Assessment Tools Predicting Fitness to Drive in Older Adults: A Systematic Review

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This systematic review synthesizes the research on screening and assessment tools used to determine older adults' fitness to drive. After a comprehensive search of the literature targeting tools commonly used by occupational therapists, 64 studies were reviewed and synthesized. The evidence demonstrated that a single tool measuring cognition, vision, perception, or physical ability individually is not sufficient to determine fitness to drive. Although some tools have stronger evidence than others, this review supports using different and focused assessment tools together for specific medical conditions. Results indicate that behind-the-wheel assessment remains the gold standard for driving evaluation; however, emerging evidence for observation of complex instrumental tasks of daily living and driving simulation supports further investigation with these tools.


Driving and community mobility is an identified instrumental activity of daily living (IADL; American Occupational Therapy Association [AOTA], 2014). Although community mobility encompasses other methods of getting around the community, such as mass transit, driving is the method of choice for most people. It is not surprising that older adults who grew up in the golden age of the automobile value this activity (Coughlin & D’Ambrosio, 2012), because it contributes significantly to their self-definition of independence and mobility. For many people with medical impairments, driving remains the most valued IADL once basic activity of daily living (ADL) needs are met (Dickerson, Reistetter, & Gaudy, 2012).

Occupational therapy practitioners must use their clinical judgment to evaluate driving as an IADL and address clients’ community mobility. This judgment may be based on observation of ADL and IADL performance or on results from an evaluation using evidence-based tools, and it may result in recommendations for interventions to promote mobility or an appropriate pathway for referral. Thus, the objective of this literature review was to identify, evaluate, and synthesize the evidence for evaluation of driving in older adults to assist occupational therapists with this clinical decision-making process. The review addressed the following focused question: What is the evidence supporting the use of clinical assessments (e.g., vision, cognition, physical function) and performance-based assessments (e.g., behind the wheel, simulated) for determining driving safety or competence and driving cessation for older adults?

Statement of the Problem

Given the trend among U.S. older adults of choosing to age in place, more than 75% of older adults are projected to be living in suburban and rural areas in the United States.
next decade (Rosenbloom, 2012). Older adults living in these communities will need to drive to meet their occupational needs, even if it is unsafe for them to do so. Although most older adults are safe drivers, analyses of crashes have shown that drivers ages 70–79 yr have an increased risk of a fatal crash; for drivers older than age 80, the risk is as much as 4 times greater (Stutts, Martell, & Staplin, 2009), in part because of the increased fragility that comes with advanced age (Evans, 2012). The issue is not age specific; research has clearly shown that driving decisions should be based on functional abilities (Barrassh et al., 2010; Dickerson et al., 2007). However, the reality is that with advancing age, people are more likely to have medical conditions that affect driving, such as dementia, stroke, or other neurological conditions (Carr, 2010).

In addition to a growing prevalence of Alzheimer’s disease (National Institute on Aging, 2002), 1 in 7 people older than age 71 are estimated to have some type of cognitive impairment (Plassman et al., 2007). Cognitive impairment affects not only the skills and abilities required for safe driving, but also the ability to make appropriate decisions about driving because of lack of insight, poor judgment, or loss of reasoning ability (Adler & Kuskowski, 2003).

The public health issue is how to identify at-risk drivers without affecting the rights and independence of older drivers who are not at risk. Restricting low-risk drivers would be counterproductive for the following reasons:
1. Increased medical costs (depression rates are higher among former drivers; Marottoli et al., 1997; Ragland, Satariano, & MacLeod, 2005)
2. Increased economic loss due to decreased consumers in the economy
3. Loss of income for caregivers as a result of interruptions in employment to provide transportation for the nondriver (D’Ambrosio, Coughlin, Pratt, & Mohyde, 2012).

Thus, it is critical to find the appropriate balance between decreased risk and promotion of mobility for older adults, especially for occupational therapy clients who may be able to return to driving after recovering from a medical condition.

Occupational therapists can assist in ensuring the safety of and fostering independence for older adults with medical conditions. When a person has a medical condition (e.g., stroke, hip replacement, amputation), he or she typically has a period of recovery in a medical facility or rehabilitation center or at home with services. During this time, clients usually understand that driving is not recommended. However, if health care professionals do not address the question of driving before discharge from services, clients are left to determine their own level of fitness to drive or risk being isolated with no means of community mobility. Some clients may return to driving before they have reached a level of recovery at which driving might be recommended. Other clients may never return to driving, believing they cannot function or yielding to family pressure to stop driving, when vehicle adaptation or rehabilitation could facilitate a return to this important functional task.

Because driving is a valued IADL within the occupational therapy scope of practice, all occupational therapists, regardless of their area of practice, need to understand and use screening and assessment tools in the areas of cognition, motor skills, vision, and perception to advise the medical team on fitness to drive; appropriately refer clients to driver rehabilitation services; and be able to advise clients and family about alternative transportation options if driving cessation is necessary.

Background

Although multiple screening and assessment tools are available to identify the physical, sensory, visual–perceptual, and cognitive skills critical for driving, the current gold standard for determining fitness to drive is the behind-the-wheel (BTW) assessment (Dickerson, 2013; Langford et al., 2008; Wheatley & Di Stefano, 2008). The challenge is that BTW assessment is costly because it is usually part of a comprehensive driving evaluation (i.e., it has both a clinical and an on-road component) and involves risk. In addition, only a limited number of practitioners have the expertise, specialized equipment, or license to perform a BTW assessment (Dickerson, 2013).

To address the needs of the growing older population, researchers have been investigating and developing assessment tools with the objective of accurately predicting people who are likely to pass or fail a BTW assessment. Established cognitive and perceptual tools (e.g., Trail Making Tests A and B [TMT–A & B; Reitan, 1958]; Motor-Free Visual Perception Test [MVPT; Colarusso & Hammill, 2003]; and the Mini-Mental State Examination [MMSE; Folstein, Folstein, & McHugh, 1975; Folstein, Folstein, White, & Messer, 2010]) have been used in multiple studies to predict BTW performance, and other tools have been specifically developed to evaluate driving fitness (e.g., Useful Field of View® [UFOV®]; Ball, Owsley, Sloane, Roenker, & Bruni, 1993), Driving Health Inventory [DHI; Staplin, Lococo, Gish, & Decina, 2003], and Stroke Drivers Screening Assessment [Nouri &
Lincoln, 1992]). The BTW assessment will likely remain the gold standard, even within the comprehensive driving evaluation, because it is the primary factor specialists use in making a driving recommendation (Dickerson, 2013).

Before progressing to a BTW assessment, it is important to differentiate drivers who are likely to be fit to drive, drivers who demonstrate patterns of behavior that might be considered unsafe, and drivers who may be at risk and need a BTW for a final determination to be made. Using screening and clinical assessment to accurately refer drivers for a specialized comprehensive driving evaluation, including a BTW assessment, will enhance the expansion of driver evaluation services to meet the growing needs.

The purpose of this systematic review was to summarize and critically appraise the current literature on clinical assessment and performance-based assessments for determining fitness to drive. Specifically, we reviewed studies that supported predictive or concurrent validity on the basis of the outcome of BTW assessment, crashes, or driving cessation for older adults.

Method

In collaboration with AOTA as part of the evidence-based practice project focusing on older adults and driving, this review was conducted as part of a graduate student project under the direction of Anne E. Dickerson. A detailed description of the methodology for this systematic review can be found in the article “Method for the Systematic Reviews on Occupational Therapy and Driving and Community Mobility for Older Adults” in this issue (Arbesman, Lieberman, & Berlinstein, 2014). The question for this systematic review focused on assessment tools rather than intervention strategies.

Because this was the first AOTA-supported review of screening and assessment tools related to driving, the search period was expanded to encompass 1990 through April 2011. Dickerson first reviewed each of the identified citations and eliminated those clearly unrelated to the question. The team, consisting of Dickerson and three occupational therapy master’s degree students (Meuel, Ridenour, and Cooper), met and reviewed the identified abstracts. Full articles were assigned to one of the three students and Dickerson to critically review. The team met weekly to discuss each article, determine the level of evidence, and develop the evidence table. Dickerson completed the review synthesis after the evidence table was complete.

Results

The electronic database search yielded 1,743 records. Review of titles reduced the number of potential manuscripts to 128. Studies were eliminated when they were already included in either a meta-analysis or systematic review or were not directly related to the focused question. A total of 80 full articles were reviewed by at least two members of the team, with 59 articles selected for this review. Five studies were added to the final review because they were published after the initial searches were completed. Of the 64 studies, 5 were Level I studies; 6, Level II; and 53, Level III. Regarding outcomes, 4 studies used cessation of driving as an outcome, 7 used crashes, and the rest used BTW performance as the outcome. Supplemental Table 1 summarizes selected studies on clinical and performance-based assessments for determining fitness to drive (available online at http://otjournal.net; navigate to this article, and click on “Supplemental”).

Types of Assessments

In the majority of the studies, an array of assessment tools was used to predict the outcome. The studies using multiple assessments generally covered the areas of cognition, perception, vision, and physical or motor components. Forty-two studies used an assessment tool that evaluated cognition, with the most commonly selected ones being the TMT, MMSE, Digit Symbol Modalities Test (Wechsler, 1997), clock drawing test, block design, Rey-Osterrieth Complex Figure Test (Bennet-Levy, 1984), maze tests, and letter or number cancellation. Thirty-one studies used assessments for perception (e.g., UFOV, visual attention, MVPT, visual neglect); 23 tested vision (e.g., acuity, contrast sensitivity, visual field, depth perception), and 21 tested physical or motor components (e.g., range of motion, Rapid Pace Walk [Marottoli, Cooney, Wagner, Doucette, & Tinetti, 1994], manual muscle test, finger tapping, grip strength, reaction time). Fourteen studies focused on an individual tool, an individual assessment battery, or a driving simulator. For example, a driving simulator was specifically used in 2 studies, and in 3 studies a driving simulator was used in addition to other assessment tools. In other studies, individually developed batteries (e.g., DHI, Assessment of Driving Related Skills [ADReS; Carr, Barco, Wallendorf, Snellgrove, & Ott, 2011], Stroke Drivers Screening Assessment) or individual tools (e.g., Assessment of Motor and Process Skill [AMPS; Fisher, 2006], Driving Decisions Workbook [Eby, Molnar, Shope, Vivoda, & Fordyce, 2003], DriveAble, Attention Network Test [Weaver, Bédard, McAuliffe, & Parkkari, 2009], Adelaide Driving Self-Efficacy Test [George,
Clark, & Crotty, 2007]) were compared with the BTW outcome. Individually developed batteries are typically designed to provide one score by incorporating the physical, cognitive, and perceptual components of driving.

Main Findings

One of the main findings from synthesizing the numerous research studies is that no single screening or assessment tool is the “one and only” to use in determining fitness to drive (Baldock, Mathias, McLean, & Berndt, 2007; Bédard, Weaver, Darzins, & Porter, 2008; Carr et al., 2011; Classen et al., 2011). Because of the complexity of driving, it is unlikely that any single tool can address all the factors required to make a decision for older adults with such diverse abilities and skills, including older adults with various medical conditions. However, initial evidence has shown that the evaluation of occupational performance during completion of complex IADLs can identify older adults who may be at risk for unsafe driving (Dickerson, Reistetter, Schold Davis, & Monahan, 2011).

Vision. Multiple studies had strong evidence that visual acuity has little or no relationship to crash data or driving risk, unless the person has significantly reduced visual acuity of <20/70 or has additional visual issues (Carr et al., 2011; Munro et al., 2010; Stav, Justiss, McCarthy, Mann, & Lanford, 2008; Uc et al., 2009; Wood, Anstey, Kerr, Lacherez, & Lord, 2008). Decreased contrast sensitivity is a normal part of aging, and moderate evidence has shown that impaired contrast sensitivity is linked to increased crash risk for older adults (Amick, Grace, & Ott, 2007; Keay et al., 2009; Stav et al., 2008). However, this finding has not been reported in all studies (Rubin et al., 2007).

Cognition. Individual scores on the MMSE are not correlated with crashes or BTW outcomes (Classen et al., 2009; Ingley, Chinnaswamy, Devakumar, Bell, & Tranter, 2009; Munro et al., 2010; Ott et al., 2008; Uc et al., 2009). Although the evidence for exact cutoffs on the MMSE is insufficient, scores of <18 indicate that a person has moderate to severe dementia. There is good evidence that people with an MMSE score at this level are unsafe to drive (Fox, Bowden, Bashford, & Smith, 1997).

Another cognitive test, the TMT–A & B, was frequently represented in the studies. Slowed processing speed on the TMT–B identified older drivers at risk (Amick et al., 2007; Carr et al., 2011; Classen et al., 2008; Grace et al., 2005; Kantor, Mauger, Richardson, & Unroe, 2004; Keay et al., 2009; Munro et al., 2010; Ott et al., 2008; Whelihan, DiCarlo, & Paul, 2005; Wood et al., 2008; Zook, Bennett, & Lane, 2009). In fact, good evidence has shown that when a person takes >2 min or cannot complete the test, he or she is at significant risk for being unfit to drive. However, the evidence for exact cutoff scores for either the TMT–A or the TMT–B is insufficient.

The UFOV, a test specifically designed as a driving screening tool measuring attention (i.e., selected and divided) and processing speed, was frequently included in studies. Moderate evidence has shown that the UFOV is correlated with crashes and risk for unsafe driving (Amick et al., 2007; Bédard et al., 2008; Classen et al., 2009; Clay et al., 2005; De Raedt & Ponjaert-Kristoffersen, 2001; Edwards et al., 2008; Marshall et al., 2007; Stav et al., 2008; Wood et al., 2008). The strongest evidence is for Subtest 2 of the UFOV, which tests processing speed (Classen et al., 2009, 2011; Edwards, Bart, O’Connor, & Cissell, 2010; Wood et al., 2008). However, not all studies supported the UFOV’s predictive validity (Carr et al., 2011; Weaver et al., 2009).

Although cognitive abilities or skills were almost always measured in the reviewed studies, the large variety of assessment tools used makes comparing outcomes difficult. For example, in some studies, the clock drawing test demonstrated a relationship to fitness to drive (Carr et al., 2011; Mathias & Lucas, 2009; McCarthy & Mann, 2006; Oswanski et al., 2007), whereas other studies did not find a relationship (Molnar et al., 2007; Zook et al., 2009). Some research examining the effectiveness of the Digit Symbol Modalities Test showed it was able to predict fitness to drive (Edwards et al., 2008; Lafont et al., 2010), but this test is not always predictive (Wood et al., 2008). A meta-analysis by Mathias and Lucas (2009) illustrated that, depending on the outcome measure (i.e., BTW, driving simulation, or crashes), different assessment tools changed in their predictive validity. However, this meta-analysis was important in that it found that all drivers who failed the outcome measure also performed poorly on cognitive tests.

Perceptual. As with cognition, a variety of assessments are used to measure perceptual skills, with none demonstrating consistent evidence in predicting fitness to drive. Some perceptual assessments overlap with cognition (e.g., UFOV, clock drawing). The MVPT has been used frequently in studies, though some studies have used only the Visual Closure component of the assessment. Findings linking MVPT performance with fitness to drive have been inconsistent (Edwards et al., 2010; Korner-Bitensky et al., 2000; Oswanski et al., 2007), with some reporting no relationship to fitness to drive (Carr et al., 2011; Kantor et al., 2004; Stav et al., 2008; Zook et al., 2009).
**Motor.** There is moderate evidence that poor performance in the Rapid Pace Walk is linked to decreased fitness to drive (Classen et al., 2011; Edwards et al., 2010; Stav et al., 2008). However, other studies have found motor function not to be predictive of outcomes (Carr et al., 2011). More studies have provided little or weak evidence for assessment of physical abilities or skills (Carr et al., 2011; Cordell, Lee, Granger, Vieira, & Lee, 2008; Kantor et al., 2004; Ott et al., 2008), with only a few studies finding links between driving fitness and motor performance (Radford, Lincoln, & Lennox, 2004; Wood et al., 2008).

**Screening Batteries.** Several batteries have been developed to screen for fitness to drive. Batteries are designed to be brief screening tools that include a range of component parts to measure cognition, vision, motor skills, or perception and provide an overall score. Using data from individual assessments described in the Maryland Pilot Older Driver Study, Staplin, Gish, and Wagner (2003) laid the groundwork for development of the DHI. Although each component was studied separately, current evidence for the DHI as a battery is not strong because no studies have linked the final version of the DHI with fitness to drive.

Another battery, the ADReS, was developed for physicians to identify at-risk drivers in the office setting. It consists of several individual tools (e.g., TMT–B, range of motion, clock drawing) used to screen for cognitive, visual, and physical abilities. McCarthy and Mann (2006) found the ADReS identified high numbers of older adults for further evaluation when they were not necessarily at risk, indicating poor specificity. The Stroke Drivers Screening Assessment and its Nordic counterpart have moderate evidence of predictive value for people with stroke, but not for those with other clinical conditions (Lincoln, Radford, Lee, & Reay, 2006; Selander, Johansson, Lundberg, & Falkmer, 2010).

More recently, carefully selected individual assessment tools have been used together to measure the functional deficits of a specific condition associated with aging. In these studies, the predictive validity has been stronger because of the focused assessment tools. Three studies used this process. Classen et al. (2009, 2011) found Subtest 2 of the UFOV and the Rapid Pace Walk to be predictive of BTW performance in people with Parkinson’s disease. Similarly, a combination of TMT–A, a complex figure design, and block design provided evidence for people with neurological conditions (e.g., Parkinson’s disease; Uc et al., 2009), and a combination of the visual field test, the Rey-Osterrieth Complex Figure Test, and lesion location has evidence for prediction of BTW performance for people with stroke (Akinwuntan et al., 2002). Finally, Carr et al. (2011) found good evidence for using an interview, clock drawing, and the TMT–A or Snellgrove Maze Test (Snellgrove, 2010) to predict BTW performance in people with dementia.

**Simulation.** Although limited evidence has shown that interactive driving simulation can be used as an assessment for driving fitness (Bédard, Parkkari, Weaver, Riendeau, & Dahlquist, 2010; Clay et al., 2005; Lee, Cameron, & Lee, 2003; Lee, Lee, Cameron, & Li-Tsang, 2003), it is insufficient to make a final determination on its validity and reliability.

**Discussion and Implications for Occupational Therapy Practice, Education, and Research**

**Implications for Practice**

Some screening and assessment tools frequently used in practice have strong evidence demonstrating they are not predictive of BTW performance and therefore cannot be used to determine fitness to drive. Examples of these measures include simple brake reaction time, MMSE, visual acuity, color perception, range of motion, and manual muscle testing. This evidence does not necessarily mean that these tools should not be used, but consideration of why and when they should be used is important. For example, if the older adult scores <18 (of a maximum of 30) on the MMSE, indicating moderate to severe dementia, the individual is very likely at risk for unsafe driving (Wheatley, Carr, & Marottoli, 2014), and further assessment is not warranted. However, scores <24 on the MMSE may indicate the presence of a cognitive impairment, but determining fitness to drive would require additional assessment. Another assessment, the simple brake reaction time, has been shown not to be predictive of BTW assessment outcomes, although it has good face validity for older adults. However, if the older adult has difficulty following the directions for the brake test when using a simplified floor model of a brake and acceleration pedal, he or she is likely at significant risk during real-world driving.

The ADReS is an example of a screening battery for physicians. Although it does not have good discrimination (i.e., it identifies people as being at risk when they may not be), it is a useful tool for general practice physicians to use in conjunction with clinical judgment to identify potential concerns with older patients’ fitness to drive. Similarly, occupational therapists in general practice can identify clients who may be at risk for unsafe driving and clients...
who may need further evaluation, including referral for an individualized comprehensive driving evaluation, by observing them performing ADLs and IADLs.

Many of the tools evaluated in this review are neuropsychological tests, developed to measure discrete functions of the brain. Discrete tests are particularly useful in identifying specific impairments (e.g., visual closure, verbal memory); however, they offer limited information about completion of more complex activities (e.g., cooking, budgeting, driving). Complex functional tasks require the integration of many discrete skills for effective performance. Evidence has emerged that observation of a person performing a complex IADL is a good predictor of fitness to drive (Dickerson et al., 2011; Stapleton, 2012). Occupational therapists who observe their clients, especially over time, should be able to assist in determining a client’s driving status as unfit to drive, fit to drive, or requiring further evaluation by a driver rehabilitation specialist. Therapists who make recommendations about independence in the home environment (e.g., that a client is unsafe to independently cook on a stove) should have the confidence to extend that safety restriction to driving a motor vehicle. However, the BTW assessment remains the best tool for evaluating fitness to drive because of (1) its ecological validity; (2) the real-world environment in which it is conducted; and (3) the observation of a complex IADL (i.e., driving), a basic skill of occupational therapists. Thus, when occupational therapists in general practice are unsure about the application of their observations, referral to a driver rehabilitation specialist is warranted.

Finally, interactive driving simulation is developing at a rapid pace. Several companies have redesigned their driving simulators to make them affordable and attractive for purchase by medical centers and hospital systems. Although the evidence is not sufficient at this point (Bédard et al., 2010; Clay et al., 2005; Lee, Cameron, & Lee, 2003; Lee, Lee, et al., 2003), research is clearly needed to ensure the validity and reliability of interactive driving simulation as an evidence-based assessment tool. Moreover, research is needed to develop the protocols for using simulators, train those who use simulators, and address simulator adaptation sickness that accompanies using simulators, train those who use simulators, and address simulator adaptation sickness that accompanies driving simulation with older adults.

Implications for Research

The results of this systematic review illustrate the complexity of driving with the fact that no single screening or assessment tool can determine driving fitness for the older adult, including drivers with specific medical conditions. Even when multiple measures of person factors are completed (i.e., physical, visual, cognitive), occupational performance is not equal to the sum of its parts; rather, it is the product of the complex interaction of the factors involved. This systematic review is complicated by the fact that many different tools are used to assess the diverse abilities and skills involved in driving, particularly for the domain of cognition.

The evidence is clear, however, that evaluation of higher level cognitive skills (e.g., executive function) is critical for determining fitness to drive, which is why the BTW assessment remains the gold standard for evaluation. Unfortunately, BTW assessments are not truly standardized. Although the BTW assessment using a standardized route consists of similar components (e.g., traffic signs, signals, unprotected turns, neighborhoods, streets with traffic), the same route can differ significantly as a result of traffic, weather, or time of day. Regardless of the inconsistencies, the BTW assessment provides important observations of the driver in a dynamic context and gauges his or her ability to scan the environment, anticipate the actions of others, and prioritize and multitask actions to arrive at a selected destination.

Implications for Education

Addressing community mobility should be a routine component of occupational therapy services. Education of students regarding driving as a means of community mobility is one of the Accreditation Council on Occupational Therapy Education’s (2012) educational standards.

Educational modules or courses on this standard should include the process and tools with the best evidence used by occupational therapists when determining fitness to drive, especially when available for specific diagnostic categories.

Evaluation of driving fitness is an ongoing research priority for the National Highway Traffic Safety Administration (NHTSA), the U.S. Department of Transportation, and state licensing agencies because of the aging population and increased fatality rates of older adults (NHTSA & American Association of Motor Vehicle Administrators, 2009). Occupational therapy is recognized as the profession that best addresses the screening and evaluation needs of the medically at-risk client (Carr et al., 2011), and service expansion is needed to meet the needs of the growing number of at-risk older adults. This review supports screening and evaluating older adults for fitness to drive as important content to include in curricula, training, and, in particular, research agendas to address the gaps in the knowledge base, particularly for occupational therapy academic programs at the professional level.
In early published studies on driving, statistical analysis consisted of correlations between the screening or assessment tool score and one of the two main outcomes: a crash or BTW evaluation results. As the research expanded with more focused research questions based on early evidence and the development of assessment tools, the statistical analysis moved into regression studies, using both retrospective and prospective study models to try to identify the best predictive tool. The issue of using different outcome measures is significant because crashes are rare events, no standardized BTW assessment exists, and driving cessation has become another complex outcome measure. Measurement tools are also dependent on demographics, medical conditions, and the mix of assessment tools, decreasing the ability to compare studies and make definite decisions about evidence for specific tools.

Within the past 10 yr, research studies on fitness to drive have adopted more sophisticated statistical analysis to determine predictive validity. Specifically, receiver operating characteristic (ROC) curves and test characteristics such as positive and negative predictive values and likelihood ratios have become the statistical benchmark for evidence-based research. The ROC curve illustrates how different cutoff scores will affect the number of true hits, or sensitivity (i.e., the proportion who are unfit to drive who are correctly identified as unfit by the test), and true misses, or specificity (i.e., the proportion who are truly fit to drive who are correctly identified as fit by the test). Thus, studies using ROC curves allow the practitioner to determine the amount of error that is acceptable in a particular situation such that a practitioner might use a less sensitive cutoff score when using the tool as a general screening tool but a more sensitive cutoff score when desiring a more definitive determination.

Tools with stronger evidence include the UFOV, the TMT–A & B, and tests for contrast sensitivity. Each of these tools has been used for more than 20 yr, although published studies have supported their ability to determine fitness to drive, when used in isolation or as a single tool, the evidence is inconclusive. As stated, multiple recent studies have used various combinations of multiple assessments to determine how tools can be combined to determine the BTW outcome without actually getting in a vehicle. The results continue to be inconclusive because more research is needed using consistent tools thoughtfully grouped together in order to make a final recommendation on driving status. However, as previously mentioned, several research teams have investigated combining tools as a battery to determine fitness to drive for specific medical conditions rather than for the general population of older adults. Promising evidence is emerging from this work (see Akinwuntan et al., 2002; Carr et al., 2011; Classen et al., 2009, 2011; Uc et al., 2009). Thus, it may be more important to select tools with evidence for specific clinical conditions and to analyze the sensitivity, specificity, and positive and negative predictive values of such batteries.

Limitations

One of the key issues with screening and assessment of fitness to drive is how outcomes are measured. Typical outcomes include crash rate, BTW assessment results, or driving cessation. Each outcome is different, and the methods used to measure the discrete outcomes vary across studies (Mathias & Lucas, 2009). Crashes are rare events, which makes them difficult to use as an outcome measure. Additionally, some crashes are state reported, and some are self-reported minor crashes or near misses never reported to authorities. Another example is the variation in BTW assessments in terms of time, conditions, difficulty, and skill of the evaluator (Classen, Dickerson, & Justiss, 2012). When determining the reliability and validity of specific screening and assessment tools, it is important to have consistency in the outcome measures used by researchers.

In addition to the outcomes being measured, the assessment tools used in studies are very diverse, which makes it difficult to compare between and among studies. Finally, many of the studies included in this review had small sample sizes and used self-report of driving cessation, which is subject to bias. Despite these limitations, this review identifies gaps in knowledge needing additional research and offers evidence for practitioners about tools and skill sets needed to determine fitness to drive or referral for expert evaluation.

Conclusion

This review illustrates that more research is needed before individual clinical screening and assessment tools can accurately predict older adults’ fitness to drive. Although diverse tools are used to screen and evaluate driving, this review suggests that some tools have greater validity than others for discrimination of skills and abilities needed for driving. The review also reinforces the need to use tools with sensitivity and specificity (i.e., appropriate cutpoints for at-risk populations), including the BTW assessment, to determine fitness to drive. In addition, evidence is emerging that when specifically selected tools are used in combination for particular client diagnoses, they have good predictive validity (i.e., sensitivity and specificity), especially for those people at the two ends of the spectrum (i.e., those who are definitely unfit or fit to drive).
The review also illustrates that evidence is emerging that occupational therapists can use previously gathered evaluation data as well as observation of complex IADLs to make appropriate recommendations for fitness to drive. Nevertheless, large prospective cohort studies, similar to CanDrive (see Marshall et al., 2013), are needed to establish that occupational therapists’ observation of IADLs or assessment tools such as the AMPS can specifically be used to determine fitness to drive. These common IADL assessments may serve as a preclinical assessment for the more specialized, costly, and risky BTW assessment. Finally, occupational therapy leaders need to support the vision that establishes competent and confident occupational therapy practitioners as the go-to providers for driving and community mobility services to build capacity in this area of practice to meet the growing needs of the aging population. ▲

References


