REHAB

EUFAPA

Physical Activity Guidelines for Persons with Disabilities

Persons after Stroke

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LSPA

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Physical Fitness after Stroke

Reduced physical fitness after stroke:

- Reduced muscle strength and power
- VO_2 max: about 50% of age appropriate controls
- Insufficient fitness to perform
  - Activities of daily living (ADL), e.g. cleaning, dressing , shopping
  - Crossing the road
- Low fitness: ↑ risk of further vascular events
- ↑ risks of falls
- ↓ community based participation

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Fitness training

- **Definition**: It consists of planned and structured activities with appropriate intensity, involving continuous rhythmic movements and various muscular groups, aimed at maintaining or increasing components related to physical fitness. It is based upon physiological principles, which increase the ability to transport and use oxygen during physical activity.
- Advantages: Easy administration and relatively low cost. Possibility of being delivered to groups.
- Clearly established evidence for stroke patients with mild to moderate impairments at both the acute and chronic stages in outcomes, such as maximal oxygen consumption, gait capacity and speed.
- Limited scientific evidence to improve quality of life.

https://www.stroke.org.uk/professionals/life-after-stroke-services/moving-forward-after-stroke

(ACSM, 2009; Brazelli et al., 2011)

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Constraint-induced movement therapy

- **Definition**: It is a behavioural approach, which focuses on improving and increasing the use of the paretic limb in people with asymmetrical use of the limbs. Comprises three pillars: (1) restriction of the non-paretic limb; (2) intensive task-oriented training (task practice and shaping); and (3) a transfer package.
- Advantages: The activities to be trained may be those that are part of the patients' daily lives and be administered within their life context.
- Clearly established evidence for stroke patients at the acute, sub-acute, and chronic stages in outcomes related to the quantity and quality of the use of their paretic upper limb in daily life, dexterity, and motor recovery.
- Limited scientific evidence for the lower limbs, in outcomes related to strength and gait.

(Stock and Mork, 2009; Nijland et al., 2011; McIntyre et al., 2012)

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Biofeedback

- **Definition**: It is delivered using equipment to provide patients with information regarding physiological processes during the performance of a given movement, activity, or task, in order to improve performance and learning.
- Advantages: The physiological information is continuously and simultaneously delivered in a objective manner and is specific to the trained movement, activity, or task.
- Clearly established evidence for stroke patients at the acute, sub-acute, and chronic stages to improve activity performances more related to the lower limbs (stand-up, gait, and sit-to-stand).
- Limited scientific evidence for sensorimotor impairments, activities related to the upper limbs, and spasticity that interferes with activity or personal care.

(National Stroke Foundation, 2010; Stanton et al., 2011; van Vliet et al., 2010)

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Progressive resistance training

- **Definition**: Refers to the use of progressive overload applied to a specific muscular group, to stimulate further adaptation toward specific training goals.
- Advantages: Low cost, easy to administer, and may be delivered in groups. It can be used for muscles of different segments (upper limbs, lower limbs, and trunk) and also for the respiratory muscles.
- Clearly established evidence for for weak patients at the acute, sub-acute, and chronic stages, without any adverse effects, even on spasticity, to improve strength, gait performance, quality of life, and oxygen consumption (peak VO_2).
- Limited scientific evidence to improve mobility, sit-to-stand, stairclimb, the performance of activities related to the upper limbs, and functional performance in general.

(ACSM, 2009; Ada et al., 2006; National Stroke Foundation, 2010; Pak et al., 2008)

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	Intervention				Comparison	Outcomes
	Description	Duration	Frequency Length	Intensity		
ıs	Concentric isotonic muscle strengthening (Flex-Ext-Abd Hip; Flex-Ext Knee; DE-PF) Functional exercises, balance	4 weeks 12 sess.	3×/week 3 h	70% 1 RM	Same exercises without muscle strengthening	Isometric strength (dynamometer) flex + ext + abd H, flex + ext K, DE + PF
	Strength on "sliding rehabilitation machine" + Bobath	2 weeks 10 sess.	5×/week 30 min		Conventional training based on Bobath concept	6MWT, TUGT, BBS, MMT (Knie)
	Strengthening on Leg Extension/Curl Rehab machine Passive Stretching of Knee extensors + flexors	10 weeks 20 sess.	2×/week 90 min (PRT 6 min)	5 rep.25% 1 RM 2 × 6–8rep. 80%1 RM	ADL and other training (not PRT)	Dynamic strength K flex + ext, isokinetic strength K flex + ext, TUG, 6MWT, 10MWT Dynamic strength K flex + ext, isokinetic strength k flex + ext, TUG, 6MWT, 10MWT
	Gr1: Strengthening on pneumatic resistance equipment ext H + K unilateral; abd-ext-flex K; FP; ED + Active cycling	10–12 30 sess.	3×/week 60 min	PRT 50%–80% 1 RM Active cycling: 50%Vo2max	Gr3 bilateral: exercises without resistance + active cycling	6MWT, 10MWT
	Gr2: same as Gr1 but passive cycling (motorised)				Gr4: like Gr3, but passive cycling	Strength dynamic PF + DE + flex k + ext k + ext H, isometric abd H
	Leg-Press bilateral and Ext k + PF + DE unilateral	12 weeks 36 sess.	3×/week	3 sets of 8–10 × 70% 1 RM	ROM bilateral and upper body exercises	1 RM, 6MWT, stand up, 10MWT
ıs	Sit-to-stand + global Physio (balance, walking, leg strengthening)	4 week 12 sess.	3×/week 15 min Strength + 30 min global physio		Global physio (balance, walk, leg strengthening)	BBS, isometric strength ext H + k + PF (dynamometer)
	Aerobic cycling exercise training with additional weight on paretic side Stretching and balance	8 weeks 40 sess.	5×/week 40 min	3% max body weight (hemi-side) 50–70% HRR	Low intensity walking Stretching and balance	6MWT, excentric strength ext k, BBS
	ES-LCE	6 weeks 12 sess.	2×/week 25–30 min		LCE	Isometric strength ext K, 6MWT, BBS

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Mirror therapy

- **Definition**: It focuses on moving the unimpaired limb, while the patient watches its mirror reflection superimposed over the impaired limb that is unseen, thus creating a visual illusion of the movement capability of the impaired limb.
- Advantages: Low cost and is easily performed. The patients may perform the intervention by themselves.
- Clearly established evidence for weak patients at the acute, sub-acute, and chronic stages to improve the following outcomes related to the upper limbs: Pain, motor function, and the performance of functional activities.
- Limited scientific evidence to improve range of motion, visual-spatial neglect, and the performance of activities of daily living.
- https://www.youtube.com/watch?v=up9sR6rjTwg

(National Stroke Foundation, 2010; Sütbeyaz et al., 2007; Thieme et al., 2012)

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Bobath concept

- **Definition**: It is defined by the International Bobath Instructors Training Association (IBITA), as a problem solving approach for the assessment and treatment of individuals with disturbances of function, movement, and postural control due to a lesion of the central nervous system. The aims are to identify and analyze problems within functional activities and participation in everyday life, as well as analyse movement components and underlying impairments. It is based upon afferent information, named facilitation, to enable successful movement and task performance.
- Advantages: It is a global strategy with a holistic approach, but it requires expert training to be delivered.
- Evidence: There is no evidence that the Bobath Concept is superior to other approaches.

(Lennon, 1996; Graham et al., 2009)

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Task-specific training

- **Definition:** It consists of repetitive training of movements directly related to functional activities.
- Advantages: It can be performed as circuit training and delivered to groups. The intensity of training can be adjusted and progressed to fit the individuals' needs.
- Clearly established evidence for stroke patients at the sub-acute and chronic stages to improve balance, sit-to-stand, reaching, manipulation, and walking performance.

(French et al., 2010; Rensink et al., 2009)

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Virtual reality therapy

- **Definition**: It refers to use of interactive simulations generated from images, such as computer processors, to provide the users the opportunity to interact with environments that simulate real objects and events. Through a virtual environment rich in detail, virtual reality simulates functional tasks that are intensively practiced.

- Advantages: Virtual reality programs simulate real life functional activities in an interesting and challenging manner and may encourage the practice of a higher number of repetitions. Moreover, the difficulty of the tasks can be graded and the physiotherapists can simulate tasks that could not be trained within clinical settings, such as crossing a street.

- Limited scientific evidence of the benefits of virtual reality compared with the same doses of conventional rehabilitation strategies for measures of upper limb function and daily life activities. There is limited evidence on the effectiveness of virtual reality in measures of grip strength and gait speed.

(Laver et al., 2011)

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Mental practice

- **Definition**: It is a cognitive strategy, in which a brain area related to specific motor action is triggered repeatedly, through the activation of the imagination, with the goal of improving the patients' performance.

- Advantages: For many individuals with nervous system damage, the execution of certain movements is very difficult and, sometimes, even impossible, which hampers their active participation in the rehabilitation process. In this sense, mental practice allows the realization of all movements.

- Limited scientific evidence of the benefits of mental practice in addition to other rehabilitation strategies for measures of upper limb function. No adverse effects with stroke patients at the acute, sub-acute and chronic stages were observed.

(Refshauge et al., 2005; Barclay-Goddard et al., 2011)

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Table 1 Summary of included studies: Tailored counseling

Study	Design/Participants/Setting	Intervention Content	Follow-Up Period	Measures	Control Condition
Green et al[38]	RCT; n=200 community-dwelling ambulatory stroke survivors; Canada	Nurse-mediated motivational counseling Dose: 1 interview with tailored advice, 1 class	3mo	Knowledge of stroke Change from passive to active stage of change for PA	Usual care
Sit et al[42]	Quasi-experimental trial; n=190 survivors with minor stroke or TIA; Community setting, China	Teaching, games, experience sharing, experimental learning methods, goal setting, action plans, personal logs, pedometers Dose: Eight 2-h sessions	3mo	Stroke knowledge scale Self-health monitoring practice Medication compliance scale Cigarette and alcohol consumption Dietary intake Participation in walking exercise	Usual care and health promotion leaflets
Van der Ploeg et al[43]	RCT; n=154 stroke survivors receiving in-patient rehabilitation, other conditions also included, total sample N=1202; The Netherlands	R&S: Tailored counseling session 6wk before the end of rehabilitation and 10-min telephone check-up 6wk after rehabilitation Or R&S + Active after rehabilitation counseling based on the transtheoretical model; 40-min tailored counseling session before the end of rehabilitation and 3 telephone counseling sessions at 2, 5, and 8wk after rehabilitation	1y	Sport participation Intensity and average duration of sport Meet public health guidelines for PA 7-d Physical Activity Recall Scale for adults with physical disabilities	Usual care
Boysen et al[34]	RCT; Stroke survivors (n=314) <90d poststroke able to walk unassisted; Community setting, Denmark, China, Poland, and Estonia	Encouragement and verbal instruction on being physically active from physiotherapist. Individualized program, written agreement Dose: 30–40min with instructor at start of study	Thrice per year and every 6mo thereafter until 24mo	Physical Activity Scale for the Elderly Time and frequency of recurrent stroke Modified Rankin Scale Myocardial infarction or death Falls Fractures	Usual care
Gillham and Endacott[37]	RCT; Stroke survivors (n=52) with minor stroke and TIA recruited at first stroke clinic visit; Community setting, the	Information about stroke and risk factors, motivational interview about behavior change interventions based	3mo	Readiness to change behavior Contemplation to action Exercise behavior—self-report frequency of 20-min sessions	Usual care

(*continued on next page*)

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Table 1 (*continued*)

Study	Design/Participants/Setting	Intervention Content	Follow-Up Period	Measures	Control Condition
Duncan et al[36]	RCT; Stroke survivors (n=408) with slight, moderate, or moderately severe disability; Community setting, the United States	Locomotor training, with partial weight-bearing treadmill + progressive overground walking 2 months after stroke Dose: 90min thrice a week for 12–16wk compared with a home exercise program supervised by a therapist in the home and by encouraging daily walking 2mo after stroke (n=126) Or Locomotor training, with partial weight-bearing treadmill + progressive overground walking 6 months after stroke Dose: 90min thrice a week for 12–16wk	6 and 12mo	Ability in independent gait speed ≥0.4m/s 10m walk speed Number of steps walked per day Range of functional measures Falls diary 6MWT	Home exercise program supervised by a therapist in the home and by encouraging daily walking 2mo after stroke
Dean et al[35]	RCT; Stroke Survivors (n=151); Community setting, Australia	Weekly exercise classes targeting mobility, PA, and falls. Dose: 40wk over a 1-y period plus a home exercise program to be completed at least 3 times per week. Interventions tailored to the participant's functional ability	12mo	Habitual PA—step count pedometer Quality of life Community participation Health service contact Falls calendar	Weekly exercise class of same duration designed to improve upper limb function

Abbreviations: R&S, rehabilitation sport; RCT, randomized controlled trial; SF-36, Medical Outcomes Study 36-Item Short-Form Health Survey; 6MWT, 6-minute walk test; 10MWT, 10-meter walk test; TIA, transient ischemic effect.

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Table 1 (*continued*)

Study	Design/Participants/Setting	Intervention Content	Follow-Up Period	Measures	Control Condition
	United Kingdom	on the transtheoretical model, plan of behavior change. Compared with usual care. Telephone support and follow-up 2 and 6wk after the initial interview		Hospital Anxiety and Depression Scale	
Huijbregts et al[39]	RCT; Stroke survivors (n=30); Community setting, Canada	Stroke self-management program: Seventeen 2-h sessions twice a week for 8wk + a booster session 6wk later. Discussion, goal setting, and problem solving with exercise group plus 14 sessions of pool-based endurance exercise. Caregivers included	3mo	Activity Inventory of Chedoke-McMaster Stroke Assessment Participation in a formal exercise program Reintegration to Normal Living Index Activities-specific Balance Confidence Scale Goal Attainment Scale FIM Geriatric Depression Scale	90-min discussion session not focused on PA for 6wk
Olney et al[41]	RCT; Ambulatory stroke survivors (n=72); Community setting, Canada	10-wk supervised exercise program, aerobic + stretching 1.5h, thrice a week for 10wk, increased intensity throughout compared with 1 week supervised instruction followed by 9 weeks unsupervised home program	6 and 12mo	Human Activity Profile Gait endurance (6MWT) SF-36: Physical and mental outcome components Physiological cost index Lower extremity muscle strength	1-wk supervised instruction program with written + verbal instruction on advancing exercise followed by 9-wk unsupervised home exercise program
Langhammer et al[40]	RCT; Stroke survivors at hospital discharge (n=75); Community setting, Norway	Intensive exercise group with encouragement to maintain a high activity level Dose: 20h with a physio-therapist at months 3, 6, and 12. Delivered 2–3 times a week by a physiotherapist.	12mo	Motor function and grip strength Participation in supervised exercise sessions	Regular exercise group with no specific intervention, but encouragement to maintain a high level of activity
Mudge et al[21]	RCT; Stroke survivors (n=58) >6mo poststroke; Community setting, New Zealand	Twelve group circuit exercise sessions 50–60min, thrice a week for 4wk	3mo	Mean number of steps per day Walking speed (10MWT) Confidence during mobility Self-reported PA Functional mobility	4 social and 4 educational sessions

(*continued on next page*)

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Table. Summary of Exercise/Physical Activity Recommendations for Stroke Survivors

Setting/Mode of Exercise	Goals/Objectives	Prescriptive Guidelines: Frequency/Intensity/Time
Hospitalization and early convalescence (acute phase) • Low-level walking, self-care activities • Intermittent sitting or standing • Seated activities • Range of motion activities, motor challenges	• Prevent deconditioning, hypostatic pneumonia, orthostatic intolerance, and depression • Evaluate cognitive and motor deficits • Stimulate balance and coordination	• ≈10- to 20-bpm increases in resting HR; RPE ≤11 (6–20 scale); frequency and duration as tolerated, using an interval or work-rest approach
Inpatient and outpatient exercise therapy or "rehabilitation"		
Aerobic • Large-muscle activities (eg, walking, graded walking, stationary cycle ergometry, arm ergometry, arm-leg ergometry, functional activities seated exercises, if appropriate	• Increase walking speed and efficiency • Improve exercise tolerance (functional capacity) • Increase independence in ADLs • Reduce motor impairment and improve cognition • Improve vascular health and induce other cardioprotective benefits (eg, vasomotor reactivity, decrease risk factor)	• 40%–70% $\dot{V}O_2$ reserve or HR reserve; 55%–80% HR max; RPE 11–14 (6–20 scale) • 3–5 d/wk • 20–60 min/session (or multiple 10-min sessions) • 5–10 min of warm-up and cool-down activities • Complement with pedometers to increase lifestyle physical activity
Muscular strength/endurance • Resistance training of U/L extremities, trunk using free weights, weight-bearing or partial weight-bearing activities, elastic bands, spring coils, pulleys • Circuit training • Functional mobility	• Increase muscle strength and endurance • Increase ability to perform leisure-time and occupational activities and ADLs • Reduce cardiac demands (ie, RPP) during lifting or carrying objects by increasing muscular strength, thereby decreasing the % MVC that a given load now represents	• 1–3 sets of 10–15 repetitions of 8–10 exercises involving the major muscle groups at 50%–80% of 1RM • 2–3 d/wk • Resistance gradually increased over time as tolerance permits
Flexibility • Stretching (trunk, upper and lower extremities)	• Increase ROM of involved segments • Prevent contractures • Decrease risk of injury • Increase ADLs	• Static stretches: hold for 10–30 s • 2–3 d/wk (before or after aerobic or strength training)
Neuromuscular • Balance and coordination activities • Tai chi • Yoga • Recreational activities using paddles/sport balls to challenge hand-eye coordination • Active-play video gaming and interactive computer games	• Improve balance, skill reacquisition, quality of life, and mobility • Decrease fear of falling • Improve level of safety during ADLs	• Use as a complement to aerobic, muscular strength/endurance training, and stretching activities • 2–3 d/wk

1RM indicates 1 repetition maximum; ADLs, activities of daily living; HR, heart rate; MVC, maximal voluntary contraction; ROM, range of motion; RPE, rating of perceived exertion (6–20 category scale); RPP, rate-pressure product; U/L, upper/lower; and $\dot{V}O_2$, oxygen uptake.

Modified with permission from Gordon et al.[124] Copyright © 2004, American Heart Association, Inc.

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- https://www.youtube.com/watch?v=ErTCauSjMyU
- Interesei: Ted Talks -
- https://www.ted.com/talks/jill_bolte_taylor_s_powerful_stroke_of_insight

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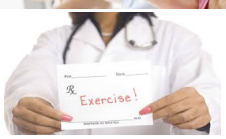
REHAB

EUFAPA

Physical Activity Guidelines for Persons with Disabilities

Persons with Type 2 Diabetes



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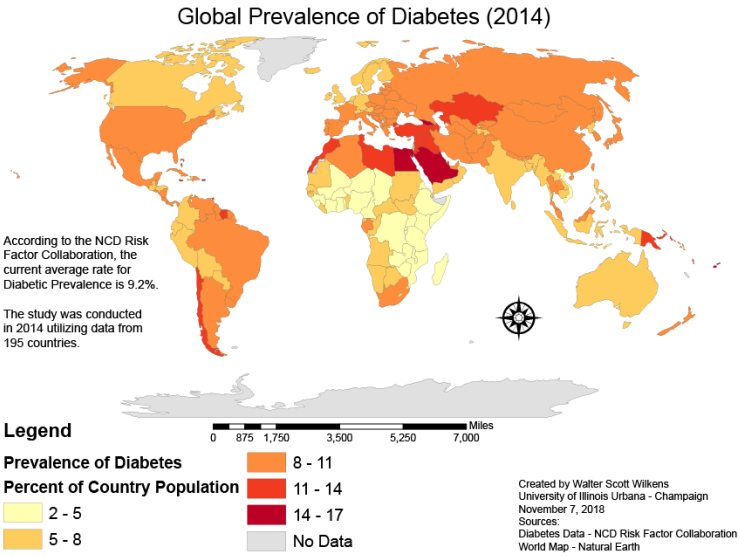
In the World every 11th adult has diabetes.

About half has no idea!
(International Federation of Diabetes)



Latvia:

2017 - 91571 with diabetes, 86639 has 2TD. About 2000 new patients every year.

https://spkc.gov.lv/lv/statistika-un-petijumi/statistika/veselibas-aprupes-statistika1

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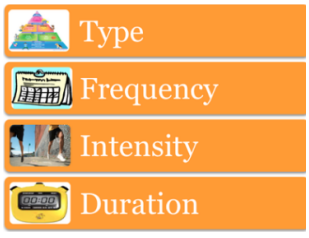
Physical Activity in Type 2 Diabetes (T2D)

- Regular physical activity (PA) is a keystone in type 2 diabetes (T2D) rehabilitation.
- Structured, long-term and supervised exercise program services is a large societal **challenge and is not feasible.**
- Effective **long-term and low-cost** strategies to keep these patients' physically active are needed.
- **SOLUTION - mobile technologies and remote feedback.**



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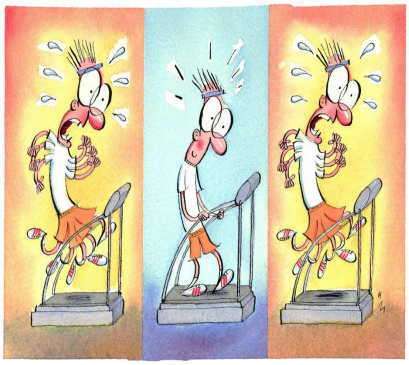
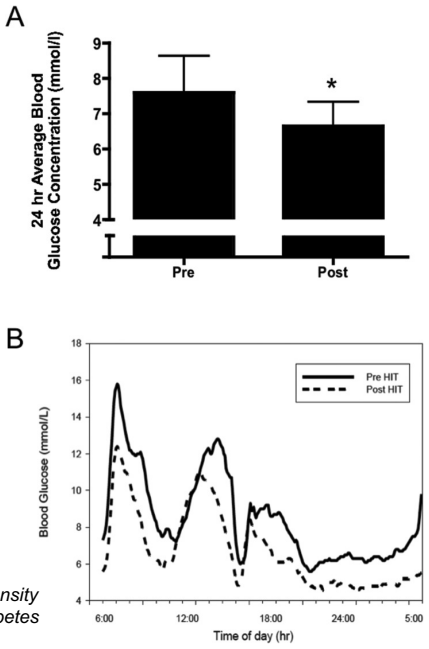
High Intensity Interval Training



Hal Mayforth



Francois & Little. "Effectiveness and Safety of High-Intensity Interval Training in Patients With Type 2 Diabetes." Diabetes Spectrum: A Publication of the American Diabetes Association 28.1 (2015): 39–44.

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Review

Effects of High-Intensity Interval Training on People Living with Type 2 Diabetes: A Narrative Review

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ABSTRACT

People with type 2 diabetes typically present with comorbidities, such as elevated blood pressure, high cholesterol, high blood glucose, obesity and decreased fitness, all contributive to increased risk for cardiovascular complications. Determination of effective exercise modalities for the management of such complications is important. One such modality is high-intensity interval training (HIIT). To conduct the review, PubMed and EBSCOHost databases were searched through June 1, 2016, for all HIIT intervention studies conducted in people living with type 2 diabetes. Thereafter, the central characteristics of HIIT were analyzed to obtain a broader understanding of the cardiometabolic benefits achievable by HIIT. Fourteen studies were included for review, but the heterogeneity of the participants with type 2 diabetes, the training equipment and HIIT parameters, accompanied by variations in supervision, dietary advice and medications, prevented direct comparisons. However HIIT, regardless of the specific parameters employed, was a suitable option in pursuing improved glycemic control, body composition, aerobic fitness, blood pressure and lipidemia measures in individuals with type 2 diabetes. HIIT is a therapy with at least equivalent benefit to moderate-intensity continuous training; hence, HIIT should be considered when prescribing exercise interventions for people living with type 2 diabetes.

RÉSUMÉ

14 pētījumi iekļauti apskatā

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Table 1
Summary of studies that used HIIT as a clinical intervention in people living with type 2 diabetes

Study and study design	Modality, intervention duration, and run-in duration (if any)	Participant characteristics, including prescribed antihyperglycemic medication and resting blood pressure limitations (if any)	Training frequency, session duration, (additional aspects) and adherence	HIIT parameters: bouts, work-rest duration and intensities, progression and mode Comparison group parameters (if any): Steady state duration, intensity and mode
Alvarez et al (36) RCT	HIIT (AIT) 16 wks	N=13 women Age=45.6±11.2 yrs T2DM duration=3.4±4.0 yrs A1C=51.9 (median) (metformin and glibenclamide)	3×/wk 22 min progressed to ~38 min with 89.0%±5.0% adherence	8 bouts 30 sec ~95% HRR-2 min ≤70% HRR progressed to 14 bouts 58 sec ~95% HRR-1:36 min ≤70% HRR using indoor sports court (jogging/ walking)
	Control 16 wks	N=10 women Age=43.1±4.7 yrs T2DM duration=3.6±3.5 yrs A1C=57.4 (median) (metformin and glibenclamide)	Instructed to remain sedentary	N/A
Backx et al (37) Pilot study	HIIT (AIT) 12 wks Including run-in of 2 wks MICT	n=10 Age=59.6 yrs (median) T2DM duration =>0.25 yrs (newly diagnosed) A1C=46.5 mmol/mol (median) (treatment naive)	3 x/wk 35 min progressed to 60 min (plus 2×/w MICT) with 63% for HIIT and 78% for MICT adherence	4 bouts 2 min ~85% HRR to 2 min ~45% HRR progressed to 8 bouts 3 min ~85% HRR to 2 min 45% HRR using cycle ergometer
	MICT advice 12 wks	N=9 Age=59.6 yrs (median) T2DM duration =>0.25 yrs (newly diagnosed) A1C=48.6 mmol/mol (median) (treatment naive)	5×/wk 30 min with 69% adherence	Advised to exercise at moderate-high intensity using self-selected modalities
Cassidy et al (38) RCT	HIIT (AIT) 12 wks	N=12 Age=61.0±9.0 yrs T2DM duration=5.0±3.0 yrs A1C=54.0±11.0 mmol/mol (metformin only)	3×/wk 30 min progressed to 40 mins (included 4 resistive band exercises) with >89% adherence	5 bouts 2 min ~16.5 RPE to 3 min ~11 RPE progressed to 5 bouts 3:50 min ~16.5 RPE to 3 min ~11 RPE using cycle ergometer
	Control 12 wks	N=11 Age=59.0±9.0 yrs T2DM duration=4.0±2.0 yrs A1C=55.0±6.0 mmol/mol (metformin only)	Instructed to continue habitual lifestyle and not to change medication or body mass	N/A
Fexet al (39)] Pilot study	HIIT (SIT) 12 wks	N=16 of which 8 T2DM Age 60.4±6.1 yrs A1C=45.0±6.6 mmol/mol	3×/wk 30 min with 88% adherence	10 bouts 30 sec ~83% HRR to 1:30 min ~63% HRR using elliptical trainer
Hollekim-Strand et al (46) RCT	HIIT (AIT) 12 wks	N=20 with diastolic dysfunction Age=58.6±5.0 yrs T2DM duration=4.2±2.3 yrs	3×/wk 40 min	4 bouts 4 min ~93% HR max to 4 min low-intensity recovery

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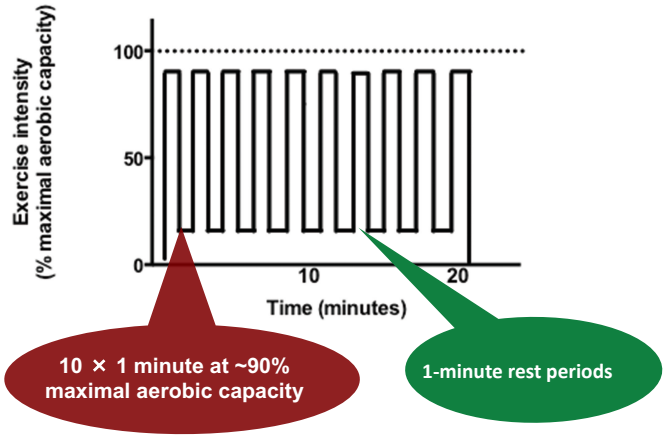
Physical Activity in Health Care of T2D

- **HIGH-INTENSITY INTERVAL TRAINING (HIIT)**



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	Control 16 wks	N=10 women Age=43.1±4.7 yrs T2DM duration=3.6±3.5 yrs A1C=57.4 (median) (metformin and glibenclamide)	Instructed to remain sedentary	58 sec : 1.36 min
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	MICT advice 12 wks	N=9 Age=59.6 yrs (median) T2DM duration =>0.25 yrs (newly diagnosed) A1C=48.6 mmol/mol (median) (treatment naive)	5×/wk 30 min with 69% adherence	3 min : 2 min
Cassidy et al (38) RCT	HIIT (AIT) 12 wks	N=12 Age=61.0±9.0 yrs T2DM duration=5.0±3.0 yrs A1C=54.0±11.0 mmol/mol (metformin only)	3×/wk 30 min progressed to 40 mins (included 4 resistive band exercises) with >89% adherence	5 bouts 2 min ~16.5 RPE to 3 min ~11 RPE progressed to 5 bouts 3:50 min ~16.5 RPE to 3 min ~11 RPE using cycle ergometer
	Control 12 wks	N=11 Age=59.0±9.0 yrs T2DM duration=4.0±2.0 yrs A1C=55.0±6.0 mmol/mol (metformin only)	Instructed to continue habitual lifestyle and not to change medication or body mass	N/A 30 sec/83% : 1.30 min ~63%
Fexet al (39)] Pilot study	HIIT (SIT) 12 wks	N=16 of which 8 T2DM Age 60.4±6.1 yrs A1C=45.0±6.6 mmol/mol	3×/wk 30 min with 88% adherence	4 min : 4 min
Hollekim-Strand et al (46) RCT	HIIT (AIT) 12 wks	N=20 with diastolic dysfunction Age=58.6±5.0 yrs T2DM duration=4.2±2.3 yrs	3×/wk 40 min	4 min ~95% HR max to 4 min low-intensity recovery

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Project "Healthy Walk" (2017-2019)

Project partners:

- University of Latvia, Faculty of Computer Science
- University of Latvia, Faculty of Medicine, Lab of Personalized Medicine
- Endocrinology Center PSCUH
- PSCUH Cardiology Center
- Latvian Academy of Sport Education (LASE)

LATVIJAS UNIVERSITĀTES FONDS

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LATVIJAS UNIVERSITĀTE FM Faculty of Medicine

LATVIJAS SPORTA PEDAGOĢIJAS AKADĒMIJA

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Vita Rovīte,
Leonora Pahirko,
Jānis Valeinis

MikroTik

lmt

FORA ForaCare Suisse AG

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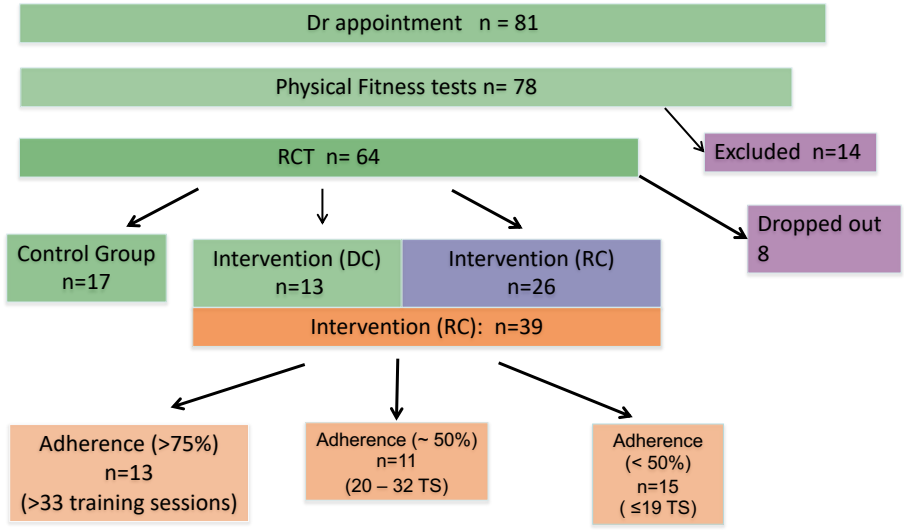
Healthy Walk (2017-2019)



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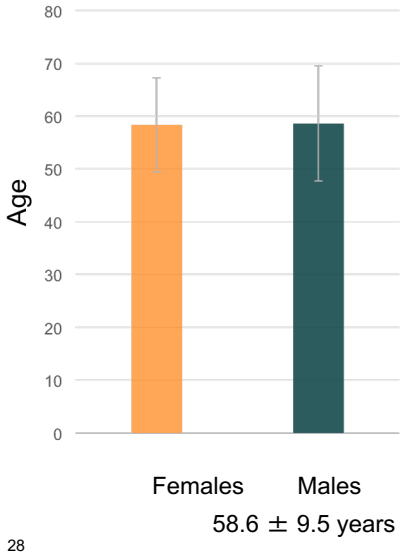
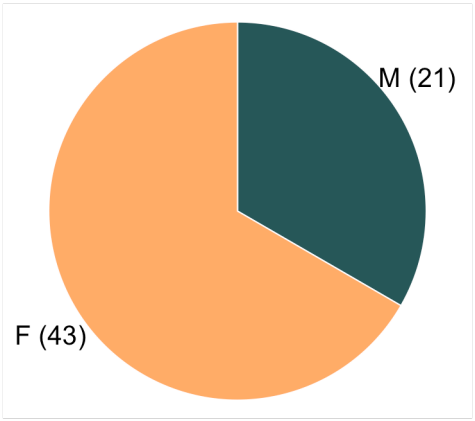
Participants

N = 64, Mean duration of diabetes 6.9±5.1 years



58.6 ± 9.5 years



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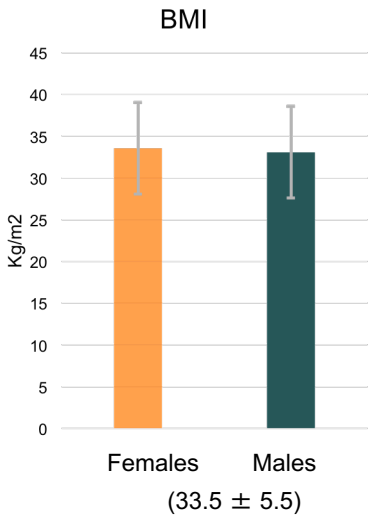
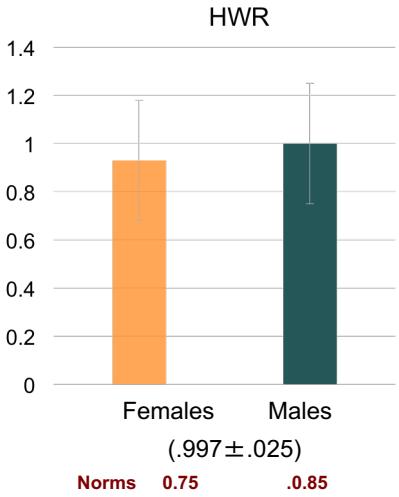
Antropometric Measures





Norms 0.75 .0.85

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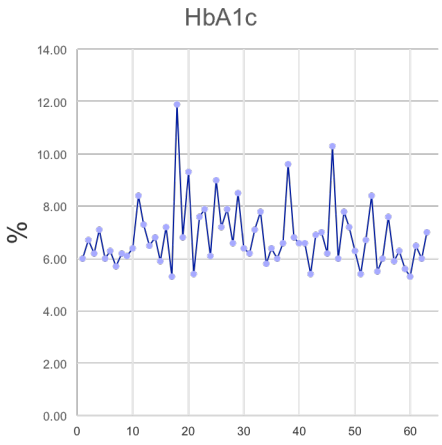
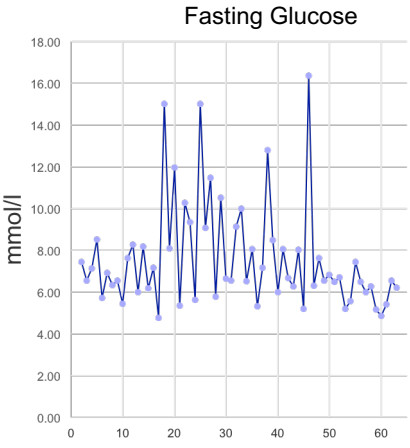
Glucose Level



M = 6.9 ± 1.3 %



M = 7.5 ± 2.4mmol/L

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Relative VO2max

FEMALE

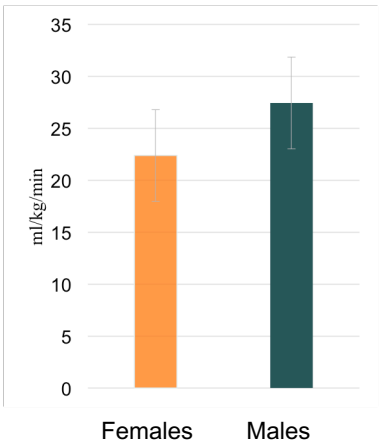
(values in ml/kg/min)

Age	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19	<25.0	25.0 - 30.9	31.0 - 34.9	35.0 - 38.9	39.0 - 41.9	>41.9
20-29	<23.6	23.6 - 28.9	29.0 - 32.9	33.0 - 36.9	37.0 - 41.0	>41.0
30-39	<22.8	22.8 - 26.9	27.0 - 31.4	31.5 - 35.6	35.7 - 40.0	>40.0
40-49	<21.0	21.0 - 24.4	24.5 - 28.9	29.0 - 32.8	32.9 - 36.9	>36.9
50-59	<20.2	20.2 - 22.7	22.8 - 26.9	27.0 - 31.4	31.5 - 35.7	>35.7
60+	<17.5	17.5 - 20.1	20.2 - 24.4	24.5 - 30.2	30.3 - 31.4	>31.4

MALE

(values in ml/kg/min)

Age	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19	<35.0	35.0 - 38.3	38.4 - 45.1	45.2 - 50.9	51.0 - 55.9	>55.9
20-29	<33.0	33.0 - 36.4	36.5 - 42.4	42.5 - 46.4	46.5 - 52.4	>52.4
30-39	<31.5	31.5 - 35.4	35.5 - 40.9	41.0 - 44.9	45.0 - 49.4	>49.4
40-49	<30.2	30.2 - 33.5	33.6 - 38.9	39.0 - 43.7	43.8 - 48.0	>48.0
50-59	<26.1	26.1 - 30.9	31.0 - 35.7	35.8 - 40.9	41.0 - 45.3	>45.3
60+	<20.5	20.5 - 26.0	26.1 - 32.2	32.3 - 36.4	36.5 - 44.2	>44.2



mean VO2max 24.0 ± 95.1 ml/kg/min

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Equipment for Participants

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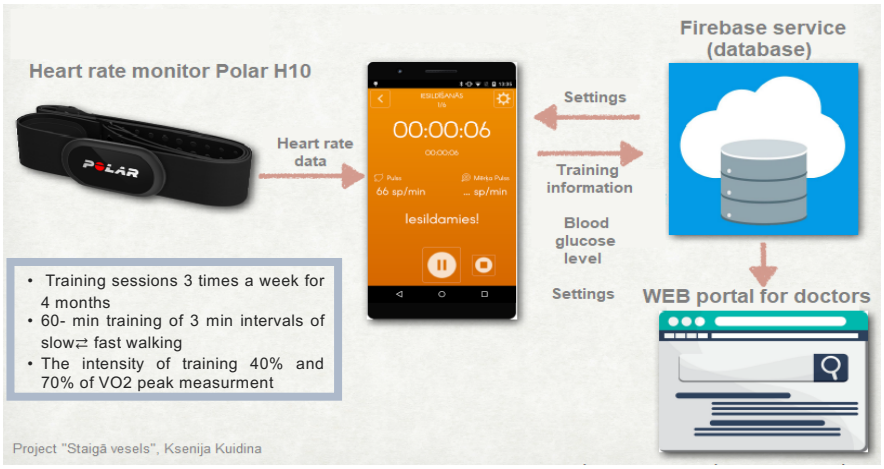
- **Instawalk**



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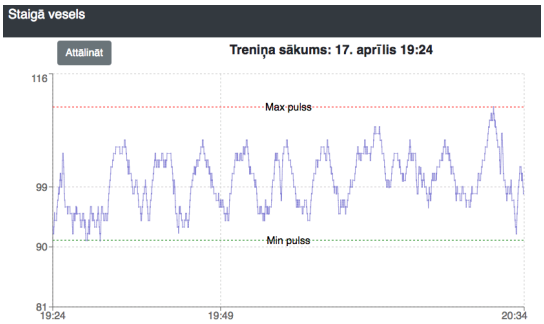

https://www.comarch.com/healthcare

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Glikozes mērījumi

SV0067 treniņi
19. aprīlis 18:21
17. aprīlis 19:24
17. aprīlis 18:44
15. aprīlis 17:16
13. aprīlis 18:44
11. aprīlis 18:20
9. aprīlis 18:15
7. aprīlis 17:07
5. aprīlis 17:14
5. aprīlis 16:04
4. aprīlis 14:30
2. aprīlis 13:45

ilikozes mērījumi

Datums	Mērījums
19. aprīlis 20:49	8.4
19. aprīlis 19:45	6.2
19. aprīlis 17:59	7.6
17. aprīlis 22:26	8.2
17. aprīlis 20:50	8.6
17. aprīlis 18:33	8.6
15. aprīlis 22:07	9.6
15. aprīlis 18:40	10.4
15. aprīlis 16:58	11
13. aprīlis 22:08	8.1
13. aprīlis 20:03	8.1
13. aprīlis 18:43	8.7
11. aprīlis 21:55	10.3

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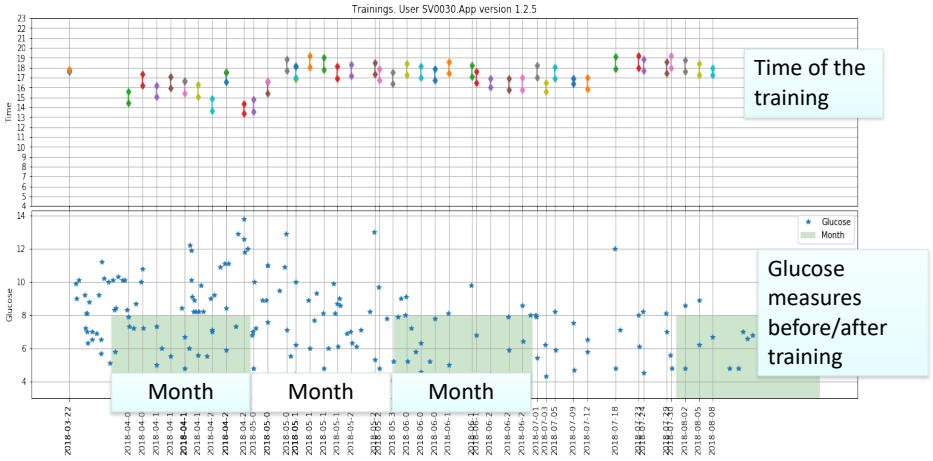
Training Calendar



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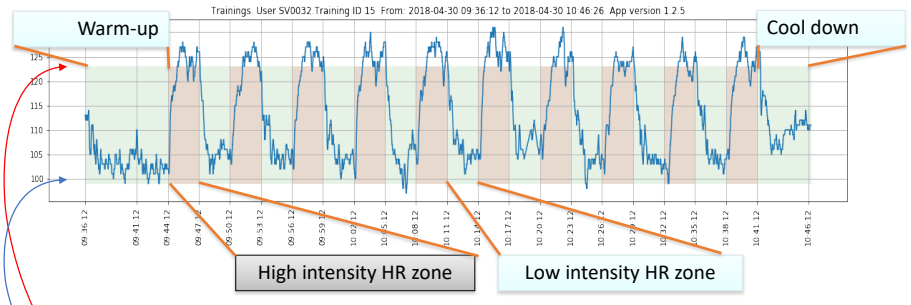
HR During Physical Training



SV0032 15
HR high target 123
HR low target 99
Expected training time: 01:10:00

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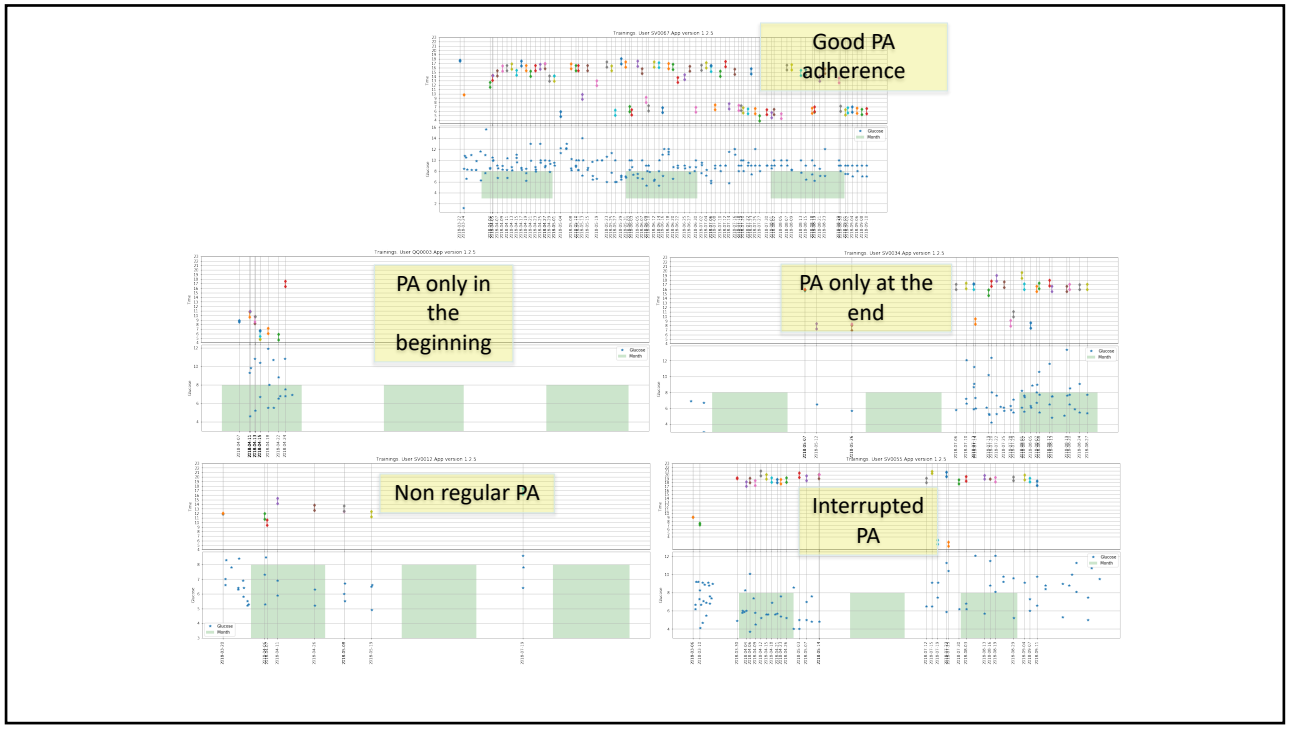
Good PA adherence
PA only in the beginning
PA only at the end
Non regular PA
Interrupted PA

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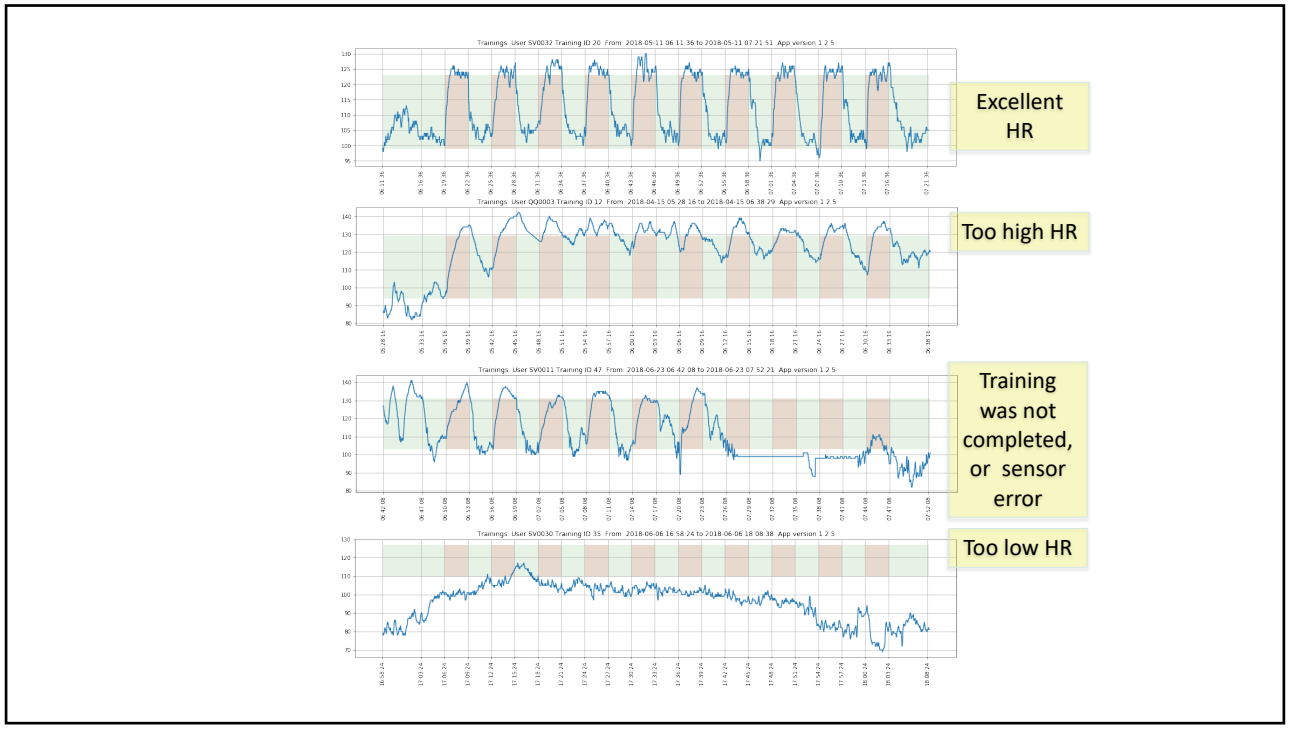
Excellent HR
Too high HR
Training was not completed, or sensor error
Too low HR

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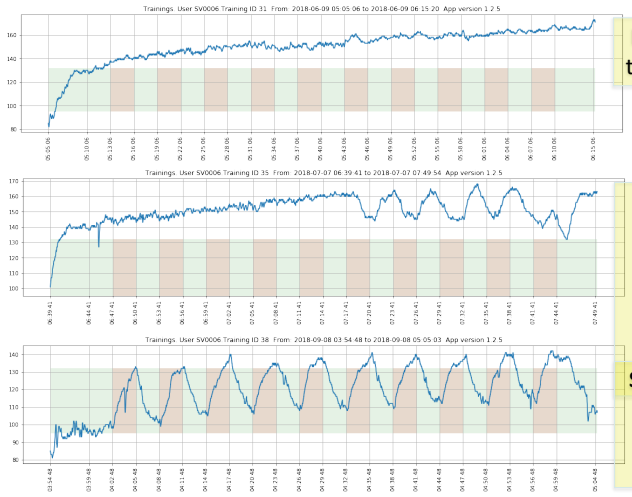

May, 2018 too high HR

July,2018 Too high HR, while getting better towards August

September 2018 , excellent HR

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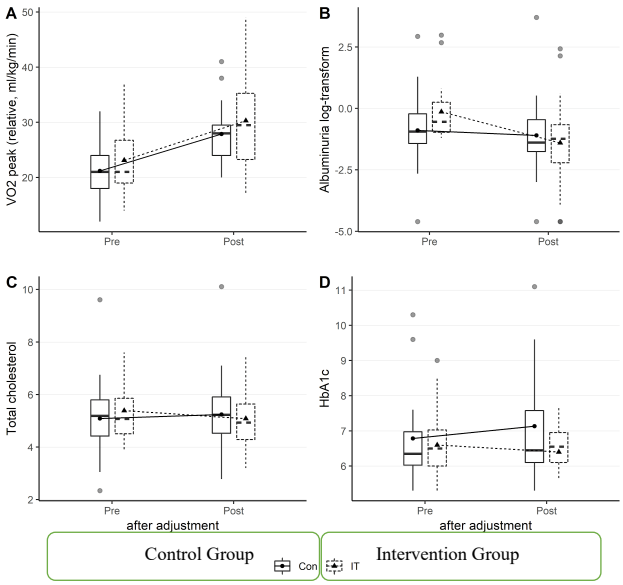
Significant Outcomes



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EUSAPA
Education and Culture DG
Lifelong Learning Programme
European Standards in Adapted Physical Activities

European Standards in Adapted Physical Activities (EUSAPA)

- **Who** provides physical activities in:
- Physical Education
- **Rehabilitation**
- Sport

- **COMPETENCIES?**
- **SKILLS?**
- **KNOWLEDGE?**

EUFAPA **http://www.eufapa.eu/** **http://eusapa.upol.cz/**

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EUFAPA

APA in REHABILITATION

- Responsibilities of APA specialist:
  - Planning
  - Consulting, educate
  - Assessment
  - Implementation
- Skills and knowledge
  - Therapeutic
  - Pedagogic
  - Management

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Editorial policy:

- Peer-review journal
- Spread scientific knowledge in the area of APA
- Provide researcher and academic personnel with new opportunities of publication
- Encourage young researchers (PhD students, postdocs) and experienced researchers to publish their research
- Indexed in SCOPUS

http://eujapa.upol.cz/index.php/EUJAPA

EUJAPA
European Journal
of Adapted Physical Activity

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EUFAPA
European Federation of Adapted Physical Activity

- Brussels, Belgium, 1986
- Leuven, Belgium, 1993
- Leuven, Belgium, 1995
- Thessaloniki, Greece,1998
- Vienna, Austria, 2001
- Amiens, France, 2002
- Dortmund, Germany, 2004
- Olomouc, Czech Republic, 2006
- Torino, Italy, 2008
- Jyväskylä, Finland, 2010
- Killarney, Ireland, May 2012
- Madrid, Spain, 2014
- Olomouc, Czech Rep. 2016
- University of Worcester, United Kingdom, 2018
- **Miguel Hernandez University, Elche, Spain 2020**

See you in Elche on 2020!

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Adapted Physical Activity for Health

Elche (Spain), 21-23 October

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