Predictors of Mobility among Wheelchair Using Residents in Long Term Care

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Abstract

Objective—The purpose of this study was to identify predictors of mobility among long term care residents who use wheelchairs as their main means of mobility. Based on the Matching Person to Technology Model, we hypothesized that wheelchair-related, personal and environmental factors would be independent predictors of mobility.

Design—Cross-sectional study.

Setting—Eleven long term residential care facilities in the Lower Mainland of British Columbia, Canada

Participants—The study included 268 residents: 149 self-responding residents and 119 residents who required proxy respondents.

Interventions—Not applicable.

Main outcome measures—Mobility was measured using the Nursing Home Life Space Diameter. Standardized measures of personal, wheelchair-related and environmental factors were administered and socio-demographic data were collected as independent variables.

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Previous Presentation

Portions of the findings from the study have been presented at the International Association of Gerontology and Geriatrics and Canadian Association of Occupational Therapists National Conference.

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Results—Independent mobility decreased as the distance from the resident's room increased: 63% of participants were independently mobile on their units, 40% were independently mobile off their units within the facilities and 20% were independently mobile outdoors. For the total sample, the significant predictors of mobility, in descending order of importance, were wheelchair skills (including the capacity to engage brakes and manoeuvre), functional independence in activities of daily living, having four or more visits per week from friends or family and use of a power wheelchair. This regression model accounted for 48% of variance in mobility scores.

Conclusions—Limited independent mobility is a common problem among facility residents. Residents may benefit from interventions such as wheelchair skills training or provision of powered mobility but the effectiveness of these interventions needs to be evaluated.

Keywords

Nursing Home; Wheelchair; Assistive Technology; Mobility

Introduction

In North America, most residents of long-term care facilities use wheelchairs as a primary means of mobility;^{1, 2} however, wheelchair-related problems are common. Problems such as poor postural alignment, discomfort, immobility, and dysfunctional wheelchairs are experienced by residents who use wheelchairs.^{3, 4} Narrow, crowded hallways may impede wheeled mobility within facilities.⁵ Residents may be immobilized with their wheelchairs if they cannot release the brakes that staff engage.^{3, 6} Limited assistance may be available for residents who are unable to self-propel, which may also restrict their mobility.⁵ Residents who attempt to use their wheelchairs outside their facilities may encounter accessibility issues and negative reactions from others that limit their mobility.⁷⁻⁹

Some evidence supports providing properly fitted wheelchairs. A pilot study found that individually prescribed wheelchairs improved propulsion speed.¹⁰ In a random sample of residents from two facilities with good funding for wheelchair equipment and seating service, only 22% of residents were in need of intervention to address wheelchair-related problems such as positioning and difficulty propelling. In those facilities, need for seating intervention was the only significant predictor of mobility.¹¹

We undertook a study to develop a better understanding of factors that influence the daily mobility of residents who use wheelchairs. We used the Matching Person to Technology model (MPT) to help select and organize variables for inclusion.¹² This framework indicates that personal (i.e., physical and cognitive abilities and preferences), technological (i.e., type of device and manner of use), and environmental factors (i.e., physical and social milieu) contribute to assistive technology outcomes. We hypothesized that variables from each MPT domain would independently contribute to resident's mobility. Given that many residents are experiencing declines in personal abilities, we hoped to identify technological and environmental factors may be most amenable to change.

Methods

We conducted a multi-site, cross-sectional study using a protocol that was approved by the local university ethics board (certificate # H08-00064).

Facilities and Study Participants

We invited participation from all facilities with over 100 English-speaking, wheelchair-using residents, within a prescribed area of the Lower Mainland of British Columbia. Residents in these facilities had a wide variety of diagnoses, although a majority had a concomitant diagnosis of dementia. Most were in their 80s and most used a wheelchair because they were unable to ambulate safely due to a variety of medical conditions and functional limitations. Residents were eligible for inclusion if they 1) used a wheelchair to go from their bedrooms to the facility common rooms, 2) used their wheelchair for more than two hours per day, 3) were medically stable, 4) were over 60 years of age, and 5) had used a wheelchair in the facility for more than one month.

Recruitment

Staff members at each facility identified eligible residents and generated two lists: residents who could provide their own consent and those who needed consent from surrogate decision makers. Potential participants were randomly selected from these lists and recruitment continued until we enrolled either 17 residents from each list from each facility or until all listed persons had been invited. To act as a proxy respondent, the individual needed to be in at least weekly contact with the resident and speak English. Staff members who were familiar with the resident acted as proxies if no family member was available.

Measures

We identified variables for the study based on the MPT model, and published empirical research.^{3, 5, 6, 8, 10, 11} We selected measures that represented each variable based on content, psychometric properties, and utility. When a proxy measure did not exist for a variable, we created one by transforming first person nouns and pronouns from the parallel self-report measure to third person (i.e., the word “I” was replaced with resident’s name and “my” was replaced by “his/her”). To ensure that the reliability of study instruments was adequate, because some had not been used previously in this setting, retest reliability was determined for a sub-sample of 10 proxy and 10 self-responding participants by administering all measures again two weeks later ($M=13.8$ days $SD=2.9$). Higher scores on all the measures described below indicate increasing amounts of the construct being measured. Organized according to MPT model, Table 1 provides a description of the constructs of interest, measures used and their published psychometric properties.

Dependent Variable—We operationalized mobility using the Nursing Home Life Space Diameter Measure (NHLSD).¹³ The NHLSD measures the extent, frequency and independence of mobility of residents in four concentric life spaces: their room, their unit, inside the facility and outside the facility.

Personal Independent Variables—From the resident's chart, data on the participant's age, sex, length of stay in the facility, and diagnoses were collected. The daily room rate, which is assessed based on resident's income after taxes, was used as a surrogate for annual income.

We assessed health status using two variables. General health was determined using the first question from the SF-12.¹⁴ We abstracted specific health conditions from the resident's chart using the Co-Morbidity Index.¹⁶

We measured three physical constructs: pain interference,¹⁴ vision problems¹⁸ and functional motor ability. We omitted item 11, bath transfer, as household bathtubs are normally not present in these facilities and therefore could not be assessed; and excluded item 12 from the analysis as it measures mobility performance, which overlaps conceptually with our dependent variable of interest. We included two psychocognitive variables. We measured cognitive ability directly for all participants, without the use of a proxy, using the Standardized Mini-Mental State Exam (SMMSE).²² Symptoms of depression were measured using the Geriatric Depression Scale (GDS).²⁴ The word "home" was replaced with "nursing home" for item 9 to ensure clarity.

Assistive Technology Independent Variables—We collected information about a variety of wheelchair-related variables. We documented participant's type of wheelchair; length of time using a wheelchair, hours per day spent sitting in a wheelchair; and ownership. Raters measured the need for seating intervention using the Seating Identification Tool (SIT).²⁶ We created a variable labelled "wheelchair issues" to capture five potential wheelchair problems that we identified during the qualitative phase of the research.. Wheelchair skills were documented using the Wheelchair Skills Test Questionnaire (WST-Q).²⁷

Environmental Independent Variables—Data on perceived environmental barriers were captured using the Craig Hospital Inventory of Environmental Factors (CHIEF).²⁸ The four applicable CHIEF domains included: attitudes, services/assistance, physical structure, and policies. We replaced the word "home" with "facility" in questions 2, 12, 15, and 18 to prevent ambiguity.

We collected data about the frequency of visits by either friends or family (number of visits over the course of week via self or proxy report,

To describe the facilities, we collected data from facility administrators on: 1) number of beds; 2) direct care staffing ratio (hours of funded care per resident per day); 3) occupational therapy, activity worker/recreational and physiotherapy staffing levels (measured in full time equivalents); 4) ownership (public/not-for-profit/for-profit); 5) adoption of the Eden philosophy,²⁹ a resident empowering model of care; 6) policy of least restraint (i.e., restraint use should only be considered after all other interventions have proven unsuccessful and the least restrictive restraint should be used); 7) facility provides only basic wheelchairs; and 8) power wheelchairs permitted.

Data Collection

Trained raters collected all data. Data collection began with the administration of the SMMSE to ensure that all self-responding subjects had scores ≥ 15 as recommended for self completion of the GDS.³⁰ We administered all subsequent participant-completed measures in a random order to minimize bias due to the order of presentation.

Analysis

We calculated our necessary sample size using G*Power 3.1.0 software to create separate regression models for proxy and self-responding participants. To detect a significant variables with a moderate effect size ($F=0.15$) we calculated a sample size of 132 participants per sub-population using the following parameters: $\alpha=0.05$, power =0.8, number of tested predictors= 13.

As data were missing for less than 5% of participants for all items, finances excepted, no missing values were imputed.³¹ We explored differences among facilities using an unconditional multi-level linear model to determine if facility variation scores warranted additional investigation.³² We calculated an intraclass correlation coefficient (ICC) (2,1) to assess the retest reliability of the measures in the study.³³ SPSS version 17 was used for all statistical analyses.

Regression analysis—It was decided, *a priori*, to create a regression model for the total sample only if cognition was not an independent predictor of mobility scores, as that would indicate there was no statistical reason that the samples could not be combined. We also explored the possibility that cognition acted as a moderator of mobility scores through its interactions with other variables. We entered variables in blocks, according to the MPT Model. To develop a better understanding of the influence of wheelchair-related factors on mobility, we entered these variables first, followed by personal factors, then environmental factors, into each specific regression model. We determined the variables for inclusion based on plausibility of the relationship, previous published evidence of a relationship between variables, and statistical selection by using bivariate correlations of $r>0.2$.³⁴ When potential collinearity was identified (defined as correlation coefficients among independent variables >0.7), the measure with the highest correlation with the dependent variable was selected.³⁵

When there was significant skew or when variables were represented by single items, we dichotomized these variables using previously published or statistically significant cut points ($p < .05$). Six continuous or ordinal variables were dichotomized for entry into the regression models, specifically health (≥ 3), vision (≥ 2), visits (≥ 4 per week), length of wheelchair use (≥ 13 months), wheelchair issues (≥ 1), and need for seating intervention (≥ 2).²⁶

Results

Eleven of 13 facilities agreed to take part in the study. Facilities had a direct staffing ratio of 2.60 (SD= 0.48), and 0.68 (SD=0.40) occupational therapists, 0.55 (SD=0.33) physiotherapists, and 2.31 (SD=1.54) activity workers/recreation staff per 100 residents. All facilities had a least restraint policy, seven (64%) had adopted the Eden alternative, four (36%) allowed scooters and ten (91%) allowed the residents to use power wheelchairs. On

average 24 (SD=8) residents participated from each facility with a range of 11 to 34. ANOVA revealed significant differences in mobility (NHLSD) scores between facilities ($F=2.699$, $p=0.004$). Post hoc testing using Hochberg's GT2 indicated that scores from facility 10 were significantly higher than from sites 1, 4, 8, and 11. In the unconditional multilevel linear model, the intercept was not significant ($p=0.135$), indicating that multi-level modeling was not required to account for the variance in mobility scores between the sites. No significant differences in mobility scores were noted between the eight public facilities and three others (one private and two non-profit) ($T=.991$, $p=.323$).

Fifty-five percent of residents or surrogate decision makers who we approached consented to take part in the study. As noted in Table 1, six of the measures had ICCs > 0.90 , and the remainder had ICCs > 0.80 . The proportion of residents who were independently mobile diminished as distance between their room and each NHLSD zone increased: 63% were independently mobile on their units, 44% were independently mobile off their units within their facilities, and 20% were independently mobile outside.

Mean scores or frequencies for the study variables and associations with NHLSD total scores are presented in Table 2. Most participants were women in their mid-eighties who used a manual wheelchair. Most participants (59%) were in need of seating intervention based on cutoff scores and almost half (45%) experienced one or more wheelchair issues. There were significant differences in wheelchair mobility scores for different levels of most independent variables.

The regression analysis for the total sample is presented in Table 3. Wheelchair-related variables explained most of the variance in mobility scores. The addition of personal and environmental variables at each additional step resulted in small but statistically significant increase in the variance explained. In the final regression model, two wheelchair-related variables (wheelchair skills and use of power wheelchair), one personal factor (FIM motor scores) and one environmental factor (having four or more visits per week) were significant predictors of mobility. This model accounted for almost half the variance ($r^2 = .48$) in mobility scores. Cognition was not identified as a moderator, as no significant interaction terms were found.

Discussion

Few studies have explored the predictors of mobility among individuals in residential care who use wheelchairs as their primary means of mobility.^{3, 10, 11} Although the proportion of participants who were independently mobile in different life spaces was higher in this study than among a random sample of residents from two facilities in the same geographical area,¹¹ limited independent mobility was still a common problem. Most participants encountered problems with off unit and outdoor mobility. It is understandable that residents who are not self-responding might be discouraged or prevented from leaving their units or the facility, which may decrease the opportunities for independent mobility in these life spaces; however, over one-third of participants were not independently mobile even within their own units, suggesting that their mobility was limited by cognitive, physical, equipment, or institutional

related barriers. As was hypothesized, variables from all MPT domains were significant predictors of mobility.

Personal Factors—Motor function was the only personal factor that was a significant predictor of mobility. As manual and power wheelchair use requires complex motor abilities, this relationship is fairly intuitive.

Assistive Technology Factors—Among assistive technology variables, wheelchair skills and use of a power wheelchair were the only significant independent predictors of mobility. It seems logical that wheelchair skills would enable wheeled mobility performance. A similar finding has been reported among individuals with spinal cord injury.³⁶ Several studies have indicated that power mobility facilitates outdoor mobility^{37, 38} and is essential for independent mobility for some residents.⁵ However, few facilities allowed scooters, which are less costly than power chairs. Another possible option might be the use of power assisted wheels, which have been found to decrease exertion and improve mobility in some populations.³⁹ Power mobility use may also act as a subtle proxy for higher level executive function that our measure of cognition was too crude to discern. Although there are safety concerns associated with the use of power mobility,^{5, 40} anti-collision power wheelchairs are currently under development for use in these settings.⁴¹

Unlike previous research,¹¹ SIT scores were not significant independent predictors of mobility. This result may reflect the volunteer nature of the sample in the current study, which on average was more mobile and had greater need for seating intervention than the random sample obtained by Bourbonniere et al.¹¹ Findings from the study by Bourbonniere et al., however, may be less generalizable given the small number of facilities studied and their high level of funding for equipment and services. Although SIT scores were not independent predictors, it should be noted that appropriateness of the wheelchair, in terms of fit and potential for self-propulsion, was likely reflected in wheelchair skill scores that did predict mobility.

The prevalence of need for seating intervention was similar to other Canadian research⁴² that found 62.7% of a sample of residents from ten facilities in one Canadian city needed seating intervention. Sadly, high rates of wheelchair-related problems that have been identified in other locations^{3, 4, 43} seem to remain an unresolved issue for residents.

Environmental Factors—Only one environmental variable, weekly frequency of visits from friends and family, was an independent predictor of mobility. Family visitors offer various forms of assistance to their relatives in residential care.⁴⁴ In fact, others report that 50% of family caregivers helped relatives move about in their facilities.⁴⁵ Visitors may encourage or help residents to access life spaces inside and outside the facility with greater frequency, although the converse may also be true given our cross-sectional design: residents who have better independent mobility have more frequent visitors. Based on the MPT model and qualitative research in this area,^{5–8} we had anticipated a greater impact of environmental factors. The focus of the CHIEF, our primary environmental measure, is on perceived barriers to activities generally, rather than mobility specifically. For this reason, the measure may not have been sensitive enough to capture perceived environmental barriers that affected

mobility. This finding may also reflect a well-entrenched personal model of disability in which individuals blame themselves rather than contextual issues for difficulties they encounter.⁴⁶

Implications—Our research has identified serious issues in these facilities in terms of the proportion of residents who have restricted independent mobility and are in need of seating intervention. Although wheeled mobility is frequently provided to enable socialization, autonomy and participation,⁴⁷ these facility problems likely have a detrimental effect on resident's social engagement and quality of life.⁵ These issues need to be addressed to provide care that is respectful and compassionate for those in their final years of life.

Some predictors of mobility identified in this study may be amenable to intervention. The association between wheelchair skills and mobility suggests that this is an area for a potential future intervention study. Training residents in wheelchair skills with a resident-specific approach that targets priority issues and addresses any wheelchair-related deficiencies may expand the life spaces that these individuals may enter. This training could include individuals with dementia, as motor learning ability remains relatively intact in this population.⁴⁸ Facilitating family visitors or perhaps volunteers may be another way to improve resident's mobility. A prospective study could also examine the effect of power wheelchair prescription on resident's mobility.

Some strengths of our study are the large sample size and the high reliability of the measures used. Although many studies in residential care include either proxy or self-responding participants, the inclusion of both groups and analyses of them separately and together can also be considered a strength.

Study Limitations

Several limitations should be noted. We modified some measures from their original format, which may have affected their validity. As well, many of the measures were based on self or proxy report and may have been affected by a social desirability bias or problems with recall. As a measure of mobility performance, the NHLSD is a relatively crude instrument, as it does not capture distance travelled or time spent moving. Although we attempted to enrol a random sample of residents from the facilities involved in the research, our response rate indicates we ended up with more of a convenience sample. Finally, our study design did not allow us to determine causation.

There are a number of potential future directions for research suggested by this study. Future studies could supplement self-reported data with the inclusion of more objective measures. Measuring mobility performance by an odometer or global positioning device readings could provide increased granularity for this data.

Conclusion

Few studies have explored predictors of mobility among individuals in residential care holistically. This study found that most residents experienced limited independent mobility in different life spaces, and high levels of restraint and need for seating intervention.

Regression analyses that explained almost half the variance in mobility scores revealed that having the skill to use the wheelchair and use of power wheelchairs were important technological predictors of mobility and that visits from family and friends were an important environmental factor. This study lays the groundwork for additional research in this area, which might include intervention studies.

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Abbreviations

CHIEF	Craig Hospital Inventory of Environmental Factors
FIM	Functional Independence Measure
GDS	Geriatric Depression Scale
ICC	intraclass correlation coefficient
MPT	Matching Person to Technology
NHLSD	Nursing Home Life Space Diameter Measure
SIT	Seating Identification Tool
SMMSE	Standardized Mini Mental Status Exam
WST-Q	Wheelchair Skills Test Questionnaire

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Table 1

Constructs, Measures and their Psychometric Properties

Construct	Name of Measure (number of items/type of scale(s))	Published Validity Data	Study specific reliability (ICC, 95% CI)
Mobility	NHSD(4/6-point ordinal) ¹³	NHSDL scores are moderately correlated (@0.5) with functional abilities and participation in social activities. ¹³	0.88 (0.73–0.95)
Personal Factors			
Health	General Health Item SF-12 (1/5-point ordinal) ¹⁴	The general health item is strongly correlated (0.65) with total scores from the physical functioning and emotional health domains of the SF-12 and accounts for most of the variance in these domain scores. ¹⁵	0.81 (0.59–0.92)
Pain Interference	Comorbidity Index (18/dichotomous) ¹⁶	Correctly classified patients into high or low function groups in 77% of cases. ¹⁶	0.94 (0.87–0.98)
Vision Problems	Pain Interference Item SF-12(1/5-point ordinal) ¹⁴	Recommended as a measure of pain interference in comparison to other measures. ¹⁷	0.91 (0.80–0.96)
Functional Ability	Vision Problems (1/5-point ordinal) ¹⁸	Scores are negatively associated with visual acuity and contrast sensitivity. ¹⁹	0.84 (0.66–0.93)
Cognition	FIM (17/7-point ordinal) ²⁰	The FIM is a commonly used measure of function that can differentiate patients in different diagnostic categories. ²¹	0.88 (0.73–0.95)
Depression	SMMSE (22/varies) ²²	The SMMSE is more reliable than the MMSE, and has an area under the receiver operated curve area (ROCA) of 0.94 in relation to findings from a Competency Clinic assessment. ²³	0.91 (0.80–0.96)
Assistive Technology Factors			
Wheelchair information	GDS (15/dichotomous) ²⁴	GDS Cut off score of 4/5 had a sensitivity of 88% and specificity of 65% compared with diagnosis based on the Diagnostic and Statistical Manual criteria ²⁵	0.89 (0.75–0.95)
Need for wheelchair/seating intervention	Power or manual wheelchair (1, dichotomous); length of time using a wheelchair in months (1, continuous), hours per day spent sitting in a wheelchair (1, continuous); and facility or resident ownership of WC (1, dichotomous)	This SIT had a ROCA of 0.86 compared with judgements from two expert wheelchair prescribers. ²⁶	0.94 (0.82–0.98)
Restraint related issues not identified in the SIT	SIT (11/dichotomous) ²⁶		
Wheelchair skills (capacity to manoeuvre wheelchairs and negotiate barriers)	Wheelchair Issues (5/dichotomous) 1) inability to release seatbelt, 2) use of a lap tray, 3) sitting on a transfer sling, 4) wheelchair not capable of self-propulsion, and 5) inability to release both brakes.		
Environmental Factors	WST-Q (57/dichotomous) ²⁷	WST-Q scores are highly correlated (r=0.91) with an objective assessment of wheelchair skills. ²⁷	0.94 (0.82–0.98)

Construct	Name of Measure (number of items/type of scale(s))	Published Validity Data	Study specific reliability (ICC, 95% CI)
Environmental barriers to participation	CHIEF (19/5-point ordinal) ²⁸	Significant differences in scores found among people with different disability levels and categories. ²⁸	0.84 (0.64–0.93)
Visits	Number of visits per week by friends and family (1/continuous)		0.82(0.54–.93)

CI, = confidence interval, CHIEF= Craig Hospital Inventory of Environmental Factors, FIM = Functional Independence Measure, GDS = Geriatric Depression Scale, ICC= intraclass correlation coefficient, SIT= Seating Identification Tool, SMMSE=Standardized Mini Mental Status Exam, WST-Q= Wheelchair Skills Test Questionnaire

Table 2

Descriptive Statistics and Correlation with Nursing Home Life Space Diameter Score (N=268)

Variable (range for scales/cut off)	Mean (SD) or %	r (T)	p
Personal Factors			
Age (yrs.)	84.15 (8.62)	-.200	.001
Comorbidity (0–18)	3.08 (1.94)	.089	.149
Daily Rate (\$)	42.65 (16.16)	-.075	.245
FIM Motor(11–77)	34.73 (17.86)	.512	.000
GDS (0–15)	5.11 (3.52)	-.315	.015
Health (0–4) (3)	29%	(-2.975)	.003
Length of Stay	32.82 (37.09)	.033	.147
Pain Interference	.91(1.10)	-.084	.172
Sex(Female)	69%	(-2.971)	.003
SMMSE (0–30)	15.44 (10.69)	.491	.000
Smoker(Yes)	5%	(-3.071)	.002
Vision Problems(0–4/>2)	20%	(-2.505)	.013
Assistive Technology Factors			
Hours in WC	8.89 (3.65)	.124	.046
Length of WC use (months) (13)	69%	(-1.162)	.246
Owens WC (Yes)	32%	(-2.250)	.025
Power Chair (Yes)	9%	(-5.852)	.000
SIT (0–15/ 2)	59%	(1.827)	.069
WC issues(0–5/ 1)	45%	(6.858)	.000
WC cannot be self-propelled	7%	(3.581)	.000
Lap tray	8%	(2.868)	.004
Sitting on transfer sling	19%	(2.868)	.007
Restrained	22%	(4.358)	.000
Unable to release brakes	29%	(4.975)	.000
WST-Q (0–100)	0.31 (0.22)	.660	.000
Environmental Factors			
CHIEF total(0–152)	13.57 (15.87)	.038	.539
Visits per week (4)	37%	(-2.386)	.018

CHIEF= Craig Hospital Inventory of Environmental Factors, FIM = Functional Independence Measure, GDS = Geriatric Depression Scale, r = Pearson's correlation coefficient, SIT= Seating Identification Tool, SMMSE=Standardized Mini Mental Status Exam, WC= Wheelchair, WST-Q= Wheelchair Skills Test Questionnaire

Table 3

NHLSD Regression Analysis for Total Sample (N=259)

Steps	Assistive Technology Factors				Assistive Technology + Personal Factors				Assistive Technology + Personal Factors + Environmental Factors						
	β	SE	S β	LB	UB	β	SE	S β	LB	UB	β	SE	S β	LB	UB
(Constant)	24.37	2.68		19.09	29.65	34.65	10.28		14.40	54.90	26.20	10.27		5.97	46.44
WST-Q	53.43	5.84	0.61	41.92	64.93	36.73	7.73	0.42	21.52	51.95	37.25	7.53	0.42	22.42	52.09
Power Chair	7.16	3.50	0.11	0.26	14.05	9.33	3.78	0.14	1.89	16.77	9.01	3.68	0.14	1.75	16.26
WC Issues	-0.62	2.34	-0.02	-5.23	3.99	0.13	2.37	0.00	-4.54	4.80	-0.34	2.31	-0.01	-4.90	4.22
Owens WC	-0.20	1.98	-0.01	-4.10	3.70	0.23	2.02	0.01	-3.75	4.22	0.45	1.97	0.01	-3.43	4.33
GDS						-0.33	0.30	-0.06	-0.92	0.25	-0.25	0.29	-0.05	-0.82	0.32
FIM Motor						0.21	0.09	0.18	0.04	0.38	0.18	0.08	0.16	0.02	0.35
sex						1.44	2.06	0.04	-2.61	5.49	0.80	2.01	0.02	-3.16	4.76
smoking						3.06	4.48	0.03	-5.76	11.88	5.71	4.42	0.06	-3.00	14.42
age						-0.14	0.11	-0.06	-0.36	0.08	-0.08	0.11	-0.04	-0.29	0.14
Vision>2						-0.78	2.30	-0.02	-5.31	3.76	-0.68	2.24	-0.01	-5.10	3.74
SMMSE						2.41	2.15	0.06	-1.83	6.65	2.73	2.10	0.07	-1.41	6.86
Health 3						0.03	0.12	0.02	-0.20	0.26	0.08	0.12	0.04	-0.15	0.31
Visits 4											7.02	1.88	0.17	3.32	10.72
Cum. Adj. r^2			.44					.46					.48		
change per step			--					.02					.02		

Abbreviations: SE = Standard Error; S β = Standardized β ; Sig. = Significance; LB = lower 95% confidence interval for β ; UB = upper 95% confidence interval for β ; FIM = Functional Independence Measure; GDS = Geriatric Depression Scale; SIT = Seating Identification Tool; SMMSE = Standardized Mini Mental Status Exam; WC = Wheelchair; WST-Q = Wheelchair Skills Test Questionnaire; **bold** = significant p 0.05