

PROGRAMME

Friday 25 January

- 09:00** Registration opens
- 10:00 – 13:15** Free oral presentations (see full schedule on page 18)
- 13:15 – 14:00** Lunch break
- 14:00 – 14:30** Official opening
- SDU Vice-Chancellor Henrik Dam
 - Minister for Fisheries and Equal Opportunities and Nordic Cooperation Eva Kjer Hansen
 - UEFA First vice-president Karl-Erik Nilsson
 - DBU President Jesper Møller
 - Chairman, Scientific Committee, Peter Krustrup
- 14:30 – 16:00** Football as Medicine – World-wide Perspectives
- Exercise as medicine**
- Karim Khan, *University of British Columbia, Canada*
- Football and cardiovascular disease**
- Peter Riis Hansen, *University of Copenhagen, Herlev and Gentofte University Hospital, Denmark*
- Motivational aspects in football**
- Anne-Marie Elbe, *University of Leipzig, Germany*
- Round table discussion**
- Moderator Lykke Friis
 - Participants: Minister for Fisheries and Equal Opportunities and Nordic Cooperation Eva Kjer Hansen, Mayor of Nyborg Municipality Kenneth Muhs, 71-year-old Football Fitness player Aase Hansen, Karim Khan, Anne-Marie Elbe, Jesper Møller, Peter Krustrup.
- 16:00 – 16:30** Coffee break
- 16:30 – 18:00** Football for hypertensive women
- Magni Mohr, *University of the Faroe Islands, University of Southern Denmark, Denmark*
- Two sides of the coin – effects and side-effects**
- Tim Meyer, *University of Saarland, Germany*
- The implementation of Football for Health initiatives – the Danish case**
- Søren Bennike, *Danish Football Association (DBU), Denmark*
- Football as a therapy to treat diabetes – a Brazilian study**
- Maysa de Sousa, *University of São Paulo, Brazil*
- 18:00** Dinner-bags-to-go
- 18:30 – 20:30** Indoor football tournament

PROGRAMME

Saturday 26 January

- 09:00 – 10:30** Danish school football projects
- Malte Nejest Larsen, *University of Southern Denmark, Denmark*
- Bone effects of football for children
- Dimitris Vlachopoulos, *University of Exeter, United Kingdom*
- School-based football projects in Portugal
- Susana Póvoas, *University Institute of Maia, ISMAI, Portugal*
- 10:30 – 11:00** Coffee break
- 11:00 – 12:30** The FC Prostate trials: going from efficacy to real world effectiveness
- Jacob Uth and Julie Midtgaard, *The University Hospitals' Centre for Health Research, Rigshospitalet, Denmark*
- Football for pre-diabetic patients
- May-Britt Skoradal, *University of the Faroe Islands, Faroe Islands*
- From high performance to football for health
- George Nassis, *Athens, Greece*
- 12:30 – 13:30** Lunch, "Restauranten"
- 13:30 – 15:00** Effects of football on muscular function
- Per Aagaard, *University of Southern Denmark, Denmark*
- Testing of recreational football players
- Carlo Castagna, *University of Rome Tor Vergata, Italy*
- Football training and healthy ageing
- Pasqualina Buono, *University of Parthenope, Naples, Italy*
- Psychology and mental health in football
- Carsten Hvid Larsen, *University of Southern Denmark, Denmark*
- 15:00 – 15:30** Coffee break
- 15:30 – 17:00** How to organize Football Fitness – where science and practice meet
- Morten B Randers, *University of Southern Denmark, Denmark*
- The Football is Medicine strategy in the Portuguese Football Federation
- João Brito, *Portuguese Football Federation (FPF), Portugal*
- Football for Health in Denmark – Ambitious partnerships
- Søren Bennike, *Danish Football Association (DBU), Denmark*
- 17:00 – 17:30** Closing session

PROGRAMME – Free oral session

Friday 25 January 10:00 – 13:15 ROOM O97

10:00

Effect of game format in physical, physiological and technical demands in U9 team handball

- *Georgios Ermidis, Rasmus C. Ellegaard, Morten B Randers, Vincenzo Rago, Peter Krusturup and Malte N. Larsen*

10:15

Effects of recreational team handball on lower limb muscle strength and postural balance in young men and women

- *Bjørn Fristrup, Peter Krusturup, Jesper L Andersen, Therese Hornstrup, Frederik T Løwenstein, Mikkel A Larsen, Jørn W Helge Susana Póvoas and Per Aagaard*

10:30

Effect of game format on U13 male and female team handball players

- *Mads Madsen, Georgios Ermidis, Vincenzo Rago, Kristoffer Surrøw, Jeppe F Vigh-Larsen, Morten B Randers, Peter Krusturup and Malte N Larsen*

10:45

Physical and physiological demands of recreational team handball for over 50-year-old sedentary men

- *Ivone Carneiro, Peter Krusturup, Rita Pereira, Eduardo Coelho, José Magalhães, Rute Santos, Carlo Castagna and Susana Póvoas*

11:00

Team handball training as health promotion for overweight untrained premenopausal women

- *Therese Hornstrup, Susana Póvoas, Jørn W Helge, Pia S Melcher, Bjørn Fristrup, Jesper L Andersen, Rasmus Møgelvang, Peter R Hansen, Lars Nybo and Peter Krusturup*

11:15 – 11:30 Coffee break in the Panorama view

11:30

Football is Medicine – A Proposed Design for a Dose-Response Clinical Trial in High Risk Adults

- *Ioannis G Fatouros, Charalambos Zelenitsas, Athanasios Z Jamurtas, Konstantinos Papanikolaou, Dimitrios Batsilas, Dimitrios Draganidis, Panagiotis Tsimeas, Athanasios Chatzinikolaou, Magni Mohr, Peter Krusturup*

11:45

Effect on muscle strength and balance of an 11-wk school football intervention in relation to sports club engagement

- *Rasmus C Ellegaard, Malte N Larsen, Morten B Randers, Georgios Ermidis, Mads Madsen and Peter Krusturup*

12:00

Danish 5th grade children's and their teachers experience of the "11 for Health" concept

- *Esbén E Madsen, Anne-Marie Elbe, Carsten H Larsen, Tina Hansen, Gitte Wind, Malte N Larsen, Mads Madsen and Peter Krusturup*

12:15

Football & coaching – a dynamic interplay supporting self-concept

- *Knud Ryom, Johan Wikman and Reinhard Stelzer*

12:30

FIT FIRST – from research to a school-based training concept

- *Charlotte Sandager Jeppesen, Malte N. Larsen and Peter Krusturup*

12:45

Health effects of a 10 weeks residential stay on the Danish Christmas Seal Home

- *Trine K Møller, Malte N Larsen, Mads Madsen, Esben Madsen, Mads F Hjort, Jan C Brønd, Anders Grøntved, Anders Sjødin, Kim F Michaelsen and Peter Krusturup*

13:00

Is bite useful to improve strength and coordination in injured football players? An observational study

- *N Biasolo, R Schoy, G Rossini and S Pistolesi*

PROGRAMME – Free oral session

Friday 25 January 10:00 – 13:15 ROOM O96

10:00

SWEET-FOOTBALL: Development of an evidence-based walking football program for middle-aged and older patients with type 2 diabetes

- *Ana Barbosa, João Brito, Júlio Costa, Elisabete Ramos, João Firmino-Machado, André Seabra, Pedro Figueiredo, Maria João Sá, Nuno Lunet and Romeu Mendes*

10:15

Health effects of a 15-week combined exercise programme for sedentary 50-70-year-olds: A randomised controlled trial

- *Tina-Thea Nielsen, Trine K. Møller, Niels Olesen, Mette K. Zebis, Nikolai Nordsborg, Peter R. Hansen and Peter Krstrup*

10:30

Diabetes Prevention Program Football Club: Effects After 3-months of Intervention Among Latino Men

- *Jennifer K. Frediani, Jianheng Li and Felipe Lobelo*

10:45

Team-sport and fitness training for sedentary women with lifestyle diseases in a community centre setup

- *Trine K Møller, Tina-Thea Nielsen, Ida Lundager, Rene Andersen, Peter Krstrup and Morten B Randers*

11:00

Effects of recreational football on isokinetic strength and jump performance in sedentary male adults

- *Silvia Vieira, António Ascensão, Rita Pereira, Carlo Castagna, Peter Krstrup and Susana Póvoas*

11:15 – 11:30 Coffee break in the Panorama View

11:30

Feasibility of deploying the U.S. National Diabetes Prevention Program Plus Recreational Soccer Among Latino Men

- *Felipe Lobelo, Jianheng Li and Jennifer K. Frediani*

11:45

Gender-dependent evaluation of football as medicine for prediabetes

- *May-Britt Skoradal, Thomas Rostgaard Andersen, Peter Krstrup and Magni Mohr*

12:00

Nocturnal cardiac autonomic activity in patients with type 2 diabetes engaged in a walking football programme

- *Júlio Costa, João Brito, Ana Barbosa, Pedro Figueiredo, André Seabra, Maria João Sá, João Firmino-Machado, Elisabete Ramos and Romeu Mendes*

12:15

A heart patients journey

- *Farooq Mohammed*

12:30

Exercise intensity during walking Football for +60 men in comparison with walking and small-sided football

- *Mads Madsen, Malte N Larsen and Peter Krstrup*

12:45

Activity profile during walking football training sessions in patients with type 2 diabetes

- *Vincenzo Rago, João Brito, Júlio Costa, Ana Barbosa, Pedro Figueiredo, André Seabra, Bruno Travassos and Romeu Mendes*

13:00

Football Fitness ABC (After Breast Cancer) – Study Design and Baseline Data from the Randomized Controlled Trial

- *Bjørn Frstrup, Jacob Uth, Julie Kjærgaard, Maja Kjærgaard, Trine K. Møller, Peter Krstrup*

Effect of game format in physical, physiological and technical demands in U9 team handball

Georgios Ermidis^{1,2}, Rasmus C Ellegard², Morten B Randers², Vincenzo Rago^{3,4}, Peter Krstrup^{2,5} and Malte N Larsen²

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PURPOSE: The purpose of this study was to investigate the influence of game format on exercise intensity, technical involvement and perception in U9 male and female team handball. **METHODS:** Locomotor activity, heart rate (HR) and technical involvement were collected during 15-min games of various formats from a total of 57 Danish U9 players (37 boys and 20 girls). The game formats were small-sized court (20×13 m) 3v3 + offensive goalkeepers and 4v4 players (S3+1, S4), medium-sized court (25.8×20 m) 4v4 and 5v5 (M4, M5) and large-size court (40×20 m) 5v5 (L5). **RESULTS:** Mean HR was 165–176 bpm for both genders. In addition, players spent from 3.04 to 5.96 min at 180–200 bpm and 0.03 to 0.85 min >200 bpm of the total 15 min. Furthermore, boys and girls covered a higher total distance (TD), 13–17.99 km/h (HSR) and >18 km/h (sprinting), in L5 compared to all other game formats (P<0.05). Players performed 1.5 to 11.9 sprints in the various game formats, with L5 having a higher number of sprints compared to all other game formats (P<0.05).

CONCLUSION: In summary, TD, high-intensity distances and HR are high in U9 team handball matches irrespective of the game format. Heart rate demands appeared to be similar between game formats, but locomotor activity demands were higher during games with larger court sizes. When reducing the number of players and court size, the physiological demands were lowered, whereas technical involvement was elevated.

FUNDING: Georgios Ermidis is supported by the “Parthenope” University of Naples. Vincenzo Rago is supported by an individual doctoral grant awarded by Fundação para a Ciência e Tecnologia (SFRH/BD/129324/2017). Funding was also obtained from the Danish Handball Federation (Dansk Håndbold Forbund, DHF).



Effects of recreational team handball on lower limb muscle strength and postural balance in untrained young men and women

Bjørn Frstrup^{1,2,3}, Peter Krstrup¹, Jesper L Andersen², Therese Hornstrup³, Frederik T Løwenstein³, Mikkel A Larsen³, Jørn W Helge⁴, Susana Póvoas⁵ and Per Aagaard⁶

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PURPOSE: Increased prevalence of physical inactivity among young men and women leads to loss of musculoskeletal fitness. Furthermore, risk of falls increases with insufficient postural balance (PB) and reduced muscle strength. There is a need to investigate intervention strategies that can stimulate participation in regular physical activity. **PURPOSE:** To evaluate the effects of regular participation in small-sided team handball training on maximal lower limb muscle strength and PB. **METHODS:** Eighty-five young men and women with no prior experience with regular exercise for the past 2-yr were recruited. Study participants were stratified for maximal oxygen uptake (VO_{2max}) and body fat percentage, and randomly allocated to either recreational team handball training (HTG) or control (CON). Fifty-four study participants completed the 12-wk intervention period; 14 men and 14 women age 24.1 ± 2.6 in HTG, and 12 men and 14 women age 24.8 ± 3.1 in CON. HTG were encouraged to participate in 2 out of 3 weekly indoor training sessions and trained 1.8 ± 0.3 per wk on average. Training sessions consisted of 15-min of standardized warm-up, 10-min of technical drills followed by 4x10-min small-sided team handball games separated by 3-min rest periods.

Study participants were tested for fat free mass (FFM) using DXA scanning, maximal knee extensor strength and rate of force development (RFD) using isokinetic dynamometry. Unilateral PB (30-s center of pressure (CoP) sway length) and vertical countermovement jump (CMJ) height were measured on a force plate. Male participants had m. vastus lateralis biopsies collected for evaluation of muscle fiber cross-sectional area (CSA). **RESULTS:** FFM increased ($p < 0.01$) 2.2% in HTG after the intervention period, which was more ($p = 0.037$) than CON (1.0%, $p = 0.018$). Late phase RFD (0-200 ms) increased 9.6% in HTG ($p = 0.017$) along with a 9.0% decrease ($p = 0.054$) in CoP sway length. Also, HTG demonstrated tendencies for increases in maximal dynamic knee extensor strength (+4.0%, $p = 0.096$) and mean fiber CSA (+25.3%, $p = 0.093$). No change was observed for CMJ jump height. **CONCLUSION:** Twelve weeks of twice-weekly small-sided team handball training improved rapid force capacity (RFD), fat free mass and postural balance in young men and women. Interestingly, quadriceps myofiber size tended to increase following the training period, suggesting that the intense actions of small-sided team handball games may provide a myogenic stimulus to lower limb muscles.



Effect of game format on U13 male and female team handball players

Mads Madsen¹, Georgios Ermidis^{2,1}, Vincenzo Rago^{4,5}, Kristoffer Surrow¹, Jeppe Foged Vigh-Larsen^{1,6}, Morten B Randers¹, Peter Krstrup^{1,3} and Malte N Larsen¹

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PURPOSE: The aim of the study was to compare activity pattern, heart rate (HR), technical involvement and subjective perceptions in 11-12-year-old boys and girls in five game setups. **METHODS:** Four girl teams and four boy teams played a 1-day tournament with 15-min games on five different court setups: Medium court size 4v4(M4v4), 5v5(M5v5) and 6v6(M6v6), and Large court size 5v5(L5v5) and 6v6(L6v6). Activity pattern, HR, technical involvement, perceived fun and exertion were recorded. **RESULTS:** Girls covered more total distance (TD) (1201 ± 172 to 780 ± 77 m) and high-speed running (HSR, $13-17.99$ km·h⁻¹) (261 ± 93 to 36 ± 22 m) on the large court compared to the medium court ($P<0.05$; ES=2.1-3.1 and 1.2-2.5, respectively) while boys covered more distance as HSR (207 ± 81 to 78 ± 49 m) and sprinting (81 ± 64 to 20 ± 23 m) on the large court compared to medium court but only more TD (1284 ± 162 to 990 ± 163 m) on the large court compared to medium court with the same number of players, ($P<0.05$; ES=1.0-1.8, 1.0-1.8 and 1.1-1.8, respectively).

The girls had more shots ($6,1\pm3,4$ to $2\pm1,5$) and scored more goals ($3,8\pm2,8$ to $0,9\pm1,1$) when playing M4v4 compared to all other game types ($P<0.05$; ES=0.8 to 1.7), but for boys the same difference was only seen when playing M4v4 compared to M6v6 and L6v6 ($5\pm2,4$ vs. $3,2\pm2,3$ and $2,3\pm1,8$, $2,5\pm1,1$ vs. $1,7\pm1,3$ and $1\pm1,1$ respectively) ($P<0.05$; ES=1.1 and 1.3 respectively). **CONCLUSION:** Team handball for U13 boys and girls is a high-intensity physical activity irrespective of court size, even though more distance is covered on the large court. Increasing the court size with fixed number of players changed the activity pattern, whereas manipulating the number of players on a fixed court size appears to influence activity pattern, HR and technical involvement.

FUNDING: Danish handball federation (DHF)



Physical and physiological demands of recreational team handball for over 50-year-old sedentary men

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PURPOSE: Physical inactivity is the primary cause of most chronic diseases[1]. Middle-aged and older men typically show excessive body weight, due to increased body fat, and compared to women, show less healthier behaviours, physiological and functional status, higher rates of most chronic diseases resulting in higher healthcare costs[2]. Men are also harder to engage in lifestyle changes, namely in exercise programmes than their female counterparts[2]. In the last 15 years, research on team sports and health, especially recreational football, has shown encouraging results in improving participants' health and physical fitness[3]. Recently, recreational team handball practice has shown positive effects on cardiovascular and musculoskeletal fitness of adult men with and without experience with this sport [4, 5]. However, intervention studies using this sport for untrained older populations are still missing. **PURPOSE:** To examine the physical and physiological demands of recreational team handball played as small-sided games to evaluate if this exercise mode can be used as a fitness and health enhancement exercise intervention for over 50-year-old sedentary men with no prior experience with this sport. **METHODS:** Activity profile, heart rate (HR), rating of perceived exertion (RPE) and blood lactate analysis were obtained from 16 participants (61–74 years) during six 5v5 (80m²/player in a 40x20m pitch) recreational team handball matches.

RESULTS: The mean distance covered during the 45-min matches was 2895±644 m. Match average and peak HR were 130±9 and 146±11 b.min⁻¹ corresponding to 84% and 95% HRmax, respectively. Participants exercised at intensities between 81% and 90% HRmax for 37% (17±9 min) and >90% HRmax for 7% (3±6 min) of total match time. Match average and peak blood lactate values were 3.7±1.2 (1.5-5.9) and 5.0±1.8 (1.5-8.3) mM, respectively. Matches' RPE was 8±1 (5-10 range, AU). **CONCLUSION:** Recreational team handball, played as small-sided games (5v5), is an intermittent high-intensity exercise mode with physical and physiological demands expected to induce positive effects on cardiovascular, muscular and skeletal health in middle-aged and older men[3]. Further studies addressing different team handball game formats are warranted.

REFERENCES: ¹ Booth, F.W. Compr Physiol, 2012. 2(2): p. 1143-211. ² Anderson C.S.L., et al. J Aging Res, 2016: p.1-8. ³ Bangsbo, J., et al. Br J Sports Med, 2015. 49(9): p. 568-76. ⁴ Hornstrup, T., et al. Eur J Appl Physiol, 2018. ⁵ Póvoas, S.C.A., et al. Biomed Res Int, 2018.



Team handball training as health promotion for overweight untrained premenopausal women

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PURPOSE: We tested the hypothesis that participation in small-sided team handball training could provide beneficial effects on cardiovascular and metabolic parameters in overweight premenopausal women with special focus on the importance of prior handball experience. **METHODS:** A randomized 16 week RCT training intervention in overweight premenopausal women were conducted for three groups; a team handball training group without prior handball experience (UN; $n=13$), a team handball group with prior handball experience (EXP; $n=10$) and an inactive control group (CON; $n=9$). Both UN and EXP completed 1.6 ± 0.3 training sessions per week with average heart rates of 84 ± 5 and $85\pm 9\%$ of maximal heart rate, respectively. Cardiovascular and metabolic parameters were assessed before and after the training intervention by DXA scans, blood samples, echocardiography and physical tests.

RESULTS: Compared to CON, UN had significant increases in VO_{2max} ($7\pm 4\%$) and intermittent endurance performance ($26\pm 14\%$) as well as reduced total fat mass ($4\pm 6\%$), total fat percentage ($4\pm 5\%$) and android fat mass ($7\pm 12\%$), respectively (all $p<0.05$). Compared to UN and CON, EXP displayed increased left ventricular mass and left ventricular mass index (both $p<0.05$) after the training period. There were no significant changes between any of the groups in muscle mass, blood lipids, resting heart rate and blood pressure (all $p>0.05$). **CONCLUSION:** Small-sided team handball training in premenopausal women was associated with cardiovascular and metabolic adaptations for participants with minimal handball experience, indicating that prior handball experience is not a prerequisite for improving physiological parameters of importance for health.



Football is Medicine – A Proposed Design for a Dose-Response Clinical Trial in High Risk Adults

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PURPOSE: Physical inactivity is a well-documented risk factor for numerous non-communicable chronic diseases manifested as a worldwide epidemic. Despite the accumulation of evidence that support the value of physical activity and exercise for public health, there is still poor physical activity promotion and adherence. From a public health perspective, football's popularity renders it an ideal intervention to reach and engage large numbers of people especially among the sedentary adult population which otherwise would remain inactive. The aim of the proposed trial is to determine the optimal volume of Recreational Football Training (RFT) to improve health status and performance in high disease risk middle-aged individuals. **METHODS:** Power analysis indicated a sample size of approximately 120-140 middle-aged (40-65 years) males and females with BMI 25-35 kg/m², increased body fat, mild hypertension, insulin resistance, high blood lipid levels and low daily physical activity levels. Participants will have their body mass, body height, waist-to-hip ratio, body composition, level of sarcopenia, blood pressure, maximal oxygen consumption, muscle strength of upper and lower body, functional performance, quality of life, and mood state measured, and blood samples collected at baseline and following 4 months of RFT. Blood samples will be measured for blood lipid profile, glucose sensitivity and inflammatory markers.

Participants will then be randomly assigned to one of 4 groups (N = 25/group): 1) control Group (free-living without participating in RFT), 2) Group 60: RFT play for 60 min/week (1x60 min), 3) Group 120: RFT play for 120 min/week (2x60 min), and 4) Group 180: RFT play for 180 min/week (3x60 min).

During practice, locomotor activity will be monitored using high-resolution global positioning system (GPS) and heart rate (as an intensity index) will be continuously recorded using a portable heart rate monitoring system. Daily dietary intake and daily physical activity will be measured once every two months. Adherence to training will be recorded.

RESULTS: An estimation of the economic impact of RFT will be performed for high-risk middle-aged adults using the WHO model. A two-way repeated measures analysis of variance with planned contrasts on different time points will be used to determine the effects of time and group on dependent variables. A dose-response curve will be estimated.

CONCLUSION: Findings of this trial will aid our understanding regarding the optimal volume of RFT training for improving health and performance in high-risk middle-aged adults.

FUNDING: This project has been funded by the UEFA HatTrick IV program (2016 -2020).



Effect on muscle strength and balance of an 11-wk school football intervention in relation to sports club engagement

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PURPOSE: The aim was to evaluate the effects of the “11 for Health” programme on muscle strength, balance and muscle mass in schoolchildren in relation to leisure time sports club engagement.

METHODS: 515 schoolchildren (10-12-year-old) participated in the study of which 377 (girls; 179, boys; 198) were included in the intervention group (IG) and 140 (girls; 64, boys; 76) in the control group (CG). IG performed 11-weeks twice-weekly 45-min sessions of combined football and health education, while CG continued regular school activities. Pre- and post-testing included horizontal long jump, stork and muscle mass measurements, and questionnaires of leisure time activities. Data are expressed for all children (AC) and in relation to leisure time sports engagement; football (FG), other ball games (OB), other sports (OS) and no sport (NSC).

RESULT: At baseline, FG (11%), OB (9%) and OS (7%) performed better in jumping compared NSC. No significant baseline differences were found between IG and CG. The “11 for Health” intervention resulted in improved balance (21%) for AC, and 23% for all sports, compared to controls. Moreover, FG increased muscle mass (0,6 kg), OB improved jumping performance (10%), OS improved balance (33%) and NSC improved jumping performance (8%) comparing IG from CG. **CONCLUSION:** “11 for Health” is effective for improving balance. Children already playing football in clubs, gain muscle mass, while children playing other ball games, other sports and no sports, gain muscle strength and/or balance from the programme. Future studies are required to evaluate the full potential of the “11 for Health” programme.



Danish 5th Grade Children's and their Teacher's Experiences of the "11 for Health" Concept

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PURPOSE: To describe the experiences with the "11 for Health" concept of Danish 5th grade children and their teachers. **METHODS:** To gain access to subjective dimensions of human way of life, which unfolded during the completion of the concept. The applied method was participant observation supplemented by ad.hoc interviews with the children and their teacher (1,2). Participant observation was carried out over a four-month period from March to June 2018, usually during the entire school day and on two days a week. Days with PE and "11 for Health" (from 8 am to 3 pm) were targeted. The participants were twenty-two Danish children (12 boys, 10 girls, mean age: 11.86 ± SD=0,43) and one female teacher from the Capital Region of Copenhagen, Denmark. The participant observation was conducted as scenic descriptions (3) and specific attention was given to the nature of the social interactions, including what was spoken about, by whom, when and how it was said. **RESULTS:** The children were engaged in the concept activities and paid consideration to their classmates' football abilities by adjusting passes, shots etc. The concept placed little demands on the physical environment of the school. The children seemed happy, joyful and spontaneously praised their classmates during activities. However, the concept required additional preparation for teachers without prior football experience. Also, some of the drills in the concept manual were interpreted as being complex and described as using a certain "football language". Children with football experience seemed to understand the wording in the "football language", which for them implied a focus on game rules, counting goals, focusing on tactical aspects of the short-sided games etc.

The communication concerning the "football language" often separated children with and without football experience during the activities, because children with an understanding of the "football language" intuitively seemed to understand the drill instruction and wording provided by the manual and delivered by the teacher. **CONCLUSION:** The "11 for Health" concept can easily be applied in a Danish school context, places little demands on the physical environment and is perceived as joyful by the children. However, the concept requires preparation for a teacher without football experience, because the manual was described as using "football language". The use of "football language" throughout the concept activities is a challenge that needs to be solved, because the quality of the concept depends on communication between participants with different cognitive levels of understanding and football knowledge.

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Football & coaching – a dynamic interplay supporting self-concept

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PURPOSE: The purpose of this study has been to investigate the experience of and effect, created by a team sport/football and coaching intervention upon the self-concept of male school students (aged 12-16 years) of diverse backgrounds (129 participants). Many of them were being perceived as troublemakers in the school. The study unfolded in Copenhagen, Denmark, in an area of primarily immigrant families and families of lower socioeconomic status. **METHODS:** A convergent parallel mixed method design was used to compare and relate a questionnaire study and an interview study in a quasi-experimental design. A two-year intervention period was chosen and the study included students from 6th to 9th grade of compulsory school in Copenhagen, Denmark.

RESULTS: Quantitative results showed a significant experienced effect on a) the general self-concept, b) physical skills, and c) social relations. Qualitative interviews showed that participants experienced 1) a stronger and more confident self, 2) a better physical condition, and 3) a stronger and more supportive social environment as the result of their participation. **CONCLUSION:** Implications of the results are discussed alongside strategies for working with football/team sport and coaching as a way of addressing behavioral problems in school settings in deprived areas.

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FIT FIRST – from research to a school-based training concept

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PURPOSE: FIT FIRST is a research project conducted by Peter Krstrup's research group, which observed that 3 weekly 40-min sessions of high intensity training (small sided ball games or strength training) improved fitness and health status of children aged 8 to 10 years (3rd grade in Danish schools). Today the FIT FIRST research programme has been extended through a close collaboration between the University of Southern Denmark (SDU), the Danish Sports Confederation (DIF), 10 sports associations and Team Denmark and it is being expanded turned into a school-based lesson plan for Danish school children aged 6 to 10 based on the knowledge from the FIT FIRST research project and the Copenhagen Consensus Conference on physical activity for children (Krstrup et al. 2014, Bangsbo et al. 2016, Larsen et al. 2018). **METHODS:** Each of the 10 sports association, i.e. Badminton Denmark, Danish Basketball Federation, Danish American Football Federation, Danish Football Association, Danish Handball Federation, Danish Judo and Ju-Jitsu Federation, Danish Orienteering Federation, Danish Rugby Federation, Danish Taekwondo Federation and Danish Volleyball Federation, has contributed to the concept by providing their own lesson plan which meets the FIT FIRST requirements for high-intensity interval training, meaning that there are elements of aerobic high-intensity training, as well as strength training and bone impact. These lesson plans are gathered in a FIT FIRST manual. Furthermore, the lessons fulfil the obligatory aims of the curriculum for Physical Education and provide the teachers with an adequate model for teaching.

The overall aim is that the students - in addition to improved health – will develop physical, social and personal competences, and an all-round knowledge about the culture of sports. **PERSPECTIV:** FIT FIRST is being implemented in the Danish schools in 2019. The manuals will be available as open access material online and will be distributed as hard copies to everybody participating in one of the three free FIT FIRST dissemination seminars held in Brøndby (Zealand), Odense (Funen) and Aarhus (Jutland) in March 2019.

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Health effects of a 10 weeks residential stay on the Danish Christmas Seal Homes

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PURPOSE: To evaluate (1) the short-term effects of a 10-week residential stay in a Danish Christmas Seal Home (DCSH) on health, physical fitness, physical activity level, cognitive functions, sleep and well-being; (2) the long-term effects 3 and 12 months after the stay; and (3) whether a special effort involving a high-intensity activity/health education programme ("11 for Health") increases the effects on physical fitness and health knowledge, cognitive functions, sleep patterns, well-being and adherence to a physically active lifestyle compared to the standard programme. **METHODS:** The participants are cluster-randomised according to DCSH to one of two research groups: A standard group (with the standard programme (SG) and a standard plus (including "11 for Health") group (SG+)). The training consists of various football exercises, such as passing, shooting, dribbling, etc., and small-sided games (3v3 – 5v5). The participants are tested at the start and end of their 10-week residential stay. Furthermore, there are follow-up tests 3 and 12 months after their stay. The four test days include: **Anthropometric measurements:** Body weight, standing and sitting height, muscle mass, fat percentage, resting heart rate and blood pressure. **Physical performance:** Balance and muscle strength/horizontal jumping performance, aerobic fitness and intermittent performance, as well of training intensity and physical activity measurements.

Cognitive functions: Four computer based tests measuring reaction time, attention, visual learning and long-term memory, work memory and executive functions. **Metabolic markers:** Saliva, to indicate the level of the hormone insulin, hair samples for determination of long-term exposure to the biomarker cortisol. **Questionnaires:** Health knowledge, well-being, ego and task orientation, cohesion, stress and sleep habits as well of a strengths and difficulties questionnaire. **Physical activity and sleep patterns:** Is measured by accelerometers before, during and one year after the stay at the DCSH. **RESULTS:** At present time, there are 30 participants (13 boys, 17 girls) in SG and 26 participants (17 boys, 9 girls) in SG+. These participants are 11.8±1.7 (SG) and 12.3±1.1 (SG+) years old (mean±SD), and have a BMI z-score of 2.0±0.9 and 1.7±0.9, respectively (mean±SD, 2007 WHO reference) at baseline. The project is designed to include 600 participants.

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Is bite useful to improve strenght and coordination in injured football players? An observational study

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PURPOSE: The temporo-mandibular joint can cause a peripheral disorder which can be eliminated by mandibular- dental adjustment. Any change of the occlusal position is fired to the brain by mean of the various receptors in the temporal - mandibular joint. The system brain- temporal mandibular joint plays a key role in the regulation of the posture and the balance in man. **PURPOSE:** Our study wants to demonstrate that the bite in injured football players can be a way to achieve a good balance again and to have more stability and more coordination during physical activity. **METHODS:** 14 male football players aged 18-28 years playing in the Interregional League of Switzerland have been tested. They have been divided into two groups: A and B. Group A: players who suffered under muscular injuries (5 players). Group B: players who never had muscular injuries. Two tests were performed. Test A: long jump starting from a squat position. (Indicative of strenght capacities). Test B: to run as fast as possibile along a 10 m distance in a circuit with 4 hurdles of 40 cm. height. (Indicative of coordination capacities). Three attempts were performed and the best one was taken into consideration. The players performed both tests with and without a bite support. The Paw method was used to analyzed data with $P < 0.05$ as significant.

RESULTS: Long Jump with bite; group A: 2.80 meters and group B: 2.76 meters. Long Jump without bite; group A: 2.75 meters and group B: 2.65 meters. Running Test with bite; group A: 2.19 seconds and group B: 2.17 seconds. Running Test without bite; group A: 2.76 seconds and group B: 2.37 seconds. Both groups of players showed evidence of a better performance with the bite in the running-coordinative test. + 20% group A, + 8% group B. **CONCLUSION:** The bite can be a form of prevention by giving more balance between the muscular groups. It can also be a way to improve the performance in those players who had in the previous time muscular injuries.

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SWEET-FOOTBALL: Development of an evidence-based walking football program for middle-aged and older patients with type 2 diabetes

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PURPOSE: Although physical activity (PA) is one of the cornerstones of type 2 diabetes control most patients do not engage in regular exercise (1). Community programs based on popular activities, such as football training, may contribute to overcoming the reluctance in taking regular PA. Therefore, this project aims to test the feasibility and safety of a community-based walking football (WF) program in middle-aged and older patients with type 2 diabetes (T2D). **METHODS:** This study was designed to include 40 patients, recruited from primary health care units of Porto Oriental (Porto, Portugal) by family doctors, according to following criteria: diagnosis of T2D at least for 12 months; male; aged 50-70 years old; major complications of diabetes screened and controlled; no cardiovascular, respiratory and musculoskeletal contraindications to exercise practice; non-smokers; without limitations in gait or balance; independent living in the community. All patients have undergone a cardiac exercise stress test on a treadmill, diabetic foot risk assessment, clinical blood analysis, and anthropometric evaluation. Participants were organized into two teams of 20 players. Each team is practicing 60-min WF sessions three times per week, for 12 weeks (36 sessions). Exercise sessions are being conducted in a sports hall by a football coach and supervised by an exercise physiologist and a nurse. Different WF exercise strategies are being developed according to participants' motor skills and tested with dose-escalated intensity (between light to vigorous) for its safety and enjoyment.

Capillary glycemia, blood pressure, exercise intensity (rate of perceived exertion, heart rate, distance and speed), the session's enjoyment, and exercise-related injuries and adverse events are being evaluated every session (2). **RESULTS:** The project started in September 2018 (ending in December 2018). We expect WF program to have a low incidence of exercise-related injuries and adverse events and no harmful metabolic or hemodynamic acute effects. High levels of enjoyment and adherence are also predicted, along with improvements in the indicators of glycemic control. **CONCLUSION:** The development of a safe and enjoyable exercise program for these patients may translate into a toolkit to be used by football clubs and primary health care centres to offer these programs as a service to their communities, contributing for T2D control.

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Health effects of a 15-week combined exercise programme for sedentary 50-70-year-olds: A randomised controlled trial

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PURPOSE: This study evaluated the health effects and feasibility of a pragmatic 15-week combined exercise programme on aerobic fitness (VO_{2max}/kg) as well as cardiovascular risk factors and metabolic fitness in middle-aged and elderly subjects.

METHODS: In a randomised controlled trial, 45 sedentary subjects aged 50-70-years (26 women, 19 men) were randomly assigned (2:1 ratio) to a training group (TG, n=30) or an inactive control group (CG, n=15). The TG underwent a 15-week supervised group-based exercise program based on aerobic fitness- and strength training once a week for 1.5 hours and was encouraged to perform 30 min. of home-based training weekly. Training adaptations were assessed at baseline and after 15 weeks. Primary outcome was change in VO_{2max}/kg and cardiovascular risk factors were determined by blood pressure measurements, echocardiography and peripheral arterial tonometry. Metabolic fitness was determined by body composition from DXA-scan and lipid profile and glucose tolerance from resting blood samples. Feasibility outcomes were exercise intensity, adherence, and adverse events. **RESULTS:** Average heart rate (HR) during the supervised training was 113 ± 13 beats/min ($68.6 \pm 7.0\%$ HR_{max}), with only $4.3 \pm 6.6\%$ of training time $>90\%HR_{max}$.

At the 15-week follow-up intention-to-treat analyses revealed no between-group difference for aerobic fitness ($0.4 \text{ mL}\cdot\text{min}^{-1}\cdot\text{kg}^{-1}$, 95% CI -0.8 to 1.5; $P=0.519$ and $-2.6 \text{ mL}\cdot\text{min}^{-1}$, 95% CI -122.6 to 117.5, $P=0.966$) or any secondary cardiovascular outcomes (blood pressure, resting HR, reactive hyperemia index, and echocardiographic variables; $P>0.05$). Compared to CG, total fat mass (-1.9 kg , 95% CI -3.2 to -0.5; $P=0.005$), total fat percentage (-1.3% , 95% CI -2.2 to -0.3; $P=0.01$) and total-/HDL-cholesterol ratio ($P=0.032$) decreased in TG. Adherence was high (79%) for the supervised exercise and low (5%) for the home-based exercise. Six (20%) subjects in TG experienced acute musculoskeletal injuries and 3 subjects reported considerable joint pain or groin pain related to the training. **CONCLUSION:** The group-based supervised training was associated with high adherence and moderate exercise intensity, whereas the home-based training was not feasible in this study population. This combined exercise programme performed once per week did not improve aerobic fitness or affect measured cardiovascular risk factors although minor improvements of metabolic parameters were observed.



Diabetes Prevention Program Football Club: Effects After 3-months of Intervention Among Latino Men

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PURPOSE: One third of the U.S. adult population is estimated to have prediabetes. Hispanics have a 50% higher type 2 diabetes (T2DM) death rate compared to non-Hispanic whites, yet low participation in lifestyle change programs, making this subgroup an important target for prevention efforts. The purpose of this study was to determine the effects of an intervention implementing the Center for Disease Control and Prevention (CDC) National Diabetes Prevention Program (NDPP) plus recreational soccer (RS) in Hispanic men. **METHODS:** Overweight and obese Hispanic men, aged 30-57 years with prediabetes at screening were recruited from the community. Enrolled participants were divided into three cohorts. Trained soccer coaches led 30-minute facilitated discussion of the NDPP modules after each RS session, with two sessions per week delivered in 3 months. The 1-hour RS sessions followed the Football Fitness curriculum structure (Krustrup et al.) Standardized study assessments included body mass index, waist circumference, multi-frequency bioelectrical impedance analysis (InBody 270), blood pressure, hemoglobin A1c, and validated field physical fitness tests (figure of 8 run, handgrip strength, vertical jump, modified sit-ups, dynamic push-ups, one leg stand and Yo-Yo intermittent sprint test).

Mixed models assessed the outcomes as a function of time and cohort and incorporated an unstructured covariance structure to examine the difference between baseline and 3 months. All analyses were conducted as intent-to-treat and generated using SAS v 9.4. **RESULTS:** Hispanic males (n=41; mean age 41.7 [0.1] years) were obese at baseline (mean BMI 32.9, standard error [0.7], mean weight 94.4 [2.2] kg). After 3 months of the NDPP+RS intervention, there were significant changes in diastolic blood pressure (-7.1 [2.2] mm Hg; p<0.01), vertical jump (5.4 [2.5] cm; p=0.04), 1-leg stand (5.6 [2.8] sec; p=0.05), figure of 8-run (-0.3 [0.1] sec; p<0.01), number of modified push-ups in 40 seconds (2.8 [0.4]; p<0.001), dynamic sit-ups (1.6 [0.4]; p<0.01), and predicted VO₂ (ml/kg/min) (0.8[0.3]; p<0.01. Despite significant reductions in weight (3.2 [0.7] kg), % body fat (2.1 [0.3]) and waist (4 [0.8] cm), all p<0.001, lean body mass was preserved [-0.1 [0.2]; p=0.623]. **CONCLUSION:** Among middle-aged Latino men, broad-ranging significant improvements in body composition, physical fitness and blood pressure were observed after 3-months of participating in lifestyle education plus RS.



Team-sport and fitness training for sedentary women with lifestyle diseases in a community centre set-up

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PURPOSE: This study aimed to examine the health effects of fitness training and team sport training in a pragmatic community centre set-up for women with lifestyle diseases. **METHODS:** The methods included training intensity evaluations and measurements of VO_2max , blood pressure, body composition and exercise performance. Forty women in the fitness training group (FG) and 34 women in the team-sport training group (TG) completed pre- and post-tests, after they were offered 12-16 weeks of 60-90 min, twice-weekly training sessions. **RESULTS:** Mean heart rate during training was not different ($P=0.569$) between FG ($72.7\pm 4.2\% \text{HR}_{\text{max}}$) and TG ($71.4\pm 6.8\% \text{HR}_{\text{max}}$). TG achieved improvements in aerobic fitness of $0.9\pm 2.0 \text{ mlO}_2\cdot\text{kg}\cdot\text{min}^{-1}$ ($P=0.034$) and in resting heart rate of $3.7\pm 9.1 \text{ bpm}$ ($P=0.026$), as well as performance in sit-to-stand (STS: 3.5 ± 3.3 stands-sec-1; $P=0.003$) and 6-min-walking test (6MWT: $53\pm 29 \text{ m}$; $P<0.001$), whereas fat percentage was reduced by $0.6\pm 1.6\%$ point ($P=0.038$).

FG achieved improvements in performance in STS of 3.1 ± 2.8 stands-sec-1 ($P<0.001$) and 6MWT of $41\pm 47 \text{ m}$ ($P<0.001$), and reduced fat percentage by $0.9\pm 1.7\%$ ($P=0.003$). There were no between-group differences. However, there was a between-group effect for training attendance ($P=0.001$), with the fitness group having the highest attendance (1.5 ± 0.4 vs. 1.1 ± 0.5 per week). **CONCLUSION:** Team-sport training for sedentary women in a community health centre set-up is possible, but attention to training intensity is advisable. Small-sided team-sport training and fitness training conducted in this pragmatic set-up induces corresponding health effects for women with lifestyle diseases.



Effects of recreational football on isokinetic strength and jump performance in sedentary male adults

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PURPOSE: Recreational football has been widely used in both healthy and unhealthy populations as a motivating training type with marked cardiovascular, metabolic and musculoskeletal fitness effects, showing great potential as prevention, treatment and rehabilitation of non-communicable diseases [1]. Nevertheless, being physically active involves the risk of developing adverse events, such as injuries. In football, isokinetic evaluation has been used to evaluate muscular strength and imbalances, as several muscle strength-related variables, namely muscle strength asymmetries, have been associated with increased risk of injury [2]. **PURPOSE:** To describe quadriceps (Q) and hamstrings (H) muscle isokinetic strength, and to determine potential muscle imbalances in the knee extensors and flexors (H/Q ratio) and right and left limbs (bilateral difference) in the knee extension and flexion and standing long jump (SLJ) performance, in sedentary male adults participating in a recreational football-based exercise intervention. **METHODS:** Forty-one (40±7; 30-51 years) participants performed 2-3 60-min recreational football training sessions, consisting of a warm-up with emphasis on injury prevention and small-sided games (5v5; 6v6; 7v7; 80 m²/player) for 12 weeks, and were evaluated pre-post intervention. Knee flexor and extensor muscles peak torques (PT) were assessed at 90°.s⁻¹ (1.57 rad.s⁻¹) in a concentric mode.

RESULTS: In both time-points, H/Q ratio (52-55%) and bilateral differences (-0.1-4.7%) were within the "recommended" ranges for professional football players [2]. After the 12 weeks, no significant differences were observed in the extensors PT (right: 184±32 vs. 182±32 Nm, p=0.687, d=0.068; left: 185±41 vs. 179±37 Nm, p=0.340, d=0.198) and flexors PT (right: 96±25 vs. 100±25 Nm, p=0.371, d=-0.186; left: 97±21 vs. 94±22 Nm, p=0.456, d=0.166), though an increase was observed in SLJ (158±20 vs. 171±20 cm, p=0.001, d=-0.686). An increase was also noted in the H/Q ratio in the right leg (52±12 vs. 55±11%, p=0.026, d=-0.511), and in the flexors' bilateral differences (-3.6±16.2 vs. 4.7±13.7%, p=0.042, d=-0.203), despite within values considered as "recommended" [2]. **CONCLUSION:** No isokinetic muscular imbalances associated with increased H injury risk were shown in sedentary participants before and after a recreational football-based exercise intervention. Short-term recreational football training was effective in increasing SLJ performance.

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Feasibility of Deploying the U.S. National Diabetes Prevention Program Plus Recreational Soccer Among Latino Men

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PURPOSE: In 2010 the U.S. Centers for Disease Control and Prevention (CDC) established the National Diabetes Prevention Program (NDPP) to scale implementation of an evidence-based lifestyle change curriculum to achieve population health impact. Despite being a high-risk group, only 10% of current NDPP participants are Hispanic/Latino and 20% male. The purpose of this study was to determine the feasibility implementing the CDC's NDPP curriculum delivered in conjunction with recreational soccer (RS) programming among Latino men. **METHODS:** Overweight Latino men screened positive for prediabetes (CDC prediabetes questionnaire) and not currently engaged in other lifestyle or weight loss program were enrolled. The NDPP modules were facilitated by trained coaches after each RS session. The core phase consisted of two RS sessions per week for the first three months (results shown here) and once per week for the following three months for the maintenance phase. We assessed program tolerance by monitoring session attendance, self-reported perceived exertion and program engagement drivers and barriers. Musculoskeletal injuries or other adverse events were monitored to assess safety. Progress achieving the NDPP weight loss goal (5% or more) was assessed using a standardized measurement protocol (InBody scale model 270).

RESULTS: A total of 41 Latino men (30 to 47 years) with a mean BMI of 32.9 [0.7] were enrolled. Participants attended on average 15.4 of the NDPP+RS core sessions with 18 attending 75% or more (18 out of 24) of the planned sessions. At 3-months, 10 participants (24%) achieved the NDPP weight loss goal, five (12%) lost between 3 and 4.9%, eight (20%) lost between 1 and 2.9%, seven (17%) did not change (between -1% and 1% weight loss), three (7%) gained more than 1% and eight (20%) were lost to follow-up. The average perceived exertion decreased from 7 to 6 and there were 5 mild injuries (hamstring/calf strain, Achilles tendinitis flares) that resolved in 2-3 weeks. Reasons for missing sessions were reported as time management difficulties and travel for work/holidays. Engagement was associated with increasing levels of commitment to their new soccer friends and a desire to improve their health for their children and families. **CONCLUSION:** Encouraging signals for program efficacy were detected at 3-months. Leveraging RS to increase engagement in the NDPP lifestyle change program among Latino men was feasible and the program was well tolerated.



Gender-dependent evaluation of football as medicine for prediabetes

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PURPOSE: Training intensity and health effects of football were investigated gender-specifically in individuals with prediabetes. **METHODS:** Participants with prediabetes (age 60 ± 1 yrs) were randomised into a football and dietary advice group (FD-men $n=13$ and FD-women $n=14$) or a dietary advice only group (D-men $n=12$ and D-women $n=11$). FD performed football training (twice/week for 16 weeks), while both groups received dietary advice. Body composition, bone variables, blood pressure, blood lipid profile and maximal oxygen uptake (VO_{2max}) were determined pre- and post-intervention. **RESULTS:** Mean heart rate during football training was 79 ± 2 and $80 \pm 3\%$ HR_{max} for FD-men and FD-women, respectively, with peak heart rate values of 96 ± 1 and $97 \pm 1\%$ HR_{max} , with no gender differences. VO_{2max} increased more ($P < 0.05$) in FD-men and FD-women than in D-men and D-women. However, relative delta change in VO_{2max} was $21 \pm 14\%$ in FD-women, which was greater ($P < 0.05$) than in FD-men ($11 \pm 12\%$).

Reductions in SBP and DBP, respectively, were similar in FD-men (-10.8 ± 13.0 and -7.3 ± 11.8 mmHg) and FD-women (-11.3 ± 11.0 and -7.1 ± 6.2 mmHg), with within-gender differences for men. Total plasma cholesterol and LDL cholesterol decreased ($p < 0.05$) by -0.7 ± 1.1 and -0.5 ± 0.9 mmol·L⁻¹, respectively, in FD-women and -0.2 ± 0.4 and -0.2 ± 0.3 mmol·L⁻¹ in FD-men, with no significant gender differences ($P = 0.08$). Body fat content was lowered ($p < 0.05$) by 3 and 4 %-points in FD-men and FD-women, respectively. **CONCLUSION:** Football training combined with dietary advice causes broad-spectrum health effects for men and women with prediabetes, with minor gender-specific differences. Thus, the intensity and training-induced effects of football training are also high for elderly women with prediabetes.



Nocturnal cardiac autonomic activity in patients with type 2 diabetes engaged in a walking football programme

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PURPOSE: Heart rate variability (HRV) provides information about the balance between the sympathetic and parasympathetic nervous systems. HRV could be reduced in individuals with type 2 diabetes (T2D) due to impairments in cardiovascular autonomic function.¹ Still, patients with T2D often receive beta-blockers to control hypertension.² The present study aimed to investigate nocturnal cardiac autonomic activity in patients with T2D engaged in a walking football programme (SWEET-FOOTBALL project, Portugal). **METHODS:** Twenty-eight male patients with T2D (aged 64.0 ± 0.8 years; body mass index, 26.3 ± 1.0 kg/m²) engaged in a walking football programme (3 training sessions per week, 1-h sessions, wore heart rate (HR) monitors during training sessions and night-sleep. Overnight HR and HRV were assessed on non-exercising days in 3 different moments. Data was analyzed comparing beta-blockers users (BBG, n = 10) with non-beta-blockers users (NBBG, n = 18) with independent-samples *t*-test. The results were computed as mean \pm SD (effect size [95% confidence interval]). **RESULTS:** Peak HR during exercise was (BBG vs. NBBG) 113 ± 20 vs. 131 ± 18 bpm ($d = -0.96$ [-1.5, -0.4]; moderate effect; $p \leq 0.001$). Mean HR during exercise was 92 ± 16 vs. 104 ± 14 bpm ($d = -0.79$ [-1.3, -0.3]; moderate effect; $p \leq 0.001$), representing $60 \pm 10\%$ vs. $66 \pm 9\%$ of peak HR ($d = -0.65$ [-1.0, -0.3]; moderate effect; $p \leq 0.001$).

Training impulse was 20 ± 19 vs. 31 ± 18 AU ($d = -0.60$ [-1.0, -0.2]; moderate effect; $p \leq 0.001$). Nocturnal mean HR was (BBG vs. NBBG) 60 ± 6 vs. 63 ± 8 bpm ($d = -0.4$ [-0.9, -0.02]; small effect; $p = 0.06$). In addition, nocturnal log-transformed HRV (lnRMSSD; square root of the mean of the sum of the squares of differences between adjacent NN intervals) was 3.2 ± 0.5 vs. 3.0 ± 0.5 ln[ms] ($d = 0.40$ [-2.9, 3.7]; $p = 0.81$). **CONCLUSION:** Overall, patients with T2D using beta-blockers to control hypertension (with significant reduced HR during training sessions) presented no differences on nocturnal cardiac autonomic activity compared to non-beta-blockers users.

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Exercise intensity during walking Football for +60 men in comparison with walking and small-sided football

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PURPOSE: Football training has been shown to be an intense, versatile and effective health-enhancing training type for participants across the lifespan (Krstrup et al. 2017), and various modifications of football training has been introduced for various subject groups. As an alternative to classic small-sided running football (CF), walking football (WF) has become popular especially in England, Canada and Portugal. The aim of the present study is to quantify the intensity of walking, walking football and small-sided traditional football in +60 elderly men.

METHODS: 8 +60 year old men from a football fitness team performed a 6-min walk (W) around the pitch followed by one 10 min game of WF and one 10 min game of CF with a 8 min break in between. Both games were played 5 vs 5 on a pitch at the size of the penalty area (40.3 m x 16.5 m) on 5-a-side-goals (3 wide x 1.5 m high). Heart rate (HR) and locomotion was monitored during the session (Polar Team Pro, Polar Electro Oy, Kempele, Finland). **RESULTS:** HR_{mean} and HR_{peak} were significantly higher in CF compared to WF and W (132±25, 118±27 and 97±18 beats/min and 151±24, 136±30 and 109±27 beats/min, respectively) ($P<0.05$), and higher in walking football than walking.

More distance was covered when plying CF in the speed zones 8-16 km/h compared to WF and W (61±42, 15±9 and 0±1 m, respectively, ($P>0.05$), and when WF was compared to W. More distance was covered in the speed zone 4-8 km/h during W, compared to WF and CF (497±14, 228±80 and 234±93 m). No significant differences were found in total distance covered. **CONCLUSION:** Walking football results in higher HR and more distance covered in more intense speed zones than walking, but less than in small-sided traditional football. Future studies should be carried in order to elucidate the hypothesis that walking football is more effective in relation to fitness and health benefits compared to walking, but less effective than small-sided traditional football.

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Activity profile during walking football training sessions in patients with type 2 diabetes

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PURPOSE: To describe the activity profile during walking football training sessions in patients with type 2 diabetes. **METHODS:** The activity profile was recorded in 29 men (aged 50-70 years) with type 2 diabetes engaged in a walking football programme. The participants used a wearable inertial system WIMU PRO™ (RealTrack Systems, Almeria, Spain) during 9 walking football training sessions (n = 221 individual observations). The activity profile was analysed as slow walking (<4 km·h⁻¹), moderate walking (4–6 km·h⁻¹) and fast walking (>6 km·h⁻¹). Additionally, individual maximum walking speed was measured on a 20-m walking test using the wearable inertial system and timing gates Witty (Microgate, Bolzano, Italy). **RESULTS:** The duration of the walking football sessions was 60 ± 8 min (mean ± standard deviation). The participants covered 1919 ± 459 m during the walking football training sessions. Overall, the participants covered 916 ± 183 m in slow walking (48% of the total distance covered), 638 ± 214 m in moderate walking (33% of total distance) and 364 ± 267 m in fast walking (19% of total distance). Average speed during the sessions was 3.2 ± 0.4 km·h⁻¹.

Peak walking speed during walking football training was 12.3 ± 2.9 km·h⁻¹, which was similar to maximum walking speed attained during the 20-m walking test measured with the wearable inertial system (12.9 ± 4.5 km·h⁻¹; p > 0.05).

However, maximum walking speed attained during the 20-m walking test measured with timing gates was 8.9 ± 1.6 km·h⁻¹, which was significantly lower than peak walking speed during walking football training (p < 0.001). There was no agreement between maximum walking speed during the 20-m walking test and peak walking speed attained during the walking football sessions (r < 0.90). However, maximum walking speed during the 20-m walking test was correlated with the distance covered in fast walking during the walking football sessions (r = 0.55–0.71; p < 0.01). **CONCLUSION:** During walking football session patients with type 2 diabetes attained fast walking speed. In fact, peak walking speed during walking football was similar or even higher than maximum walking speed during a flat linear test. Overall, the activity profile of walking football seems to be intermittent, with several active periods of slow, moderate and fast walking.

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Football Fitness ABC (After Breast Cancer) – Study Design and Baseline Data from the Randomized Controlled Trial

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PURPOSE: Treatment for breast cancer (BC) may reduce peak oxygen uptake (VO_{2peak}), bone mineral density (BMD), Health Related Quality of Life (HRQOL), and increase body fat mass. To evaluate the effects of Football Fitness training on health parameters in female BC survivors. The primary outcome is the difference in changes in VO_{2peak} between a Football Fitness training group (FTG) and a control group (CON) from baseline to 6 mo after baseline. Secondary outcomes include the differences in changes between FTG and CON in BMD, fat percentage, fat free mass (FFM), blood pressure (BP), resting heart rate (HR_{rest}), plasma cholesterol levels, markers of inflammation and bone turnover, muscle strength, postural balance, physical activity levels, and HRQOL at 6 mo and 1 yr.

METHODS: Female BC survivors, aged 18-76 at The University Hospital of Copenhagen, Rigshospitalet, were invited to baseline tests after a screening procedure. Tests were performed after an overnight fast and included Dual-energy X-ray Absorptiometry (DXA) scans to evaluate BMD, fat percentage and FFM. BP and HR_{rest} were measured after 30-min of supine rest. Blood samples were taken to evaluate blood lipid profile, and markers of inflammation (CRP) and bone turnover (P1NP, CTX and osteocalcin).

Leg muscle strength and postural balance were measured with 1RM leg extension and a 1-min Flamingo balance test, respectively. VO_{2peak} was measured with an incremental cycle ergometer test to volitional exhaustion. Study participants filled out questionnaires regarding their HRQOL and physical activity levels. FTG carry out twice weekly 60-min Football Fitness training sessions throughout the 1-yr intervention period. Each training session consists of a 20-min warm up, technical drills for 15-min, followed by 3x7-min periods with small-sided games, separated by 2-min rest periods. Training intensity is assessed with heart rate monitors. **BASELINE RESULTS:** Seventy women completed the baseline testing, and were randomly allocated in a 2:1 ratio to either FTG (n=47) or CON (n=23). At baseline, mean age was 48.5 yrs (23–72 yrs) in FTG and 48.4 yrs (25–64 yrs) in CON ($p=0.975$). VO_{2peak} , total BMD, and fat percentage for FTG were 28.5 ± 6.4 ml/min/kg, 1.181 ± 0.105 g/cm² and $36.7\pm 7.6\%$, respectively. CON had a VO_{2peak} , total BMD and fat percentage of 25.6 ± 5.9 ml/min/kg ($p=0.076$), 1.198 ± 0.099 g/cm² ($p=0.534$) and $39.9\pm 6.7\%$ ($p=0.216$), respectively.

Final study results are expected in December 2019.

