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Physical activity behaviour up to 1 year post-rehabilitation among adults with physical disabilities and/or chronic diseases: results of the prospective cohort study ReSpAct

Pim Brandenbarg ,[1,2] Femke Hoekstra ,[1,2,3] Leonie A Krops ,[2] Bregje L Seves ,[1] Florentina J Hettinga ,[4] Trynke Hoekstra ,[2,5] Rienk Dekker ,[2] Lucas H V van der Woude [1,2]

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For numbered affiliations see end of article.

Correspondence to
Pim Brandenbarg;
p.brandenbarg@umcg.nl

ABSTRACT

Background Little is known of physical activity behaviour among adults with a disability and/or chronic disease during and up to 1 year post-rehabilitation. We aimed to explore (1) dose characteristics of physical activity behaviour among adults with physical disabilities and/or chronic diseases during that period, and (2) the effects of personal characteristics and diagnosis on the development of physical activity over time.

Methods Adults with physical disabilities and/or chronic diseases (N=1256), enrolled in the Rehabilitation, Sports and Active lifestyle study, were followed with questionnaires: 3–6 weeks before (T0) and 14 (T1), 33 (T2) and 52 (T3) weeks after discharge from rehabilitation. Physical activity was assessed with the adapted version of the Short Questionnaire to ASsess Health enhancing physical activity. Dose characteristics of physical activity were descriptively analysed. Multilevel regression models were performed to assess physical activity over time and the effect of personal and diagnosis characteristics on physical activity over time.

Results Median total physical activity ranged from 1545 (IQR: 853–2453) at T0 to 1710 (IQR: 960–2730) at T3 min/week. Household (495–600 min/week) and light-intensity (900–998 min/week) activities accrued the most minutes. Analyses showed a significant increase in total physical activity moderate-intensity to vigorous-intensity physical activity and work/commuting physical activity for all time points (T1–T3) compared with baseline (T0). Diagnosis, age, sex and body mass index had a significant effect on baseline total physical activity.

Conclusion Physical activity is highly diverse among adults with physical disabilities and/or chronic diseases. Understanding this diversity in physical activity can help improve physical activity promotion activities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This is a large-scale prospective cohort study that gives a detailed overview of the different dose characteristics of physical activity behaviour in adults with physical disabilities and/or chronic diseases.
⇒ We measured physical activity with a self-reported questionnaire specifically designed for adults with disabilities giving detailed information on the different dose characteristics.
⇒ We included a large heterogeneous group of adults with physical disabilities and/or chronic diseases, which makes it more applicable to the general rehabilitation setting and population.
⇒ Potential sample selection bias may be present, since participants could only participate in the Rehabilitation, Sports and Active lifestyle cohort study if they received physical activity counselling support during their rehabilitation treatment.

INTRODUCTION

Regular physical activity (PA) has many benefits on cognitive, mental and physical health, fitness and quality of life, both for the general population as well as for adults with physical disabilities and/or chronic diseases.[1–4] Besides the direct health benefits for adults with physical disabilities/chronic diseases, being more physically active is also considered a secondary (reducing or preventing long-term effects of an established health problem/disease) and tertiary (reduce impact of an established health problem/disease by restoring function and reduce disease-related complications) prevention mechanism.[5 6] Despite these benefits, PA behaviour is suggested to be low among adults with physical disabilities/chronic diseases.[7–9]

The recently updated WHO guidelines for PA recommend that all adults, including those with physical disabilities and/or chronic diseases, should be physically active for at least 150–300 min of moderate intensity or 75–150 min of vigorous intensity per week or an equivalent combination, with

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the addition of muscle-strengthening activities of at least moderate intensity twice per week.[10 11] While these recommendations are formulated for adults with physical disabilities/chronic diseases, the development of the guidelines is mainly informed by evidence from studies in the general population.[11] As highlighted by the WHO PA Guidelines Development Group and the accompanying research agenda, there is a clear need for more research on PA among adults with physical disabilities/chronic diseases.[12 13]

Despite various calls for more research on PA in people with disabilities,[14–16] measuring and understanding dose–response relationships of the construct of PA in the context of a heterogeneous population with disabilities are not straightforward. PA is defined as 'any bodily movement produced by skeletal muscles that results in energy expenditure'.[17] It is by definition a multidimensional construct, with setting (eg, PA during leisure time, work), mode (eg, walking, bicycling), frequency (eg, times per week), duration (eg, in hours) and intensity (eg, low, moderate or vigorous) as its crucial constituents.[18 19] These dimensions could also be called the dose characteristics of PA, and are important to understand PA among different subgroups, as well as to study the dose–response relations of PA and health during and after rehabilitation. Furthermore, it could be an important aspect in tailored PA counselling, as more information on dose characteristics can lead to more focused PA recommendations. Only a few studies described details on multiple dose characteristics of PA in adults with physical disabilities/chronic diseases.[20–22] These studies either mainly concern validation of instruments that measure multiple dose characteristics, and not focused on describing the dose characteristics itself[20 22] or are of a cross-sectional nature in small diagnosis-specific populations.[21] Consequently, there is a need for large-scale prospective studies that take this multidimensionality of PA within and among adults with a diversity of disabilities/chronic diseases into account.

An important step to enhance our understanding of PA is to explore the effect of personal characteristics on the multidimensional construct PA behaviour. Adults with physical disabilities/chronic diseases are a heterogeneous group, both in PA behaviour[9] and personal and disease characteristics.[23] Personal characteristics, such as age and sex, are determinants for PA in the general population and specific diagnosis groups,[24–27] yet it is largely unknown how these characteristics influence the development of PA over time during and after a PA-promoting rehabilitation programme. As such, it is important to understand which dimensions of PA behaviour contribute to the dose of PA and how this is perceived in the context of personal characteristics or diagnoses. Such insights will help to understand PA behaviour over time, and will enable to individualise PA stimulation programmes.

The multicentre prospective cohort study 'Rehabilitation, Sports and Active lifestyle' (ReSpAct) offers a great opportunity to start addressing these knowledge gaps.[28 29] This study was built around the implementation of a PA behavioural intervention in Dutch rehabilitation care.[28 29] Uniquely, the ReSpAct Study includes data on self-reported PA behaviour and potential determinants in a large, diverse population of adults with physical disabilities/chronic diseases at four occasions: 3–6 weeks before discharge up to 1 year after discharge of rehabilitation.[28 29]

Using data from the ReSpAct study, the primary aim of this study was to explore the different dose characteristics of PA behaviour (duration, setting, intensity, mode and frequency) among a diverse group of adults with a physical disability and/or chronic disease at discharge from rehabilitation up to 1 year post-rehabilitation. The secondary aims were to explore the development of PA behaviour over time, and to analyse the effects of personal characteristics and diagnosis on PA behaviour and its development over time.

METHODS

Study overview

This study is part of prospective cohort study ReSpAct to evaluate the nationwide implemented Dutch rehabilitation programme Rehabilitation, Sport and Exercise (RSE, Dutch: 'Revalidatie, Sport en Bewegen').[28 29] RSE is an evidence-based PA counselling programme involving multiple counselling sessions based on motivational interviewing during and after rehabilitation to stimulate a physically active lifestyle in adults with physical disabilities/chronic diseases.[28–31] Participants, recruited between May 2013 and August 2015, were followed over time with a set of questionnaires: at baseline (T0: 3–6 weeks before discharge), and at 14 (T1), 33 (T2) and 52 (T3) weeks after discharge from rehabilitation.[28]

Patient and public involvement

Representatives of the Dutch community organisations Knowledge Centre for Sport Netherlands and Stichting Special Heroes (former: Stichting Onbeperkt Sportief) were involved as collaborators and consultants in the design and conduct of the ReSpAct study.[28 29] Rehabilitation professionals (counsellors, project leaders, physicians, managers) from the participating rehabilitation centres and hospitals were involved as consultants in the design and conduct of the ReSpAct study. We did not involve people with disabilities/chronic diseases as consultants/advisors/collaborators in the study. The current paper reports results from the primary outcome measure of the ReSpAct study (PA).

Study population

Inclusion criteria for this study were: (1) aged 18 years or older; (2) having a physical disability and/or chronic disease; (3) receiving inpatient, outpatient or consultancy rehabilitation treatment at one of the participating rehabilitation departments or institutes; (4) participating in the RSE programme; (5) data available on diagnosis; and (6) valid data available of the adapted version of the Short Questionnaire to ASsess Health enhancing physical

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activity (Adapted-SQUASH) at baseline and at least one follow-up measurement.

Participants were excluded if they (1) were unable to complete questionnaires, even with help; (2) participated in a PA programme other than RSE.

PA behaviour

Self-reported PA behaviour was measured using the Adapted-SQUASH, a 19-item recall questionnaire to assess PA among adults with disabilities based on an average week of the past month.[32] Participants had to fill out the number of days (frequency), average hours and minutes per day (duration) and the perceived intensity (intensity: light, moderate, vigorous) of different types of activities (mode: for example, walking, cycling, wheeling, gardening) that were prestructured in different settings: activities during commuting, activities at work and school, household activities and leisure time activities. The Adapted-SQUASH has a good reliability (intraclass correlation coefficient (ICC)=0.67 and 0.76, for total activity score and total minutes of activity per week, respectively), and a validity comparable with other PA questionnaires when using accelerometer-derived PA (p=0.40 for total activity score and ICC=0.22 for total minutes of activity per week).[32]

Raw Adapted-SQUASH data were processed with a custom-created syntax (SPSS statistics V.26, IBM). Minutes of activity per week were calculated by multiplying frequency by duration. Intensity of activity was calculated by combining the perceived intensity of each activity with a corresponding metabolic equivalent of task (MET) value based on the Ainsworth compendium of PAs[33] and a compendium of energy costs of the PAs for wheelchair-dependent individuals[34] into light (<4 MET for people 18–65 years old, <3 MET for people older than 65 years), moderate (4–6.5 MET for people 18–65 years old, 3–6 MET for people older than 65 years) or vigorous intensity (>6.5 MET for people 18–65 years old, >6 MET for people older than 65 years).[32 35] Primary outcomes were total minutes of PA per week, minutes of PA per setting, minutes of PA per intensity and the frequency of PA modes.

Adapted-SQUASH data of a measurement occasion were deemed valid when no more than one of the prestructured settings was missing and the total minutes of PA per week was not higher than 6720 min (on average 16 hours/day).

Personal characteristics

Personal characteristics included age, sex, body mass index (BMI), marital status, current smoking habit, current alcohol usage, education level and work status. Current smoking habit was dichotomised into smoker and non-smoker. Current alcohol usage was categorised in no, light (1–3 or 1–2 drinks per week for males and females, respectively), moderate (4–20 or 3–13 drinks per week for males and females, respectively) and excessive (≥21 or ≥14 drinks per week for males and females, respectively).[8] Education level was dichotomised into high (applied university and higher) and low, to make it internationally comparable. Work status was categorised into school, employed, unemployed, retired, unable to work and other (eg, voluntary work). Personal characteristics were self-reported by participants, with the exception of age and sex, which were reported by the RSE counsellor.

Rehabilitation characteristics

Rehabilitation characteristics included diagnosis, rehabilitation context (hospital or rehabilitation centre), rehabilitation form (inpatient, outpatient or consultancy rehabilitation) and number of received counselling sessions from the RSE programme (0 sessions, 1–3 sessions, 4 or more sessions).

Different diagnoses were grouped according to diagnosis groups of the Dutch Diagnose-Treatment Combinations, a structure for the financial aspects of a hospital visit, which has roots in the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) structure: amputation (both upper and lower extremities), brain disease (eg, stroke, congenital brain diseases), chronic pain, musculoskeletal disease (eg, rheumatic conditions, conditions of upper, lower extremities and spine), neurological disease (eg, Parkinson's disease, multiple sclerosis), organ disease (eg, heart disease, chronic obstructive pulmonary disease), spinal cord injury and other (eg, chronic fatigue syndrome, medically unexplained symptoms).[36] Rehabilitation characteristics were reported by the RSE counsellor.

Statistical analysis

Descriptive information of the population and the dose characteristics of PA behaviour are shown in mean±SD or median (IQR) for continuous variables, and percentages for categorical variables. Differences of baseline characteristics between included and excluded participants were tested with independent t-test for continuous variables and Pearson X^2 test for categorical variables.

To evaluate the development of PA behaviour over time, we created six separate multilevel regression models with total minutes of PA per week (model 1), minutes of PA per week per setting (models 2–5) and minutes of moderate to vigorous PA (MVPA) per week (model 6) as dependent variables, and measurement occasions (categorical) as independent variable. Each model consisted of measurement occasion at level 1, participants at level 2 (random intercepts) and rehabilitation institutes as level 3 (random intercepts). Since we expected variation among participants in their PA behaviour over time, we added random slopes for measurement occasion on the level of participants. However, this resulted in non-converging (ie, unreliable) models, and subsequently removed from the models.

To explore the effects of personal characteristics and diagnosis on the development of PA behaviour over time, multilevel regressions models were created with measurement occasion, characteristic and an interaction term

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between measurement occasion and characteristic for each of the six dependent variables and for each characteristic separately. Evaluated characteristics were diagnosis (largest diagnosis in our data, that is, brain disease, as reference), age (continuous, in years), sex (male as reference), BMI (continuous, in kg/m^2), smoking (non-smoker as reference), alcohol use (no alcohol use as reference) and education level (low as reference).[24–27] Type III analysis of variance tests were used to assess significance of the overall interaction between measurement occasion and the characteristics. Since multilevel regression analyses are robust against missing data, this was not addressed.[37] All analyses were done with R and RStudio.[38] The lmerTest package was used for multilevel regression analysis.[39] Significance level was set at 0.05.

RESULTS

Study population

Table 1 shows baseline descriptors of included and excluded participants per measurement occasion. Of the 1719 participants in the ReSpAct cohort, 1256 participants were included in this study. The largest diagnosis groups were: brain disease (27.1%, n=341), musculoskeletal disorders (18.6%, n=234), chronic pain (15.8%, n=198) and neurological disease (15.0%, n=188). Excluded participants were younger (p<0.001), more often a smoker (p=0.04) and received less counselling sessions (p<0.001).

PA dose characteristics

Table 2 shows the PA dose characteristics (duration, setting, intensity, mode and frequency) at the four different measurement occasions.

Duration

Total duration of PA (min/week) varied over time and among participants, showing its lowest median value at discharge from rehabilitation (T0: 1545); followed by increased levels of 1770, 1830 and 1710 min/week at, respectively, T1, T2 and T3 (table 2).

Setting

Participants spent most PA time in household tasks (median range T0–T3: 495–600 min/week), followed by leisure time (median range T0–T3: 450–510 min/week). A large proportion of participants reported 0 min/week PA in work (range T0–T3: 52.6%–59.9%; largest IQR 0–1080 min/week) and commuting (range T0–T3: 70.4%–72.5%; largest IQR commuting 0–40 min/week) settings (table 2).

Intensity

Participants spent between T0 and T4 a median of 900–998 min/week in light-intensity PA, 120–180 min/week in moderate-intensity PA and 100–120 min/week in vigorous-intensity PA. In household tasks, most minutes were spent in light intensity (median range T0–T4: 480–540 min/week) and little to none in moderate and vigorous intensity (range T0–T4: 82.0%–87.6% 0 min/week and 100%–100% 0 min/week, respectively). Leisure time activities were predominantly in MVPA (median range T0–T4: 40–60 min/week light; 60–90 min/week moderate; and 90–120 min/week vigorous). Intensity of work activities was of light (range T0–T4: median 0–0, IQR 0–165 to 0–420) or moderate intensity (range T0–T4: median 0–0, IQR 0–0 to 0–60) and not of vigorous intensity (100% 0 min/week at all measurement occasions). Commuting activities were mostly spent in vigorous (range T0–T4: 16.1%–17.0% >0 min/week), followed by light (range T0–T4: 11.2%–12.3% >0 min/week) and moderate intensity (range T0–T4: 4.5%–6.6% >0 min/week) (table 2).

Mode and frequency

Walking is the most frequent mode of leisure time activities at all measurement occasions, with an average frequency ranging from 3.3±2.7 to 3.6±2.7 times/week. Bicycling is the second most frequent mode, with an average frequency ranging from 1.6±2.1 to 1.8±2.2 times/week. Gardening, odd jobs and fitness are frequented around 0.6 times/week (table 2).

PA behaviour over time

Figure 1 and online supplemental appendix 1 show the results of the multilevel regression models for PA behaviour over time. Compared with baseline (T0), there is a significant increase (p<0.001) in total minutes of PA per week over time for each of the three follow-up measurement occasions (increase: 218.6 (95% CI 142.9 to 294.3), 242.2 (95% CI 162.6 to 321.7) and 153.8 (95% CI 70.9 to 236.6) min/week at, respectively, T1, T2 and T3). Time spent in the settings work and commuting significantly increased at follow-up occasions (all p<0.05). With the exception of one occasion, leisure time (T1, p<0.01) and household tasks (T2, p<0.05) remained stable compared with baseline values (T0). Time spent in MVPA significantly increased at each measurement occasion compared with T0 (increase: 105.0 (95% CI 57.6 to 152.2), 138.4 (95% CI 88.7 to 188.1) and 112.9 (95% CI 61.1 to 164.6) min/week at, respectively, T1, T2 and T3, all p<0.001).

Effects of personal characteristics and diagnosis

Figure 2 shows total PA per measurement occasion and distribution of PA in the four settings separated for the different diagnoses. Online supplemental appendix 2 provides a detailed description of PA behaviour per diagnosis.

Figure 3 shows the effect of each personal characteristic on total PA and MVPA. The multilevel regression model analyses showed that at baseline, a significant effect on total PA was found for diagnosis (musculoskeletal disease, β=307.5 (95% CI 92.7 to 522.2), and other diseases, β=392.7 (95% CI 5.0 to 780.3) more active than brain disease), age (higher age less active, β=−12.7 (95% CI −18.0 to −7.4)), sex (females more active than males,

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Table 1 Baseline descriptive statistics of included participants at each measurement occasion (T0–T3) and excluded participants at T0

	Included				
	T0	T1	T2	T3	Excluded
N	1256	1114	966	860	463
Age (years)	50.7±13.4	51.1±13.4	51.5±13.0	51.6±13.2	47.5±14.3**
Sex (% male)	47.3	47.9	47.6	49.2	42.1
BMI (kg/m^2)	27.5±8.6	27.5±8.8	27.4±9.1	27.4±9.3	27.0±5.9
Diagnosis					
% Brain disease	27.1	26.8	26.5	27.4	24.4
% Musculoskeletal disease	18.6	18.0	17.6	17.3	18.1
% Chronic pain	15.8	15.8	14.9	14.9	18.1
% Neurological disease	15.0	15.5	16.1	16.9	12.5
% Organ disease	12.1	12.7	12.7	12.4	9.9
% Amputation	4.5	4.7	4.9	4.7	4.3
% Spinal cord injury	3.0	2.7	2.8	2.8	4.3
% Other diseases	3.8	3.8	4.5	3.6	3.2
Smoking					*
% Yes	16.3	16.6	15.4	15.3	13.0
% No	71.3	73.5	74.9	75.2	39.7
Alcohol use					
% No	58.0	57.9	59.0	58.7	34.6
% Light	10.4	10.5	11.0	10.9	5.4
% Moderate	24.0	25.0	24.0	24.1	11.2
% Excessive	2.2	2.4	2.3	2.0	0.6
Marital status					
% Single	26.8	27.7	27.7	27.7	21.4
% Married/living with partner	62.9	63.9	63.9	63.9	39.3
Education level					
% Low	67.0	67.8	68.2	69.5	47.5
% High	22.5	23.7	23.5	22.7	12.7
Work status					
% School	1.8	1.8	1.1	1.7	1.9
% Employed	31.2	32.3	31.9	32.1	20.1
% Unemployed	11.6	11.9	11.4	11.7	9.3
% Retired	15.4	16.4	16.0	16.9	7.6
% Unable to work	21.7	21.8	22.3	21.5	14.9
% Other	7.7	7.5	9.0	8.1	6.3
Rehabilitation context					
% Rehabilitation centre	71.6	71.6	72.3	72.8	75.4
% Hospital	28.4	28.4	27.7	27.2	24.6
Rehabilitation form					
% Inpatient	2.8	2.6	2.3	2.3	3.7
% Outpatient	89.8	90.3	89.8	90.5	90.1
% Consultancy	7.4	7.1	8.0	7.2	6.3
Number of counselling moments					**
% 0	11.4	11.0	10.8	10.0	21.0

Continued

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Table 1 Continued

	Included				
	T0	T1	T2	T3	Excluded
% 1–3	56.4	55.8	56.3	57.0	55.3
% 4 or more	32.2	33.1	32.9	33.0	23.8

Data presented as mean±SD or %.
For some participants, information was missing, leading to not all percentages adding up to a 100%. There were more missing data in the excluded group of participants compared with the included group of participants.
* and ** mean significant difference between the included and excluded participants based on independent sample t-tests for continuous variables and based on X^2 tests for categorical variables without unknown category between baseline participants and those excluded. (*p<0.05; **p<0.001).
BMI, body mass index.

β=273.9 (95% CI 130.9 to 417.0)) and BMI (higher BMI less active, β=−8.8 (95% CI −17.6 to −0.03)) (see also online supplemental appendix 3). No interaction effects between these characteristics and measurement occasion were found, that is, the effect of these characteristics on PA remained constant over time. There was one significant interaction effect for education on PA over time, with people with high education increasing their levels of PA more over time than people with low education (p<0.05).

Online supplemental appendix 3 provides a detailed description of the effects of the diagnosis and personal characteristics on baseline levels and the development over time of PA in each setting and MVPA. In short, diagnosis had a significant baseline effect for MVPA and all settings of PA, except for commuting, where we found an interaction effect of diagnosis. People with a higher age were less active in work, household and commuting, but more active in leisure time and MVPA. In the work setting, an older age led to increase in PA over time. Females were more active in household tasks, but less active in MVPA; and in both household and MVPA, females had less increase in PA over time. Smokers had less increase in MVPA over time than non-smokers. Alcohol use had baseline effects on leisure time (moderate alcohol usage more active, excessive alcohol usage less active) and on MVPA (moderate alcohol usage more active) and interaction effect on MVPA (light and excessive alcohol usage had more improvement of MVPA over time).

DISCUSSION

We explored the PA dose characteristics in a broad population of adults with disabilities/chronic diseases from discharge up to 1 year after rehabilitation. We found a significant increase in total minutes per week of PA between baseline and all follow-ups. The largest increase in PA was found between baseline and 14 weeks after rehabilitation, and then more or less stabilised. Almost two-thirds of the total minutes were light-intensity PA. Most minutes of PA were in household setting. Leisure time contributed to the most minutes of MVPA. We found on average an active population, showing a considerable degree of variation in PA among this population and over time, in all dose characteristics and among personal and disease characteristics.

PA dose characteristics

To the best of our knowledge, this is the first prospective cohort study that considers all dose characteristics (duration, setting, intensity, mode and frequency) of PA in a large heterogeneous population of adults with physical disabilities/chronic diseases. Compared with previous studies (self-reported PA in specific disability groups and in heterogeneous disability groups), our participants were more active in total PA, MVPA and leisure time PA.[8 20 22 40–45] Furthermore, the proportion of participants adhering to the aerobic component of the WHO PA guideline (>150 min of moderate PA, >75 min of vigorous PA or combination of both) is higher in our population compared with previous research (68%–74% vs 35%–60%).[8 46–48] This suggests that the ReSpAct cohort is a potential positive selection regarding PA behaviour. A possible explanation of our active population may relate to the fact that all participants voluntarily engaged in the RSE programme, and thus received PA counselling during and after rehabilitation.

Participants completed a large amount of light-intensity PA. There are indications that the curvilinear relationship between PA and health found in able-bodied individuals[3] also applies to adults with physical disabilities/chronic diseases.[49] This means that for inactive people, even a small increase in PA (in any duration, intensity, mode and frequency) can lead to health benefits. Indeed, breaking up sedentary time into light-intensity PA does have positive effects on PA in able-bodied individuals.[50] Also, a study in people with mobility limitations suggested a decrease in all-cause mortality by engaging in light-intensity PA.[51] All this suggests the potential importance of light-intensity PA. However, as light-intensity activities might be harder to recall than MVPA, it is debatable how valid self-reported instruments can measure light intensity. Future research should focus on reliably measuring light intensity and the dose–response relationship between light-intensity PA and health outcomes.

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Table 2 Physical activity (PA) behaviour of adults with physical disabilities/chronic diseases per measurement occasion as measured with the Adapted-SQUASH[32]

	T0	T1	T2	T3
Total PA				
N	1256	1114	966	860
Total (min/week)	1545 (853–2453)	1770 (990–2780)	1830 (981–2730)	1710 (960–2730)
Light (min/week)	900 (360–1680)	998 (420–1920)	960 (409–1980)	900 (360–1800)
Moderate (min/week)	120 (0–480)	180 (15–596)	180 (0–690)	150 (0–630)
Vigorous (min/week)	100 (0–246.25)	120 (0–300)	120 (0–300)	120 (0–289)
Adherence to the aerobic WHO PA guidelines (%)	68.3	74.9	71.3	71.2
Leisure time				
N	1252	1098	955	843
Total (min/week)	450 (230–795)	510 (270–853)	480 (240–840)	465 (240–840)
% 0 min/week	3.6	2.4	4.1	4.4
Light (min/week)	60 (0–323)	60 (0–330)	60 (0–300)	40 (0–270)
% 0 min/week	43.6	44.4	44.6	46.9
Moderate (min/week)	75 (0–255)	90 (0–300)	60 (0–300)	70 (0–273)
% 0 min/week	37.6	32.1	36.8	38.0
Vigorous (min/week)	90 (0–213)	120 (0–268)	100 (0–240)	100 (0–240)
% 0 min/week	30.8	27.2	31.0	30.8
Frequency of leisure time activities per week*				
Walking	3.6±2.7	3.5±2.6	3.3±2.6	3.3±2.7
Bicycling	1.8±2.2	1.7±2.1	1.6±2.1	1.7±2.1
Wheelchair riding	0.4±1.5	0.4±1.5	0.4±1.5	0.4±1.5
Handcycling	0.0±0.4	0.1±0.5	0.1±0.5	0.1±0.4
Gardening	0.7±1.2	0.6±1.1	0.5±1	0.5±1.1
Odd jobs	0.7±1.4	0.5±1.2	0.5±1.1	0.5±1.1
Fitness	0.6±1.1	0.7±1.1	0.5±1	0.4±0.9
Swimming	0.3±0.7	0.3±0.6	0.2±0.5	0.2±0.5
Household				
N	1234	1096	953	853
Total (min/week)	540 (180–960)	540 (210–1020)	600 (240–1020)	495 (210–930)
% 0 min/week	13.5	10.4	10.3	11.8
Light (min/week)	510 (180–960)	540 (210–960)	540 (210–960)	480 (185–900)
% 0 min/week	13.9	11.0	11.1	12.3
Moderate (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	87.6	83.4	82.0	82.8
Vigorous (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	100.0	100.0	100.0	100.0
Work				
N	1186	1093	943	844
Total (min/week)	0 (0–600)	0 (0–960)	0 (0–1080)	0 (0–1080)
% 0 min/week	59.9	52.6	52.9	54.5
Light	0 (0–165)	0 (0–420)	0 (0–300)	0 (0–240)
% 0 min/week	72.9	67.9	70.2	71.1
Moderate (min/week)	0 (0–0)	0 (0–60)	0 (0–60)	0 (0–60)
% 0 min/week	80.8	72.9	71.8	73.5

Continued

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Table 2 Continued

	T0	T1	T2	T3
Vigorous (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	100.0	100.0	100.0	100.0
Commuting				
N	1246	1108	959	847
Total (min/week)	0 (0–25)	0 (0–30)	0 (0–30)	0 (0–40)
% 0 min/week	72.5	71.3	71.3	70.4
Light (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	88.8	87.7	88.2	88.5
Moderate (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	95.5	93.4	93.8	94.5
Vigorous (min/week)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
% 0 min/week	83.3	83.9	83.6	83.0

*Frequencies of leisure time activities per week are presented in mean±SD. Other data are presented in median (IQR) or percentage.
Adapted-SQUASH, Adapted version of the Short Questionnaire to ASsess Health enhancing physical activity.

PA behaviour over time

In contrast to the common decline in PA after rehabilitation,[52] we found a significant increase in total minutes of PA and in MVPA after rehabilitation. The largest improvement was found between just before discharge (T0) and 14 weeks after (T1) and remained more or less stable until 1 year after rehabilitation. We found a decrease in PA from 33 weeks (T2) to 1 year after rehabilitation (T3), but PA at T3 was still significantly higher compared with PA at T0. The improvement in PA aligns with the period that participants received personalised PA counselling (RSE programme).[28 29 31] As a previous randomised controlled trial (RCT) already showed the effectiveness of counselling after rehabilitation in improving PA behaviour,[31 53] this may explain the increase in PA behaviour between T0 and T1. Since the period just after rehabilitation is a critical window of opportunity for intervening and important to assist people from being a patient to a participant in lifelong PA,[54] a broader implementation of PA counselling not just in the Netherlands[55] but internationally seems a promising approach. However, our data and that of the RCT[31] are limited to 1 year after rehabilitation, and future research should investigate whether these counselling sessions are enough for adherence to lifelong PA.

Effects of personal characteristics and diagnosis

We found a large diversity in individual PA behaviour over time, as seen by the large IQRs for all dose characteristics

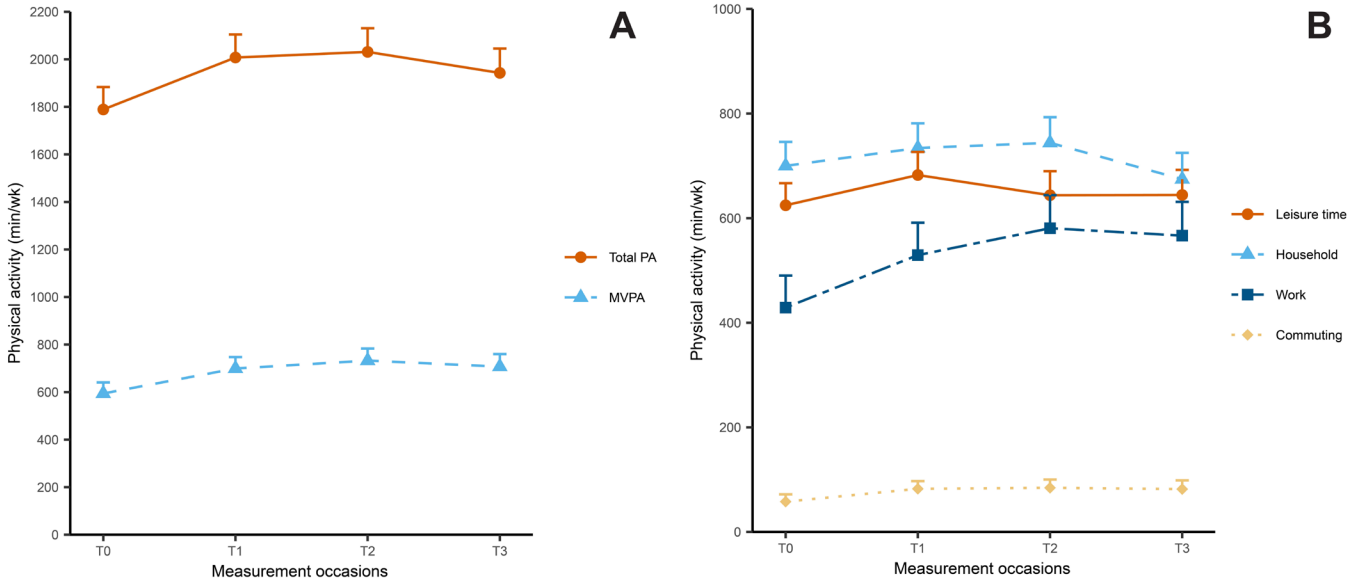

Figure 1 Regression lines of the multilevel regressions models for (A) minutes of total physical activity (PA) per week and minutes of moderate to vigorous physical activity (MVPA) and (B) for minutes of physical activity per week per setting.

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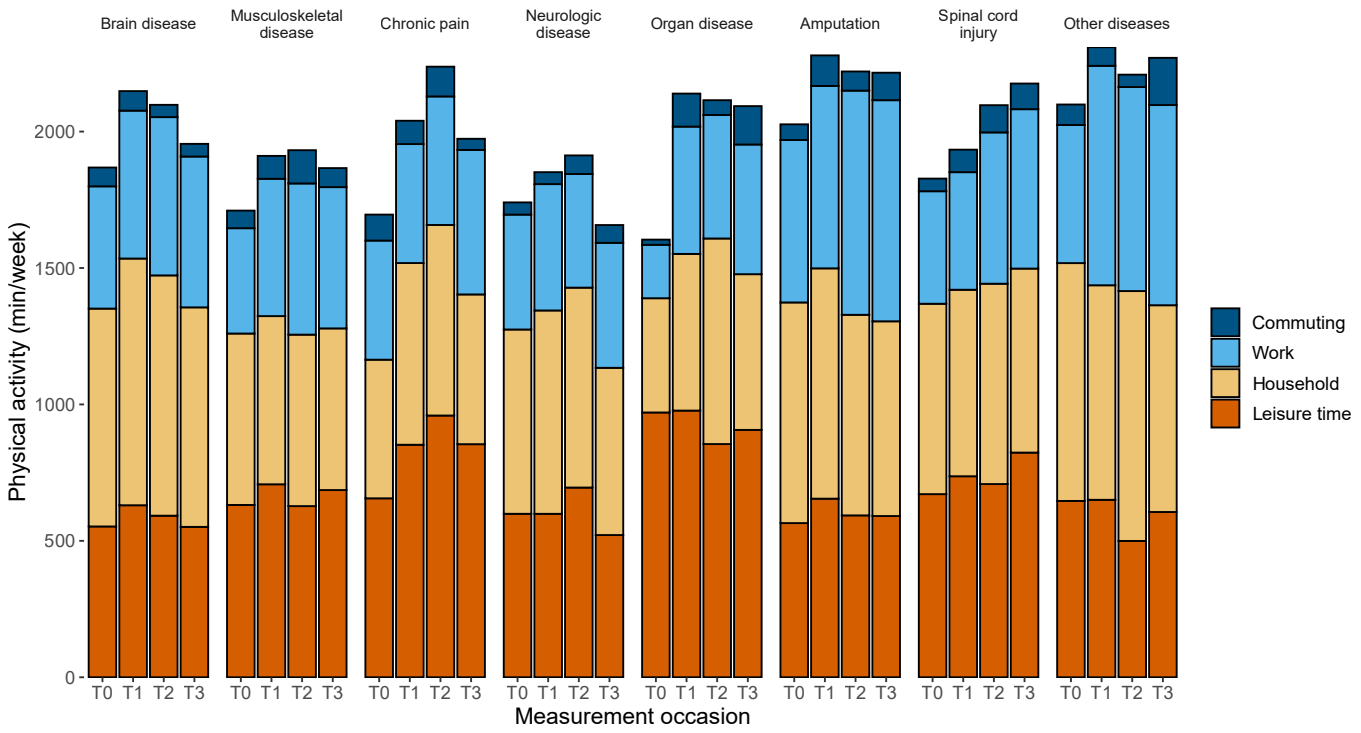

Figure 2 Descriptive data of total physical activity behaviour and the distribution in the four settings per measurement occasion of each diagnosis.

of PA. Part of this diversity in PA can be explained by age, sex, BMI and diagnosis. The effects of age and sex on PA are also found in the general population and in people with disabilities, with older people being less active and males being more active than females.[24 25 46 48] In contrast, we found that females were more active than males, which may be explained by the household PA as these were reported much more by females than males. As household PAs were mostly of light intensity, we also found that males were more active than females in MVPA, which is in line with previous literature.[24 46]

Interestingly, we found that older people were more active in MVPA than younger people. One explanation could be that for people older than 55 years, MVPA is reached with a lower MET value.[56] Because the Adapted-SQUASH has predefined MET values for each activity, it could be that the same activity is categorised as light intensity for people younger than 55 years, but as moderate intensity for people older than 55 years.

Only education had a significant interaction effect on PA over time, with people with higher education increasing their PA behaviour more than people with lower education. Previous research also found that people with higher education were more active, but to the best of our knowledge, the association between education and longitudinal change of PA behaviour was not studied before.[24 57]

Combining the knowledge about dose characteristics of PA behaviour and the influence of personal characteristics on PA behaviour could help health professionals and PA-promoting programmes to give more individually tailored recommendations. This could be beneficial for getting adults with physical disabilities/chronic diseases more active, as it is known from goal setting literature that more specificity is better.[58]

Strengths and limitations

A strength of the current study is that we study people with a broad range of physical disabilities/chronic diseases, who underwent rehabilitation in different rehabilitation centres and hospital departments across the Netherlands. This, together with the pragmatic measurement setting, improves generalisability of the results. However, as the ReSpAct cohort is probably a positive sample regarding PA, results should also be generalised with some caution.

This study used an observational study design, in which all participants received personalised PA counselling as part of the RSE programme. Without a control group, we cannot study the effectiveness of the RSE programme. As such, we do not know whether participating in the RSE programme contributed to the increased levels of PA after rehabilitation. However, the primary aim of this study was to explore the dose characteristics of PA in adults with physical disabilities/chronic diseases up to 1 year after rehabilitation, for which an observational study lends it design. Furthermore, the RSE programme was developed based on the results of an RCT that showed the effectiveness of counselling during and after rehabilitation in increasing overall PA behaviour.[31 53]

PA was measured with a self-reported questionnaire. Questionnaires are prone to recall bias and social desirability, and therefore lead to overestimation of PA.[32 59 60] Intensity outcomes of the Adapted-SQUASH are mostly

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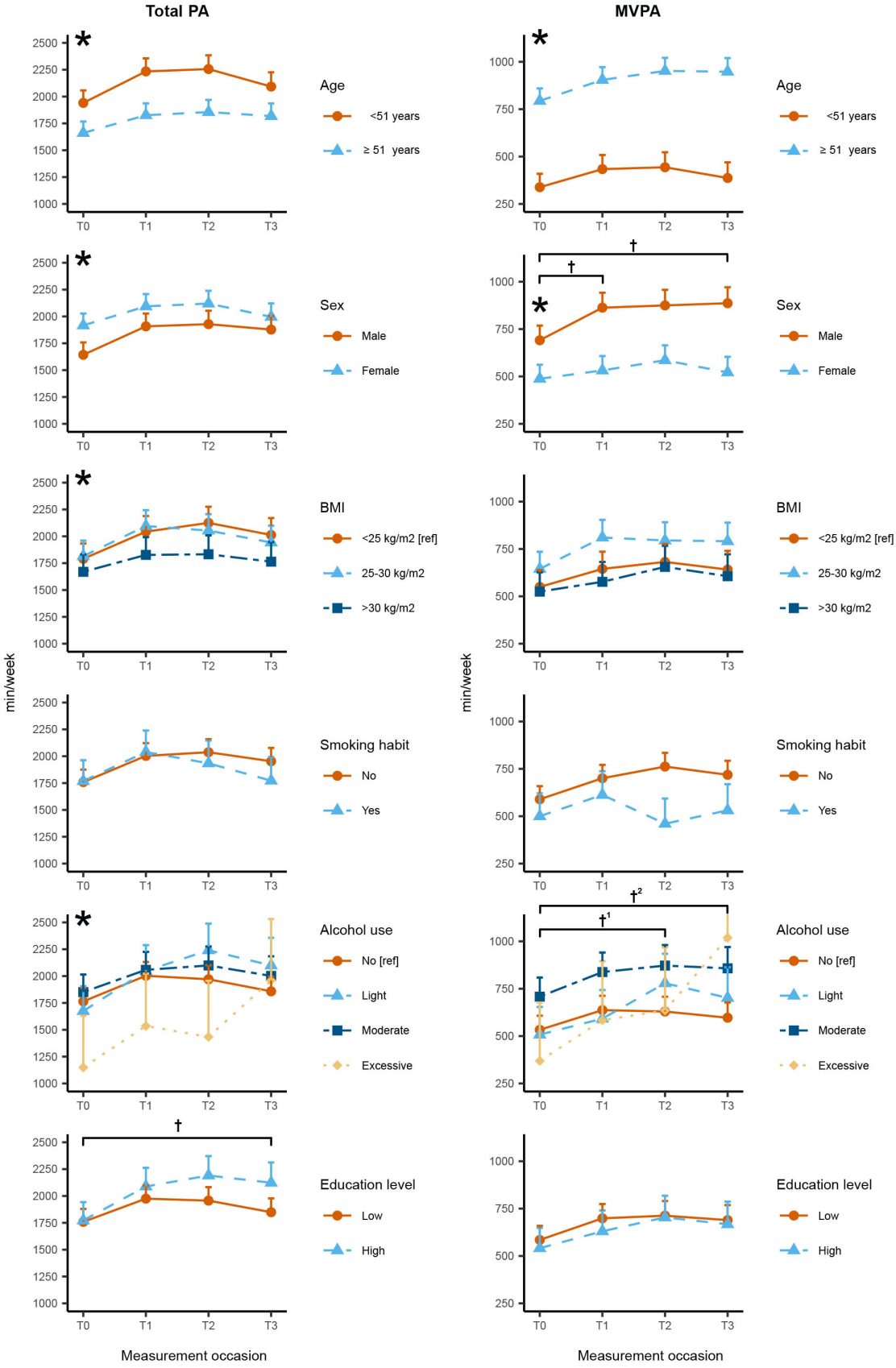

Figure 3 Effects of personal characteristics on baseline levels and development over time of total PA and MVPA, based on the individual multilevel regression models with 95% CI. *Significant difference between groups at baseline (p<0.05). †Significant difference in development over time between groups (1 between light alcohol usages and no alcohol usage, 2 between excessive alcohol usage and no alcohol usage) (p<0.05). BMI, body mass index; MVPA, moderate to vigorous PA; PA, physical activity.

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based on MET values from the Ainsworth compendium of PAs, based on a general population,[33] which might not be as valid for people with disabilities. However, as the test–retest reliability was high for the Adapted-SQUASH, the increase of PA behaviour found in this study is fairly robust.

Lastly, possible effects of characteristics (ie, age, sex, BMI, smoking behaviour, alcohol use and education level) and diagnosis on PA were tested univariable and not multivariable. It is possible that effects of characteristics are influenced by other characteristics. Multivariable testing would correct for this. However, because our main aim was to explore the dose characteristics and the studied characteristics were based on previous literature,[24–27] we currently limited the study ambitions to univariate testing.

Future research

This study gives detailed information on the dose characteristics of PA behaviour in adults with physical disabilities/chronic diseases, which is a first step in the dose–response relationship of PA and health. Due to lack of research on this relationship in adults with physical disabilities/chronic diseases, evidence of the current WHO PA guidelines for this population is mostly derived from research in non-disabled populations.[11] This makes it questionable how applicable these guidelines are, and perhaps making disability-specific guidelines more suitable.[15 61] However, the current PA guidelines for people with disabilities do have their merits, as they exposed the lack of systematic research on PA in this population,[62] inspiring new studies, such as the current study, to bridge this gap. Future research should now focus on the dose–response relationships between PA and health.

Closely related to the need for more research on the dose–response relationship of PA and health is the need for more research on PA measurement instruments in adults with physical disabilities/chronic diseases. Both self-reported and device-based instruments have limitations in this population, and future research should find out which types of instruments are most appropriate for dose/dose–response studies.

The effect of personal characteristics and diagnosis on PA behaviour overall and over time found in this study helps to inform readers to points of attention when promoting PA behaviour. Although most characteristics examined in this study cannot be intervened at, theoretical models underlying PA promotion, such as the Physical Activity for people with a Disability model,[63] suggest personal factors (eg, motivation, self-efficacy) and environmental factors (eg, barriers and facilitators, social support) that can be intervened at, also influence PA behaviour. Future research should investigate how these modifiable factors influence the development of PA behaviour during and after rehabilitation. This could help improve PA promotion interventions and gear them more to individualised therapy.

CONCLUSION

Both PA level and change of PA over time are highly variable among adults with physical disabilities/chronic diseases, in terms of different PA dimensions and in the context of personal and diagnosis characteristics. The findings of this study help to understand the construct of PA behaviour among a diverse population of persons with a physical disability and/or chronic disease. In addition, they can potentially be used to improve PA promotion activities among this population during and after rehabilitation.

Author affiliations
[1]Department of Human Movement Sciences, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands
[2]Department of Rehabilitation Medicine, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands
[3]School of Health and Exercise Sciences, The University of British Columbia Okanagan, Kelowna, British Columbia, Canada
[4]Department of Sport, Exercise and Rehabilitation, Northumbria University, Newcastle upon Tyne, UK
[5]Department of Health Sciences and Amsterdam Public Health Research Institute, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

Twitter Leonie A Krops @leoniekrops and Trynke Hoekstra @TrynkeHoekstra

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Contributors PB conceptualised the current study, analysed the data, interpreted the data and drafted the manuscript. FH, LAK, LHVvdW and RD aided in the conceptualisation, interpretation and drafting of the manuscript. FH and BLS collected the data. LHVvdW, RD and FJH designed the overarching ReSpAct Study. TH and LAK helped with statistical analysis. All authors provided critical feedback. All authors have read and approved the final version of the manuscript, and agree with the order of presentation of the authors. PB and LHVvdW act as guarantors for the manuscript.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not required.

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ORCID iDs
Pim Brandenbarg http://orcid.org/0000-0002-6909-5111
Femke Hoekstra http://orcid.org/0000-0002-0068-652X
Leonie A Krops http://orcid.org/0000-0003-1721-3953
Bregje L Seves http://orcid.org/0000-0003-4066-1893
Florentina J Hettinga http://orcid.org/0000-0002-7027-8126
Trynke Hoekstra http://orcid.org/0000-0002-0535-0056
Rienk Dekker http://orcid.org/0000-0001-6649-6289
Lucas H V van der Woude http://orcid.org/0000-0002-8472-334X

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Appendix 1. Results of longitudinal multilevel analysis of physical activity behavior over time in table

Appendix 1. Results of longitudinal multilevel analysis of physical activity behavior over time

	Baseline to T1				Baseline to T2				Baseline to T3			
	β	95% CI		p-value	β	95% CI		p-value	β	95% CI		p-value
Total PA	218.6	142.9	294.3	**<.001**	242.2	162.6	321.7	**<.001**	153.8	70.9	236.6	**<.001**
Leisure Time	57.9	15.0	100.8	**.008**	19.3	-25.7	64.3	.400	19.8	-27.2	66.7	.409
Household	34.2	-6.7	75.0	.101	44.1	1.2	86.9	**.044**	-25.5	-70.1	19.0	.262
Work	100.3	59.2	141.4	**<.001**	151.7	108.5	195.0	**<.001**	137.6	92.6	182.5	**<.001**
Commuting	24.5	6.1	43.0	**.009**	26.5	7.2	45.8	**.007**	24.0	3.9	44.1	**.019**
MVPA	105.0	57.8	152.3	**<.001**	138.4	88.7	188.1	**<.001**	112.9	61.1	164.6	**<.001**

PA = Physical activity, MVPA = moderate to vigorous physical activity
Bold = statistically significant

Appendix 2. Descriptive statistics and PA behavior of each diagnosis groups separately.

Brain disease:

Appendix 1.1 Descriptive statistics of participants with a brain disease

	Population at T0	Population at T1	Population at T2	Population at T3
N	341	299	256	236
Age (years)	52.7 ± 12.3	53 ± 12.2	53.3 ± 11.8	53.5 ± 11.9
Sex (% male)	56.6	57.9	56.6	58.9
BMI (kg/m2)	27 ± 10.7	27.1 ± 11.3	27 ± 11.9	27 ± 12
Smoking				
% Yes	12.6	12	10.2	11
% No	73.6	77.3	78.9	78
Alcohol use				
% No	51	54.2	52.3	53.8
% Light	12.9	13.4	14.5	14
% Moderate	20.5	19.7	20.7	19.5
% Excessive	1.5	1.7	1.2	1.3
Marital status				
% Single	23.8	25.1	25.1	25.1
% Married/living with partner	65.1	66.2	66.2	66.2
Education level				
% Low	65.1	66.2	66	66.9
% High	23.5	24.7	24.2	24.6
Work status				
% School	1.5	1.3	0.8	1.3
% Employed	36.1	37.5	35.9	37.7
% Unemployed	9.7	10.4	9	9.7
% Retired	17.3	18.7	18	18.6
% unable to work	15.8	15.7	17.2	15.7
% Other	7.3	7.4	9	8.1
Rehabilitation context				
% Rehabilitation center	76.2	75.6	78.1	78.8
% Hospital	23.8	24.4	21.9	21.2
Rehabilitation form				
% Inpatient	3.8	3.7	3.5	2.5
% Outpatient	89.7	90	88.7	90.3
% Consultancy	6.5	6.4	7.8	7.2
Number of counseling moments				
% 0	11.4	10.7	10.9	9.3
% 1-3	52.5	53.5	52.3	52.1
% 4 or more	36.1	35.8	36.7	38.6

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.2 Physical activity behavior of people with a brain disease per measurement occasion

	T0	T1	T2	T3
Total PA				
N	341	299	256	236
Total (min/week)	1410 (760 - 2400)	1620 (930 - 2685)	1568 (952 - 2604)	1680 (960 - 2604)
Light (min/week)	790 (240 - 1440)	840 (308 - 1650)	750 (243 - 1642)	780 (240 - 1538)
Moderate (min/week)	160 (0 - 540)	180 (30 - 615)	195 (1 - 788)	230 (3 - 750)
Vigorous (min/week)	120 (0 - 300)	150 (40 - 360)	140 (0 - 312)	120 (29 - 360)

Leisure time				
N	341	295	256	232
Total (min/week)	450 (240 - 805)	520 (288 - 878)	510 (240 - 840)	480 (296 - 908)
% 0 min/week	3.2	3.4	4.7	3
Light (min/week)	30 (0 - 250)	30 (0 - 270)	0 (0 - 246)	0 (0 - 240)
% 0 min/week	49.9	49.2	51.2	51.3
Moderate (min/week)	120 (0 - 300)	120 (0 - 360)	120 (0 - 338)	120 (0 - 360)
% 0 min/week	33.1	28.1	31.2	32.3
Vigorous (min/week)	120 (0 - 270)	120 (42 - 300)	120 (0 - 289)	120 (30 - 300)
% 0 min/week	27	21	29.7	23.3
Frequency of leisure time activities (mean ± sd days per week)				
Walking	3.6 ± 2.7	3.3 ± 2.5	3.3 ± 2.5	3.2 ± 2.6
Bycicling	1.8 ± 2.2	1.9 ± 2.3	1.7 ± 2.2	1.9 ± 2.2
wheelchair riding	0.2 ± 1.2	0.3 ± 1.2	0.2 ± 1	0.2 ± 1
Handbiking	0 ± 0	0 ± 0.2	0 ± 0.5	0 ± 0.3
Gardening	0.6 ± 1.1	0.6 ± 1.2	0.5 ± 1.1	0.6 ± 1.1
Odd jobs	0.7 ± 1.4	0.6 ± 1.2	0.6 ± 1.2	0.5 ± 0.9
Fitness	0.6 ± 0.9	0.7 ± 1.2	0.6 ± 1.1	0.5 ± 1.1
Swimming	0.3 ± 0.7	0.3 ± 0.7	0.1 ± 0.5	0.1 ± 0.4
Household				
N	333	293	253	236
Total (min/week)	480 (140 - 855)	420 (150 - 960)	525 (180 - 870)	472 (148 - 878)
% 0 min/week	17.1	11.3	13	13.1
Light (min/week)	450 (120 - 840)	420 (150 - 900)	450 (180 - 840)	420 (135 - 840)
% 0 min/week	17.4	12.3	14.2	14.8
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	87.7	80.2	81	80.9
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	321	296	247	231
Total (min/week)	0 (0 - 480)	0 (0 - 900)	0 (0 - 1020)	0 (0 - 960)
% 0 min/week	62.9	51.4	51	55
Light	0 (0 - 0)	0 (0 - 300)	0 (0 - 120)	0 (0 - 0)
% 0 min/week	76.9	68.9	73.3	76.2
Moderate (min/week)	0 (0 - 0)	0 (0 - 60)	0 (0 - 120)	0 (0 - 90)
% 0 min/week	80.4	73	70.4	71.4
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	340	296	253	231
Total (min/week)	0 (0 - 36)	0 (0 - 30)	0 (0 - 50)	0 (0 - 60)
% 0 min/week	70.3	71.6	66.8	68.4
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	90.9	88.9	88.5	90.9
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	94.4	94.3	93.3	93.5
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	80.6	80.7	79.1	80.5

Data presented as median (interquartile range), mean ± SD or %

Musculoskeletal disease

Appendix 1.3 Descriptive statistics of participants with a musculoskeletal disorder

	Population at T0	Population at T1	Population at T2	Population at T3
N	234	201	170	149
Age (years)	47 ± 14.9	47.5 ± 15	47.6 ± 14.8	46.4 ± 14.5
Sex (% male)	35.9	36.3	37.1	35.6
BMI (kg/m2)	27.5 ± 6.1	27.2 ± 5.8	27.7 ± 6.4	27.7 ± 6.2
Smoking				
% Yes	20.5	21.9	20.6	22.1
% No	66.7	66.7	71.2	68.5
Alcohol use				
% No	52.6	52.7	56.5	57
% Light	10.7	10.4	11.2	11.4
% Moderate	22.6	24.4	22.9	21.5
% Excessive	1.3	1	1.2	0.7
Marital status				
% Single	26.5	25.9	25.9	25.9
% Married/living with partner	61.5	63.7	63.7	63.7
Education level				
% Low	64.1	64.7	66.5	69.1
% High	24.4	25.4	26.5	22.1
Work status				
% School	2.6	3	1.8	2
% Employed	31.2	32.3	31.2	33.6
% Unemployed	12.8	13.9	12.9	15.4
% Retired	12	13.4	12.4	12.1
% unable to work	19.7	18.4	21.8	18.1
% Other	10.7	9.5	12.4	10.7
Rehabilitation context				
% Rehabilitation center	65.4	65.2	67.6	63.8
% Hospital	34.6	34.8	32.4	36.2
Rehabilitation form				
% Inpatient	1.3	1.5	0.6	1.3
% Outpatient	87.2	89.1	88.2	88.6
% Consultancy	11.5	9.5	11.2	10.1
Number of counseling moments				
% 0	13.7	13.4	12.4	12.8
% 1-3	62	60.2	62.9	62.4
% 4 or more	24.4	26.4	24.7	24.8

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.4 Physical activity behavior of participants with a musculoskeletal disorder

	T0	T1	T2	T3
Total PA				
N	234	201	170	149
Total (min/week)	1728 (1042 - 2918)	2055 (1200 - 3070)	1935 (1011 - 3270)	1898 (1085 - 3270)
Light (min/week)	1140 (450 - 2124)	1260 (600 - 2370)	1145 (600 - 2248)	1050 (555 - 2290)
Moderate (min/week)	120 (0 - 472)	150 (15 - 510)	128 (0 - 600)	120 (0 - 540)
Vigorous (min/week)	120 (0 - 268)	120 (0 - 310)	120 (0 - 300)	120 (0 - 300)

Leisure time				
N	233	199	168	145
Total (min/week)	420 (243 - 770)	450 (252 - 765)	420 (204 - 750)	375 (185 - 660)
% 0 min/week	4.3	2	5.4	5.5
Light (min/week)	120 (0 - 360)	90 (0 - 352)	90 (0 - 278)	60 (0 - 271)
% 0 min/week	38.2	35.2	39.9	40
Moderate (min/week)	60 (0 - 195)	90 (0 - 220)	60 (0 - 214)	30 (0 - 180)
% 0 min/week	42.5	32.2	42.9	48.3
Vigorous (min/week)	100 (0 - 240)	120 (0 - 285)	110 (0 - 241)	105 (0 - 240)
% 0 min/week	27.9	28.1	29.2	36.6
Frequency of leisure time activities (mean ± sd days per week)				
Walking	3.6 ± 2.6	3.6 ± 2.4	3.4 ± 2.6	3.2 ± 2.6
Bycicling	2.1 ± 2.3	1.8 ± 2.2	1.7 ± 2.2	1.4 ± 1.9
wheelchair riding	0.3 ± 1.5	0.3 ± 1.3	0.2 ± 1.2	0.2 ± 1.1
Handbiking	0.1 ± 0.5	0.1 ± 0.6	0.1 ± 0.5	0 ± 0.3
Gardening	0.5 ± 1.1	0.4 ± 0.7	0.4 ± 0.8	0.3 ± 0.6
Odd jobs	0.5 ± 1.2	0.4 ± 1.1	0.5 ± 1.1	0.4 ± 1
Fitness	0.7 ± 1.1	0.6 ± 1.1	0.5 ± 1.1	0.3 ± 0.8
Swimming	0.4 ± 0.8	0.4 ± 0.7	0.3 ± 0.7	0.2 ± 0.6
Household				
N	232	199	166	147
Total (min/week)	630 (236 - 1099)	630 (300 - 1140)	600 (278 - 1012)	585 (248 - 900)
% 0 min/week	9.5	8	7.2	6.1
Light (min/week)	615 (210 - 1080)	600 (282 - 1140)	600 (270 - 960)	585 (240 - 900)
% 0 min/week	9.9	9	7.2	6.1
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	90.1	89.9	88	90.5
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	223	197	166	148
Total (min/week)	0 (0 - 960)	300 (0 - 1200)	390 (0 - 1440)	360 (0 - 1710)
% 0 min/week	50.7	44.2	41.6	42.6
Light	0 (0 - 600)	0 (0 - 840)	0 (0 - 1005)	0 (0 - 1200)
% 0 min/week	64.6	58.4	57.2	57.4
Moderate (min/week)	0 (0 - 0)	0 (0 - 180)	0 (0 - 285)	0 (0 - 120)
% 0 min/week	77.1	68.5	64.5	70.3
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	232	200	169	149
Total (min/week)	0 (0 - 52)	0 (0 - 82)	0 (0 - 30)	0 (0 - 60)
% 0 min/week	68.1	63.5	67.5	61.7
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	87.5	80	84	82.6
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	96.6	94.5	95.3	95.3
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	78.9	81	81.7	77.2

Data presented as median (interquartile range), mean ± SD or %

Chronic pain

Appendix 1.5 Descriptive statistics of participants with chronic pain

	Population at T0	Population at T1	Population at T2	Population at T3
N	198	176	144	128
Age (years)	45.4 ± 11.6	45.8 ± 11.8	47.4 ± 10.8	46.6 ± 11.2
Sex (% male)	24.2	25.6	23.6	25
BMI (kg/m2)	27.9 ± 6.1	28 ± 6.2	27.8 ± 5.7	27.6 ± 5.9
Smoking				
% Yes	16.2	17	16	14.8
% No	70.7	72.7	73.6	76.6
Alcohol use				
% No	51	51.1	52.8	54.7
% Light	8.6	9.1	7.6	9.4
% Moderate	24.7	26.7	25.7	25
% Excessive	2.5	2.8	3.5	2.3
Marital status				
% Single	28.3	30.7	30.7	30.7
% Married/living with partner	59.1	59.7	59.7	59.7
Education level				
% Low	72.2	73.3	74.3	76.6
% High	15.7	17.6	16.7	15.6
Work status				
% School	2	2.3	0.7	1.6
% Employed	30.3	32.4	32.6	33.6
% Unemployed	16.2	15.3	13.2	14.1
% Retired	3.5	4	3.5	2.3
% unable to work	25.3	26.7	28.5	27.3
% Other	10.1	9.7	12.5	12.5
Rehabilitation context				
% Rehabilitation center	63.1	63.6	62.5	64.1
% Hospital	36.9	36.4	37.5	35.9
Rehabilitation form				
% Inpatient	2.5	2.8	0.7	1.6
% Outpatient	92.4	92	94.4	94.5
% Consultancy	5.1	5.1	4.9	3.9
Number of counseling moments				
% 0	9.1	8.5	7.6	3.1
% 1-3	52.5	49.4	51.4	55.5
% 4 or more	38.4	42	41	41.4

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.6 Physical activity behavior of participants with chronic pain

	T0	T1	T2	T3
Total PA				
N	198	176	144	128
Total (min/week)	1710 (1051 - 2520)	1845 (972 - 2770)	1868 (1080 - 2771)	1598 (1080 - 2771)
Light (min/week)	1260 (652 - 2032)	1338 (630 - 2250)	1308 (606 - 2280)	1192 (770 - 1989)
Moderate (min/week)	60 (0 - 300)	112 (0 - 360)	94 (0 - 424)	112 (0 - 300)
Vigorous (min/week)	90 (2 - 210)	120 (0 - 240)	90 (0 - 240)	95 (0 - 240)

Leisure time				
N	198	171	143	125
Total (min/week)	435 (240 - 735)	525 (282 - 792)	445 (240 - 752)	450 (210 - 710)
% 0 min/week	1.5	0.6	3.5	3.2
Light (min/week)	150 (30 - 420)	180 (0 - 480)	150 (0 - 360)	120 (0 - 360)
% 0 min/week	24.2	28.1	31.5	32.8
Moderate (min/week)	30 (0 - 180)	60 (0 - 210)	45 (0 - 188)	15 (0 - 180)
% 0 min/week	46.5	40.9	44.8	48
Vigorous (min/week)	60 (0 - 191)	120 (5 - 210)	90 (0 - 180)	90 (0 - 225)
% 0 min/week	26.3	25.1	30.1	25.6
Frequency of leisure time activities (mean ± sd days per week)				
Walking	4.5 ± 2.5	4.3 ± 2.5	4.1 ± 2.6	4.1 ± 2.6
Bycicling	2 ± 2.2	1.9 ± 2.2	1.7 ± 2	2.1 ± 2.2
wheelchair riding	0.2 ± 1.2	0.2 ± 0.8	0.2 ± 1	0.2 ± 1
Handbiking	0 ± 0.5	0 ± 0	0 ± 0.2	0 ± 0.3
Gardening	0.6 ± 1.1	0.5 ± 1.1	0.4 ± 1.1	0.6 ± 1.3
Odd jobs	0.8 ± 1.6	0.5 ± 1.1	0.5 ± 1.1	0.3 ± 0.8
Fitness	0.6 ± 1.1	0.6 ± 1.1	0.5 ± 1	0.3 ± 0.8
Swimming	0.3 ± 0.6	0.2 ± 0.4	0.2 ± 0.5	0.2 ± 0.5
Household				
N	196	171	141	128
Total (min/week)	690 (270 - 1080)	720 (300 - 1245)	680 (315 - 1260)	702 (300 - 1059)
% 0 min/week	6.6	4.1	5	7
Light (min/week)	690 (270 - 1058)	660 (300 - 1245)	680 (300 - 1260)	702 (300 - 1050)
% 0 min/week	6.6	4.7	5.7	7
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	92.9	91.8	90.1	89.1
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	190	175	141	126
Total (min/week)	0 (0 - 720)	0 (0 - 900)	0 (0 - 960)	0 (0 - 930)
% 0 min/week	55.3	52.6	53.2	55.6
Light	0 (0 - 480)	0 (0 - 600)	0 (0 - 540)	0 (0 - 480)
% 0 min/week	62.6	60.6	63.1	63.5
Moderate (min/week)	0 (0 - 0)	0 (0 - 30)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	83.7	74.9	75.2	77
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	197	174	143	127
Total (min/week)	0 (0 - 50)	0 (0 - 40)	0 (0 - 14)	0 (0 - 8)
% 0 min/week	68.5	70.7	72.7	74
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	85.3	85.6	86	86.6
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	96.4	94.8	95.8	97.6
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	79.2	82.8	83.9	84.3

Data presented as median (interquartile range), mean ± SD or %

Neurologic disease

Appendix 1.7 Descriptive statistics of participants with a neurologic disease

	Population at T0	Population at T1	Population at T2	Population at T3
N	188	173	156	145
Age (years)	49.6 ± 12	49.7 ± 12.1	50.2 ± 11.8	51.1 ± 11.5
Sex (% male)	43.6	42.8	42.9	46.9
BMI (kg/m2)	27 ± 6.6	27 ± 6.7	26.4 ± 5.8	26.2 ± 5.3
Smoking				
% Yes	19.7	20.2	19.9	17.2
% No	67.6	68.8	69.9	72.4
Alcohol use				
% No	53.2	53.2	57.1	55.9
% Light	8	8.1	7.1	8.3
% Moderate	23.9	25.4	23.1	23.4
% Excessive	2.1	2.3	2.6	2.1
Marital status				
% Single	30.3	31.2	31.2	31.2
% Married/living with partner	59.6	60.1	60.1	60.1
Education level				
% Low	60.6	61.3	60.3	59.3
% High	29.3	30.1	30.8	31
Work status				
% School	0.5	0.6	0	0.7
% Employed	28.2	30.1	28.8	28.3
% Unemployed	11.7	12.7	11.5	11.7
% Retired	9	8.7	10.3	9.7
% unable to work	32.4	31.2	31.4	32.4
% Other	8	8.1	9	7.6
Rehabilitation context				
% Rehabilitation center	69.7	69.9	68.6	70.3
% Hospital	30.3	30.1	31.4	29.7
Rehabilitation form				
% Inpatient	1.1	1.2	1.3	0.7
% Outpatient	93.1	93.1	92.9	94.5
% Consultancy	5.9	5.8	5.8	4.8
Number of counseling moments				
% 0	13.3	13.9	13.5	13.1
% 1-3	59	59	57.1	60.7
% 4 or more	27.7	27.2	29.5	26.2

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.8 Physical activity behavior of participants with a neurologic disease

	T0	T1	T2	T3
Total PA				
N	188	173	156	145
Total (min/week)	1478 (709 - 2268)	1500 (900 - 2625)	1770 (840 - 2280)	1450 (735 - 2280)
Light (min/week)	870 (311 - 1669)	930 (420 - 1890)	952 (412 - 1744)	840 (360 - 1635)
Moderate (min/week)	120 (0 - 480)	155 (0 - 510)	120 (0 - 458)	95 (0 - 420)
Vigorous (min/week)	48 (0 - 210)	90 (0 - 210)	90 (0 - 281)	45 (0 - 210)

Leisure time				
N	186	171	153	143
Total (min/week)	420 (200 - 686)	405 (219 - 690)	450 (218 - 840)	360 (178 - 600)
% 0 min/week	5.9	2.9	3.3	6.3
Light (min/week)	60 (0 - 225)	30 (0 - 270)	60 (0 - 330)	60 (0 - 270)
% 0 min/week	44.1	46.8	39.9	42
Moderate (min/week)	60 (0 - 210)	90 (0 - 240)	60 (0 - 225)	60 (0 - 140)
% 0 min/week	34.4	35.1	36.6	39.9
Vigorous (min/week)	45 (0 - 180)	75 (0 - 198)	90 (0 - 240)	45 (0 - 180)
% 0 min/week	40.9	33.3	30.7	44.1
Frequency of leisure time activities (mean ± sd days per week)				
Walking	3 ± 2.8	3.2 ± 2.8	3 ± 2.7	2.8 ± 2.7
Bycicling	1.6 ± 2.1	1.6 ± 2.1	1.7 ± 2.1	1.3 ± 1.9
wheelchair riding	0.4 ± 1.5	0.5 ± 1.6	0.6 ± 1.7	0.6 ± 1.7
Handbiking	0 ± 0.1	0.1 ± 0.5	0 ± 0.3	0.1 ± 0.5
Gardening	0.8 ± 1.5	0.6 ± 1.2	0.4 ± 1	0.5 ± 1.1
Odd jobs	0.5 ± 1.2	0.4 ± 1	0.4 ± 1	0.4 ± 1.1
Fitness	0.7 ± 1.1	0.7 ± 1	0.7 ± 1.2	0.5 ± 0.8
Swimming	0.3 ± 0.6	0.3 ± 0.6	0.2 ± 0.4	0.2 ± 0.5
Household				
N	186	171	155	143
Total (min/week)	570 (180 - 1020)	540 (240 - 1020)	540 (240 - 1065)	420 (180 - 988)
% 0 min/week	13.4	12.3	11	15.4
Light (min/week)	540 (180 - 956)	480 (232 - 960)	480 (232 - 1065)	420 (165 - 900)
% 0 min/week	13.4	12.3	11.6	15.4
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	87.1	87.1	83.9	90.2
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	175	167	153	145
Total (min/week)	0 (0 - 600)	0 (0 - 750)	0 (0 - 540)	0 (0 - 600)
% 0 min/week	66.3	61.7	62.1	62.8
Light	0 (0 - 0)	0 (0 - 150)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	78.9	73.7	77.1	76.6
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	85.1	79.6	77.8	79.3
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	186	173	155	144
Total (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 10)	0 (0 - 0)
% 0 min/week	80.6	80.3	74.2	75.7
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	90.9	90.8	89	88.9
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	95.7	96	94.2	95.1
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	90.3	90.2	88.4	88.9

Data presented as median (interquartile range), mean ± SD or %

Organ disease

Appendix 1.9 Descriptive statistics of participants with an organ disease

	Population at T0	Population at T1	Population at T2	Population at T3
N	152	141	123	107
Age (years)	59.9 ± 10.3	60.4 ± 10.1	60 ± 10.5	61.1 ± 10.9
Sex (% male)	68.4	68.8	65.9	68.2
BMI (kg/m2)	28.6 ± 4.9	28.5 ± 4.9	28.4 ± 4.8	28.1 ± 4.9
Smoking				
% Yes	13.2	13.5	13	12.1
% No	78.9	80.1	80.5	81.3
Alcohol use				
% No	48	48.9	49.6	46.7
% Light	11.2	9.9	12.2	11.2
% Moderate	30.3	31.9	29.3	33.6
% Excessive	2	2.1	1.6	0.9
Marital status				
% Single	25	26.2	26.2	26.2
% Married/living with partner	69.1	68.1	68.1	68.1
Education level				
% Low	76.3	76.6	75.6	76.6
% High	17.1	17	18.7	18.7
Work status				
% School	0.7	0.7	0.8	0.9
% Employed	28.3	27.7	28.5	26.2
% Unemployed	11.8	12.1	14.6	12.1
% Retired	34.2	35.5	35	41.1
% unable to work	17.1	17	13.8	13.1
% Other	2.6	2.1	3.3	1.9
Rehabilitation context				
% Rehabilitation center	82.2	83	84.6	86
% Hospital	17.8	17	15.4	14
Rehabilitation form				
% Inpatient	2	2.1	1.6	1.9
% Outpatient	90.1	90.1	88.6	89.7
% Consultancy	7.9	7.8	9.8	8.4
Number of counseling moments				
% 0	10.5	9.9	10.6	10.3
% 1-3	61.8	61.7	63.4	60.7
% 4 or more	27.6	28.4	26	29

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.10 Physical activity behavior of participants with an organ disease

	T0	T1	T2	T3
Total PA				
N	152	141	123	107
Total (min/week)	1500 (840 - 2370)	1560 (870 - 2775)	1950 (870 - 3112)	1740 (904 - 3112)
Light (min/week)	600 (180 - 1489)	600 (180 - 1260)	600 (211 - 1770)	600 (165 - 1260)
Moderate (min/week)	300 (0 - 795)	390 (90 - 1080)	420 (60 - 1150)	385 (60 - 1042)
Vigorous (min/week)	120 (0 - 270)	180 (0 - 360)	124 (0 - 360)	180 (0 - 385)

Leisure time				
N	152	139	120	105
Total (min/week)	505 (224 - 848)	605 (300 - 990)	570 (326 - 960)	690 (360 - 990)
% 0 min/week	2	2.2	2.5	5.7
Light (min/week)	0 (0 - 120)	0 (0 - 45)	0 (0 - 120)	0 (0 - 0)
% 0 min/week	67.8	71.2	67.5	77.1
Moderate (min/week)	180 (0 - 450)	180 (20 - 480)	180 (0 - 480)	240 (30 - 615)
% 0 min/week	31.6	23.7	26.7	24.8
Vigorous (min/week)	120 (0 - 270)	140 (0 - 352)	120 (0 - 300)	180 (20 - 360)
% 0 min/week	27.6	26.6	30	24.8
Frequency of leisure time activities (mean ± sd days per week)				
Walking	3.7 ± 2.6	3.5 ± 2.5	3.4 ± 2.6	3.7 ± 2.6
Bycicling	1.7 ± 2.1	1.5 ± 1.9	1.5 ± 1.9	1.9 ± 2.1
wheelchair riding	0.1 ± 0.7	0.1 ± 0.6	0.1 ± 0.9	0.1 ± 1
Handbiking	0 ± 0.1	0 ± 0	0 ± 0	0 ± 0
Gardening	0.9 ± 1.4	0.7 ± 1.4	0.7 ± 1	0.7 ± 1.2
Odd jobs	0.9 ± 1.5	0.7 ± 1.5	0.8 ± 1.3	0.9 ± 1.6
Fitness	0	0.7 ± 1.1	0.4 ± 0.8	0.4 ± 1
Swimming	0.2 ± 0.5	0.1 ± 0.4	0.1 ± 0.4	0.1 ± 0.5
Household				
N	147	138	121	106
Total (min/week)	455 (142 - 930)	540 (169 - 960)	525 (240 - 1080)	525 (180 - 1005)
% 0 min/week	15.6	14.5	12.4	15.1
Light (min/week)	420 (128 - 840)	465 (150 - 840)	420 (150 - 900)	435 (139 - 840)
% 0 min/week	17.7	15.2	14.9	15.1
Moderate (min/week)	0 (0 - 0)	0 (0 - 60)	0 (0 - 60)	0 (0 - 84)
% 0 min/week	75.5	63	63.6	59.4
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	142	137	120	102
Total (min/week)	0 (0 - 480)	0 (0 - 480)	0 (0 - 765)	0 (0 - 705)
% 0 min/week	65.5	59.9	60.8	61.8
Light	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	84.5	84.7	84.2	85.3
Moderate (min/week)	0 (0 - 0)	0 (0 - 300)	0 (0 - 120)	0 (0 - 120)
% 0 min/week	78.2	67.9	70	71.6
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	148	141	122	102
Total (min/week)	0 (0 - 0)	0 (0 - 8)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	78.4	74.5	78.7	75.5
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	93.2	94.3	94.3	94.1
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	94.6	89.4	91.8	92.2
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	85.8	85.8	86.9	86.3

Data presented as median (interquartile range), mean ± SD or %

Amputation

Appendix 1.11 Descriptive statistics of participants with an amputation

	Population at T0	Population at T1	Population at T2	Population at T3
N	57	52	47	40
Age (years)	56.8 ± 12.6	56.6 ± 13	55.9 ± 13.3	57.4 ± 12.2
Sex (% male)	77.2	78.8	76.6	82.5
BMI (kg/m2)	27.1 ± 5.9	26.7 ± 5.8	26.7 ± 5.8	27.3 ± 6.1
Smoking				
% Yes	22.8	21.2	19.1	25
% No	70.2	73.1	76.6	72.5
Alcohol use				
% No	59.6	59.6	59.6	62.5
% Light	5.3	5.8	6.4	2.5
% Moderate	21.1	21.2	23.4	25
% Excessive	7	7.7	6.4	7.5
Marital status				
% Single	31.6	32.7	32.7	32.7
% Married/living with partner	61.4	61.5	61.5	61.5
Education level				
% Low	77.2	76.9	80.9	82.5
% High	14	15.4	12.8	12.5
Work status				
% School	0	0	0	0
% Employed	19.3	19.2	23.4	20
% Unemployed	8.8	7.7	10.6	7.5
% Retired	31.6	30.8	29.8	30
% unable to work	28.1	30.8	25.5	32.5
% Other	3.5	3.8	4.3	5
Rehabilitation context				
% Rehabilitation center	71.9	71.2	68.1	70
% Hospital	28.1	28.8	31.9	30
Rehabilitation form				
% Inpatient	7	5.8	8.5	7.5
% Outpatient	87.7	88.5	85.1	85
% Consultancy	5.3	5.8	6.4	7.5
Number of counseling moments				
% 0	17.5	19.2	19.1	20
% 1-3	42.1	42.3	40.4	45
% 4 or more	40.4	38.5	40.4	35

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.12 Physical activity behavior of participants with an amputation

	T0	T1	T2	T3
Total PA				
N	57	52	47	40
Total (min/week)	1294 (615 - 2130)	1942 (1260 - 2565)	1920 (1276 - 2925)	1918 (1130 - 2925)
Light (min/week)	840 (360 - 1680)	1238 (702 - 1732)	1200 (420 - 2070)	840 (420 - 1680)
Moderate (min/week)	210 (0 - 420)	190 (60 - 600)	210 (19 - 840)	330 (60 - 855)
Vigorous (min/week)	30 (0 - 180)	30 (0 - 278)	45 (0 - 240)	60 (0 - 278)

Leisure time				
N	56	51	47	39
Total (min/week)	745 (311 - 1215)	690 (415 - 1290)	585 (262 - 1200)	660 (420 - 1122)
% 0 min/week	7.1	3.9	10.6	2.6
Light (min/week)	88 (0 - 725)	180 (0 - 540)	60 (0 - 420)	90 (0 - 472)
% 0 min/week	48.2	35.3	44.7	43.6
Moderate (min/week)	139 (0 - 375)	180 (0 - 450)	120 (0 - 480)	90 (0 - 480)
% 0 min/week	39.3	27.5	34	30.8
Vigorous (min/week)	30 (0 - 184)	30 (0 - 255)	30 (0 - 240)	60 (0 - 270)
% 0 min/week	46.4	47.1	46.8	46.2
Frequency of leisure time activities (mean ± sd days per week)				
Walking	2.9 ± 3.1	2.9 ± 3	2.7 ± 2.8	3 ± 3
Bycicling	0.7 ± 1.8	0.7 ± 1.6	0.8 ± 1.7	0.7 ± 1.6
wheelchair riding	2.8 ± 3.3	2.2 ± 3.1	1.9 ± 2.9	2.3 ± 3.2
Handbiking	0.2 ± 0.8	0.4 ± 1.3	0.4 ± 1.1	0.3 ± 0.9
Gardening	0.5 ± 1.3	0.5 ± 0.9	0.5 ± 1.1	0.7 ± 1.4
Odd jobs	0.7 ± 1.6	0.9 ± 1.6	0.7 ± 1.3	1.1 ± 1.8
Fitness	0.8 ± 1.2	0.8 ± 1.4	0.5 ± 1	0.5 ± 0.9
Swimming	0.5 ± 0.9	0.3 ± 0.5	0.2 ± 0.5	0.2 ± 0.4
Household				
N	54	52	47	40
Total (min/week)	225 (0 - 652)	485 (202 - 840)	650 (225 - 1050)	420 (105 - 840)
% 0 min/week	29.6	19.2	21.3	22.5
Light (min/week)	225 (0 - 630)	485 (188 - 840)	630 (225 - 1005)	390 (105 - 840)
% 0 min/week	29.6	19.2	21.3	22.5
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 1)	0 (0 - 0)
% 0 min/week	90.7	86.5	74.5	82.5
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	53	49	46	38
Total (min/week)	0 (0 - 0)	0 (0 - 540)	0 (0 - 315)	0 (0 - 660)
% 0 min/week	75.5	59.2	69.6	52.6
Light	0 (0 - 0)	0 (0 - 240)	0 (0 - 0)	0 (0 - 315)
% 0 min/week	84.9	73.5	82.6	73.7
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 150)
% 0 min/week	84.9	77.6	76.1	65.8
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	57	52	47	39
Total (min/week)	0 (0 - 0)	0 (0 - 1)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	87.7	75	85.1	76.9
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	91.2	90.4	89.4	89.7
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	96.5	86.5	95.7	87.2
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	96.2	93.6	92.3

Data presented as median (interquartile range), mean ± SD or %

Spinal cord injury

Appendix 1.13 Descriptive statistics of participants with SCI

	Population at T0	Population at T1	Population at T2	Population at T3
N	38	30	27	24
Age (years)	48.2 ± 15.4	48.2 ± 15.6	49.4 ± 14.2	50 ± 16.2
Sex (% male)	42.1	36.7	44.4	45.8
BMI (kg/m2)	31 ± 23.8	32.4 ± 26.3	31.8 ± 28.3	31.5 ± 29.6
Smoking				
% Yes	18.4	20	14.8	16.7
% No	68.4	73.3	74.1	75
Alcohol use				
% No	42.1	43.3	44.4	41.7
% Light	2.6	3.3	3.7	0
% Moderate	34.2	36.7	33.3	41.7
% Excessive	7.9	10	7.4	8.3
Marital status				
% Single	44.7	43.3	43.3	43.3
% Married/living with partner	50	53.3	53.3	53.3
Education level				
% Low	60.5	56.7	55.6	66.7
% High	34.2	40	37	29.2
Work status				
% School	5.3	3.3	3.7	8.3
% Employed	26.3	26.7	25.9	16.7
% Unemployed	10.5	10	11.1	8.3
% Retired	18.4	20	18.5	25
% unable to work	26.3	26.7	25.9	29.2
% Other	7.9	10	7.4	8.3
Rehabilitation context				
% Rehabilitation center	89.5	86.7	88.9	91.7
% Hospital	10.5	13.3	11.1	8.3
Rehabilitation form				
% Inpatient	13.2	6.7	11.1	16.7
% Outpatient	73.7	76.7	70.4	66.7
% Consultancy	13.2	16.7	18.5	16.7
Number of counseling moments				
% 0	2.6	0	0	4.2
% 1-3	71.1	73.3	70.4	66.7
% 4 or more	26.3	26.7	29.6	29.2

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.14 Physical activity behavior of participants with SCI

	T0	T1	T2	T3
Total PA				
N	38	30	27	24
Total (min/week)	1515 (885 - 2059)	2018 (915 - 3008)	2100 (924 - 2599)	1700 (1061 - 2599)
Light (min/week)	885 (555 - 1582)	1185 (555 - 1642)	1185 (720 - 2115)	1203 (390 - 1779)
Moderate (min/week)	52 (0 - 240)	142 (0 - 465)	30 (0 - 225)	150 (0 - 484)
Vigorous (min/week)	42 (0 - 195)	120 (0 - 377)	90 (0 - 270)	120 (0 - 210)

Leisure time				
N	38	30	26	23
Total (min/week)	435 (188 - 825)	604 (398 - 1155)	540 (375 - 862)	495 (370 - 955)
% 0 min/week	5.3	3.3	3.8	8.7
Light (min/week)	135 (0 - 442)	240 (0 - 555)	195 (1 - 465)	60 (0 - 375)
% 0 min/week	36.8	36.7	26.9	39.1
Moderate (min/week)	52 (0 - 240)	128 (0 - 285)	0 (0 - 232)	90 (0 - 321)
% 0 min/week	34.2	33.3	53.8	39.1
Vigorous (min/week)	42 (0 - 195)	120 (0 - 311)	75 (0 - 225)	120 (0 - 210)
% 0 min/week	44.7	33.3	30.8	30.4
Frequency of leisure time activities (mean ± sd days per week)				
Walking	2.1 ± 2.6	2.2 ± 2.6	1.5 ± 2.1	2 ± 2.5
Bycicling	1.2 ± 2.1	1.6 ± 2.4	0.8 ± 1.8	1.6 ± 2.6
wheelchair riding	1.6 ± 2.6	1.7 ± 2.9	2.6 ± 3.4	2.5 ± 3.3
Handbiking	0.3 ± 1.3	0.3 ± 0.9	0.7 ± 1.4	0.4 ± 1.2
Gardening	0.4 ± 0.9	0.2 ± 0.5	0.2 ± 0.5	0.3 ± 0.7
Odd jobs	0.8 ± 1.6	0.4 ± 1	0.3 ± 0.6	0.7 ± 1.3
Fitness	0	0.7 ± 0.8	0.5 ± 0.9	0.6 ± 1
Swimming	0.5 ± 0.8	0.4 ± 0.8	0.2 ± 0.5	0.2 ± 0.5
Household				
N	38	30	27	22
Total (min/week)	450 (38 - 840)	510 (135 - 998)	360 (180 - 1125)	322 (120 - 630)
% 0 min/week	21.1	13.3	11.1	13.6
Light (min/week)	450 (38 - 840)	510 (135 - 998)	360 (180 - 880)	278 (120 - 604)
% 0 min/week	21.1	13.3	11.1	13.6
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	97.4	86.7	92.6	86.4
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	36	30	27	23
Total (min/week)	0 (0 - 495)	0 (0 - 720)	180 (0 - 930)	0 (0 - 1110)
% 0 min/week	61.1	53.3	48.1	56.5
Light	0 (0 - 300)	0 (0 - 360)	0 (0 - 810)	0 (0 - 840)
% 0 min/week	69.4	70	55.6	65.2
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	86.1	83.3	88.9	82.6
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	38	30	27	24
Total (min/week)	0 (0 - 90)	0 (0 - 71)	0 (0 - 52)	0 (0 - 0)
% 0 min/week	63.2	70	66.7	79.2
Light (min/week)	0 (0 - 22)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	73.7	86.7	92.6	91.7
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	92.1	90	81.5	100
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	94.7	90	85.2	87.5

Data presented as median (interquartile range), mean ± SD or %

Other diseases

Appendix 1.15 Descriptive statistics of participants with other diseases

	Population at T0	Population at T1	Population at T2	Population at T3
N	48	42	43	31
Age (years)	46.4 ± 13.8	47.4 ± 14.1	46.4 ± 13.9	46.9 ± 14.9
Sex (% male)	47.9	47.6	51.2	45.2
BMI (kg/m2)	26 ± 4.6	25.7 ± 4.4	26.1 ± 4.6	26.8 ± 5
Smoking				
% Yes	10.4	9.5	11.6	6.5
% No	72.9	81	72.1	77.4
Alcohol use				
% No	35.4	40.5	34.9	35.5
% Light	18.8	19	20.9	22.6
% Moderate	27.1	28.6	25.6	22.6
% Excessive	2.1	2.4	2.3	3.2
Marital status				
% Single	14.6	16.7	16.7	16.7
% Married/living with partner	75	78.6	78.6	78.6
Education level				
% Low	62.5	64.3	69.8	71
% High	25	28.6	20.9	22.6
Work status				
% School	6.2	7.1	7	9.7
% Employed	39.6	40.5	41.9	41.9
% Unemployed	4.2	2.4	4.7	6.5
% Retired	12.5	14.3	11.6	12.9
% unable to work	20.8	23.8	18.6	16.1
% Other	6.2	7.1	7	6.5
Rehabilitation context				
% Rehabilitation center	62.5	66.7	60.5	61.3
% Hospital	37.5	33.3	39.5	38.7
Rehabilitation form				
% Inpatient	0	0	0	0
% Outpatient	93.8	92.9	95.3	93.5
% Consultancy	6.2	7.1	4.7	6.5
Number of counseling moments				
% 0	4.2	2.4	2.3	6.5
% 1-3	52.1	50	55.8	51.6
% 4 or more	43.8	47.6	41.9	41.9

Data presented as mean ± SD or %

Note: For some participants information was missing, leading to not all percentages adding up to a 100%.

Appendix 1.16 Physical activity behavior of participants with other diseases

	T0	T1	T2	T3
Total PA				
N	48	42	43	31
Total (min/week)	1996 (1282 - 2535)	1715 (1402 - 3205)	2050 (1380 - 2960)	2135 (1560 - 2960)
Light (min/week)	1305 (652 - 2018)	1260 (562 - 2205)	1265 (731 - 2160)	1320 (530 - 2075)
Moderate (min/week)	132 (0 - 615)	172 (8 - 788)	240 (0 - 690)	180 (68 - 780)
Vigorous (min/week)	60 (0 - 188)	125 (40 - 251)	60 (0 - 205)	100 (60 - 240)

Leisure time				
N	48	42	42	31
Total (min/week)	415 (216 - 735)	405 (285 - 889)	412 (259 - 630)	450 (312 - 810)
% 0 min/week	2.1	2.4	2.4	3.2
Light (min/week)	120 (0 - 315)	90 (0 - 288)	120 (0 - 348)	120 (0 - 300)
% 0 min/week	27.1	38.1	31	32.3
Moderate (min/week)	60 (0 - 225)	30 (0 - 285)	60 (0 - 202)	105 (0 - 352)
% 0 min/week	41.7	42.9	40.5	35.5
Vigorous (min/week)	60 (0 - 180)	120 (40 - 232)	60 (0 - 172)	75 (22 - 150)
% 0 min/week	33.3	23.8	35.7	22.6
Frequency of leisure time activities (mean ± sd days per week)				
Walking	3.9 ± 2.6	3.9 ± 2.7	3.7 ± 2.6	3.9 ± 2.7
Bycicling	1.8 ± 2	1.7 ± 1.8	1.2 ± 1.9	1.6 ± 1.7
wheelchair riding	0 ± 0	0 ± 0.3	0.1 ± 0.8	0 ± 0
Handbiking	0 ± 0.1	0 ± 0	0 ± 0	0 ± 0
Gardening	1 ± 1.5	0.8 ± 1.5	0.5 ± 0.8	1.3 ± 1.9
Odd jobs	0.7 ± 1.4	0.6 ± 1.1	0.4 ± 0.8	0.7 ± 1.3
Household				
N	48	42	43	31
Total (min/week)	740 (349 - 1060)	515 (188 - 982)	802 (480 - 1050)	720 (390 - 915)
% 0 min/week	6.2	7.1	2.3	6.5
Light (min/week)	660 (349 - 1028)	510 (188 - 945)	742 (420 - 960)	720 (360 - 915)
% 0 min/week	6.2	7.1	2.3	6.5
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	81.2	85.7	83.7	77.4
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Work				
N	46	42	43	31
Total (min/week)	240 (0 - 810)	660 (0 - 1245)	480 (0 - 1440)	360 (0 - 1440)
% 0 min/week	43.5	33.3	37.2	41.9
Light	0 (0 - 450)	120 (0 - 900)	0 (0 - 690)	0 (0 - 840)
% 0 min/week	58.7	50	58.1	58.1
Moderate (min/week)	0 (0 - 105)	0 (0 - 285)	0 (0 - 450)	0 (0 - 150)
% 0 min/week	71.7	61.9	65.1	71
Vigorous (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	100	100	100	100
Commuting				
N	48	42	43	31
Total (min/week)	0 (0 - 45)	0 (0 - 79)	0 (0 - 60)	0 (0 - 110)
% 0 min/week	64.6	57.1	65.1	54.8
Light (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	83.3	88.1	86	83.9
Moderate (min/week)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
% 0 min/week	97.9	90.5	95.3	93.5
Vigorous (min/week)	0 (0 - 0)	0 (0 - 22)	0 (0 - 0)	0 (0 - 25)
% 0 min/week	77.1	73.8	79.1	71

Data presented as median (interquartile range), mean ± SD or %

Appendix 3. Effect modification of personal characteristics and diagnosis on the development of physical activity behavior

		Total PA			**Leisure time**			**Household**			**Work**			**Commuting**			**MVPA**		
		β	SE	P-value	β	SE	P-value	β	SE	P-value	β	SE	P-value	β	SE	P-value	β	SE	P-value
Diagnosis	(Intercept)	1676.4	76.2	**>.001**	63.3	37.2	**>.001**	626.7	37.7	**>.001**	373.9	43.0	**>.001**	64.5	13.5	**>.001**	654.7	44.9	**>.001**
Brain disease (ref)	t1	223.9	74.2	**.003**	67.6	41.9	.107	-6.3	4.2	.876	144.5	4.1	**>.001**	17.5	18.0	.332	132.7	46.4	**.004**
	t2	211.7	78.3	**.007**	-23.7	44.0	.590	7.4	42.2	.861	172.2	42.7	**>.001**	59.8	18.9	**.002**	147.5	49.0	**.003**
	t3	144.1	80.6	.074	29.9	45.5	.512	-29.2	43.2	.500	128.7	43.7	**.003**	7.5	19.5	.701	105.0	5.4	**.037**
	Musculoskeletal disorder	307.5	109.6	**.005**	-62.1	55.9	.267	181.4	58.9	**.002**	20.4	67.4	**.003**	-7.1	21.2	.736	-54.6	7.4	.438
	Chronic pain	164.6	114.8	.152	-79.4	58.6	.176	169.0	61.9	**.006**	75.6	7.8	.285	4.3	22.3	.845	-246.1	74.1	**.001**
	Neurologic disease	12.9	117.0	.913	-29.8	59.9	.618	45.5	63.0	.470	36.8	72.3	.611	-19.7	22.7	.385	-104.7	75.4	.165
	Organ disease	129.3	128.1	.313	43.7	64.9	.501	73.3	68.0	.281	38.2	77.6	.622	-19.0	24.5	.438	127.1	8.9	.116
	Amputation	-122.4	184.0	.506	344.3	94.5	**>.001**	-205.0	10.4	**.041**	-201.0	114.1	.078	-45.6	35.6	.201	-137.5	118.7	.247
	Spinal cord injury	27.8	219.6	.899	19.5	112.2	.862	-118.7	118.1	.315	67.9	135.8	.617	3.6	42.6	.472	-165.4	141.9	.244
	Other diseases	392.7	197.8	**.047**	15.9	101.1	.875	244.9	106.5	**.021**	106.7	121.9	.382	1.6	38.4	.783	-2.6	127.9	.984
	t1 * Musculoskeletal disorder	38.1	116.8	.744	15.4	66.0	.815	35.0	62.9	.578	-54.5	63.1	.388	4.2	28.3	.157	-39.0	73.0	.593
	t2 * Musculoskeletal disorder	36.5	123.6	.768	5.4	69.6	.470	-32.2	66.6	.629	66.7	67.2	.321	-44.5	29.8	.136	-6.6	77.3	.433
	t3 * Musculoskeletal disorder	70.5	128.6	.584	27.9	72.8	.702	-63.0	69.1	.362	71.6	69.3	.302	4.6	3.9	.189	-3.5	8.4	.965
	t1 * Chronic pain	6.6	122.0	.957	-1.1	69.2	.987	114.3	66.0	.084	-69.0	65.6	.293	-15.0	29.7	.613	-6.7	76.2	.426
	t2 * Chronic pain	-20.1	130.1	.877	66.7	73.2	.363	72.7	7.2	.300	-71.1	7.5	.314	-81.0	31.4	**.010**	-8.2	81.4	.919
	t3 * Chronic pain	-118.9	135.0	.379	-43.8	76.4	.566	17.3	72.4	.811	-52.6	73.0	.471	-28.4	32.5	.383	-21.9	84.4	.796
	t1 * Neurologic disease	-114.5	123.1	.352	-73.0	69.7	.295	66.7	66.3	.315	-99.8	66.9	.136	-18.0	29.9	.548	-12.9	76.9	.116
	t2 * Neurologic disease	-11.6	128.4	.928	121.0	72.6	.096	35.0	69.0	.612	-141.7	69.9	**.043**	-36.8	31.1	.236	-4.5	8.3	.614
	t3 * Neurologic disease	-176.5	131.8	.181	-105.8	74.6	.156	-2.4	7.8	.973	-75.6	71.5	.290	13.2	31.9	.679	-8.7	82.4	.327
	t1 * Organ disease	-94.0	131.9	.476	5.0	74.6	.947	-3.8	71.6	.957	-134.6	71.8	.061	2.7	32.1	.520	28.7	82.4	.728
	t2 * Organ disease	76.0	138.5	.583	49.4	78.3	.528	24.3	74.9	.745	-9.6	75.5	.899	-5.8	33.6	.862	111.6	86.5	.197
	t3 * Organ disease	181.2	144.4	.209	96.5	81.6	.237	2.6	77.8	.792	5.5	78.8	.522	38.2	35.3	.279	154.0	9.3	.088
	t1 * Amputation	365.9	193.8	.059	-36.5	11.3	.741	162.9	105.2	.122	16.4	107.1	.134	85.2	47.0	.070	84.4	121.1	.486
	t2 * Amputation	317.9	201.1	.114	-129.2	113.6	.255	319.9	108.7	**.003**	121.6	109.7	.268	-2.6	48.6	.671	44.6	125.7	.722
	t3 * Amputation	359.5	211.7	.090	-114.4	12.5	.343	203.2	114.4	.076	165.1	115.8	.154	115.8	51.3	**.024**	156.8	132.4	.236

	t1 * Spinal cord injury	-18.7	242.1	.938	86.9	136.3	.524	99.0	129.4	.445	-197.9	129.8	.128	-22.0	58.4	.706	-26.9	151.3	.859
	t2 * Spinal cord injury	271.2	252.1	.282	304.2	143.4	**.034**	171.0	134.8	.205	-152.5	136.6	.264	-44.9	6.5	.458	-74.2	157.7	.638
	t3 * Spinal cord injury	113.3	262.6	.666	142.8	149.6	.340	126.4	144.5	.382	2.7	143.2	.985	-62.1	62.8	.323	49.2	164.3	.765
	t1 * Spinal cord injury	10.7	211.3	.960	-67.1	119.0	.573	-86.2	112.9	.446	179.4	113.4	.114	-17.6	51.1	.731	32.1	132.0	.808
	t2 * Spinal cord injury	-83.8	211.5	.692	-113.2	119.8	.345	67.9	113.0	.548	45.8	113.7	.687	-88.1	51.2	.085	-122.4	132.1	.354
	t3 * Spinal cord injury	96.1	234.1	.681	-44.0	131.5	.738	-54.1	125.0	.665	91.6	125.5	.465	97.4	56.2	.083	-73.8	146.4	.614
	Type III ANOVA Diagnosis			**.001**			**>.001**			**>.001**			**.001**			.311			**>.001**
	*Type III ANOVA Time * Diagnosis*			.612			.263			.493			.105			**.041**			.860
Age	(Intercept)	2429.2	142.5	**>.001**	446.2	73.9	**>.001**	846.2	77.6	**>.001**	1006.4	87.5	**>.001**	115.2	27.7	**>.001**	-96.0	91.7	.296
	t1	436.5	152.0	**.004**	84.4	86.4	.329	85.6	81.7	.295	258.6	81.9	**.002**	66.1	37.0	.074	21.9	95.0	.818
	t2	589.1	164.0	**>.001**	69.4	93.0	.455	104.4	88.1	.236	428.8	88.9	**>.001**	23.1	39.7	.560	78.2	102.6	.446
	t3	416.5	169.0	**.014**	-16.7	96.5	.863	4.1	9.8	.964	441.2	91.4	**>.001**	34.8	4.9	.395	-2.2	105.7	.983
	Age	-12.7	2.7	**>.001**	3.5	1.4	**.012**	-2.9	1.5	**.049**	-11.4	1.6	**>.001**	-1.1	.5	**.033**	13.5	1.7	**>.001**
	t1 * Age	-4.2	2.9	.143	-.5	1.6	.750	-1.0	1.6	.529	-3.1	1.6	**.046**	-0.8	.7	.250	1.6	1.8	.372
	t2 * Age	-6.7	3.1	**.031**	-1.0	1.8	.567	-1.1	1.7	.492	-5.4	1.7	**.001**	0.1	.8	.919	1.1	1.9	.556
	t3 * Age	-5.1	3.2	.113	0.7	1.8	.708	-0.6	1.7	.728	-5.9	1.7	**.001**	-0.2	.8	.797	2.2	2.0	.271
	*Type III ANOVA Time * Age*			.145			.839			.894			**.002**			.618			.696
Sex	(Intercept)	1642.7	59.1	**>.001**	619.5	25.7	**>.001**	461.8	27.6	**>.001**	453.3	39.9	**>.001**	54.7	1.3	**>.001**	69.9	39.4	**>.001**
Male (ref)	t1	265.0	55.9	**>.001**	61.9	25.6	**.016**	48.9	3.2	.105	113.8	3.4	**>.001**	36.5	13.6	**.007**	172.0	34.8	**>.001**
	t2	285.5	58.8	**>.001**	29.6	26.7	.268	93.6	31.7	**.003**	147.8	32.1	**>.001**	4.1	14.3	**.005**	183.8	36.7	**>.001**
	t3	235.0	60.5	**>.001**	4.8	27.8	.142	32.5	32.5	.318	138.9	32.9	**>.001**	51.1	14.7	**.001**	195.5	37.8	**>.001**
	Female	273.9	73.0	**>.001**	-22.4	51.6	.665	45.4	37.9	**>.001**	-45.7	45.4	.314	6.2	14.2	.664	-203.1	46.9	**>.001**
	t1 * Female	-87.6	77.3	.257	17.0	6.0	.776	-24.6	41.7	.555	-25.9	42.0	.537	-22.8	18.8	.225	-128.3	48.2	**.008**
	t2 * Female	-81.9	81.2	.313	-8.0	63.9	.901	-93.6	43.7	**.032**	7.7	44.2	.862	-25.9	19.7	.189	-86.1	5.7	.089
	t3 * Female	-155.2	84.5	.066	-78.5	66.9	.241	-107.9	45.4	**.018**	-2.7	45.9	.953	-53.0	2.5	**.010**	-161.9	52.7	**.002**
	*Type III ANOVA Time * Sex*			.314			.633			**.045**			.887			.080			**.009**
BMI	(Intercept)	2008.8	135.0	**>.001**	668.2	68.1	**>.001**	768.1	71.9	**>.001**	553.0	81.9	**>.001**	5.2	24.2	**.038**	643.7	86.8	**>.001**
	t1	346.7	133.3	**.009**	101.3	75.6	.180	55.3	71.9	.442	155.6	7.9	**.028**	31.1	31.4	.322	131.2	82.7	.113
	t2	204.6	137.1	.136	87.2	77.5	.260	-72.7	74.0	.326	139.3	73.3	.058	54.8	32.2	.089	116.8	85.1	.170

	t3	62.4	140.5	.657	96.6	79.5	.224	-173.9	75.8	**.022**	146.5	74.9	.051	12.7	33.0	.700	72.3	87.2	.407
	BMI	-8.8	4.5	**.049**	-1.9	2.3	.403	-2.4	2.4	.331	-4.8	2.7	.079	0.2	.8	.816	-2.5	2.9	.398
	t1 * BMI	-4.0	4.6	.384	-1.4	2.6	.605	-0.8	2.5	.760	-1.6	2.5	.518	-0.4	1.1	.742	-0.8	2.9	.771
	t2 * BMI	1.9	4.7	.692	-2.1	2.7	.441	4.3	2.6	.093	0.4	2.5	.861	-1.1	1.1	.338	0.8	2.9	.791
	t3 * BMI	3.4	4.9	.490	-2.5	2.7	.356	5.4	2.6	**.038**	-0.4	2.6	.875	0.2	1.1	.859	1.4	3.0	.651
	*Type III ANOVA Time * BMI*			.457			.800			**.042**			.870			.703			.898
Smoking behavior	(Intercept)	1758.6	59.7	**>.001**	619.5	25.7	**>.001**	689.0	27.3	**>.001**	422.9	33.9	**>.001**	55.3	8.2	**>.001**	589.3	35.3	**>.001**
No (ref)	t1	244.3	44.9	**>.001**	61.9	25.6	**.016**	38.9	24.2	.107	114.5	24.4	**>.001**	21.3	1.7	**.047**	111.1	28.0	**>.001**
	t2	278.6	46.8	**>.001**	29.6	26.7	.268	47.4	25.2	.060	162.3	25.6	**>.001**	3.0	11.1	**.007**	172.7	29.2	**>.001**
	t3	194.5	48.6	**>.001**	4.8	27.8	.142	-14.8	26.1	.570	143.8	26.5	**>.001**	19.6	11.6	.091	129.1	3.4	**>.001**
	Yes	9.9	99.4	.921	-22.4	51.6	.665	42.8	54.2	.430	-14.2	61.6	.817	2.4	18.8	.898	-89.4	64.1	.163
	t1 * Yes	26.7	104.3	.798	17.0	6.0	.776	41.5	56.3	.461	-21.9	56.6	.699	2.4	24.9	.925	1.4	65.1	.983
	t2 * Yes	-113.2	111.8	.311	-8.0	63.9	.901	25.1	6.2	.677	-87.0	6.5	.150	-3.5	26.5	.250	-212.3	69.8	**.002**
	t3 * Yes	-190.8	116.6	.102	-78.5	66.9	.241	-21.9	62.8	.728	-53.6	63.5	.398	-9.5	27.6	.730	-98.2	72.8	.178
	*Type III ANOVA Time * Smoking behavior*			.231			.546			.759			.516			.621			**.008**
Alcohol use	(Intercept)	1764.2	63.9	**>.001**	594.5	28.8	**>.001**	727.2	31.2	**>.001**	409.9	37.3	**>.001**	58.6	9.6	**>.001**	533.2	37.8	**>.001**
No (ref)	t1	239.0	53.1	**>.001**	56.5	3.4	.063	53.1	28.6	.064	9.8	28.9	**.002**	29.7	12.7	**.019**	103.9	33.2	**.002**
	t2	206.2	55.5	**>.001**	18.7	31.7	.555	37.8	29.9	.206	13.0	3.3	**>.001**	1.6	13.2	.423	96.5	34.6	**.005**
	t3	93.8	57.6	.103	-12.4	33.0	.706	-24.3	3.9	.433	105.6	31.3	**.001**	19.2	13.7	.161	63.8	36.0	.076
	Light	-89.9	122.9	.465	-3.0	63.5	.962	-138.1	66.8	**.039**	59.2	76.7	.441	-23.7	23.5	.312	-25.4	79.1	.748
	Moderate	86.8	89.8	.334	107.4	46.5	**.021**	-39.9	48.9	.415	33.6	55.8	.547	0.2	17.0	.992	175.0	57.8	**.002**
	Excessive	-614.7	247.9	**.013**	-291.6	128.0	**.023**	-85.4	136.1	.530	-244.3	155.4	.116	-13.3	47.6	.780	-164.1	159.4	.304
	t1 * Light	134.5	129.4	.299	11.0	73.9	.882	88.1	69.6	.206	81.5	7.4	.247	-24.9	31.0	.422	-19.6	8.7	.808
	t2 * Light	360.2	134.1	**.007**	124.6	76.6	.104	82.9	72.4	.252	105.5	73.2	.149	82.3	32.0	**.010**	174.9	83.7	**.037**
	t3 * Light	331.1	139.7	**.018**	202.3	8.5	**.012**	49.0	75.0	.514	128.5	76.9	.095	18.2	33.4	.586	13.0	87.2	.136
	t1 * Moderate	-31.8	93.5	.734	14.9	53.7	.781	-65.7	5.5	.193	33.8	5.8	.505	-11.1	22.4	.619	25.9	58.4	.658
	t2 * Moderate	42.0	99.0	.671	-21.7	56.6	.701	25.7	53.2	.629	4.9	53.9	.928	17.3	23.5	.462	67.5	61.8	.275
	t3 * Moderate	56.8	102.9	.581	34.8	58.7	.553	-9.7	55.3	.861	32.4	55.8	.562	-12.5	24.5	.608	85.6	64.2	.183
	t1 * Excessive	147.2	254.5	.563	119.4	145.1	.411	0.4	137.7	.998	84.2	141.3	.551	-62.3	61.4	.310	11.9	158.8	.485

	t2 * Excessive	78.4	272.9	.774	68.6	155.2	.658	-116.3	148.7	.434	202.6	149.4	.175	-0.8	65.9	.990	169.6	17.4	.319
	t3 * Excessive	716.7	298.2	**.016**	347.4	169.3	**.040**	121.5	163.3	.457	311.3	167.9	.064	6.6	71.9	.927	586.4	186.2	**.002**
	Type III ANOVA Alcohol use			.064			**.001**			.308			.112			.847			**>.001**
	*Type III ANOVA Time * Alcohol use*			.074			.157			.514			.586			.145			**.040**
Education level	(Intercept)	1758.9	61.4	**>.001**	634.4	27.4	**>.001**	723.4	27.9	**>.001**	373.2	34.5	**>.001**	55.3	8.2	**>.001**	584.8	37.8	**>.001**
Low (ref)	t1	216.2	46.9	**>.001**	63.5	26.6	**.017**	35.2	25.3	.164	95.3	25.5	**>.001**	22.5	1.9	**.038**	114.0	29.1	**>.001**
	t2	197.8	49.1	**>.001**	16.8	27.8	.546	34.8	26.5	.190	13.4	26.8	**>.001**	16.5	11.3	.147	127.8	3.6	**>.001**
	t3	90.2	50.8	.076	6.0	28.9	.834	-36.6	27.3	.181	112.1	27.6	**>.001**	14.0	11.7	.234	104.7	31.6	**.001**
	High	13.4	88.3	.879	-77.9	45.7	.088	-94.2	48.2	.051	187.1	54.5	**.001**	1.3	16.4	.935	-43.7	57.3	.446
	t1 * High	100.0	92.6	.280	-1.1	52.6	.984	24.1	5.0	.629	66.9	49.9	.180	-4.7	21.5	.826	-24.7	57.6	.668
	t2 * High	220.5	97.3	**.024**	55.1	55.2	.318	46.7	52.4	.374	78.9	52.7	.134	23.4	22.4	.297	34.6	6.6	.568
	t3 * High	260.9	102.1	**.011**	84.1	58.0	.147	53.1	55.0	.335	94.9	55.1	.085	15.6	23.5	.506	21.7	63.5	.733
	*Type III ANOVA Time * Education level*			**.038**			.375			.749			.284			.581			.791