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Influence of health locus of control on recovery of function in recently hospitalised frail older adults

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Aim: To investigate the influence of health locus of control on physical function, quality of life, depression and satisfaction with care transition in a sample of older adults following a hospital admission.

Methods: 230 older adults referred for transition care following a hospital admission (mean length of stay 25.7 days, S.D. 17.2) were recruited into a randomised controlled intervention trial investigating the effect of specialized coaching compared with usual care. Older adults completed the multidimensional health locus of control (MHLC) survey at baseline. Self-rated quality of life, depression and physical function were assessed at baseline and 12 months using the EQ-5D, geriatric depression scale (GDS) and Modified Barthel Index (MBI), respectively.

Results: Results from hierarchical multiple regression analysis in 136 participants (70 usual care and 66 specialized care) with complete data showed that higher scores on the MHLC internal subscale were related to better quality of life, and better physical function in the usual care group at 12 months, but not depression or transition process satisfaction at 3 months. No relationships between MHLC subscales and outcome measures were observed in the specialized care group, where the coaching intervention may have precluded any relationship observed.

Conclusions: A stronger sense of personal control over health was associated with better maintenance of quality of life and physical function at 12 months in older adults undergoing usual care transition after acute hospitalisation. Modification of control beliefs has the potential to promote resilience and impact on health outcomes in older adults during care transitions.

Keywords: decision making, frail elderly, health services for aged, physical function, quality of life, health control.

Introduction

The view that we lose control of many aspects of our life as we age is pervasive in societal stereotypes and attitudes to aging today with important consequences for maintaining health.[1] Older adults hold vastly different beliefs about who influences their health outcomes, and the extent of this influence. These beliefs are thought to influence health domains important for "successful aging" including psychological well-being, physical and cognitive functioning. A strong sense of perceived individual control could act as a mechanism to improve performance in physical and mental health domains, as well as a buffer against perceptions of age-related decline over time in these domains .[1]

The perceived control construct was first introduced in psychology, using the term locus of control, as part of social learning theory.[2] Sources of control are either internal (e.g. abilities, effort) or external (e.g. chance, fate, powerful others) to the individual. Health locus of control refers to the extent an individual believes their health is controlled by themselves and external sources. Control beliefs display age-related changes including an overall decline in sense of control,[3] and increases in perceived control by external sources.[4] This is thought to be a product of older adults experiencing fewer opportunities for control and more control-limiting situations.[1] Differences in ratings of health locus of control have been observed between older adults with varying levels of disability and formal support. For example, increased ratings of chance external health locus of control has been noted in long-term care residents compared with community-dwelling elderly, raising questions about whether this is the result of institutionalisation or contributes to the move into care.[5]

Decline in control may have a detrimental impact on older adults' health and well-being and lead to increased mental and physical vulnerability in disease.[6] There is

increasing evidence that control beliefs are predictors of functional health,[7] including better reported quality of life (QOL) and health status, reduced health service use, reduced symptoms and symptom severity, and improved recovery time.[5, 8, 9] This relationship is thought to occur partly because a greater sense of control may increase the likelihood of engagement in health-promoting behaviours, such as exercising and consumption of a healthy diet.[10-12] The finding that better maintenance of physical function in adults over time is associated with positive control beliefs together with other protective variables, e.g., social support and physical exercise, also supports this theory.[13] Personal control also appears to play an important role in maintaining positive perceptions of aging in the face of declines in physical function.[14] Control should therefore be considered in research into resilience in aging and recovery following acute illness and hospitalisation.

Older adults transitioning between healthcare sites, home, and aged care systems following an acute hospital episode are vulnerable to poor healthcare outcomes.[15] Patients and caregivers are often the only common thread between sites of care and coaching programs aimed at increasing personal ownership of healthcare in this group have been shown to improve patient satisfaction, reduce rehospitalisation and costs at 180 days.[16] Identifying factors to promote resilience in this vulnerable group is important as the risks of institutionalisation are high and the pathway to loss of independence is complex. The influence of perceived control beliefs on health outcomes within these coaching programs is unclear. Older adults with higher perceived internal control may benefit most from these types of programs as they may be more equipped to manage their care. Alternatively, older adults with lower perceived internal control may have the most to gain from a coaching program to encourage ownership of

healthcare. Overall, lowered perceived control could compound the effects of increasing age and frailty and impact on changes in health and well-being observed in this group over time. However, the effect of control beliefs on health and well-being outcomes in older adults undergoing care transitions following an acute healthcare episode is unclear.

We report on an investigation into the effect of health locus of control measured shortly after discharge from hospital on subsequent measures of health and well-being in older people. Outcomes included self-rated satisfaction with care transition (at 3 months), and changes in self-rated QOL, depression and physical function at 12 months.

Methods

Setting and study population

The sample was part of a randomized controlled intervention trial in a residential transition care unit in southern Adelaide, Australia. Between May 2008 and March 2010, all older people admitted to transitional care at the end of a hospital stay were approached for consent to participate in the trial. Older people were eligible if they had an informal caregiver who was willing to participate. They were ineligible if they were unable to communicate in English. Older people with cognitive impairment were included. For participants unable to give informed consent due to significant cognitive impairment, proxy consent was obtained.

The ethics committee at Repatriation General approved the study (no. 90/07). This study was registered with the Australian New Zealand Clinical Trial Registry (ACTRN12607000638437) and supported by the Australian National Health and Medical Research Council Health Services Research Grant [402791].

Baseline Assessment

Trained research staff conducted baseline assessment of participants at the transition care unit. The information collected at baseline (shortly after arrival from hospital) included socio-demographic variables, admission diagnosis, duration of hospital stay and cognition (Mini Mental State Examination)[17]. Elements of a comprehensive geriatric assessment were provided by completion of the Inter RAI Post-Acute Care (interRAI-PAC)[18]. The interRAI informs a range of summary scales; the changes in health, end-stage disease, signs and symptoms scale (CHESS) and activities of daily living (ADL)-long form, were included in the current analysis as measures of current health stability and functional status respectively. The ADL-long form is scored from 0 to 28 and CHESS from 0 to 5, with higher scores indicating greater dependency and highly unstable health respectively.

Health Locus of Control

Perceived control over health was assessed at baseline using the multidimensional health locus of control scale (MHLC) Form A,[19] which has modest reliability.[20] The patient is asked to rate 18 belief statements about their medical condition (e.g. I am in control of my health) on a 6-point scale from "strongly disagree" to "strongly agree". Patient responses inform 3 independent subscales: internal health locus of control, powerful others external and chance external. A higher score indicates a greater perceived influence over health outcomes (i.e. a high score on internal MHLC indicates greater perceived control of health outcomes by the patient). The MHLC scale is designed to be used with people who function at or above an eighth grade reading level and has been previously used in older adults.[5, 21] However, it has not been validated in older adults with cognitive impairment.

Randomisation and intervention

Following baseline assessment, participants were randomly allocated via a permuted block randomisation[22] to receive the specialized care or usual care (control). The specialized care group received a coaching intervention consisting of multiple components aimed at increasing involvement in healthcare planning, including a semi-structured meeting with a geriatrician, specialist gerontic nurse and at least one family member prior to discharge from transition care.[23]

Follow-Up

Three and 12 months after randomisation a research assistant visited older adults at home to complete assessments.

Outcome measures

QOL was assessed at baseline and 12 months using the EQ-5D,[24] a self-rated preference-based measure of health-related QOL which has been previously validated in populations with cognitive impairment.[25, 26] The instrument comprises two main components: a visual analogue scale which rates patient health today from worst imaginable (0) to best imaginable (100) health state and five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) which are each rated by three levels of increasing severity according to current status. Responses are converted to utilities, where a score of "0" indicates a health state equivalent to being dead and "1" indicates an ideal state of full health, through application of a scoring algorithm based upon general population values for all possible health states defined by the instrument.[27, 28]

The Geriatric Depression Scale (GDS)[29] was completed at baseline and 12 months by participants to assess depressive symptoms. The measure is suitable for use

in cognitively impaired populations with a MMSE over 14. The GDS is a 15-item short-form self-report assessment which can reliability detect the presence of a major depressive episode in older people.[30] Scores range from 0 to 15, where higher scores indicate more depressive symptoms.

The Modified Barthel Index (MBI)[31] was completed by research staff at baseline (pre-morbid and current) and 12 months to assess physical function and independence of the patient. It consists of 10 items, scored from "unable to perform task" to "fully independent" with a total score of 100 indicating complete independence.

Perceived quality of care transfers was assessed by the self-rated Care Transition Measure (CTM-15)[32] at 3 months. It is scored between 0 and 100, with higher scores indicating a better transition.[16, 32]

Statistical Analysis

Relevant descriptive statistics were generated for baseline outcome measures and participant characteristics. We used hierarchical multiple regression to examine the extent MHLC at baseline was associated with changes in outcome measures (EQ-5D, MBI, GDS and CTM-15) after background factors were taken into account. As sense of control is known to vary according to socio-demographic variables including age and sex,[1] these were accounted for in the analysis. The baseline score for each respective outcome measure was added in the model as a predictor; hence the analyses are for change in each outcome. The regression models included the following: baseline outcome measure, age, gender, MMSE, CHESS, ADL at Step 1. The three MHLC scales (internal, powerful others and chance) were added at Step 2. The CTM-15 scale was collected at 3 months only and therefore the model did not adjust for baseline values at Step 1. Analysis was stratified by usual care and specialized care group. All

assumptions were met for hierarchical regression, including no multicollinearity between variables. The level of significance was set at .05. All analyses were performed using SPSS for Windows 19.0.

Results

A total of 477 patients were admitted to the transition care unit between May 2008 and March 2010. Of these, 230 provided consent and underwent baseline assessments. Two hundred and thirteen and 172 participants completed the three month and 12 month follow-up, respectively. During the 12 month follow-up, there were 54 deaths and 4 participant withdrawals. There was complete data available from 136 participants (70 usual care and 66 specialized care) for regression analysis, and baseline characteristics were similar between the two groups (Table 1). Baseline characteristics were also compared between participants who did not complete the -study (n=58), participants with incomplete data excluded from analysis (n=36) and participants included in the current analysis (n=136). There were no differences in baseline characteristics between the three groups, with the exception of MMSE, which was lower in participants with incomplete data excluded from analysis compared to drop outs and analysed (mean (SD): 19.7 (5.85) vs. 22.9 (5.97) vs. 24.2 (4.22) , $p<.001$).

The majority of older adults had been living independently in the community before admission (n= 118, 87%) with 66% (n=90) living alone. Most participants also had some form of caregiver before admission to hospital (n=101, 74%).

The sample had a number of characteristics which are markers of increased frailty and risk of decline (Table 1). Both participant groups had a mean age of 84 years and there were 11 and 14 older adults aged 90 years or more in the usual care and specialized care groups respectively. In addition, a large proportion of the participants

(usual care n=28, 40% and specialized care n=14, 32%) had a MMSE below 24 and were classified as cognitively impaired. On average older adults in the usual and specialized care groups had experienced two admissions to hospital over the 12 months prior to transfer to the transition care unit, with some participants reporting up to nine hospital admissions. Most of the older adults had been admitted to hospital for a musculoskeletal injury such as a fracture or fall (usual care n=34, 48.6% and specialized care n=38, 57.6%). The last hospital admission before admission to transition care was 27.2 days in the usual care group and 23.3 days in the specialized care group on average.

Relationship between health locus of control and outcome measures

Variables entered at step 1 explained 23.7% of the variance in change in quality of life in the usual care group (Table 2). After the MHLC scales were entered at step 2, the total variance explained by the model was 33.2%, $F(9, 60) = 3.32$, $p=.002$, with MHLC explaining an additional 9.5% of variance in change in EQ-5D scores after controlling for variables entered at step 1. In the final model, baseline EQ-5D score (beta = .340, p= .008), and MHLC internal (beta = .325, p = .009) were statistically significant. MHLC internal was a significant contributor in the model, with higher scores indicating greater perceived control of health outcomes by the participant associated with greater improvement in EQ-5D scores over 12 months. MHLC scales were not significant contributors to change in EQ-5D scores in the specialized care group.

Over 36% of the variance in change in depression rating was explained by variables entered at step 1 in the usual care group, with baseline GDS scores a significant independent predictor (Table 3). The addition of MHLC scales at step 2 did not explain any further variance in GDS scores. In the specialized care group, 42.1% of

the variance in depression scores at 12 months was explained by variables entered at step 1, with baseline GDS scores and gender significant independent predictors. The addition of MHLC scales at step 2 did not explain any additional variance in depression scores at 12 months in the specialized care group.

Variables entered at step 1 explained 33.7% of the variance in change in physical function (MBI) in the usual care group (Table 4). The addition of MHLC scales explained an additional 10.6% of the variance, bringing total variance explained to 44.3%, $F(9, 60) = 5.29$, $p<.001$. In the final model, baseline MBI (beta = .547, p=.007) and MHLC internal (beta=.372, p=.002) were statistically significant contributors independent of other variables. MHLC was a significant contributor to variance in change in MBI scores, with greater improvement in MBI scores associated with greater perceived control of health outcomes by the participant. In the specialized care group, MHLC scales were not predictors of physical function at 12 months. Higher cognitive function assessed by MMSE score at baseline was associated with greater improvement in physical function at 12 months (table 4).

The experimental model did not explain variance in CTM-15 scores in the usual care or specialized care groups (data not shown).

Discussion

Our aim was to investigate the relationship between health locus of control and change in health and well-being in older people following a hospital admission and admission to a transition care facility 12 months earlier. These relationships were explored in older adults who underwent usual transition care either with or without specialized coaching. Results provide mixed support for an independent effect of higher ratings of internal

health locus of control. They only added significantly to the variance explained in physical function and quality of life at 12 months in the usual care group. This is consistent with the effect being small, explaining an additional 10% of variance in outcome measures after background factors were taken into account.

The effect of health locus of control on outcome measures was observed in the usual care (control) group only. Theoretically, it is thought that a higher sense of internal control could increase an individual's likelihood of adopting a variety of adaptive strategies to a health stress, such as following an acute hospital admission.[33] In the same way that internal health locus of control may be assisting a person to adapt following an acute event, the specialized care may have assisted older adults in that group thereby precluding any additional influence of internal health locus of control. Evidence from the Australian Longitudinal Study of Aging indicates that expectancy of personal control can also buffer the negative effect of declining physical function on self-perceptions of aging.[14] It may be that control is a risk factor, where individuals with lower levels of perceived control may be more vulnerable and less resilient after an acute episode or illness as experienced by our participants.

The relationship observed between internal health locus of control and physical function is more robust than has previously been found in other populations, including community based adults.[34] A national longitudinal study conducted in 3,626 community based American adults aged 32-84, found that a composite of three protective variables (control beliefs, social support and physical exercise) at baseline was associated with better maintenance of physical function over 10 years, with increased declines also associated with fewer protective factors overall.[13] Perceived control also influenced ratings of physical function and moderated effects of self-perceptions of aging on

physical function over 18 years in a sample from the Ohio Longitudinal Study of Aging and Retirement.[9]

Previous evidence also points towards a relationship between internal health locus of control and health-related QOL similar to that observed here. Kostka and Jachimowicz recently investigated older adults across three different living environments (community-dwelling, a voluntary veteran home and long-term care) and found ratings of health-related QOL on the EQ-5D were related to the internal MHLC across the whole sample and also declined with increasing level of dependence and institutionalisation.[5] A large study of adults aged 25-75 years also found ratings of mastery and perceived constraints were significant predictors of self-rated health, life satisfaction and depressive symptoms.[34]

The current study found ratings of chance or powerful others MHLC did not predict variance in outcome measures. Sources of control most influential to QOL and health ratings appear to differ across residential settings for older adults. Kostka and Jachimowicz recently found that MHLC powerful others and chance were important correlates of QOL in a group living voluntarily in a residential home for veterans (considered a transitional stage between community and institution) whilst MHLC internal was an important correlate of QOL in the long term care inhabitants.[5] Relationships between QOL and MHLC in the current study reflected the latter group, with the internal scale of the MHLC the only subscale which was a statistically significant predictor of outcome measures in the usual care group.

Limitations and generalizability

The results of this study should be considered in light of some limitations. A large number of variables, including QOL, MHLC and depression are based on self-

reported assessments and could therefore be affected by bias. For instance, a proportion of our participants were mildly to moderately cognitively impaired and the MHLC scale is not validated specifically in this population. As sense of control is known to vary according to sociodemographic variables including age and sex,[1] these were accounted for in the analysis. However, other sociodemographic factors associated with control, including socioeconomic status (educational attainment, income), culture and race/ethnicity were not included. In addition, changes in medications over the 12 months could also have affected outcome measures such as depression, and this could not be accounted for in the analysis. As our analysis was stratified by care group, the number of cases included is small and the possibility of a type-II error cannot be ruled out.

The study setting was a single transition care facility, and therefore it is possible that results are not generalizable to other settings. Considering the variation in strength of associations between MHLC subscales and scores on the EQ-5D across groups of older adults from various levels of independence reported previously,[5] any relationships observed here may not be applicable to healthy community-dwelling older adults. However, due to the heterogeneous nature of our volunteer group, findings from this study could inform further investigation into frail older people following an acute hospital admission. By including volunteers with cognitive impairment and end-stage disease, results from the current study are generalizable to the large population of older adults who have not fully recovered from an acute hospital admission on discharge. However, the occurrence of cognitive impairment in our sample may limit comparisons with other settings investigating control beliefs, including chronic disease management and cancer.

Implications for future research

This study shows the importance of considering the effect that individual psychological beliefs, including health locus of control, have on health and well-being measures over time, especially when recovering from illness or injury. It is possible that this effect may be more marked in groups with high susceptibility to health problems and less likely to participate in preventative health activities, such as those from lower socioeconomic backgrounds.[35] Cognitive function assessed by MMSE was associated with change in physical function at 12 months in the current study. Considering older adults with cognitive impairment also represent a group at risk for health decline, further research should investigate the possible moderating effect cognitive impairment may have on relationships between control beliefs and health outcomes in older adults.

Previous investigation in older adults across a range of community and residential care settings observed the most powerful relationships between health locus of control and QOL in a group from a veteran home.[5] The investigators concluded similar groups that are "in transition" between the community and institutions may be most vulnerable to the effects of control beliefs on QOL and should be targeted in future interventions. The current study demonstrates the influence control beliefs can have on older populations transitioning through care sites following an acute event.

Control beliefs are thought to be modifiable,[1] and could be specifically targeted in interventions in the transition care setting. Modification of control beliefs have the potential to enhance the effect of coaching interventions already aimed at increasing health literacy, shared decision making and ownership of healthcare in older adults.[16] In the current study, the effect of control beliefs was observed in usual care but not in the specialized care group, suggesting that the coaching component may have overcome

any association control beliefs had with health outcomes in this group. A moderating effect of perceived control was previously observed during a randomised controlled trial of self-management training in adults with chronic illness, where patients with the lowest perceived control over self-management of their chronic illness at baseline experienced the greatest enhancement in self-efficacy following the intervention.[36] Given the increased numbers of older adults with long-term functional limitations, further insight into the role of control beliefs has the potential to enhance recovery following hospitalisation and reduce costs associated with disability in later life.

Conclusion

In the 12 months following hospitalisation for an acute event, in a very frail group of older people at high risk of death or institutionalisation, a stronger belief of personal control over health outcomes was associated with better maintenance of quality of life and physical function, in the absence of any other intervention. Modification of control beliefs has the potential to promote resilience and impact on health outcomes in the transition care setting.

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Table 1. Characteristics of participants included in analysis (n=136)

	Usual care (n=70)	Specialized care (n=66)
Age (years), mean (SD)	83.8 (6.33)	84.0 (7.41)
Male, *n* (%)	26 (37.1)	19 (28.8)
Admissions 12 months, mean (SD) †	2.00 (1.09)	2.12 (1.51)
Acute admission length of stay, days mean (SD)‡	27.2 (21.5)	23.3 (10.1)
Reason for acute admission, n (%)		
Musculoskeletal	34 (48.6)	38 (57.6)
Neurological	9 (12.9)	7 (10.6)
Infection	7 (10.0)	4 (6.1)
Other	20 (28.6)	17 (25.8)
Mini Mental State Examination, mean (SD)	24.1 (4.35)	24.2 (4.12)
Modified Barthel Index, mean (SD)	62.2 (20.5)	59.6 (21.1)
Geriatric Depression Scale, mean (SD)	4.20 (3.05)	5.14 (3.02)
EQ-5D, mean (SD)	0.48 (0.29)	0.42 (0.30)
MHLC, mean (SD)		
Internal	24.6 (5.45)	22.9 (5.87)
Chance	21.1 (4.91)	20.3 (6.72)
Powerful Others	25.2 (5.67)	23.5 (6.00)

MHLC, multidimensional health locus of control.
† Number of hospital admissions 12 months prior to admission to transition care.
‡ Length of stay (days) of the hospital admission directly prior to admission to transition care.

Table 2. Hierarchical multiple regression for change in quality of life (EQ-5D) over 12 months

	Usual care (n=70)				Specialized care (n=66)			
Predictors	B	SE	Beta	P	B	SE	Beta	P
	Step 1: R^2 = .237 F (6, 63)= 3.263, p = .007				Step 1: R^2 = .141 F (6, 59)= 1.613, p = .160			
Baseline EQ-5D	0.376	0.145	0.331	.012	0.183	0.161	0.166	.260
Age	0.001	0.006	0.022	.850	0.006	0.005	0.137	.270
Gender	-0.048	0.080	-0.070	.553	0.055	0.090	0.076	.547
MMSE	0.004	0.009	0.051	.667	-0.011	0.010	-0.138	.287
CHESS[1]	-0.047	0.041	-0.127	.263	0.089	0.045	0.266	.054
ADL[2]	-0.011	0.008	-0.183	.159	-0.013	0.009	-0.219	.149
	Step 2: R^2 change = .095 F Change(3, 60)= 2.846, p= .045				Step 2: R^2 change = .018 F Change(3, 56)= 0.407, p=.749			
Baseline EQ-5D	0.386	0.142	0.340	.008	0.203	0.165	0.184	.222
Age	0.001	0.006	0.022	.846	0.004	0.006	0.101	.443
Gender	-0.044	0.077	-0.065	.572	0.053	0.099	0.073	.597
MMSE	0.005	0.009	0.070	.545	-0.012	0.010	-0.148	.266
CHESS[1]	-0.029	0.040	-0.077	.481	0.096	0.048	0.286	.051
ADL[2]	-0.014	0.008	-0.223	.077	-0.013	0.009	-0.219	.159
MHLC Internal	0.020	0.007	0.325	.009	0.000	0.008	-0.004	.981
MHLC Chance	-0.001	0.009	-0.016	.901	-0.002	0.009	-0.034	.847
MHLC Powerful others	-0.001	0.007	-0.014	.912	0.009	0.010	0.164	.367

B, unstandardised B; SE, standard error; Beta, standardised beta; MMSE, mini mental state exam; CHESS, changes in health, end-stage disease and signs and symptoms (health stability); ADL, activities of daily living; MHLC, multidimensional health locus of control.
1. Scores range from 0 to 5, with higher scores indicating greater health instability.
2. Scores range from 0 to 28, with higher scores indicating greater dependence.

Table 3. Hierarchical multiple regression for change in depression score (GDS) over 12 months

	Usual care (n=70)				Specialized care (n=66)			
	B	SE	Beta	P	B	SE	Beta	P
	Step 1: R^2 = .360 F (6, 63)= 5.897, p <.001				Step 1: R^2 = .421 F (6, 59)= 7.151, p <.001			
Baseline GDS	0.513	0.116	0.470	.000	0.557	0.104	0.536	.000
Age	0.051	0.057	0.098	.370	-0.046	0.043	-0.109	.285
Gender	0.781	0.726	0.114	.286	-1.643	0.713	-0.239	.025
MMSE	0.102	0.081	0.133	.212	-0.019	0.079	-0.025	.808
CHESS[1]	0.702	0.382	0.189	.071	-0.627	0.349	-0.195	.077
ADL[2]	0.066	0.067	0.107	.332	0.029	0.064	0.050	.655
	Step 2: R^2 change = .035 F Change(3, 60)= 1.167, p= .330				Step 2: R^2 change = .004 F Change(3, 56)= 0.120, p=.948			
Baseline GDS	0.456	0.123	0.418	.000	0.545	0.116	0.524	.000
Age	0.038	0.057	0.072	.510	-0.043	0.046	-0.102	.348
Gender	0.725	0.735	0.106	.328	-1.652	0.792	-0.240	.041
MMSE	0.105	0.082	0.137	.206	-0.022	0.083	-0.029	.791
CHESS[1]	0.628	0.386	0.169	.108	-0.604	0.370	-0.188	.108
ADL[2]	0.080	0.069	0.131	.250	0.027	0.066	0.046	.687
MHLC Internal	-0.121	0.073	-0.199	.103	-0.027	0.069	-0.051	.693
MHLC Chance	0.103	0.082	0.151	.212	0.020	0.072	0.043	.778
MHLC Powerful others	0.021	0.068	0.036	.754	-0.020	0.077	-0.038	.797

B, unstandardised B; SE, standard error; Beta, standardised beta; GDS, geriatric depression scale; MMSE, mini mental state exam; CHESS, changes in health, end-stage disease and signs and symptoms (health stability); ADL, activities of daily living; MHLC, multidimensional health locus of control.

1. Scores range from 0 to 5, with higher scores indicating greater health instability.

2. Scores range from 0 to 28, with higher scores indicating greater dependence.

Table 4. Hierarchical multiple regression for change in physical function (MBI) over 12 months

	Usual care (n=70)				Specialized care (n=66)			
	B	SE	Beta	P	B	SE	Beta	P
	Step 1: R^2 = .337 F(6, 63)= 5.327, p <.001				Step 1: R^2 = .225 F(6, 59)= 2.854, p =.017			
Baseline MBI	0.309	0.159	0.390	.056	0.253	0.164	0.312	.129
Age	0.095	0.302	0.037	.754	-0.217	0.271	-0.094	.427
Gender	-1.521	3.608	-0.046	.675	6.855	4.513	0.183	.134
MMSE	0.555	0.416	0.149	.187	1.102	0.504	0.265	.033
CHESS[1]	-3.361	1.891	-0.185	.080	2.944	2.270	0.168	.200
ADL[2]	-0.239	0.577	-0.080	.680	-0.076	0.632	-0.024	.905
	Step 2: R^2 change = .106 F Change(3, 60)= 3.800, p=.015				Step 2: R^2 change = .035 F Change(3, 56)= 0.889, p=.452			
Baseline MBI	0.434	0.155	0.547	.007	0.302	0.173	0.371	.086
Age	0.068	0.288	0.027	.813	-0.256	0.284	-0.111	.371
Gender	-0.574	3.440	-0.017	.868	6.324	4.928	0.168	.205
MMSE	0.560	0.400	0.150	.167	1.175	0.512	0.283	.025
CHESS[1]	-2.338	1.806	-0.129	.200	2.520	2.368	0.143	.292
ADL[2]	0.060	0.549	0.020	.913	0.121	0.649	0.038	.852
MHLC Internal	1.110	0.337	0.372	.002	0.561	0.417	0.192	.184
MHLC Chance	-0.332	0.383	-0.100	.389	-0.234	0.422	-0.092	.582
MHLC Powerful others	-0.386	0.318	-0.135	.229	0.158	0.480	0.055	.744

B, unstandardised B; SE, standard error; Beta, standardised beta; MBI, Modified Barthel Index; MMSE, mini mental state exam; CHESS, changes in health, end-stage disease and signs and symptoms (health stability); ADL, activities of daily living; MHLC, multidimensional health locus of control.

1. Scores range from 0 to 5, with higher scores indicating greater health instability.

2. Scores range from 0 to 28, with higher scores indicating greater dependence.