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Validity of a single question to assess habitual physical activity of community-dwelling older people

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Short running head: Single question on habitual physical activity

Validity of a single question to assess habitual physical activity of community-dwelling older people

The aim is to determine concurrent validity of a single self-report habitual physical activity (PA) question against accelerometer-based PA and mobility variables, and corresponding changes in self-reported PA and mobility. Cross-sectional and longitudinal data of the "Life-space mobility in old age" (LISPE) cohort and its substudy on PA were utilized. At baseline 848 community-dwelling, 75-90-years-old people living independently in central Finland participated in home-based interviews. One and two years later, 816 and 761 of them were reassessed by phone, respectively. Tri-axial accelerometer data over seven days was collected following the baseline assessments in a subsample of 174. Self-reported habitual PA was assessed based on intensity and duration using a single question with seven response options (range: mostly resting – competitive sports). Mobility variables were: life-space mobility, walking difficulty over 500m, and short physical performance battery. Statistically significant correlations were found between self-reported habitual PA and mobility (Spearman correlation coefficient Rs=0.40-0.61) and accelerometer-based PA variables (step counts (Rs=0.49), time in moderate (Rs=0.49) and low intensity (Rs=0.40) PA, and time in sedentary behavior (Rs=-0.28)). A decline in self-reported habitual PA over time was associated with 5-10p decline in life-space mobility (PA improvement with 0–3p increase) and with developing a higher degree of walking difficulty (in 35-44% of participants). In conclusion, based on these results, the self-report question to assess habitual PA is valid and responsive to change and thus useful for epidemiological research in community-dwelling older people, also in follow-up studies.

Key words: Physical exercise, mobility limitation, aging, behavior, survey, psychometric properties

Introduction

The importance of physical activity (PA) for maintaining health and function into old age is widely known. Walking, both for leisure and errands, is one of the most common forms of physical exercise among older people (Barnett et al., 2014;Davis et al., 2011). Higher PA has also been associated with greater life-space mobility, higher lower-limb physical performance and less mobility difficulty (Miller et al., 2000;Pahor et al., 2014;Tsai et al., 2015). Tools that assess habitual PA in older populations should not only include physical exercise, but also lower intensity activities, such as walking and housework activities (Grimby, 1986;Schrack et al., 2016). In the last decade, PA has been frequently assessed using objective means such as accelerometers (ACC-PA) (Kowalski et al., 2012;Matthews et al., 2012;Schrack et al., 2016). But in large surveys there is still a need for simple self-report measures of PA (SR-PA) that are validated (Grimby et al., 2015;Kowalski et al., 2012). Objectively measuring PA requires specific tools and is rather time consuming, as it requires at least four days of data collection to reflect variation in activities (Kowalski et al., 2012;Matthews et al., 2012;Schrack et al., 2016). In addition, activities such as cycling and skiing are not captured with most PA monitors (Kowalski et al., 2012).

In 1986, Grimby developed a single-item self-report question to assess PA related to leisure time, work (including housework activities) and carrying out daily activities. The scale was based on a scale by Saltin and Grimby (1968), which was adapted to make it more suitable for assessing habitual PA at the lower end of the spectrum, and thus for assessment in older people. Activities were graded against heart rate (Mattiasson-Nilo et al., 1990). The Grimby scale was translated into Finnish and further developed (Table 1), and it has been frequently used in research among older people (e.g. Aijo et al., 2002;Portegijs et al., 2007;Rantanen et al., 1997;Rasinaho et al., 2012). Considering current advancements in PA research, there is a need to validate the scale against more direct measures of PA, that is, ACC-PA (Grimby et al., 2015).

Previously, responses of the Finnish version of the SR-PA scale have often been categorized using two cut-off points, for which predictive validity has been established (Aijo et al., 2016;Laukkanen et al., 1998;Portegijs et al., 2007). Reporting moderate PA ≥4h/week or strenuous PA, which is in line with current PA recommendations for health of older people (American College of Sports Medicine et al., 2009), was associated with a reduced mortality

risk in a 10-year follow-up (Portegijs et al., 2007). Older people reporting at most light SR-PA had a higher mortality risk over 5-18 years of follow-up then those engaging in at least moderate physical activity for about 3 hours a week (Aijo et al., 2002;Aijo et al., 2016). This is in line with previous studies showing that even low intensity PA may provide some health benefits (Buman et al. 2010). Using the resulting 3-category variable, higher SR-PA was associated with better health and functional ability five years later (Laukkanen et al., 1998). Longitudinal studies have shown increases in SR-PA over time due to a PA counseling intervention (Rasinaho et al., 2012), and demonstrated that SR-PA declines were associated with declines in muscle strength and mortality (Aijo et al., 2016;Rantanen et al., 1997). However, it is unknown whether changes in SR-PA coincide with changes in mobility and whether the cut-off point affects this relationship.

The aim of this study was 1) to determine concurrent validity of the SR-PA scale against ACC-PA and mobility variables, 2) to determine its responsiveness to change, that is, corresponding changes in other mobility variables, and 3) to compare categorization cut-off points previously used. Life-space mobility, short physical performance battery and walking difficulty over 500m were used as mobility variables.

Methods

Cross-sectional and longitudinal data of the “Life-space mobility in old age (LISPE)” cohort and its substudy on PA were analyzed. Study methods were published before (Rantanen et al., 2012). Community-dwelling 75-90-years-old people living independently in the recruitment area in central Finland, who were able to communicate and willing to participate were eligible for the study. At baseline (N=848), one (N=816) and two (N=761) years later participants were interviewed. By then, 15 participants had moved to institutional care facilities, 41 had died, 12 were excluded due to communication problems and 6 due to a move outside of the study area. Poor health (n=5), unwillingness to participate (n=6) and being out of reach (n=2) were reasons for non-response (Rantakokko et al., 2015). A subsample of 190, wore a tri-axial accelerometer for seven days following the baseline assessments. Technical problems (n=4), <4 valid accelerometer days (n=11) and >1 days in-between consecutive measurement days (n=1) led to exclusion of data, thus leaving 174 participants for the analyses (Tsai et al., 2015). Valid days included ≥10 hours of

accelerometer wear time (Matthews et al., 2012). Prior to data collection, participants signed a written informed consent. LISPE was approved by the Ethical Committee of the University of Jyväskylä.

Habitual SR-PA was assessed using a single question with seven response options combining frequency and intensity of common physical activities (Table 1). This scale is easy and quick to use, and it also rates housework. Participants were asked to choose the description that best pictured their PA over the last six months. Modifications to the original Grimby (1986) scale were: separation of sitting and light physical activities (category 1 and 2), replacement of the term 'light physical exercise' with 'moderate physical activity' in category 3 and 4 to more clearly cover e.g. housework-related activities, and category 6 'competitive sports' instead of 'hard or very hard exercise'. Participants were categorized into three groups (**PA3**): 1) at most light SR-PA (category 0-2), 2) moderate SR-PA (category 3), and 3) regular SR-PA (category 4-6). Subsequently, two sets of dichotomous variables were created and tested against each other: category 0-2 versus 3-6 and category 0-3 versus 4-6. Pearson correlation coefficients (r=0.634 for men and r=0.655 for women) (Rantanen et al., 1997) and Kendall's tau-(b=0.874) (Rasinaho et al., 2012) demonstrate fair test-retest reliability.

ACC-PA was obtained using an accelerometer (Hookie, tri-axial, "AM20 Activity Meter", Hookie Technologies Ltd, Espoo, Finland) that was worn on the right hip for seven consecutive days following baseline assessments. The protocol and variables (based on default thresholds and formulas supplied by the manufacturer) have been described previously (Tsai et al., 2015). Activities were identified based on rhythmic accelerations and intensity (Parkka et al., 2007). ***Time in moderate intensity PA*** was calculated by summing time in walking (rhythmic moderate intensity), running (rhythmic higher intensity) and other activities (without rhythm moderate to higher intensity). Additionally, ***time in low intensity PA*** (without rhythm low intensity), ***time in sedentary behavior*** (no activity detected for ≥5s), and ***step counts*** were identified. The total daily wear time of the accelerometer was calculated from a self-report diary in which participants registered the times when the accelerometer was put on and taken off as well as potential breaks. Missing accelerometer wear time values were imputed with the average wear time of that respective individual (if missing 1 or 2 days; n=15) or the group average of each day (if missing for all days; n=1), following visual inspection. Sensitivity analyses revealed no marked effect of the imputation.

In addition to absolute times in activities (low intensity PA, moderate intensity PA and sedentary behavior), for each individual, the proportion of time in each activity against accelerometer wear time was calculated for each valid day, and averaged to obtain daily values.

At baseline and both follow-ups, **life-space mobility** during the preceding four weeks was determined with the 15-item Life-Space Assessment with established validity and reliability (Baker et al., 2003;Portegijs et al., 2014a). For each life-space level (bedroom, other rooms, outside home, neighborhood, town, beyond), participants were asked how many days a week they attained that level and whether they needed help from another person or assistive devices. A composite score reflecting the distance, frequency and assistance was calculated (range 0-120); higher scores indicate greater mobility. At baseline and both follow-ups, **walking difficulty** was assessed by a single question on experienced difficulty in walking 500m (Manty et al., 2007), and categorized as 1) able to walk without any difficulty, 2) able to walk with difficulty (some or a great deal), and 3) inability to walk (with or without help of another person). At baseline only, the **Short Physical Performance Battery** was used to assess standing balance, walking speed over 2.44 meters, and timed chair rises (five times). Each task was rated according to established age- and gender-specific cut-off points (Guralnik et al., 1994;Mänty et al., 2007), and a sum score was calculated (range 0-12) when at least two tests were completed (n=839) (Portegijs et al., 2014b). Higher scores indicate better performance.

Age and **sex** were derived from the national register. The **number of self-reported chronic conditions** was calculated from a list of 22 physician diagnosed chronic diseases and an additional open-ended question (Rantanen et al., 2012). **Cognitive impairment** was assessed with the Mini-Mental State Examination (range 0-30, higher scores indicating better performance). **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

Baseline group differences according to PAlight, PAregular, and PA3 in descriptive and mobility variables were tested with Mann Whitney U, Kruskal Wallis tests and Chi-square

tests. Group differences for ACC-PA variables were tested with Generalized Linear models using log link transformation (for step counts, absolute and proportional time in low and moderate intensity PA) and identity link models (for absolute and proportional time in sedentary behavior). Analyses including absolute times in activities were adjusted for accelerometer wear time. Spearman rank correlation coefficients (Rs) were calculated for SR-PA and ACC-PA, mobility and descriptive variables.

Categorized variables of ACC-PA were used to calculate percentages of agreement with PA3. For each ACC-PA variable, quintiles were computed and used to construct *separate variables* (reflecting the grouping of participants in PA3): quintile 1 (lowest PA, or highest sedentary time) vs. quintile 2-3 vs. quintile 4-5 (highest PA, or lowest sedentary time). Percentages of agreement and Kappa statistics were calculated for PAlight and PAregular and their corresponding dichotomized variable of ACC-PA.

Changes over time in PA3 (decline, no change, and increase) and walking difficulty (more difficulty, no change, and less difficulty) were determined, and changes in life-space mobility (continuous scale with negative values indicating declines) were calculated by subtracting the baseline from the follow-up score. Group differences in changes in life-space mobility (repeated measure ANOVA) and walking difficulty (Chi-square tests) according to the categories of change in PA3 over one and two years were tested. These analyses were repeated and stratified according to PA3 at baseline. Statistical analyses were performed using SPSS 22.0 (IBM SPSS Inc.).

Results

Table 2 shows that participants reporting at most light SR-PA were statistically significantly older than those reporting moderate or regular SR-PA and a greater proportion of them was female. Those reporting at most light SR-PA also had poorer health and mobility. Significant correlations were found between SR-PA and all descriptive (range Rs=0.11-0.30) and mobility (range Rs=0.40-0.61) variables.

ACC-PA and SR-PA

Lower SR-PA was significantly associated with lower step counts, lower times in low and moderate intensity PA (absolute and proportional) and higher times in sedentary behavior (absolute and proportional) (Table 3, Supplementary Table A). Significant correlations were found between SR-PA and ACC-PA variables, with the strongest correlations (Rs=0.47-0.49) found for step counts, absolute and proportional time in moderate intensity PA and proportional sedentary time.

At most light vs. moderate or regular SR-PA

Descriptive (Table 2) and ACC-PA (Table 3, Supplementary Table A) variables were significantly different between those reporting at most light SR-PA and those reporting moderate or regular SR-PA. The agreement between PAlight and categorized variables for step counts, absolute and proportional time spent in moderate intensity PA was moderate (Kappa>0.5, p<.001), and rather poor (<0.35, p≤.014) for absolute and proportional time spent in low intensity PA and sedentary behavior (Supplementary Table B and C).

At most light or moderate vs. regular SR-PA

Descriptive (Table 2) and ACC-PA (Table 3, Supplementary Table A) variables differed significantly between those reporting at most light or moderate SR-PA and those reporting regular SR-PA. Agreement between ACC-PA variables and PAregular was rather poor (kappa<0.37, p≤.006) (Supplementary Table B and C).

SR-PA change over time

Overall, declines in SR-PA were associated with 5-10-point declines in life-space mobility. Increases in SR-PA over time were associated with no change or marginally increased life-space mobility scores on average (0-3 points). Greater declines in life-space mobility score were found among those reporting a decline from moderate to at most light SR-PA than among those with a decline from regular to moderate SR-PA (Figure 1). Only in the first year of follow-up, an increase from at most light to moderate SR-PA was associated with an average improvement of nearly 5 points in life-space mobility.

Declines in SR-PA often coincided with the development of higher degrees of walking difficulty (Table 4). Among those with an improvement in SR-PA, the majority of

participants did not experience changes in walking difficulty, and increases and decreases in difficulty were reported equally.

Discussion

This study shows that the single question to assess habitual PA is a valid and useful self-report tool for epidemiological research in community-dwelling older people. Habitual SR-PA correlated with all variables of mobility and ACC-PA. Declines in SR-PA over time were associated with declines in life-space mobility and the development of a higher degree of walking difficulty. Importantly, this indicates that this single question is also responsive to change and thus also useful in follow-up studies.

Several types of self-report measures have been used in research of older people, including several one-item questionnaires. Times or numbers of days engaged in certain activities have been asked and also generic questions on perceived activity level or comparisons to PA of peers (e.g. response options good, fair, poor) have been used (Gill et al., 2012;Milton et al., 2011). Results of generic questions are difficult to interpret due to lacking link to PA intensity or frequency. The SR-PA scale used in this study describes several levels of habitual PA and combines both intensity and frequency of physical activities. Similar questions have been used in other studies as well (e.g. Stenholm et al., 2016), but they have also been criticized because of potential difficulty in interpretation (Altschuler et al., 2009), especially among older individuals with cognitive impairments. The current study shows that older people were able to choose a response category that adequately described the amount and intensity of their PA. Participant reported SR-PA correlated moderately with ACC-PA variables and mobility, indicating that the scale is relevant and valid for assessing habitual PA in a relatively well-functioning group of community-dwelling older people.

Currently it is recognized that even light PA provides important health benefits when compared to sedentary behavior (Buman et al. 2010), while more strenuous PA is needed to attain optimal health (American College of Sports Medicine et al., 2009). Most PA guidelines recommend older people to engage in moderate intensity PA for at least 30 min a day, which translates to a cut-off point between moderate (category 3) and regular SR-PA (category 4-6) on the scale. However, based on the results of this study, the cut-off point between the

categories of at most light (category 0-2) and moderate SR-PA (category 3) generated higher agreement with ACC-PA. In addition, also declines in life-space mobility over time seemed to be more pronounced among participants simultaneously changing from moderate to at most light SR-PA, thus supporting the use of this cut-off point. Yet it should be noted that both cut-off points have previously been used to predicted adverse health outcomes in long-term follow-up studies (Aijo et al., 2002;Aijo et al., 2016;Portegijs et al., 2007).

Declines from moderate to at most light SR-PA over time were associated with evident declines in mobility. Between baseline and the first follow-up, SR-PA increases were associated with improvement in life-space mobility scores. Changes between at most light and moderate SR-PA may be due to more than one aspect in an older individual's life. Poor health, low PA and poor physical function often coincide in the same individual and they may reinforce each other, causing a vicious circle of declining health and function (Laukkanen et al., 1998;Miller et al., 2000;Rantanen et al., 1997). In contrast, declines from higher PA levels may be compensatory actions of older people trying to conserve their energy (Baltes and Baltes, 1990;Schrager et al., 2014) for essential activities, such as mobility activities. This may explain that declines from regular to moderate SR-PA were not necessarily associated with declines in mobility.

SR-PA questionnaires may underestimate sedentary time, while overestimating PA (Cerin et al., 2016;Schrack et al., 2016). In addition to personal (e.g. age, sex) and environmental factors (e.g. cultural setting) (Cerin et al., 2016) factors related to the assessments may have contributed to discrepancies between the ACC-PA and SR-PA measures. SR-PA was assessed for a six month period prior to the baseline assessment, while ACC-PA data was collected in the following week. In addition, ACC-PA variables were not conceptually similar to the response categories of the SR-PA question. No interaction effects for age or sex were found in this study (data not shown).

Data were derived from a large population-based study with few missing data. The majority of study participants represent a relatively well-functioning group of older people living independently. The PA assessment protocol using accelerometers was in accordance with current guidelines of wear times and numbers of days needed to account for daily variation in PA levels (Kowalski et al., 2012;Matthews et al., 2012;Schrack et al., 2016). There are concerns about the sensitivity of accelerometers to detect PA among those with poor mobility

and potential effects of intermittent patterns of PA among older people, when using standard algorithms to detect bouts of PA (Kowalski et al., 2012;Schrack et al., 2016). Therefore we decided not to identify bouts of activity, but to allow for PA accumulation throughout the day. Unfortunately, ACC-PA variables were available only at baseline. Responsiveness to change analyses of habitual SR-PA were based on validated self-report measures of mobility.

In conclusion, this study contributes to the evidence that this simple self-report question to assess habitual PA level is valid and responsive to change, and thus useful for epidemiological research in community-dwelling older people, including follow-up studies. The cut-off points previously used to categorize habitual SR-PA (at most light vs. moderate vs. regilar PA) seem justifiable, with the lower cut-off point more accurately reflecting differences between and changes within people.

Perspective

PA is increasingly assessed using objective PA monitors, but in large surveys there is still a need for simple self-report measures (Grimby et al., 2015;Kowalski et al., 2012). This single question describes several levels of habitual PA and combines intensity and frequency of physical activities. In December 2015, the Scandinavian Journal published a review on the Saltin-Grimby physical activity scale recommending validation studies (Grimby et al., 2015). In this study, we used a subsequently developed question specifically for older people and demonstrated its validity against accelerometers and responsiveness to change. This and other studies (Aijo et al., 2016;Laukkanen et al., 1998;Portegijs et al., 2007) showed the relevance of categorizing participants: 1) at most light housework/gardening and short walks (at most light SR-PA), 2) moderate PA 3h/week (moderate SR-PA), and 3) moderate PA ≥4h/week or strenuous PA (regular SR-PA). Using the higher cut-off point is in line with PA guidelines (e.g. American College of Sports Medicine et al., 2009), but in this study, the lower cut-off point between at most light and moderate SR-PA reflected differences between and changes within older people.

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Figure Legend

Figure 1. Mean change in life-space mobility score (± standard deviation) over one (a) and two (b) years of follow-up among participant categorized by change in self-reported physical activity (SR-PA) and stratified by baseline SR-PA (BL; N=752-804). Group*time interaction effects from repeated measures ANOVA test are indicated in the figure. Change in SR-PA was based on PA3 variable (at most light vs. moderate vs. regular SR-PA).

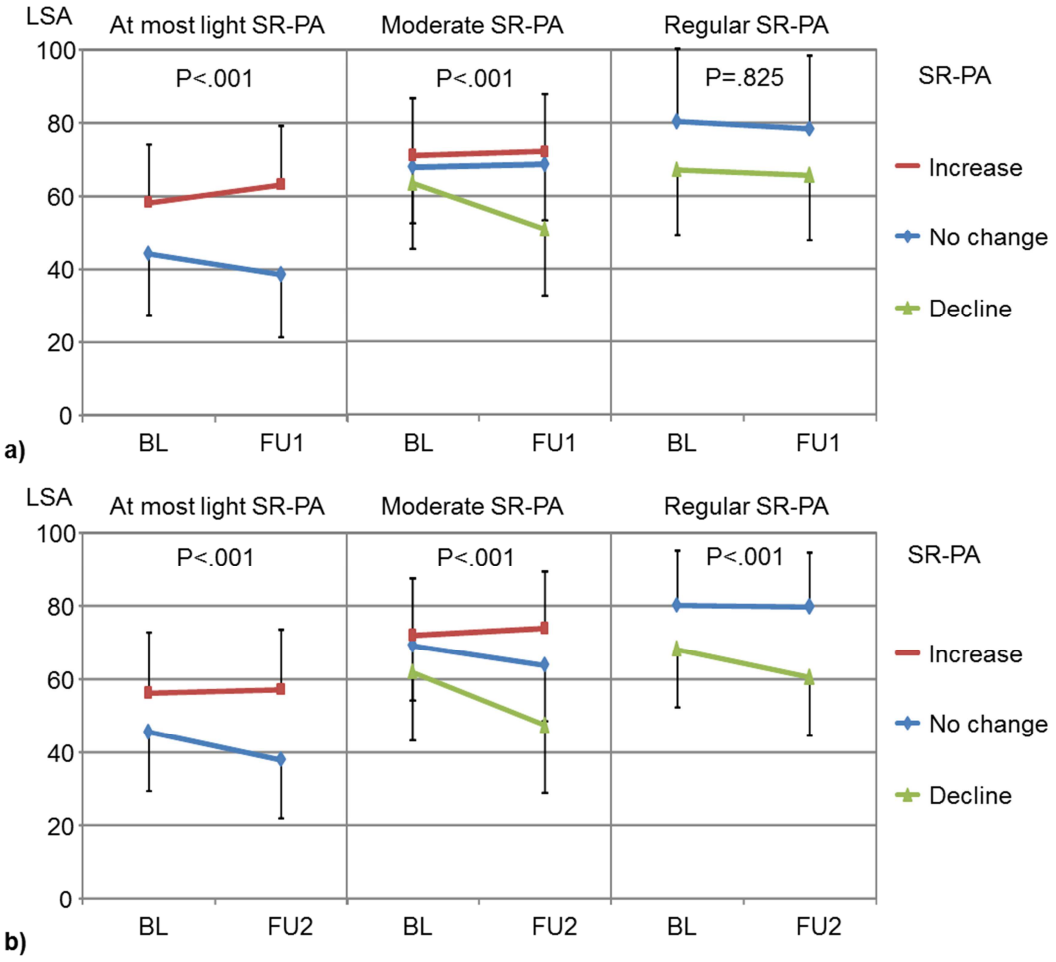

Table 1. The self-report scale assessing habitual physical activity and frequencies of responses in the full baseline sample (N=848) and in the physical activity subsample (N=174).

If you think about the past 6 months, which of the following descriptions best pictures your physical activity?	**Full % (n)**	**Sub-sample % (n)**
0. Mostly resting, hardly any activity.	0.1 (1)	0 (0)
1. Mostly sitting. You are usually doing things in a seated position, reading and watching TV. Your only physical activities relate to activities of daily living (grooming, dressing).	7.5 (64)	3.4 (6)
2. Light physical activity. You are doing light housework (e.g. preparing food, dusting) or light gardening or going for a walk two to three times a week.	28.4 (241)	19.0 (33)
3. Moderate physical activity about 3 hours a week. You are doing common housework (e.g. vacuum cleaning/ sweeping floors, lawn mowing) or going for longer walks (at least 2 km) or cycling.	29.8 (253)	40.8 (71)
4. Moderate physical activity at least 4 hours a week or heavier physical activity up to 4 hours a week (daily more than 30 minutes). You are doing moderate physical activities (see before) for at least 4 hours or physically exercise 1-2 hours a week or doing heavy gardening/ housework or home maintenance involving some breathlessness and sweating.	26.9 (228)	29.9 (52)
5. You are engaging in active sports several times a week, which makes you heavily sweat and breathless during the exercise or you are doing heavy gardening or leisure-time activities (at least 3 hours a week).	7.1 (60)	6.9 (12)
6. You are participating in competitive sports.	0.1 (1)	0 (0)

Horizontal lines represent cut-off points used for the PA3 variable.

Table 2. Baseline characteristics of participants reporting at most light, moderate or regular physical activity (SR-PA) and correlation coefficients (N=848).

	At most light SR-PA (n=306) Median (IQR)	Moderate SR-PA (n=253) Median (IQR)	Regular SR-PA (n=289) Median (IQR)	Group differences PA3 P [b]	1 vs. 2-3 P [c]	1-2 vs. 3 P [c]	Correlation [a] Rs	P
Age (yr)	82.5 (7.2)	80.0 (7.7)	78.7 (5.9)	<.001	<.001	<.001	-0.30	<.001
Chronic conditions (n)	5 (3)	4 (4)	3 (3)	<.001	<.001	<.001	-0.28	<.001
Mini-Mental State Examination (p)	26 (4)	27 (4)	27 (3)	.007	.020	.002	0.11	<.001
Centre for Epidemiologic studies Depression Scale (p)	11 (9)	8 (8)	7 (8)	<.001	<.001	<.001	-0.23	<.001
Short Physical Performance Battery (p)	9 (5)	11 (2)	11 (2)	<.001	<.001	<.001	0.40	<.001
Life-space mobility (p)	48 (26)	68 (32)	76 (26)	<.001	<.001	<.001	0.59	<.001
Female (%)	71.2	61.7	52.6	<.001	<.001	<.001	-0.16	<.001
No difficulty walking 500m (%)	18.6	73.5	86.2	<.001	<.001	<.001	-0.61	<.001
Difficulty walking 500m (%)	46.7	23.7	12.5	-	-	-	-	-
Inability walking 500m (%)	34.6	2.8	1.4	-	-	-	-	-

PA3= at most light vs. moderate vs. regular SR-PA, IQR=interquartile range

[a] Spearman Rank correlation coefficient with 7-category SR-PA variable, [b] Kruskal Wallis test, [c] Mann-Whitney U test, [d] Chi-square test

Table 3. Absolute accelerometer-based physical activity (PA) variables among participants reporting at most light, moderate or regular physical activity (SR-PA) (N=174).

	At most light SR-PA (n=39)		Moderate SR-PA (n=71)		Regular SR-PA (n=64)		Group differences [a] PA3	1 vs. 2-3	1-2 vs. 3	Correlation [b]	
	MM	95CI	MM	95CI	MM	95CI	P	P	P	Rs	P
Step count (n*1000)	0.8	0.6-1.1	3.0	2.4-3.7	3.9	3.1-4.8	<.001	<.001	<.001	0.49	<.001
Moderate intensity PA (min)	8.4	6.5-11.0	27.2	22.4-33.0	34.7	28.3-42.5	<.001	<.001	<.001	0.49	<.001
Low intensity PA (hr)	2.1	1.9-2.3	2.6	2.4-2.8	3.0	2.8-3.3	<.001	<.001	<.001	0.40	<.001
Sedentary behavior (hr)	11.3	11.0-11.6	10.5	10.2-10.7	10.1	9.9-10.4	<.001	<.001	<.001	-0.28	<.001

PA3= at most light vs. moderate vs. regular SR-PA, MM=marginal mean, 95%CI=95% confidence interval

[a] Generalized Linear Model analyses with log link transformation (sedentary behavior variables identity link) and adjusted for wear time, [b] Spearman Rank correlation coefficients with 7-category SR-PA variable

Table 4. Simultaneous change in self-reported physical activity (SR-PA) and walking difficulty over one or two years of follow-up (FU) for all participants (N=752-803), and participants stratified according to baseline (BL) SR-PA .

	BL – FU1				**BL – FU2**			
	Walking difficulty change				**Walking difficulty change**			
	More difficulty	No change	Less difficulty		More difficulty	No change	Less difficulty	
SR-PA change [a]	**% (n)**	**% (n)**	**% (n)**	**P** [b]	**% (n)**	**% (n)**	**% (n)**	**P** [b]
Overall				<.001				<.001
Decline	36 (49)	55 (74)	9 (12)		44 (59)	49 (66)	7 (9)	
No change	19 (85)	74 (332)	7 (29)		21 (88)	73 (300)	6 (23)	
Increase	18 (40)	68 (151)	14 (31)		20 (41)	66 (137)	14 (29)	
BL - At most light				.038				.002
No change	32 (60)	60 (111)	8 (15)		37 (58)	57 (90)	7 (11)	
Increase	23 (23)	60 (60)	17 (17)		25 (24)	54 (51)	21 (20)	
BL - Moderate				<.001				<.001
Decline	49 (22)	40 (18)	11 (5)		57 (25)	30 (13)	14 (6)	
No change	17 (12)	73 (51)	10 (7)		23 (15)	69 (45)	8 (5)	
Increase	14 (17)	75 (91)	12 (14)		15 (17)	77 (86)	8 (9)	
BL - Regular				<.001				<.001
Decline	30 (27)	62 (56)	8 (7)		38 (34)	59 (53)	3 (3)	
No change	7 (13)	90 (170)	4 (7)		8 (15)	88 (165)	4 (7)	

[a] Based on PA3 variable: at most light vs. moderate vs. regular SR-PA, [b] Chi-square tests

Supplementary tables

Table A. Proportional accelerometer-based physical activity (PA) variables among participants reporting at most light, moderate or regular physical activity (SR-PA) (N=174).

	At most light SR-PA (n=39)		Moderate SR-PA (n=71)		Regular SR-PA (n=64)		Group differences [a] PA3	1 vs. 2-3	1-2 vs. 3	Correlation [b]	
	MM	95CI	MM	95CI	MM	95CI	P	P	P	Rs	P
Moderate intensity PA (%)	1.1	0.8-1.4	3.3	2.7-3.9	4.2	3.4-5.1	<.001	<.001	<.001	0.49	<.001
Low intensity PA (%)	15.6	14.1-17.2	18.8	17.5-20.2	22.0	20.3-23.7	<.001	<.001	<.001	0.38	<.001
Sedentary behavior (%)	82.6	80.1-85.2	75.2	73.4-77.1	73.0	71.0-74.9	<.001	<.001	<.001	-0.47	<.001

PA3= at most light vs. moderate vs. regular SR-PA, MM=marginal mean, 95%CI=95% confidence interval

[a] Generalized Linear Model analyses with log link transformation (sedentary behavior variables identity link), [b] Spearman Rank correlation coefficients with 7-category SR-PA variable

Table B. Distribution-based comparison of self-reported physical activity (SR-PA) and categorized quintiles (Q) of absolute accelerometer-based physical activity (PA) variables (N=174).

		At most light SR-PA (n=39)	Moderate SR-PA (n=71)	Regular SR-PA (n=64)	Agreement PAlight [a]		Agreement PAregular [b]	
		% (n)	% (n)	% (n)	Kappa	P	Kappa	P
Step count	**Q1**	13.2 (23)	4.6 (8)	1.7 (3)	.53	<.001	.26	.001
	Q2-3	6.9 (12)	19.5 (34)	14.4 (25)				
	Q4-5	2.3 (4)	16.7 (29)	20.7 (36)				
Moderate intensity PA (min)	**Q1**	13.8 (24)	4.6 (8)	1.7 (3)	.55	<.001	.26	.001
	Q2-3	6.3 (11)	19.5 (34)	14.4 (25)				
	Q4-5	2.3 (4)	16.7 (29)	20.7 (36)				
Low intensity PA (hr)	**Q1**	8.6 (15)	6.9 (12)	1.1 (7)	.26	.001	.28	<.001
	Q2-3	9.8 (17)	19.5 (34)	14.9 (20)				
	Q4-5	4.0 (7)	14.4 (25)	20.7 (37)				
Sedentary behavior (hr)	**Q1**	7.5 (13)	6.9 (12)	4.0 (9)	.19	.014	.21	.006
	Q2-3	10.9 (19)	17.8 (31)	10.9 (21)				
	Q4-5	4.0 (7)	16.1 (28)	21.8 (34)				

[a] Agreement between dichotomized variables at most light vs. moderate or regular SR-PA

[b] Agreement between dichotomized variables at most light or moderate vs. regular SR-PA

Table C. Distribution-based comparison of self-reported physical activity (SR-PA) and categorized quintiles (Q) of proportional accelerometer-based physical activity (PA) variables (N=174).

		At most light SR-PA (n=39)	Moderate SR-PA (n=71)	Regular SR-PA (n=64)	Agreement PAlight [a]		Agreement PAregular [b]	
		% (n)	% (n)	% (n)	Kappa	P	Kappa	P
Moderate intensity PA (%)	**Q1**	13.8 (24)	4.6 (8)	1.1 (2)	.57	<.001	.25	.001
	Q2-3	6.3 (11)	19.0 (33)	14.9 (26)				
	Q4-5	2.3 (4)	17.2 (30)	20.7 (36)				
Low intensity PA (%)	**Q1**	8.6 (15)	7.5 (13)	4.0 (7)	.25	.001	.31	<.001
	Q2-3	8.6 (15)	20.7 (36)	11.5 (19)				
	Q4-5	5.2 (9)	12.6 (22)	21.3 (38)				
Sedentary behavior (%)	**Q1**	10.3 (18)	6.3 (11)	5.2 (6)	.35	<.001	.27	<.001
	Q2-3	10.3 (18)	17.2 (30)	12.1 (21)				
	Q4-5	1.7 (3)	17.2 (30)	19.5 (37)				

[a] Agreement between dichotomized variables at most light vs. moderate or regular SR-PA

[b] Agreement between dichotomized variables at most light or moderate vs. regular SR-PA