Published in final edited form as:
Am J Occup Ther. 2010 ; 64(4): 580–589.

In Home Occupational Performance Evaluation (I-HOPE)

Susan L. Stark, PhD
OTR/L is an assistant professor of Occupational Therapy and Neurology in the Program of Occupational Therapy at Washington University in St. Louis, MO

Emily K. Somerville, MS
OTR/L is a research coordinator in the Program of Occupational Therapy at Washington University in St. Louis

John C. Morris, MD
Harvey A. and Dorismae Hacker Friedman Professor of Neurology; Professor, Pathology and Immunology Director, Center for Aging; Director, Memory and Aging Project; Director, Alzheimer's Disease Research Center at Washington University in St. Louis School of Medicine

Abstract

OBJECTIVE—This study describes the development and preliminary psychometric properties of an assessment to quantify the magnitude of an environmental barrier's influence on occupational performance.

METHOD—The assessment was developed then piloted on a group of 77 older adults before and after an occupational therapy intervention focused on environmental barrier removal. Refinements were made to the assessment before it was evaluated for interrater reliability in a sample of 10 older adults using two raters.

RESULTS—The In-Home Occupational Performance Evaluation (I-HOPE) is a performance based measure that evaluates 44 activities in the home. The four subscales of activity participation, client's rating of performance, client's satisfaction with performance, and severity of environmental barriers are sensitive to change in the environment. The internal consistency of the subscales ranged from . 77-.85 and ICCs ranged from .99 to 1.0.

CONCLUSION—This preliminary study suggests that the I-HOPE is a psychometrically sound instrument which can be used to examine person-environment fit in the home.

Keywords

Outcome Assessment; Aging; Environment; Housing

The United States is facing the prospect of caring for one of the largest populations of older adults ever to live in our society. By the year 2030, the number of older Americans will have more than doubled to over 70 million (“A profile of older Americans”, 2001). Many of these community-dwelling older adults experience chronic health conditions and are at significant risk for disability. As the elderly population continues to grow, it will make increasing demands on medical and social services. Critical gaps exist in our knowledge of how to manage the health needs of adults aging with disabilities.

Correspondence to: Susan L. Stark.
Campus Box 8505 St. Louis, MO 63108 Phone: 314-286-1626 Fax: 314-286-1601 E-mail: starks@wustl.edu.

The International Classification of Function, Disability, and Health (WHO, 2001) describes the participation of daily activities as an interaction between the abilities of individuals and the contexts in which they live. The demands of the environment (e.g., high bathtub ledge) will determine the extent to which a person's functional limitation (e.g., mobility impairment) is disabling (e.g., inability to bathe independently). Conversely, it may be possible to use environmental supports to compensate for functional loss, thus improving an individual's performance in activities of daily living (ADLs) and instrumental activities of daily living (IADLs). However, little attention has been given to the influence of the environment on health and functioning in studies that focus on preventing disability (Satariano, 1997), despite promising work that environmental intervention can influence health and functional abilities (Gitlin & Corcoran, 1993; Gitlin *et al.*, 2001; Mann *et al.*, 1999).

One reason for this lack of evidence is our inability to measure the consequences of a misfit between an individual's abilities and the environment. Current assessments do not effectively evaluate the person-environment misfit of older adults and their homes. Instead, most assessments view the person, environment, or task as separate and distinct entities or do not even include the environment in the evaluation process (Pollock, 1993). The environmental assessments that do exist do not adequately assess the activities vital to older adults aging in place. Two commonly cited assessments are the ENABLER (Iwarsson & Slaug, 1991) and the Safety Assessment of Function and the Environment for Rehabilitation (SAFER) (Chui *et al.*, 2001). The ENABLER promises to predict problems arising as a consequence of an individual's functional limitations and barriers in the home by first assessing the client for 15 possible functional limitations and then checking the environment for 188 different barriers identified as associated with the client's functional limitations. Thus, the ENABLER yields a prediction of accessibility problems, not actual occupational performance. The ENABLER can be administered without assessing the person interacting with his or her home environment (Iwarsson & Isacsson, 1999), which is convenient for screening potential housing options for individuals; however, the ENABLER may fail to recognize the unique individual abilities discovered during the observation of performance in situ.

The SAFER is an environmental assessment that was originally designed for a psychogeriatric population but has since been expanded for use with people with physical disabilities. It contains 97 items that measure 14 domains to identify safety concerns for community dwelling older adults (Chui et al., 2001). Although the instrument was designed using an occupational performance model, the scores of the SAFER may not link directly to independence in ADL and IADL tasks (Letts et al., 1998). While the SAFER offers an important focus on safety features, it does not offer a quantifiable outcome of person-environment fit.

The lack of performance-based assessments which evaluate function in relation to the environment is a long standing problem for clinicians and researchers. There is a need for psychometrically sound ADL/IADL assessments that consider the client's perspective and satisfaction (Law et al., 1994) while recognizing the role of the environment in performance. The In-Home Occupational Performance Measure (I-HOPE) was developed to fill this gap by targeting activities performed in the home which are essential for aging in place.

Methods

This study consisted of two phases: (I) developing the items and scoring procedures, and testing and refining the instrument; and (II) testing the interrater reliability of the instrument. Each phase of the study was approved by Washington University School of Medicine's Human Subjects Research Protection Office.

In phase I, 77 volunteers who had participated in a study of home modifications were evaluated using the I-HOPE battery. In this prospective cohort study, the measure was repeated at two time points: prior to a home modification intervention and post intervention. During phase II, a convenience sample of 10 volunteers was recruited from a community agency. Each participant was evaluated in his or her home by two clinicians.

Phase I

Item Development and Content Validity—In a previous pilot study of home modifications (Stark, 2004), it was established that once older adults had given up an activity due to an environmental barrier, they no longer identified the activity as a potential target for intervention. To address this problem, we decided to employ a method previously successful in measuring the activity patterns of older adults (Baum & Edwards, 2001; Everard et al., 2000) that inventories current and desired activity patterns using photographic images as visual cues.

We began by developing a list of activities typically performed by older adults in the home. Basic ADLs, IADLs, and leisure activities were included. The items were derived from a review of clinical records of a home modification treatment program and from a review of the literature. Content analysis on over 200 clinical records was conducted to generate a list of activities that occur in the home. A pool of 38 activities were identified and included in the I-HOPE.

Next, photographic cards depicting the activities were prepared. The photographs served as a visual cue to recall current and previous participation in the activity. To verify that the images on the cards were an accurate representation of the activity, we asked three lay individuals unfamiliar with the project to review a set of cards without labels. Each person was asked to describe the activity represented. Images were modified and the exercise was repeated until all three reviewers accurately identified the activity.

A multi-step assessment procedure was then developed to establish current activity patterns, identify activities which were difficult but important to the older adult, and identify the environmental barriers that influence specific activities. For the first step, a sorting scheme was created to reflect the older adults' current activity performance patterns. Using a sort technique (Valenta & Wiggers, 1997), the activity cards were sorted into four categories including 1 = “I do not do—don't want to do,” 2 = “I do now with no problem,” 3 = “I do now with difficulty,” and 4 = “I do not do but wish to do.”

To calculate an activity score, we followed the approach used by the Activity Card Sort (Baum & Edwards, 2001; Everard et al., 2000). The score is a proportion of difficult activities divided by the total number of activities that the individual needs or wants to do. The total number of activities (termed the base activity score) was computed by first assigning a score of 1 to each “do now,” “do with difficulty,” or “do not do but wish to do” card from the sort. The base activity score was computed as a sum of these scores. Next, a difficulty with activity score was calculated by assigning a value of 0 to those activities participants do not do but wish to do, a 0.5 to those activities participants do with difficulty, and a 1 to activities that posed no difficulty. The difficulty with activity score was a sum of these scores. The activity participation score was calculated as a proportion of the difficulty with activity score divided by the base activity score. Activities that participants “do not do and do not wish to do” were not included in the calculation, eliminating a penalty to individuals who participate in fewer activities.

The next step in the process was to focus on the subset of activities from categories 3 (I do now with difficulty) and 4 (I do not do but wish to do). The participant ranked the problematic activities from most to least important. The problems ranked as most important (up to 10) were

rated by the participant. An un-weighted goal attainment scaling approach (Stolee et al, 1999) was employed to measure subjective performance and satisfaction with performance. The COPM anchor points of 1 “not able to do it” and 10 “able to do it extremely well” were used to rate performance and 1 “not satisfied at all” and 10 “extremely satisfied” were used for satisfaction (Law et al., 1994). A mean score was calculated for performance and satisfaction.

The third and final step in the process was a performance based assessment of the older adult performing the activity in the relevant environmental context. To determine the magnitude of the barrier's influence on performance, an approach similar to the Home Assessment Profile (Chandler et al., 2001) and the Enviro-Functional Independence Measure (Steinfeld & Danford, 1997) was employed. In this approach, the therapist observed the participant performing the activity, identified the environmental barrier(s), and rated the influence of the barrier(s) on performance. Barriers were scaled to measure whether the barrier resulted in 0 (no activity), 1 (total dependency on another to complete the task), 2 (moderate assistance needed), 3 (minimal assistance needed), 4 (standby assistance needed, safety risk or extreme energy expenditure), and 5 (independent with or without a device). The sum of each score yielded a total barrier severity score.

In summary, the I-HOPE uses a multi-step assessment process to (1) identify activities that are difficult or impossible to perform in the current context, (2) prioritize and subjectively score activities that are most important to the individual, and (3) determine the magnitude of the influence of the environment on performance of the activity. There are four sub scores that can be derived from the assessment. An *activity participation score* is derived from the sort, *performance* and *satisfaction scores* are derived from the rating session, and a *severity of environmental barrier score* is derived from the performance based assessment. The process is described in Figure 1.

Internal Consistency, Convergent Validity, and Responsiveness of the Instrument

Participants: Between January and August of 2003, 458 older adults age 60 or older participated in a cross-sectional study regarding their service needs (Carpenter *et al.*, 2007). At the conclusion of an in-home interview, participants were screened to identify individuals who had difficulty completing activities of daily living, had poor physical health, used assistive devices, or had a history of falling in the home. The participants who reported difficulty in these areas were invited to take part in the home modification study. A total of 80 older adults agreed to participate in this study.

Of the 80 subjects enrolled, 77 completed the pretest and 67 participated in the post-intervention assessment. We compared the participants who dropped out of the project after pre-test to the remaining participants on their baseline scores for key variables including age, gender, income, marital status, and functional performance scores. There were no significant differences between groups. Baseline characteristics of the final sample are shown in Table 1.

Measures: Socio-demographic characteristics were obtained for participants. Problems with body function, environment, and performance were assessed using a battery of standardized assessments. We assessed vision, [Lighthouse Near Acuity Vision test (Elam, 1997)], mobility [Get up and Go test (Mathias & Isaacs, 1986)], and cognition [Short Blessed Memory Test (Katzman, 1983)]. Strength and range of motion of the upper extremity were assessed using group muscle tests and goniometry, and scored as within normal limits, within functional limits, or impaired (Radomski & Trombly Latham, 2008). The Functional Independence Measure (FIM) was used to measure functional performance in motor and cognitive domains (Keith et

al., 1987). The I-HOPE was conducted to examine activity patterns, performance and satisfaction, and person-environment fit.

Procedures: Prior to enrollment in the study, an initial visit was scheduled to provide verbal and written information regarding the study parameters, answer questions regarding the purpose and scope of the project, and obtain consent. The participant was then evaluated by an occupational therapist using measurement battery and the 38-item I-HOPE over one to two visits (dependent upon the tolerance of the participant). The evaluation was followed by a home modification intervention.

Although the results of this study are reported elsewhere (Stark & Ellert, 2004), for the purpose of understanding the clinical utility of the instrument we will briefly describe the intervention. The occupational therapy (OT) intervention included the provision of adaptive equipment, architectural modifications, major home renovation, and substantial training by an occupational therapist. An average of four problems were addressed for each participant (range 1-7). The most common modifications included grab bars, bath seats, hand-held showerheads, additional lighting, and reacher devices. Less frequently provided interventions included removing tubs for walk-in showers and installing ramps at home entrances. An average of five occupational therapy treatment visits was provided.

Three months after completion of the modifications the same occupational therapist re-administered the assessment battery. The performance, satisfaction, and environmental barrier subscale of the I-HOPE was repeated.

I-HOPE Revision—Several revisions were made to the assessment based on feedback from clinicians and preliminary descriptive analyses of the data. As part of the activity sort, the occupational therapist asked each participant if there were unique activities not depicted in the cards that were important to evaluate. An additional three items were independently identified 20 or more times by participants. These activities included opening a jar, getting in and out of a car, and getting on and off a toilet. There was another set of activities that were identified three or more times by the participants. These included using a computer, operating a faucet handle, and getting in and out of the shower. These items were subsequently added to the list of activities. Six new cards were developed following the same procedure used to develop the original activity cards.

During the rating step of the I-HOPE, the 10 point performance and satisfaction scales proved difficult for older adults to use. Clinicians reported difficulty eliciting valid responses using this metric. The scale was reduced to five points and piloted on a small group of participants. Clinicians reported that this scale appeared to be more clinically valid. This is consistent with the findings of Carp (Carp, 1989) who found five-point scales are most liked by older adults and have the best distributions of responses. Thus, the five-point scale was adopted for the final version of the I-HOPE.

Clinicians also noted during the sort that several participants expressed concerns for safety and their ability to complete activities in the future, but there was not a sort category that met those criteria. For example, several participants admitted to slipping in the tub but felt that they were currently performing the activity without difficulty. A new pile category was added to the card sort with the title “worried about doing in the future” and assigned a value of .75 for scoring purposes.

The revised I-HOPE included 44 items with five sorting categories and a five-point likert-type scale for rating satisfaction and performance. The revised measure was successfully piloted on a sample of 3 participants prior to including it in the final I-HOPE.

Phase II

Interrater Reliability—Between September 2006 and May 2007, a convenience sample of 10 older adults was recruited using snowball sampling from a community service provider in St. Louis, Missouri. These participants were included if they identified one or more daily activity problems, were 60 years of age or older, and participated in the community program. Participants were excluded if they lived in congregate living facilities or had a cognitive impairment as indicated by a score of 10 or greater on the Short Blessed Test (Katzman, 1983). None of the participants lived with each other (e.g., spouses or siblings), so there were 10 unique environments for this study. Participants were given a 10 dollar gift certificate to a grocery store for their participation.

Baseline characteristics are shown in Table 1. The group was also predominately white and female, although this sample was younger than the phase I participants.

Procedures: Interrater reliability was established by testing the 10 individuals with the revised 44 item I-HOPE on one occasion with two trained raters blinded to the other rater's responses. The entire battery of assessments described in phase I was repeated for this study. Prior to conducting the assessments, both clinicians attended a 4 hour training session that included an introduction to the measure, review of the assessment protocol, explanation of the scoring procedures, a demonstration, and time to practice conducting the assessment with a peer. Rater one had 6 years of experience in community based home modification programs; rater two, 3 years.

The raters visited the home together, but one was randomly (by flip of a coin) assigned to conduct the assessment protocol while the other observed and scored the I-HOPE in silence. After the assessment process was complete, both raters had time to privately ask for further information from the client. Raters did not discuss findings or scores with each other for the duration of the study. This approach, similar to Gitlin et al. (Gitlin *et al.*, 2002), was used to control for the variability that occurs in living environment on a daily basis.

Data analysis: Data were entered into Microsoft Access for Windows and checked for accuracy. All analyses were conducted using SPSS version 15.1 (“SPSS for windows, release 15.0”, 2006).

For the first phase, the main effect of the intervention on daily activity performance, satisfaction, and environmental barriers was examined using paired t-tests with Bonferroni adjustments. Internal consistency of the items was evaluated using Cronbach's alpha reliability coefficient. The subscales (activity participation score, performance and satisfaction score, and severity of environmental barrier score) were considered reliable if coefficients were greater than 0.7 (Nunnaly & Bernstein, 1994). Criterion validity of the I-HOPE performance score to the FIM total score was calculated using the Pearson correlation coefficient, using criteria for evaluating correlation coefficients from clinical data as described by Portney and Watkins (Portney & Watkins, 2008). We also examined the I-HOPE scores compared to relevant demographic characteristics.

To estimate the interrater reliability of the I-HOPE in the second phase, agreement between raters was analyzed using an intra-class correlation coefficient (ICC). Shrout and Fleiss's model two was used to calculate the ICC (Schrout, 1979). This calculation assumes that all participants are assessed by the same raters who are considered representative of the larger population of raters. Using Shrout and Fleiss's criteria, agreement was considered excellent when the ICC was equal to or greater than 0.75, whereas ICCs below 0.75 indicated moderate to poor reliability.

Results

For the group who received home modifications (Phase I), functional disability as measured by the FIM motor score indicated mild to moderate disability with a mean score of 72.7 (range 45-82). Older adults performed an average of 33 of the 38 activities from the initial version card sort. Activity participation rates are presented in Table 2. The proportion of activities subscale (measured only during pre-test) was .84 (SD .11) with a range of .48-.99. The average time to conduct the I-HOPE portion of the battery of assessments was 30 minutes. Participants reported that they enjoyed participating in the assessment and there was no report of undue assessment burden.

Paired t-tests were used to examine the differences between pre and posttest scores for both satisfaction and performance scores. Participants demonstrated an improvement in scores in both satisfaction and performance (Table 3). Mean pretest performance scores rose significantly from 5.70 points on the pretest to 7.38 on the posttest (t = -8.07; p = .000). Scores on the satisfaction subscale significantly increased from pretest to posttest, with an initial mean score of 5.14 and posttest mean of 7.27 (t = -10.27; p = .000). The severity of environmental barriers mean initial score was 10.88 but was reduced to 3.69 post intervention; t = 13.45; p = .000. Comparing the initial (106.42) and posttest (112.52) total FIM scores indicated an improvement in function (t = -9.85; p = .000).

The internal consistencies of the subscales were as follows: activity participation subscale α = 0.85 (38 items), satisfaction subscale α=0.78 (6 items),performance subscale α = 0.77 (6 items), and severity of environmental barrier subscale α=0.77 (8 items). All subscales demonstrated good internal consistency applying the criteria by Nunnaly (1978), which suggests that a finding of .7-.9 indicates good internal consistency.

Convergent validity was addressed by examining the correlation between the I-HOPE and the FIM. It was hypothesized that the I-HOPE subscale scores of performance and satisfaction would be positively correlated to the FIM and that the Environmental Barriers subscale would be negatively correlated. Additionally, it was hypothesized that activity scores would be correlated to the age and number of chronic conditions of the older adults. The FIM was positively correlated to the I-HOPE performance subscale r(75) = .53 (p<.000) and satisfaction subscale r(75) = .43 (p<.000). The FIM was negatively correlated to the I-HOPE environmental barrier subscale r(75) = -.46 (p<.000) indicating that more barriers was correlated to a poorer FIM score. These were fair to moderate correlations (Portney & Watkins, 2008). Correlations between activity scores and characteristics of the participants were examined. A composite score was created by summing the number of co-morbid conditions that participants reported. A negative correlation r(75) = -.41 (p<.000) indicated that participants took part in fewer activities if they had more chronic conditions. There was no significant correlation between age and the I-HOPE activity subscale r(75) = -.02 (p=.86).

For Phase II (n = 10), the proportion of problem activities ranged from .61-1.0 with a mean of .92 (SD .13). The proportion of activities subscale indicated that older adults performed an average of 41 of the 44 activities from the revised card sort. Intraclass correlation coefficients were calculated for the I-HOPE subscales. Scores ranged from .94 to 1.0 for raters (Table 4). The strength of agreement for the I-HOPE was excellent for all subscales (Portney & Watkins, 2008).

Discussion

We aimed to provide a psychometrically sound instrument with the following goals: reliably ascertain older adults' participation in daily activities, determine older adults' ability to perform

the activities, quantify older adults' satisfaction with their performance, and objectively quantify degree or magnitude of environmental barriers' influence on activity performance. The assessment needed high clinical utility to address the issues faced by clinicians in treatment settings but needed to serve as a meaningful endpoint for clinical studies.

In this preliminary study, we found the I-HOPE to be a psychometrically sound assessment that can be used to determine the activity patterns of older adults in their home, performance of daily activities, satisfaction with that performance, and influence of environmental barriers. Specifically, we have determined that the I-HOPE is internally stable, and it demonstrates convergent validity with meaningful clinical measures. The I-HOPE performance, satisfaction, and environmental barrier subscales are significantly correlated with the current criterion measure of disability (the FIM). As expected, the activity subscale is significantly correlated to the number of chronic conditions that participants reported. The direction of the relationship is what would be expected: the more chronic conditions a person has, the more experienced barriers in their home. The I-HOPE suggests that health (chronic conditions) is related to activity participation, but age is not. The refined I-HOPE proved to be reliable across trained raters.

The I-HOPE is clinically useful. It supports a client centered approach to practice and can be administered by a trained clinician. Training sessions lasted 4 hours and the clinicians involved in this study were considered experts in home modifications. Although additional training may be required for clinicians unfamiliar with the process of providing home modifications, the 4 hour training was successful in establishing reliability in rating.

The I-HOPE is conducted in the home of the participant, takes approximately 30 minutes to complete, and is appealing to older adults. To our knowledge, this is the only reliable and valid performance-based assessment of the home environment that provides scores of activity participation, activity performance, satisfaction with performance, and environmental barriers. The I-HOPE quantifies the extent to which environmental barriers influence the function of the participant in a performance based assessment, moving beyond currently available instruments used in practice. This approach can account for the tremendous variability that can occur across homes by focusing on person-environment fit.

The I-HOPE shows excellent potential for measuring change in performance, satisfaction, and environmental barrier scores. In the intervention study, the I-HOPE was sensitive to detect a change in performance after environmental barriers were reduced. The differences between pre and post scores were statistically significant suggesting that the I-HOPE is a useful endpoint for clinical interventions that focus on reducing environmental barriers.

Limitations

One potential limitation of the I-HOPE is the performance based nature of the assessment process. The client must be evaluated in his or her current environment. This is contrasted by the ENABLER which can be conducted without the client present. The ENABLER's approach is useful to compare potential homes for a client who is returning to the community and searching for a new home, or for a client who is unable to leave a health care facility to participate in a home evaluation. While performance based assessment in the home is preferred (Golant, 2003), it is not always possible. This is a question that deserves further study to examine outcomes as well as policy implications of this type of assessment. Another potential drawback of the I-HOPE is that the study sample was not population based and selection bias may limit the generalizability of the results. Our sample was biased toward Caucasian females. Further psychometric work with other populations is warranted.

Nonetheless, new models of intervention rely on the ability to quantify performance and environmental barriers in the home (Laura Gitlin et al., 2002). The four dimensions defined by the subscales of the I-HOPE contribute to the development of important profiles of performance and environment. Indeed, the I-HOPE has potential utility for clinicians who provide care focused on supporting older adults' ability to age in place.

Conclusions

The purpose of this study was to present the development of a new measure of older adults'-environment fit, and to report the preliminary psychometric properties of the instrument. The performance-based I-HOPE presents promising psychometric properties and offers a clinically relevant evaluation procedure. The findings suggest that it is possible to reliably measure the constructs of activity, performance, satisfaction, and barriers in the home. These dimensions appear to be related to criterion measures of disability and are meaningful in light of demographic characteristics of the sample.

Evaluating the home environment and the performance of activities in the home environment are important aspects of clinical interventions designed to assist older adults' aging in place. New models of disability research and theoretical perspectives that focus on the role of the environment as influencing performance require empirical testing. A lack of sound environmental measures has led to limited research on person-environment fit, particularly related to housing needs. While the I-HOPE holds promise as a measure to capture person-environment fit, it requires additional study in more diverse populations.

Acknowledgments

The authors of this paper would like to thank Shanon Enslein, Dory Sabata, and Amanda Landsbaum for their contributions to the development of the assessment. This study was conducted in partnership with the Washington University Center for Aging and the Jewish Federation of St. Louis. This work was supported by a National Institutes of Health grant (K07AG21164-02) and by a NIH Multidisciplinary Clinical Research Career Development award (UL1RR024992 and K12RR023249). The results of this paper were previously described at the Gerontological Society of America Annual Conference in San Francisco, CA, November, 2007.

REFERENCES

Baum, C.; Edwards, D. Activity card sort. Harcourt Assessment, Inc.; 2001.

Carp, FM. Maximizing data quality in community studies of older people. In: Herzog, LMP.; Herzog, AR., editors. Special research methods for gerontology. Baywood Publishing Co.; Amityville, NY: 1989.

Carpenter BD, Pickard JG, Palmer JL, Stark S, Neufeld PS, Morrow-Howell N, et al. Anticipating relocation: Concerns about moving among norc residents. Journal of Gerontological Social Work 2007;49(1-2):165–84. [PubMed: 17804366]

Chandler JM, Duncan PW, Weiner DKMD, Studenski SA. Special feature: The home assessment profile-a reliable and valid assessment tool. Topics in Geriatric Rehabilitation 2001;16(3):77–88. March 2001.

Chui, T.; Oliver, R.; Oliver, L.; Oliver, M.; Letts, L. Safety assessment of function and the environment for rehabilitation tool (SAFER). Comprehensive Rehabilitation and Mental Health Services; Toronto, ON: 2001.

Elam JH. Analysis of methods for predicting near-magnification power. Journal of the American Optometric Association 1997;68(1):31–36. [PubMed: 9037987]

Everard K, Lach H, Fisher E, Baum C. Relationship of activity and social support to the functional health of older adults. Journals of Gerontology Series B. Psychological and Social Science 2000;45:92–100.

Gitlin L, Corcoran M. Expanding caregiver ability to use environmental solutions for problems of bathing and incontinence in the elderly with dementia. Technology and Disability 1993;2(1):12–21.

Gitlin L, Corcoran M, Winter L, Boyce A, Hauck W. A randomized, controlled trial of a home environmental intervention to enhance self-efficacy and reduce upset in family caregivers of persons with dementia. The Gerontologist 2001;41:15–30. [PubMed: 11220810]

Gitlin L, Schinfeld S, Winter L, Corcoran M, Boyce A, Hauck W. Evaluating home environments of persons with dementia: Interrater reliability and validity of the home environmental assessment protocol (heap). Disability and Rehabilitation 2002;24(1/2/3):59–71. [PubMed: 11827156]

Gitlin LN, Mann W, Tomit M, Marcus SM. Factors associated with home environmental problems among community living older people. Disability & Rehabilitation 2001;23(17):77–87.

Golant S. Conceptualizing time and behavior in environmental gerontology: A pair of old issues deserving new thought. The Gerontologist 2003;43(5):638–648. [PubMed: 14570960]

Iwarsson S, Isacsson A. The housing enabler: An objective tool for assessing accessibility. British Journal of Occupational Therapy 1999;62:491–497.

Iwarsson, S.; Slaug, B. The enabler: An instrument for assessing and analysing accessibility problems in housing. Studentlitteratur; Lund, Sweden: 1991.

Katzman R, Brown T, Fuld P, et al. Validation of a short orientation memory concentration test of cognitive impairment. American Journal of Psychiatry 1983;140:734–739. [PubMed: 6846631]

Keith RA, Granger CV, Hamilton BB, Sherwin FS. The functional independence measure: A new tool for rehabilitation. Advances in Clincal Rehabilitation 1987;1:6–18.

Law, M.; Baptiste, S.; Carswell, AMM.; Polatajko, H.; Pollock, N. Canadian occupational performance measure. Canadian Association of Occupational Therapists; Toronto: 1994.

Letts L, Scott S, Burtney J, Marshall L, McKean M. The reliability and validity of the safety assessment of function and the environment for rehabilitation (safer tool). British Journal of Occupational Therapy 1998;61(3):127–132.

Mann WC, Ottenbacher KJ, Fraas L, Tomita M, Granger CV. Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the frail elderly. A randomized controlled trial. Arch Fam Med 1999;8(3):210–217. [PubMed: 10333815]

Mathias SN, Isaacs B. Balance in elderly patients: The “get-up and go” test. Archives of Physical Medicine and Rehabilitation 1986;67(6):387–389. [PubMed: 3487300]

Nunnaly, J.; Bernstein, I. Pyschometric theory. 3rd ed.. McGraw Hill; New York: 1994.

Pollock N. Client-centered assessment. American Journal of Occupational Therapy 1993;47(4):298–301. [PubMed: 8322870]

Portney, LG.; Watkins, MP. Foundations of clinical research: Applications to practice. Appleton & Lange; Norwalk, CT: 2000.

Portney, LG.; Watkins, MP. Foundations of clinical research: Applications to practice. Third ed.. Appleton & Lange; Norwalk, CT: 2008.

U. S. D. o. H. a. H. Services. , editor. A profile of older americans. Administration on Aging; Washington D.C.: 2001.

Radomski, MV.; Trombly Latham, C., editors. Occupational therapy for physical dysfunction. Sixth ed.. Willams and Wilkins; Lippincott: 2008.

Satariano WA. Editorial: The disabilities of aging-looking to the physical environment. American Journal of Public Health 1997;87(3):331–332. [PubMed: 9096527]

Schrout PE, Fleiss JL. Intraclass correlations: Uses in assessing rater reliability. Psychological Bulletin 1979;86:420–428. [PubMed: 18839484]

SPSS for windows, release 15.0. SPSS, Inc.; Chicago: 2006.

Stark S. Removing environmental barriers in the homes of older adults with disabilities improves occupational performance. Occupational Therapy Journal of Research 2004;24(1):32–39.

Stark, S.; Ellert, A. Aging in place in a naturally occurring retirement community: How home modifications improve daily activity performance; Paper presented at the 57th Annual Scientific Meeting of the Gerontological Society of America; Washington, DC: 2004.

Steinfeld, E.; Danford, GS. Environment as a mediating factor in functional assessment. In: Dittmar, GS.; Dittmar, G., editors. Functional assessment and outcome measure for the rehabilitation health professional. Aspen; Gaithersburg, MD: 1997. p. 37-56.

Stolee P, Zaza C, Pedlar A, Myers A. Clinical experience with goal attainment scalling in geriatric care. Journal of Aging and Health 1999;11:96–124. [PubMed: 10848144]

Valenta AL, Wiggers U. Q-methodology: Definition and application in health care informatics. Journal of American Medical Information Association 1997;4(6):501–510.

WHO. International classification of functioning, disability and health. World Health Organization; Geneva: 2001.

Table 1

Demographic Characteristics

	Phase I N=77	**Phase II N=10**
Age (years)		
Mean (SD)	81(6.7)	74.4 (8.1)
Gender % (n)		
Male	13 (10)	20 (2)
Female	87 (67)	80 (8)
Ethnicity % (n)		
Caucasian	92 (71)	70 (7)
African American	7 (5)	30 (3)
Asian	1 (1)	0
Marital Status % (n)		
Married	19 (15)	50 (5)
Divorced	15 (11)	20 (2)
Widowed	66 (51)	30 (3)
Education % (n)		
Some High School	10 (7)	10 (1)
High School	30 (23)	20 (2)
Some College	35 (27)	40 (4)
College	26 (20)	30 (3)
Home Type % (n)		
Home	13 (10)	60 (6)
Condo/Apt	87 (67)	40 (4)

Table 2

Frequencies of Activity Participation by Sort Category

	Activities want to do			Activities do not want to do
	have difficulty Frequency (%)	cannot do Frequency (%)	no problem Frequency (%)	do not want to do Frequency (%)
Activity				
Reaching for things up high	51 (68.9)	2(2.7)	21(28.4)	0
Taking a Bath/Shower	46(62.2)	1(1.4)	27(63.5)	0
Getting Up from Chair/Sofa	44(59.5)	30(40.5)	0	0
Going Up/Down Stairs	40(54.1)	6(8.1)	24 (32.4)	4(5.4)
Picking something up off floor	39(52.7)	2(2.7)	32(43.2)	1(1.4)
Carrying Items	34(45.9)	1(1.4)	33(44.6)	6(8.1)
Opening Jars*	34(45.9)	1(1.4)	26(3.51)	0
Sleeping	30(40.5)	1(1.4)	43(58.1)	0
Reading	28(37.8)	1(1.4)	45(60.8)	0
Cleaning Living Area	27(36.5)	2(2.7)	32(43.2)	12(17.6)
Getting Dressed	27(36.5)	0	47(63.5)	0
Getting In/Out of Entrance Doors	26(35.1)	1(1.4)	47(63.5)	0
Getting In/Out of the Car*	25(33.8)	0	33(44.6)	0
Writing	24(32.4)	1(1.4)	48(64.9)	1(1.4)
Getting On/Off Toilet*	23(31.1)	0	38(51.4)	0
Getting In/Out of Bed	21(28.4)	1(1.4)	52(70.3)	0
Talking on the Phone	18(24.3)	0	55(74.3)	1(1.4)
Opening/Closing Doors	16(21.6)	1(1.4)	56(75.7)	1(1.4)
Repairing Clothing	17(23.0)	7(9.5)	35(47.3)	15(20.3)
Washing and Drying Clothes	17(23.0)	4(5.4)	37(50.0)	16(21.6)
Preparing a Meal	13(17.6)	2(2.7)	54(73.0)	5(6.8)
Paying the Bills	12(16.2)	1(1.4)	57(77.0)	4(5.4)
Moving Around in the Home	12(16.2)	0	62(83.8)	0

Note. n=77;

	Activities want to do			Activities do not want to do
	have difficulty Frequency (%)	cannot do Frequency (%)	no problem Frequency (%)	do not want to do Frequency (%)
Getting the Mail	11(14.9)	1(1.4)	55(74.3)	7(9.5)
Controlling the Environment (A/C, light switch)	11(14.9)	0	61(82.4)	2(2.7)
Ironing Clothes	9(12.2)	2(2.7)	30(40.5)	33(44.6)
Taking Out the Trash	9(12.2)	4(5.4)	52(70.3)	9(12.2)
Responding to an Emergency	9(12.2)	2(2.7)	63(85.1)	0
Answering Door or Phone	8(10.8)	0	68(86.5)	1(1.4)
Repairing Household Objects	7(9.5)	9(12.2)	34(45.9)	24(32.4)
Taking Medication	6(8.1)	0	66(89.2)	2(2.7)
Grooming	6(8.1)	0	68(91.9)	0
Watching TV	4(5.4)	0	69(93.2)	0
Caring for Pets	3(4.1)	5(6.8)	9(12.2)	57(77.0)
Listening to Music/Radio	3(4.1)	4(5.4)	62(83.8)	5(6.8)
Washing Dishes	3(4.1)	1(1.4)	65(87.8)	5(6.8)
Visiting with Family and Friends	2(2.7)	3(4.1)	66(89.2)	3(4.1)
Eating	2(2.7)	0	72(97.3)	0
Caring for Children	1(1.4)	3(4.1)	10(13.5)	60(81.1)
Resting	1(1.4)	1(1.4)	70(94.6)	2(2.7)
Maintaining Yard	0	0	2(2.7)	71(95.9)

Note. n=77;

* items added to the battery during pilot, n=63.

Table 3

Differences within Group Pre to Post Test for IHOPE and FIM scale, Phase I

	Pre		Post	
	M	*SD*	*M*	*SD*
I-HOPE Subscales				
Activity Participation	.84	.11		
Performance of Daily Activities	5.7	1.8	7.38	1.6
Satisfaction with Performance of Daily Activities	5.14	2.1	7.28	1.7
Environmental Barrier Severity	1.8	.66	.54	.63
FIM Total Score	106.6	8.7	112.7	8.3

Note. n=67; All repeated measures significant at p=.000; no post test was conducted on the activity scale

Table 4

Intraclass Correlation Coefficients

IHOPE Scores	ICC
Activity Participation Subscale	.99
Performance Subscale	.94
Satisfaction Subscale	1.00
Environmental Barriers Subscale	.99

Note. Phase II, n=10