (50%) | |
| | Plans Ahead | 14/17 (82%) | 13/16 (81%) | 13/14 (93%) | 12/13 (92%) | 1/14 (7%) | 1/13 (8%) | 0 | 1/3 (33%) | 0 | 0 | 3/3 (100%) | 2/3 (67%) | |
| | Decision Making | 15/17 (88%) | 14/16 (88%) | 15/15 (100%) | 12/14 | 0 | 2/14 | 0 | 1/2 (50%) | 1/2 (50%) | 0 | 1/2 (50%) | 1/2 (50%) | |
| | Memory / Follow Directions | 15/17 (88%) | 15/16 (94%) | 15/15 (100%) | 15/15 (100%) | 0 | 0 | 0 | 1/1 (100%) | 0 | 0 | 2/2 (100%) | 0 | |
| | Speed of Processing | 16/17 (94%) | 14/16 (88%) | 16/16 (100%) | 14/14 (100%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Rules of the Road | 17/17 (100%) | 15/16 (94%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |

Table H-4. Outcomes for Physical Conditioning Group versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 2.

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|---------------------------|------------------------------|-----------------------|-----------------------------------|-----------------------|---------------|-----------------------|--------------------------------------|-----------------------|---------------|-----------------------|--------------|-----------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 12/15 (80%) | 15/15 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 1/3 (33%) | 1/2 (50%) | 0 | 1/2 (50%) | 2/3 (67%) |
| | Scans Environment | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 10/13 (77%) | 1/15 (7%) | 3/13 (23%) | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 12/15 (80%) | 16/16 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 3/3 (100%) |
| | Identifies Signage | 17/17 (100%) | 13/15 (87%) | 16/17 (94%) | 11/13 (85%) | 1/17 (6%) | 2/13 (15%) | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Checks Cross Traffic | 17/17 (100%) | 15/15 (100%) | 16/17 (94%) | 14/15 (93%) | 1/17 (6%) | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Following Distance | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Stopping Distance | 14/17 (82%) | 14/15 (93%) | 12/14 (86%) | 14/14 (100%) | 2/14 (14%) | 0 | 1/3 (33%) | 1/1 (100%) | 0 | 0 | 2/3 (67%) | 0 |
| | Centered in Lane Position | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Drives in Proper Lane | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (R) | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 13/15 (87%) | 14/14 (100%) | 11/13 (85%) | 0 | 2/13 (15%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 2/2 (100%) |
| | Lane Changes | 16/17 (94%) | 13/15 (87%) | 16/16 (100%) | 12/13 (92%) | 0 | 1/13 (8%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 2/2 (100%) |

Table H-4. (Cont'd)

| Skill/Behavior Evaluated | Subscale Scored by CDRS | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|--|-----------------------------|------------------------------|-----------------------|-----------------------------------|-----------------------|---------------|-----------------------|--------------------------------------|-----------------------|--------------|-----------------------|---------------|-----------------------|
| | | Control | Physical Conditioning | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 11/15 (73%) | 15/16 (94%) | 11/11 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 2/4 (50%) | 0 | 0 | 0 | 2/4 (50%) |
| | Smooth Steering | 17/17 (100%) | 15/15 (100%) | 16/17 (94%) | 15/15 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Smooth Accelerator | 17/17 (100%) | 14/15 (93%) | 15/17 (88%) | 13/14 (93%) | 2/17 (12%) | 1/14 (7%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Smooth Braking | 16/17 (94%) | 14/15 (93%) | 16/16 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 1/1 (100%) | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Complete Stops | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Right Turns | 17/17 (100%) | 15/15 (100%) | 16/17 (94%) | 15/15 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Left Turns | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Yields Right of Way | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turn Signals | 16/17 (94%) | 14/15 (93%) | 15/16 (94%) | 14/14 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Speed Maintenance | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 10/15 (67%) | 11/14 (79%) | 9/10 (90%) | 3/14 (21%) | 1/10 (10%) | 1/3 (33%) | 3/5 (60%) | 0 | 0 | 2/3 (67%) | 2/5 (40%) |
| | DA-Central Vision | 11/11 (100%) | 13/13 (100%) | 11/11 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | DA-Peripheral Vision | 2/11 (18%) | 8/13 (62%) | 0 | 3/8 (37%) | 2/2 (100%) | 5/8 (63%) | 6/9 (67%) | 4/5 (80%) | 0 | 0 | 3/9 (33%) | 1/5 (20%) |
| | Anticipates Hazards | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 13/14 (93%) | 1/17 (6%) | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Plans Ahead | 14/17 (82%) | 12/15 (80%) | 13/14 (93%) | 11/12 (92%) | 1/14 (7%) | 1/12 (8%) | 0 | 1/3 (33%) | 0 | 0 | 3/3 (100%) | 2/3 (67%) |
| | Decision Making | 15/17 (88%) | 12/15 (80%) | 15/15 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 1/2 (50%) | 0 | 1/2 (50%) | 3/3 (100%) |
| | Memory / Follow Directions | 15/17 (88%) | 13/15 (87%) | 15/15 (100%) | 10/13 (77%) | 0 | 3/13 (23%) | 0 | 2/2 (100%) | 0 | 0 | 2/2 (100%) | 0 |
| | Speed of Processing | 16/17 (94%) | 13/15 (87%) | 16/16 (100%) | 11/13 (85%) | 0 | 2/13 (15%) | 1/1 (100%) | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Rules of the Road | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |

Table H-5. Outcomes for Classroom + BTW Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|--|------------------------------|-----------------|-----------------------------------|-----------------|--------------|-----------------|--------------------------------------|-----------------|--------------|-----------------|---------------|-----------------|
| | | Control | Classroom + BTW | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW | Control | Classroom + BTW |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 11/15 (73%) | 14/15 (93%) | 11/11 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 1/4 (25%) | 0 | 0 | 1/2 (50%) | 3/4 (75%) |
| | Scans Environment | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 12/13 (92%) | 1/15 (7%) | 1/13 (8%) | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 13/15 (87%) | 15/16 (94%) | 13/13 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Identifies Signage | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Checks Cross Traffic | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Following Distance | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Stopping Distance | 14/17 (82%) | 11/15 (73%) | 13/14 (93%) | 10/11 (91%) | 1/14 (7%) | 1/11 (9%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 4/4 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 12/15 (80%) | 16/17 (94%) | 12/12 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Drives in Proper Lane | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Turns in Proper Lane (R) | 17/17 (100%) | 11/15 (73%) | 17/17 (100%) | 11/11 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4/4 (100%) |
| | Lane Usage | 14/17 (82%) | 14/15 (93%) | 14/14 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 3/3 (100%) | 1/1 (100%) |
| Lane Changes | 16/17 (94%) | 14/15 (93%) | 15/16 (94%) | 14/14 (100%) | 1/16 (6%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) | |

Table H-5(Cont'd).

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | | | |
|--|--|------------------------------|-----------------|-----------------------------------|-----------------|---------------|-----------------|--------------------------------------|-----------------|--------------|-----------------|---------------|-----------------|---------------|---|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | | | |
| | | Control | Classroom + BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | Control | + Classroom BTW | | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 10/15 (67%) | 14/16 (88%) | 10/10 (100%) | 2/16 (12%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 5/5 (100%) | |
| | Smooth Steering | 17/17 (100%) | 11/15 (73%) | 17/17 (100%) | 11/11 (100%) | 0 | 0 | 0 | 1/4 (25%) | 0 | 0 | 0 | 0 | 3/4 (75%) | |
| | Smooth Accelerator | 17/17 (100%) | 12/15 (80%) | 17/17 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | |
| | Smooth Braking | 16/17 (94%) | 11/15 (73%) | 16/16 (100%) | 11/11 (100%) | 0 | 0 | 0 | 1/4 (25%) | 0 | 0 | 0 | 1/1 (100%) | 3/4 (75%) | |
| | Complete Stops | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |
| | Right Turns | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Left Turns | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 14/15 (93%) | 0 | 1/15 (7%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Yields Right of Way | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turn Signals | 16/17 (94%) | 11/15 (73%) | 16/16 (100%) | 11/11 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 4/4 (100%) | |
| | Speed Maintenance | 17/17 (100%) | 12/15 (80%) | 16/17 (94%) | 12/12 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 10/15 (67%) | 13/14 (93%) | 9/10 (90%) | 1/14 (7%) | 1/10 (10%) | 1/3 (33%) | 1/5 (20%) | 0 | 0 | 2/3 (67%) | 4/5 (80%) | | |
| | DA-Central Vision | 8/8 (100%) | 5/5 (100%) | 8/8 (100%) | 4/5 (80%) | 0 | 1/5 (20%) | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | DA-Peripheral Vision | 2/8 (25%) | 2/5 (40%) | 1/2 (50%) | 0 | 1/2 (50%) | 2/2 (100%) | 3/6 (50%) | 1/3 (33%) | 1/6 (17%) | 0 | 2/6 (33%) | 2/3 (67%) | | |
| | Anticipates Hazards | 17/17 (100%) | 12/15 (80%) | 16/17 (94%) | 11/12 (92%) | 1/17 (6%) | 1/12 (8%) | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | | |
| | Plans Ahead | 14/17 (82%) | 9/15 (60%) | 12/14 (86%) | 9/9 (100%) | 2/14 (14%) | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | 6/6 (100%) | | |
| | Decision Making | 15/17 (88%) | 10/15 (67%) | 14/15 (93%) | 9/10 (90%) | 1/15 (7%) | 1/10 (10%) | 1/2 (50%) | 1/5 (20%) | 0 | 0 | 1/2 (50%) | 4/5 (80%) | | |
| | Memory / Follow Directions | 15/17 (88%) | 12/15 (80%) | 15/15 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 0 | 0 | 0 | 2/2 (100%) | 3/3 (100%) | | |
| | Speed of Processing | 16/17 (94%) | 10/15 (67%) | 16/16 (100%) | 10/10 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 5/5 (100%) | | |
| | Rules of the Road | 17/17 (100%) | 15/15 (100%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Table H-6. Outcomes for Computer-Based Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|--|------------------------------|-------------------------|-----------------------------------|-------------------------|--------------|-------------------------|--------------------------------------|-------------------------|--------------|-------------------------|---------------|-------------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 14/17 (82%) | 14/15 (93%) | 14/14 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 2/3 (67%) | 0 | 1/3 (33%) | 1/2 (50%) | 0 |
| | Scans Environment | 15/17 (88%) | 15/17 (88%) | 14/15 (93%) | 14/15 (93%) | 1/15 (7%) | 1/15 (7%) | 1/2 (50%) | 0 | 0 | 2/2 (100%) | 1/2 (50%) | 0 |
| | Blind Spot Checks | 16/17 (94%) | 15/17 (88%) | 15/16 (94%) | 14/15 (93%) | 1/16 (6%) | 1/15 (7%) | 1/1 (100%) | 0 | 0 | 2/2 (100%) | 0 | 0 |
| | Identifies Signage | 17/17 (100%) | 14/17 (82%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 2/3 (67%) | 0 | 0 | 0 | 1/3 (33%) |
| | Checks Cross Traffic | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 0 | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 15/16 (94%) | 0 | 1/16 (6%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Following Distance | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 15/16 (94%) | 0 | 1/16 (6%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Stopping Distance | 14/17 (82%) | 15/17 (88%) | 13/14 (93%) | 12/15 (80%) | 1/14 (7%) | 3/15 (20%) | 1/3 (33%) | 1/2 (50%) | 0 | 0 | 2/3 (67%) | 1/2 (50%) |
| | Centered in Lane Position | 17/17 (100%) | 15/17 (88%) | 16/17 (94%) | 14/15 (93%) | 1/17 (6%) | 1/15 (7%) | 0 | 2/2 (100%) | 0 | 0 | 0 | 0 |
| | Drives in Proper Lane | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (R) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 14/17 (82%) | 14/14 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 3/3 (100%) | 3/3 (100%) |
| | Lane Changes | 16/17 (94%) | 15/17 (88%) | 15/16 (94%) | 15/15 (100%) | 1/16 (6%) | 0 | 0 | 1/2 (50%) | 0 | 0 | 1/1 (100%) | 1/2 (50%) |

Table H-6 (Cont'd).

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|--|--|------------------------------|-------------------------|-----------------------------------|-------------------------|---------------|-------------------------|--------------------------------------|-------------------------|--------------|-------------------------|---------------|-------------------------|
| | | Control | Computer-Based Training | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training | Control | Computer-Based Training |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 14/17 (82%) | 14/16 (88%) | 12/14 (86%) | 2/16 (12%) | 2/14 (14%) | 0 | 1/3 (33%) | 0 | 0 | 1/1 (100%) | 2/3 (67%) |
| | Smooth Steering | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 16/16 (100%) | 0 | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Smooth Accelerator | 17/17 (100%) | 15/17 (88%) | 17/17 (100%) | 15/15 (100%) | 0 | 0 | 0 | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Smooth Braking | 16/17 (94%) | 16/17 (94%) | 16/16 (100%) | 15/16 (94%) | 0 | 1/16 (6%) | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) |
| | Complete Stops | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 16/17 (94%) | 0 | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Right Turns | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Left Turns | 17/17 (100%) | 16/17 (94%) | 17/17 (100%) | 16/16 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Yields Right of Way | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turn Signals | 16/17 (94%) | 15/17 (88%) | 16/16 (100%) | 14/15 (93%) | 0 | 1/10 (10%) | 0 | 0 | 0 | 0 | 1/1 (100%) | 2/2 (100%) |
| | Speed Maintenance | 17/17 (100%) | 16/17 (94%) | 16/17 (94%) | 15/16 (94%) | 1/17 (6%) | 1/16 (6%) | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 14/17 (82%) | 13/14 (93%) | 12/14 (86%) | 1/14 (7%) | 2/14 (14%) | 1/3 (33%) | 1/3 (33%) | 0 | 1/3 (33%) | 2/3 (67%) | 1/3 (33%) |
| | DA-Central Vision | 8/8 (100%) | 12/12 (100%) | 8/8 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | DA-Peripheral Vision | 2/8 (25%) | 3/12 (25%) | 1/2 (50%) | 1/3 (33%) | 1/2 (50%) | 2/3 (67%) | 3/6 (50%) | 8/9 (89%) | 1/6 (17%) | 0 | 2/6 (33%) | 1/9 (11%) |
| | Anticipates Hazards | 17/17 (100%) | 13/17 (76%) | 16/17 (94%) | 11/13 (85%) | 1/17 (6%) | 2/13 (15%) | 0 | 2/4 (50%) | 0 | 0 | 0 | 2/4 (50%) |
| | Plans Ahead | 14/17 (82%) | 14/17 (82%) | 12/14 (86%) | 13/14 (93%) | 2/14 (14%) | 1/14 (7%) | 0 | 1/3 (33%) | 0 | 0 | 3/3 (100%) | 2/3 (67%) |
| | Decision Making | 15/17 (88%) | 14/17 (82%) | 14/15 (93%) | 13/14 (93%) | 1/15 (7%) | 1/14 (7%) | 1/2 (50%) | 1/3 (33%) | 0 | 0 | 1/2 (50%) | 2/3 (67%) |
| | Memory / Follow Directions | 15/17 (88%) | 14/17 (82%) | 15/15 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 2/3 (67%) | 0 | 0 | 2/2 (100%) | 1/3 (33%) |
| | Speed of Processing | 16/17 (94%) | 15/17 (88%) | 16/16 (100%) | 15/15 (100%) | 0 | 0 | 0 | 2/2 (100%) | 0 | 0 | 1/1 (100%) | 0 |
| | Rules of the Road | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 17/17 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table H-7. Outcomes for OT-Administered Training Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|--|------------------------------|--------------------------|-----------------------------------|--------------------------|--------------|--------------------------|--------------------------------------|--------------------------|--------------|--------------------------|---------------|--------------------------|
| | | Control | OT-Administered Training | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | | | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 13/13 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Scans Environment | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 13/13 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 13/15 (87%) | 15/16 (94%) | 13/13 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Identifies Signage | 17/17 (100%) | 13/15 (87%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Checks Cross Traffic | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Following Distance | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Stopping Distance | 14/17 (82%) | 13/15 (87%) | 13/14 (93%) | 13/13 (100%) | 1/14 (7%) | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 2/2 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Drives in Proper Lane | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turns in Proper Lane (L) | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turns in Proper Lane (R) | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 14/15 (93%) | 14/14 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) | 1/1 (100%) |
| | Lane Changes | 16/17 (94%) | 13/15 (87%) | 15/16 (94%) | 13/13 (100%) | 1/16 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |

Table H-7 (Cont'd).

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|--|--|------------------------------|--------------------------|-----------------------------------|--------------------------|---------------|--------------------------|--------------------------------------|--------------------------|--------------|--------------------------|---------------|--------------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training | Control | OT-Administered Training |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 13/15 (87%) | 14/16 (88%) | 13/13 (100%) | 2/16 (12%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 2/2 (100%) |
| | Smooth Steering | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 1/1 (100%) | 0 | 0 | 0 | 0 |
| | Smooth Accelerator | 17/17 (100%) | 12/15 | 17/17 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3/3 (100%) |
| | Smooth Braking | 16/17 (94%) | 14/15 (93%) | 16/16 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) |
| | Complete Stops | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Right Turns | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Left Turns | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Yields Right of Way | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Turn Signals | 16/17 (94%) | 13/15 (87%) | 16/16 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 2/2 (100%) |
| | Speed Maintenance | 17/17 (100%) | 14/15 (93%) | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 14/15 (93%) | 13/14 (93%) | 14/14 (100%) | 1/14 (7%) | 0 | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 1/1 (100%) |
| | DA-Central Vision | 8/8 (100%) | 6/7 (86%) | 8/8 (100%) | 6/6 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | DA-Peripheral Vision | 2/8 (25%) | 1/6 (17%) | 1/2 (50%) | 1/1 (100%) | 1/2 (50%) | 0 | 3/6 (50%) | 4/5 (80%) | 1/6 (17%) | 0 | 2/6 (33%) | 1/5 (20%) |
| | Anticipates Hazards | 17/17 (100%) | 14/15 | 16/17 (94%) | 14/14 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| | Plans Ahead | 14/17 (82%) | 13/15 (87%) | 12/14 (86%) | 13/13 (100%) | 2/14 (14%) | 0 | 0 | 1/2 (50%) | 0 | 0 | 3/3 (100%) | 1/2 (50%) |
| | Decision Making | 15/17 (88%) | 13/15 (87%) | 14/15 (93%) | 13/13 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) | 2/2 (100%) |
| | Memory / Follow Directions | 15/17 (88%) | 14/15 (93%) | 15/15 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) | 1/1 (100%) |
| | Speed of Processing | 16/17 (94%) | 14/15 (93%) | 16/16 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) |
| | Rules of the Road | 17/17 (100%) | 14/15 (93%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |

Table H-8. Outcomes for Physical Conditioning Versus Control Group Participants as Scored by CDRS After Drive 1 and Drive 3.

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | |
|---|--|------------------------------|-----------------------|-----------------------------------|-----------------------|--------------|-----------------------|--------------------------------------|-----------------------|--------------|-----------------------|---------------|-----------------------|
| | | | | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | |
| | | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning |
| <i>Tactical Skills:</i> Visual Search and Scanning Tasks | Mirror Checks | 15/17 (88%) | 11/14 (79%) | 14/15 (93%) | 11/11 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 2/3 (67%) | 0 | 0 | 1/2 (50%) | 1/3 (33%) |
| | Scans Environment | 15/17 (88%) | 12/14 (86%) | 14/15 (93%) | 12/12 (100%) | 1/15 (7%) | 0 | 1/2 (50%) | 1/2 (50%) | 0 | 0 | 1/2 (50%) | 1/2 (50%) |
| | Blind Spot Checks | 16/17 (94%) | 11/14 (79%) | 15/16 (94%) | 11/11 (100%) | 1/16 (6%) | 0 | 1/1 (100%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) |
| | Identifies Signage | 17/17 (100%) | 12/14 (86%) | 17/17 (100%) | 12/12 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2/2 (100%) |
| | Checks Cross Traffic | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Tactical Skills:</i> Vehicle Positioning Tasks | Gap Selection | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Following Distance | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Stopping Distance | 14/17 (82%) | 13/14 (93%) | 13/14 (93%) | 12/13 (92%) | 1/14 (7%) | 1/13 (8%) | 1/3 (33%) | 0 | 0 | 0 | 2/3 (67%) | 1/1 (100%) |
| | Centered in Lane Position | 17/17 (100%) | 12/14 (86%) | 16/17 (94%) | 12/12 (100%) | 1/17 (6%) | 0 | 0 | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) |
| | Drives in Proper Lane | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (L) | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 13/14 (93%) | 0 | 1/14 (7%) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Turns in Proper Lane (R) | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Lane Usage | 14/17 (82%) | 12/14 (86%) | 14/14 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 0 | 0 | 0 | 3/3 (100%) | 2/2 (100%) |
| | Lane Changes | 16/17 (94%) | 12/14 (86%) | 15/16 (94%) | 12/12 (100%) | 1/16 (6%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 2/2 (100%) |

Table H-8 (Cont'd).

| Skill/Behavior Evaluated | Variable Number (Score Sheet) and Descriptor | Number (%) at Max on Drive 1 | | Number (%) at Max on Drive 1 who: | | | | Number (%) Below Max on Drive 1 who: | | | | | | |
|--|--|------------------------------|-----------------------|-----------------------------------|-----------------------|---------------|-----------------------|--------------------------------------|-----------------------|--------------|-----------------------|---------------|-----------------------|---------------|
| | | Control | Physical Conditioning | (a) Maintained | | (b) Declined | | (a) Maintained | | (b) Declined | | (c) Improved | | |
| | | | | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | Control | Physical Conditioning | |
| <i>Tactical Skills:</i> Vehicle Handling Tasks | Appropriate Speed | 16/17 (94%) | 10/14 (71%) | 14/16 (88%) | 10/10 (100%) | 2/16 (12%) | 0 | 0 | 2/4 (50%) | 0 | 0 | 1/1 (100%) | 2/4 (50%) | |
| | Smooth Steering | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Smooth Accelerator | 17/17 (100%) | 13/14 (93%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |
| | Smooth Braking | 16/17 (94%) | 13/14 (93%) | 16/16 (100%) | 12/13 (92%) | 0 | 1/13 (8%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) |
| | Complete Stops | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Right Turns | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Left Turns | 17/17 (100%) | 13/14 (93%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |
| | Yields Right of Way | 17/17 (100%) | 14/14 (100%) | 17/17 (100%) | 14/14 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Turn Signals | 16/17 (94%) | 13/14 (93%) | 16/16 (100%) | 11/13 (85%) | 0 | 2/13 (15%) | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | 1/1 (100%) |
| | Speed Maintenance | 17/17 (100%) | 13/14 (93%) | 16/17 (94%) | 13/13 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) |
| <i>Strategic Skills:</i> Cognitive and Executive Function Tasks | Divided Attention (general) | 14/17 (82%) | 9/14 (64%) | 13/14 (93%) | 9/14 (64%) | 1/14 (7%) | 0 | 1/3 (33%) | 2/5 (40%) | 0 | 0 | 2/3 (67%) | 3/5 (60%) | |
| | DA-Central Vision | 8/8 (100%) | 10/10 (100%) | 8/8 (100%) | 10/10 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | DA-Peripheral Vision | 2/8 (25%) | 6/10 (60%) | 1/2 (50%) | 1/6 (17%) | 5/6 (83%) | 3/6 (50%) | 2/4 (50%) | 2/4 (50%) | 1/6 (17%) | 0 | 2/6 (33%) | 2/4 (50%) | |
| | Anticipates Hazards | 17/17 (100%) | 13/14 (93%) | 16/17 (94%) | 13/13 (100%) | 1/17 (6%) | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |
| | Plans Ahead | 14/17 (82%) | 11/14 (79%) | 12/14 (86%) | 10/11 (91%) | 2/14 (14%) | 1/11 (9%) | 0 | 1/3 (33%) | 0 | 0 | 3/3 (100%) | 2/3 (67%) | |
| | Decision Making | 15/17 (88%) | 11/14 (79%) | 14/15 (93%) | 10/11 (91%) | 1/15 (7%) | 1/11 (9%) | 1/2 (50%) | 0 | 0 | 0 | 1/2 (50%) | 3/3 (100%) | |
| | Memory / Follow Directions | 15/17 (88%) | 12/14 (86%) | 15/15 (100%) | 11/12 (92%) | 0 | 1/12 (8%) | 0 | 1/2 (50%) | 0 | 0 | 2/2 (100%) | 1/2 (50%) | |
| | Speed of Processing | 16/17 (94%) | 12/14 (86%) | 16/16 (100%) | 12/12 (100%) | 0 | 0 | 0 | 2/2 (100%) | 0 | 0 | 1/1 (100%) | 0 | |
| | Rules of the Road | 17/17 (100%) | 13/14 (93%) | 17/17 (100%) | 13/13 (100%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1/1 (100%) | |

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