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Community Mobility Among Older Adults With Reduced Kidney Function: A Study of Life-Space

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Abstract

Background—Life-space Assessment (LSA) captures community mobility and social participation and quantifies the distance, frequency and independence obtained as an older adult moves through their environment. Reduced estimated glomerular filtration rate (eGFR) is associated with decline in activities of daily living among older adults, but less is known about the association of eGFR with restrictions in mobility.

Study Design—Prospective, observational cohort study.

Setting & Participants—Community-dwelling Medicare beneficiaries from the University of Alabama at Birmingham Study of Aging who had serum creatinine measured during a baseline in-home study visit and completed at least one telephone follow-up (N=390).

Predictor—eGFR 60, 45-59 and <45 ml/min/1.73 m².

Outcome—Life-space mobility trajectory.

Measurements—Life-space mobility was evaluated by telephone every six months for up to 4.5 years using the previously validated LSA. Scores using this tool range from 0-120 (higher scores indicate greater mobility).

Results—The mean age of the 390 participants was 77.6 ± 5.8 (SD) years, 41% were African American, and 50.5% were women; 30.0% had an eGFR of 45-59 ml/min/1.73 m², and 20.2% had an eGFR < 45 ml/min/1.73 m². Age, race, and sex adjusted mean baseline life-space mobility

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scores were 64.8 (95% CI, 62.0-67.6), 63.8 (95% CI, 60.3-67.4), and 58.3 (95% CI, 53.8-62.7) among those with eGFR categories ≥ 60 , 45-59, and < 45 ml/min/1.73 m², respectively. Compared to those with eGFR ≥ 60 ml/min/1.73 m², a more rapid decline in life-space mobility was found among those with eGFR < 45 ml/min/1.73 m², though this did not reach statistical significance ($p=0.06$); a similar effect was not seen among those with eGFR 45-59 ml/min/1.73 m² ($p=0.3$).

Limitations—Urinary albumin or longitudinal measures of eGFR were not available.

Conclusions—An eGFR < 45 ml/min/1.73 m² was associated with a trend towards a more rapid decline in life-space mobility among community-dwelling older adults. Findings should be confirmed in a larger population.

Keywords

chronic kidney disease; life-space mobility; elderly

The prevalence of reduced estimated glomerular filtration rate (eGFR) increases with older age. Even among the oldest-old (i.e., those ≥ 80 years of age), reduced eGFR is associated with concurrent complications of chronic kidney disease (CKD) and adverse health outcomes including cardiovascular disease and mortality.¹⁻³ Furthermore, among older adults, reduced eGFR is associated with problems not traditionally thought to be a consequence of kidney disease such as declines in both basic and instrumental activities of daily living (ADLs) and the development of persistent inability to walk one-quarter mile or climb ten steps.^{4, 5}

Whereas prior studies have identified associations between reduced eGFR and the ability to carry out specific functional tasks and impairments in walking, less is known about the broader impact of kidney function on community mobility and social participation. Maintaining task-specific functional abilities is important for independent living, however older adults often report health goals in terms of their ability to engage in social activities.⁶ Attending family events such as graduations or weddings, participating in religious services and visiting with friends may require movement outside of one's home, neighborhood or town as well as assistance from another person or special equipment. Measures of ADLs do not adequately capture this movement.

Life-space mobility is a measure of community mobility and social participation that quantifies the distance, frequency and independence obtained as an older adult moves through their environment.^{6, 7} Among community-dwelling older adults, life-space mobility has been shown to be independently associated with mortality and declines in life-space have been shown to occur in the setting of acute events such as a hospitalization.^{8, 9} In contrast to task-specific measures that do not capture mobility across the full continuum of function, life-space mobility measures movement through specific life-space levels ranging from within one's bedroom to beyond one's town and reflects social participation to the degree that mobility is associated with such activities.⁹ As older adults with reduced eGFR have a high burden of functional impairment,⁴ we hypothesized that reduced eGFR may also be associated with a decline in life-space mobility. Therefore, the aim of the current study was to evaluate the association of reduced eGFR with longitudinal life-space mobility trajectory over 4.5 years of follow-up among community-dwelling older adults in the University of Alabama at Birmingham (UAB) Study of Aging.

Methods

Participants

The UAB Study of Aging is a population-based, longitudinal study of mobility among community-dwelling older adults recruited between November 1999 and February 2001 from a stratified random sample of Medicare beneficiaries 65 years old from five counties (2 urban and 3 rural), in central Alabama. The details of the study have been previously reported.^{6, 7, 10} To provide a balanced sample in terms of race, gender, and rural-urban residence, the UAB Study of Aging oversampled African Americans, men, and residents of rural areas. Persons in nursing homes and those who were unable to set their own appointments were excluded. In the UAB Study of Aging, 624 participants were alive and provided informed consent for a second in-home visit in 2004 of whom 400 had data on serum creatinine from a one-time blood draw. Blood work was not available prior to the second in-home visit. We further limited our study population to those with at least one follow-up life-space mobility measure, resulting in a final analytic sample of 390 (Figure S1, available as online supplementary material). Overall, those excluded were more likely to be African-American, report transportation difficulty, have less than a high school education, or have a history of hypertension or stroke. Those excluded also had lower Mini-Mental State Examination (MMSE) scores, lower baseline life-space mobility and higher Geriatric Depression Scale (GDS) scores (Table S1).

Data Collection and Measures

During an in-home assessment, trained interviewers obtained information on sociodemographic factors and comorbid conditions. Comorbid conditions including hypertension, coronary artery disease, stroke and peripheral vascular disease were verified by use of a prescription drug for the condition or confirmation by medical history questionnaire completed by participants' primary care physicians or by review of a hospital discharge summary. Participants were asked to show the interviewer all medications they currently used. Medication names were recorded and coded into drug classes. Transportation difficulty was defined as answering "a little" or "a lot" to the question "over the past four weeks, have you had any difficulty getting transportation to where you want to go?" The MMSE was performed with possible scores ranging from 0 to 30 and higher scores representing better mental status.¹¹ Depressive symptoms were obtained using the 15-item GDS.¹² Weight and height were measured and body mass index (BMI) calculated. Obesity was defined as a BMI ≥ 30 kg/m². Of relevance to the current study, laboratory studies included serum creatinine, hemoglobin and glycated hemoglobin (A1c). Diabetes mellitus was defined as use of antidiabetic medication, confirmation by medical doctor questionnaire, review of a hospital discharge summary or as an A1c value $\geq 6.5\%$. Data on all baseline participant characteristics were obtained from the 2004 study visit.

Measures of Kidney Function

Fasting blood samples were obtained by trained phlebotomists and processed by the UAB Hospital Laboratory. Serum creatinine was measured using the Beckman Coulter model LX20 analyzer. eGFR was estimated using the CKD-EPI (CKD Epidemiology Collaboration) creatinine equation and categorized as ≥ 60 , 45-59, and < 45 ml/min/1.73 m².¹³

Life-Space Mobility

The UAB Study of Aging Life-Space Assessment (LSA) is a validated measure that reflects mobility and social participation.⁷ The composite measure of life-space mobility incorporates life-space level, frequency with which it is attained and the degree of

independence, based on the reported use of assistive equipment or help from another person over the past four weeks. Life-space mobility sub-scores are obtained for each life-space level (1-5) by multiplying the life-space level by the frequency and independence. Level sub-scores are then summed across levels to obtain the composite score (Appendix). Scores can range from 0-120 with higher scores indicating greater mobility and have been shown to be normally distributed in the UAB Study of Aging population.⁹ Life-space mobility scores are reliable when collected in-person or by telephone.⁶ Life-space scores remain relatively stable over two weeks of follow-up (intraclass correlation coefficient = 0.96), but reflect changes, both increases and declines, with longer follow-up or after acute events.^{7, 8} For example, a life-space decline of 10 points has been reported to be on the order of decline that occurs with a nonsurgical hospital admission.⁸ To provide clinical context for composite life-space mobility scores, Figure 1 shows the mean $\pm$ standard deviation composite life-space mobility scores by life-space levels (bedroom, home, yard, neighborhood, town, and out of town) among all participants in the UAB Study of Aging. LSA was conducted at the time of the in-home assessment completed in 2004 and by telephone interview every six months over the subsequent 4.5 years of follow-up. For participants who died during the study, life-space mobility scores through the last available follow-up were used.

Statistical Analysis

Mean levels or proportion (as appropriate) for demographics, health related factors and medical conditions at baseline were calculated overall, and by eGFR category (≥ 60 , 45–59, and < 45 ml/min/1.73 m²). Our primary dependent variable was life-space mobility. For the main analysis, multilevel change (random-coefficients) regression models were used to determine the association between eGFR and life-space mobility trajectory over time. In our multilevel change model, level 1 consisted of longitudinal (within-person) trajectories of life space as a function of time and level 2 consisted of group intercepts and growth factors, as well as between-person predictors of individual differences in those intercepts and growth factors.¹⁴ This method allows for the evaluation of overall group effects with random individual deviations in life-space mobility slope.

We first evaluated unconditional mean models that included only eGFR category and time evaluating linear, quadratic and logarithmic life-space trajectories and different error structures. Model fit statistics, including the Akaike information criterion, were calculated and a model using log transformed years with an unstructured error model using restricted maximum likelihood estimation provided the best fit. In order to evaluate the impact of eGFR independent of potential confounders, our next model included adjustment for age, race and sex. A subsequent model included additional adjustment for rural residence, marital status, transportation difficulty, smoking status, education, diabetes, hypertension, stroke, peripheral vascular disease, obesity, coronary artery disease, hemoglobin concentration, MMSE score, and GDS score. Using the multivariable adjusted model, growth curves for change in life-space mobility from baseline were plotted.

In a secondary analysis, Poisson regression models were used to obtain crude and multivariable adjusted risk ratios for the association between baseline eGFR and a decline in life-space mobility. Life-space decline was defined as a decrease of at least 10 points from baseline to the last available follow-up. As above, eGFR was categorized as ≥ 60 , 45–59, and < 45 ml/min/1.73 m² with ≥ 60 ml/min/1.73 m² serving as the referent category. A multivariable adjusted Poisson model included adjustment for the characteristics described above and follow-up time. As a sensitivity analysis we modeled a decline in life-space mobility as a 10 point decline from baseline to both of the last two available follow visits. All analyses were conducted using SAS version 9.3 (SAS Institute Inc).¹⁵

Results

Baseline Characteristics of Participants

The mean age of the 390 participants was 77.6 ± 5.8 (standard deviation) years, 41% were African American, and 50.5% women (Table 1). Of the 390 participants, 194 (49.7%) had an eGFR ≥ 60 ml/min/1.73 m² and 117 (30.0%) and 79 (20.2%) had eGFRs of 45-59 and < 45 ml/min/1.73 m², respectively. Compared to those with an eGFR ≥ 60 ml/min/1.73 m², those in the lower eGFR categories were more likely to be female, live in rural areas, report transportation difficulty, and have hypertension or diabetes and were less likely to be married. Those with an eGFR < 45 ml/min/1.73 m² were older and more likely to be African American and have a lower hemoglobin concentration.

Reduced eGFR and Baseline Life-Space Mobility

Mean life-space mobility scores at baseline were 66.9 (95% confidence interval [CI], 63.8-70.0), 63.5 (95% CI, 59.5-67.5), and 52.9 (95% CI, 48.0-57.9) among those with eGFRs ≥ 60 , 45-59, and < 45 ml/min/1.73 m², respectively. After adjustment for age, race and sex, the mean life-space mobility scores at baseline were 64.8 (95% CI, 62.0-67.6), 63.8 (95% CI, 60.3-67.4), and 58.3 (95% CI, 53.8 – 62.7) among those with eGFRs ≥ 60 , 45-59, and < 45 ml/min/1.73 m², respectively.

Reduced eGFR and Life-Space Trajectory

The mean number of life-space mobility scores over 4.5 years of follow-up was 8.7 ± 2.0 , 9.0 ± 1.8 and 8.3 ± 2.4 , among those with eGFRs ≥ 60 , 45-59, and < 45 ml/min/1.73 m², respectively. Changes in life-space mobility scores over follow-up are displayed in Figure 2 and Table S2. After adjustment for age, race, sex, rural residence, marital status, transportation difficulty, diabetes, hypertension, coronary artery disease, stroke, peripheral vascular disease, hemoglobin concentration, MMSE score, GDS score and baseline life-space mobility score, and compared to those with eGFR ≥ 60 ml/min/1.73 m², a more rapid decline in life-space mobility was found among those with eGFR < 45 ml/min/1.73 m² ($p=0.06$), but not among those with eGFR 45-59 ml/min/1.73 m² ($p=0.3$) (Table 2).

Reduced eGFR and Decline in Life-Space Mobility ≥ 10 Points

A decline in life-space mobility score ≥ 10 points from baseline to the last available follow-up occurred in 47.9%, 39.3% and 60.8% of participants with eGFRs of ≥ 60 , 45-59, and < 45 ml/min/1.73 m², respectively (Table 3). Compared to those with an eGFR ≥ 60 ml/min/1.73 m², the multivariable adjusted risk ratio for decline in life-space mobility was 1.33 (95% CI, 1.05-1.70) among participants with eGFR < 45 ml/min/1.73 m². An eGFR of 45-59 ml/min/1.73 m² was not associated with a decline in life-space mobility. Results were similar when decline in life-space mobility was defined as a ≥ 10 point reduction from baseline to the last two available follow-up assessments (data not shown).

Discussion

In the current study of community-dwelling older adults, eGFR < 45 ml/min/1.73 m² was associated with a non-statistically significant trend towards a more rapid decline in life-space trajectory over 4.5 years of follow-up. The mean decline in life-space mobility in this group, which as shown in Fig 2 was over 12 points, was consistent with a constriction of independent movement by one life-space zone such as from within one's town to within one's neighborhood, from one's neighborhood to one's yard, or from one's yard to one's home. Interestingly, this was true only for those with more severe reductions in eGFR, defined as an eGFR < 45 ml/min/1.73 m², and not among those with an eGFR of 45-59 ml/min/1.73 m². Also, we found participants with an eGFR < 45 ml/min/1.73 m² were more

likely to have a decline in life-space mobility 10 points compared to their counterparts with an eGFR ≥ 60 ml/min/1.73 m². While prior studies have identified associations between reduced eGFR and difficulty with task-specific function and walking impairment, life-space mobility captures community mobility across the full continuum of function.

Life-space is a broad measure of mobility and social participation, and declines in life-space are likely related to complex relationships between multiple factors that are part of physical, cognitive, social and psychological health.⁶ While it is unlikely that a single unifying mechanism can be identified to explain the associations we found, moderately-to-severely reduced eGFR (i.e., < 45 ml/min/1.73 m²) may contribute to life-space decline in several ways. Recent studies have shown that among people aged 80 years or older, CKD is associated with an increased prevalence of concurrent complications of CKD (e.g., anemia, acidosis) and cardiovascular disease.^{1, 16} Further, among older adults, CKD is associated with non-disease-specific problems including poor physical performance, cognitive impairment and frailty.¹⁷⁻¹⁹ These conditions may contribute to the decline in life-space mobility directly or through hospitalizations related to these conditions. The presence of concurrent complications, frailty and risk for hospitalization is greatest at lower eGFRs and may explain our findings of a significant decline in life-space mobility only among those with an eGFR < 45 ml/min/1.73 m².

Our findings are consistent with those of previous studies of functional impairment and CKD in older adults, but they also improve the understanding of reduced eGFR in this population. Several studies have evaluated the association of eGFR with task-specific measures of function, physical performance measures and walking mobility.²⁰ For example, we have previously shown reduced eGFR to be associated with a decline in basic and instrumental ADLs.⁴ A cystatin C concentration ≥ 1.13 mg/L has also been shown to be associated with development of a persistent inability to walk one-quarter of a mile or climb 10 steps.⁵ In contrast to previously studied task-specific measures that describe what participants are capable of doing, life-space assessments identify what participants actually did over the past four weeks and reflect community mobility and social participation. In a recent systematic review, Purnell and colleagues performed a comprehensive evaluation of studies comparing life-participation activities among adults treated with hemodialysis, peritoneal dialysis and kidney transplantation.²¹ The authors noted that an important limitation to previous studies was the heterogeneity in outcomes used to assess social participation and outcome assessments that were obtained at only one time point. Life-space mobility may be used in future studies to determine the impact of renal replacement treatment modalities on community mobility and social participation over time.

Findings from the current study have important clinical and public health implications. First, older adults often report health goals in terms of their ability to maintain functional independence and engage in social activities rather than achieving disease-specific goals. While CKD management that addresses correcting concentrations of biomarkers (e.g., GFR, phosphorus, hemoglobin) and disease-specific indicators (e.g., blood pressure), may be effective for reducing adverse health outcomes in younger populations, among older adults, who often have multiple comorbid conditions, functional impairment and decreased life-expectancy, addressing disease-specific outcomes alone may be inappropriate or ineffective in improving outcomes of importance to them.^{22, 23} A decline in life-space mobility of over 12 points, as we have observed among those with eGFR < 45 ml/min/1.73 m², may affect a person's ability to move outside of their neighborhood and may limit them from visiting with friends or attending doctor's appointments. For these individuals, identifying interventions to improve or maintain life-space mobility may have an important role in an individualized approach to CKD management by allowing them to meet their health goals.

Second, life-space mobility may provide important prognostic information about mortality and incident functional impairment for community-dwelling older adults, independent of traditional risk factors.^{9, 24} For example, compared to older adults with life-space scores 90, those with life-space scores of 60- 89 are twice as likely to die over four years of follow-up, and those with life-space mobility scores < 30 are more than 10 times as likely to die over four years.⁹ Future studies are needed to determine if evaluation of life-space mobility may improve clinical decision making or provide context to reframe discussions on preparation for dialysis in terms of the patient's health goals.²⁵

Findings from the current analysis should be considered in the context of known and potential limitations. Serum creatinine concentration was available from a one-time blood draw, longitudinal changes in eGFR were not assessed and misclassification is possible. Also, urinary albumin excretion provides important information about CKD severity and prognosis, but was not available in the UAB Study of Aging.^{26, 27} While we adjusted for potential confounders such as anemia, we did not have available data on other CKD complications such as metabolic acidosis which may contribute to muscle weakness, frailty and subsequent decline in life-space mobility.²⁸ While there were no significant differences between the number of follow-up life-space measures by eGFR category, bias due to differential drop out from death, especially among those with very low eGFR, is possible. However, loss of follow-up of those with more severe reductions in eGFR may underestimate the true differences in life-space mobility trajectory. Lastly, participants included a sample of older adults from five central Alabama counties who were alive after four years of the UAB Study of Aging and able to give consent for a second in-home visit. Findings from this analysis may not be generalizable to the broader US population. Despite these potential limitations, the longitudinal design and multiple assessments of life-space mobility during follow-up are strengths of the current analysis. Mobility is a dynamic process involving transitions between periods of difficulty and recovery, and the trajectory analysis approach used here included all available life-space scores.⁸

In conclusion, among community-dwelling older adults, an eGFR < 45 ml/min/1.73 m² was associated with an accelerated decline in life-space mobility trajectory. With the aging of the US population, increasing prevalence of CKD, and emphasis on providing patient-centered care,²² evaluation of life-space mobility may provide health information not reported by traditional functional assessment. Future studies are needed to confirm the findings from the current analysis in a larger population and identify factors associated with decline in life-space mobility among older adults with CKD in order to target those with highest risk for declines in mobility. Additional research is needed to determine the benefit of life-space mobility assessment for clinical decision making regarding preparation for dialysis and advanced care planning among older adults with progressive kidney disease.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Appendix

Components of the Composite Life-Space Mobility Score

Life-space level: During the past four weeks, have you been to...	Frequency: How often did you get there?	Independence: Did you use aids or equipment? Did you need help from another person?	Level Sub-Score*
Level 1 - Other rooms of your home besides the room where you sleep? 1 = Yes 0 = No	1 = <1x/wk 2 = 1-3 x/wk 3 = 4-6 x/wk 4 = Daily	1 = Personal assistance 1.5 = Equipment only 2 = No equipment or personal assistance	Level 1 sub-score
Level 2 - An area outside your home such as your porch, deck, or patio, hallway (of an apartment building) or garage, in your own yard or drive way? 2 = Yes 0 = No	1 = <1x/wk 2 = 1-3 x/wk 3 = 4-6 x/wk 4 = Daily	1 = Personal assistance 1.5 = Equipment only 2 = No equipment or personal assistance	Level 2 sub-score
Level 3 - Places in your neighborhood, other than your own yard or apartment building? 3 = Yes 0 = No	1 = <1x/wk 2 = 1-3 x/wk 3 = 4-6 x/wk 4 = Daily	1 = Personal assistance 1.5 = Equipment only 2 = No equipment or personal assistance	Level 3 sub-score
Level 4 - Places outside your neighborhood, but within your town? 4 = Yes 0 = No	1 = <1x/wk 2 = 1-3 x/wk 3 = 4-6 x/wk 4 = Daily	1 = Personal assistance 1.5 = Equipment only 2 = No equipment or personal assistance	Level 4 sub-score
Level 5 - Places outside your town? 5 = Yes 0 = No	1 = <1x/wk 2 = 1-3 x/wk 3 = 4-6 x/wk 4 = Daily	1 = Personal assistance 1.5 = Equipment only 2 = No equipment or personal assistance	Level 5 sub-score

Note: the sum of level sub-scores is equal to the Life-space composite score

*

Level sub-score = Life-space level × Frequency × Independence

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Figure 1. Conceptual model showing life-space levels with mean $\pm$ standard deviation for composite life-space score among all UAB Study of Aging participants (n=1000) by level achieved without help from another person in the four weeks before the baseline assessments completed between 1999-2001.

Figure 2.

Logarithmic trajectory of life-space change by estimated glomerular filtration rate (eGFR) category. Adjusted for age, race, sex, rural residence, marital status, transportation difficulty, current smoking, less than high school education, diabetes, hypertension, stroke, peripheral vascular disease, obesity, coronary artery disease, hemoglobin level, Mini-Mental State Examination score, and Geriatric Depression Scale score.

Table 1
Baseline characteristics of UAB Study of Aging participants by eGFR category

Characteristic	All (N=390)	eGFR 60 (n=194)	eGFR = 45 – 59 (n= 117)	eGFR < 45 (n= 79)	p-trend
Age (y)	77.6 (5.8)	76.5 (5.4)	77.6 (5.7)	80.4 (6.2)	<0.001
Female sex	197 (50.5)	85 (43.8)	65 (55.6)	47 (59.5)	0.001
African American	160 (41.0)	79 (40.7)	44 (37.6)	37 (46.8)	0.5
Rural residence	180 (46.2)	74 (38.1)	61 (52.1)	45 (57.0)	0.002
Married	205 (52.6)	115 (59.3)	61 (52.1)	29 (36.7)	0.001
Transportation difficulty	49 (12.6)	18 (9.3)	17 (14.5)	14 (17.7)	0.04
Current smoker	25 (6.4)	13 (6.7)	8 (6.8)	4 (5.1)	0.7
< HS education	157 (40.3)	71 (36.6)	48 (41.0)	38 (48.1)	0.08
Comorbid Conditions					
Diabetes mellitus	140 (35.9)	62 (32.0)	43 (36.8)	35 (44.3)	0.06
Hypertension	293 (75.1)	132 (68.0)	92 (78.6)	69 (87.3)	0.001
Coronary artery disease	81 (20.8)	42 (21.7)	25 (21.4)	14 (17.7)	0.5
PVD	53 (13.6)	31 (16.0)	11 (9.4)	11 (13.9)	0.4
Stroke	42 (10.8)	20 (10.3)	11 (9.4)	11 (13.9)	0.5
Obesity	118 (30.3)	57 (29.4)	35 (29.9)	26 (32.9)	0.6
Health-Related Factors					
Hemoglobin (g/dL)	13.5 (1.7)	13.7 (1.5)	13.7 (2.0)	12.6 (1.5)	<0.001
MMSE score	25.8 (4.0)	26.1 (4.1)	26.0 (3.7)	24.6 (3.9)	0.01
GDS score	2.0 (2.0)	1.9 (2.1)	1.8 (1.8)	2.4 (2.0)	0.1

Note: Values for categorical variables are given as number (percentage); values for continuous variables are given as mean ± standard deviation.

Baseline in-home visit and data collection for all patient characteristics for this analysis was in 2004.

eGFR, estimated glomerular filtration rate (given in mL/min/1.73 m²); GDS, Geriatric Depression Scale; MMSE, Mini-Mental State Examination; HS, high school; PVD, peripheral vascular disease; UAB, University of Alabama at Birmingham

Table 2
Parameter estimates for logarithmic trajectory of life-space mobility by eGFR category

	Intercept (95% CI)	p-value	Slope (95% CI)	p-value
Unadjusted				
eGFR Category				
60	reference		reference	
45-59	-3.4 (-8.4 – 1.7)	<0.001	1.7 (-1.3 – 4.7)	0.3
< 45	-14.0 (-19.8 – -8.1)	<0.001	-3.4 (-6.7 – 0.3)	0.07
Multivariable Adjusted*				
eGFR Category				
60	reference		reference	
45-59	-1.5 (-5.5 – 2.6)	0.5	1.6 (-1.4 – 4.6)	0.3
< 45	-3.0 (-7.9 – 1.8)	0.2	-3.3 (-6.8 – 0.2)	0.06

Note: eGFRs expressed in mL/min/1.73 m².

CI = confidence interval; eGFR, estimated glomerular filtration rate

* Includes adjustment for age, race, sex, rural residence, marital status, transportation difficulty, current smoking, less than high school education, diabetes, hypertension, stroke, peripheral vascular disease, obesity, coronary artery disease, hemoglobin level, Mini-Mental State Examination score, and Geriatric Depression Scale score.

Table 3
Risk ratios for decline in life-space mobility 10 points by eGFR category

eGFR Category	Life-space decline 10 points*	RR (95% CI)	
		Unadjusted	Multivariable adjusted**
60 (n=194)	93 (47.9%)	1.00 (reference)	1.00 (reference)
45-59 (n=117)	46 (39.3%)	0.82 (0.63 – 1.07)	0.85 (0.65 – 1.10)
< 45 (n=79)	48 (60.8%)	1.27 (1.01 – 1.60)	1.33 (1.05 – 1.70)

Note: eGFRs expressed as ml/min/1.73 m².

CI = confidence interval ; RR, risk ratio; eGFR, estimated glomerular filtration rate;

* Decline in life-space mobility score 10 points from baseline to last available follow-up

** Includes adjustment for age, race, sex, rural residence, marital status, transportation difficulty, current smoking, less than high school education, diabetes, hypertension, stroke, peripheral vascular disease, obesity, coronary artery disease, hemoglobin level, Mini-Mental State Examination score, and Geriatric Depression Scale score, baseline life-space mobility score, and length of follow-up