The Life Space Questionnaire: A Measure of the Extent of Mobility of Older Adults

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Mobility in older adults is typically discussed in terms of component maneuvers including analysis of gait and postural instability; activities that depend on mobility such as bathing, dressing, or shopping; or adverse events during mobility such as falls or motor vehicle crashes. None of these approaches reflects a key aspect of mobility—the extent of movement within a person's environment, or life space in the gerontological literature. Here we describe this concept as it applies to mobility and present a questionnaire instrument designed to measure life space in community-dwelling older adults. Results indicate that the Life Space Questionnaire (LSQ) is reliable and has construct and criterion validity in a sample of older adults. The LSQ can be used to establish the spatial extent of an older person's mobility and may ultimately be useful as an outcome measure in studies evaluating interventions designed to enhance mobility and independence in community-dwelling older populations.

In broad terms, mobility refers to a person's purposeful movement through the environment from one place to another. Mobility can be conceptualized as a continuum from bed bound (immobility) on one extreme to making excursions to distant locations on the other extreme. With increasing age, threats to mobility increase in prevalence and include problems such as

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impairments in physical, cognitive, and sensory functioning (Barberger & Fabrigoule, 1997; Guralnik & LaCroix, 1992; Salive et al., 1994), all of which have been linked to mobility restrictions.

Decreased mobility in the elderly is an important public health concern. Among those older than age 65, almost 20% report difficulty with mobility-related activities (Guralnik, Fried, & Salive, 1996). Restrictions in mobility adversely affect the quality of life of older adults by threatening independent living and personal autonomy and increasing the need for formal and informal care (Ettinger, 1994). Mobility restriction has a negative impact on both mortality and morbidity. Epidemiological studies show that older adults with mobility disability (e.g., not able to go out alone) are more likely to die sooner than those with no such disability (Donaldson, Clayton, & Clarke, 1980). Mobility problems are also strongly associated with other health outcomes such as increased number of acute conditions (Branch & Meyers, 1987), increased risk for falls and injuries (Fried & Bush, 1988), depression (Marottoli et al., 1997), and further decline in overall functioning (Branch, Katz, Kniepmann, & Papsidero, 1984; Manton, 1988).

Mobility assessment has been approached in several different ways. One approach is to evaluate a person's ability to carry out personal activities of daily living (ADLs) such as bathing, dressing, toileting, and meal preparation, as well as instrumental activities of daily living (IADLs) that involve movement through the environment for activities such as shopping or social contact (Clark, Czaja, & Weber, 1990; Kovar & Lawton, 1994). The mobility demanded by these tasks largely reflects motoric function and coordination necessitated by activities in the home. Assessment of these activities serves as a method of evaluating interventions designed to enhance self-care and functional independence. Another approach to studying mobility in the elderly is to isolate risk factors for adverse outcomes such as falls (Cummings et al., 1995; Ettinger, 1994; Tinetti, 1986; Tinetti, Speechley, & Ginter, 1988) and motor vehicle crashes (Marottoli, Cooney, Wagner, Doucette, & Tinetti, 1994; Owsley et al., 1998; Owsley, McGwin, & Ball, 1998). For example, the assessment of gait, stair climbing, and postural stability are useful in isolating risk factors for falls and morbidity in older subjects and are often the basis for interventions or environmental modifications.

The mobility measures discussed above fail to reflect a key aspect of mobility—the spatial extent of one's travel within the environment. Mobility as a construct is more than performance maneuvers, motoric activities, and adverse outcomes; it also encompasses travel in, around, and outside the home as one conducts the business and social aspects of everyday life. An

older person's mobility may reflect multiple factors such as environment (weather, residential location, neighborhood crime rate) and resources (vehicle ownership, availability of public transportation, disposable income for travel), as well as intrapersonal factors (e.g., functional health, sensory status, cognitive status, social roles, depression, education). Lawton (1979) has used the term *basic competence* to describe these intrapersonal factors and has found that the largest amount of variance in time expenditure, satisfaction, and psychological well-being was attributable to basic competence. In studies of activity, he found that elders with the least basic competence spent more time within the dwelling unit, in personal care, and in resting, whereas the most competent spent more time away from the home, with friends, and in recreation (Lawton, 1983).

Previous studies have examined activity patterns (Lawton, 1983) and time-budgeting (Robinson, 1977) among the elderly, with some studies focusing on the spatial behavior of the aged (Golant, 1979, 1984a; Regnier, 1976; Rowles, 1978). Lawton (1983) suggested that activity, defined as the time allocations of overt behaviors within specifiable environmental contexts, has four components: time, space, activities, and well-being. The present study focuses on the spatial aspect of this construct with the acknowledgment that the range of people's spatial mobility may be affected by such environmental factors, personal resources, and intrapersonal factors as mentioned previously. Pastalan (1970) has discussed progressive, age-related life-space contraction in association with a series of losses such as children leaving home, the death of a spouse or age peers, loss of health, physical mobility, income, and social roles. Rowles and Ohta (1983) have also hypothesized that the elderly show greater reliance on geographically more proximate sources of support with increasing sensory and motor deficits. For example, older adults with impairment in domains of functioning such as visual processing ability, cognitive function, depression, or those having multiple medical conditions may be less likely to make more distant excursions away from home.

One approach to measuring this aspect of spatial mobility has been suggested by May, Nayak, and Isaacs (1985), who referred to life space as the area in which a person moved in a given time period (e.g., within a day), providing an estimate of the magnitude of the space in which a person habitually lived. The term *life space* has been used in a variety of ways in the social science literature (see Rowles, 1978) beginning with the work of Lewin (1951); the meaning of life space used here is based in the clinical gerontological literature as discussed by May et al. (1985) as just described. In the May et al. study on the frail elderly, respondents kept a diary for 1 month and daily checked

off whether they had moved into a particular zone. Zones consisted of successively concentric areas immediately around the home, beginning with the bedroom at the center and then extending to increasingly wider areas including the rest of the home, the yard or grounds surrounding the dwelling, the block where the home was, and the area across a traffic-bearing street. In addition, specific trips outside the home were also recorded (e.g., stores, church). Diary entries were then converted to a life-space diameter score that summarized the extent of a person's mobility over a month's time. A larger life space was related to component physical functions such as faster gait speed and a smaller sway path (May et al., 1985). Building on the May et al. (1985) study, Tinetti and Ginter (1990) developed the Nursing Home Life-Space Diameter (NHLSD), a measure of the extent and frequency of mobility among residents in skilled nursing facilities. The NHLSD diameter score reflects the frequency of a resident's movement within his or her own room and outside the room, the unit, and the facility. For older adults living in a skilled nursing facility, a smaller life-space diameter was associated with decreased vision, presence of neurologic conditions, and a greater need for assistance with ADLs (Tinetti & Ginter, 1990).

May et al.'s (1985) diary instrument primarily covered regions in, and immediately around, the home, and Tinetti and Ginter's (1990) instrument was designed for use in institutional settings. As a result, these existing life-space measurement tools, which focus on a narrow life space, are not appropriate for a community-dwelling elder who may make more frequent excursions beyond the immediate home environment. This article introduces the Life Space Questionnaire (LSQ) covering a broader range of environmental regions as a means to characterize the mobility of community-dwelling older adults. The questionnaire format bypasses the labor- and commitment-intensive demands of a diary instrument. The LSQ may be useful when conducting epidemiological studies designed to characterize the mobility patterns of older adults or when evaluating changes in mobility life space due to sensory or motor deficits, depression, or disengagement. It could also be used to assess the effectiveness of interventions whose purpose is to enhance mobility and functional independence in the community-dwelling elderly such as exercise programs, cognitive function training, or the provision of assistive devices. The purpose of this article is to (a) describe the LSQ, (b) demonstrate its test-retest reliability, (c) establish construct validity in this context of the association between the LSQ and intrapersonal factors (functional health, visual sensory status, cognitive status, social roles, depression), and (d) establish the LSQ's criterion validity with respect to other measures of mobility.

Table 1. The Life Space Questionnaire (LSQ) Items and Test-Retest Reliability

	% Agreement
1. During the past 3 days, have you been to other rooms of your home besides the room where you sleep?	100
2. During the past 3 days, have you been to an area immediately outside your home such as your porch, deck or patio, hallway of an apartment building, or garage?	99
3. During the past 3 days, have you been to an area outside your home such as a yard, courtyard, driveway, or parking lot?	99
4. During the past 3 days, have you been to places in your immediate neighborhood, but beyond your own property or apartment building?	95
5. During the past 3 days, have you been to places outside your immediate neighborhood, but within your town or community?	92
6. During the past 3 days, have you been to places outside your immediate town or community?	70
7. During the past 3 days, have you been to places outside of your county?	73
8. During the past 3 days, have you been to places outside the state?	92
9. During the past 3 days, have you been to places outside this region of the United States?	99

NOTE: Response options are yes/no. Introduction to subject: "Please think about the places you have been during the past 3 days."

Method

Structure and Content of the Questionnaire

The LSQ consists of nine items, each of which addresses a specific life-space zone. The items are listed in Table 1. The LSQ is designed to be interviewer administered. Each item asks respondents whether they have been to a particular zone in their environment during the past 3 days. Each successive item asks about a concentrically larger space or area, beginning with the bedroom, and then areas immediately outside the home, in the neighborhood, town, or community, and finally, outside the town, county, state, and region of the United States. Clearly, boundaries between zones are approximate and topography, population density, and the direction of roads will produce considerable directional distortion. Thus, the nine items represent ordinal steps in increasing life space. The response options are yes/no, with "yes" scored as 1 and "no" scored as 0. The LSQ score is the sum of responses to all nine items and thus can range from 0 to 9. Larger scores signify a larger life space. This approach of addressing the subject's excursions into increasingly larger

environmental zones was modeled after the structure of May et al.'s (1985) Life Space Diary.

The terminology used in the individual items of the LSQ was chosen to represent concentric zones for geographic areas where community-dwelling populations reside. The standard question-by-question guidelines are presented in the appendix and give additional verbiage that the administrator can use to minimize any ambiguity for a given respondent (see Appendix A). These guidelines allow the examiner to cite examples and to clarify the boundaries of the given geographic area suggesting range of distance if needed (e.g., 10 miles) instead of relying solely on the respondent's immediate interpretation of a geographic zone such as community. Designative misinterpretation, that is, the extent to which subjects differ in their interpretation and visualization of spatial constructs, is unavoidable (Lynch, 1960, 1976), yet the magnitude of misinterpretation can be greatly reduced by appropriate administration.

The referent time period was set to 3 days to avoid ceiling effects in the total score because it is more likely that the majority of individuals in our sample would at some time within a month travel to the more distant zones of the environment (see Table 1). Longer referent periods are more likely to detect the more distant excursions that are often infrequent and not a true reflection of daily routine. The 3-day time period avoids the potential unrepresentative nature of a single day's data (Carp & Carp, 1981) yet is sufficiently short so as to minimize recall difficulties.

Sample

Older adults were recruited from eye care clinics in Birmingham, Alabama, for a study evaluating the effectiveness of a cataract surgery intervention on mobility—the Impact of Cataract on Mobility (ICOM) project. Subjects had a current driver's license and were current drivers, and all were ambulatory without a wheelchair. Exclusionary criteria were the presence of dementia, Parkinson's disease, psychosis, or any illness that precluded annual clinic visits for the 3-year follow-up period for the main ICOM study. Each participant underwent a structured interview and functional assessment of vision and mobility, all of which were examiner-administered on the same day. Only study subjects who were not participants in the cataract surgery intervention are included in this analysis of the LSQ because the intervention's impact would confound assessments of validity ($N = 242$). Subjects represented a range of older ages, 27% age 55-64, 51% age 65-74, and 22% age 75-85. With respect to gender, the sample was 56% male and 44% female. A majority of the sample was White (17% African American). With

respect to visual acuity in the better eye, 34% of subjects had 20/20 or better, 56% were worse than 20/20 but 20/40 or better, 7% were worse than 20/40 but 20/70 or better, and only 3% had acuity worse than 20/70. Thus, subjects had a range of visual function from outstanding to moderately impaired, but the majority had 20/40 acuity or better. When asked to rate their overall health status, individuals reported a wide range with 10% in excellent health, 31% in very good health, 33% in good health, 22% in fair health, and 5% in poor health. On the Center for Epidemiological Studies-Depression (CES-D) measure, 10% reported having no depressive symptoms, 64% had a score from 1 to 8, and 26% had a score ≥ 9, the average score of depressive symptoms in community-dwelling populations (Radloff & Teri, 1986).

Test-Retest Reliability

Method. Test-retest reliability was evaluated by administering the LSQ to each subject on the first two annual visits in the 3-year study. Of the 242 in the original sample, only 200 returned for the second follow-up visit and thus the test-retest analysis is based on a subset (83%) of the original sample. It is important to note that there was little change in the health and functioning of the sample between the initial and follow-up visit. There were no functionally significant changes in visual acuity, contrast sensitivity, cognitive status, general health, or depressive symptoms. Reliability for each individual item was assessed by the percent agreement between responses at the two administrations. Reliability of the LSQ for all items taken together was evaluated by the Kappa coefficient weighted equally across all questions.

Results. Reliability results for each item are listed in Table 1. Items 1-5, 8, and 9 had $\geq 90\%$ test-retest agreement. Agreement on items 6 and 7 was 70% and 73%, respectively. Reliability of the LSQ for all items taken together was 0.80.

Construct Validity

Methods. Life space was evaluated for construct validity by examining to what extent the LSQ score is associated with intrapersonal factors in the elderly. Earlier work indicates that older adults with cognitive impairment, depression, and/or poor general health are more likely to limit their excursions from home (Barberger & Fabrigoule, 1997; Branch & Meyers, 1987;

Marottoli et al., 1997). Similarly, we reasoned that older adults with impairment in domains of functioning such as visual processing ability, cognitive function, depression, or those having multiple medical conditions would be less likely to make more distant excursions away from home.

Visual processing ability was assessed in three ways. Because we were primarily interested in vision in everyday life, visual abilities were assessed with habitual spectacle correction (i.e., the spectacles subjects indicated they routinely wore). Previous work suggests that the ability to resolve fine detail plays less of a role in mobility than do contrast sensitivity and/or visual field characteristics (Ball, Owsley, Sloane, Roenker, & Bruni, 1993; Marron & Bailey, 1982; Rubin, Roche, Prasada-Rao, & Fried, 1994). Thus, we reasoned that contrast sensitivity and an assessment of visual processing throughout the visual field would be more strongly linked to life space than would visual acuity. Distance letter acuity was measured with the ETDRS letter chart (Ferris, Kassoff, Bresnick, & Bailey, 1982) and expressed as log minimum angle of resolution. Contrast sensitivity was assessed using the Pelli-Robson Contrast Sensitivity Chart (Pelli, Robson, & Wilkins, 1988) and expressed as log contrast sensitivity. A third way in which visual status was measured was the useful field of view test (Ball, Roenker, & Bruni, 1990), which is a composite visual function measure of visual processing speed, divided attention, and selective attention. Higher scores indicate greater impairment.

Mental status was evaluated by the Mattis Organic Mental Syndrome Screening Examination (MOMSSE), specifically designed to assess cognitive function in the elderly (Mattis, 1976). This test provides a composite score of cognitive function that reflects performance in 14 domains including general information, abstraction, attention, orientation, verbal memory, speed, naming, comprehension, sentence repetition, writing, reading, drawing, and block design. Composite scores range from 0 to 28, with higher scores representing greater impairment.

Depression was evaluated by the presence of depressive symptoms as assessed by the CES-D (Radloff & Teri, 1986). Patients were asked to rate 20 items based on how often they felt that way in the past week. Responses ranged from "rarely or none of the time" to "most or all of the time," and were scored from 0 to 3, respectively. Total scores could range from 0 to 60, with a higher number indicating more depressive symptoms.

General health was measured by asking subjects if they have problems in 17 areas (e.g., heart, cancer, diabetes, stroke), and if so, to what extent they are bothered by the condition (measured on a three-point scale). The questionnaire was derived from an earlier study on eye conditions and quality of

Table 2. Correlation Coefficients for the LSQ Score and Measures of Functional Impairment, Health, and Mobility

	rs^a	p Value†
Visual acuity	−0.10	0.12
Contrast sensitivity	0.07	0.25
Useful field of view	−0.24	0.0001
Mental status	−0.29	0.0001
Depressive symptoms	−0.17	0.007
Comorbidity index	−0.08	0.20
Driving[b]		
Days per week	0.08	0.22
Miles per week	0.36	0.0001
Destinations	0.19	0.003
Trips	0.15	0.02
POMA Score[c]	0.18	0.01
ADVS Composite[d]	0.14	0.03
	χ^2	
Fall[e]	1.11	0.29
Crash[f]	3.81	0.05

†Two-tailed.
a. Spearman rank correlation coefficients; $N = 241$.
b. As measured by the Driving Habits Questionnaire (Owsley, Stalvey, Wells, & Sloan, 1999).
c. As measured by the Performance Oriented Mobility Assessment II (POMA) (Tinetti, 1986).
d. As measured by the Activities of Daily Vision Scale (ADVS) (Mangione et al., 1992).
e. In the prior 12 months.
f. In the prior 5 years.

life (Steinberg et al., 1994). To generate a comorbidity index, each medical condition present is weighted by the "bothersome score" (see above) and then all are summed. Scores theoretically range from 0 (no health conditions present) to infinity (because the subject can add conditions to the query list).

Results. The mean and median LSQ score for the sample was 6 (*SD* 1.4) The minimum score was 1 and the maximum score was 9. In this sample, there were no differences in the LSQ score for males and females ($p = .11$), and the LSQ score did not change with increasing decade of age ($p = .63$). All associations between the LSQ score and the functional measures were evaluated by Spearman rank correlation because the LSQ score lies on an ordinal scale. The LSQ score was not associated with age in this sample, r_s (241) = −0.05, $p = 0.48$, and thus, associations between the LSQ score and functional

measures were not age-adjusted. Results are listed in Table 2. Reductions in the useful field of view, impaired cognitive function, and depressive symptoms were associated with a more restricted life space. Visual acuity and contrast sensitivity, both measures of central vision, were not associated with life space, nor was impaired health, as represented by the comorbidity index.

Criterion Validity

Method. To evaluate criterion validity, we examined whether there was an association between life space and other measures commonly used to assess mobility. A practical issue is whether the LSQ is redundant with existing methods for evaluating mobility, diminishing the need for such a measure, or whether it represents a distinct mobility construct not adequately addressed by existing measures. The following aspects of mobility were measured—mobility maneuvers, IADL functioning, driving exposure, and adverse mobility outcomes of falling and crashing.

Mobility maneuvers were measured using the Performance Oriented Mobility Assessment (POMA), version II, designed to assess balance and gait in community-living populations (Tinetti, 1986; Mary Tinetti, personal communication, 1993). This assessment requires individuals to carry out maneuvers such as transferring from a seated to a standing position, balancing while standing or while on one foot, and walking along a designated path. Higher scores on the scale indicate higher functioning. The POMA is reliable, valid, and is predictive of falls, fall injuries, and nursing home placements and has been correlated with laboratory measures of physical performance (Duncan & Studenski, 1994).

Participants also were asked about their ADL and IADL functioning using the Activities of Daily Vision Scale (ADVS) (Mangione et al., 1992). The ADVS assesses the extent of difficulty a respondent experiences in the visual activities of daily living (e.g., preparing meals, threading a needle, reading) and has good test-retest reliability and construct validity (Mangione et al., 1992; Mangione et al., 1994). A vision-targeted IADL measure was used because the ICOM project (from which the sample was derived; Owsley, Stalvey, Wells, & Sloane, 1999) focused on vision. Response options covered a five-point difficulty scale. A composite score on the ADVS was computed using the recommended scoring technique (Mangione et al., 1992) and scaled on a 100-point scale. Lower composite scores indicate a greater degree of difficulty with ADLs.

Driving exposure was assessed by the Driving Habits Questionnaire (DHQ) (Owsley et al., 1999), which includes four items asking about driving

exposure—days driven per week, miles driven per week, total number of destinations traveled to per week, and number of trips made per week. These items on the DHQ, which is interviewer-administered, have good test-retest reliability and construct validity (Owsley et al., 1999). In addition, responses to questions about driving exposure bear a close similarity to actual travel patterns, supporting the validity of self-report driving exposure measures (Murakami & Wagner, 1997).

The occurrence of a fall was assessed by asking subjects if they experienced one or more falls in the prior 12 months. Crash involvement was defined by the occurrence of one or more crashes during the prior 5 years. Crash data were obtained from state records made available from the Alabama Department of Public Safety (ADPS), the state agency in charge of compiling crash data.

Results. Spearman correlations were used to evaluate associations between the LSQ score and the following mobility measures: POMA score; ADVS score; number of days, miles, trips, and destinations driven to per week; the occurrence of falls; and crash involvement. Results are in Table 2. With respect to the performance mobility and ADLs, those subjects having smaller life spaces had poorer POMA scores (indicating lower functioning) and reported more difficulty in visual ADLs. Lower LSQ scores were significantly associated with fewer miles driven, destinations per week, and trips per week. The LSQ score was not related to days driven per week. Because falling and crash involvement are both categorical variables, their association with the LSQ score was evaluated by the Mantel Haenszel Chi-Square test. For the purpose of this analysis, a cut point for the LSQ score was selected to make life space a categorical variable. A restricted life space was defined as scoring five or below on the LSQ. Thirty-five individuals (15% of the sample) were involved in at least one crash in the prior 5 years; those subjects with a restricted life space were less likely to be involved in a crash. Seventy-two individuals (30% of the sample) reported at least one fall in the prior year. The LSQ score and incurring a fall in the prior year were not related.

Although the LSQ score is significantly related to performance mobility and driving mobility, it is important to point out that it shares only a small percentage of variance with each of these variables (14%-36%). We further evaluated to what extent the POMA and ADVS scores and driving mobility scores, taken together, would predict the LSQ score using a multiple regression model. The above combination of mobility measures accounted for only a third of the variance ($R^2 = 0.31$), with approximately two thirds of the LSQ's variance not accounted for by the more traditional measures of mobility.

Discussion

The results indicate that the LSQ, which was designed to assess the spatial extent of mobility in community-dwelling older adults, has good test-retest reliability, construct and criterion validity in a sample of community-dwelling older adults, and addresses an aspect of mobility untapped by other measures of mobility. The vast majority of LSQ items (7 out of 9) have excellent test-retest reliability, at least 90% agreement or better, with the remaining two items (items 6 and 7) having moderate agreement levels in the 70%s. The test-retest reliability of individual items of the LSQ will be influenced by the type of population and its frequency of excursion activity within a given time period. Daily and infrequent activities are more likely to be consistent from assessment to assessment using a 3-day reference frame. However, activities occurring once every 2 to 4 days are more likely to be inconsistent on test-retest. For this community-dwelling population, it was items 6 and 7 that showed lower consistency. Subjects with more restricted mobility might show lower test-retest scores for items lower on the scale. The LSQ is designed to minimize the influence of rare excursions and focus on mobility as it occurs as part of routine living.

The LSQ has good construct validity with reference to functional impairment known to hamper mobility in the elderly. Those older adults exhibiting depressive symptoms and having impaired cognitive skills had a smaller life space. As discussed earlier, intrapersonal factors such as depression and cognitive impairment have been linked to restricted mobility (Barberger & Fabrigoule, 1997; Marottoli et al., 1997), and the narrower life space found in our patients with these problems is consistent with this prior literature. In addition, a reduced life space was also found in older adults with reduction in the useful field of view, a composite measure of the attentional visual field. However, reduced life space was not linked to visual acuity impairment. This pattern of results is consistent with previous work that peripheral visual field deficits predispose older adults to mobility problems, whereas visual acuity deficits, unless very severe, do not (Marron & Bailey, 1982; Rubin et al., 1994). The previous literature on vision and mobility implies that contrast sensitivity impairment also is linked to mobility restrictions, but this link did not emerge in our sample. It is interesting that although the functional manifestations of disease (useful field of view reduction, cognitive deficits) were associated with life space magnitude, the presence of multiple health problems per se was not. This underscores the significance of relying on functional assessment, rather than mere disease presence, in assessing older adults' problems in everyday tasks.

The LSQ also demonstrates good criterion validity when compared to other types of mobility measures. Reductions in life space as assessed by the LSQ are linked to difficulty performing component mobility maneuvers and ADLs, as is also the case for other measures of life space and component maneuvers (*The Life Space Diary* of May et al., 1985, and *The Nursing Home Life-Space Diameter* by Tinetti & Ginter, 1990). However, it is clear that the information provided by the LSQ and performance measures is not redundant, given the substantial amount of unshared variance (about 70%). For example, an older adult may have difficulty with mobility maneuvers (e.g., problems walking or walking very slowly) that may slow him or her down but may not necessarily have their life space restricted if they have developed coping and compensatory strategies to get around.

The LSQ also has good criterion validity when compared to driving mobility measures that involve travel extent or frequency. Those older adults who drive fewer miles per week, travel to fewer destinations, and make fewer trips in their car also have a more narrow life space. Similarly, those with a restricted life space were less likely to be involved in a crash in which they were at fault. It is important to note that although life space is related to driving habits, the concepts are not identical, as indicated by the large amount of variance not shared by the two. For example, there are other ways to travel extensively in the community and not be a driver (e.g., ride with someone else, use public transportation). In addition, several of the early LSQ items ask about mobility in spaces where travel by car is not an issue. In essence, the concept of life space estimates the magnitude or extent of travel into the environment, regardless of how one gets there and whether or not one uses assistive mobility devices (e.g., cane, walker). As such, it takes into account compensatory and coping strategies that individuals implement in order to get where they want to go.

Mobility restrictions have already been tied to depression and social isolation (Marottoli et al., 1997; Seeman, 1996). Of course, there are already many existing instruments for detecting depressive symptoms and social isolation problems in the geriatric clinical setting, and the LSQ is not designed to replace these. However, the scale could be a useful supplement because it zeroes in on the mobility consequences of these psychosocial problems, as well as the mobility implications of other types of health and functional impairments. Most health care interventions are directed at intrapersonal factors with the aim to enhance or prolong functional independence in the elderly. These intrapersonal factors (muscle strength, sensory impairment, depression) are most likely to affect mobility. Used in conjunction with

existing measures of variables known to affect mobility, the LSQ can serve as a reliable and valid outcome measure quantifying the spatial extent of mobility.

In essence, the LSQ provides an index of mobility behavior that offers information about the spatial extent of mobility in the environment not available from performance evaluations of specific mobility maneuvers. In doing so, the LSQ is not designed to identify the many factors that can affect a person's mobility but rather to simply characterize the magnitude of their excursion from a home base. Factors that could theoretically influence life space are numerous and include environmental factors such as crime rate, climate, the adequacy of public transportation, and other aspects of the resource environment (Lawton, 1978; Regnier, 1983); personal resource factors such as income, education, social support network, and social and work roles; and intrapersonal factors such as health, functional motor ability, sensory, cognitive, and emotional status. Changes in personal resources may also affect mobility. Socioeconomic status may influence the propensity toward distant excursions in that older adults with higher income levels have the financial resources to afford travel and attend events outside the home community (Golant, 1984b). Health care, community, or sociopolitical interventions designed to change these factors may change life space as measured by the LSQ, an issue worthy of further investigation.

Mobility is a key ability underlying the successful implementation and enjoyment of many aspects of everyday life. Unfortunately, it can be hampered by sensory, cognitive, and physical impairments, all of which are of higher prevalence in the elderly. We have developed a valid and reliable instrument that provides an estimate of the spatial extent of an older adult's mobility in the environment. The reliability and validity of the LSQ in a population-based sample should be confirmed in future work. The LSQ has potential usefulness when conducting research designed to characterize the mobility patterns of this population or when evaluating interventions designed to enhance mobility life space. In addition to its current use in the ICOM study that is evaluating the impact of a visual functional intervention on mobility, the LSQ has been adapted for use as an outcome measure in the National Institute on Aging's multisite clinical trial called ACTIVE (Advanced Cognitive Training for Independent Vital Elderly), which is evaluating the impact of cognitive training in the elderly on everyday task performance and quality of life. The results of these studies and future research using the LSQ tool will reveal to what extent interventions enhance mobility in terms of expanding spatial excursions into the environment.

Appendix A
Question × Question Guidelines for Examiner Administration of the Life Space Questionnaire

You are basically interested in finding out how much the person gets out and about and the spatial extent of the person's typical life space, i.e., what is the usual range of places in which the person engages in activities within a 3-day time frame. In order to customize the administration it would be useful to know prior to administering the measure whether the person lives in a rural, suburban, or urban area and whether they live in a house, apartment, etc. Knowing this information, you will be able to use verbiage more appropriate to the respondent's living circumstances.

Because you are interested in their routine behavior, we do not want to include any travel necessary to participate in the present appointment because this assessment appointment may be out of the ordinary for some people. Therefore, one must stress that *the questions do not pertain to travel on the day of the assessment.*

It is recommended that you mention the specific time frame you are asking about (e.g., if the questionnaire is being administered on a Thursday, one would say, "on Monday, Tuesday, and Wednesday have you been . . ."). The provision of a more concrete time frame should help the respondent in remembering their various destinations.

For these questions, it is not important how the respondent got to these destinations, i.e., they might have driven, or been driven by another person, wheeled in a wheelchair, taken a taxi cab, or used public transportation.

Question 1: The question asks about going to places outside the room where they usually sleep. This includes other rooms of the home such as the bathroom, kitchen, den, living room, etc. A person would only answer "no" to this question if they had been bed-bound for the last 3 days.

Question 2: This includes going to, or through, places immediately outside the home area but still adjacent to the home. These places include a porch, deck, patio, garage, or hallway of an apartment building (etc.). The places covered by this question don't have to be destinations. For example, a person going to their mailbox or down the block would obviously pass through one or more of these places and should answer "yes."

Question 3: This includes going to, or through, places outside the home area and into places immediately surrounding the home such as the yard, driveway, sidewalk, courtyard, or parking lot. As in the previous question, a person going through these places on their way to a more distant destination should answer "yes" to this question.

Question 4: This includes going to, or through, places beyond the property where their home is located. For homeowners, this refers to places beyond the property line. For those living in city apartments, this refers to places beyond the immediate block. For rural areas, this includes leaving the property lines.

Question 5: This includes going to, or through, places outside the neighborhood surrounding the home. In a city, this would be places beyond the surrounding five

blocks. In a suburban area this refers to places about three streets from the home. For sparsely populated rural areas, this includes going to places on the other side of the closest neighbors.

Question 6: This includes going to, or through, places outside the town or community area nearest the home. This refers to places outside a particular subregion of the city. This could be areas with a distinct name, or city areas such as east, west, north, or south. For rural areas, this includes going to places on the other side of the nearest town.

Question 7: This includes going to, or through, places on the other side of the county line (where substantial travel is involved) or to places on the other side of a large city. Respondents living near a county line where crossing into another county does not constitute a significant distance should not respond "yes" here. To aid in standardization of the instrument, one could use a 20-mile radius as a guideline to answering questions of clarification on Item 7, especially for rural residents.

Question 8: This includes going to, or through, places over the state line. People living close (less than 20 miles) to the state line should not answer "yes" to this question unless they traveled a substantial distance (more than 20 miles) into a neighboring state.

Question 9: The region of the country should be specified site-specifically and the appropriate states listed. "By this region, we mean the states of _____."

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