Physical performance and sense of autonomy in outdoor activities were associated with life-space mobility in community-dwelling older people

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Running head: Physical performance, autonomy and life-space

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ABSTRACT

Objectives. We studied the relationship between physical performance and sense of autonomy in outdoor activities with life-space mobility in community-dwelling older people. Life-space mobility - the spatial area a person purposefully moves through in daily life - reflects a person's actual mobility and correlates with quality of life in older people. Life-space mobility may depend on a person's physical capabilities but also his/her psychosocial situation e.g. the perception of control over one's life (sense of autonomy).

Design. Cross-sectional analyses of baseline data of the "Life-space mobility in old age" cohort study

Setting. Structured interviews in participants' home.

Participants. Community-dwelling older people aged 75-90 years (N=848).

Measurements. Sense of autonomy outdoors (subscale of Impact on Participation and Autonomy questionnaire), life-space mobility (Life-Space Assessment; University of Alabama, Birmingham Study of Aging), and short physical performance battery.

Results. The median score for life-space mobility was 64.0. In linear regression models, poorer physical performance and more limited sense of autonomy were independently associated with more restrictions in life-space mobility; explaining about one third of the variation in life-space mobility. Physical performance also had an indirect effect on life-space mobility through sense of autonomy outdoors. Subgroup analyses of 5-year age-groups and gender revealed that the associations were somewhat stronger in women and the oldest age-group.

Conclusion. Physical performance and sense of autonomy in outdoor activities explained a substantial portion of the variation in life-space mobility in relatively healthy older people. Thus physical and psychosocial aspects play a role in maintaining mobility in old age.

Key words: Mobility limitation, participation, physical functioning, activity, aging

INTRODUCTION

Mobility in its broadest sense includes weight bearing movements as well as use of a vehicle. Life-space mobility refers to the size of the spatial area (bedroom, home, outside home, neighborhood, town, distant locations) a person purposely moves through in daily life and to the frequency of travel within a specific time and the need for assistance for that travel.[1] Thus, it reflects the actual performance of mobility activities in daily life. When the demands of the environment exceed the capabilities of a person, actual performance of the activity is likely to be reduced (avoidance behavior).[2-4] If a person is able to compensate for a deficit [5,6], e.g. by using assistive devices or personal assistance, the life-space area and the frequency of travel may be maintained. Adapting compensatory strategies reflects decreased capability or pre-clinical disability, but at the same time such adaptations may post-pone changes in the frequency or distance of mobility patterns [7,8]

In older people, restrictions in perceived participation have been reported most frequently for outdoor mobility.[9] Outdoor activities are activities that that take place outside of the home, they may occur in the near vicinity or over a larger life-space area. Sense of autonomy in outdoor activities is optimal when a person perceives full control over the decision making of where, when and how to go outdoors.[9,10] In this paper, sense of autonomy refers to sense of autonomy in outdoor activities as assessed with the autonomy outdoors subscale of the Impact on Participation and Autonomy scale. Available resources (e.g. transportation, social support) may compensate for functional deficits, while barriers in the physical or psychosocial environment may limit sense of autonomy even in persons with good physical functioning.[11,12] The need for assistive devices or personal assistance in activities may compromise a person's sense of autonomy, although it does not necessarily exclude it.[10,12]

Physical ability, measured objectively by balance and walking tasks, is a component of life-space mobility.[1,13,14] Physical performance and sense of autonomy are related to each other [10,15], but do not overlap completely, nor does the absence of one discount the possibility of the other. The relationship between life-space mobility and sense of autonomy has, to our knowledge, not been studied before. Other psychosocial factors, such as depressive symptoms, have been shown to be associated with life-space mobility.[1,13,14] Intuitively, a more limited sense of autonomy would be expected to coincide with more restrictions in life-space mobility. Restrictions in life-space mobility refer to moving through smaller life-space areas, lowering frequencies of travel and/or increased need for assistance in the travels. However, a person may travel long distances without having complete control over when and where they travel, for example when being taken to a medical appointment. Studying the combination of physical performance and sense of autonomy in outdoor activities may provide insight in mechanisms underlying restrictions in life-space mobility in older people.

With increasing age, the functioning of multiple body systems declines, gradually or as a result of catastrophic events (e.g. illnesses or injuries), leading to higher prevalence of functional limitation.[16] Higher age and female gender have been associated with more restrictions in life-space mobility.[1,13,14] This association may be explained partly by age- and gender differences reported in determinants of life-space mobility, such as physical and cognitive function [1,13,14,17] and availability of resources, such as availability and use of a car.[18,19] Limitations in sense of autonomy are more prevalent in women and older age-groups.[9] It is unclear whether age and gender affect only the levels of functioning or whether age and gender also affect the associations between physical performance, sense of autonomy, and life-space mobility. In addition, it is possible that with increasing age, different aspects of physical performance become more important for life-space mobility.

Our aim was to determine whether the short physical performance battery (SPPB), and its subscales, and sense of autonomy in outdoor activities have an independent relationship with life-space mobility in community-dwelling older men and women. We hypothesized that sense of autonomy partly depends on physical performance, but that life-space mobility depends both on physical performance as well as sense of autonomy. We also hypothesized that these associations may differ according to age and gender. Indicators of health and function, transportation, depressive symptoms and education were taken into account as potential confounders.

METHODS

Study design and recruitment

These are cross-sectional analyses of baseline data of the “Life-space mobility in old age” (LISPE) cohort study in community-dwelling, 75-90-years-old people, living in the municipalities of Muurame and Jyväskylä in central Finland. The study methods, including non-respondent analyses, have been published previously.[20] In summary, a random sample of 2 550 was drawn from the population register. These persons were informed with a letter about the study, after which they were interviewed by phone to determine eligibility. Those living independently, able to communicate, residing in the recruitment area and willing to participate were considered eligible for participation in the study. Baseline data (N=848) were collected during an interview in participant homes using computer-assisted personal interviewing. Participants signed an informed consent form at the start of the face-to-face interview. LISPE was approved by the Ethical Committee of the University of Jyväskylä, Finland.

Measures

Life-space mobility was measured with the 15-item University of Alabama at Birmingham Study of Aging Life-Space Assessment.[1] For each life-space level (bedroom, other rooms, outside home, neighborhood, town, beyond town), participants were asked how many days a week they attained that level during the preceding 4 weeks and whether they needed help from another person or from assistive devices. The following measures were calculated: 1) Independent life-space, indicating the highest level of life-space attained without help from any devices or persons (range 0-5), and 2) Life-space mobility, a composite score which reflects distance, frequency and independence of movement (range 0-120). For both measures, higher scores indicate a larger life-space.

Lower-limb **physical performance** was objectively assessed by the Short Physical Performance Battery (SPPB).[21] The battery comprises three tests that assess standing balance, walking speed over 2.44 meters, and timed chair rises (five times). Each task is rated from 0 to 4 points according to established age- and gender-specific cut-off points.[21,22] A sum score was calculated (range 0-12) when at least two tests were completed. Higher scores indicate better performance.

The Impact on Participation and Autonomy questionnaire [23,24] is a validated questionnaire designed to assess perceived autonomy and participation in various clinical and older populations. For this study, only the domain "**autonomy outdoors**" was used. Participants were asked to rate perceived chances in 1) visiting relatives and friends, 2) making trips and traveling, 3) spending leisure time, 4) meeting other people, and 5) living life the way they want. The response categories ranged from 0 (very good) to 4 (very poor). A sum score for sense of autonomy in outdoor activities was calculated (range 0-20); higher scores indicate more limitations.

Confounders

The demographic variables **age** and **gender** were derived from the national register. All other variables were obtained using self-report questionnaires. Participants were asked to report their total number of years of **education**. Type of **neighborhood** (urban vs. rural) and **housing** (apartment block, row house, and semi-detached or detached house) were determined based on observation by the interviewers. The frequency of use of different transportation modes was assessed. Participants were categorized based on frequent use (at least few times a month) of the following transportation modes 1) car driving, 2) car passenger, 3) public transportation, or 4) other (e.g. taxi or Special Transportation Service).

Self-reported **number of chronic diseases** was calculated from a list of 22 physician diagnosed chronic diseases (asthma, COPD, chronic bronchitis, myocardial infarction, coronary heart disease, heart failure, hypertension, stroke, thrombosis, rheumatic arthritis, osteoarthritis, chronic back pain or problems, chronic neck pain or problems, cataract (not surgically repaired), glaucoma, macular degeneration, hearing disorders, diabetes mellitus, malignant cancer, Parkinson's disease, Alzheimer or dementia, depression or other psychiatric disorder) and an additional open-ended question about any other physician diagnosed chronic conditions. The relevance of diseases reported in the open question was checked by a physician. Perceived **difficulty in walking 2 km** (no/some/a great deal of difficulty/unable) was assessed, reflecting the abilities of a person in relation to the environment he or she moves through. **Depressive symptoms** were assessed with the 20-item self-report Centre for Epidemiologic studies Depression Scale (range 0-60, higher scores indicate more depressive symptoms).

Statistical analyses

Participants with missing SPPB scores (n=9; due to temporary medical condition, wheel chair use, severely impaired sight, lack of suitable chair or unwillingness to cooperate) were excluded from the analysis. Analyses were performed first for all participants, then separately for men and women, and for 5-year age-groups. Group differences were tested with Mann-Whitney U, Kruskal-Wallis, and Chi^2-tests. Spearman correlation coefficients (rs) were calculated for relationships between life-space measures, SPPB and sense of autonomy outdoors, and potential confounders. To simultaneously study the strength and direction of associations of the factors influencing life-space mobility as well as their interrelations, we constructed a path analysis model[25] using the LISREL 8.72 program (Scientific Software International, Inc, Lincolnwood, IL). To study the effect of confounding variables crude and adjusted linear regression analyses were used to explain the variation in life-space mobility. SPPB (model 1) and sense of autonomy (model 2) scores were included in the models, separately and combined (model 3). Covariates (except for neighborhood and type of housing due to no or very week correlation ($r_s \leq .10$) with main dependent and independent variables) were entered into combined models one at a time to provide insight in underlying mechanisms. Only crude (model 1-3) and fully adjusted (model 4) models are shown. Additionally, supplementary analyses (crude regression models) were conducted for SPPB subscales, separately and combined with sense of autonomy. IBM SPSS Statistics 20 was used for statistical analyses, and statistical significance was set at $P<.05$. Participant characteristics are depicted with medians and interquartile ranges (IQR).

RESULTS

Participant characteristics

The median score life-space mobility score was 64 (on a scale of 0 to 120), median SPPB score was 10 (on a scale of 0 to 12) and median sense of autonomy was 6 (on a scale of 0-20). Sixty-two percent of the sample was women. The median age was 80.4 years (IQR 7.4) and the number of chronic diseases 4.0 (IQR 3.0). Table 1 shows the participant characteristics by gender and 5-year age-groups. Women (80.8 (IQR 7.8) years) were somewhat older than men (76.6 (IQR 6.7) years; p=.003). Women and those in the oldest age-group, had poorer health and functioning, less education, and drove a car less frequently.

Correlational analyses

Poorer physical performance was associated with more limited sense of autonomy (rs=-.34; Table 2). Poorer physical performance (rs=.43 and rs=.43) and more limited sense of autonomy (rs=-.44 and rs=-.41) were associated with more restrictions in life-space mobility and a smaller independent life-space area, respectively. Correlation coefficients were somewhat higher in women and the oldest age-group compared to men and younger age-groups. Additionally, those with an independent life-space area that was restricted to the neighborhood level had significantly poorer SPPB scores (8.0 (IQR 4.0), vs. 11.0 (IQR 3.0)) and more limited sense of autonomy (8.0 (IQR 5.0), vs. 5.0 (IQR 4.0)) than those whose life-space mobility extended to the town level or beyond (Figure 1).

The constructed path analysis model was saturated and fitted the data perfectly (Figure 2) confirming our hypothesis on the dependence of life-space mobility on physical performance and sense of autonomy, and the dependence of sense of autonomy on physical performance.

SPPB and sense of autonomy, explained 32% of the variation in life-space mobility. Poorer SPPB scores (β=.49 (SE=.03)) and more limited sense of autonomy (β=-.31 (SE=.03)) were directly associated with more restrictions in life-space mobility. In addition, poorer SPPB scores were associated with more limited sense of autonomy (β=-.40 (SE=.03)), through which they had an indirect association with restrictions in life-space mobility (β=-.12 (SE=.02)).

The linear regression models provided parallel results about the associations between SPPB scores, sense of autonomy and life-space mobility (Table 3). In the regression model, all associations remained statistically significant after adjustment for age, gender and other covariates. The fully adjusted model (model 4) explained 51% of the variation in life-space mobility. The supplementary analyses showed that the SPPB scores in all subscales significantly explained the variation in life-space mobility (β=.19-25 p<.001).

Subgroup analyses based on age and gender

The linear regression models for the subgroups revealed results parallel to those comprising the total sample. SPPB and sense of autonomy, separately and combined, significantly explained the variation in life-space mobility (Table 3). SPPB remained highly significant in the fully adjusted models (p<0.001). The contribution of sense of autonomy to the variation in life-space mobility became non-significant in the youngest (75-79 years-old; p=.116), while it remained statistically significant in men (p=.022), women (p=.003) and the older age-groups (80-84 years-old, p=.039; and 85+ years-old, p=.001). This attenuation was not due to a single variable, as the association remained significant in the models including one covariate at a time.

The supplementary analyses showed that in the age- and gender-based subgroups (except in women), the SPPB subscales did not equally contribute to the variation in life-space mobility. In men, the SPPB-chair test contributed less to the variation in life-space mobility (β=.14 p=.022 vs. β=.20 and β=.24 p<.001 for walking and balance, respectively); this association became non-significant when sense of autonomy was included in the model. Similarly, in the youngest age-group, the SPPB-balance test result contributed less to the variation in life-space mobility (β=.13 p=.014 vs. β=.17 p=.003 and β=.25 p<.001 for walking and chair rise, respectively); this association became non-significant when sense of autonomy was included in the model. In the middle age-group, the SPPB-walking test contributed most to the variation in life-space mobility (β=.25 p<.001 vs. β=.17 p=.009 and β=.16 p=.018 for balance and chair rise, respectively); this association remained significant also when sense of autonomy was added. In the oldest age-group, the SPPB-balance test contributed most to the variation in life-space mobility (β=.31 p<.001 vs. β=.16 p=.064 and β=.21 p=.008 for walking and chair rise, respectively); this association remained significant in the model including sense of autonomy. The SPPB-walking test did not explain the variation in life-space mobility in either model.

DISCUSSION

In older people, physical performance and sense of autonomy in outdoor activities together explained about one third of the variation in life-space mobility. Physical performance had a direct as well as an indirect effect, through sense of autonomy, on life-space mobility. Sense of autonomy also had an independent effect on life-space mobility. When adjusting for other variables, sense of autonomy explained less of the variation in life-space mobility, especially in men and the youngest age-group. Furthermore, it seemed that the relative importance of both physical performance and sense of autonomy increased for life-space mobility in the older age-groups and in women, among whom functional impairments or adverse health conditions become more prevalent. Potentially, compensation strategies enabling mobility and sense of autonomy fail with increasing age and the accumulation of functional impairments.

Life-space mobility assesses the area through which a person moves irrespective of the mode of transportation.[1] Moving though a larger life-space area is likely to create greater reliance on other modes of transportation than walking.[18] However, physical performance is relevant also in this context as the ability to walk safely is a pre-requisite to getting outdoors independently [26] and to being able to drive a car or use public transportation. In concordance with previous studies, lower-limb physical performance, as measured with the SPPB, was associated with life-space mobility.[1,13,14] In contrast to a previous study [14], in our study gait speed did not have the strongest relationship with life-space mobility; the contribution of the SPPB subscales differed across gender and age-group. Differences in SPPB score variability in the gender and age-groups may partly explain this phenomenon. However, it is possible that with increasing age, different aspects of physical performance become more important for life space mobility.

The questionnaire on sense of autonomy in outdoor activities includes common social activities.[10] These activities may occur in the near vicinity of the home or further away. Whether a person perceives autonomy in these situations depends on individual as well as environmental characteristics.[9,10] We found that more limited sense of autonomy in outdoor activities was associated with more restrictions in life-space mobility. In accordance with previous literature, only part of the variation in sense of autonomy was explained by the differences in physical performance.[10,15] In our study, the association between sense of autonomy and life-space mobility was weaker in men and the youngest age-group. In these groups, the variation in the sense of autonomy scores was limited; in general, showing greater sense of autonomy. The more frequent car use in younger persons and men, particularly as driver, may play a role. Owning a car and being able to drive increases objective and subjective participation and sense of autonomy in older people,[19] and is associated with a larger life-space area.[18] In our models, adjustment for frequent car use did not eliminate the relationships found. In concordance with previous literature, life-space mobility, SPPB score and sense of autonomy declined with increasing age.[1,9,13,14] Adjusting for age in the regression models, did not materially change the associations between physical performance, sense of autonomy and life-space mobility. However, we found that the associations were slightly stronger in the oldest age-group.

Our participants were rather well-functioning community-dwelling older people. Intuitively, the relationships should be stronger if more frail older people were included. Consequently, our results may underestimate the associations; however, this should be studied in the future. Potentially, a more demanding test for physical function and/or a more discriminative assessment for sense of autonomy could have increased the variability among our study participants. Our study had sufficient power to do sub-group analyses and multivariate regression analyses. In addition, a strength of our study was the high data quality with very few missing responses due to computer-assisted personal interviewing in the participant's home.

Conclusions

Being able to go outdoors is an important factor in maintaining physical and mental health as well as for quality of life and well-being in community-dwelling older people.[1,17,27-30] Restrictions in life-space mobility probably coincides with giving up valued activities (e.g. participating in out-of-home activities, including visiting friends and accessing community amenities). With increasing age, older people spend more time in and around their own home. It is important to obtain insight into the mechanisms underlying restrictions in life-space mobility. This study shows that physical as well as psychosocial aspects are important to maintain life-space mobility in relatively healthy older people. Furthermore it seemed that the relative importance of physical performance and sense of autonomy in outdoor activities increased when more functional limitations become prevalent. Further study is needed to confirm the relationships found also in populations of more frail older people. In addition, longitudinal studies are needed to determine the cause and effect relationships between these factors.

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Conflict of Interest Disclosures:

Elements of Financial/Personal Conflicts	*Author 1 EP		Author 2 MR		Author 3 TMM		Author 4 AV		Author 5 TR	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		X		X		X		X		X
Grants/Funds		X		X		X		X		X
Honoraria		X		X		X		X		X
Speaker Forum		X		X		X		X		X
Consultant		X		X		X		X		X
Stocks		X		X		X		X		X
Royalties		X		X		X		X		X

Expert Testimony		x		x		x		x		x
Board Member		x		x		x		x		x
Patents		x		x		x		x		x
Personal Relationship		x		x		x		x		x

Author Contributions: involved in concept and design of the study (EP, MR, TMM, AV, and TR), data acquisition (EP, MR, AV, and TR), analyses and interpretation of data (EP), drafting the manuscript (EP), critically revising the manuscript (MR, TMM, AV, and TR). All authors have read and approved of the submitted manuscript.

Sponsor's Role: The sponsors had no involvement in the design, analyses and reporting of the results.

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GRAPHICS

Figure 1. Median (interquartile range) short physical performance battery (range 0-12) and sense of autonomy (range 0-20) scores in groups of maximal independent life-space.

Figure 2. The path analyses model explaining the variation in life-space mobility. In the model, short physical performance battery (SPPB) and sense of autonomy significantly explained the variation in life-space mobility. In addition, SPPB affected life-space mobility also indirectly through sense of autonomy. Arrows indicate significant associations and their directions between variables. Numbers show the maximum likelihood estimates of the path coefficients for direct associations, standard errors are given in parenthesis. In addition, an indirect association (β=-.40 (SE=.03); not shown) was found for physical performance through sense of autonomy on life-space mobility. Coefficients are significant if they are greater than two times the standard errors. Coefficient of determination (R^2) values indicate the amount of variation in the dependent variables explained by the other variables. The model was saturated and fitted the data perfectly (Chi-Square P=1.00).

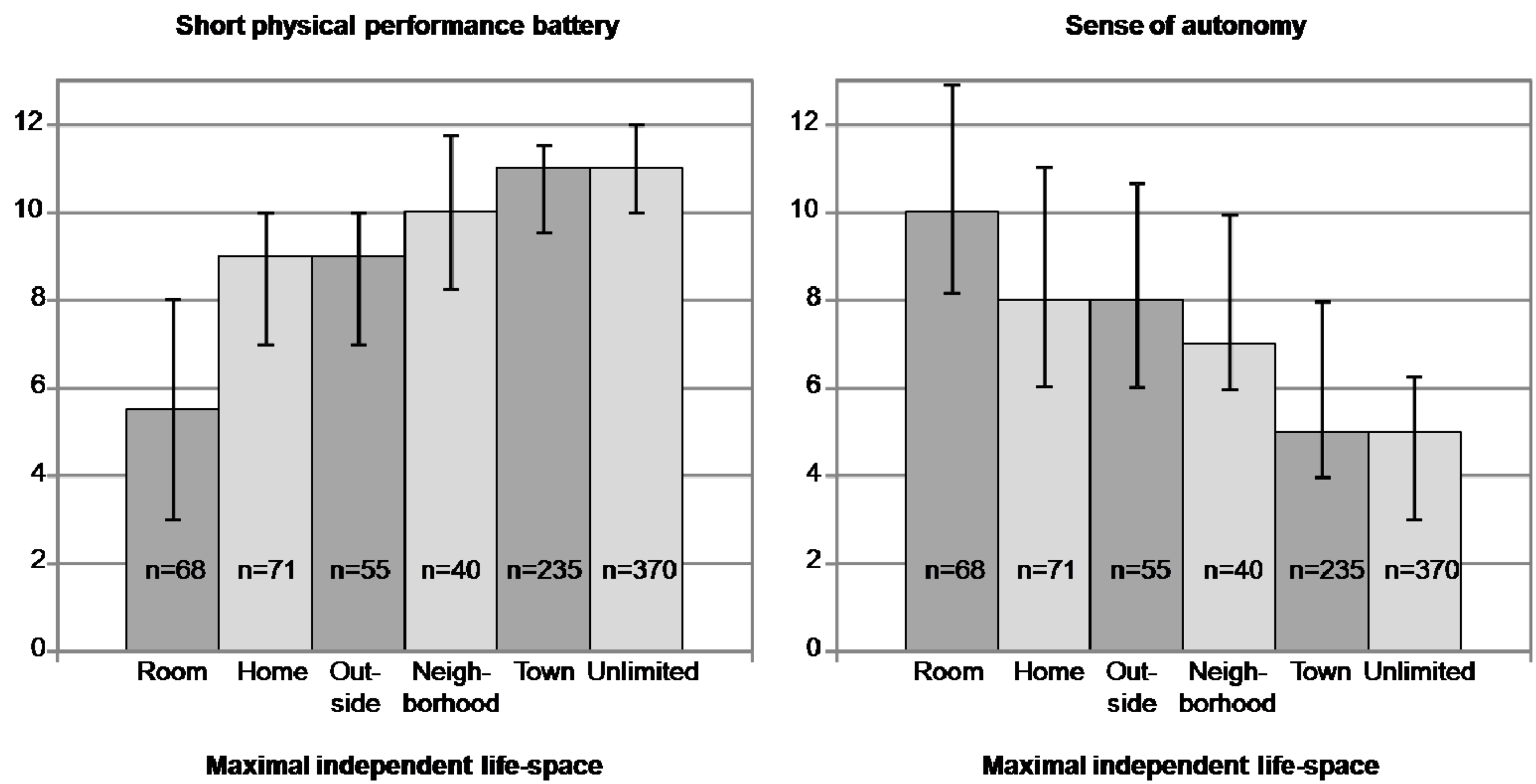
Short physical performance battery
Sense of autonomy
0
2
4
6
8
10
12
n=68
n=71
n=55
n=40
n=235
n=370
Room
Home
Out-side
Neigh-borhood
Town
Unlimited
Maximal independent life-space

Figure 1

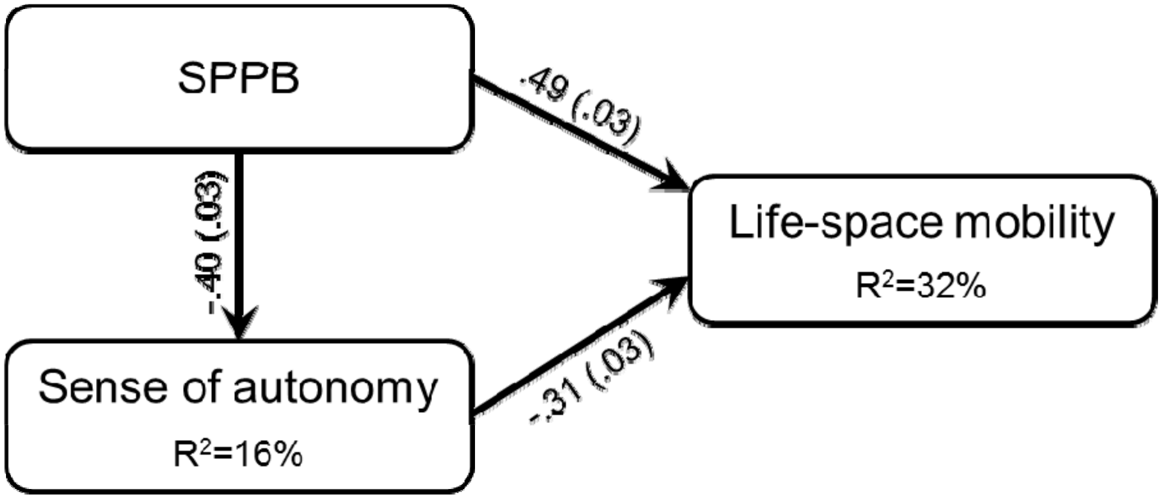
SPPB
Life-space mobility
R2=32%
Sense of autonomy
R2=16%
.49 (.03)
-.40 (.03)
-.31 (.03)

Figure 2

Table 1. Median (interquartile range) or percentage (n) of participant characteristics by gender and age-group.

		Men (n=318)	**Women** (n=521)	P	**75-79 yrs** (n=354)	**80-84 yrs** (n=281)	**85-89 yrs** (n=204)	P
Chronic diseases (n)		4.0 (3.0)	4.0 (3.0)	<.001*	4.0 (3.0)	4.0 (3.0)	5.0 (3.0)	<.001†
Centre for Epidemiologic studies Depression Scale (p) (range 0-60)		8.0 (9.0)	9.0 (10)	<.001*	8.0 (8.3)	9.0 (10.0)	10.5 (9.0)	<.001†
Education (yrs)		9.0 (5.0)	8.0 (5.0)	.004*	10.0 (4.0)	8.0 (5.0)	7.0 (4.0)	<.001†
Life-space mobility (p) (range 0-120)		72.0 (26.0)	60.0 (28.3)	<.001*	74.0 (24.0)	64.0 (27.0)	54.0 (26.0)	<.001†
SPBB (p) (range 0-12)		10.0 (3.0)	10.0 (3.0)	.148*	11.0 (3.0)	10.0 (4.0)	10.0 (3.0)	.013†
Sense of autonomy (p) (range 0-20)		5.0 (3.0)	6.0 (5.0)	.005*	5.0 (4.0)	6.0 (4.0)	7.0 (5.0)	<.001†
Transportation	Driver	77 (244)	19 (99)	<.001‡	52 (185)	40 (113)	22 (45)	<.001‡
	Passenger	17 (54)	62 (325)		38 (135)	47 (131)	55 (113)	
	Public transport	3 (10)	8 (42)		6 (21)	5 (15)	8 (16)	
	Other	3 (10)	11 (55)		4 (13)	8 (22)	15 (30)	

Difficulty 2km walk	No	68 (217)	52 (273)	<.001‡	73 (259)	54 (152)	39 (79)	<.001‡
	Some	18 (56)	23 (119)		17 (60)	25 (70)	22 (45)	
	Great deal	7 (22)	8 (42)		4 (15)	10 (28)	10 (21)	
	Unable	8 (23)	17 (87)		6 (20)	11 (31)	29 (59)	
Maximal independent life-space	Neighborhood or less	17 (53)	35 (181)	<.001‡	14 (49)	30 (85)	49 (100)	<.001‡
	Town or unlimited	83 (265)	65 (340)		86 (305)	70 (196)	51 (104)	
SPPB-Balance	0-1p	7 (21)	10 (50)	.019‡	4 (15)	9 (24)	16 (32)	<.001‡
	2p	4 (13)	4 (23)		3 (11)	6 (18)	3 (7)	
	3p	9 (28)	16 (81)		8 (29)	15 (43)	18 (37)	
	4p	81 (256)	70 (367)		85 (299)	69 (196)	63 (128)	
SPPB-Walking	0-1p	3 (11)	4 (23)	.923‡	2 (8)	5 (13)	6 (12)	.180‡
	2p	11 (36)	10 (52)		10 (35)	10 (28)	12 (25)	
	3p	20 (65)	19 (100)		20 (71)	18 (50)	22 (44)	
	4p	65 (206)	67 (345)		68 (240)	68 (190)	60 (121)	
SPPB-Chair	0-1p	19 (59)	20 (104)	.455‡	18 (63)	20 (57)	26 (53)	.174‡
	2p	18 (57)	19 (101)		19 (66)	20 (55)	18 (37)	

3p	28 (90)	29 (153)	32 (114)	28 (79)	25 (50)
4p	35 (112)	29 (152)	31 (111)	32 (89)	31 (64)

NOTE: SPPB=Short Physical Performance Battery; * Mann Whitney U test; † Kruskal-Wallis test; ‡ χ^2-test

Table 2. Spearman correlation coefficients between short physical performance battery (SPPB), sense of autonomy and life-space by gender and age-group.

	Gender-specific		Age-specific		
	Men	Women	75-79 years	80-84 years	85-89 years
Autonomy*SPPB	-.27	-.39	-.22	-.34	-.49
Life-space mobility* Autonomy	-.32	-.49	-.29	-.43	-.50
Life-space mobility*SPPB	.33	.50	.37	.41	.54
Life-space mobility*SPPB-Balance	.28	.41	.23	.35	.48
Life-space mobility*SPPB-Walking	.28	.45	.26	.40	.47
Life-space mobility*SPPB-Chair	.26	.41	.35	.34	.44
Independent life-space*Autonomy	-.33	-.43	-.27	-.35	-.49
Independent life-space*SPPB	.29	.50	.33	.43	.54

NOTE: p<0.001

Table 3. Crude and fully adjusted linear regression models explaining life-space mobility with short physical performance battery (SPPB) and/or sense of autonomy.

	Model 1			Model 2			Model 3			Model 4*		
	R^2	Beta	P	R^2	Beta	P	R^2	Beta	P	R^2	Beta	P
All	.24		<.001	.22		<.001	.32		<.001	.51		<.001
SPPB		.49	<.001		-	-		.36	<.001		.22	<.001
Autonomy		-	-		-.47	<.001		-.31	<.001		-.12	<.001
Men	.18		<.001	.14		<.001	.24		<.001	.42		<.001
SPPB		.43	<.001		-	-		.35	<.001		.21	<.001
Autonomy		-	-		-.38	<.001		-.25	<.001		-.12	.022
Women	.28		<.001	.26		<.001	.36		<.001	.52		<.001
SPPB		.53	<.001		-	-		.39	<.001		.24	<.001
Autonomy		-	-		-.51	<.001		-.33	<.001		-.12	.003
75-79 years	.18		<.001	.10		<.001	.21		<.001	.35		<.001
SPPB		.42	<.001		-	-		.36	<.001		.22	<.001
Autonomy		-	-		-.32	<.001		-.20	<.001		-.08	.116
80-84 years	.22		<.001	.19		<.001	.29		<.001	.49		<.001
SPPB		.47	<.001		-	-		.36	<.001		.22	<.001
Autonomy		-	-		-.44	<.001		-.30	<.001		-.12	.039
85-89 years	.30		<.001	.29		<.001	.38		<.001	.57		<.001
SPPB		.55	<.001		-	-		.39	<.001		.27	<.001

Autonomy	-	-	-.54	<.001	.33	<.001	-.23	.001

*Adjusted for age, gender, number of chronic diseases, difficulty 2km walk, transportation, depressive symptoms, and years of education

Supplementary material

Table. Crude linear regression models explaining life-space mobility with short physical performance battery (SPPB) subscales and/or sense of autonomy.

	Model 1			Model 2		
	R^2	Beta	P	R^2	Beta	P
All	.25		<.001	.33		<.001
SPPB-balance		.25	<.001		.19	<.001
SPPB-walking		.18	<.001		.14	<.001
SPPB-chair		.19	<.001		.13	<.001
Autonomy		-	-		-.31	<.001
Men	.21		<.001	.26		<.001
SPPB-balance		.24	<.001		.20	<.001
SPPB-walking		.20	.001		.17	.005
SPPB-chair		.14	.022		.11	.069
Autonomy		-	-		-.24	<.001
Women	.29		<.001	.38		<.001
SPPB-balance		.21	<.001		.16	<.001
SPPB-walking		.23	<.001		.19	<.001
SPPB-chair		.21	<.001		.13	.004
Autonomy		-	-		-.32	<.001
75-79 yrs	.18		<.001	.21		<.001

SPPB-balance		.13	.014		.10	.050
SPPB-walking		.17	.003		.15	.009
SPPB-chair		.25	<.001		.22	<.001
Autonomy		-	-		-.20	<.001
80-84 yrs	.22		<.001	.30		<.001
SPPB-balance		.17	.009		.12	.060
SPPB-walking		.25	<.001		.21	.002
SPPB-chair		.16	.018		.12	.067
Autonomy		-	-		-.29	<.001
85-89 yrs	.34		<.001	.42		<.001
SPPB-balance		.31	<.001		.27	<.001
SPPB-walking		.16	.064		.13	.118
SPPB-chair		.21	.008		.08	.309
Autonomy		-	-		-.34	<.001