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The Impact of One's Sex and Social Living Situation on Rehabilitation Outcomes Following a Stroke

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Abstract

Objective: To investigate sex differences and the impact of social living situation on individual Functional Independence Measure (FIM™) outcomes after stroke rehabilitation

Design: A retrospective observational study utilizing Medicare fee-for-service beneficiaries (N=125,548) who were discharged from inpatient rehabilitation facilities in 2013 and 2014 after a stroke. Discharge individual FIM™ score, dichotomized as ≥ 5 and < 5 , was the primary outcome measure. A two-step generalized linear mixed model was used to measure the effect of sex on each FIM™ item while controlling for many clinical and sociodemographic covariates.

Results: After adjusting for sociodemographic and clinical factors, females had higher odds of reaching a supervision level for 14/18 FIM™ items. Males had higher odds of reaching a supervision level on 2/18 FIM™ items. Individuals who lived alone prior to their stroke had higher odds of reaching a supervision level than individuals who lived with a caregiver or with family for all FIM™ items.

Conclusions: When sociodemographic and clinical factors are controlled, females are more likely to discharge from inpatient rehabilitation at a supervision level or better for most FIM™ items. Individuals who live alone prior to their stroke have higher odds of discharging at a supervision level or better.

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Final results of the study were presented as a platform discussion at the OT summit of Scholars in June, 2018 in Kansas City, Kansas.

Keywords

Stroke; sex; rehabilitation; outcomes; social support

Stroke is one of the leading causes of disability around the world.^{1,2} As more people survive their stroke, there is greater interest in determining what factors may predict an individual's recovery trajectory afterwards. Some important factors that have been associated with stroke treatment and recovery include race/ethnicity^{3,4}, socioeconomic status^{5,6}, and premorbid functional status.^{7,8} Another important area to consider is the impact of sex/gender on stroke recovery. The American Heart Association (AHA) recently included sex specific guidelines for prevention and management of stroke.⁹

There are sex differences in stroke risk,¹⁰ treatment^{11,12} and outcomes.^{7,12-19} Females tend to be older when they have their stroke and are more likely to have hypertension and atrial fibrillation than men.¹¹ During acute care, females are less likely to receive standard of care for stroke management including antiplatelets, statins, and tissue plasminogen activator (tPA) after an ischemic stroke.^{11,20} Females tend to experience less functional gain during rehabilitation,¹⁸ are less likely to be discharged home,^{7,12} and are less likely to report an identified caregiver.²¹ Because females are more likely to be older and living alone when they have their stroke, they are more at risk for social isolation. Social isolation is associated with a subsequent stroke, myocardial infarction, and death in stroke survivors.²²

The majority of the broad literature on sex differences in rehabilitation outcomes following strokes described in the previous paragraph utilizes total scores on functional outcomes. In contrast, O'Brien and Xue²³ recently examined sex differences on individual rehabilitation goals and showed females are more likely to reach their clinician-identified rehabilitation goals compared to males. Information on sex differences in specific rehabilitation outcomes could help guide clinicians on how to focus their therapy. The purpose of this study was to examine sex differences in achieving a universally-desired rehabilitation outcome – functional independence at discharge – and the impact that social living situation has in explaining those differences.

METHODS

Data Source

This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies (see Supplementary Checklist). Medicare data from the Centers for Medicare and Medicaid Services (CMS) was utilized for this study. The sample was drawn from the Inpatient Rehabilitation Facility - Patient Assessment Instrument (IRF-PAI) submissions and then linked by beneficiary identification number to the Beneficiary Summary Files and Medicare Provider Analysis and Review (MedPAR) claims. The institution has a data usage agreement with CMS and this study was approved by the university's institutional review board. The need for written consent was waived by the institutional review board because only deidentified data from publicly available files was utilized.

Study Population

Participants were Medicare fee-for-service beneficiaries, aged 65 and older, who were discharged from inpatient rehabilitation facilities (IRFs) in 2013 and 2014 after sustaining a stroke. Individuals who receive rehabilitation in an IRF must be provided, and be able to tolerate, at least three hours of therapy a day, at least five days a week. Stroke was identified using the International Classification of Diseases, 9th Revision (ICD-9) codes: hemorrhagic stroke (430–432), ischemic stroke (433–434), acute cerebrovascular diseases (CBVD)-ischemic (436), late effects of CBVD (438). Patients were excluded if they did not have an acute hospital discharge within one day of IRF admission, were not living in the community prior to their hospitalization, stayed less than three days in the IRF, or had a prior IRF stay for the same diagnosis. Figure 1 provides a study flow diagram of the total sample and the number removed for each exclusion criterion. The final sample was 67.8% of the original sample and included 125,548 individuals.

Independent and Dependent Variables

Supplementary Table 1 includes information on the variables used in the analysis, where they were obtained, and how they were categorized. The independent variables were *sex* (male vs. female) and premorbid living arrangement (lived alone, lived with family or spouse, lived with a hired caregiver). The dependent variable was FIM™ score at discharge from the inpatient rehabilitation facility. The FIM™ consists of 18 items in self-care, motor, speech and cognition categories that are scored from 1 (total dependence) to 7 (independent). The summative score on the FIM™ ranges from 18–126, and a higher score is indicative of higher function. FIM™ score at discharge for each individual FIM™ item was dichotomized as ≥ 5 or <5 . A score of 5 represents a requirement of “supervision” assistance only for basic activities. This cutoff was selected based on clinical experience: individuals who discharge at a supervision level or above on the FIM™ items demonstrate good physical recovery from their stroke and have potential to recover to full independence post discharge. During the period of the study, the FIM™ was administered at admission and discharge for all individuals receiving rehabilitation at an inpatient rehabilitation facility in the United States. Figure 2 includes a description of the scoring criteria for each FIM™ level.²⁴

Clinical Covariates

Admission FIM™ score for each individual FIM™ item ranges from 1 to 7. Individuals who scored 0 - “did not occur” on admission had scores changed to a 1. A score of 0 (did not occur) is generally given for activities that the client is unable to attempt (i.e. they aren’t walking yet, so can’t attempt stairs) during the initial evaluation period in rehabilitation and therefore a score of 1 (total assistance) is the most appropriate score to assign to get the best picture of admission status of the individual. Rehabilitation length of stay (LOS) was coded into four categories (less than 10 days, 11–22 days, 23–35 days, greater than 35 days). The LOS categories were determined based on clinical judgment and on the average length of stay of 15.42 days (SD=7.4). Other clinical covariates included: the Elixhauser comorbidity index, which is an index that uses an extensive list of comorbidities that may interfere with an individual’s progress during rehabilitation, categorized (no comorbidities, 1–2

comorbidities, more than 3 comorbidities),²⁵ the type of stroke (hemorrhagic, ischemic, other), tPA treatment during their acute care admission for their stroke (yes/no), and receiving disability payments prior to their stroke (yes/no).

Sociodemographic Covariates

Age was categorized into 5 groups (<70, 70–74, 75–79, 80–84, 85+) and Race/Ethnicity included 4 categories (non-Hispanic white, non-Hispanic black, Hispanic, other). Dual eligibility was dichotomized (yes/no) to indicate if individuals were receiving coverage from both Medicaid and Medicare. Medicare is a U.S. federal health insurance program primarily for people aged 65 years or older. Individuals younger than aged 65 can qualify for Medicare if they have end stage renal disease or have been receiving disability payments for at least 24 months. Medicaid is a U.S. federally-funded health care program that is administered at the state level to assist individuals on limited incomes, with their medical costs.

Statistical Analysis

To describe the sample, means and standard deviations for continuous variables and frequencies and percentages for categorical variables were calculated. The sample was stratified by sex and compared on all covariates. A chi-square test was used to compare categorical variables and a two-sided independent *t*-tests was used to compare continuous variables.

A two-step generalized linear mixed model (SAS GLIMMIX module) was used to determine if previous living arrangement mediated the effect of sex on goal attainment. Separate models were run for each FIM™ item. Step I examined the association between sex and goal attainment while adjusting for age, sociodemographic and economic status variables and clinical covariates. Step II added premorbid living arrangement to the model. SAS v9.4 was used for all analyses. Alpha was set at 0.05.

RESULTS

Table 1 presents demographic information about the total sample and comparison of the sample by sex. The two groups were statistically different in all categories ($p<0.05$), except whether they received tPA or not ($p=0.83$). The male group was more likely to be non-Hispanic white, and the female group had a higher non-Hispanic black population. Males were more likely to be living with a spouse or friends prior to their stroke (80.4% vs 64.1%), and females were more likely to be living alone (34.9% vs 19.1%). More females had dual eligibility for both Medicare and Medicaid (23.0% vs 16.0%) and more males were on disability prior to their stroke (23.0% vs 19.0%). Small, but statistically significant differences in stroke type were also observed; 89.0% of females had an ischemic stroke compared to 87.6% of males. Females were older (76.7 years vs 74.8 years) and had more comorbidities (4.0 vs 3.8). Females and males had similar LOS (W-15.4 days vs M-15.5 days). Total admission and discharge FIM™ scores between the two groups were similar (admission FIM™ score: females=54.0, males=54.2, $p=0.04$; discharge FIM™ score: females=81.2, males=81.6, $p=0.004$).

Table 2 shows the unadjusted sex differences in reaching a FIM™ level of 5 or better on each individual FIM™ item at admission and discharge. Statistically more males were admitted with a FIM™ score of 5 or better for most of the motor FIM™ items including: bathing, upper extremity dressing, toileting, bowel control, all transfers (bed/chair/wheelchair, toilet, tub/shower), walking, and stairs. Females were more likely to be admitted with a FIM™ score of 5 or better in expression and social interaction. At discharge, more males discharged at a FIM™ score of 5 or better in upper extremity dressing, all transfers (bed/chair/wheelchair, toilet, tub/shower), walking, and stairs. More females discharged with a score of 5 or better in expression and social interaction, eating, and bladder control.

Table 3 shows the results from the two-step multivariable regression models for each FIM™ item. In step I, females had higher odds of reaching a FIM™ score of 5 or higher in 14 out of 18 FIM™ items (eating, grooming, bathing, lower extremity dressing, toileting, bladder control, bowel control, walking, toilet transfers, comprehension, expression, interaction, problem solving, and memory) and lower odds in 2 out of 18 FIM™ items (upper extremity dressing and stairs). There was no difference between the two groups in the other two FIM™ items (wheelchair transfers and tub transfers). Adding prior living arrangement to the model (step II) only slightly mediated the relationship between sex and functional independence at discharge. Females continued to have higher odds of success on 13 FIM™ items, but the magnitude of the difference was slightly reduced. Walking was the one FIM™ item where the odds ratio changed from favoring females to not significant. Compared to individuals who lived with family or friends prior to their stroke, those who lived with a paid caregiver or other non-family member had lower odds of reaching independent functional ratings and those who lived alone had higher odds on all FIM™ items. Figure 3 shows the adjusted probabilities with 95% confidence intervals for males and females discharging at a supervision level or greater for each FIM™ item.

DISCUSSION

In this national sample of Medicare beneficiaries receiving inpatient rehabilitation for stroke, males had higher observed (unadjusted) rates of reaching functional independence (FIM™ score ≥ 5) than females. However, after controlling for other sociodemographic characteristics and clinical factors, females demonstrated greater likelihood of achieving independence on most functional items. This finding is in agreement with a recent study showing females were more likely than males to reach FIM™ target levels established by their clinicians.²³

There are plausible clinical explanations for the two FIM™ items on which males performed better than females after adjusting for all the covariates. Upper extremity dressing FIM™ item is a harder task for females, because they typically must don a bra as well as a shirt. Donning a bra is one of the most challenging dressing tasks, as it requires fine motor dexterity as well as strength in both hands. Even when a bra is used that doesn't require fasteners, the material is typically elastic and requires strength from both arms to don and adjust the bra appropriately. Stairs is the most challenging lower extremity item on the FIM™ scale as it requires both trunk stability and at least some strength in the affected lower extremity. Previous research has indicated males may do better than females after a

stroke secondary to premorbid strength differences.¹⁵ Being physically stronger prior to the stroke could explain why males tend to do better on stairs, and equally well to females on transfers and walking.

These results differ from many previous studies suggesting that males have better functional outcomes^{3,18,26,27} and discharge disposition^{7,12} than females. A recent systematic review noted that hospital-based studies tend to find significant sex differences more often than population-based studies and many studies did not adjust for key covariates such as age and stroke severity.¹⁹ It is also important to consider whether a total score on a functional measure was used to compare outcomes or whether individual item scores were utilized. Similar to previous research, this investigation found that age is negatively associated with reaching a supervision level on each FIM™ item.²⁸ Females tend to be older and have more severe strokes. This study involved subjects eligible for inpatient rehabilitation. Thus, the group would be a higher functioning group of stroke survivors, on average, than those discharged to a skilled nursing facility.

In this study, females consistently did better on the cognition and communication FIM™ items. A higher percentage of the females were living alone prior to their stroke, which could indicate a premorbid higher level of cognition. Lesion location, which can impact communication and expression deficits, was not controlled for in this investigation.

The females and males included in this study had similar usage of intravenous thrombolysis (IVT) therapy. This contradicts some previous investigations which have suggested that the reason for a sex difference in stroke outcomes is secondary to sex differences in the acute care management of stroke^{12,29} including less usage of IVT.³⁰ This study involved only those individuals who received inpatient rehabilitation after their stroke which could explain why there were not sex differences in IVT usage found in this group.

When previous living arrangement was added to the regression models, individuals who lived alone prior to their stroke did better than those who lived with family/friends or a caregiver. The fact that individuals who lived alone prior to their stroke discharged at a higher level of function suggests that this living arrangement measure reflects premorbid function more so than the support one receives from family and friends. A similar investigation into the impact of social isolation on stroke recovery found individuals who lived alone had less severe strokes at admission and better recovery at three months than those who lived with a spouse, family or caregiver.³¹ These findings are relevant to current clinical practice because they support the importance of interventions that allow individuals to maintain their physical and cognitive abilities and age in place. The impact of sex and previous living arrangement on discharge destination after rehabilitation was not considered in this investigation, but is an area that should be addressed in future studies. Further investigation is also warranted into the characteristics of individuals living alone prior to their stroke, including how physical health, social support, psychological resilience and isolation risk-factors interact.

LIMITATIONS

There are a few limitations to this study that should be considered. These results are limited to stroke survivors who received inpatient rehabilitation after their stroke, which precludes generalizing the findings to individuals with less severe stroke who were able to go home from the acute care hospital and with more severe stroke who were not able to tolerate the required 3 hours of therapy in an IRF. Also, the number of individuals who received tPA could be underreported because this medication is typically given while the patient is still in the emergency room and is not included in the Medicare claims data we utilized. However, this study does provide valuable information regarding FIM™ outcome of participants who do receive rehabilitation in an IRF. The measure of premorbid living situation does provide information about the presence or absence of family, but it does not elucidate the level of involvement of the potential caregivers. While stroke severity was not available in this data, there was admission FIM™ scores which does provide information about the level of assistance required for that individual.

CONCLUSIONS

When controlling for differences in sociodemographic characteristics and clinical factors, females are more likely than males to discharge from inpatient rehabilitation without needing physical assistance on most FIM™ items. The items where males tend to do better can be explained by differences in task difficulty and premorbid strength. Individuals who live alone prior to their stroke are more likely to discharge without needing physical assistance on each FIM™ item. These results suggest that maintaining physical and cognitive abilities during the aging process, regardless of sex, and having the capability to live alone could prepare one for better recovery from a stroke.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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What is known: Males tend to demonstrate more improvement after a stroke than females when a total score on a functional measure is used. There are many clinical and sociodemographic factors that impact recovery after a stroke.

What is new: When each individual FIM™ item is considered separately, females do as well or better than males on most items. Individuals who live alone prior to their stroke tend to do better after stroke rehabilitation, further supporting the benefits of aging in place.

Medicare beneficiaries discharged from IRF in 2013 and 2014 following a stroke n=185,173

Exclusion Criterion	Number Excluded	% original sample
No prior acute hospital stay within 1 day of IRF admission	42,479	77.1%
Living in institution prior to hospitalization	3,878	74.9%
Rehab LOS < 3 days	3,398	73.1%
Prior IRF stay for same impairment	5,163	70.3%
Not first rehab stay	4,707	67.8%

Study sample n=125,548

Figure 1.
Flow diagram with exclusion criteria.

Functional Independence Measure (FIM™) Levels	
No Helper	
7	Complete Independence (Timely, Safely)
6	Modified Independence (Device)
Helper- Modified Dependence	
5	Supervision (Subject=100%)
4	Minimal Assistance (Subject= 75% or more)
3	Moderate Assistance (Subject=50%- 74%)
Helper- Complete Dependence	
2	Maximal Assistance (Subject=25%-49%)
1	Total Assistance (Subject less than 25%)
0	Activity does not occur: Use this code only at admission

Figure 2.
FIM™ levels

Figure 3. Probability of reaching a supervision level or greater (FIM™ ≥ 5) at discharge by sex. Adjusted values were calculated from step 2 of the multivariable models for each functional item.

Table 1.

Sample characteristics

Variables	Total (N=125,548)	Male (N=58,715)	Female (N=66,833)	p-value
Race/ethnicity [†]				<0.0001 [*]
Non-Hispanic white	75.4%	76.1%	74.9%	
Non-Hispanic black	15.0%	13.7%	16.1%	
Hispanic	6.0%	6.2%	5.7%	
Other	3.4%	3.6%	3.1%	
Unknown	0.3%	0.5%	0.2%	
Prior Living Arrangement [†]				<0.0001 [*]
Family/friends	71.8%	80.4%	64.1%	
Paid/other	0.7%	0.5%	1.0%	
None	27.5%	19.1%	34.9%	
Dual eligible [†]	19.7%	16.0%	23.0%	<0.0001 [*]
Disability [†]	20.8%	23.0%	19.0%	<0.0001 [*]
Stroke type				<0.0001 [*]
Ischemic	88.3%	87.6%	89.0%	
Hemorrhagic	9.43%	9.9%	9.0%	
Other	2.2%	2.5%	2.0%	
tPA Received (Yes) [†]	6.9%	6.9%	6.9%	0.83
Age-years, Mean (SD) [‡]	75.79(10)	74.8(9.8)	76.7(10.1)	<0.0001 [*]
Elixhauser Sum, Mean (SD) [‡]	3.9(1.8)	3.8(1.8)	4.0(1.8)	<0.0001 [*]
Length of stay-days, Mean (SD) [‡]	15.4(7.4)	15.5(7.7)	15.4(7.2)	0.0098 [*]
Admission FIM total score, Mean (SD) [‡]	54.1(18.2)	54.2(18.3)	54.0(18.1)	0.04 [*]
Admission FIM cognitive score[°], Mean (SD) [‡]	19.0(7.0)	18.9(7.1)	19.1(7.1)	<.0001 [*]
Admission FIM motor score^ℓ, Mean (SD) [‡]	35.1(13.5)	35.3(13.5)	34.9(13.5)	<0.0001 [*]
Discharge FIM total score, Mean (SD) [‡]	81.4(23.3)	81.6(23.3)	81.2(23.4)	0.004 [*]
Discharge FIM cognitive score[°], Mean (SD) [‡]	24.3(6.9)	24.3(6.9)	24.4(6.9)	0.03 [*]
Discharge FIM motor score^ℓ, Mean (SD) [‡]	57.0(18.6)	57.3(18.5)	56.8(18.6)	<0.0001 [*]

Note.

[†], chi-square test;[‡], t-test^{*} statistically significant at an alpha level of 0.05[°] FIM cognitive subscale includes score from 5 of 18 items (comprehension, expression, social interaction, problem solving and memory)^ℓ FIM motor subscale includes score from remaining 13 of 18 items

Table 2.

FIM score comparison by sex- unadjusted

FIM item	Admission FIM rating			Discharge FIM rating			p-value	p-value
	Total	Male	Female	Total	Male	Female		
Eating	61.4%	61.3%	61.4%	0.55	87.6%	87.1%	88.0%	<0.001 *
Grooming	32.3%	32.5%	32.2%	0.213	78.7%	78.8%	78.6%	0.310
Bathing	7.9%	8.2%	7.6%	<0.001 *	53.8%	54.1%	53.5%	0.031 *
Dressing Upper	18.9%	21.0%	17.0%	<0.001 *	66.3%	69.4%	63.5%	<0.001 *
Dressing Lower	4.5%	4.5%	4.4%	0.346	50.0%	49.7%	50.2%	0.04 *
Toileting	5.8%	6.5%	5.2%	<0.001 *	52.8%	52.9%	52.8%	0.690
Bladder Control	31.4%	31.0%	31.8%	0.005 *	61.2%	60.3%	62.0%	<0.001 *
Bowel Control	50.1%	52.1%	50.0%	<0.001 *	74.4%	74.7%	74.2%	0.064
Chair Transfers	2.3%	2.6%	2.1%	<0.001 *	53.7%	54.2%	53.3%	0.003 *
Toilet Transfers	3.3%	3.8%	3.0%	<0.001 *	53.2%	53.5%	53.0%	0.022 *
Tub Transfers	4.1%	4.3%	3.9%	<0.001 *	46.5%	47.1%	46.0%	<0.001 *
Walking	2.5%	2.9%	2.2%	<0.001 *	57.0%	58.4%	55.9%	<0.001 *
Stairs	1.6%	1.9%	1.3%	<0.001 *	35.3%	37.7%	33.2%	<0.001 *
Comprehension	42.4%	42.2%	42.6%	0.14	72.0%	71.9%	72.1%	0.380
Expression	40.3%	39.4%	41.0%	<0.001 *	68.8%	68.1%	69.5%	<0.001 *
Social Interaction	52.8%	52.2%	53.5%	<0.001 *	79.2%	78.8%	79.5%	0.0015 *
Problem Solving	22.3%	22.1%	22.5%	0.052	50.9%	50.8%	51.0%	0.635
Memory	25.1%	24.8%	25.4%	0.011 *	52.5%	52.4%	52.7%	0.270

*, statistically significant at an alpha level of 0.05

Table 3.

Models examining the effects of sex and prior living arrangement on discharge FIM scores. Values are odds ratios (95% confidence intervals).

		Eating	Grooming	Bathing	Dressing Upper
Step I	Female	1.10 (1.05,1.14)	1.04 (1.00,1.07)	1.05 (1.03,1.08)	0.79 (0.77, 0.81)
Step II	Female	1.08 (1.03, 1.13)	1.03 (0.99,1.06)	1.03 (1.01,1.06)	0.78 (0.75,0.80)
	Support (family/Friends)	1.00	1.00	1.00	1.00
	Paid/Other	0.74 (0.60, 0.91)	0.65 (0.56,0.77)	0.62 (0.53,0.72)	0.61 (0.52,0.72)
	None	1.14 (1.08, 1.20)	1.09 (1.05,1.13)	1.17 (1.13,1.20)	1.12 (1.09,1.16)
		Bladder Control	Bowel Control	Chair Transfers	Toilet Transfers
Step I	Female	1.13 (1.1, 1.17)	1.08 (1.05, 1.11)	1.01 (0.98, 1.03)	1.05 (1.02, 1.08)
Step II	Female	1.12 (1.09,1.15)	1.07 (1.03,1.10)	0.98 (0.96,1.01)	1.03 (1.00,1.06)
	Support (family/Friends)	1.00	1.00	1.00	1.00
	Paid/Other	0.68 (0.58,0.80)	0.65 (0.56,0.76)	0.64 (0.55,0.75)	0.63 (0.54,0.74)
	None	1.11 (1.07,1.15)	1.11 (1.07,1.15)	1.18 (1.14,1.22)	1.17 (1.14,1.21)
		Stairs	Comprehension	Expression	Problem Solving
Step I	Female	0.90 (0.88, 0.92)	1.05 (1.02, 1.09)	1.09 (1.06, 1.13)	1.04 (1.01, 1.07)
Step II	Female	0.88 (0.85,0.90)	1.04 (1.01,1.08)	1.09 (1.05,1.12)	1.03 (1.00,1.06)
	Support (family/Friends)	1.00	1.00	1.00	1.00
	Paid/Other	0.51 (0.43,0.62)	0.67 (0.56,0.80)	0.73 (0.61,0.88)	0.62 (0.52,0.74)
	None	1.23 (1.19,1.26)	1.09 (1.05,1.13)	1.06 (1.02,1.10)	1.06 (1.02,1.10)
		Dressing Lower	Toileting	Tub Transfers	Walking
Step I	Female	1.12 (1.09, 1.15)	1.09 (1.06, 1.12)	1.02 (0.99, 1.04)	1.03 (1.01, 1.06)
Step II	Female	1.09 (1.06,1.12)	1.07 (1.04,1.10)	0.99 (0.96,1.01)	1.01 (0.99,1.04)
	Support (family/Friends)	1.00	1.00	1.00	1.00
	Paid/Other	0.61 (0.52,0.72)	0.59 (0.50,0.70)	0.64 (0.55,0.75)	0.59 (0.51,0.69)
	None	1.19 (1.15,1.22)	1.17 (1.14,1.21)	1.24 (1.20,1.27)	1.17 (1.14,1.21)
		Memory	Social Interaction		
Step I	Female	1.05 (1.02, 1.08)	1.07 (1.04, 1.11)		
Step II	Female	1.04 (1.01,1.07)	1.07 (1.03,1.11)		
	Support (family/Friends)	1.00	1.00		
	Paid/Other	0.65 (0.54,0.78)	0.59 (0.50,0.71)		
	None	1.07 (1.03,1.10)	1.05 (1.01,1.10)		

Step I accounts for age, race/ethnicity, dual eligibility, admission FIM™ scores, days in rehabilitation, Elixhauser comorbidity, type of stroke, tPA treatment, and disability prior to stroke.

Step II accounts for covariates in Step I and prior living arrangement.