ORIGINAL ARTICLE

Conceptualizing and Measuring Confidence in Older Drivers: Development of the Day and Night Driving Comfort Scales

Anita M. Myers, PhD, Josee A. Paradis, MSc, Robin A. Blanchard, MSc

ABSTRACT. Myers AM, Paradis JA, Blanchard RA. Conceptualizing and measuring confidence in older drivers: development of the Day and Night Driving Comfort Scales. Arch Phys Med Rehabil 2008;89:630-40.

Objective: To examine and measure driving confidence from the perspective of older adults.

Design: Used focus groups for construct examination, item generation, and ratings; conducted psychometric testing using Rasch analysis for scale refinement; examined test-retest reliability and associations with driver characteristics and driving habits.

Setting: Retirement complexes and seniors' housing and centers in Ontario, Canada.

Participants: Convenience samples of current drivers (n=143) (range, 66–92y) and 7 counselors.

Interventions: Not applicable.

Main Outcome Measure: The Day (DCS-D) and Night (DCS-N) Driving Comfort Scales developed inductively with older drivers.

Results: Older drivers believed that it was important to consider confidence in their own abilities and discomfort caused by other drivers, to separate day and night driving, and to specify the driving context (eg, traffic flow, speed). Rasch analysis showed that the final 13-item DCS-D and 16-item DCS-N were both hierarchic and unidimensional, with good person (.89, .96) and item (.98, .97) reliabilities, respectively. Test–retest reliability was adequate for the DCS-D (intraclass correlation coefficient [ICC]=.7) and good for the DCS-N (ICC=.88). Scores were significantly associated with reported driving frequency, situational avoidance, and perceived abilities ($P<.001$).

Conclusions: The Driving Comfort Scales are promising new tools for research and practice.

Key Words: Aged; Aged 80 and over; Automobiles; Rehabilitation; Reproducibility of results.

ALTHOUGH OLDER DRIVERS are disproportionately involved in fatal collisions (per miles driven) and represent the fastest growing segment of the driving population,[1-3] efforts to restrict older drivers such as age-based licensing requirements must be weighed against the impact on quality of life.[2,4] Driving is the preferred mode of transportation in North America, and many seniors, particularly those in rural areas, rely on driving to maintain their mobility and independent lifestyles.[1,4-6] Seniors who forfeited their licenses have expressed regret, social isolation, and loss of self-worth.[6,7] Prospectively, driving cessation has been associated with both increased depression[8] and reduced out-of-home activities.[9]

Not surprisingly, most seniors want to keep driving for as long as possible and want control over the decision to stop.[6] For some, driving cessation may be a gradual process of self-imposed restrictions and compensations.[10] In a large survey, nearly half of older drivers said that they drove less than they did 10 years ago, and as age increased they were more likely to avoid driving in peak hours, on highways, in bad weather, and at night.[5] Although findings are mixed concerning the extent to which older drivers are aware of declining abilities or willing to acknowledge such limitations,[11-16] it is becoming increasingly apparent that self-perceptions play a critical role in determining why some people adjust their driving but others do not.[4,6,10-16] In particular, confidence may be an important mediator between declining abilities, associated problems (such as night blindness), and ensuing self-regulation.[6,11,12,14]

Driving confidence is worthy of investigation given the proven importance of self-efficacy in other domains, such as the mediating role of balance confidence in self-imposed activity restriction.[17,18] Rooted in Bandura's social cognitive theory, self-efficacy is a stronger determinant of behavior than one's actual skills or abilities.[19] People who lack confidence in a particular domain will avoid challenging situations (specific to that context) as much as possible and are less likely to persist in the face of obstacles. Self-efficacy is primarily influenced, either positively or negatively, by (1) performance, (2) vicarious experience, (3) verbal persuasion, and (4) physiologic cues (eg, feeling anxious).[19]

There have been a number of attempts to measure this construct—for example, by asking older drivers to rate their stress level in 16 driving situations.[10] Parker et al[11] created a nervousness/confidence subscale ($\alpha=.87$) using 12 questions from their Driving Behavior Questionnaire: 7 on the extent of nervousness in various driving situations and single items on how relaxed, stressed, confident, flustered, or calm people usually feel when driving. Another group of researchers, meanwhile, adapted items from the Driving Habits Questionnaire[16] from a difficulty to a confidence-rating format but without further psychometric testing.[20]

When this project began, only 1 scale designed specifically to measure driving confidence had been published. The Driving Confidence Rating Scale asks respondents to rate their levels of confidence from 0 (not at all confident) to 10 (completely confident) driving in each of the following conditions: at night, in bad weather, in rush hour or heavy traffic, on the highway, on long trips, changing lanes on a busy street, reacting quickly, pulling into traffic from a stop, making a left turn across traffic, and parallel parking into a space between cars.[14] Unfortunately, the developers did not provide any psychometric evidence for this scale.

From the Department of Health Studies and Gerontology, University of Waterloo, Waterloo, ON, Canada.

Presented to the Gerontological Society of America, November 2006, Dallas, TX.

Supported by the Canadian Driving Research Initiative for Vehicular Safety in the Elderly (CanDRIVE), Canadian Institutes of Health Research.

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the authors or upon any organization with which the authors are associated.

Correspondence to Anita M. Myers, PhD, University of Waterloo, 200 University Ave W, Waterloo, ON N2L 3G1, Canada, e-mail: *amyers@healthy.uwaterloo.ca.*

Reprints are not available from the authors.

0003-9993/08/8904-00455$34.00/0

doi:10.1016/j.apmr.2007.09.037

Table 1: Characteristics of Older Driver Samples

Characteristics	Focus Groups (n=42)	Study 1		Study 2	
		Ratings (n=49)	Pilot (n=16)	Validation (n=100)	Retest Group (n= 27)
Region					
Urban	24 (57.1)	27 (55.1)	16 (100.0)	68 (68.0)	22 (81.5)
Rural	18 (42.9)	22 (44.9)	0 (0.0)	32 (32.0)	5 (18.5)
Women	27 (64.3)	34 (69.4)	9 (56.3)	61 (61.0)	18 (66.7)
Age (y)	78.0±5.5	79.0±5.9	78.0±4.6	79.7±6.4	78.6±6.6
College education	19 (45.2)	16 (32.6)	9 (56.3)	32 (32.0)	12 (50.0)
Worry about car expenses	19 (46.3)	22 (44.9)	5 (31.3)	38 (38.0)	21 (77.8)
Lives alone	24 (57.1)	31 (63.3)	10 (62.5)	58 (58.0)	17 (63.0)
Other driver in household	16 (38.1)	21 (43.8)	5 (31.3)	38 (38.0)	7 (25.9)
Others rely on them	16 (40.0)	15 (31.9)	5 (35.7)	36 (40.9)	10 (40.0)
Cataract surgery	14 (35.0)	21 (42.9)	5 (31.3)	42 (42.8)	8 (29.6)
Use cane or walker	9 (23.1)	9 (18.8)	6 (40.0)	32 (32.9)	10 (37.0)
Able to walk .25 mile (.40km)	33 (84.6)	9 (60.0)	13 (86.7)	77 (79.4)	22 (81.5)
No. of days driven past week	5.0±2.0	4.4±2.5	4.0±2.3	4.8±2.2	5.7±1.9

NOTE. Values are n (% based on valid cases) or mean ± standard deviation (SD).

Subsequently, another tool—the Adelaide Driving Self-Efficacy Scale (ADSES)—has been published, with some accompanying psychometric support (internal consistency, ability of scores to discriminate between older adults with stroke and younger hospital staff, and those who passed or failed on-road driving tests).[21] The ADSES consists of 12 items rated from 0 (not confident) to 10 (completely confident). Content is similar but not identical to Marottoli and Richardson's scale.[14] Both developers used a deductive approach for item generation (ie, based on the literature and their judgment).[14,21]

Together, these studies suggest that perceived stress, nervousness, and confidence appear to be associated with reported driving frequency[11,14] and avoidance,[10,20] as well as perceptions of driving abilities.[11,14] Findings are mixed, however, concerning the association with adverse driving events and on-road performance.[11,14,20,21] In any case, the findings are difficult to interpret because the construct itself has not been well defined, consistently measured, or thoroughly examined from a psychometric standpoint.

The present studies were conducted to further examine this construct from the perspective of older drivers themselves and to develop a scale based on Bandura's theory.[19] A mixed-methods, inductive approach (ie, involving the intended recipients in the scale development process) was used to enhance the tool's conceptual relevance and content validity.[22,23] Rasch analysis was used to examine the tool's structure and help interpret the numeric ratings in relation to the descriptive content and underlying construct.[24] Thus, this project afforded the opportunity to compare the resulting content of scales, which purportedly measure the same underlying construct (ie, driving confidence) using distinct approaches to item generation (inductive vs deductive) and structural examination (use vs nonuse of Rasch analysis).

METHODS

The current project involved 2 studies. The first study (tool development) comprised 3 sequential steps: construct exploration and item generation, item verification, and pilot-testing. The second study (validation) examined the new tool's structural properties, test-retest reliability, and associations with driver characteristics and driving habits. All procedures were approved by the university ethics board, and informed consent was obtained from all participants.

Convenience samples of English-speaking persons aged 65 years and older, who held a valid driver's license and currently drove, were recruited through local seniors' centers, retirement complexes, and subsidized seniors' housing. To capture regional diversity (types of roads and distance to services), particularly for study 1, recruitment took place in 2 communities (urban and rural) situated in different areas of the province (south and north, respectively). All participants were asked to complete a background questionnaire to obtain demographic and health information and general driving habits. Table 1 shows the characteristics of the samples.

Study 1: Conceptualization and Development

Step 1: Exploration and item generation. Our first objective was to gain a better understanding of driving confidence from the perspective of older drivers themselves. We conducted 4 separate focus groups—2 in each community with drivers aged 65 to 79 years and those aged 80 years or above. This age grouping was considered important because, in Ontario, all drivers over the age of 80 years are required to undergo mandatory re-licensing every 2 years (comprising vision and rules testing, review of driving records, and a group education session).

Semi-structured scripts were used to guide the discussion. Embedded in a general discussion about driving, the key probes were as follows:

(1) Do you ever feel concerned while driving (and how would you describe this feeling)?
(2) In what situations do you tend to feel _____ (using their terms from question 1)?
(3) Do you try to avoid driving in _____ (from question 2)?
(4) What if you had an appointment or needed groceries, what do you do?

Step 2: Item verification. Situations emerging from the focus group data that appeared to evoke concerns among older drivers were selected for further examination. The objectives of this step were to obtain ratings and feedback on the pool of potential items or driving situations, as well as further clarification of the construct. Once again, 4 groups (2 in each community, segregated by age) were assembled for this purpose. Participants from the previous phase were invited to return and constituted 55% (n=27) of the total sample (N=49).