



Can personal and environmental factors explain participation of older adults?

Dana Anaby, William C. Miller, Janice J. Eng, Tal Jarus, Luc Noreau & PACC Research Group

To cite this article: Dana Anaby, William C. Miller, Janice J. Eng, Tal Jarus, Luc Noreau & PACC Research Group (2009) Can personal and environmental factors explain participation of older adults?, *Disability and Rehabilitation*, 31:15, 1275-1282, DOI: [10.1080/09638280802572940](https://doi.org/10.1080/09638280802572940)

To link to this article: <https://doi.org/10.1080/09638280802572940>



Published online: 21 Jul 2009.



Submit your article to this journal [↗](#)



Article views: 604



View related articles [↗](#)



Citing articles: 29 View citing articles [↗](#)

RESEARCH PAPER

Can personal and environmental factors explain participation of older adults?

DANA ANABY^{1,2}, WILLIAM C. MILLER^{1–3}, JANICE J. ENG^{2–4}, TAL JARUS^{1–3},
LUC NOREAU⁵ & PACC RESEARCH GROUP

¹Department of Occupational Science and Occupational Therapy, University of British Columbia, Vancouver, Canada,

²Program in Rehabilitation Science, University of British Columbia, Vancouver, Canada, ³GF Strong Rehabilitation Research Lab, Vancouver, Canada, ⁴Department of Physical Therapy, University of British Columbia, Vancouver, Canada, and

⁵Department of Rehabilitation, Laval University, Quebec, Canada

Accepted October 2008

Abstract

Purpose. This study explores the extent to which personal and environmental factors explain participation in daily activities and social roles of older adults with chronic conditions.

Method. Two hundred older adults with chronic conditions completed the following assessments: Assessment of Life Habits (participation); Interpersonal Support Evaluation List (social support); Activities Specific Balance Confidence Scale (balance confidence); Timed Up and Go Test (mobility capacity); and Centre for Epidemiological Studies Depression Scale (depression symptomatology).

Results. Mobility and balance confidence explained 30% of the level of participation in daily activities and 24% of participation in social roles, whereas social support and depression did not contribute to the explanation of participation. When explaining participation in daily activities, sex had a significant contribution to the model.

Conclusions. Participation accomplishment is explained by personal factors related to an elder's physical and mental ability while sex differences had an important role for explaining accomplishment of daily activities. Additional aspects of participation, environmental barriers, and level of disability, are key factors identified for further inquiry.

Keywords: Participation, personal factors, chronic conditions, aging, social environment

Introduction

The World Health Organisation [1] recognises participation as a key indicator of human health and well being. Health professionals consider participation as a significant outcome measure of their therapeutic interventions, and are interested in enhancing their clients' participation in desired roles and life situations [2]. For the health professional working with older adults living with chronic conditions, enhancing participation is critical and can be a challenge because individuals with chronic conditions are often at risk for participation restriction. Understanding which factors influence participation is central to working therapeutically and effectively with an older adult population.

Participation and older adults

Participation is defined as involvement in life situations [1] such as work, school, play, sports, entertainment, learning, civic life and religious practice among others. Developmental theories suggest that participation patterns change across the life span. These changes in participation patterns are most notable among the elderly, particularly for those who are faced with health decline, reduced income and death [3]. A notable decline in diversity of participation resulting in less leisure and productive activities, and instead, an increased focus on instrumental activities of daily living is evident [4]. Additionally, there is a tendency at this life stage to engage in more passive activities in isolation and at home [3,5,6]. Given that

the elderly are at risk for lower participation, the need to examine their participation patterns as well as explore the factors that lead to these patterns becomes critical. In this study, participation will be examined from the aspect of accomplishment, which refers to one's ability to perform an activity independently, while considering both facets of participation: daily activities and social roles.

Disability, co-morbidities and participation in the elderly

Disability, defined as any restriction in the ability to perform an activity in the range considered normal for a human being [1], has a substantial effect on participation across all age groups. It results in less diverse participation, less active recreation, more time spent at home and involves fewer social relationships [7]. Many factors such as chronic conditions may lead to disability. Chronic conditions are long-term adverse health events in a person's life that can limit his/her functional performance [8]. For example, having a stroke or cardiac condition may restrict an individual's ability to walk or transfer independently. Studies show that the number of chronic conditions (co-morbidities) present is one of the predictors for lower level of participation [9,10]. However, age and co-morbidities are not the only factors that may affect an older person's participation. The use of a conceptual approach to understanding and explaining disability and participation can be helpful.

The Disability Creation Process (DCP) [11] model provides a conceptual approach for examining participation. The DCP model describes the interactive process occurring between a person, his/her environment, the accomplishment of his/her participation [12] (see Figure 1). Here, participation is operationalised through the concept of life habits. Life habits are defined as daily activities such as personal care and mobility, and social roles such as interpersonal relationships and leisure. Life habits can be accomplished on a daily basis (e.g. getting into and out of bed, taking a meal) or at various frequencies (e.g. getting around in local stores, planning a budget, taking part in social activities). This model acknowledges that the accomplishment of life habits results from an interaction between personal factors and environmental dimensions. As shown in Figure 1, personal factors are linked to one's *organic system* indicating level of impairment (i.e. chronic conditions) and *capabilities* implying level of disability (i.e. as physical and emotional abilities) where environmental factors are social, cultural, political, and physical acting as facilitators or obstacles. The DCP model represents one of the more interesting and complete conceptualisations of participation to date.

Studies have shown that personal factors such as advanced age, higher number of chronic conditions, emotional distress, poor balance and a lack of coordination of the lower extremities, are the best predictors of low levels of participation among people after stroke [9,10]. Emotional distress is the most important factor contributing to participation level among people with varied chronic conditions

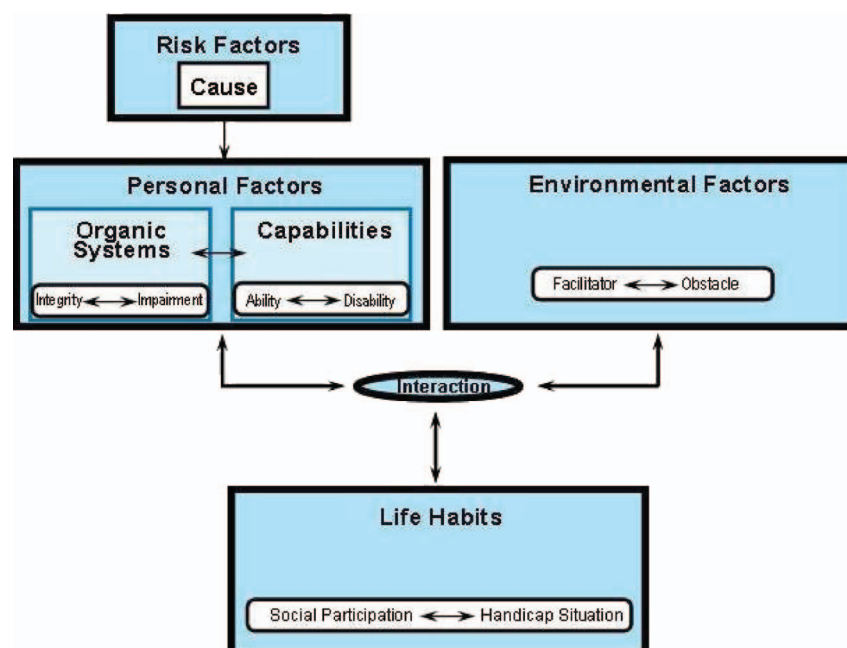


Figure 1. The DCP model.

[13], and balance self-efficacy is one of the factors that determines community reintegration in the older adults with chronic stroke [14]. The environment is seen as another important factor impacting participation. For example, Rochette et al. [15] found that perceived barriers in the physical and social environment contributed to lower levels of participation after stroke. Most notably, primary environmental facilitators to participation were found to be social, whereas the main obstacles to participation were identified as physical [16]. Despite this potential influence, the effect of the environment on participation has not been sufficiently studied. Moreover, in these referenced studies the effect of each factor (personal or environmental) on participation has been examined separately. Our study considers both factors simultaneously as we examine the effect of the environment on participation while controlling for the individual's personal factors. Therefore, we are able to explore and infer which factor can explain participation better. Thus, our hypothesis is that personal factors such as sex, age, number of chronic conditions, balance confidence, mobility capacity and depression, and environmental factors such as social support, can explain participation accomplishment in daily activities, social roles and total activities (see Figure 2).

Method

Participants

This cross-sectional study included older adults who were recruited using a 'shelf-talker' strategy. Recruitment information was placed on the shelves of 30 community pharmacies throughout the Vancouver

region. Pharmacists provided study information to people who came to their counter with multiple prescriptions. Individuals were included if they: (1) were aged 65 years or older, (2) had two or more chronic diseases (e.g. arthritis, stroke, heart disease) diagnosed by a medical doctor, (3) were living in their own home, (4) were able to walk for a minimum of 10 m with/without assistive devices and (5) achieved a score ≥ 24 on the Folstein's Mini Mental State Examination [17]. Subjects were excluded if they were unable to communicate with the investigator over the phone and/or had an impairment or health concern that prevented the completion of testing.

Procedure

After giving informed consent, participants were invited to the GF Strong Rehabilitation Research Laboratory (Vancouver, Canada) for data collection. Testing, which consisted of one performance based and four self-report measures, took ~ 2 h to complete. The participants completed six testing stations in random order. All participants received a \$75.00 honorarium for their participation and time. The study was approved by the University of British Columbia behavioural review ethics board.

Measurements

We used the DCP model to assist us in conceptually organising the variables and to facilitate the analyses for this study (see Figures 1 and 2). The following text outlines the measures used which represent different domains of the DCP.

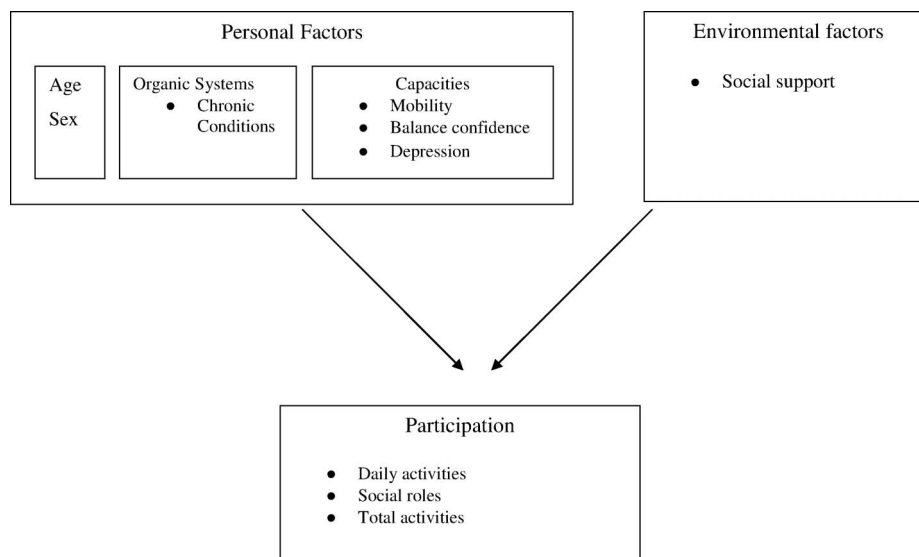


Figure 2. Summary of the expected relations between personal and environmental factors and participation.

Participation, conceptualised as life habits, was measured using the Assessment of Life Habits (LIFE-H). This assessment evaluates the participation of people with disability, regardless of the type of underlying impairment. The LIFE-H (version 3.1) includes 77 life habits covering six categories of daily activities (nutrition, fitness, personal care, communication, housing, mobility) and six categories of social roles (responsibility, interpersonal relationships, community life, education, employment and recreation) [18]. The participant is asked to rate each life habit in terms of difficulty, type of assistance needed (level of accomplishment) and level of satisfaction regarding the accomplishment of the life habit. In this study, we used only the participation accomplishment scores. These scores were converted to a 0–10 scale (normalises score) where 0 indicates total restriction (the activity or social role is not accomplished) and 10 indicates optimal social participation (the activity is performed without difficulty or assistance). Summary scores comprised of the means from across the six daily activities categories (37 items), across the six social role categories (40 items), and across all 77 life habits were computed. In summary, accomplishment scores were generated for each of the life habit domains: daily activities, social role, and total life habits. The test–retest reliability has been conducted with various samples of people with disabilities [18] and specifically with the elderly [19]. Construct validity of the LIFE-H has been established amongst the elderly with functional limitation: the LIFE-H could distinguish between different living environments (discriminant validity) and the LIFE-H was moderately correlated with measure of functional autonomy (convergent validity) [20].

Environmental factor

The interpersonal support evaluation list. This scale evaluates the individual's perception of his or her level of social support [21]. The participant is asked to rate six items that account for four dimensions of support (tangible, belonging, self-esteem and appraisal) using a 4-point Likert scale. The generated score is a sum of all the values ranging from 0 to 18 with higher scores indicating greater perceived support. The interpersonal support evaluation list (ISEL) has sufficient validity and reliability [21,22].

Personal factors

A physical personal factor was measured using the Timed Up and Go (TUG) Test. This measure of basic mobility requires subjects to stand from a

seated position, walk 3 m turn around, retrace their path and sit down again. The time in seconds it takes to complete the TUG test is recorded where 15 s or less is a cut-off score indicating a lower risk for falling [23]. The TUG has adequate validity among community-dwelling elderly [24], with people with various chronic conditions [25], and excellent reliability among people with chronic stroke [26].

Two mental personal factors were assessed: (1) The Activities-specific Balance Confidence (ABC) Scale which measures self-efficacy (belief in oneself and in one's perceived ability) in performing 16 specific functional activities without falling. Individuals were asked to rate balance confidence on a numerical rating scale (0–100%) for each activity (0% = no confidence, 100% = complete confidence). The mean of the 16 items is used to represent the overall indication of balance confidence. Evidence supporting the validity and reliability of this self report measure has been reported for the older adult population [27,28] (2) The Centre for Epidemiological Studies Depression Scale (CES-D) – This 20-item self report questionnaire measures symptoms of depression over the past week using a 4-point Likert scale. The score is generated by summing all the assigned values (range from 0 to 60) with higher scores indicating a greater level of distress. A score below 16 indicates no evidence of depression [29]. The CES-D has been found to be reliable and valid [30] in the general and older adult populations.

Data analysis

We computed Pearson correlations in order to estimate the bivariable association between personal factors, social support and participation accomplishment. The strength of the correlation coefficients was interpreted according to Domholdt's [31] classification where an r value smaller than 0.25 indicates a weak correlation, an r between 0.26 and 0.49 a low correlation, an r between 0.5 and 0.69 moderate correlation and high correlation was considered when an r value was greater than 0.7. T -test was used to evaluate the differences in participation between the sexes. To estimate to what extent participation could be explained by the predictors, separate multiple linear regressions were performed using an Enter method. In this method, predictors are entered in blocks based on substantial knowledge such as theory and/or previous findings [32]. To examine our stated hypothesis, three separated linear regressions for explaining accomplishment in (1) daily activities (2) social roles and (3) total activities were conducted and included personal and environmental variables as predictors. In each regression model three steps were performed. Step 1 included

three variables (sex, age and number of chronic conditions), in step 2 personal factors were entered (balance confidence generated from the ABC scale; mobility capacity from the TUG and depression from the CES-D) and in step 3, social support (measured by the ISEL) was entered. The variable selection and the order they were entered in are based on substantive findings in this area [8–10,15]. Plots of the residuals were performed to search for violation of the multiple regression assumptions in terms of linearity, and equality of variance and normality. Multi-collinearity was diagnosed using two methods: (1) examining the simple correlation among the predictors where moderate to high correlation is a reason for concern and (2) examining the Condition Index where any index greater than 15 indicates a possible problem and an index greater than 30 suggesting a serious problem [32]. The level of significance was set at 0.05 for all statistical tests using SPSS 14. We recruited 200 subjects for this project which provides enough power to model up to 10 predictors at a conservative effect size ($F_{sq} = 0.10$) with a power of 0.87 when $\alpha = 0.05$ [33].

Results

Sample characteristics

Our sample included 200 participants, primarily females (65%) between the ages of 65 and 90 (mean = 75, SD = 6.1) who had a range of 2–16 chronic conditions (mean = 5.9, SD = 2.6). The levels of accomplishment in daily activities, social roles and total life habits (described in Table I) are relatively high. Proportionally, level of accomplishment in daily activities is slightly higher with respect to accomplishment in social roles. In addition, the

Table I. Raw scores of explanatory variables and outcome measures ($n = 200$).

Explanatory variables	Min	Max	Mean	SD
Age	65	90	75	6.1
Number of CC	2	16	5.88	2.58
SES-D	0	40	11.19	8.47
ABC scale	14	100	81.13	17.91
ISEL	2	18	12.52	2.76
TUG (s)	5.43	30.67	11.02	3.89
<i>Outcome measure</i>				
Participation accomplishment				
Daily activities	5.6	10	9.45	0.54
Social roles	4.2	10	9.04	1.02
Total LIFE-H	5.71	10	9.37	0.62

CC, chronic conditions; CES-D, Centre for Epidemiological Studies Depression Scale; ABC, activities specific balance confidence; ISEL, interpersonal support evaluation list; TUG, time up and go test; LIFE-H, life habits.

majority (74%) scored less than 16 on CES-D indicating that on average, most participants do not experience many symptoms of depression [29]. Ninety percent of the participants scored less than 15 in the TUG test indicating a lower risk for falling [23].

The association between personal and environmental factors and participation. The Pearson correlations (Table II), indicate that total life habits accomplishment scores had a moderate correlation with mobility capacity and with balance confidence; low correlation with number of chronic conditions and weak correlation with level of depression and social support. Both daily activities and social roles scores were moderately correlated with mobility and balance confidence, and showed low correlation with number of chronic conditions and weak correlation with depression. Social support was significantly associated with participation in social roles but not in daily activities. In addition, no significant differences were found in participation accomplishment between the sexes in daily activities ($t = -1.02$, $p = 0.3$) as well as in social roles ($t = 0.78$, $p = 0.43$). Although not significant, the mean scores reveal that women tend to be more independent in daily activities (mean = 9.5, SD = 0.44) and less independent in social roles (mean = 9, SD = 1.04) than men (mean = 9.4, SD = 0.8; mean = 9.1, SD = 0.99, respectively).

The extent to which personal and environmental factors can explain participation. The regression results indicate that 30% of the variance of total participation accomplishment was explained by the level of balance confidence and mobility capacity. As demonstrated by the coefficients in Table III, mobility and balance confidence had a similar magnitude of importance in the regression model. The negative coefficient suggests that better mobility capacity (less time to complete the task) was associated with higher level of total participation accomplishment. The R^2 change values for each step reveal that age and number of chronic conditions explained a small proportion of the variance of total participation ($R^2 = 8\%$) whereas adding the environmental factor (social support) did not have any contribution to the explained variance. Here, mobility and balance confidence contributed an additional 22% of the explained variance. Similar results were found in each of the model summaries for explaining daily activities and social roles accomplishment. However, balance confidence was the strongest predictor of daily activities whereas mobility capacity was the best predictor of social roles. In fact, these two factors (mobility and confidence balance) combined explained 30% of the daily activities variance and 24%

Table II. Pearson correlation between personal and environmental factors and level of LIFE-H accomplishment scores ($n=200$).

		Personal factors					Environment
		Age	Mobility	Balance	Number of CC	Depression	Social support
Daily activities	r	-0.10	-0.47**	0.50**	-0.26**	-0.23**	0.08
	p	0.14	0.001	0.001	0.001	0.001	0.23
Social role	r	-0.13	-0.50**	0.42**	-0.29**	-0.16*	0.20**
	p	0.07	0.001	0.001	0.00	0.02	0.00
Total LIFE-H	r	-0.14	-0.53**	0.46**	-0.26**	-0.19**	0.19**
	p	0.051	0.001	0.001	0.001	0.005	0.005

*Correlation is significant at the 0.05 level.

**Correlation is significant at the 0.01 level.

Table III. Model summary for explaining accomplishment of LIFE-H scores.

Variables	Total LIFE-H				Daily activities				Social roles			
	B	SE B	β	R^2	B	SE B	β	R^2	B	SE B	β	R^2
Step 1												
Gender	0.11	0.08	0.09	0.08	0.15	0.08	0.13	0.09	0.03	0.14	0.02	0.08
Age	-0.14	0.007	-0.15*		-0.01	0.00	-0.11		-0.02	0.01	-0.15*	
Number of CC	-0.05	0.02	-0.24**		-0.06	0.02	-0.26**		-0.09	0.03	-0.25**	
Step 2												
Gender	0.01	0.07	0.08	0.30	0.15	0.07	0.13*	0.30	-0.01	0.13	0.00	0.24
Age	0.00	0.01	-0.02		0.00	0.00	0.02		0.00	0.01	-0.03	
Number of CC	-0.02	0.02	-0.07		-0.02	0.01	-0.08		-0.04	0.03	-0.12	
Depression	0.00	0.01	0.02		0.00	0.00	-0.01		0.00	0.01	0.03	
Balance confidence	0.01	0.00	0.31**		0.01	0.00	0.37**		0.01	0.00	0.18*	
Mobility capacity	-0.05	0.01	-0.27**		-0.03	0.01	-0.22**		-0.08	0.02	-0.31**	
Step 3												
Gender	0.10	0.08	0.08	0.30	0.16	0.07	0.15*	0.30	-0.02	0.14	-0.01	0.24
Age	0.00	0.01	-0.02		0.00	0.01	0.01		0.00	0.01	-0.03	
Number of CC	-0.02	0.02	-0.08		-0.01	0.02	-0.09		-0.04	0.03	-0.12	
Depression	0.00	0.01	0.01		0.00	0.00	-0.04		0.00	0.01	0.03	
Balance confidence	0.01	0.00	0.31**		0.01	0.00	0.37**		0.01	0.00	0.18*	
Mobility capacity	-0.05	0.01	-0.27**		-0.04	0.01	-0.22**		-0.08	0.02	-0.31**	
Social support	0.00	0.02	-0.02		-0.02	0.02	-0.07		0.00	0.03	0.02	

* $p < 0.05$; ** $p < 0.01$.

of the social role variance. Interestingly, in addition to the effect of mobility and balance confidence, sex was a significant factor in the daily activities model but not in the social roles one. Its positive coefficient suggests that women accomplishment in daily activities is higher than men.

Discussion

The results indicate that balance confidence and mobility capacity, categorised under personal factors according to the DCP model, explained a considerable portion of total participation, participation in daily activities and participation in social roles. These findings are consistent with other studies indicating that, in general, personal factors predict social participation [8,34]. Moreover, our findings indicate that these factors better explain daily activities (30%)

than social roles (24%). It seems plausible that carrying out social roles is not always dependent on physical characteristics. For instance, maintaining friendships does not necessarily rely on physical ability. These subtle differences between predictors of social roles and daily activities requires further study especially given that balance confidence was shown to be a stronger predictor of daily activities, and mobility a stronger predictor of social roles.

Interestingly, sex played a significant role in explaining daily activities. In the LIFE-H, daily activities include categories such as *nutrition* (selecting food and preparing meals) and *housing* (cleaning, home maintenance and household tasks) among others. It is plausible that women tend to participate more in these traditional daily activities which they might consider or value as their role [35].

Although we expected that personal and environmental factors would explain level of participation

based on the DCP model, our findings indicate that only personal factors were related to the older adults physical (mobility) and mental (balance confidence) abilities explained participation, not environmental factors (social support) or the other mental personal factors (depression). One explanation for this finding may be that environmental characteristics have a greater impact on participation for people with more severe disabilities [16,36]. The results indicate our sample was characterised by low levels of depression symptoms, and low level of risk for falling (TUG < 15 in 90% of the sample) and high level of participation accomplishment. These characteristics suggest our sample had minimal disability and minimal level of participation restriction. Given that, it is possible that social support would play a less significant role for this study group. It could also be that specific life habit categories (i.e. interpersonal relations) would be more sensitive to the level of one's social support than to total participation in general, and social roles in particular.

Not only did this study explore one aspect of the environment (social support), but it also considered the potential influence of an environmental facilitator as opposed to an environmental barrier. Rochette et al. [15] claim that perceived barriers in the environment are associated with participation restriction whereas facilitators are not. As such, future studies might consider measuring environmental factors such as the built environment and institutional environment (resources funded by the government, policy and rights) while focussing on barriers in the environment as well as controlling for level of disability [16]. Finally, although emotional distress/depression has been found to be the most important predictor of participation restriction for people with chronic conditions [8], it is somewhat surprising that it did not explain participation in this study. It could be however, that one's mental function would have greater impact on participation for people with more severe disabilities.

Interestingly, the regression analysis indicates that aside from the fact that age and number of chronic conditions have a small contribution to the regression in step 1, entering the personal factor in step 2 overshadowed their effect and eventually their contribution to the final regression model was not statistically important. This finding is consistent with another study which shows that the client's functional level is more important when considering participation than just his/her number of chronic conditions and demographic variables [8].

The limitations of this study include the use of a convenience sample suggesting that results might not be representative of the whole population. In addition, using 'shelf-talkers' as a method of recruitment, although novel, may be limited as it attracts

participants that have a certain level of community mobility. However, the sample did have a similar distribution of chronic health conditions to a representative sample of the Canadian population [37]. The findings herein are applied to the population of elderly persons experiencing minor disability and living at home in the community. However, this population is an important group to study because of their potential transition to frailer states. Intervention at this stage can play a critical role in delaying if not transforming this transition. One final limitation is the use of a cross-sectional study design. This method implies that results are not causal in nature. Future studies might consider using longitudinal or a semi-experimental/experimental design (such as pre-post) to examine the effect of health care professionals' intervention on participation and well-being amongst the elderly living with and without disability. Studies which aim to effect participation might address self-efficacy issues such as balance confidence and mobility in their action plan as these factors found to be influential in this study.

In conclusion, our findings indicate that personal factors related to mobility and balance confidence were the only factors that had a significant contribution to participation. Clinically, these findings suggest that health care professionals might address the issue of their clients' mobility by modifying the physical environment in general and its accessibility in particular. Further studies are warranted to clarify how additional factors influence participation and how participation influences well being in various levels of disability.

Acknowledgements

We acknowledge operating funds from the Canadian Institutes of Health Research (CIHR), the British Columbia Medical Services Foundation and salary support from CIHR (to Drs. Eng and Miller) and Michael Smith Foundation of Health Research (to Dr. Eng). Dana Anaby supported by a Strategic Training Fellowship in Rehabilitation Research from the Canadian Institute of Health Research Musculoskeletal and Arthritis Institute.

References

1. WHO. International classification of functioning, disability and health; 2001.
2. AOTA. Occupational therapy practice framework: domain and process. *Am J Occupat Ther* 2002;56:609-639.
3. Edward D, Christiansen C. Occupational development. In: Christiansen C, Baum CM, editors. *Occupational therapy: Performance, participation and well-being*. NJ: Slack; 2005. pp 42-63.
4. Sachs D, Josman N. The activity card sort: a factor analysis. *OTJR: Occup Participation Health* 2003;23:165-174.

5. Barnea RN, Waserlauf L, Burtz S, Yakoe I, Gal-On L, Peleg S, Grinbaum S, Jarus T. The development of the Israeli adult assessment of participation. *Isr J Occup Ther* 2005;15: H93–H111.
6. Freysinger VJ, Alessio H, Mehdizadeh S. Re-examining the morale-physical health-activity relationship: a longitudinal study of time changes and gender differences. *Activities Adaptation Aging* 1993;17:25–41.
7. Law M. Participation in the occupations of everyday life. *Am J Occup Ther* 2002;56:640–649.
8. Cardol M, Jong BA, Bos G, Beelen A, Groot IJM, Haan RJ. Beyond disability: perceived participation in people with a chronic disabling condition. *Clin Rehabil* 2002;16:27–35.
9. Desrosiers J, Noreau L, Rochette A, Bourbonnais D, Bravo G, Bourget A. Predictors of long-term participation after stroke. *Disabil Rehabil* 2006;28:221–229.
10. Desrosiers J, Noreau L, Rochette A, Bravo G, Boutin C. Predictors of handicap situations following post-stroke rehabilitation. *Disabil Rehabil* 2002;24:774–785.
11. Fougeyrollas P, Noreau L, Bergeron H, Cloutier R, Dion SA, St-Michel G. Social consequences of long term impairments and disabilities: conceptual approach and assessment of handicap. *Int J Rehabil Res* 1998;21:127–141.
12. Fougeyrollas P, Noreau L, Boschen K. Interaction of environment with individual characteristics and social participation: theoretical perspective and applications in persons with spinal cord injury. *Top Spinal Cord Inj Rehabil* 2002; 7:1–16.
13. Cardol M, Haan RJ, Jong BA, Boc GAM, Groot IGM. Psychometric properties of the impact on participation and autonomy questionnaire. *Arch Phys Med Rehabil* 2001; 82:210–216.
14. Pang MYC, Eng JJ, Miller WC. Determinants of satisfaction with community reintegration in older adults with chronic stroke: role of balance self-efficacy. *Phys Ther* 2007;87: 282–291.
15. Rochette A, Desrosiers J, Noreau L. Association between personal and environmental factors and the occurrence of handicap situations following a stroke. *Disabil Rehabil* 2001; 23:559–569.
16. Noreau L, Fougeyrollas P, Boschen KA. Perceived influence of the environment on social participation among individuals with spinal cord injury. *Top Spinal Cord Inj Rehabil* 2002; 7:56–72.
17. Tombaugh TN, McIntyre NJ. The mini-mental-state-examination – a comprehensive review. *J Am Geriatr Soc* 1992; 40:922–935.
18. Noreau L, Fougeyrollas P, Vincent C. The LIFE-H: assessment of the quality of social participation. *Technol Disabil* 2002;14:113–118.
19. Noreau L, Desrosiers J, Robichaud L, Fougeyrollas P, Rochette A, Viscogliosi C. Measuring social participation: reliability of the LIFE-H in older adults with disabilities. *Disabil Rehabil* 2004;26:346–352.
20. Desrosiers J, Noreau L, Robichaud L, Fougeyrollas P, Rochette A, Viscogliosi C. Validity of the assessment of life habits in older adults. *J Rehabil Med* 2004;36:177–182.
21. Heitzman CA, Kaplan RM. Assessment of methods for measuring social support. *Health Psychol* 1988;7:75–109.
22. Cohen S, Mermelstein R, Kamarck T, Hoberman HN. Measuring the functional components of social support. In: Sarason I, Sarason B, editors. *Social support: theory, research, and applications*. Nijhoff: Martinus; 1987. pp 73–94.
23. Whitney JC, Lord SR, Close J. Streamlining assessment and intervention in a falls clinic using the timed up and go test and physiological profile assessments. *Age Ageing* 2005 11;34: 567–571.
24. Lin M, Hwang H, Hu M, Wu HI, Wang Y, Huang F. Psychometric comparisons of the timed up and go, one-leg stand, functional reach, and tinetti balance measures in community-dwelling older people. *J Am Geriatr Soc* 2004; 52:1343–1348.
25. HersHKovitz A, Brill S. Get up and go – home. *Aging Clin Exp Res* 2006;18:301–306.
26. Ng SS, Hui-Chan CW. The timed up & go test: its reliability and association with lower-limb impairments and locomotor capacities in people with chronic stroke. *Arch Phys Med Rehabil* 2005;86:1641–1647.
27. Myers AM, Fletcher PC, Myers AH, Sherk W. Discriminative and evaluative properties of the activities-specific balance confidence (ABC) scale. *J Gerontol A Biol Sci Med Sci* 1998; 53:M287–M294.
28. Powell LE, Myers AM. The activities-specific balance confidence (abc) scale. *J Gerontol A Biol Sci Med Sci* 1995; 50:M28–M34.
29. Hann D, Winter K, Jacobsen P. Measurement of depressive symptoms in cancer patients: evaluation of the center for epidemiological studies depression scale (CES-D). *J Psychosom Res* 1999;46:437–443.
30. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1977;1:385–401.
31. Domholdt E. *Physical therapy research: principles and applications*. 2nd ed. Philadelphia: Saunders, 2000. 522 p.
32. Stevens J. *Applied multivariate statistics for the social sciences*. 4th ed. Mahwah, NJ: Lawrence Erlbaum Associates, 2002. 699 p.
33. Erdfelder E, Faul F, Buchner A. GPOWER: a general power analysis program. *Behavior Res Methods Instruments Computers* 1996;28:1–11.
34. Desrosiers J, Noreau L, Rochette A, Bourbonnais D, Bravo G, Bourget A. Predictors of long-term participation after stroke. *Disabil Rehabil* 2006;28:221–230.
35. Desrosiers J, Noreau L, Rochette A. Social participation of older adults in Quebec. *Aging Clin Exp Res* 2004;16:406–412.
36. Noreau L, Fougeyrollas P, Post M, Asano M. Participation after spinal cord injury: the evolution of conceptualization and measurement. *J Neurol Phys Ther* 2005;29:147–156.
37. Rockwood K, Howlett SE, MacKnight C, Beattie BL, Bergman H, Hebert R, Hogan DB, Wolfson C, McDowell I. Prevalence, attributes, and outcomes of fitness and frailty in community-dwelling older adults: report from the Canadian study of health and aging. *J Gerontol A Biol Sci Med Sci* 2004;59:1310–1317.