Effect of a 1-year physical activity intervention on cardiovascular health in long-term childhood cancer survivors – A randomised controlled trial (SURfit)

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ONLINE APPENDIX

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1. SUPPLEMENTARY eMETHODS

Study population: inclusion and exclusion criteria

Eligible participants were identified by the Swiss Childhood Cancer Registry (SCCR).[1,2] The SURfit study included CCS aged <16 years at diagnosis, diagnosed with a cancer classifiable according to the International Classification of Childhood Cancer (ICCC-3) [3] or Langerhans Cell Histiocytosis, who were diagnosed and treated at a clinic of the Swiss Paediatric Oncology Group (SPOG), survived ≥5 years since primary cancer diagnosis or any subsequent cancer event (relapse or 2nd tumour), and were aged ≥16 years at baseline of the study. Participants had to agree that they will commit to the conditions of their study group allocation prior to the allocation and independent of the allocation.

The presence of any of the following criteria, assessed at baseline, lead to exclusion of the participant: participation in another clinical trial, inability to exercise or exercise potentially harmful, pregnant or breast feeding, cardiac arrhythmias under exercise, diagnosis of diabetes <3 months previously, detection or presence of a clinical condition that needs immediate treatment, planned surgeries within the subsequent 12 months that interfere with physical exercising, major musculoskeletal injuries/fractures <2 months previously, change in medication that interfere with the parameters of the CVD risk score <1 month previously, >4 hours of reported vigorous physical activities per week, or, inability to follow the procedures and understand the intervention and assessments of the study, e.g. due to cognitive impairment, language problems, or psychological disorders.

We decided to include a general population of long-term survivors of childhood cancer and not only survivors at high risk for cardiovascular late-effects in order to make our results generalizable to all long-term childhood cancer survivors.

Recruitment

Eligible patients were contacted with an information letter from their former treating hospital including a short study information brochure. Interested survivors received the detailed patient information of the study and the informed consent. All survivors who did not react to the initial study information letter were followed-up by a phone call. Survivors who decided to participate were invited for the baseline assessment where final decision on eligibility was made and the informed consent obtained. We recorded the reasons for non-participation of each contacted survivor who did not want to participate. In addition, basic information on demographics and clinical factors were available from the SCCR on all non-participants.

Assessments

Within the SURfit study, we performed assessments at baseline (T0) and after three (T3), six (T6), and 12 (T12) months. The assessments at T0, T6 and T12 comprised of two visits (a and b, respectively) in the study centre, 14 days apart, and T3 of one visit. The assessments within SURfit have been described in detail.[4-7] For the current analysis we only included information assessed at T0, T6 and T12.

Waist circumference (assessed at T0, T3, T6, T12) was measured with a medical measuring tape. Standing height and weight (assessed at T0, T3, T6, T12) were measured by standard procedures, barefoot and in underwear. Systolic and diastolic blood pressure (assessed at T0, T3, T6, T12) were measured by automated oscillography (DINAMAP® ProCare). Two readings were taken and a third one if the first two differed by >5 mmHg.[8] The mean of the nearest two readings was used for the analysis. Blood was taken fastened in the morning (at T0, T6, T12), stored at -70°C and analysed in one batch at the end of the study. Blood samples were processed using Roche Cobas® 8000 modular analyser series (Roche Diagnostics, USA). Total body percent fat mass and absolute fat mass were estimated by whole body dual x-ray absorptiometry (DXA; at T0 and T12) using a Hologic Discovery densitometer (Hologic, Bedford MA, USA).[9] Peak performance was assessed (at T0, T6, T12) by a continuous incremental cycling test to volitional exhaustion following the step protocol by Godfrey and colleagues.[10,11] Peak performance (watt) was defined as the power maintained over the final 1-minute stage of the test plus 5 watt for each fulfilled 15 second bout of the non-finished stage. Hand grip strength was assessed (at T0, T6, T12) using the JAMAR Hydraulic Hand Dynamometer.[12,13] Each hand was measured 3 times, with alternating sides. The mean strength in the dominant and non-dominant hand were calculated for the current analysis. Leg strength and endurance was assessed (at T0, T6, T12) by the 1-minute sit-to-stand (STS) test.[14,15] The participants performed one test trial at least 20 minutes before the final test. The number of repetitions of standing up and sitting down in the final test was used in the analysis. Physical activity was assessed by ActiGraph® GT3X+ (Pensacola, Florida, USA) accelerometer (100Hz, 60s epochs) worn between the two visits at T0, T6 and T12. Participants were asked to wear the accelerometer all the time, except for water based activities, and even during night-time. For the current analysis, time was restricted to activities between 06:00 a.m. to 10:00 p.m. using the manufacturer's software (ActiLife 6.13.4). Accelerometers were worn on average over 11 days (interquartile range (IQR) 8 to 13 days) with a median wear time of 14.2 hours/day (IQR 13.5 to 15.1). Total physical activity counts, daily minutes spent in moderate-to-vigorous physical activities (MVPA), and daily minutes spent sedentary were calculated using the ActiLife v6.13.4. Software. Daily averages were calculated by dividing the total by valid days (≥10h wear-time between 6am and 10pm). MVPA was defined as ≥2020 counts/min and sedentary time as <100 counts/min.[16] Daily overall and aerobic steps were assessed by pedometer (Fitbug Air) worn for the same period than the accelerometer. Total number of steps were averaged over all valid days (≥100 and ≤50000 steps).[17]

Covariates, baseline demographics and safety

We extracted date of birth, sex, date of diagnosis, cancer diagnosis, and information on relapse(s), secondary cancer(s) and cancer treatment from the participants' medical records. We calculated age at study (date of baseline assessment), age at first cancer diagnosis and time since last cancer diagnosis in years. Cancer diagnoses were categorized according to the International Classifications of Childhood Cancer – 3rd edition (ICCC-3).[3] For cancer treatment, we extracted information on cancer resection surgery(ies), chemotherapy, radiotherapy including location and dose, and stem cell transplantation. We calculated cumulative doses of anthracyclines (Doxorubicin isotoxic equivalent dose, mg/m2)[18] and cumulative doses of steroids (g/m2).[19] At each study time point participants were asked to report any adverse events that occurred since the last visit. In case of an adverse event the following information was assessed: description of event, severity, start and end date, outcome, relationship to the intervention, consequence of the event. All adverse events were classified according to the Common Terminology Criteria for Adverse Events (CTCAE) 4th edition.[20]

Sample size

A study by Kriemler and colleagues using the same composite CVD risk score showed a reduction in the z-score by 14% after a 1-year physical activity intervention in children and adolescents.[21] Based on this, we powered our study to detect a difference between the intervention and control group of 15% after the 1-year intervention. For a power of 0.80 and a two-sided type 1 error probability of 0.05, 60 survivors were required in each arm.[22]

Intervention and control conditions

Survivors in the intervention group were asked to add at least 2.5 h of intense physical activities per week. These should include 30 min of strength building exercises and 2 h of aerobic exercises per week. Exercise bouts

lasting 20 min or longer were counted towards the total weekly training time. This "dose" of physical activity was based on the international recommendations of healthy physical activities from the Centre of Disease Control and Prevention (CDC; www.cdc.gov). Based on the initial physical activity levels, physical fitness tests, general health status and participant's preferences and motivation, subjects of the intervention group received a counselling at the second visit of the baseline assessment. A standardized approach was used to assess survivors' preferences with respect to physical activities, identify possible barriers and determine the individual motivation to start specific activities. Based on this assessment, individualized physical activities were defined and implemented into the participant's daily life. Survivors of the intervention group were also motivated to incorporate activities of moderate intensities into daily life such as active commuting or climbing stairs instead of taking the escalator. The motivational interviews were performed by one of the project physiotherapists who were trained prior to the study. For motivational reasons each survivor of the intervention group was equipped with a step counter (pedometer, Model Fitbug Air) and asked to document daily steps. Participants kept a daily training log using a web-based platform with individual anonymous logins. Data on 1) strenuous exercise performed that day (type of exercise, duration), 2) step counts (overall and aerobic steps), 3) media-related sedentary time and sleeping hours, and 4) mood and well-being were entered and graphically displayed to give the participants immediate feedback about their progress. The participants received a "reminder" message if no entries were made for three consecutive days. If no entries were made for a whole week, the survivor was contacted by phone by his/her "personal coach" (physiotherapist). There were also scheduled phone contacts after 1, 2, 4, 5, 8 and 10 months of the intervention to discuss compliance, motivation, and progress and to re-counsel the survivors on their training plan. Training logs and physical activity behaviour were checked and discussed during the clinic visits (at months 3 and 6), and exercise counselling repeated.

Participants of the control group were asked to keep their activity level constant over the one-year study period. Receiving no specific information or recommendation on physical activity behaviour is the current standard of care during follow-up care of childhood cancer survivors in Switzerland.

This type of personalized intervention allowed us to test the effect of additional physical activity compared to a "normal" activity level.

Change in model to assess the treatment effect

In the published protocol article, we planned to analyse the treatment effect using a mixed model with last observation carried forward (LOCF) as primary analysis and complete case as secondary analysis. When pre-defining and refining the methods in detail for the statistical analysis plan (SAP) we slightly changed the statistical models for the outcomes presented in the current paper. Those changes were done a priori (before unblinding of the data) and based on knowledge gains in the field of analysis of RCTs since the start of the trial. We decided to rather exploit the nature of the repeated measures of this study and use the mixed model to handle missing data points instead of performing one model with LOCF and one based on complete cases.[23] We used the generalized linear mixed effects model to be able to set the treatment effect at baseline to zero by using a constraint on the parameter space.

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3. SUPPLEMENTARY TABLES

eTable 1. Overview of primary and secondary outcomes analysed and displayed

Original outcome as described in clinicaltrials.gov	Changes to the outcome after trial commencement	Unit for the absolute display of the outcome	Unit for the standardized display of the outcome	Cut-off for categorized display of the outcome
Primary Outcome:				
Composite cardiovascular disease (CVD) risk score [z-score] [Time Frame: 6 and 12 months] (summarized mean z-score of waist circumference, blood pressure, HOMA-IR, inverted high-density lipoprotein cholesterol, triglycerides and inverted cardiorespiratory fitness)	We used fasting glucose instead of HOMA-IR in the composite score because it was not possible to find good reference values for HOMA-IR and HOMA-IR varies a lot depending on the laboratory measurement method.	n.a.	z-score	z-score ≥1
Secondary Outcomes:				
Single CVD risk factors:				
Waist circumference [cm] [Time Frame: 3, 6, and 12 months]	Time point 3 months not displayed because of a lot of missing information[a]	cm		≥94 cm in males, ≥80 cm in females[b]
Systolic and diastolic blood pressure [mmHg] [Time Frame: 3, 6, and 12 months]	Time point 3 months not displayed because of a lot of missing information[a]	mmHg		≥130 mmHg systolic and/or ≥85 mmHg diastolic[b]
Homeostasis Model Assessment Insulin Resistance (HOMA-IR) [Time Frame: 6 and 12 months] (calculated from insulin and glucose)	HOMA-IR was replaced by fasting glucose [mmol/l] because we could not find good reference values and the results are extremely variable between laboratories	mmol/l		≥5.6 mmol/l[b]
HbA1c [mmol/mol] [Time Frame: 6 and 12 months]	Displayed in % instead of mmol/mol	%		≥5.7%[c]
Insulin resistance from response to oral glucose tolerance test (oGTT) [Time Frame: 12 months] (Assessment of fasting glucose [mmol/l] and insulin [mIU/l] and glucose 2 hours after drinking of a glucose solution)		mmol/l (absolute value at 2 hours and change from 0-2 hours)		≥7.8 mmol/l at 2 hours of oGTT[c]
Inverted high-density lipoprotein cholesterol (HDL) [mmol/l] [Time Frame: 6 and 12 months]	We did not invert HDL cholesterol when displayed as single secondary endpoint	mmol/l		<1.03 mmol/l in males, <1.30 mmol/l in females[b]

Low-density lipoprotein cholesterol (LDL) [mmol/l] [Time Frame: 6 and 12 months]		mmol/l		≥4.9 mmol/l[d]
Total cholesterol [mmol/l] [Time Frame: 6 and 12 months]	Outcome dropped because HDL and LDL are better markers for CVD than total cholesterol			
Triglycerides [mmol/l] [Time Frame: 6 and 12 months]		mmol/l		≥1.7 mmol/l[b]
Body mass index (BMI) [z-score] [Time Frame: 3, 6, and 12 months] (Calculated from height and weight)	Displayed it in kg/m^2 instead of a z-score Time point 3 months not displayed because of a lot of missing information[a]	kg/m^2		≥25 kg/m^2 [e]
Absolute [kg] and relative [%] body fat mass [Time Frame: 3, 6, and 12 months] (Assessed with 2 methods: skinfold measurement (3, 6, and 12 months) and dual x-ray absorptiometry (DXA, 12 months only))	Only absolute and relative body fat mass assessed by DXA was analysed and displayed	kg and %		≥20% in males, ≥33% in females[f]
Physical fitness:				
Peak oxygen uptake (VO2max) [ml/(kg*min) and % predicted] [Time Frame: 6 and 12 months] (Assessed with maximal spiroergometry test)	Not analysed and displayed due to technical problems with the metabolic cart resulting in many missing and invalid information			
Peak performance [watt/kg and % predicted] [Time Frame: 6 and 12 months] (Assessed with maximal spiroergometry test)	Absolute (watt) and relative (watt/kg) performance was analysed and displayed	Watt/kg und watt	% predicted of watt and watt/kg[g]	
Hand grip strength in the left and right hand [kg] [Time Frame: 6 and 12 months] (Assessed with a hydraulic hand grip dynamometer)	Analysed and displayed as dominant and non-dominant hand instead of left and right hand	kg		
Leg strength and endurance [repetitions/min] [Time Frame: 6 and 12 months] (Assessed with the 1 minute sit-to-stand test)		number of repetitions/min		
Physical activity:				
Total physical activity [counts/min] [Time Frame: 6 and 12 months] (Assessed by accelerometer)		counts/min		

Moderate to vigorous physical activities [minutes/day] [Time Frame: 6 and 12 months] (Assessed by accelerometer)		min/day	<150 min of MVPA/week (<21 min of MVPA/day)[h]
Sedentary behaviour [minutes/day] [Time Frame: 6 and 12 months] (Assessed by accelerometer)		min/day	
Number of steps per day [steps/day] [Time Frame: 6 and 12 months] (Assessed by accelerometer)	Steps assessed by pedometer instead of accelerometer were analysed and displayed	steps/day (for overall steps and aerobic steps)	<10'000 steps/day (overall steps)[i]

Abbreviations: BMI, body mass index; CVD, cardiovascular disease; DXA, dual-energy x-ray absorptiometry; HbA1c, glycated haemoglobin; HDL, high-density lipoprotein cholesterol; HOMA-IR, homeostatic model assessment for insulin resistance; LDL, low-density lipoprotein cholesterol; MVPA, moderate-to-vigorous physical activities; n.a., not applicable; oGTT, oral glucose tolerance test; VO2max, peak oxygen uptake.

Note: an empty cell in the last three columns means that the outcome was not displayed in the respective format.

[a] At 3 months, only very few outcome assessments were performed in addition to the physical activity intervention counselling for participants of the intervention group. To reduce the burden of the study, some of the visits were dropped for the control participants who had a long way to travel to the clinic.

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eTable 2. Participants in the different groups of the per protocol analyses according to their compliance, stratified by originally randomized group

	Control group (N = 75)	Intervention group (N = 76)
Assumed compliance (PP1)		
Assumed control	42 (56%)	34 (45%)
Assumed intervention	18 (24%)	18 (24%)
Dropout[a]	6 (8%)	13 (17%)
No valid CPET[b]	9 (12%)	11 (14%)
Reported compliance, missing entries imputed with zero PA (PP2)		
Reported not compliant	22 (29%)	28 (37%)
Reported compliant	47 (63%)	35 (46%)
Dropout[a]	6 (8%)	13 (17%)
Reported compliance, missing entries imputed with average annual PA level (PP3)		
Reported not compliant	22 (29%)	23 (30%)
Reported compliant	47 (63%)	40 (53%)
Dropout[a]	6 (8%)	13 (17%)

Abbreviations: N, Number; PA, physical activity; PP1, per protocol allocation 1; PP2, per protocol allocation 2; PP3 per protocol allocation 3.

[a] Dropouts were set to missing in the mixed models to estimate the treatment effect of the assumed compliance; dropouts were treated as not compliant and therefore also excluded for the mixed models to estimate the treatment effects of the reported compliance.

[b] Only the following exercise tests were taken into consideration: either maximal or sub-maximal (sub-maximal at same level) effort at both time points, or improvement of performance despite less effort at T12.

eTable 3. Description of all outcomes by study time point and per protocol 1 allocation, assumed intervention and control

	Assumed control group[a]			Assumed intervention group[a]		
	Baseline (N = 76)	6 months (N = 76)	12 months (N = 76)	Baseline (N = 36)	6 months (N = 36)	12 months (N = 36)
Continuous study outcomes						
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
CVD risk score (z-score), primary outcome	**0.4 (0.7)**	**0.4 (0.9)**	**0.4 (0.9)**	**0.5 (0.6)**	**0.2 (0.6)**	**0.2 (0.6)**
N[b]	**76**	**75**	**76**	**36**	**36**	**36**
Waist circumference (cm)	81.2 (10.9)	81.2 (10.5)	81.6 (11.5)	85.3 (9.3)	84.9 (9.5)	85.3 (9.7)
N	75	75	76	36	35	36
Systolic BP (mmHg)	121.1 (15.0)	117.1 (14.3)	115.3 (14.5)	121.0 (14.4)	116.3 (15.2)	116.5 (12.1)
N	76	75	76	36	36	36
Diastolic BP (mmHg)	74.4 (10.2)	71.9 (9.8)	72.7 (10.8)	75.3 (9.4)	72.2 (10.0)	71.9 (8.0)
N	76	75	76	36	36	36
Fasting glucose (mmol/l)	4.6 (0.5)	4.7 (0.5)	4.7 (0.5)	4.8 (0.4)	4.7 (0.3)	4.8 (0.4)
N	73	66	73	36	34	36
HDL cholesterol (mmol/l)	1.5 (0.4)	1.5 (0.4)	1.5 (0.4)	1.5 (0.3)	1.5 (0.3)	1.5 (0.3)
N	76	71	75	36	36	36
Triglycerides (mmol/l)	1.3 (1.0)	1.4 (1.6)	1.4 (1.7)	1.1 (0.6)	1.1 (0.6)	1.0 (0.5)
N	76	71	74	36	36	36
Absolute peak power (Watt)	189.4 (47.9)	188.6 (50.8)	181.9 (47.4)	196.0 (49.7)	210.2 (55.3)	216.2 (55.8)
N	76	72	76	36	36	36
HbA1c (%)	5.1 (0.3)	5.2 (0.3)	5.2 (0.4)	5.1 (0.3)	5.3 (0.5)	5.2 (0.4)
N	74	65	74	35	33	34
Glucose, 2h oGTT[c] (mmol/l)	4.9 (1.7)	na	4.7 (1.6)	4.9 (1.3)	na	4.4 (1.0)
N	72		71	35		36
Glucose change, 0 to 2h oGTT[c] (mmol/l)	0.3 (1.6)	na	0.1 (1.4)	0.2 (1.3)	na	-0.4 (0.9)
N	72		70	35		36
LDL cholesterol (mmol/l)	2.5 (0.8)	2.6 (0.8)	2.5 (0.8)	2.7 (0.7)	2.9 (0.7)	2.7 (0.6)
N	74	70	73	36	36	36
BMI (kg/m²)	23.6 (3.6)	23.5 (3.5)	23.6 (3.7)	24.2 (3.6)	24.0 (3.7)	24.2 (3.8)
N	76	75	76	36	36	36
Total body fat mass (kg)[c]	21.4 (6.3)	na	21.5 (6.6)	22.8 (6.4)	na	22.5 (7.1)
N	75		75	36		36
Total body fat proportion (%)[c]	30.9 (7.0)	na	30.9 (7.0)	30.7 (6.6)	na	30.0 (6.7)
N	75		75	36		36
% predicted abs. peak power	72.0 (16.4)	71.7 (16.9)	69.2 (16.3)	71.2 (14.6)	76.4 (16.1)	78.5 (15.8)
N	76	72	76	36	36	36
Relative peak power (Watt/kg)	2.8 (0.6)	2.8 (0.6)	2.7 (0.6)	2.7 (0.6)	2.9 (0.8)	3.0 (0.7)
N	76	72	76	36	36	36
% predicted rel. peak power	80.2 (17.8)	80.1 (17.5)	77.2 (17.9)	76.7 (15.9)	82.9 (19.0)	84.7 (18.0)
N	76	72	76	36	36	36
Grip strength dominant (kg)	41.9 (13.0)	43.1 (13.3)	42.6 (12.7)	45.4 (11.1)	45.6 (12.4)	47.1 (11.6)

N	73	75	76	36	35	36
Grip strength non-dominant (kg)	38.4 (12.0)	39.7 (12.4)	39.7 (11.3)	43.0 (12.0)	43.2 (11.0)	43.8 (11.8)
N	73	75	76	36	35	36
Repetitions 1-min STS	50.3 (12.5)	55.8 (13.1)	57.5 (11.8)	51.6 (12.1)	55.7 (12.6)	58.3 (14.5)
N	76	75	76	36	36	36
Overall counts per minute	386.2 (127.2)	384.0 (119.1)	373.1 (124.8)	429.7 (130.1)	436.8 (154.3)	434.5 (124.9)
N	76	74	75	36	36	36
Time in MVPA (min/day)	38.2 (18.8)	37.2 (18.5)	36.6 (19.3)	47.5 (19.6)	45.0 (21.9)	45.6 (17.6)
N	76	74	75	36	36	36
Time sedentary (min/day)	542.0 (83.6)	521.1 (79.2)	535.7 (78.6)	523.6 (81.5)	522.4 (81.4)	523.6 (74.7)
N	76	74	75	36	36	36
Average steps/day	7367.3 (2527.5)	7245.5 (2813.9)	7041.3 (2978.4)	7946.3 (2444.7)	8229.5 (3126.7)	7712.6 (2591.6)
N	75	74	74	36	35	36
Average aerobic steps/day	1291.2 (1283.0)	1397.0 (1509.6)	1225.5 (1255.4)	1507.5 (1228.0)	1915.3 (2166.9)	1476.7 (1260.4)
N	75	74	74	36	35	36
***Binary study outcomes*[d]**						
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
CVD risk						
Normal CVD risk	60 (79%)	64 (85%)	62 (82%)	29 (81%)	31 (86%)	31 (86%)
Elevated CVD risk (z-score ≥1)	16 (21%)	11 (15%)	14 (18%)	7 (19%)	5 (14%)	5 (14%)
Waist circumference						
Normal	54 (72%)	55 (73%)	57 (75%)	28 (78%)	26 (74%)	28 (78%)
High (male ≥94 cm, female ≥80 cm)	21 (28%)	20 (27%)	19 (25%)	8 (22%)	9 (26%)	8 (22%)
Blood pressure						
Normotensive	54 (71%)	57 (76%)	65 (86%)	26 (72%)	29 (81%)	28 (78%)
Hypertensive (≥130 systolic / ≥85 diastolic bp)	22 (29%)	18 (24%)	11 (14%)	10 (28%)	7 (19%)	8 (22%)
Fasting glucose						
Normal	72 (99%)	63 (94%)	72 (96%)	35 (97%)	34 (100%)	36 (100%)
Elevated (≥5.6 mmol/L)	1 (1%)	4 (6%)	3 (4%)	1 (3%)	0 (0%)	0 (0%)
HDL cholesterol						
Normal	62 (82%)	57 (80%)	60 (80%)	32 (89%)	35 (97%)	34 (94%)
Low (male <1.03 mmol/L , female <1.30 mmol/L)	14 (18%)	14 (20%)	15 (20%)	4 (11%)	1 (3%)	2 (6%)
Triglycerides						
Normal	64 (84%)	56 (79%)	62 (84%)	32 (89%)	31 (86%)	33 (92%)
Elevated (≥1.7mmol/L)	12 (16%)	15 (21%)	12 (16%)	4 (11%)	5 (14%)	3 (8%)
HbA1c						
Normal	71 (96%)	63 (97%)	67 (91%)	35 (100%)	30 (91%)	29 (85%)
Elevated (≥5.7%)	3 (4%)	2 (3%)	7 (9%)	0 (0%)	3 (9%)	5 (15%)
Insulin resistance (oGTT)[c]						
No	67 (93%)	na	67 (94%)	34 (97%)	na	36 (100%)
Yes (glucose ≥7.8 mmol/L at 2h of oGTT)	5 (7%)		4 (6%)	1 (3%)		0 (0%)
LDL cholesterol						
Normal	74 (100%)	68 (97%)	73 (100%)	36 (100%)	36 (100%)	36 (100%)
Elevated (≥4.9 mmol/l)	0 (0%)	2 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
BMI						

BMI <25kg/m²	54 (71%)	56 (75%)	54 (71%)	23 (64%)	25 (69%)	23 (64%)
BMI ≥25kg/m²	22 (29%)	19 (25%)	22 (29%)	13 (36%)	11 (31%)	13 (36%)
Total body fat proportion[c]						
Normal	62 (83%)	na	59 (79%)	30 (83%)	na	33 (92%)
High (male ≥20%, female ≥33%)	13 (17%)		16 (21%)	6 (17%)		3 (8%)
Reaching CDC recommendations						
<150 min MVPA/week	12 (16%)	16 (22%)	16 (21%)	2 (6%)	7 (19%)	4 (11%)
≥150 min MVPA/week	64 (84%)	58 (78%)	59 (79%)	34 (94%)	29 (81%)	32 (89%)
Total steps/day						
<10'000 steps/day	62 (83%)	64 (86%)	65 (88%)	27 (75%)	26 (74%)	29 (81%)
≥10'000 steps/day	13 (17%)	10 (14%)	9 (12%)	9 (25%)	9 (26%)	7 (19%)

Abbreviations: abs., absolute; BP, blood pressure; CDC, Centers for Disease Control and Prevention; CVD, cardiovascular disease; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; N, number; na, not available; oGTT, oral glucose tolerance test; rel., relative; SD, standard deviation; STS, sit-to-stand.

Footnotes:

The grey shadow covers the variables that were part of the primary CVD risk score.

[a] Control group included participants with <5% increase in maximal power, intervention group included participants with ≥5% increase in maximal power, independent of original randomized allocation.

[b] Number of participants with information on the specific outcome at the specific time point (N non-missing).

[c] oGTT and body composition measured by dual-energy X-ray absorptiometry was not performed at time point 6 months.

[d] Column proportions were calculated based on available numbers for each variable.

eTable 4. Description of all outcomes by study time point and per protocol 2 allocation, reported compliance (missing entries imputed with zero physical activity)

	Compliant control group[a]			Compliant intervention group[a]		
	Baseline (N = 47)	6 months (N = 47)	12 months (N = 47)	Baseline (N = 35)	6 months (N = 35)	12 months (N = 35)
Continuous study outcomes						
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
CVD risk score (z-score), primary outcome	**0.4 (0.6)**	**0.3 (0.8)**	**0.4 (0.8)**	**0.6 (0.7)**	**0.4 (0.8)**	**0.3 (0.7)**
N[b]	**47**	**46**	**47**	**35**	**35**	**35**
Waist circumference (cm)	81.0 (9.6)	81.7 (9.2)	82.2 (10.8)	82.9 (10.4)	81.9 (10.7)	82.3 (10.5)
N	46	46	47	35	34	35
Systolic BP (mmHg)	120.0 (14.4)	114.7 (14.8)	113.7 (13.2)	121.8 (16.1)	117.2 (16.9)	115.7 (16.5)
N	47	46	47	35	35	35
Diastolic BP (mmHg)	71.5 (9.9)	68.5 (8.8)	69.5 (9.0)	77.2 (9.9)	73.8 (11.4)	74.0 (11.8)
N	47	46	47	35	35	35
Fasting glucose (mmol/l)	4.6 (0.5)	4.6 (0.6)	4.7 (0.5)	4.8 (0.5)	4.8 (0.8)	4.8 (1.1)
N	45	41	45	34	31	34
HDL cholesterol (mmol/l)	1.5 (0.3)	1.5 (0.4)	1.5 (0.4)	1.4 (0.3)	1.5 (0.4)	1.5 (0.4)
N	47	45	46	35	34	35
Triglycerides (mmol/l)	1.1 (0.5)	1.4 (1.6)	1.3 (1.7)	1.3 (1.1)	1.3 (1.4)	1.1 (0.7)
N	47	45	45	35	34	34
Absolute peak power (Watt)	184.7 (47.7)	186.4 (56.3)	181.8 (50.6)	192.2 (56.0)	199.6 (60.6)	204.4 (59.8)
N	47	45	47	35	34	33
HbA1c (%)	5.2 (0.4)	5.1 (0.3)	5.2 (0.4)	5.2 (0.5)	5.4 (0.7)	5.4 (0.7)
N	46	41	46	34	31	35
Glucose, 2h oGTT[c] (mmol/l)	4.5 (1.5)	na	4.4 (1.3)	5.2 (1.1)	na	4.6 (1.0)
N	44		43	32		33
Glucose change, 0 to 2h oGTT[c] (mmol/l)	-0.1 (1.4)	na	-0.3 (1.3)	0.5 (1.1)	na	-0.1 (1.0)
N	44		43	32		33
LDL cholesterol (mmol/l)	2.4 (0.7)	2.6 (0.8)	2.4 (0.8)	2.7 (0.7)	2.8 (0.9)	2.7 (0.8)
N	47	45	46	34	33	35
BMI (kg/m²)	23.3 (3.4)	23.4 (3.4)	23.5 (3.7)	24.3 (3.4)	24.0 (3.3)	24.2 (3.4)
N	47	46	47	35	35	35
Total body fat mass (kg)[c]	22.1 (6.9)	na	22.3 (7.4)	22.9 (6.1)	na	22.5 (6.1)
N	47		47	35		34
Total body fat proportion (%)[c]	31.4 (7.4)	na	31.3 (7.5)	31.9 (6.3)	na	31.0 (6.4)
N	47		47	35		34
% predicted abs. peak power	71.4 (16.2)	72.5 (17.7)	70.3 (17.0)	73.3 (16.1)	75.6 (17.2)	77.0 (17.2)
N	47	45	47	35	34	33
Relative peak power (Watt/kg)	2.7 (0.6)	2.7 (0.7)	2.7 (0.7)	2.7 (0.6)	2.9 (0.8)	2.9 (0.7)
N	47	45	47	35	34	33
% predicted rel. peak power	78.8 (20.2)	79.4 (20.8)	77.4 (21.7)	78.6 (17.1)	81.8 (20.1)	83.1 (16.9)
N	47	45	47	35	34	33
Grip strength dominant (kg)	41.0 (13.0)	41.8 (13.5)	41.0 (12.6)	43.2 (12.6)	44.5 (13.7)	45.4 (13.6)

N	45	45	47	35	35	35
Grip strength non-dominant (kg)	37.6 (12.0)	38.1 (11.8)	39.0 (11.7)	39.7 (13.5)	40.7 (14.1)	40.9 (12.8)
N	45	45	47	35	35	35
Repetitions 1-min STS	48.9 (13.3)	52.0 (14.2)	53.2 (14.2)	50.4 (10.8)	55.9 (10.7)	59.3 (11.5)
N	47	46	47	35	35	34
Overall counts per minute	397.0 (118.1)	408.0 (129.3)	385.4 (128.4)	419.4 (157.7)	433.2 (139.0)	397.3 (126.8)
N	46	45	45	35	34	35
Time in MVPA (min/day)	40.3 (19.8)	41.5 (22.9)	38.8 (20.9)	41.4 (22.3)	42.7 (20.2)	38.1 (14.5)
N	46	45	45	35	34	35
Time sedentary (min/day)	529.3 (70.4)	518.4 (88.4)	521.6 (79.5)	520.2 (97.4)	493.0 (74.4)	521.4 (79.0)
N	46	45	45	35	34	35
Average steps/day	7582.5 (2915.0)	7472.4 (3238.2)	7177.2 (3346.4)	7898.0 (2541.1)	8382.4 (2660.8)	7346.9 (2816.3)
N	45	46	47	34	33	34
Average aerobic steps/day	1461.3 (1500.3)	1427.1 (1860.9)	1327.8 (1456.1)	1453.7 (1359.7)	2038.5 (1752.1)	1391.4 (1172.9)
N	45	46	47	34	33	34
Binary study outcomes[d]						
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
CVD risk						
Normal CVD risk	38 (81%)	39 (85%)	41 (87%)	26 (74%)	29 (83%)	29 (83%)
Elevated CVD risk (z-score ≥1)	9 (19%)	7 (15%)	6 (13%)	9 (26%)	6 (17%)	6 (17%)
Waist circumference						
Normal	35 (76%)	32 (70%)	34 (72%)	24 (69%)	24 (71%)	25 (71%)
High (male ≥94 cm, female ≥80 cm)	11 (24%)	14 (30%)	13 (28%)	11 (31%)	10 (29%)	10 (29%)
Blood pressure						
Normotensive	35 (74%)	39 (85%)	40 (85%)	23 (66%)	24 (69%)	29 (83%)
Hypertensive (≥130 systolic/≥85 diastolic)	12 (26%)	7 (15%)	7 (15%)	12 (34%)	11 (31%)	6 (17%)
Fasting glucose						
Normal	44 (98%)	40 (95%)	46 (98%)	32 (94%)	30 (97%)	34 (97%)
Elevated (≥5.6 mol/L)	1 (2%)	2 (5%)	1 (2%)	2 (6%)	1 (3%)	1 (3%)
HDL cholesterol						
Normal	40 (85%)	37 (82%)	36 (78%)	29 (83%)	30 (88%)	31 (89%)
Low (male <1.03 mmol/L, female <1.30 mmol/L)	7 (15%)	8 (18%)	10 (22%)	6 (17%)	4 (12%)	4 (11%)
Triglycerides						
Normal	42 (89%)	36 (80%)	40 (89%)	29 (83%)	29 (85%)	30 (88%)
Elevated (≥1.7mmol/L)	5 (11%)	9 (20%)	5 (11%)	6 (17%)	5 (15%)	4 (12%)
HbA1c						
Normal	44 (96%)	40 (98%)	42 (91%)	33 (97%)	29 (94%)	29 (83%)
Elevated (≥5.7%)	2 (4%)	1 (2%)	4 (9%)	1 (3%)	2 (6%)	6 (17%)
Insulin resistance (oGTT)[c]						
No	42 (95%)	na	42 (98%)	31 (97%)	na	33 (100%)
Yes (glucose ≥7.8 mmol/L at 2h of oGTT)	2 (5%)		1 (2%)	1 (3%)		0 (0%)
LDL cholesterol						
Normal	47 (100%)	44 (98%)	46 (100%)	34 (100%)	32 (97%)	35 (100%)
Elevated (≥4.9 mmol/l)	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)

BMI						
BMI <25kg/m²	34 (72%)	37 (80%)	34 (72%)	21 (60%)	22 (63%)	20 (57%)
BMI ≥25kg/m²	13 (28%)	9 (20%)	13 (28%)	14 (40%)	13 (37%)	15 (43%)
Total body fat proportion[c]						
Normal	35 (74%)	na	35 (74%)	32 (91%)	na	28 (82%)
High (male ≥20%, female ≥33%)	12 (26%)		12 (26%)	3 (9%)		6 (18%)
Reaching CDC recommendations						
<150 min MVPA/week	6 (13%)	9 (20%)	11 (24%)	6 (17%)	6 (18%)	4 (11%)
≥150 min MVPA/week	40 (87%)	36 (80%)	34 (76%)	29 (83%)	28 (82%)	31 (89%)
Total steps/day						
<10'000 steps/day	35 (78%)	38 (83%)	41 (87%)	27 (79%)	23 (70%)	28 (82%)
≥10'000 steps/day	10 (22%)	8 (17%)	6 (13%)	7 (21%)	10 (30%)	6 (18%)

Abbreviations: abs., absolute; BP, blood pressure; CDC, Centers for Disease Control and Prevention; CVD, cardiovascular disease; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; N, number; na, not available; oGTT, oral glucose tolerance test; rel., relative; SD, standard deviation; STS, sit-to-stand.

Footnotes:

The grey shadow covers the variables that were part of the primary CVD risk score.

[a] Compliant intervention participants included survivors who reported to have reached at least 60% of their personal physical activity goal, based on daily online diary entries (missing entries were imputed with 0 activity); compliant control participants included survivors who did not increase their physical activity level (≤30 increase in intense physical activities from baseline to 12 months post-randomization).

[b] Number of participants with information on the specific outcome at the specific time point (N non-missing).

[c] oGTT and body composition measured by dual-energy X-ray absorptiometry was not performed at time point 6 months.

[d] Column proportions were calculated based on available numbers for each variable.

eTable 5: Description of all outcomes by study time point and per protocol 3 allocation, reported compliance (missing entries imputed with mean annual physical activity level)

	Compliant control group[a]			Compliant intervention group[a]		
	Baseline (N = 47)	6 months (N = 47)	12 months (N = 47)	Baseline (N = 40)	6 months (N = 40)	12 months (N = 40)
Continuous study outcomes						
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
CVD risk score (z-score), primary outcome	**0.4 (0.6)**	**0.3 (0.8)**	**0.4 (0.8)**	**0.7 (0.7)**	**0.5 (0.8)**	**0.4 (0.8)**
N[b]	**47**	**46**	**47**	**40**	**40**	**40**
Waist circumference (cm)	81.0 (9.6)	81.7 (9.2)	82.2 (10.8)	84.1 (11.4)	83.4 (11.6)	83.7 (11.7)
N	46	46	47	40	39	40
Systolic BP (mmHg)	120.0 (14.4)	114.7 (14.8)	113.7 (13.2)	123.5 (16.0)	118.8 (16.9)	115.8 (15.6)
N	47	46	47	40	40	40
Diastolic BP (mmHg)	71.5 (9.9)	68.5 (8.8)	69.5 (9.0)	77.7 (9.6)	74.5 (10.9)	74.1 (11.1)
N	47	46	47	40	40	40
Fasting glucose (mmol/l)	4.6 (0.5)	4.6 (0.6)	4.7 (0.5)	4.8 (0.5)	4.8 (0.7)	4.9 (1.0)
N	45	41	45	39	35	38
HDL cholesterol (mmol/l)	1.5 (0.3)	1.5 (0.4)	1.5 (0.4)	1.4 (0.3)	1.4 (0.4)	1.5 (0.4)
N	47	45	46	40	39	39
Triglycerides (mmol/l)	1.1 (0.5)	1.4 (1.6)	1.3 (1.7)	1.4 (1.3)	1.4 (1.4)	1.3 (1.3)
N	47	45	45	40	39	38
Absolute peak power (Watt)	184.7 (47.7)	186.4 (56.3)	181.8 (50.6)	190.5 (55.8)	195.8 (60.4)	199.4 (58.9)
N	47	45	47	40	39	38
HbA1c (%)	5.2 (0.4)	5.1 (0.3)	5.2 (0.4)	5.2 (0.5)	5.4 (0.6)	5.4 (0.6)
N	46	41	46	39	35	39
Glucose, 2h oGTT[c] (mmol/l)	4.5 (1.5)	na	4.4 (1.3)	5.4 (1.4)	na	4.7 (1.2)
N	44		43	37		37
Glucose change, 0 to 2h oGTT[c] (mmol/l)	-0.1 (1.4)	na	-0.3 (1.3)	0.6 (1.4)	na	-0.0 (1.1)
N	44		43	37		37
LDL cholesterol (mmol/l)	2.4 (0.7)	2.6 (0.8)	2.4 (0.8)	2.7 (0.8)	2.7 (0.9)	2.7 (0.8)
N	47	45	46	39	38	38
BMI (kg/m²)	23.3 (3.4)	23.4 (3.4)	23.5 (3.7)	24.4 (3.7)	24.1 (3.6)	24.2 (3.6)
N	47	46	47	40	40	40
Total body fat mass (kg)[c]	22.1 (6.9)	na	22.3 (7.4)	22.6 (6.0)	na	22.5 (6.4)
N	47		47	39		39
Total body fat proportion (%)[c]	31.4 (7.4)	na	31.3 (7.5)	31.4 (6.2)	na	30.7 (6.2)
N	47		47	39		39
% predicted abs. peak power	71.4 (16.2)	72.5 (17.7)	70.3 (17.0)	71.3 (17.0)	72.9 (18.4)	73.9 (18.4)
N	47	45	47	40	39	38
Relative peak power (Watt/kg)	2.7 (0.6)	2.7 (0.7)	2.7 (0.7)	2.7 (0.6)	2.8 (0.8)	2.8 (0.7)
N	47	45	47	40	39	38
% predicted rel. peak power	78.8 (20.2)	79.4 (20.8)	77.4 (21.7)	76.7 (17.3)	79.2 (20.6)	80.1 (17.9)
N	47	45	47	40	39	38
Grip strength dominant (kg)	41.0 (13.0)	41.8 (13.5)	41.0 (12.6)	44.4 (13.7)	45.3 (13.8)	45.9 (13.6)
N	45	45	47	40	40	40
Grip strength non-dominant (kg)	37.6 (12.0)	38.1 (11.8)	39.0 (11.7)	40.6 (13.3)	41.6 (13.7)	41.6 (12.4)
N	45	45	47	40	40	40

Repetitions 1-min STS	48.9 (13.3)	52.0 (14.2)	53.2 (14.2)	48.9 (11.3)	54.1 (12.1)	57.2 (12.6)
N	47	46	47	40	40	39
Overall counts per minute	397.0 (118.1)	408.0 (129.3)	385.4 (128.4)	402.0 (158.3)	426.1 (146.0)	391.7 (141.6)
N	46	45	45	39	38	40
Time in MVPA (min/day)	40.3 (19.8)	41.5 (22.9)	38.8 (20.9)	39.4 (22.0)	41.4 (20.1)	37.8 (16.8)
N	46	45	45	39	38	40
Time sedentary (min/day)	529.3 (70.4)	518.4 (88.4)	521.6 (79.5)	528.4 (96.4)	499.2 (75.1)	527.1 (82.6)
N	46	45	45	39	38	40
Average steps/day	7582.5 (2915.0)	7472.4 (3238.2)	7177.2 (3346.4)	7576.2 (2641.7)	8098.3 (2890.4)	7117.1 (2876.4)
N	45	46	47	38	38	37
Average aerobic steps/day	1461.3 (1500.3)	1427.1 (1860.9)	1327.8 (1456.1)	1369.0 (1342.7)	1904.7 (1704.1)	1326.9 (1145.3)
N	45	46	47	38	38	37
***Binary study outcomes*[d]**						
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
CVD risk						
Normal CVD risk	38 (81%)	39 (85%)	41 (87%)	28 (70%)	32 (80%)	32 (80%)
Elevated CVD risk (z-score ≥1)	9 (19%)	7 (15%)	6 (13%)	12 (30%)	8 (20%)	8 (20%)
Waist circumference						
Normal	35 (76%)	32 (70%)	34 (72%)	27 (68%)	27 (69%)	28 (70%)
High (male ≥94 cm, female ≥80)	11 (24%)	14 (30%)	13 (28%)	13 (33%)	12 (31%)	12 (30%)
Blood pressure						
Normotensive	35 (74%)	39 (85%)	40 (85%)	25 (63%)	27 (68%)	34 (85%)
Hypertensive (≥130 systolic / ≥85 diastolic bp)	12 (26%)	7 (15%)	7 (15%)	15 (38%)	13 (33%)	6 (15%)
Fasting glucose						
Normal	44 (98%)	40 (95%)	46 (98%)	37 (95%)	34 (97%)	37 (95%)
Elevated (≥5.6 mmol/L)	1 (2%)	2 (5%)	1 (2%)	2 (5%)	1 (3%)	2 (5%)
HDL cholesterol						
Normal	38 (81%)	39 (85%)	41 (87%)	28 (70%)	32 (80%)	32 (80%)
Low (male <1.03 mmol/L, female <1.30 mmol/L)	9 (19%)	7 (15%)	6 (13%)	12 (30%)	8 (20%)	8 (20%)
Triglycerides						
Normal	47 (100%)	44 (98%)	46 (100%)	39 (100%)	37 (97%)	38 (100%)
Elevated (≥1.7mmol/L)	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)
HbA1c						
Normal	44 (96%)	40 (98%)	42 (91%)	38 (97%)	33 (94%)	33 (85%)
Elevated (≥5.7%)	2 (4%)	1 (2%)	4 (9%)	1 (3%)	2 (6%)	6 (15%)
Insulin resistance (oGTT)[c]						
No	42 (95%)	na	42 (98%)	35 (95%)	na	36 (97%)
Yes (glucose ≥7.8 mmol/L at 2h of oGTT)	2 (5%)		1 (2%)	2 (5%)		1 (3%)
LDL cholesterol						
Normal	40 (85%)	37 (82%)	36 (78%)	31 (78%)	33 (85%)	33 (85%)
Elevated (≥4.9 mmol/l)	7 (15%)	8 (18%)	10 (22%)	9 (23%)	6 (15%)	6 (15%)
BMI						
BMI <25kg/m²	42 (89%)	36 (80%)	40 (89%)	31 (78%)	32 (82%)	33 (87%)
BMI ≥25kg/m²	5 (11%)	9 (20%)	5 (11%)	9 (23%)	7 (18%)	5 (13%)
Total body fat proportion[c]						
Normal	34 (72%)	37 (80%)	34 (72%)	23 (57%)	25 (63%)	23 (57%)
High (male ≥20%, female ≥33%)	13 (28%)	9 (20%)	13 (28%)	17 (43%)	15 (38%)	17 (43%)
Reaching CDC recommendations						

<150 min MVPA/week	6 (13%)	9 (20%)	11 (24%)	7 (18%)	8 (21%)	6 (15%)
≥150 min MVPA/week	40 (87%)	36 (80%)	34 (76%)	32 (82%)	30 (79%)	34 (85%)
Total steps/day						
<10'000 steps/day	35 (78%)	38 (83%)	41 (87%)	31 (82%)	27 (71%)	31 (84%)
≥10'000 steps/day	10 (22%)	8 (17%)	6 (13%)	7 (18%)	11 (29%)	6 (16%)

Abbreviations: abs., absolute; BP, blood pressure; CDC, Centers for Disease Control and Prevention; CVD, cardiovascular disease; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; N, number; na, not available; oGTT, oral glucose tolerance test; rel., relative; SD, standard deviation; STS, sit-to-stand.

Footnotes:

The grey shadow covers the variables that were part of the primary CVD risk score.

[a] Compliant intervention participants included survivors who reported to have reached at least 60% of their personal physical activity goal, based on daily online diary entries (missing entries were imputed with the annual mean minutes of daily physical activity); compliant control participants included survivors who did not increase their physical activity level (≤30 increase in intense physical activities from baseline to 12 months post-randomization).

[b] Number of participants with information on the specific outcome at the specific time point (N non-missing).

[c] oGTT and body composition measured by dual-energy X-ray absorptiometry was not performed at time point 6 months.

[d] Column proportions were calculated based on available numbers for each variable.

eTable 6. Intervention effect (marginal mean difference from randomization) of all continuous secondary outcomes at each study time point with intention-to-treat allocation (ITT, as randomized); from mixed effects generalized linear model

	Time point 6 months									Time point 12 months								
	Intervention group			Control group			Difference Intervention - Control				Intervention group			Control group			Difference Intervention - Control			
	β	95% CI		β	95% CI		β	95% CI		p-value	β	95% CI		β	95% CI		β	95% CI		p-value
Waist circumference (cm)	-0.70	-1.42	0.01	1.04	0.35	1.74	-1.75	-2.74	-0.75	**0.001**	-0.28	-1.00	0.44	0.92	0.22	1.62	-1.20	-2.21	-0.20	**0.019**
Systolic blood pressure (mmHg)	-4.70	-6.48	-2.92	-4.81	-6.54	-3.08	0.11	-2.37	2.59	0.931	-6.49	-8.31	-4.67	-5.59	-7.32	-3.86	-0.90	-3.42	1.61	0.482
Diastolic blood pressure (mmHg)	-2.69	-3.94	-1.44	-3.44	-4.66	-2.22	0.75	-1.01	2.51	0.404	-3.39	-4.67	-2.11	-2.22	-3.43	-1.00	-1.17	-2.96	0.61	0.196
Fasting glucose (mmol/l)	0.07	-0.02	0.17	0.07	-0.02	0.16	0.00	-0.13	0.13	0.982	0.09	0.00	0.18	0.08	-0.01	0.17	0.01	-0.12	0.14	0.867
HDL cholesterol (mmol/l)	0.05	0.01	0.09	0.04	0.00	0.07	0.01	-0.04	0.07	0.638	0.07	0.03	0.11	0.03	-0.01	0.07	0.04	-0.02	0.09	0.162
Triglycerides (mmol/l)	-0.05	-0.24	0.15	0.16	-0.02	0.34	-0.21	-0.47	0.06	0.131	-0.07	-0.26	0.13	0.15	-0.04	0.33	-0.21	-0.48	0.06	0.119
Absolute peak power (Watt)	3.84	0.24	7.43	0.74	-2.73	4.22	3.09	-1.90	8.09	0.225	0.72	-2.96	4.40	-1.82	-5.27	1.62	2.54	-2.50	7.58	0.324
HbA1c (%)	0.15	0.07	0.22	0.00	-0.07	0.07	0.15	0.05	0.25	**0.005**	0.17	0.09	0.24	0.04	-0.03	0.11	0.12	0.02	0.22	**0.016**
Glucose, 2h oGTT (mmol/l)	na			na			na				-0.18	-0.43	0.06	-0.39	-0.62	-0.15	0.20	-0.14	0.55	0.248
Glucose change, 0-2h oGTT (mmol/l)	na			na			na				-0.23	-0.47	0.02	-0.46	-0.69	-0.22	0.23	-0.11	0.57	0.182
LDL cholesterol (mmol/l)	0.10	0.01	0.18	0.15	0.07	0.24	-0.06	-0.18	0.06	0.351	0.01	-0.08	0.11	0.04	-0.05	0.12	-0.02	-0.15	0.10	0.732
BMI (kg/m²)	-0.24	-0.43	-0.05	0.07	-0.11	0.25	-0.31	-0.57	-0.04	**0.022**	-0.15	-0.34	0.04	0.15	-0.03	0.33	-0.30	-0.56	-0.03	**0.027**
Total body fat mass (kg)	na			na			na				-0.30	-0.69	0.08	0.31	-0.05	0.67	-0.61	-1.14	-0.08	**0.023**
Total body fat proportion (%)	na			na			na				-0.51	-0.83	-0.19	0.07	-0.23	0.37	-0.58	-1.02	-0.14	**0.010**

% predicted abs. peak power	1.41	0.09	2.72	0.10	-1.17	1.36	1.31	-0.52	3.14	0.159	0.28	-1.07	1.62	-0.77	-2.03	0.49	1.04	-0.80	2.89	0.266
Relative peak power (Watt/kg)	0.08	0.03	0.14	-0.01	-0.06	0.04	0.09	0.02	0.16	**0.017**	0.02	-0.03	0.08	-0.03	-0.08	0.02	0.06	-0.02	0.13	0.145
% predicted rel. peak power	2.40	0.90	3.89	-0.29	-1.74	1.15	2.69	0.61	4.77	**0.011**	0.69	-0.84	2.22	-0.96	-2.39	0.47	1.65	-0.44	3.74	0.122
Grip strength dominant (kg)	0.56	-0.25	1.36	0.86	0.06	1.65	-0.30	-1.43	0.84	0.605	1.54	0.71	2.36	0.39	-0.40	1.18	1.15	0.00	2.29	**0.049**
Grip strength non-dominant (kg)	1.15	0.37	1.93	0.42	-0.35	1.18	0.74	-0.36	1.83	0.187	1.22	0.42	2.02	1.34	0.58	2.10	-0.12	-1.22	0.98	0.832
Repetitions 1-min STS, 2nd trial	6.26	5.04	7.47	3.17	1.99	4.35	3.09	1.39	4.79	**<0.001**	8.13	6.88	9.38	5.12	3.92	6.31	3.01	1.28	4.74	**0.001**
Overall counts per minute	-2.98	-22.45	16.48	-6.63	-25.37	12.11	3.64	-23.4	30.7	0.792	-23.98	-43.61	-4.34	-3.73	-22.61	15.15	-20.25	-47.51	7.01	0.145
Time in MVPA (min/day)	-2.67	-5.95	0.61	-1.20	-4.35	1.96	-1.47	-6.03	3.08	0.526	-4.20	-7.51	-0.90	-0.62	-3.80	2.56	-3.59	-8.18	1.01	0.126
Time sedentary (min/day)	-16.16	-29.34	-2.99	-7.40	-20.09	5.29	-8.76	-27.06	9.53	0.348	5.19	-8.09	18.47	-6.48	-19.26	6.30	11.67	-6.77	30.10	0.215
Average steps/day	114	-377	605	-165	-635	305	279	-401	959	0.421	-579	-1082	-76	-88	-558	382	-491	-1180	198	0.163
Average aerobic steps/day	251	-18.7	521	-14.1	-272	244	265	-108	639	0.164	-208	-484	69	-38	-296	219	-169	-547	209	0.381

Footnote: The estimates represent the marginal mean changes of all continuous secondary outcomes, from baseline to 6 and 12 months post-randomization for the intervention and control group. The grey shadow covers the variables that were part of the primary CVD risk score. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline value of the respective outcome. Treatment allocation was based on intention-to-treat (as randomized). All randomized participants (N=151) with valid baseline measurement of the respective outcome were included in the models. See also Figure 3A and eFigure 2A for a graphical display of the same results.

Abbreviations: abs., absolute; BMI, body mass index; CI, confidence interval; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; na, not available; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand; β, marginal estimate.

eTable 7. Intervention effect (marginal mean difference from randomization) of all secondary continuous outcomes at each study time point with per protocol allocation 1; from mixed effects generalized linear model

	Time point 6 months								Time point 12 months							
	Intervention group			Control group			Difference Intervention - Control			Intervention group			Control group			Difference Intervention - Control			
	β	95% CI		β	95% CI		β	95% CI	p-value	β	95% CI		β	95% CI		β	95% CI		p-value
Waist circumference (cm)	-0.45	-1.48 -	0.57	0.09	-0.61 -	0.80	-0.55	-1.79 - 0.70	0.390	0.10	-0.91 -	1.11	0.33	-0.37 -	1.03	-0.23	-1.47 -	1.00	0.710
Systolic blood pressure (mmHg)	-4.92	-7.39 -	-2.45	-3.98	-5.69 -	-2.26	-0.95	-3.96 - 2.07	0.538	-4.74	-7.21 -	-2.27	-5.76	-7.46 -	-4.06	1.02	-1.98 -	4.02	0.506
Diastolic blood pressure (mmHg)	-3.16	-4.88 -	-1.45	-2.58	-3.76 -	-1.39	-0.59	-2.68 - 1.51	0.583	-3.45	-5.17 -	-1.74	-1.75	-2.93 -	-0.57	-1.70	-3.79 -	0.38	0.110
Fasting glucose (mmol/l)	0.03	-0.07 -	0.13	0.08	0.01 -	0.15	-0.05	-0.17 - 0.07	0.390	0.03	-0.06 -	0.13	0.08	0.01 -	0.15	-0.04	-0.16 -	0.07	0.459
HDL cholesterol (mmol/l)	0.07	0.02 -	0.12	0.04	0.00 -	0.07	0.03	-0.03 - 0.10	0.274	0.07	0.02 -	0.12	0.02	-0.01 -	0.06	0.05	-0.01 -	0.11	0.106
Triglycerides (mmol/l)	-0.08	-0.36 -	0.20	0.17	-0.02 -	0.37	-0.26	-0.60 - 0.09	0.142	-0.13	-0.40 -	0.15	0.15	-0.05 -	0.34	-0.27	-0.61 -	0.07	0.115
Absolute peak power (Watt)	14.11	10.33 -	17.89	-1.02	-3.69 -	1.65	15.12	10.49 - 19.76	**<0.001**	20.14	16.36 -	23.92	-7.40	-10.00 -	-4.80	27.54	22.95 -	32.13	**<0.001**
HbA1c (%)	0.16	0.06 -	0.27	0.04	-0.03 -	0.11	0.12	0.00 - 0.25	0.054	0.12	0.02 -	0.22	0.11	0.04 -	0.17	0.01	-0.11 -	0.13	0.891
Glucose, 2h oGTT (mmol/l)	na			na			na			-0.57	-0.89 -	-0.24	-0.18	-0.42 -	0.05	-0.38	-0.78 -	0.02	0.060
Glucose change, 0-2h oGTT (mmol/l)	na			na			na			-0.62	-0.94 -	-0.30	-0.26	-0.50 -	-0.03	-0.36	-0.75 -	0.04	0.079
LDL cholesterol (mmol/l)	0.15	0.04 -	0.27	0.11	0.03 -	0.19	0.05	-0.10 - 0.19	0.533	-0.02	-0.13 -	0.10	0.01	-0.07 -	0.09	-0.02	-0.17 -	0.12	0.734
BMI (kg/m²)	-0.18	-0.43 -	0.07	-0.08	-0.25 -	0.10	-0.11	-0.41 - 0.20	0.496	0.03	-0.22 -	0.28	-0.03	-0.20 -	0.15	0.06	-0.25 -	0.36	0.715
Total body fat mass (kg)	na			na			na			-0.30	-0.82 -	0.23	0.08	-0.28 -	0.45	-0.38	-1.02 -	0.27	0.251
Total body fat proportion (%)	na			na			na			-0.70	-1.14 -	-0.27	-0.02	-0.32 -	0.29	-0.69	-1.22 -	-0.15	**0.012**
% predicted abs. peak power	5.19	3.84 -	6.55	-0.52	-1.47 -	0.44	5.71	4.05 - 7.37	**<0.001**	7.26	5.90 -	8.62	-2.81	-3.74 -	-1.88	10.07	8.42 -	11.72	**<0.001**

Relative peak power (Watt/kg)	0.21	0.15 -	0.27	-0.02	-0.06 -	0.03	0.23	0.16 -	0.30	**<0.001**	0.28	0.22 -	0.34	-0.11	-0.15 -	-0.07	0.39	0.32 -	0.46	**<0.001**
% predicted rel. peak power	6.04	4.38 -	7.71	-0.53	-1.71 -	0.64	6.58	4.53 -	8.62	**<0.001**	7.88	6.21 -	9.54	-3.04	-4.19 -	-1.90	10.92	8.89 -	12.95	**<0.001**
Grip strength dominant (kg)	0.53	-0.58 -	1.65	1.35	0.57 -	2.12	-0.81	-2.18 -	0.55	0.243	1.75	0.65 -	2.86	0.99	0.21 -	1.76	0.77	-0.58 -	2.12	0.265
Grip strength non-dominant (kg)	0.63	-0.47 -	1.73	1.28	0.52 -	2.05	-0.65	-1.99 -	0.69	0.340	1.07	-0.01 -	2.15	1.46	0.70 -	2.21	-0.39	-1.71 -	0.94	0.568
Repetitions 1-min STS, 2nd trial	4.16	2.50 -	5.82	5.44	4.29 -	6.59	-1.28	-3.30 -	0.74	0.215	6.75	5.09 -	8.40	7.23	6.09 -	8.37	-0.49	-2.50 -	1.53	0.635
Overall counts per minute	13.82	-11.70 -	39.35	-5.69	-23.44 -	12.07	19.51	-11.69 -	50.70	0.220	11.51	-14.02 -	37.03	-16.44	-34.07 -	1.20	27.94	-3.18 -	59.06	0.078
Time in MVPA (min/day)	-0.81	-5.06 -	3.43	-1.80	-4.74 -	1.15	0.98	-4.21 -	6.18	0.710	-0.14	-4.39 -	4.10	-2.35	-5.28 -	0.58	2.20	-2.98 -	7.39	0.404
Time sedentary (min/day)	-5.04	-22.95 -	12.87	-19.12	-31.59 -	-6.66	14.08	-7.79 -	35.96	0.207	-3.84	-21.75 -	14.08	-4.43	-16.82 -	7.95	0.60	-21.23 -	22.42	0.957
Average steps/day	392	-276 -	1059	-196	-658 -	265	588	-226 -	1402	0.157	-135	-794 -	525	-370	-831 -	91	235	-571 -	1042	0.567
Average aerobic steps/day	461	88 -	835	49	-209 -	308	412	-43 -	867	0.076	25	-344 -	393	-91	-349 -	219	116	-335 -	567	0.615

Footnote: The estimates represent marginal mean changes of all continuous secondary outcomes from baseline to 6 and 12 months post-randomization for the intervention and control group. The grey shadow covers the variables that were part of the primary CVD risk score. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline value of the respective outcome. Treatment allocation was based on assumed compliance (per protocol 1 analysis): the control group included participants who increased their maximal power by <5%; the intervention group included participants who increased their maximal power by ≥5%. All assumed compliant participants (N=112) with valid baseline measurement of the respective outcome were included in the models. See also Figure 3B and eFigure 2B for a graphical display of the same results.

Abbreviations: abs., absolute; BMI, body mass index; CI, confidence interval; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; na, not available; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand; β, marginal estimate.

eTable 8. Intervention effect (marginal mean difference from randomization) of all secondary continuous outcomes at each study time point with per protocol allocation 2; from mixed effects generalized linear model

	Time point 6 months								Time point 12 months							
	Intervention group			Control group			Difference Intervention - Control			Intervention group			Control group			Difference Intervention - Control			
	β	95% CI		β	95% CI		β	95% CI	p-value	β	95% CI		β	95% CI		β	95% CI		p-value
Waist circumference (cm)	-1.11	-2.10	-0.11	1.06	0.19	1.93	-2.17	-3.50 - -0.84	**0.001**	-0.61	-1.59	0.37	1.19	0.34	2.05	-1.80	-3.12	-0.49	**0.007**
Systolic blood pressure (mmHg)	-4.46	-6.98	-1.93	-5.49	-7.69	-3.29	1.04	-2.32 - 4.39	0.545	-5.96	-8.48	-3.43	-6.45	-8.62	-4.27	0.49	-2.85	3.83	0.773
Diastolic blood pressure (mmHg)	-3.00	-4.81	-1.19	-3.29	-4.86	-1.72	0.30	-2.13 - 2.72	0.811	-2.87	-4.68	-1.06	-2.33	-3.89	-0.78	-0.54	-2.95	1.88	0.664
Fasting glucose (mmol/l)	0.04	-0.10	0.18	0.00	-0.13	0.12	0.04	-0.14 - 0.23	0.636	0.05	-0.08	0.18	0.04	-0.08	0.16	0.01	-0.17	0.19	0.916
HDL cholesterol (mmol/l)	0.08	0.03	0.13	0.03	-0.01	0.07	0.05	-0.02 - 0.12	0.131	0.11	0.06	0.16	0.01	-0.03	0.05	0.10	0.03	0.17	**0.003**
Triglycerides (mmol/l)	0.04	-0.28	0.35	0.28	0.00	0.55	-0.24	-0.66 - 0.18	0.264	-0.23	-0.54	0.08	0.20	-0.07	0.47	-0.43	-0.85	-0.01	**0.045**
Absolute peak power (Watt)	5.18	0.06	10.30	2.24	-2.21	6.68	2.94	-3.86 - 9.74	0.396	7.12	1.92	12.32	-2.82	-7.17	1.54	9.93	3.12	16.75	**0.004**
HbA1c (%)	0.19	0.08	0.30	-0.05	-0.15	0.04	0.24	0.09 - 0.39	**0.001**	0.20	0.09	0.30	0.03	-0.07	0.12	0.17	0.04	0.31	**0.014**
Glucose, 2h oGTT (mmol/l)	na			na			na			-0.59	-0.91	-0.27	-0.30	-0.58	-0.02	-0.29	-0.72	0.13	0.179
Glucose change, 0 to 2h oGTT (mmol/l)	na			na			na			-0.56	-0.87	-0.24	-0.31	-0.59	-0.04	-0.24	-0.67	0.19	0.268
LDL cholesterol (mmol/l)	0.13	0.01	0.25	0.16	0.05	0.26	-0.02	-0.18 - 0.13	0.761	0.05	-0.07	0.17	0.00	-0.10	0.10	0.05	-0.11	0.21	0.542
BMI (kg/m²)	-0.30	-0.54	-0.06	0.14	-0.07	0.35	-0.44	-0.76 - -0.12	**0.008**	-0.15	-0.39	0.09	0.11	-0.10	0.32	-0.26	-0.58	0.06	0.107
Total body fat mass (kg)	na			na			na			-0.44	-0.93	0.04	0.19	-0.22	0.61	-0.64	-1.28	0.01	**0.053**
Total body fat proportion (%)	na			na			na			-0.74	-1.19	-0.30	-0.07	-0.45	0.31	-0.67	-1.26	-0.09	**0.025**
% predicted abs. peak power	1.78	-0.08	3.65	0.54	-1.08	2.16	1.24	-1.23 - 3.72	0.324	2.56	0.67	4.45	-1.15	-2.73	0.44	3.71	1.23	6.19	**0.003**
Relative peak power (Watt/kg)	0.11	0.03	0.19	0.00	-0.07	0.07	0.11	0.00 - 0.22	**0.041**	0.11	0.02	0.19	-0.05	-0.12	0.02	0.15	0.05	0.26	**0.005**
% predicted rel. peak power	3.26	1.02	5.50	-0.07	-2.01	1.88	3.32	0.35 - 6.30	**0.028**	2.94	0.67	5.21	-1.36	-3.27	0.55	4.30	1.32	7.28	**0.005**
Grip strength dominant (kg)	1.42	0.38	2.46	1.15	0.21	2.08	0.27	-1.13 - 1.67	0.707	2.31	1.27	3.35	0.09	-0.83	1.00	2.23	0.84	3.61	**0.002**

Grip strength non-dominant (kg)	1.19	0.11	-	2.26	0.63	-0.34	-	1.60	0.55	-0.90	-	2.01	0.455	1.32	0.24	-	2.40	1.46	0.51	-	2.41	-0.14	-1.58	-	1.30	0.849
Repetitions 1-min STS, 2nd trial	5.65	3.98	-	7.33	2.92	1.46	-	4.38	2.74	0.51	-	4.96	**0.016**	8.85	7.15	-	10.55	4.27	2.82	-	5.71	4.58	2.35	-	6.82	**<0.001**
Overall counts per minute	11.47	-16.09	-	39.03	5.31	-18.88	-	29.50	6.16	-30.60	-	42.93	0.743	-19.83	-46.98	-	7.31	-12.59	-36.78	-	11.61	-7.25	-43.70	-	29.21	0.697
Time in MVPA (min/day)	0.63	-4.05	-	5.32	0.49	-3.63	-	4.61	0.15	-6.11	-	6.40	0.964	-3.32	-7.94	-	1.30	-0.89	-5.01	-	3.23	-2.43	-8.63	-	3.77	0.443
Time sedentary (min/day)	-27.32	-44.92	-	-9.71	-6.07	-21.53	-	9.39	-21.25	-44.73	-	2.24	0.076	-0.31	-17.66	-	17.04	-5.79	-21.25	-	9.68	5.48	-17.82	-	28.78	0.645
Average steps/day	470	-246	-	1185	-32	-651	-	588	501	-448	-	1451	0.301	-517	-1234	-	200	-268	-881	-	346	-249	-1197	-	698	0.606
Average aerobic steps/day	548	167	-	929	-13	-343	-	317	561	56	-	1067	**0.029**	-80	-462	-	301	-87	-414	-	239	7	-497	-	511	0.979

Footnote: Estimates represent the marginal mean changes of all continuous secondary outcomes from baseline to 6 and 12 months post-randomization for the intervention and control group. The grey shadow covers the variables that were part of the primary CVD risk score. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline value of the respective outcome. The models included compliant control and intervention participants only. Intervention compliance was based on daily reporting of physical activities. Missing days were imputed with 0 activity. Control compliance was based on an interview at the beginning and end of the intervention. All reported compliant participants (N=82) with valid baseline measurement of the respective outcome were included in the models. See also Figure 3C and eFigure 2C for a graphical display of the same results.

Abbreviations: abs., absolute; BMI, body mass index; CI, confidence interval; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; na, not available; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand; β, marginal estimate.

eTable 9. Intervention effect (marginal mean difference from randomization) of all secondary continuous outcomes at each study time point with per protocol allocation 3; from mixed effects generalized linear model

	Time point 6 months									Time point 12 months								
	Intervention group			Control group			Difference Intervention - Control			Intervention group			Control group			Difference Intervention - Control		
	β	95% CI		β	95% CI		β	95% CI	p-value	β	95% CI		β	95% CI		β	95% CI	p-value
Waist circumference (cm)	-0.81	-1.78 -	0.15	1.06	0.17 -	1.96	-1.88	-3.21 - -0.55	**0.006**	-0.40	-1.36 -	0.55	1.19	0.31 -	2.08	-1.60	-2.91 - -0.29	**0.017**
Systolic blood pressure (mmHg)	-4.45	-6.84 -	-2.06	-5.58	-7.80 -	-3.35	1.13	-2.15 - 4.40	0.500	-7.51	-9.90 -	-5.12	-6.53	-8.73 -	-4.33	-0.98	-4.24 - 2.28	0.554
Diastolic blood pressure (mmHg)	-2.79	-4.46 -	-1.12	-3.34	-4.89 -	-1.79	0.55	-1.76 - 2.86	0.642	-3.24	-4.91 -	-1.57	-2.38	-3.92 -	-0.84	-0.86	-3.16 - 1.44	0.463
Fasting glucose (mmol/l)	0.01	-0.12 -	0.14	0.00	-0.12 -	0.12	0.02	-0.16 - 0.19	0.855	0.06	-0.07 -	0.18	0.04	-0.08 -	0.15	0.02	-0.16 - 0.19	0.858
HDL cholesterol (mmol/l)	0.09	0.04 -	0.13	0.03	-0.01 -	0.07	0.06	-0.01 - 0.12	0.095	0.11	0.06 -	0.15	0.01	-0.03 -	0.05	0.10	0.03 - 0.16	**0.004**
Triglycerides (mmol/l)	-0.05	-0.35 -	0.24	0.28	0.01 -	0.56	-0.34	-0.74 - 0.07	0.105	-0.16	-0.45 -	0.14	0.20	-0.07 -	0.48	-0.36	-0.77 - 0.05	0.086
Absolute peak power (Watt)	3.39	-1.49 -	8.27	2.31	-2.24 -	6.85	1.09	-5.60 - 7.77	0.750	4.46	-0.49 -	9.41	-2.72	-7.18 -	1.73	7.18	0.50 - 13.87	**0.035**
HbA1c (%)	0.19	0.09 -	0.30	-0.05	-0.14 -	0.04	0.24	0.11 - 0.38	**0.001**	0.21	0.11 -	0.31	0.03	-0.06 -	0.12	0.18	0.05 - 0.31	**0.006**
Glucose, 2h oGTT (mmol/l)	na			na			na			-0.61	-0.91 -	-0.31	-0.31	-0.59 -	-0.03	-0.30	-0.71 - 0.11	0.152
Glucose change, 0 to 2h oGTT (mmol/l)	na			na			na			-0.58	-0.88 -	-0.28	-0.33	-0.60 -	-0.05	-0.25	-0.66 - 0.16	0.227
LDL cholesterol (mmol/l)	0.06	-0.05 -	0.18	0.15	0.05 -	0.26	-0.09	-0.25 - 0.07	0.256	0.02	-0.09 -	0.14	0.00	-0.10 -	0.10	0.02	-0.13 - 0.18	0.757
BMI (kg/m²)	-0.31	-0.54 -	-0.08	0.14	-0.08 -	0.35	-0.44	-0.76 - -0.12	**0.006**	-0.19	-0.42 -	0.04	0.11	-0.11 -	0.32	-0.29	-0.61 - 0.02	0.068
Total body fat mass (kg)	na			na			na			-0.43	-0.90 -	0.05	0.19	-0.23 -	0.62	-0.62	-1.26 - 0.02	0.058
Total body fat proportion (%)	na			na			na			-0.66	-1.08 -	-0.23	-0.06	-0.45 -	0.32	-0.59	-1.17 - -0.02	**0.042**
% predicted abs. peak power	1.18	-0.58 -	2.94	0.57	-1.07 -	2.21	0.61	-1.80 - 3.02	0.622	1.67	-0.11 -	3.46	-1.11	-2.71 -	0.50	2.78	0.37 - 5.19	**0.024**

Relative peak power (Watt/kg)	0.09	0.01 -	0.16	0.00	-0.07 -	0.07	0.09	-0.02 -	0.19	0.104	0.08	0.00 -	0.15	-0.05	-0.11 -	0.02	0.12	0.02 -	0.23	**0.018**
% predicted rel. peak power	2.59	0.49 -	4.69	-0.03	-1.98 -	1.92	2.62	-0.26 -	5.49	0.075	2.20	0.08 -	4.33	-1.31	-3.23 -	0.60	3.52	0.64 -	6.39	**0.016**
Grip strength dominant (kg)	0.98	-0.04 -	2.00	1.16	0.18 -	2.15	-0.19	-1.61 -	1.24	0.799	1.64	0.61 -	2.66	0.11	-0.85 -	1.07	1.53	0.12 -	2.94	**0.034**
Grip strength non-dominant (kg)	1.07	0.07 -	2.07	0.65	-0.31 -	1.61	0.42	-0.98 -	1.81	0.558	1.13	0.13 -	2.13	1.48	0.54 -	2.42	-0.35	-1.73 -	1.03	0.620
Repetitions 1-min STS, 2nd trial	5.39	3.83 -	6.95	2.90	1.44 -	4.35	2.50	0.35 -	4.64	**0.022**	8.36	6.78 -	9.94	4.25	2.81 -	5.69	4.11	1.96 -	6.25	**<0.001**
Overall counts per minute	8.99	-16.98 -	34.96	7.02	-16.78 -	30.81	1.98	33.34 -	37.29	0.913	-20.35	-45.63 -	4.94	-10.83	-34.63 -	12.96	-9.51	-44.32 -	25.29	0.592
Time in MVPA (min/day)	0.17	-4.25 -	4.58	0.69	-3.36 -	4.73	-0.52	-6.52 -	5.48	0.865	-3.37	-7.67 -	0.93	-0.68	-4.73 -	3.36	-2.68	-8.60 -	3.23	0.374
Time sedentary (min/day)	-25.60	-42.32 -	-8.88	-6.89	22.21 -	8.43	-18.71	41.45 -	4.03	0.107	1.68	-14.60 -	17.96	-6.68	-22.00 -	8.65	8.36	-14.06 -	30.77	0.465
Average steps/day	384	-283 -	1050	-1	-612 -	611	384	-523 -	1292	0.407	-523	-1199 -	154	-236	-841 -	369	-286.81	-1198 -	625	0.537
Average aerobic steps/day	482	128 -	836	-11	-336 -	314	493	11 -	975	**0.045**	-95	-455 -	265	-85	-406 -	237	-10.36	-494 -	474	0.967

Footnote: The estimates represent the marginal mean changes of all continuous secondary outcomes from baseline to 6 and 12 months post-randomization for the intervention and control group. The grey shadow covers the variables that were part of the primary CVD risk score. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline value of the respective outcome. The models included compliant control and intervention participants only. Intervention compliance was based on daily reporting of physical activities. Missing days were imputed with the yearly mean of physical activities per day. Control compliance was based on an interview at the beginning and end of the intervention. All reported compliant participants (N=87) with valid baseline measurement of the respective outcome were included in the models. See also Figure 3D and eFigure 2D for a graphical display of the same results.

Abbreviations: abs., absolute; BMI, body mass index; CI, confidence interval; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; na, not available; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand; β, marginal estimate.

eTable 10: Description of all outcomes by study time point and physical activity dose group

	<50% of activity goal reached[a]		50%-99% of activity goal reached[a]		≥100% of activity goal reached[a]	
	Baseline (N = 67)	12 months (N = 67)	Baseline (N = 26)	12 months (N = 26)	Baseline (N = 17)	12 months (N = 17)
Continuous study outcomes						
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
CVD risk score (z-score), primary outcome	**0.5 (0.7)**	**0.5 (0.9)**	**0.5 (0.7)**	**0.2 (0.7)**	**0.6 (0.6)**	**0.3 (0.7)**
N[b]	**67**	**67**	**26**	**26**	**17**	**17**
Waist circumference (cm)	83.0 (10.5)	83.8 (11.3)	80.6 (12.3)	79.8 (13.3)	85.9 (10.0)	85.6 (9.2)
N	66	67	26	26	17	17
Systolic BP (mmHg)	122.1 (14.3)	115.2 (12.4)	122.2 (15.0)	116.2 (12.4)	122.4 (17.7)	115.9 (20.7)
N	67	67	26	26	17	17
Diastolic BP (mmHg)	74.0 (10.3)	71.4 (9.3)	77.3 (9.1)	72.8 (8.1)	76.7 (11.1)	74.1 (15.4)
N	67	67	26	26	17	17
Fasting glucose (mmol/l)	4.6 (0.4)	4.7 (0.5)	4.7 (0.5)	4.7 (0.6)	4.8 (0.5)	5.1 (1.4)
N	64	64	25	26	17	16
HDL cholesterol (mmol/l)	1.5 (0.4)	1.5 (0.4)	1.4 (0.4)	1.5 (0.4)	1.5 (0.3)	1.6 (0.4)
N	67	65	26	26	17	17
Triglycerides (mmol/l)	1.3 (0.8)	1.5 (1.7)	1.4 (1.2)	1.1 (0.8)	1.1 (0.7)	1.0 (0.5)
N	66	64	26	26	17	16
Absolute peak power (Watt)	185.3 (46.0)	180.2 (47.0)	185.7 (55.8)	199.8 (62.1)	196.9 (54.7)	207.3 (50.3)
N	67	67	26	24	17	16
HbA1c (%)	5.2 (0.3)	5.2 (0.4)	5.1 (0.4)	5.3 (0.4)	5.3 (0.6)	5.5 (0.8)
N	66	65	24	25	17	17
Glucose, 2h oGTT (mmol/l)	4.7 (1.5)	4.7 (1.6)	5.2 (1.8)	4.8 (1.3)	5.2 (1.0)	4.5 (1.0)
N	63	61	25	26	15	15
Glucose change, 0 to 2h oGTT (mmol/l)	0.0 (1.4)	0.0 (1.4)	0.4 (1.6)	0.1 (1.2)	0.5 (1.0)	-0.3 (1.0)
N	63	61	25	26	15	15
LDL cholesterol (mmol/l)	2.4 (0.7)	2.4 (0.8)	2.5 (0.7)	2.5 (0.7)	2.9 (0.8)	3.0 (0.7)
N	67	63	25	26	17	17
BMI (kg/m²)	23.9 (3.7)	24.0 (4.1)	23.4 (4.2)	23.1 (4.1)	25.3 (2.9)	25.3 (2.7)
N	67	67	26	26	17	17
Total body fat mass (kg)	22.8 (6.9)	22.8 (7.5)	20.0 (5.2)	20.1 (6.4)	24.8 (6.8)	24.3 (6.4)
N	67	66	25	25	17	17
Total body fat proportion (%)	31.5 (7.0)	31.4 (7.1)	29.9 (5.3)	29.2 (5.5)	33.1 (7.3)	32.5 (7.2)
N	67	66	25	25	17	17
% predicted abs. peak power	70.4 (15.7)	68.6 (16.6)	69.8 (17.6)	73.5 (17.8)	76.4 (15.3)	80.3 (15.5)
N	67	67	26	24	17	16
Relative peak power (Watt/kg)	2.7 (0.6)	2.6 (0.6)	2.8 (0.7)	3.0 (0.8)	2.7 (0.6)	2.9 (0.5)
N	67	67	26	24	17	16
% predicted rel. peak power	76.2 (18.1)	74.3 (19.4)	80.0 (17.5)	83.8 (19.4)	78.8 (18.3)	83.2 (14.7)
N	67	67	26	24	17	16

Grip strength dominant (kg)	42.4 (13.0)	42.2 (11.9)	41.1 (11.1)	43.0 (12.2)	45.5 (13.7)	48.0 (15.1)
N	64	67	26	26	17	17
Grip strength non-dominant (kg)	38.3 (11.9)	39.5 (11.1)	38.9 (12.5)	40.4 (12.3)	40.1 (15.1)	41.5 (14.6)
N	64	67	26	26	17	17
Repetitions 1-min STS	49.5 (12.7)	54.0 (13.7)	48.6 (10.4)	60.1 (12.0)	50.5 (12.7)	57.8 (11.7)
N	67	67	26	25	17	17
Overall counts per minute	384.5 (119.4)	377.1 (130.0)	384.8 (133.5)	357.6 (119.4)	439.2 (171.2)	422.2 (125.2)
N	65	64	26	26	17	17
Time in MVPA (min/day)	38.9 (19.3)	37.1 (21.0)	40.0 (18.6)	35.0 (13.5)	41.3 (24.3)	41.0 (15.6)
N	65	64	26	26	17	17
Time sedentary (min/day)	536.6 (78.3)	531.5 (81.4)	548.6 (92.2)	546.4 (81.6)	493.8 (95.0)	503.0 (66.1)
N	65	64	26	26	17	17
Average steps/day	7314.1 (2749.9)	6842.1 (3110.4)	7500.7 (2794.0)	6720.8 (3027.3)	8346.4 (2533.7)	8249.3 (2521.4)
N	64	64	26	26	16	16
Average aerobic steps/day	1399.1 (1411.2)	1190.9 (1294.2)	1110.8 (1053.0)	1061.9 (1128.2)	1819.3 (1659.2)	1726.8 (1122.0)
N	64	64	26	26	16	16
Binary study outcomes[c]						
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
CVD risk						
Normal CVD risk	51 (76%)	55 (82%)	19 (73%)	21 (81%)	13 (76%)	14 (82%)
Elevated CVD risk (z-score ≥1)	16 (24%)	12 (18%)	7 (27%)	5 (19%)	4 (24%)	3 (18%)
Waist circumference						
Normal	45 (68%)	47 (70%)	22 (85%)	22 (85%)	9 (53%)	10 (59%)
High (male ≥94 cm, female ≥80 cm)	21 (32%)	20 (30%)	4 (15%)	4 (15%)	8 (47%)	7 (41%)
Blood pressure						
Normotensive	45 (67%)	56 (84%)	18 (69%)	22 (85%)	11 (65%)	14 (82%)
Hypertensive (≥130 systolic / ≥85 diastolic bp)	22 (33%)	11 (16%)	8 (31%)	4 (15%)	6 (35%)	3 (18%)
Fasting glucose						
Normal	64 (98%)	64 (97%)	24 (96%)	25 (96%)	16 (94%)	16 (94%)
Elevated (≥5.6 mmol/L)	1 (2%)	2 (3%)	1 (4%)	1 (4%)	1 (6%)	1 (6%)
HDL cholesterol						
Normal	55 (82%)	51 (78%)	20 (77%)	21 (81%)	16 (94%)	17 (100%)
Low (male <1.03 mmol/L, female <1.30 mmol/L)	12 (18%)	14 (22%)	6 (23%)	5 (19%)	1 (6%)	0 (0%)
Triglycerides						
Normal	54 (82%)	54 (84%)	21 (81%)	22 (85%)	15 (88%)	15 (94%)
Elevated (≥1.7mmol/L)	12 (18%)	10 (16%)	5 (19%)	4 (15%)	2 (12%)	1 (6%)
HbA1c						
Normal	62 (94%)	60 (92%)	24 (100%)	21 (84%)	16 (94%)	14 (82%)
Elevated (≥5.7%)	4 (6%)	5 (8%)	0 (0%)	4 (16%)	1 (6%)	3 (18%)
Insulin resistance (oGTT)						
No	60 (95%)	58 (95%)	23 (92%)	25 (96%)	15 (100%)	15 (100%)
Yes (glucose ≥7.8 mmol/L at 2h of oGTT)	3 (5%)	3 (5%)	2 (8%)	1 (4%)	0 (0%)	0 (0%)
LDL cholesterol						
Normal	67 (100%)	63 (100%)	25 (100%)	26 (100%)	17 (100%)	17 (100%)
Elevated (≥4.9 mmol/l)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
BMI						

BMI <25kg/m²	44 (66%)	45 (67%)	16 (62%)	16 (62%)	10 (59%)	9 (53%)
BMI ≥25kg/m²	23 (34%)	22 (33%)	10 (38%)	10 (38%)	7 (41%)	8 (47%)
Total body fat proportion						
Normal	55 (82%)	54 (82%)	21 (84%)	19 (76%)	17 (100%)	16 (94%)
High (male ≥20%, female ≥33%)	12 (18%)	12 (18%)	4 (16%)	6 (24%)	0 (0%)	1 (6%)
Reaching CDC recommendations						
<150 min MVPA/week	9 (14%)	17 (27%)	2 (8%)	3 (12%)	4 (24%)	2 (12%)
≥150 min MVPA/week	56 (86%)	47 (73%)	24 (92%)	23 (88%)	13 (76%)	15 (88%)
Total steps/day						
<10'000 steps/day	52 (81%)	57 (89%)	21 (81%)	23 (88%)	12 (75%)	11 (69%)
≥10'000 steps/day	12 (19%)	7 (11%)	5 (19%)	3 (12%)	4 (25%)	5 (31%)

Abbreviations: abs., absolute; BP, blood pressure; CVD, cardiovascular disease; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; N, number; na, not available; oGTT, oral glucose tolerance test; rel., relative; SD, standard deviation; STS, sit-to-stand.

Footnotes:

The grey shadow covers the variables that were part of the primary CVD risk score.

[a] The average proportions of personal physical activity goal reached were based on the daily reporting of physical activities for the participants of the intervention group. Compliant controls were set to 0%. Non-compliant controls were excluded.

[b] Number of participants with information on the specific outcome at the specific time point (N non-missing).

[c] Column proportions were calculated based on available numbers for each variable.

eTable 11. Dose-response relationship between reached physical activity goal[a] and all continuous outcomes; from linear regression model[b]

	β coefficient	95% CI			p-value
CVD risk score (primary; z-score)	-0.02	-0.04	-	0.00	**0.036**
Waist circumference (cm)	0.08	-0.32	-	0.48	0.708
Systolic blood pressure (mmHg)	0.11	-0.35	-	0.57	0.647
Diastolic blood pressure (mmHg)	0.26	-0.11	-	0.62	0.172
Fasting glucose (mmol/l)	0.04	0.01	-	0.07	**0.003**
HDL cholesterol (mmol/l)	0.01	-0.01	-	0.02	0.222
Triglycerides (mmol/l)	-0.03	-0.08	-	0.03	0.292
Absolute peak power (Watt)	2.11	0.41	-	3.81	**0.016**
HbA1c (%)	0.03	0.01	-	0.05	**0.002**
Glucose, 2h oGTT (mmol/l)	0.01	-0.05	-	0.07	0.775
Glucose change, 0 to 2h oGTT (mmol/l)	0.00	-0.06	-	0.05	0.929
LDL cholesterol (mmol/l)	0.04	0.01	-	0.07	**0.008**
BMI (kg/m²)	0.07	-0.08	-	0.22	0.339
Total body fat mass (kg)	0.06	-0.21	-	0.34	0.641
Total body fat proportion (%)	0.04	-0.16	-	0.24	0.720
% predicted abs. peak power	0.80	0.17	-	1.43	**0.013**
Relative peak power (Watt/kg)	0.02	0.00	-	0.05	0.063
% predicted rel. peak power	0.77	0.05	-	1.49	**0.037**
Grip strength dominant (kg)	0.31	0.01	-	0.62	**0.043**
Grip strength non-dominant (kg)	0.13	-0.16	-	0.43	0.360
Repetitions 1-min STS, 2nd trial	0.42	-0.07	-	0.91	0.089
Total body lean body mass (kg)	0.12	-0.16	-	0.40	0.398
Overall counts per minute	1.93	-3.01	-	6.87	0.440
Time in MVPA (min/day)	0.13	-0.60	-	0.86	0.722
Time sedentary (min/day)	-0.49	-3.60	-	2.62	0.754
Average steps/day	59.71	-57.72	-	177.13	0.316
Average aerobic steps/day	19.33	-28.56	-	67.23	0.425

Abbreviations: abs., absolute; BP, blood pressure; CVD, cardiovascular disease; HbA1c, glycosylated haemoglobin; HDL, high density lipoprotein; ITT, intention-to-treat; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; oGTT, oral glucose tolerance test; rel., relative; SD, standard deviation; STS, sit-to-stand.

Footnotes:

The grey shadow covers the variables that were part of the primary CVD risk score.

[a] The average proportions of personal physical activity goal reached were based on the daily reporting of physical activities for the participants of the intervention group. Compliant controls were set to 0%. Non-compliant controls were excluded.

[b] Results from linear regression models with proportion of physical activity goal reached as independent variable (continuous) adjusted for sex and main diagnostic group. The β-coefficients show the change in the outcome from baseline to 12 months post-randomization per 10% increase in the activity goal reached. See also eFigure 4 for a graphical display of the same results reported in eTable 11.

eTable 9. Intervention effect (marginal mean difference from randomization) of the primary CVD risk score at each study time point with intention-to-treat allocation and stratified by anthracycline received; from mixed effects generalized linear model

	Time point 6 months (change in CVD risk score from baseline to 6 months post-randomization)							Time point 12 months (change in CVD risk score from baseline to 12 months post-randomization)						
	Intervention group		Control group		Difference Intervention - Control			Intervention group		Control group		Difference Intervention - Control		
	Marginal estimate	95% CI	Marginal estimate	95% CI	Marginal estimate	95% CI	p-value	Marginal estimate	95% CI	Marginal estimate	95% CI	Marginal estimate	95% CI	p-value
Anthra.	-0.19	-0.30 to -0.07	-0.06	-0.16 to 0.05	-0.13	-0.28 to 0.03	0.112	-0.23	-0.35 to -0.11	-0.02	-0.13 to 0.08	-0.21	-0.37 to -0.05	**0.009**
No Anthra.	-0.14	-0.23 to -0.05	-0.01	-0.11 to 0.10	-0.13	-0.27 to 0.01	0.065	-0.19	-0.28 to -0.09	-0.09	-0.20 to 0.02	-0.10	-0.24 to 0.05	0.180

Footnote: The estimates represent the change in the CVD risk score [z-score] from baseline to 6 and 12 months post-randomization for the intervention and control group. A negative score represents a reduction in the CVD risk and therefore a favourable outcome. The group allocation was based on ITT (intention-to-treat). The models were adjusted for sex, main diagnostic group and baseline CVD risk score. $P_{interaction}$ for effect modification by anthracycline = 0.984. Numbers: model with anthracyclines, n=96; model without anthracyclines, n=55. See eFigure 5 for a graphical display of the same results.

Abbreviations: Anthra, Anthracyclines; CI, confidence interval; CVD, cardiovascular disease; ITT, intention to treat.

eTable 13. Overview of adverse events (N=170)

	Control group (N = 78)	Intervention group (N = 91)
Duration of adverse event		
Median (Q1, Q3) [days]	14.0 (5.0, 35.0)	9.0 (5.0, 28.0)
Number of AE per person		
1	22 (52%)	21 (46%)
2	11 (26%)	13 (28%)
3	6 (14%)	8 (17%)
4	0 (0%)	1 (2%)
5	2 (5%)	2 (4%)
6	1 (2%)	1 (2%)
AE Grade (1-5)		
Grade 1: mild	33 (42%)	52 (57%)
Grade 2: moderate	40 (51%)	35 (38%)
Grade 3: severe	5 (6%)	3 (3%)
Grade 4: life threatening	0 (0%)	1 (1%)
Relationship to the exercise intervention		
No	75 (96%)	72 (79%)
Unlikely	3 (4%)	8 (9%)
Likely[a]	0 (0%)	11 (12%)
Resulted in withdrawal from the study		
No	77 (99%)	90 (99%)
Yes	1 (1%)	1 (1%)[b]
Seriousness of AE?		
Serious	4 (5%)[c]	4 (4%)[d]
Not serious	74 (95%)	87 (96%)

Abbreviations: AE, adverse event; N, number; Q, quartile.

[a] AEs that were judged as being likely related to the intervention included six mild events (grade 1: bruising (1), fall (1), musculoskeletal and connective tissue disorder (4)), four moderate events (grade 2: back pain (2), depression (1), musculoskeletal and connective tissue disorder (1), and one severe event (grade 3: psychiatric disorder).

[b] The 2 AEs that resulted in withdrawal from the study included: one psychiatric disorder, grade 3 [severe], one Neoplasms benign, malignant and unspecified, grade 3 [severe].

[c] Serious AEs in the control group included: two gastrointestinal disorders, one neoplasm and one syncope.

[d] Serious AEs in the intervention group included: one appendicitis, one nervous system disorder, one psychiatric disorder and one surgical and medical procedure.

eTable 14. Description of adverse events according to CTCAE categories (N=170)

	Control group (N = 78)	Intervention group (N = 91)
Adverse event name (CTCAE)		
Abdominal infection	1 (1%)	0 (0%)
Allergic reaction	1 (1%)	1 (1%)
Anaemia	0 (0%)	1 (1%)
Appendicitis	0 (0%)	1 (1%)
Back pain	6 (8%)	3 (3%)
Bladder infection	1 (1%)	0 (0%)
Bone pain	1 (1%)	0 (0%)
Breast infection	1 (1%)	0 (0%)
Bronchial infection	3 (4%)	2 (2%)
Bruising	3 (4%)	3 (3%)
Common cold	1 (1%)	1 (1%)
Conjunctivitis	2 (3%)	0 (0%)
Cough	0 (0%)	2 (2%)
Depression	1 (1%)	6 (7%)
Diarrhoea	3 (4%)	0 (0%)
Dizziness	0 (0%)	1 (1%)
Dysmenorrhea	1 (1%)	0 (0%)
Ear and labyrinth disorders - Other	1 (1%)	1 (1%)
Endocrine disorders - Other	1 (1%)	0 (0%)
Erythema multiforme	2 (3%)	0 (0%)
External ear pain	1 (1%)	0 (0%)
Fall	1 (1%)	3 (3%)
Fever	1 (1%)	0 (0%)
Flu like symptoms	7 (9%)	14 (15%)
Fracture	1 (1%)	2 (2%)
Gastroenteritis	1 (1%)	0 (0%)
Gastrointestinal disorders	8 (10%)	6 (7%)
Gastrointestinal pain	0 (0%)	1 (1%)
General disorders and administration site conditions - Other	0 (0%)	1 (1%)
Headache	2 (3%)	0 (0%)
Haemorrhoids	0 (0%)	1 (1%)
Hypertension	1 (1%)	0 (0%)
Infections and infestations - Other	2 (3%)	3 (3%)
Injury, poisoning and procedural complications - Other	4 (5%)	3 (3%)
Insomnia	1 (1%)	0 (0%)
Lung infection	0 (0%)	1 (1%)
Middle ear inflammation	1 (1%)	1 (1%)
Musculoskeletal and connective tissue disorder	4 (5%)	12 (13%)
Myalgia	1 (1%)	0 (0%)
Nail infection	0 (0%)	1 (1%)
Nausea	0 (0%)	1 (1%)
Neoplasms benign, malignant and unspecified (incl cysts and polyps) - Other	1 (1%)	0 (0%)
Nervous system disorders - Other	1 (1%)	2 (2%)
Pain	1 (1%)	2 (2%)
Psychiatric disorders	0 (0%)	1 (1%)
Respiratory, thoracic and mediastinal disorders - Other	0 (0%)	4 (4%)
Rhinitis infective	1 (1%)	0 (0%)
Sinusitis	0 (0%)	1 (1%)
Skin and subcutaneous tissue disorders	2 (3%)	3 (3%)
Skin papilloma	1 (1%)	0 (0%)

Stomach pain	0 (0%)	1 (1%)
Surgical and medical procedures	4 (5%)	2 (2%)
Syncope	1 (1%)	0 (0%)
Tooth infection	0 (0%)	1 (1%)
Toothache	0 (0%)	1 (1%)
Tracheitis	1 (1%)	0 (0%)
Urinary tract infection	0 (0%)	1 (1%)

Abbreviations: CTCAE, Common Terminology Criteria for Adverse Events.

4. SUPPLEMENTARY FIGURES

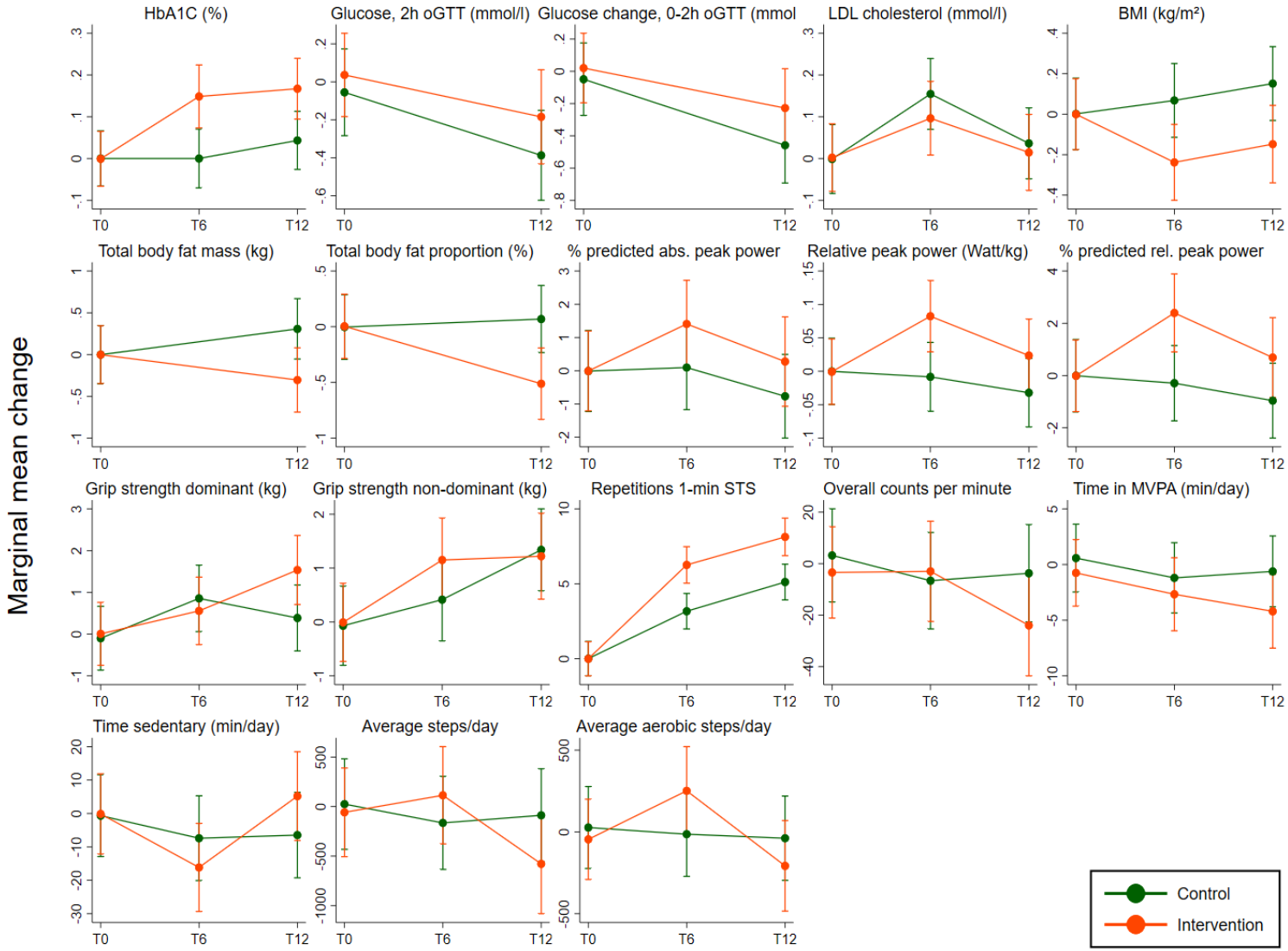
eFigure 1. Individual trajectories for the primary and secondary continuous outcomes by randomized group allocation (ITT)

eFigure 1 shows the individual trajectories of all participants for each of the primary and secondary continuous outcomes stratified by intention-to-treat (as randomized) study group allocation. The dark line in each plot represents the average across the individual trajectories. Cave: the intervals of the y-axes differ depending on the unit of the respective outcome. The unit is provided in y-axes label of each graph.

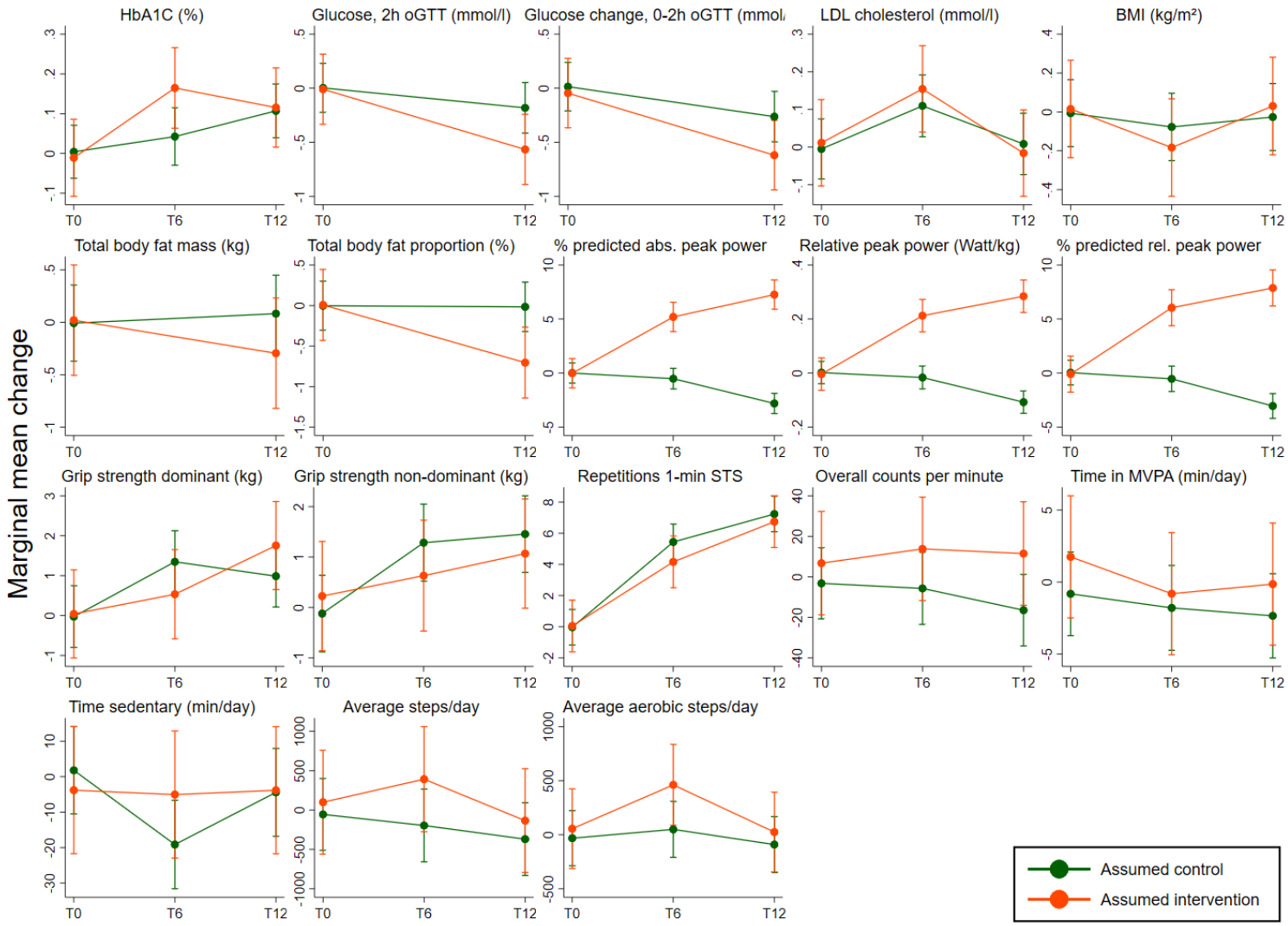
Abbreviations: abs, absolute; CVD, cardiovascular disease; BMI, body mass index; BP, blood pressure; HbA1C, glycosylated haemoglobin; HDL, high-density lipoprotein; ITT, intention-to-treat; LDL, low-density lipoprotein; MVPA, moderate-to-vigorous physical activities; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand test; T0, time point 0 (baseline); T6, time point 6 months post-randomization; T12, time point 12 months post-randomization.

eFigure 2. Marginal mean changes of the remaining secondary continuous outcomes for the intention-to-treat (ITT) and three per protocol (PP) analyses

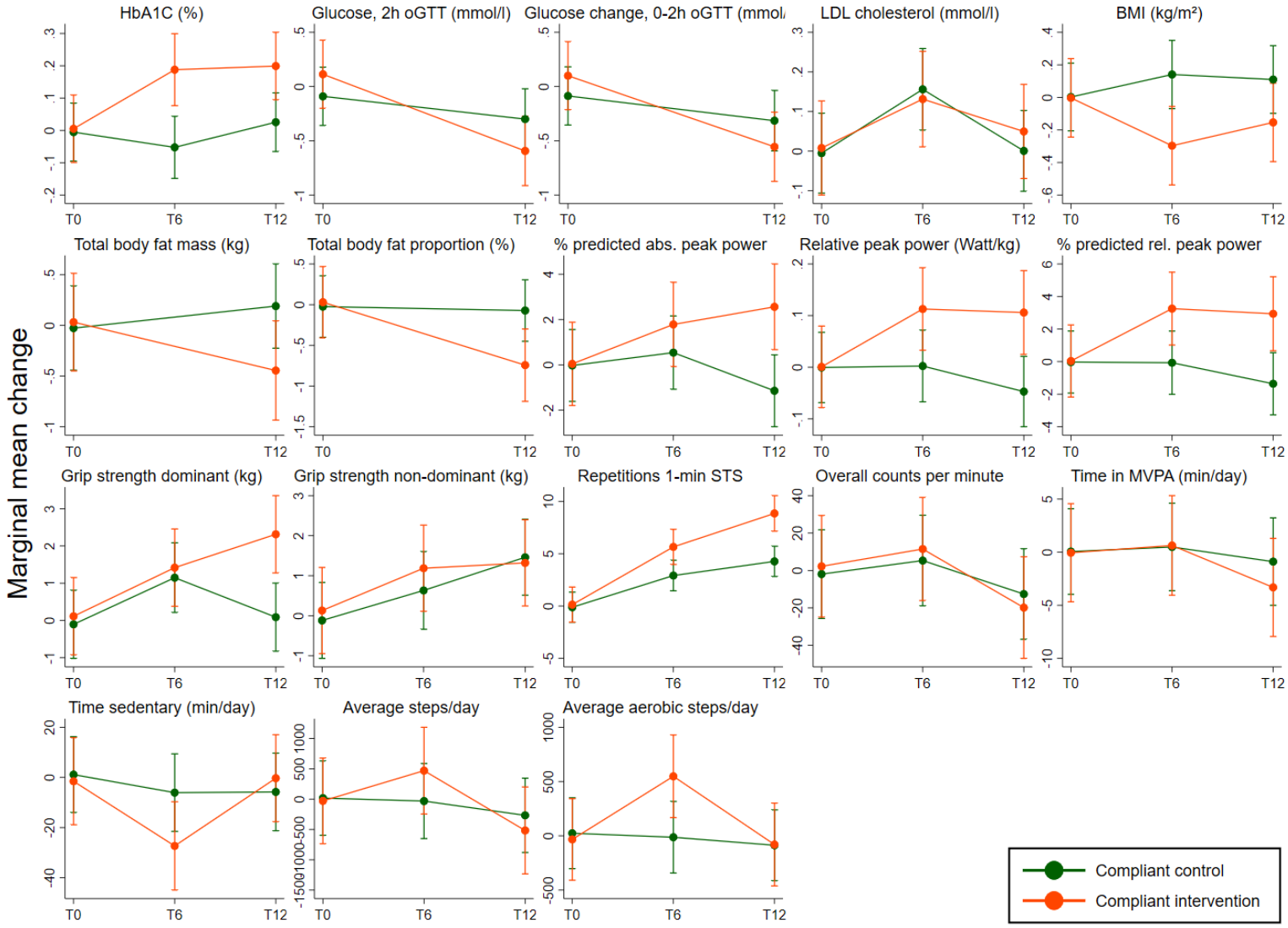
A - ITT



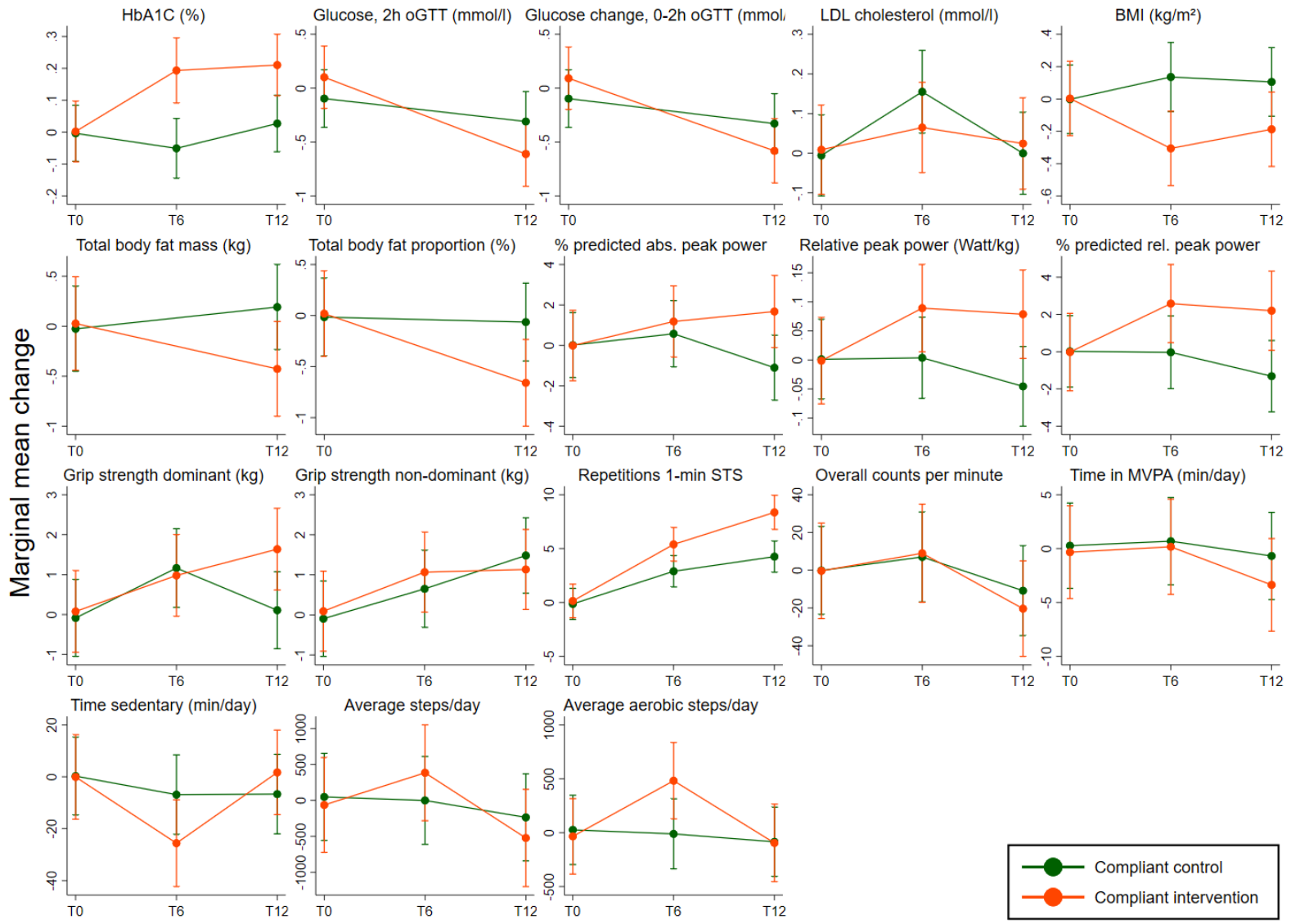
B – PP1


HbA1C (%)
Glucose, 2h oGTT (mmol/l)
Glucose change, 0-2h oGTT (mmol/
LDL cholesterol (mmol/l)
BMI (kg/m²)
Total body fat mass (kg)
Total body fat proportion (%)
% predicted abs. peak power
Relative peak power (Watt/kg)
% predicted rel. peak power
Grip strength dominant (kg)
Grip strength non-dominant (kg)
Repetitions 1-min STS
Overall counts per minute
Time in MVPA (min/day)
Time sedentary (min/day)
Average steps/day
Average aerobic steps/day
Marginal mean change
T0
T6
T12
Assumed control
Assumed intervention

C – PP2


HbA1C (%)
Glucose, 2h oGTT (mmol/l)
Glucose change, 0-2h oGTT (mmol/
LDL cholesterol (mmol/l)
BMI (kg/m²)
Total body fat mass (kg)
Total body fat proportion (%)
% predicted abs. peak power
Relative peak power (Watt/kg)
% predicted rel. peak power
Grip strength dominant (kg)
Grip strength non-dominant (kg)
Repetitions 1-min STS
Overall counts per minute
Time in MVPA (min/day)
Time sedentary (min/day)
Average steps/day
Average aerobic steps/day
Marginal mean change
T0
T6
T12
Compliant control
Compliant intervention

D – PP3



eFigure 2 shows the marginal mean changes and 95% confidence intervals of all remaining continuous secondary outcomes (not part of the composite cardiovascular disease (CVD) risk score) from baseline to 6 and 12 months post-randomization for the intervention and control group. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline value of the respective outcome. T0, T6 and T12 denote the study time

points: T0=baseline; T6=6 months post-randomization; T12=12 months post-randomization. The group allocation differed for each panel. Panel A: ITT (intention-to-treat): allocation as randomized (N=151). Panel B: PP1 (per protocol analysis 1): control group included participants with <5% increase in maximal power, intervention group included participants with ≥5% increase in maximal power (N=112). Panel C: PP2 (per protocol analysis 2): included compliant intervention and control participants only, based on daily self-reported physical activity data with missing days set to 0 activities (N=82). Panel D: PP3 (per protocol analysis 3): included compliant intervention and control participants only, based on daily self-reported physical activity data with missing days set to the annual average of activities (N=87). For each model, all participants with valid baseline measurement of the respective outcome were included. See eTables 6-9 for the exact point estimates. Cave: the intervals of the y-axes differ depending on the unit of the respective outcome. The unit is provided in brackets after the outcome, in the title of each graph.

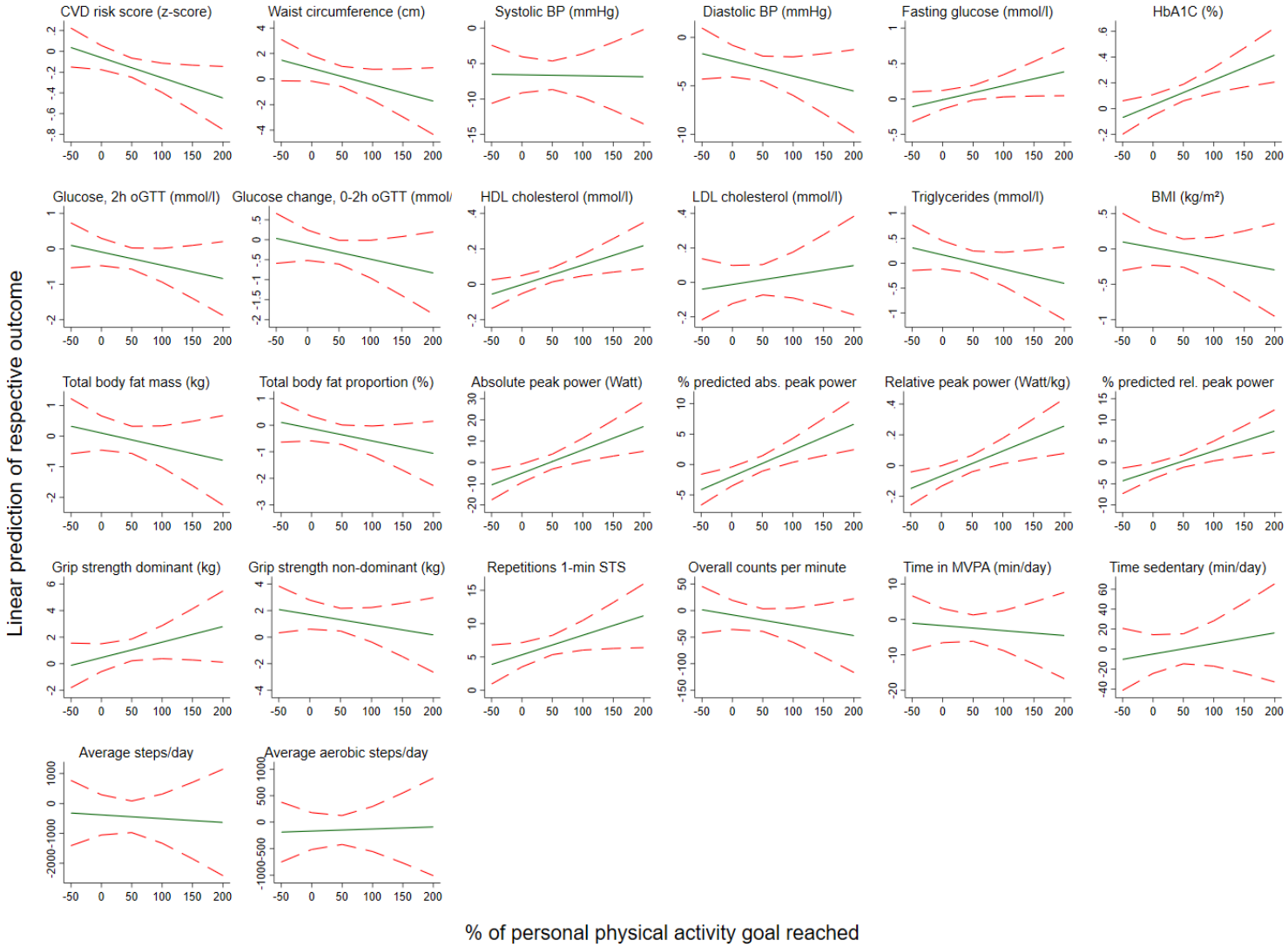
Abbreviations: abs, absolute; BMI, body mass index; HbA1C, glycosylated haemoglobin; LDL, low-density lipoprotein; MVPA, moderate-to-vigorous physical activities; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand test; T0, time point 0 (baseline); T6, time point 6 months post-randomization; T12, time point 12 months post-randomization.

eFigure 3. Description of the categorical study outcomes by randomized group allocation (ITT) and study time point

eFigure 3 shows the proportion of participants with an unfavourable result in each of the respective binary study outcomes, stratified by randomized group allocation (ITT) and study time point. Proportions are based on available data at each time point. See Table 2 for the exact numbers and proportions in each cell as well as definitions of cut-offs for each variable. Cave: that last graph has a different y-axis interval.

Abbreviations: CVD, cardiovascular disease; CDC, Centre for Disease Control and Prevention; ITT, intention-to-treat; LDL, low-density lipoprotein; oGTT, oral glucose tolerance test; T0, time point 0 (baseline); T6, time point 6 months post-randomization; T12, time point 12 months post-randomization.

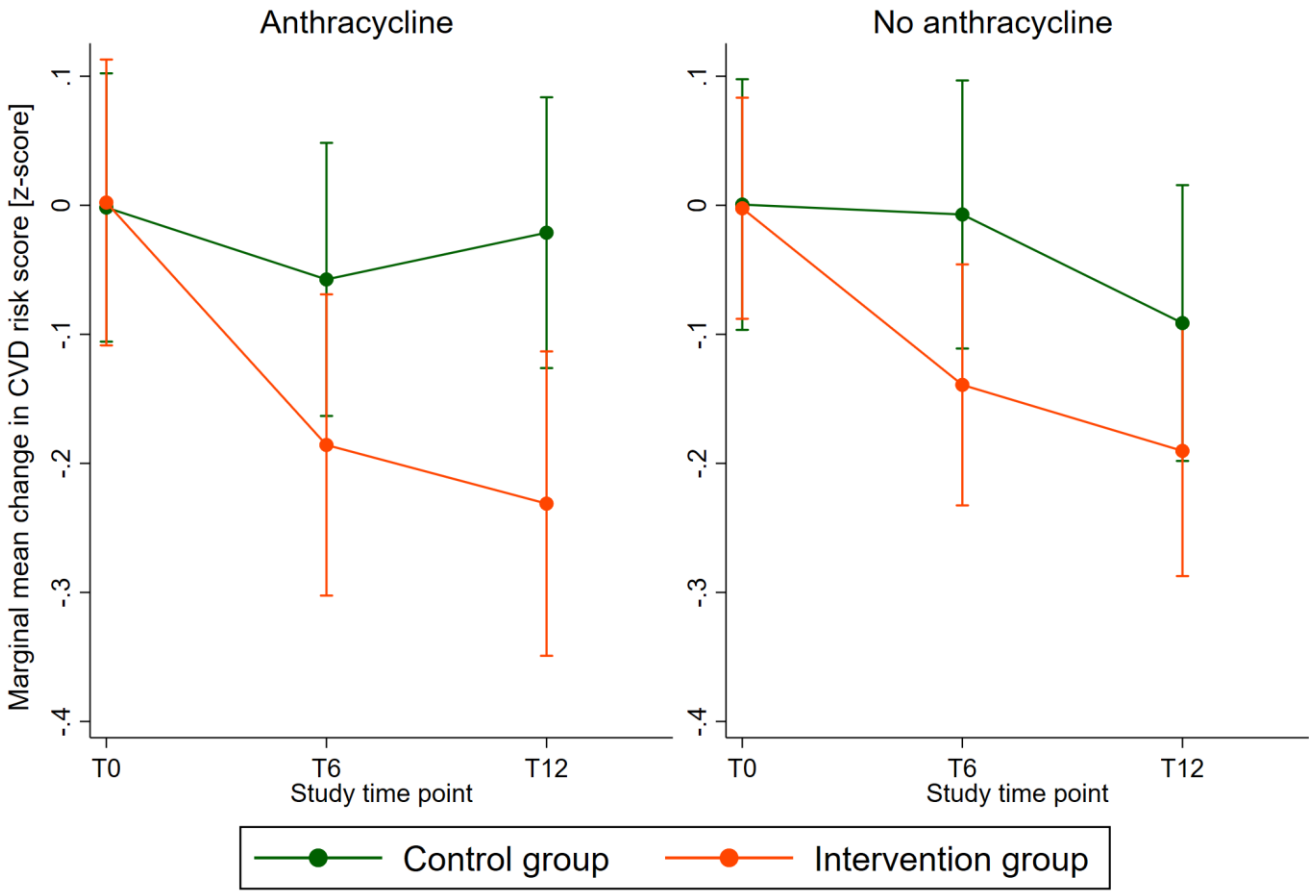
eFigure 4. Dose-response relationship between the proportion of physical activity goal reached and each continuous outcome



eFigure 4 shows the marginal linear predictions (green line) and 95% confidence bands (red dashed lines) of the dose-response relationship between the proportion of physical activity goal reached and the change from baseline (T0) to 12 months post-randomization (T12) for all continuous study outcomes. The average proportion of personal physical activity goal reached for the intervention participants was based on the daily reporting of physical activities. Compliant controls were set to 0%. Non-compliant controls were excluded. The models were adjusted for sex and main diagnostic group and based on complete case analysis. See eTable 11 for the exact marginal mean change per 10% increase in the activity goal reached. Cave: the intervals of the y-axes differ depending on the unit of the respective outcome. The unit is provided in brackets after the outcome, in the title of each graph.

Abbreviations: abs., absolute; CVD, cardiovascular disease; HbA1C, glycosylated haemoglobin; HDL, high density lipoprotein; LDL, low density lipoprotein; MVPA, moderate-to-vigorous physical activities; oGTT, oral glucose tolerance test; rel., relative; STS, sit-to-stand.

eFigure 5. Marginal mean changes of the CVD risk score (primary outcome) over time for the intention-to-treat (ITT) allocation, by study group and anthracycline received



eFigure 5 shows the marginal mean changes and 95% confidence intervals of the cardiovascular disease (CVD) risk score [z-score, primary outcome] from baseline to 6 and 12 months post-randomization for the intervention and control group stratified for participants who received and did not receive anthracycline as part of their cancer treatment. Estimates from mixed effects generalized linear models adjusted for sex, main diagnostic group and baseline CVD risk score. T0, T6 and T12 denote the study time points: T0=baseline; T6=6 months post-randomization; T12=12 months post-randomization. Group allocation was based on intention-to-treat (ITT). $P_{interaction}$ for effect modification by anthracycline = 0.984. Numbers: model with anthracyclines, n=96; model without anthracyclines, n=55. See eTable 12 for the exact point estimates.

Abbreviations: CVD, cardiovascular disease.

5. ORIGINAL DOCUMENTS OF THE PHYSICAL ACTIVITY INTERVENTION

On the following pages are the original documents attached, that were used for the physical activity recommendations at baseline and during follow-up by the study physiotherapists.

A – Physician report form: this form was used to provide the physiotherapist with essential medical information relevant for the PA recommendations. The form also included the heartrate at 60% VO_2max from the cardiopulmonary exercise test.

B – Physical activity interview: this form was used to assess the current PA level and type of activities performed as basis for future recommendations.

C – Motivational interview guideline: this form was used to assess the participant's preferences, motivation, and barriers in regard of PA.

D – Physical activity contract: this form was handed out to the participant and described the agreed activities implemented into a usual week.

E – General PA flyer: each participant of the intervention group received this flyer with general tips to increase physical activities and some strength building exercises to perform at home.

F – Instruction to measure the heart rate: participants were informed about their optimal training heart rate and instructed how to measure their heart rate.

G – Guideline follow-up interview: this form represents the guideline for the interview performed at each follow-up contact between the physiotherapist and survivor.

Physician Report Form

Das nachfolgende Dokument beinhaltet wichtige medizinische Parameter für das Erstgespräch der Interventionsgruppe mit der Physiotherapie. Die Daten werden aus REDCap exportiert (siehe unten).

1. Basic information

ID: _____ Date of examination (T0a): _____

Age: _____ years Blood pressure at rest (mean): _____:_____mmHg

Height: _____ cm Weight: _____ kg

BMI: _____ kg/m^2 Stride length: _____ cm

2. History ➔ Cancer diagnosis

_____

_____

3. Relevant diseases / symptoms that interfere / occur with physical activity

(e.g. still present diseases from the medical history)

Cardiovascular system (including risk factors such as high blood pressure):

_____

_____

Respiratory system:

_____

_____

Musculoskeletal problems:

_____

_____

Surgeries, injuries (e.g. amputations):

_____

_____

4. Sport History

Type of sport, frequency, time, years, intensity:

_____

_____

_____

_____

_____

_____

_____

5. Physical examination

	Abnormal findings (please specify):
Eyes	
Ears/nose/throat	
Lungs	
Heart / vessels	
Abdomen	
Skin	
Joints	
Back/spine	
Other	

Exam completed by: _____

6. Physical activity exclusions (mark the activities the participant should **not** engage in)

☐ Swimming	☐ Diving and jumping into water	☐ Aerobic exercise
☐ Speed exercise	☐ High impact exercise	☐ Strength building exercise
☐ Flexibility exercise	☐ Contact sports	☐ Adapted physical activity

Further comments on physical activity exclusions / recommendations

_____

_____

7. Heart rate at 60% of peak oxygen uptake (from Spiroergometry)

Heart rate at 60% $VO2_{max}$: _____ beats per minute

Sources of information (respective REDCap Form)

1. *Basic information ➔ Vital signs, Anthropometry*
2. *Relevant diseases/ symptoms that interfere/ occur with physical activity ➔ Extraction from medical record (e.g. amputations), Medical history, current clinical status (last 3 months)*
3. *Physical examination ➔ Physical examination*
4. *Physical activity exclusion ➔ Physical examination*
5. *Heart rate by 60% ➔ Spiroergometry (calculation)*

Aktivitätsinterview

ID: _____ Datum: _____

Wenn Sie von einer typischen Woche ausgehen, wie viele Minuten pro Tag verbringen Sie mit den folgenden Aktivitäten? Bitte **intensive Aktivitäten** speziell markieren/hervorheben!

Sportart	**Mo**	**Di**	**Mi**	**Do**	**Fr**	**Sa**	**So**
Schulsport							
Fahrradfahren							
Sport im Verein (Welche Sportart?)							
Sport außerhalb eines Vereins (Welche Sportart?)							
Sport mit Freunden/Familie (Was für Sport?)							

Wichtig: Diese Form ist nicht in REDCap verfügbar und dient als Hilfestellung zum Ausfüllen von Form C. Weiter dient es als Hilfe zur korrekten Erfassung des Formulars „Vigorous physical activity check“ in REDCap (Erfassung der intensiven körperlichen Aktivitäten für eine durchschnittliche Woche).

Strukturierte Teilnehmerbefragung (Motivierendes Interview) der Teilnehmenden der Interventionsgruppe

ID: _____ Datum: _____

1. Wie möchten Sie sich bewegen?

a. mit Musik
b. mit Ball
c. joggend ohne spezielle Geräte
d. Wasseraktivitäten
e. Sport alleine (z.B. Yoga, Rad/Velo)
f. Sport in einem Team
g. Wettkampf orientiert
h. Freizeit orientiert
i. in der Natur
j. Andere

Falls ANDERE, bitte spezifizieren:

_____

2. Haben Sie schon eine / mehrere konkrete Idee(n)?

_____

_____

_____

3. Was könnte Sie daran hindern, Sport zu treiben?

a. Ungewohnte Umgebung oder fremde Menschen
b. Körperliche Bedenken (zu hart, keine Kondition, Gewichtsverlust, Schmerzen)
c. Es fühlt sich wie eine weitere Therapie an
d. Schwierig Zeit zu finden, körperlich aktiv zu sein
e. Wenn Sport nicht alleine: Bedenken, was Andere über mich denken
f. Sport im Wasser, im Fitnesscenter, in der Gruppe: Problem mit dem eigenen Körperbild (Narben, Amputationen, Übergewicht, Grösse)
g. Anderes:

Falls ANDERES, bitte spezifizieren:

_____

4. Wie können die Bedenken gemindert werden?

a. im Vorfeld mit Übungsleiter / Trainer sprechen

b. Gruppe / Sportangebot erst einmal besuchen und ausprobieren, ohne sich verpflichten zu müssen

c. Mehr Informationen über den Sport im Vorfeld

d. Verminderte Zeit mit inaktiven Tätigkeiten (Integration der körperlichen Aktivität ins tägliche Leben)

e. Die neuen Sportart zuerst mit einer vertrauten Person beginnen

f. Anderes:

Falls ANDERES, bitte spezifizieren:

_____

5. Wie hoch ist die Wahrscheinlichkeit auf einer Skala von 0-10, dass Sie wirklich Bewegungs-, Trainings- und Sportaktivitäten aufnehmen?

"10" bedeutet: auf jeden Fall immer, "0" bedeutet gar nicht

Gar nicht	0	1	2	3	4	5	6	7	8	9	10	Auf jeden Fall immer

6. Wie hoch ist die Wahrscheinlichkeit auf einer Skala von 0-10, dass Sie die vorgesehenen Bewegungs-, Trainings- und Sportaktivitäten durchführen können?

"10" bedeutet: auf jeden Fall immer, "0" bedeutet gar nicht

Gar nicht	0	1	2	3	4	5	6	7	8	9	10	Auf jeden Fall immer

7. Was ist, falls Ihnen das Angebot nicht gefällt? Wenn Probleme auftauchen? Was tun Sie dagegen bzw. wie gehen Sie damit um?

_____

_____

_____

_____

Vereinbarung über die Durchführung körperlicher Aktivität und Sport

Dieser „Vertrag“ soll Ihnen und dem Studienteam helfen,
sich an alle Vereinbarungen zu erinnern

ID: _____ Datum: _____

Folgende Maßnahmen wurden in Bezug auf das Projekt SURfit vereinbart:

- Die Physiotherapeutinnen des UKBB bieten Ihnen regelmäßige Beratungen zur Steigerung der körperlichen und sportlichen Aktivität an. Zusätzlich stellen wir Ihnen einen Schrittzähler sowie ein Onlinetagebuch via Login unter www.surfit.ch zur Verfügung.
- Ihre Physiotherapeutin wird sich bei Ihnen zwischen den Besuchen telefonisch melden, um Sie laufend zu beraten. In den ersten 6 Monaten findet dieser Anruf jeweils einmal pro Monat statt, danach alle zwei Monate.
- Sie verpflichten sich, im kommenden Jahr Ihre bisherige sportliche Aktivität von _____ Stunden pro Woche um mindestens 2.5 Stunden intensive körperliche Aktivität pro Woche zu steigern. Ihre intensive sportliche Aktivität pro Woche wird also insgesamt _____ Stunden betragen.
- Zusätzlich versuchen Sie inaktive Verhaltensweisen (z.B. Fernsehen, Computer etc.) um 25% zu reduzieren. Dies würde dann etwa einer Reduktion von _____ Stunden entsprechen.

Folgende Aktivitäten sind geplant (bitte Art der Aktivität und genaue Zeit eintragen):

	Morgen	Mittag	Abend
Montag			
Dienstag			
Mittwoch			
Donnerstag			
Freitag			
Samstag			
Sonntag			

Ergänzungen zum Gespräch (Zusammenfassungen, weitere Abmachungen etc.)**:**

_____

_____

_____

_____

_____

_____

Sie haben zugestimmt, den Schrittzähler täglich zu tragen und Ihre Aktivitäten täglich, oder spätestens jeden dritten Tag in das Onlinetagebuch einzutragen. Falls dies einmal nicht möglich sein sollte, informieren Sie bitte Ihre Physiotherapeutin. Bitte beachten Sie, dass Sie selbst ausschließlich Daten der laufenden und vorangegangenen Woche im Tagebuch eingeben / ändern können. Sollte es Ihnen für einen längeren Zeitraum nicht möglich sein die Daten einzugeben, informieren Sie bitte Ihre Physiotherapeutin, welche die Daten rückwirkend für Sie eintragen kann.

Basierend auf Ihren Einträgen im Tagebuch werden Sie Rückmeldungen aus dem Studienteam erhalten.

Bei Fragen oder Problemen wenden Sie sich bitte an:

Physiotherapeutin	Telefon	E-Mail

Ort und Datum

Name Studienteilnehmer/in	Name Physiotherapeutin
Unterschrift Studienteilnehmer/in	Unterschrift Physiotherapeutin

bewegung tut gut

Tipps für einen aktiven Lebensstil

Körperliche Aktivität kann helfen, mögliche Nebenwirkungen und Langzeitfolgen Ihrer früheren Krebstherapie zu reduzieren.

Mit SURfit 2.5 Stunden mehr intensive körperliche Aktivität pro Woche! Das sind 30 Minuten an 5 Tagen…

1

Ausdauertraining mehrmals pro Woche für 20-60 Minuten (insgesamt 2 Stunden pro Woche) steigert die Leistungsfähigkeit und reduziert das Risiko für chronische Krankheiten

2

Übungen für Kraft und Beweglichkeit, sowie Sprünge (insgesamt 30 Minuten pro Woche) erhalten die Funktionalität von Muskeln, Knochen und Gelenken

3

Jeden Tag Bewegung in Form von Alltags-aktivitäten / Abbau Inaktiver Zeit

Setze ein Ziel

Mach einen Plan

Jeder Schritt zählt

So gehts leichter…

1

Tipps für den Anfang

Waren Sei eine Zeitlang weniger aktiv? Kein Problem:

- Beginnen Sie langsam und setzen Sie realistische Ziele
- Fangen sie mit Aktivitäten tiefer Intensität an
- Integrieren Sie regelmässige Bewegung in Ihren Alltag
- Versuchen Sie mit Familien und Freunden zusammen aktiv zu sein
- Wählen Sie Aktivitäten aus, die Ihnen Spass machen
- Schreiben Sie sich in einem Sportvereinen in Ihrer Nähe ein
- Jeder Mensch ist individuell, bewegen Sie sich so, wie es Ihnen passt.

2

Integrieren Sie Bewegung in Ihren Alltag

Das einfachste Rezept um regelmässig und langfristig aktiv zu bleiben:

- Fahren Sie mit dem Velo zur Arbeit
- Steigen mit dem Bus früher aus oder parkieren Sie weiter weg
- Staubsaugen, Fenster putzen und Gartenarbeit zählen auch
- Treffen Sie sich mit Freunden für einen Spaziergang oder eine Velofahrt
- Spielen sie aktiv mit Ihren Kindern oder Haustieren
- Machen Sie bei der Arbeit kurze Bewegungspausen oder einen Spaziergang
- Stehen sie auf zum Telefonieren
- Nehmen Sie die Treppen anstatt den Lift
- Spazieren Sie für eine Besprechung anstatt zu sitzen
- Organisieren Sie einen regelmässigen Sportabend mit Freunden oder Mitarbeitern

Nutzen Sie moderne Technologien..

Es gibt viele Apps, die einem beim Sport treiben unterstützen und motivieren!

Runtastic; Endomondo; Adidas miCoach; UP; Nike running; Office-Fit; Alles-in-einem Yoga; Fitness Point; 7 Minuten Training; Daily Workouts Free; 5 Minuten Heimtraining; Get Set

Was alles zählt

Körperliche Aktivität ist vielseitig. Jede Bewegung, die Sie ein bisschen ausser Atem bringt, Ihre Muskeln dehnt und stärkt oder die Gelenke durchbewegt, zählt. Zum Beispiel:

Individuelle Übungen zuhause, Velofahren, Spazieren, Haus- und Gartenarbeit, Treppensteigen, Fitnesscenter, Tanzen, Schwimmen, Ballspiele, Wandern, mit Kindern Spielen, mit dem Hund spazieren, etc. Finden Sie diese Bewegungen, die Ihnen Spass machen, aber versuchen Sie möglichst vielseitig aktiv zu sein.

Wo finden Sie weitere Informationen über Sportangebote in der Region Basel?

www.sportbasel.ch; http://sportalbasel.ch; www.sport.bs.ch; www.baselland.ch/sportamt

Wo finden Sie weitere Informationen und Ideen für einen aktiven Lebensstil?

www.baspo.ch; www.hepa.ch; www.gesundheitsfoerderung.ch; www.haltungbewegung.de

Und hier noch ein paar Übungen von uns für jeden Tag…

Auf den folgenden Seiten finden Sie ein Trainingsmanual mit Übungen zur Kräftigung der großen Muskelgruppen mit und ohne Geräte. Zudem haben wir Sprungübungen integriert, die speziell die Knochen stärken. Sie finden zu jeder Übung eine kurze Anleitung und Hinweise zur Übungsausführung. Falls Sie Fragen zu den Übungen haben, wenden Sie sich bitte an Ihre Physiotherapeutin. Wir empfehlen die Übungen vorab mit Ihrer SURfit Physiotherapeutin zu besprechen.

1. Allgemeine Hinweise zum Krafttraining

Das Ziel der SURfit Studie ist es Ihre intensiven körperlichen Aktivitäten um 2.5 Stunden pro Woche oder 30 min an 5 Tagen zu erhöhen. Davon sollten Sie wenigstens 30 Minuten pro Woche für ein Krafttraining einplanen. Nur ein trainierter Muskel kann auch eine Ausdauerleistung vollbringen!

Wichtige Hinweise zum Krafttraining:

- Achten Sie bei den Übungen stets auf eine korrekte Ausführung! Hierbei kann es hilfreich sein die Übungen vor einem Spiegel oder mit einem Freund / einer Freundin auszuführen.
- Führen Sie die Übungen langsam und ohne Schwung aus!
- Achten Sie auf Ihre Atmung: Während der Anstrengung ausatmen (*Anstrengung=Ausatmen*) und während der Entlastung einatmen (*Entlastung= Einatmen*). Halten Sie nicht die Luft an!
- Versuchen Sie stets den Anstrengungsgrad der Übungen zu steigern und erhöhen Sie schrittweise die Anzahl der Wiederholungen, den Schwierigkeitsgrad sowie den Widerstand/das Gewicht.

Besprechen Sie die Übungen mit Ihrer Physiotherapeutin und lassen Sie sich regelmäßig Tipps für Steigerungsmöglichkeiten geben!

2. Aufwärmübungen

Vor Beginn des Krafttrainings sollten Sie sich wenigstens 5-10 Minuten aufwärmen, um den Kreislauf in Schwung zu bringen und die Durchblutung der Muskulatur zu erhöhen. Damit vermindern Sie einerseits das Risiko für Muskelverletzungen und andererseits ist das Training effektiver.

Zum Aufwärmen eignen sind:

- Seilspringen, Hampelmann
- Stepübungen (Treppen rauf und runter gehen)
- Hock-Streck Sprünge
- Armkreisen, Hüftkreisen
- Handgelenke kreisen
- Aerobic, Boxübungen mit jeglichen Variationen
- Lockerer Dauerlauf, rasches Gehen
- Fahrradergometer oder Crosstrainer

Versuchen Sie jeweils die Muskeln des Ober- und Unterkörpers aufzuwärmen!

3. Kraftübungen ohne Geräte

Es werden Übungen mit verschiedenen Schwierigkeitsgraden dargestellt. Achten Sie stets darauf, dass Sie die Übung langsam und korrekt auszuführen.

3.1. Rumpf-, Schulter- und Brustmuskulatur

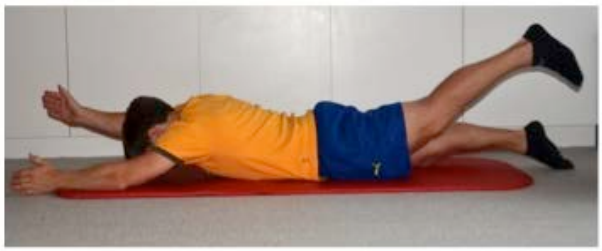
Rumpfmuskulatur

Ausgangstellung
Unterarmstütz; Arme parallel; Rücken gerade; Rumpf und Beine gestreckt (auch auf Knien möglich).

Ausführung
Langsames, wechselseitiges Abheben der Füße um Schuhlänge bei gestreckten Knien.

Ausgangstellung
Bankstellung; Rücken gerade; Arme auf Schulterhöhe und gestreckt.

Ausführung
Arme und Beine gegenseitig strecken. Stellung von Becken und Schultergürtel werden während Bewegung nicht verändert.



Ausführung
Bauchlage, Arme und Beine sind gestreckt. Arme und Beine langsam wechselseitig abheben. Kopf dabei nicht überstrecken, auf Atmung achten – die Luft nicht anhalten.

Liegestütz auf Knien

Ausgangstellung
Bankstellung; Arme auf Schulterhöhe gestreckt; Rücken gerade

Ausführung
Mit geradem Rücken langsam in die Liegestützposition gehen.

Liegestütz

Ausgangstellung
Arme und Beine sind gestreckt. Der Rücken ist gerade und das Gesäß ist angespannt.

Ausführung
Langsam in die Liegestützposition gehen. Der Rücken bleibt gerade. Den Atem nicht anhalten.

Liegestütz rückwärts (Trizepsmuskulatur)

Ausgangstellung
Beine und Arme sind gestreckt. Becken und Rücken bilden eine Gerade.

Ausführung
Arme langsam beugen und anschließend wieder strecken und Ausgangsposition einnehmen. Den Atem nicht anhalten!

3.2. Bauchmuskulatur

Seitliche Bauch- und Rumpfmuskulatur

Ausgangstellung
Seitenlage, Körpergewicht ist auf Unterarm; Becken gerade, Gesäß angespannt.

Ausführung
Becken und Rumpf langsam Richtung Boden absenken; Körperspannung halten; anschließend in Ausgangsposition zurück.

Gerade Bauchmuskulatur

Ausgangstellung
Rückenlage; Arme sind auf Oberkörper verschränkt; Bein sind aufgestellt; Fußspitzen zeigen nach oben

Ausführung
Oberkörper langsam aufrichten (ausatmen); Position kurz halten; Oberkörper wieder absenken (einatmen); Rücken nicht vollständig auf der Gymnastikmatte ablegen!

Achtung!
Bei dieser Übung sollten Sie nicht die Hände hinter dem Hals verschränken und die Übung mit Schwung ausführen!

Seitliche Bauchmuskulatur (schwierig)


Ausführung
Rückenlage, die Hände sind an der Schläfe platziert. Wechselseitig den Ellenbogen zum Knie des gegenseitigen Beines führen. Das passive Bein ist aufgestellt.

Seitliche Bauchmuskulatur (schwierig)


Ausführung
Wechselseitig den gestreckten Arm zur Fußspitze des gegenseitigen Beines führen. Das gestreckte ‚passive' Bein wird nicht am Boden abgelegt.

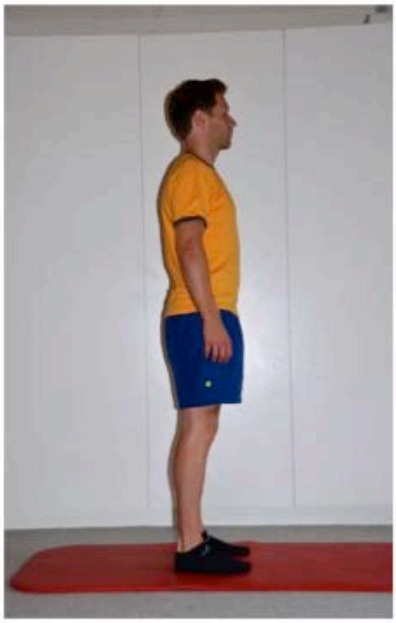


Ausgangstellung
Rückenlage; Arme auf Schulterhöhe neben dem Körper gestreckt; Beine sind in der Luft angewinkelt.

Ausführung
Das Becken wechselseitig zur Seite ‚kippen'. Die Beine werden nicht vollständig am Boden abgelegt.

3.3. Beinmuskulatur

Kniebeuge



Ausführung
Hände auf Schulterhöhe vor dem Körper zusammenführen. Langsam und mit geradem Rücken in die Kniebeugeposition gehen und Position kurz halten (bis 90 Grad Kniewinkel). Die Knie sollten nicht über die Fußspitze zeigen. Mögliche Variation mit Zusatzgewicht (z.B. Hantel mit gestreckten Armen neben dem Körper).

Kniebeuge, statisch

Ausführung
Der Rücken ist an die Wand gelehnt; Knie im rechten Winkel; Füße hüftbreit aufgestellt; Arme vor Oberkörper verschränkt; Position wird zwischen 20-60 Sekunden gehalten (je nach Trainingszustand). Die Übung mehrmals wiederholen.

Kniebeuge, einbeinig

Ausgangstellung
Aufrechte Position im Einbeinstand; Balance herstellen.

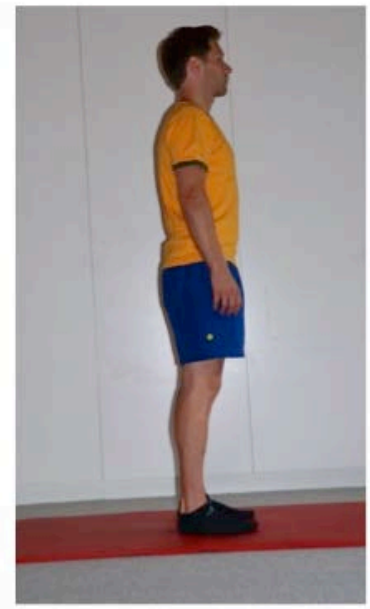
Ausführung
Langsam das Bein beugen; Rücken bleibt gerade; Arme sind vor dem Körper verschränkt; Balance beibehalten.

Ausfallschritt

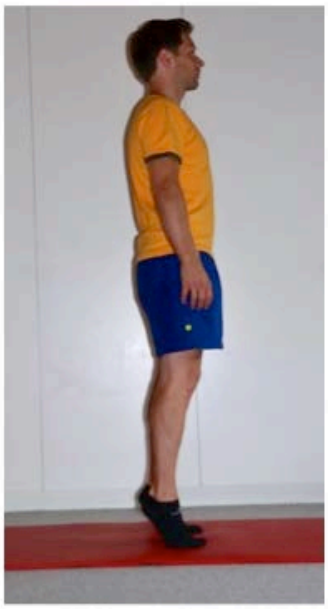
Ausgangstellung
Aufrechte Position; Beine hüftbreit positioniert

Ausführung
Wechselseitig den Ausfallschritt ausführen; Gewicht auf vorderes Bein verlagern; Rücken bleibt gerade. Gleichgewicht beibehalten. Mögliche Variation: mit Zusatzgewicht (Hanteln).

Wadenmuskulatur



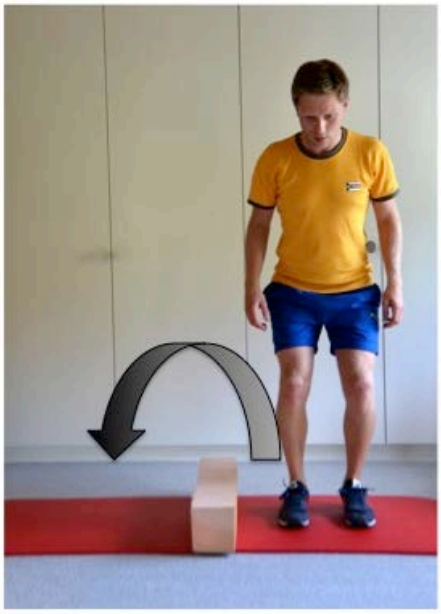
Ausgangstellung
Aufrechte Position; Beine hüftbreit positioniert.



Ausführung
Gewicht auf Zehenspitzen verlagern und nach oben drücken. Variation mit Zusatzgewicht (Hantel).

3.4. Beinmuskulatur und Stärkung des Knochens

Sprung, beidbeinig über Hindernis



Ausführung
Hüftbreit stehen; Arme sind neben dem Körper; Beine leicht gebeugt; seitlich über Hindernis springen; beidbeinig landen. Mögliche Variation durch unterschiedliche Höhe des Hindernisses.

Sprung, beidbeinig von Kiste

Ausführung
Hüftbreit stehen; Arme sind neben dem Körper; Beine leicht gebeugt; Sprung vorwärts; beidbeinig landen. Arme als Balancehilfe vor dem Körper. Mögliche Variation durch unterschiedliche Höhe des Hindernisses.

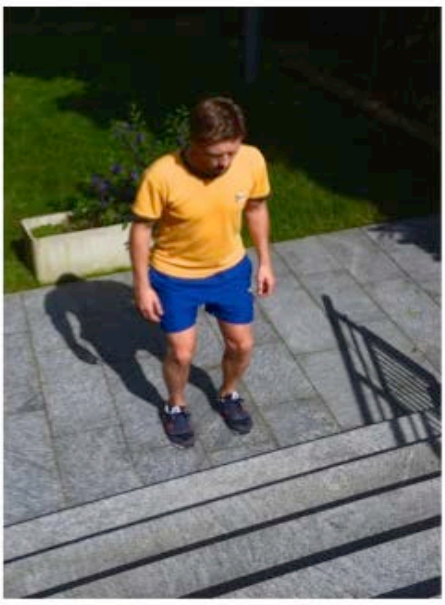
Sprung, beidbeinig über Hindernis

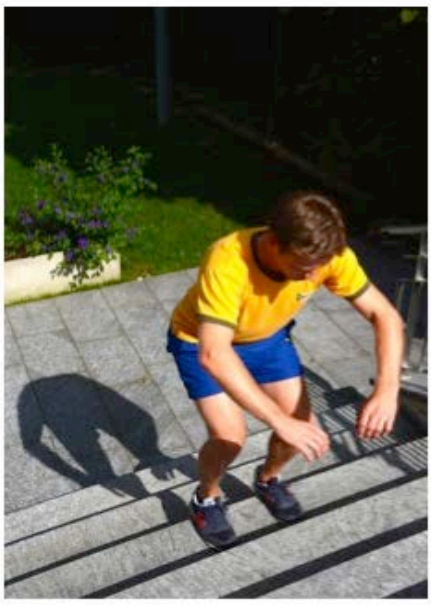
Ausführung
Hüftbreit stehen; Arme sind neben dem Körper; Beine leicht gebeugt; Sprung vorwärts; beidbeinig landen. Knie sollten nicht über Fußspitze zeigen! Mögliche Variation durch unterschiedliche Höhe des Hindernisses.

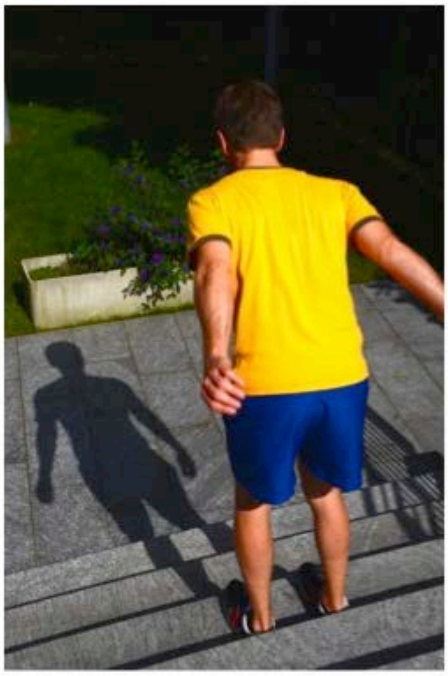
Sprung, einbeinig über Hindernis

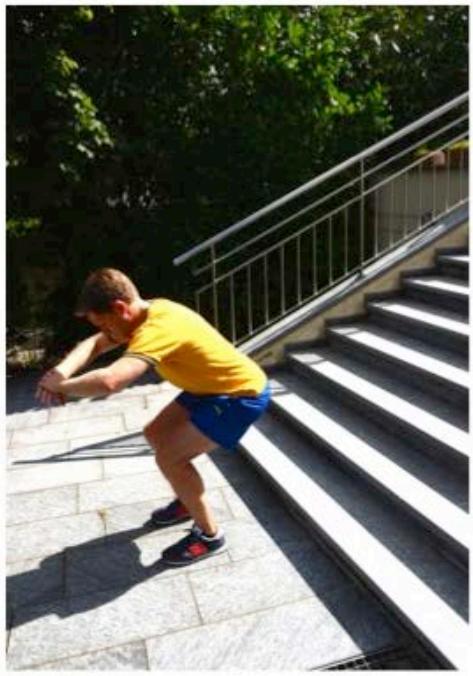
Ausführung
Das Körpergewicht ist auf dem vorderen Bein; Gleichgewicht suchen; die Arme sind neben dem Körper; Sprung über Hindernis; einbeinig landen. Mögliche Variation durch Höhenveränderung des Hindernisses.

Sprünge beidbeinig (Treppen)



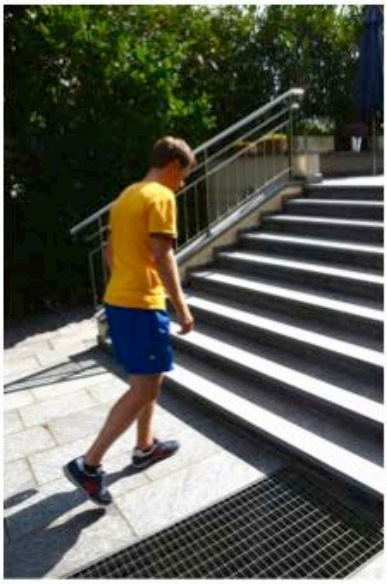


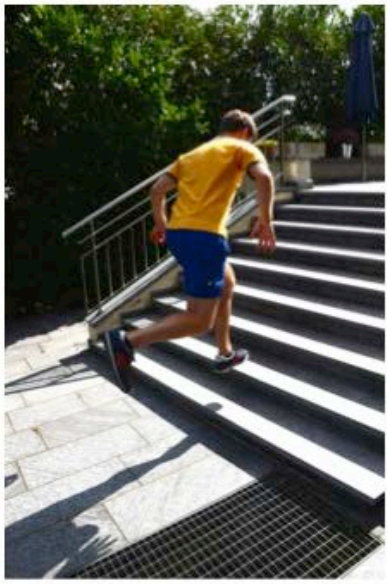


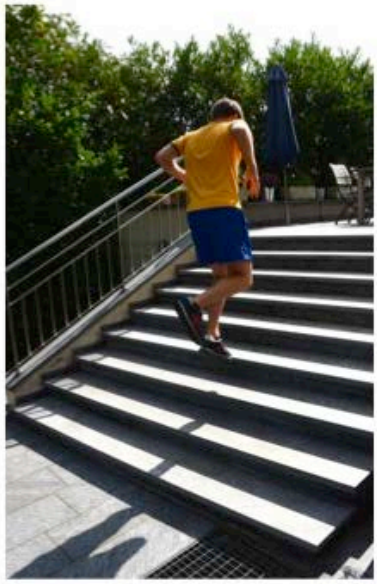


Ausführung
Beidbeinige Sprünge die Treppe rauf und runter. Fokussieren Sie auf die Landung. Hüftbreite Position und gerader Rücken. Arme brauchen als Balancehilfe. Mögliche Variation durch springen über mehrere Stufen.

Sprünge einbeinig (Treppe aufwärts)







Ausführung
Einbeinige Sprünge die Treppe rauf und runter. Körper sollte in Achse bleiben (Fuss-Knie-Hüfte-Rücken bilden eine Linie) – vermeiden Sie Ausweichbewegungen nach links oder rechts. Mögliche Variation durch Sprünge über mehrere Stufen.

4. Kraftübungen mit Geräten (Widerstandsband und Hanteln)

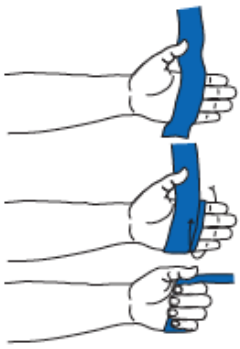
4.1. Informationen zum Widerstandsband

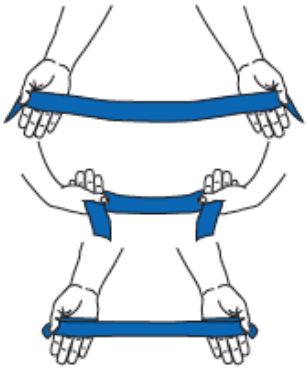
Das Widerstandsband (z.B. TheraBand™) ist ein ideales Trainingsgerät für zu Hause und auf Reisen, da es in jede Tasche passt. Es ist in verschiedenen Farben erhältlich; je nach Farbe ist der Widerstand stärker oder leichter. Die Abbildung zeigt die verschiedenen Farben und den jeweiligen Widerstand (in kg) sowie die Dehnungsfähigkeit (in %). Die Wahl der Farbe des Bands und damit der richtigen Bandstärke richtet sich nach dem individuellen Trainingszustand. Bevor Sie mit verschiedenen Farben trainieren, sollten die Übungen locker und technisch einwandfrei mit dem blauen Band 15-20 Mal durchgeführt werden können. Generell ist das Band so zu wählen, dass eine Übung am Anfang etwa 15 Mal wiederholt werden kann. Die schwarzen, silbernen und goldenen Bänder sind für Fortgeschrittene und sollten erst bei technisch korrekter Ausführung der Übungen gewählt werden.

		Widerstand in kg						
		Gelb	Rot	Grün	Blau	Schwarz	Silber	Gold
Dehnung in %	25 %	0,5	0,7	0,9	1,3	1,6	2,3	3,6
	50 %	0,8	1,2	1,5	2,1	2,9	3,9	6,3
	75 %	1,1	1,5	1,9	2,7	3,7	5,0	8,2
	100 %	1,3	1,8	2,3	3,2	4,4	6,0	9,8
	125 %	1,5	2,0	2,6	3,7	5,0	6,9	11,2
	150 %	1,8	2,2	3,0	4,1	5,6	7,8	12,5
	175 %	2,0	2,5	3,3	4,6	6,1	8,6	13,8
	200 %	2,2	2,7	3,6	5,0	6,7	9,5	15,2
	225 %	2,4	2,9	4,0	5,5	7,4	10,5	16,6
	250 %	2,6	3,2	4,4	6,0	8,0	11,5	18,2

Das Übungsband wird immer doppelt um die Hand bzw. den Fuß gewickelt. Somit wird ein Abrutschen verhindert und die Verletzungsgefahr gemindert.

Das Band kann einseitig (Bild links) oder zweiseitig (Bild rechts) um die Hand gewickelt werden. In der Ausgangsposition sollte das Band jeweils unter leichter Spannung stehen.





4.2. Schulter-, Rumpf- und Armmuskulatur mit dem TeraBand

Schultermuskulatur

Ausgangstellung
Hüftbreit stehen; Arme über Kopf positionieren; das Band unter Spannung.

Ausführung
Das Band zur bis auf Schulterhöhe ziehen, kurz halten, anschließend in Ausgangs-position zurückbringen. Das Band ist immer unter Spannung!

Schultermuskulatur

Ausgangsposition
Ein Bein aufgestellt; Arme horizontal auf Brusthöhe mit leicht angewinkelten Ellbogen; Rücken gerade; Band unter Spannung; Handgelenke gerade

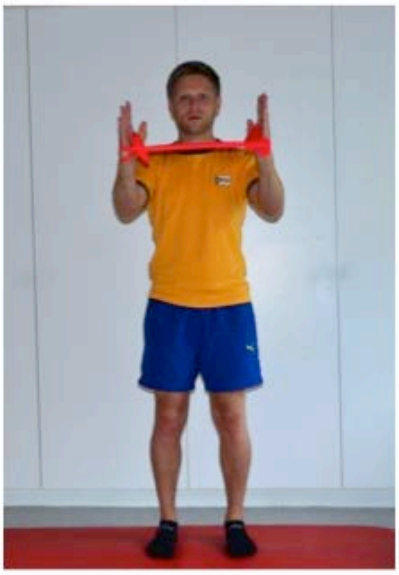
Ausführung
Band langsam Richtung Decke ziehen; kurz halten, anschließend wieder in die Ausgangsposition; Spannung halten.

Schultermuskulatur (einarmig)

Ausgangsposition
Hüftbreit stehen; Band unter Fuß geklemmt und unter Spannung; Handgelenke gerade.

Ausführung
Der Arm zieht das Band seitlich nach oben. Langsame Bewegungsausführung; zurück in Ausgangsposition.

Schultermuskulatur



Ausgangsposition
Band straff um die Hände gewickelt; Arme leicht gebeugt und in Vorhalte; Hand-innenflächen zeigen zueinander.

Ausführung
Band langsam und kontrolliert auseinanderziehen (ausatmen) und zurück in Ausgangsposition (einatmen).

Bizepsmuskulatur

Ausgangsposition
Band unter Fuß geklemmt; Arme in Vorhalte, Handinnenflächen zeigen nach oben.

Ausführung
Arme zum Körper heranziehen durch Beugen der Ellbogen; langsam zurück in Ausgangsposition; Spannung halten.

Trizepsmuskulatur

Ausgangsposition
Band gut um die Hände wickeln; eine Hand ist auf Kopfhöhe, die andere etwa auf Höhe Lendenwirbelsäule; das Band ist unter Spannung.

Ausführung
Hände ziehen in die gegenseitige Richtung nach oben bzw. nach unten durch Strecken der Ellbogen. Langsame Bewegungs-ausführung, Spannung kurz halten und zurück in Ausgangsposition.

Rückenmuskulatur

Ausgangsposition
Sitzen mit geradem Rücken und nicht ganz durchgestreckten Beinen; Hand-flächen zeigen nach innen; Band unter Spannung.

Ausführung
Hände zum Körper heranziehen und Ellbogen soweit nach hinten wie möglich; dabei ausatmen. Schulterblätter nähern sich einander an. Langsam zurück in die Ausgangsposition (ausatmen).

4.3. Beinmuskulatur mit dem TeraBand

Ausgangsposition
Seitenlage auf Arm gestützt; das Band straff um Beine oberhalb der Knöchel platziert.

Ausführung
Das obere Bein Richtung Decke ziehen (ausatmen); kurz halten und wieder zurück in die Ausgansposition (einatmen).

Ausgangsposition
Rückenlage mit passivem Bein aufgestellt; Band um den Fuß des gebeugten Übungsbeines legen.

Ausführung
Das Übungsbein strecken und dabei das Band unter Spannung halten. Die Armposition verändert sich dabei nicht.

4.4. Informationen zu Kleinhanteln

Mit den Kleinhanteln können Sie fast alle Muskelgruppen trainieren. Wählen Sie das Gewicht zu Beginn so, dass Sie die jeweilige Übung langsam und korrekt mindestens 15x ausführen können. Machen Sie zwischen den Übungssets mit 15 Wiederholungen jeweils eine Pause von 45-60s und wiederholen Sie die Übungssets 3 Mal. Sie werden merken, dass es nicht viel Gewicht benötigt, um den Muskel bei korrekter, langsamer Ausführung zur Ermüdung zu bringen.

4.5. Rumpf-, Schulter-, und Armmuskulatur mit Kleinhanteln

Schulter- und Armmuskulatur

Ausgangsposition
Hüftbreit stehen; Hanteln sind bei gebeugten Armen oberhalb der Schulter; Handgelenke gerade.

Ausführung
Arme strecken (ausatmen) und zurück in Ausgangsposition (einatmen). Die Bewegung wird ohne Schwung ausgeführt.

Rücken- und Armmuskulatur

Ausgangsposition
Hüftbreit stehen; Beine leicht gebeugt; Hanteln in Vorhalte; Rücken gerade; Arme sind fast komplett gestreckt.

Ausführung
Arme zum Körper heranziehen; Ellbogen beugen und diese soweit als möglich nach hinten bringen (ausatmen) und wieder zurück in die Ausgangsposition (einatmen). Die Bewegung ohne Schwung ausführen.

Schultermuskulatur

Ausgangsposition
Hüftbreit stehen; Beine leicht gebeugt; Hanteln in Vorhalte, Rücken gerade.

Ausführung
Arme seitlich bis auf Schulterhöhe führen (ausatmen) und zurück in Ausgangsposition (einatmen).

Arm- und Schultermuskulatur

Ausgangsposition
Hüftbreit stehen; Beine leicht gebeugt; Hanteln in Hüfthöhe; Rotieren Sie Handinnenflächen bei gestreckten Armen maximal nach aussen.

Ausführung
Hantel langsam über dem Kopf zusammenführen (ausatmen) und zurück in die Ausgangsposition (einatmen). Ohne Schwung zu holen.

Ausgangsposition
Hüftbreit stehen; Beine leicht gebeugt; Hanteln mit gestreckten Armen und Handinnenflächen gegen den Körper halten.

Ausführung
Wechselseitig den gestreckten Arm bis auf Schulterhöhe (horizontal) anheben. Während der Aufwärts-bewegung ausatmen und während der Abwärtsbewegung einatmen.

Bizepsmuskulatur (stehend)

Ausgangsposition
Hüftbreit stehen; Hanteln mit gestreckten Armen am Körper anliegend.

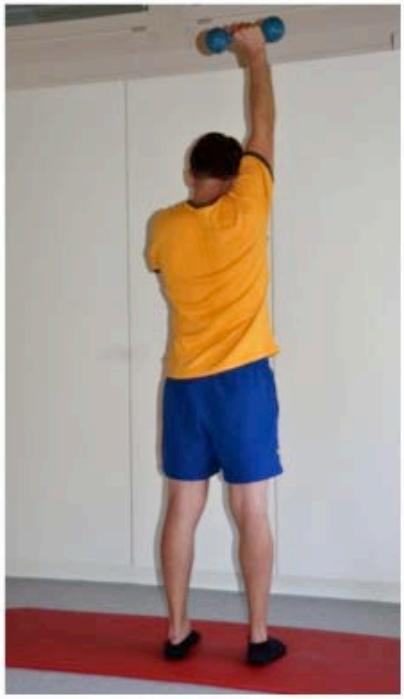
Ausführung
Arme alternierend und maximal beugen ohne Schwung und zur Ausgangsposition zurückführen.

Bizepsmuskulatur (sitzend)

Ausgangsposition
Ellenbogen an Knieinnenseite legen. Der passive Arm ist auf dem Oberschenkel platziert.

Ausführung
Die Hantel langsam in Richtung Schulter führen durch Beugung des Ellbogens (ausatmen) und zur Ausgangsposition zurückbringen.

Trizepsmuskulatur



Ausgangsposition
Hüftbreit stehen; Arm mit Hantel ist gestreckt. Die passive Hand kann zur Unterstützung unter der Achsel platziert werden.

Ausführung
Ellbogen beugen und die Hantel langsam Richtung Wirbelsäule führen (ausatmen) und zur Ausgangsposition zurück (einatmen). Die Bewegung kommt aus dem Unterarm – der Oberarm verbleibt in der Ausgangsposition.

4.5. Beinmuskulatur mit Kleinhanteln

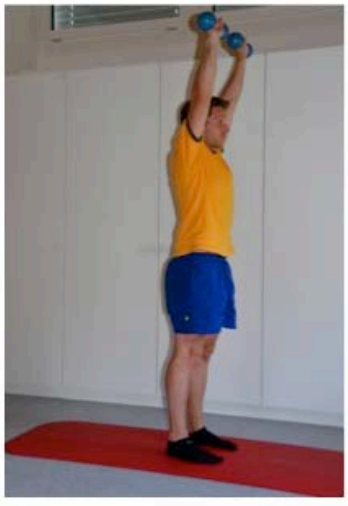
Ausfallschritt

Ausgangsposition
Hüftbreit stehen; Arme gestreckt; Rücken gerade.

Ausführung
Wechselseitig Beine nach vorne setzen und in die Beuge gehen. Den Körper wieder in die Ausgangsstellung bringen.

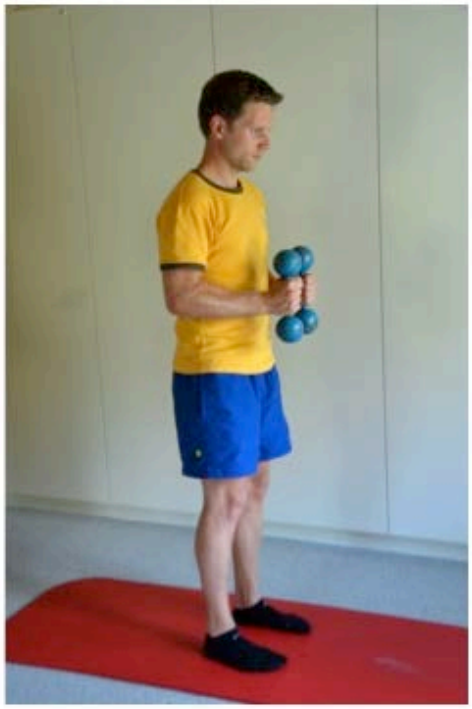
4.6. Kombinierte Übungen mit Hanteln

Kniebeuge mit gestreckten Armen



Ausführung
Beide Arme gestreckt; Kniebeuge mit geradem Rücken; die Hanteln bis auf Schulterhöhe mitführen. In der Aufwärtsbewegung werden die Hanteln in Richtung Decke gestemmt.

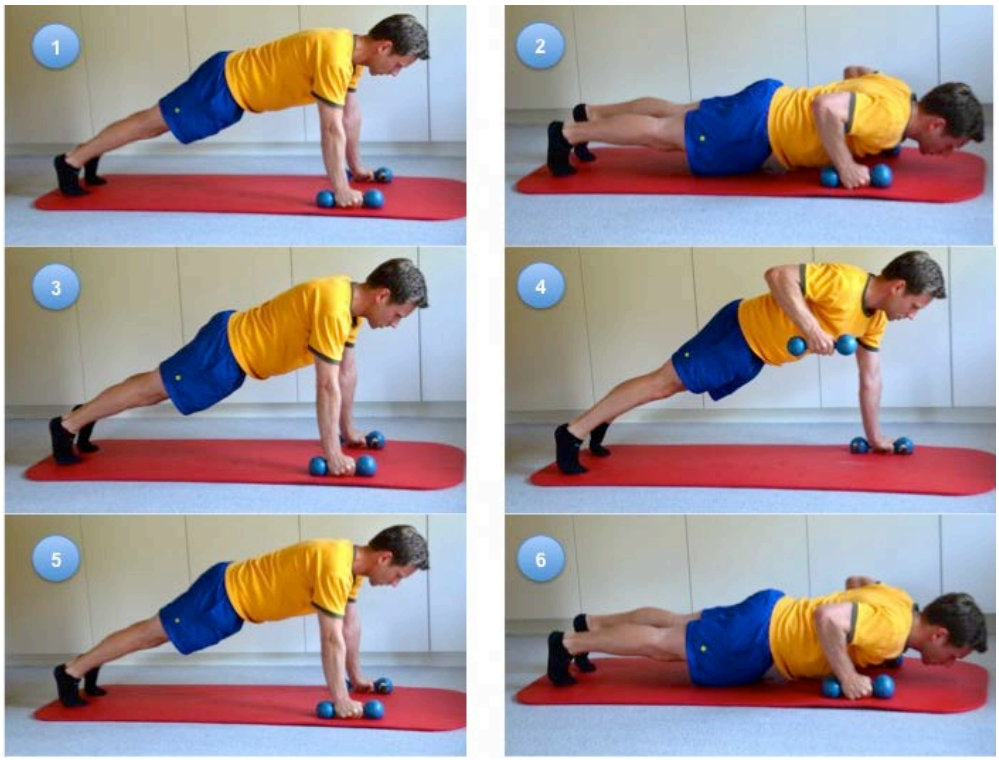
Kniebeuge mit vorgehaltenen Armen



Ausgangsposition
Hüftbreit stehen; Hantel vor dem Körper halten; Hand-gelenke sind gerade.

Ausführung
Kniebeuge (Vorsicht Knie-winkel!) ohne Veränderung der Hantelposition.

Liegestütz mit Hantelarbeit (hoher Schwierigkeitsgrad)



Ausführung
Liegestützposition mit den Hanteln einnehmen (1). Eine Liegestütze ausführen (2) und zurück in die Ausgangsposition (3) kommen. Anschließend die Hantel auf einer Seite zur Brust heranziehen (4) und wieder am Boden ablegen (5). Erneut eine Liegestütze ausführen (6).

Informationsblatt für die Physiotherapeutinnen:
Einführung in die Herzfrequenzmessung für das Ausdauertraining

Die Teilnehmenden sollten gemäss den nachfolgenden Informationen für die selbständige Herzfrequenzmessung geschult werden (Blatt wird nicht abgegeben)

Manchmal ist es schwierig abzuschätzen, wann ein kontinuierliches ausdauerorientiertes Training als intensiv oder anstrengend bezeichnet wird. Basierend auf Ihrem Leistungstest haben wir Ihre individuelle Herzfrequenz bestimmt, die die richtige Intensität für diese Art von Aktivitäten wiederspiegelt.

Ihr optimaler Trainingsbereich beginnt ab _____ Schlägen pro Minute

Es gibt verschiedene Möglichkeiten die Herzfrequenz zu bestimmen. Wenn Sie wünschen, können Sie eine Pulsuhr benutzen. Sie können Ihre Herzfrequenz aber auch ermitteln, indem Sie ihren Puls (siehe Abbildung) sofort nach dem Belastungsende während 15 Sekunden messen und das Ergebnis (Anzahl Schläge) mit 4 multiplizieren.

Damit Sie den Pulsschlag spüren benutzen Sie zwei Finger und üben leichten Druck aus.

Bitte zögern Sie nicht, Ihre Physiotherapeutin zu kontaktieren, wenn Sie diesbezüglich Fragen haben.

Strukturiertes Interview für Nachuntersuchungen und Telefonkontakte zur Erfassung der Umsetzung des vereinbarten Aktivitätsprogrammes

ID: _____ Datum: _____

1. **Haben Sie sich in der Zeit seit dem letzten Kontakt vor _____ Wochen entsprechend der Vereinbarungen zur sportlichen Aktivität bewegt?**
   O Ja
   O Nein

2. **Jetzt werfen wir einen Blick auf Ihr** Onlinetagebuch (machen Sie hier eine Übersicht und Kommentare zum Onlinetagebuch)**, kurze Zusammenfassung:**

   _____

   _____

   _____

   _____

   _____

   _____

3. **Hatten Sie seit dem letzten Termin am UKBB/dem letzten Telefonat irgendwelche Symptome?**
   O Nein
   O Ja → Falls Ja, folgende Details ausfüllen

   O Husten (Details):

   _____

   O Kurzatmigkeit (Details):

   _____

   O Erschöpfung (Details):

   _____

   O Schmerzen (Wo? Wann?):

   _____

O geschwollene Gelenke (Details):

_____

O Herzklopfen/Herzrasen (Details):

_____

O Ohnmacht (Details):

_____

O Andere Symptome (Details):

_____

_____

_____

_____

_____

4. **Waren Sie seit dem letzten Besuch zu krank um aktiv zu sein?**

   O Nein

   O Ja → Bitte geben Sie für den Zeitraum den genauen Anfang und das Ende sowie den Grund/die Erkrankung an:

   _____

   _____

   _____

   _____

5. **Denken Sie, dass Sie die im Vertrag vereinbarten Aktivitäten weiterhin durchführen können?**

   O Ja

   O Nein → Bitte geben Sie die Gründe an, wenn Sie die Aktivitäten nicht wie geplant durchführen können:

   _____

   _____

   _____

   _____

Sofern der/die Studienteilnehmer/in Probleme mit der Umsetzung des vereinbarten Aktivitätsprogrammes hatte (Antwort "NEIN" auf Frage 1 oder weniger sportliche Aktivität als vereinbart), sollten die nachfolgenden zwei Fragen gestellt und, wenn erforderlich, Modifikationen der Vereinbarung zur sportlichen Aktivität vorgenommen und dokumentiert werden.

6. **Ich frage Sie nun nach möglichen Gründen, weshalb Sie das Sportprogramm nicht wie vereinbart durchführen konnten. Sie können mehr als einen Grund angeben. Bitte geben Sie eine Rangordnung der Gründe an** (Rangordnung mit Zahlen zu den Gründen schreiben):

   O Keine Zeit
   O Keine Lust
   O Zu anstrengend
   O Zu krank
   O Symptome während des Sports
   O Andere (bitte angeben):

   _____

   _____

   _____

   _____

7. **Was schlagen Sie vor um das Ziel von _____ Stunden anstrengender Aktivitäten / Woche in Zukunft zu erreichen?**

   _____

   _____

   _____

   _____

   _____

   _____

8. **Haben Sie (als Physiotherapeutin) ein erneutes motivierendes Sportinterview durchgeführt (Form C)?**

   O Nein
   O Ja

9. **Wurde die Abmachung zum Sportprogramm verändert?**

   O Nein
   O Ja

Zusammenfassung des Telefonkontaktes und der angepassten Vereinbarungen (bitte senden diese Informationen als Nachricht an den Patienten mittels Nachrichtenoption des Onlinetagebuches):

_____

_____

_____

_____

_____

_____

_____

_____

_____

Ort und Datum

Name Physiotherapeutin

Unterschrift Physiotherapeutin