BRIEF REPORT

Preliminary Validation of a Vision-Dependent Activities of Daily Living Instrument on Adults With Homonymous Hemianopia

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KEY WORDS
- activities of daily living
- hemianopsia
- reproducibility of results
- self report

OBJECTIVE. This study sought to validate the use of the Self-Report Assessment of Functional Visual Performance (SRAFVP) as a measure of the severity of activity of daily living (ADL) limitations in people with homonymous hemianopia (HH).

METHOD. Thirty adults with HH from stroke rated their level of difficulty in completing the SRAFVP.

RESULTS. The Cronbach's αs of the SRAFVP and its three subscales (Reading, Eye–Hand Coordination, and Functional Mobility) ranged from .73 to .99. All three subscales were significantly correlated with each other and with the total SRAFVP score. Paired *t* tests revealed that Functional Mobility was significantly less difficult for participants to complete than Reading or Eye–Hand Coordination. Participants with complete HH reported greater difficulty in completing the Reading tasks than those with macular sparing.

CONCLUSION. The SRAFVP demonstrated acceptable reliability and validity in evaluating the severity of ADL impairment in people with HH.

Mennem, T. A., Warren, M., & Yuen, H. K. (2012). Brief Report—Preliminary validation of a vision-dependent activities of daily living instrument on adults with homonymous hemianopia. *American Journal of Occupational Therapy, 66,* 478–482. http://dx.doi.org/10.5014/ajot.2012.004762

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Homonymous hemianopia (HH) is a reduction of vision in one-half of the visual field on the same side in each eye resulting from damage in the postgeniculate pathways of the brain (Sahraie, 2007). The incidence of HH from stroke is 30%–48% (Sahraie, 2007; Suchoff et al., 2008; Zhang, Kedar, Lynn, Newman, & Biousse, 2006). Occipital lobe lesions from stroke are the most common cause of HH (Zhang et al., 2006). People with occipital lobe lesions demonstrate good recovery from motor and cognitive impairment, but the vision impairment persists (Ng, Stein, Salles, & Black-Schaffer, 2005). Among people with HH, typically the central (macular) and peripheral areas of the visual field are impaired, but a small percentage experience macular sparing (Zhang et al., 2006). HH disrupts visual search toward the affected field and reduces the person's ability to quickly and accurately assess and acquire information from the environment (Kerkhoff, 2000). These effects can have an adverse impact on completion of activities of daily living (ADLs; Schuett, 2009; Zihl, 2000).

Two studies have indirectly investigated ADL limitations by using the National Eye Institute Visual Function Questionnaire (Mangione, Berry, et al., 1998; Mangione, Lee, et al., 1998) to measure vision-related quality of life in people with visual field loss from postchiasmatic lesions, including HH (Gall, Lucklum, Sabel, & Franke, 2009; Papageorgiou et al., 2007). Both studies found lower scores on subscales addressing activities completed with near and distance vision, role limitations, social function, and driving, suggesting that HH may interfere with completion of daily activities. Few studies have investigated the severity of limitations in completing vision-dependent ADLs other than driving in people with HH (Wood et al., 2009), and no instruments are available to measure or quantify the severity of these limitations in this population. Therefore, this study sought to provide preliminary validation of an instrument to measure the

severity of vision-dependent ADL performance limitations in people with HH.

Method

Participants

A convenience sample of 30 adults with HH was recruited from outpatient stroke and low vision rehabilitation programs at the Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) in Houston, Texas. Inclusion criteria were age 50 yr or older; HH from an adult-onset stroke; minimum corrected visual acuity of 20/40 using the Snellen acuity chart. Exclusion criteria were documented vision-threatening eye diseases or conditions (e.g., glaucoma, age-related macular degeneration), aphasia, or hemi-inattention or spatial neglect.

Instrument

The Self-Report Assessment of Functional Visual Performance (SRAFVP; Gilbert & Baker, 2011) used in this study (Appendix A) was originally developed by the occupational therapy departments at the University of Alabama at Birmingham, University of Florida, and Washington University in St. Louis and the Eye Foundation at the University of Missouri–Kansas City to measure performance of vision-dependent ADLs in adults with low vision. The SRAFVP consists of 38 items addressing reading, writing, communication, financial and health management, feeding, personal hygiene, dressing, clothing care, meal preparation, shopping, functional mobility, and community or social and leisure participation. The ability of the person to perform each item is rated on a 3-point scale, operationally defined as follows: 1 = *unable: dependent on others to perform the task, would perform task if able;* 2 = *difficulty: performs task with difficulty even under optimal conditions, difficulty performing task in a timely manner, safety and efficiency are questionable, makes errors;* and 3 = *independent: experiences no difficulty performing task safely, accurately, and efficiently.* The composite score ranges from 38 to 114; a higher score indicates more independent ADL performance.

Reliability and validity of the SRAFVP were established using the Rasch rating scale model in a study of 102 older adults with vision impairment from age-related eye disease (age-related macular degeneration, glaucoma, diabetic retinopathy, and cataracts; Velozo, 1996). The 38-item SRAFVP showed unidimensionality and satisfactory model fit. Acceptable levels of internal construct validity were confirmed (mean item fit = 1.00, standard deviation *[SD]* = 0.34; mean person fit = 0.98, *SD* = 0.29). The SRAFVP demonstrated satisfactory reliability by Rasch analysis (person reliability = 0.88; person separation = 2.70; item reliability = 0.98; item separation = 6.59; Velozo, 1996).

The SRAFVP was selected for this study because it was designed specifically to measure the performance of a wide range of ADLs in adults with low vision in clinical settings and because it demonstrated acceptable reliability and validity in measuring performance of vision-dependent ADLs in adults with central field impairment; thus, it is appropriate for the HH population.

Procedure

We used a medical chart review to identify eligible people who met the inclusion criteria, whom we then invited to participate in the study. If the medical chart contained no documentation confirming visual field loss, Tonya A. Mennem completed perimetry testing using a Humphrey Field Analyzer II–i Series (HFA II–i; Zeiss Meditech, Inc., Jena, Germany), and an optometrist interpreted the test and confirmed the presence of HH. Mennem also confirmed the participant's visual acuity using a Snellen acuity chart and screened for hemi-inattention or spatial neglect using the Letter and Star Cancellation subtests from the Behavioral Inattention Test (Halligan, Wilson, & Cockburn, 1990). People were excluded from the study if they scored at or below the cutoff scores of 32 letters or 51 stars (Halligan et al., 1990). Qualified participants were administered the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975) to assess their cognitive ability; a questionnaire to obtain background information, including observed upper- and lower-extremity impairment resulting from the stroke; and the SRAFVP. The entire process was completed during a single 60- to 90-min session in a quiet, distraction-free-room in the clinic or the participant's home.

To administer the SRAFVP, the interviewer (Mennem) described each ADL task to the participant according to the instruction manual (Gilbert & Baker, 2011). She instructed the participant to assign a rating on the basis of his or her visual ability to complete the ADL task during the initial weeks after the onset of HH. The participant verbally rated his or her ability to complete each task (i.e., item) using the 3-point scale, and the interviewer recorded the responses on the form. If the participant did not perform a task, the interviewer did not rate the item (Gilbert & Baker, 2011).

For participants with mild residual motor limitations, the interviewer asked them to rate the difficulty completing the ADL task on the basis of their ability to see the task rather than their ability to move the upper or lower extremity. If the participant provided an answer that suggested that motor function limited performance of the task, the interviewer reworded the question to ensure that the participant assigned the rating solely on the basis of visual ability.

Recall bias was considered a potential threat to the reliability of the participants' responses because half of the participants were more than 2 yr poststroke and 6 (20%) had three or more errors on the SPMSQ indicating some degree of cognitive impairment (Demirovic et al., 2003). To minimize this bias, a family member or caregiver was present during the interview and was asked to confirm the accuracy of the participant's answers. The study received institutional review board approval from the Baylor College of Medicine, MEDVAMC, and the University of Alabama at Birmingham.

Data Analysis

Several methods were used to validate the SRAFVP for the participants. Findings from a qualitative study exploring ADL limitations in 46 adults with HH revealed that vision-dependent ADLs that require the performance of reading, writing, and functional mobility are challenging (Warren, 2009); on the basis of these findings, we categorized the 38 items on the SRAFVP into three theoretical constructs (i.e.,

Table 1. Participant Characteristics ($N = 30$)

Characteristic	Mean ± *SD*	Range
Age, yr	63.8 ± 8.1	52–82
Time since injury, yr	3.2 ± 4.1	0.02–20.9
	n	%
Male	29	96.7
Ethnicity		
White	14	46.7
African-American	12	40.0
Hispanic	4	13.3
Living situation		
Married	12	40.0
Living alone	4	13.3
Education		
Less than high school	7	23.3
High school graduate	12	40.0
Beyond high school graduate	11	36.7
Left hemianopia	18	60.0
Macular sparing	8	26.7
No. of comorbidities		
1–2	18	60.0
3–4	12	40.0
Score of >7 correct on the Short Portable Mental Status Questionnaire	24	80.0
Mild residual motor limitations of extremities	24	80.0

Note. SD = standard deviation.

performance skill areas): Reading (12 items), Eye–Hand Coordination (22 items), and Functional Mobility (4 items). We estimated internal consistency reliability of the SRAFVP and its three constructs or subscales using Cronbach's α and evaluated reliability of the subscales using the Pearson product-moment correlation. To provide evidence on construct validity, we used a known-groups method to discriminate among participants on the performance of each subscale.

Results

Participant demographic characteristics are provided in Table 1. The sample consisted of 29 men and 1 woman with a mean age of 63.8 yr ($SD = 8.1$ yr). Eighteen participants (60.0%) had left HH, and 8 (26.7%) had some sparing of the central macular field. The mean and median time since HH onset were 3.2 and 1.9 yr, respectively; onset for 10 participants was within the past year.

Mean scores and standard deviations for the three constructs (subscales) were as follows: 1.45 ± 0.50 for Reading, 1.52 ± 0.42 for Eye–Hand Coordination, and 1.73 ± 0.31 for Functional Mobility. Cronbach's α for the 38 SRAFVP items was .99; for Reading, .97; for Eye–Hand Coordination, .98; and for Functional Mobility, .73. All three subscales were significantly correlated with each other and with the total SRAFVP score; the Pearson product–moment correlation coefficients ranged from .37 to .99 (Table 2). Paired *t* tests were conducted to determine differences in performance difficulty among the three subscales. The analysis revealed no significant difference in performance difficulty between Reading and Eye–Hand Coordination ($p = .03$), but Functional Mobility was significantly less difficult for participants to complete than either Reading ($p = .003$) or Eye–Hand Coordination ($p = .005$) after adjusting for Type I error rate in multiple comparisons (α set at .017).

For the known-groups analysis, independent-sample *t* tests were used to discriminate among participants by presence of macular sparing and side of HH (left or right) on the performance of each subscale. Results showed that participants with complete HH demonstrated significantly more difficulty completing Reading ($p = .005$) than participants with macular sparing; however, no significant difference was found between people with and without macular sparing in Eye–Hand Coordination ($p = .110$), Functional Mobility ($p = .881$), and overall scale score ($p = .088$). Whether the participant experienced a right or left HH did not affect level of performance difficulty in the three subscales. Results for the analysis of participants without cognitive impairment (i.e., $n = 24$) were in agreement with the analysis of all participants.

Table 2. Correlational Matrix of the Three Subscales

Subscale	Reading	Eye–Hand Coordination	Functional Mobility	Total Scale
Reading	1.00			
Eye–Hand Coordination	0.95**	1.00		
Functional Mobility	0.37*	0.46*	1.00	
Total Scale	0.97**	0.99**	0.50*	1.00

*$p < 0.05$ (2-tailed). **$p < 0.01$ (2-tailed).

Discussion

The results of this preliminary study indicate that the SRAFVP demonstrates sufficient reliability and validity to evaluate the severity of ADL impairment in people with HH from stroke. The high internal consistency indicates that items within each subscale measure various aspects of the same construct. The significant correlations among the three subscales indicate that they are related and possibly measure the vision-dependent ADLs.

The finding that participants rated tasks that required reading and eye–hand coordination as more difficult than functional mobility tasks is consistent with the notion that certain categories of ADLs are more vision dependent than others. The importance of central vision for reading was supported by our finding that participants with macular sparing rated reading as less difficult than participants without macular sparing. Side of HH should not differentially affect performance skills, which our findings confirmed.

Study Limitations

Because the sample consisted mostly of men, many participants reported that they were not responsible for some of the home management tasks (e.g., 18 participants did not perform the task of mending) and

meal preparation tasks (e.g., 6 participants did not perform the task of reading recipes), even before their vision loss. This characteristic of our sample potentially biased the findings, especially for the Eye–Hand Coordination subscale. Further validation of this instrument is needed using a larger sample size and a representative proportion of men and women. In addition, the wide range of time since stroke introduced the possibility of recall bias; many participants were asked to recall ADL limitations that had occurred several years earlier. Future investigations should limit the study population to participants who are within the first few months of HH onset.

Implications for Occupational Therapy Practice

The SRAFVP is designed specifically to identify ADL limitations due to vision impairment; most broad-based assessments concentrate on the physical components of occupational performance. For clients with HH who experience significant vision impairment but fewer cognitive or motor limitations, the SRAFVP may provide a more accurate and comprehensive picture of the person's ADL performance status. The SRAFVP also guides the practitioner to examine whether vision impairment contributes to occupational performance impairment in clients with stroke. Obtaining a more accurate assessment of ADL limitations enables the occupational therapy practitioner to set appropriate goals and devise effective interventions for assisting clients with HH to achieve their optimal ADL performance. In summary:

- Occupational therapy practitioners can use the SRAFVP to identify and characterize ADL limitations in people with HH and can use this knowledge to develop tailored interventions.
- The SRAFVP can prompt occupational therapy practitioners to pay more attention to how visual limitations may affect occupational performance in clients with multiple impairments from stroke.
- The SRAVFP can be used as an outcome measure to evaluate the effectiveness of occupational therapy interventions to improve performance of vision-dependent ADLs. ▲

Acknowledgments

We thank Jane Anderson, Ellen Matthiesen, Barbara Kimmel, and the Eye Care Clinic for assistance in identifying participants for this study and Laura K. Vogtle for her suggestions. Opinions, positions, and content contained within this publication are those of the author and are not necessarily the official views of, or endorsed by, the U.S. Department of Veterans Affairs.

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Appendix A. Self-Report Assessment of Functional Visual Performance Profile

Directions: Ask the client to rate ability to perform each task using the rating scale. Circle the number that best fits the client's ability. If the client does not perform a task, or it is not applicable, DO NOT circle anything for that item.

- 1 = *Unable:* Dependent on others to perform task; would perform task if able
- 2 = *Difficulty:* Performs task with difficulty even under optimal conditions; difficulty performing task in a timely manner; safety and efficiency questionable; makes errors
- 3 = *Independent:* Experiences no difficulty performing task safely, accurately, efficiently

Rating	Task Description
1 2 3	**Reading**—telephone directory
1 2 3	**Reading**—TV guide
1 2 3	**Reading**—books/Bible (standard print size)
1 2 3	**Reading**—newspapers
1 2 3	**Reading**—magazines/periodicals (standard print size)
1 2 3	**Clothing Care**—mending: thread needle, uses scissors
1 2 3	**Meal Preparation**—read recipes, package instructions
1 2 3	**Leisure Participation**—other leisure activities important to client
1 2 3	**Reading**—labels/instructions
1 2 3	**Reading**—newspaper advertisements
1 2 3	**Financial Management**—manage financial records
1 2 3	**Financial Management**—read bills/financial statements
1 2 3	**Financial Management**—write check/money order
1 2 3	**Leisure Participation**—play cards/games
1 2 3	**Shopping**—locate and pay for item, manage money, make change
1 2 3	**Writing**—legible personal list that can be read back
1 2 3	**Community/Social Participation**—dine in a restaurant
1 2 3	**Writing**—legibly address envelope
1 2 3	**Meal Preparation**—use oven—transfer food, monitor temp and time
1 2 3	**Writing**—legible signature
1 2 3	**Communication**—retrieve telephone numbers—familiar and unfamiliar
1 2 3	**Meal Preparation**—chop, slice, cut, peel; use knives safely
1 2 3	**Read Timepiece**—read watch
1 2 3	**Clothing Care**—laundering: set dials, measure soap, treat stains
1 2 3	**Reading Timepiece**—read clock
1 2 3	**Meal Preparation**—pour/measure liquids and dry ingredients
1 2 3	**Meal Preparation**—use burners: set dials, transfer items
1 2 3	**Functional Mobility**—ascend/descend stairs
1 2 3	**Meal Preparation**—use microwave oven: select settings, transfer
1 2 3	**Communication**—physically operate telephone: dialing
1 2 3	**Functional Mobility**—adjust to changes in walking surface
1 2 3	**Health Management**—self-management and medication routine
1 2 3	**Leisure**—operate tape/CD player/radio/TV
1 2 3	**Personal Hygiene**—grooming
1 2 3	**Feeding**—locates food, seasons, spreads toppings, cuts
1 2 3	**Meal Preparation**—locate/organize items in kitchen
1 2 3	**Dressing**—locate, identify and match clothing
1 2 3	**Functional Mobility**—avoid collisions/tripping
Comments:	

Note. From "Evaluation and Intervention for Basic and Instrumental Activities of Daily Living," by M. P. Gilbert and S. S. Baker, in *Occupational Therapy Interventions for Adults With Low Vision* (pp. 257–265), by M. Warren (Ed.), 2011, Bethesda, MD: AOTA Press.