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## **The “Football is Medicine” platform – scientific evidence, large-scale implementation of evidence-based concepts and future perspectives**

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## **The “Football is Medicine” platform – scientific evidence, large-scale implementation of evidence-based concepts and future perspectives**

The idea that football can be used as therapy and as a high-intensity and literally breath-taking training regime goes back centuries. To take one prominent example, the French philosopher Voltaire describes in the *Book of Fate* (1747), how a patient is cured by playing with a sacred football: “... full-blown and carefully cover’d with the softest Leather. You must kick this Bladder, Sir, once a Day about your Hall for a whole Hour together, with all the Vigour and Activity you possibly can.”, “Ogul, upon making the first Experiment, was ready to expire for want of Breath”, “In short, our Doctor in about eight Days Time, perform’d an absolute Cure. His Patient was as brisk, active and gay, as One in the Bloom of his Youth.”<sup>1</sup> Today, Voltaire and his main character, philosopher Zadig, have been proved right: Football is indeed a breath-taking activity and it can be used as therapy. Albeit today’s recommendations suggest a lower training frequency, longer training periods and encourage group-based training, and say that any football can be applied...

Today comprehensive research has shown that small-sided football is an intense, versatile combination of strength, endurance and aerobic high-intensity interval training and that twice-weekly 1-hour sessions can be utilized for the prevention, treatment or rehabilitation of non-communicable diseases, such as hypertension, type 2 diabetes and prostate cancer.<sup>2-5</sup> Likewise, various school and football club projects have shown that football has great potential to increase fitness, psycho-social well-being, motor skills, cognitive functioning and learning.<sup>6-8</sup> During the last century the scientific study of football focused almost entirely on elite football, however, as of the early 2000’s investigations into the fitness and health effects of football were initiated.<sup>2</sup> The evidence regarding the use of football as a health-enhancing activity for the general population is currently expanding rapidly with more than 150 scientific articles published over the last 10 years in 35 peer-reviewed international journals, including three meta-analyses<sup>9-11</sup>, three narrative reviews<sup>3-5</sup>, three special issues on Football for Health<sup>12-19</sup> and one on football, basketball, team handball and other team sports<sup>20</sup>.

The overall conclusions are summarized in the “Football is Medicine”-model, integrating sports science, sport training physiology, sports medicine, sports psychology and sports sociology results (Fig. 1).<sup>2</sup> The three special issues on Football for Health have all been published in the Scandinavian Journal of Medicine and Science in Sports and they tell an interesting story about the development of the research and the gradually increasing focus on football as therapy. The first was published in 2010 focusing on “Football as prevention”<sup>12-14</sup>, the second in 2014 expanded on the work on “Football as prevention and treatment”<sup>15-19</sup>, and the present special issue published in 2018 is entitled “Football is Medicine” and emphasizes the comprehensive results and the huge implications of using the world’s most popular sport, with an estimated 500 million regular participants<sup>2</sup>, as a therapy.

Relying on this scientific base with contributions from more than 250 authors from 22 countries, the scientific “Football is Medicine” platform has now been established. The first organizational meeting took place in Odense, Denmark, in January 2017, with 25 international researchers present and the first “Football is Medicine” conference was held in Lisbon, Portugal, in January 2018, with 50 speakers and a total of 300 delegates, with the Portuguese FA (FPF) as the

main organizers and the University of Southern Denmark (SDU), The Danish FA (DBU) and UEFA as partners. It is a pleasure to confirm that the second Football is Medicine Conference will be held on January 25-26, 2019 in Odense, Denmark, with symposia on training in the evidence-based football concepts Football Fitness, FIT FIRST and 11 for Health on January 21-24, 2019, organized by SDU with DBU, FPF and UEFA as partners. The purposes and possibilities of the global Football is Medicine platform are multifaceted, with research quality and productivity, scientific collaboration and networking, research dissemination as well as development of and education in evidence-based football programs as the most prominent.

The ongoing and future research into the effects of football training on human health is interesting and ambitious, with small-to-medium RCT projects on prevention and treatment of type 2 diabetes, cardiovascular disease, osteopenia, severe obesity and several types of cancer running or planned in Europe, South America, North America, Asia and Africa, and a large-scale multicentre project on Football Fitness in Europe. Pilot projects, feasibility studies and small-scale RCT's are also running for refugees and socially deprived groups as well as patient subsets with Parkinson's disease, dementia, psoriasis, asthma and anxiety, and it is being investigated whether Walking Football is a feasible and valid alternative to "running football" to achieve conspicuous health effects for patient groups.<sup>21</sup> Long-term training studies and implementation projects are also running with football for men with prostate cancer and Football Fitness for young, middle-aged and elderly women.<sup>19,22</sup> In all of these projects it is encouraged to take a multidisciplinary or interdisciplinary perspective and to integrate expertise and research questions from sports science, sport training physiology, sports medicine, sports psychology and sports sociology.<sup>2</sup>

The plans for global research dissemination and implementation are equally ambitious. With regard to research dissemination there will be a focus on research articles and special issues in high-quality peer-reviewed international journals, like the present issue, with audio-visual coverage of the main results, including these, and with evidence-based popular articles, booklets and books published for the general population as well as health care workers and authorities. With regard to implementation there will be a focus on global dissemination of evidence-based concepts with football training for children (FIT FIRST<sup>7,8</sup> and 11 for Health<sup>6,8</sup>) and sedentary adults and patient groups (Football Fitness<sup>2-5,9-22</sup>), but also evidence-based programmes using e.g. elite football clubs to promote healthy diet and everyday life physical activity for fans (FFIT<sup>23</sup>/EuroFIT<sup>24</sup>). For such large-scale implementation plans to succeed a close collaboration is required between important stakeholders in the scientific community, the football governing bodies, the world wide health organizations and national authorities. We look forward contributing to this work. Fifteen years of research have produced strong evidence to show that football is indeed breath-taking high-intensity multipurpose training and effective as physical and psycho-social therapy. In fact, football is medicine, and we are ready to act on this knowledge!

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Portuguese FA, the Danish and Faroese governments, Nordea-fonden, TrygFonden, The Danish Heart Foundation, FIFA F-MARC and UEFA. Competing interests: None declared.

## Legends to figures

Figure 1: A holistic “Football is Medicine”-model, describing the training components of football training, the training-induced adaptations in fitness and health variables, the link between the training stimuli and cardiovascular, metabolic and musculoskeletal fitness and the use of football training in the prevention, treatment and rehabilitation of non-communicable diseases, as well as the psycho-social elements of football training, organized as per the Football Fitness concept with 1-hour sessions with a proper warm-up, pair-based football exercises and 2v2-5v5 football drills with rules adapted to the participant group. This type of football training is organised so that it is for almost everybody, it is for life and results in few injuries compared to 11v11 match-play, and have positive long-term psycho-social training-induced effects and the possibility of creating adherence to an active lifestyle. Presented with permission, Krusturup and Krusturup, 2018, British Journal of Sports Medicine.

## References

- 1) de Voltaire, F-MA. *Zadig, ou la destinée (Zadig, or the Book of Fate, an Oriental history)*. 1747/2008, Chapter XV, The Basilisk. (English translation). Boston, Mass: MobileReference.
- 2) Krusturup P, Krusturup BR. Football is medicine - it is time for patients to play! *Br J Sports Med* 2018;3(1):1-4. Editorial.
- 3) Krusturup P, Aagaard P, Nybo L, et al. Recreational football as a health promoting activity: a topical review. *Scand J Med Sci Sports* 2010;20(Suppl 1):1–13.
- 4) Krusturup P, Helge EW, Hansen PR, et al. Effects of recreational football on women’s fitness and health: adaptations and mechanisms. *Eur J Appl Physiol* 2018;118:3717–33.
- 5) Bangsbo J, Hansen PR, Dvorak J, et al. Recreational football for disease prevention and treatment in untrained men: a narrative review examining cardiovascular health, lipid profile, body composition, muscle strength and functional capacity. *Br J Sports Med* 2015;49:568–76.
- 6) Ørntoft C, Fuller C, Larsen MN, et al. "FIFA 11 for Health" in Europe. II: Effect on health markers and physical fitness in 10 to 12 year-old Danish school children. *Br J Sports Med* 2015;50(22):1394-99.
- 7) Larsen MN, Nielsen CM, Helge EW, et al. Positive effects on bone mineralisation and muscular fitness after 10 months of intense school-based physical training for children aged 8-10 years: the FIT FIRST randomised controlled trial. *Br J Sports Med*. 2018;52(4):254-260.
- 8) Krusturup P, Dvorak J, Bangsbo J. Small-sided football in schools and leisure-time sport clubs improves physical fitness, health profile, wellbeing and learning of children. *Br J Sports Med* 2016;50(19):1166-67.
- 9) Milanović Z, Pantelić S, Čović N, et al. Is recreational soccer effective for improving VO<sub>2</sub>max a systematic review and meta-analysis. *Sports Med* 2015;45:1339–53.
- 10) Oja P, Titze S, Kokko S, et al. Health benefits of different sport disciplines for adults: systematic review of observational and intervention studies with meta-analysis. *Br J Sports Med* 2015;49:434–40.
- 11) Milanović Z, Pantelić S, Čović N, et al. Broad-spectrum physical fitness benefits of recreational football: a systematic review and meta-analysis. *Br J Sports Med* 2018 Jan 25. pii: bjsports-2017-097885. doi: 10.1136/bjsports-2017-097885. [Epub ahead of print].
- 12) Krusturup P, Dvorak J, Junge A, Bangsbo J (2010). Executive summary: The health and fitness benefits of regular participation in small-sided football games. *Scand J Med Sci Sports*. 20, suppl 1: 132-135.
- 13) Ottesen L, Jeppesen RS, Krusturup BR. The development of social capital through football and running: studying an intervention program for inactive women. *Scand J Med Sci Sports* 2010;20(Suppl 1):118–131.

- 14) Elbe AM, Strahler K, Krstrup P, et al. Experiencing flow in different types of physical activity intervention programs: three randomized studies. *Scand J Med Sci Sports* 2010;20(Suppl 1):111–117.
- 15) Bangsbo J, Junge A, Dvorak J, Krstrup P (2014). Executive summary: Football for health - prevention and treatment of non-communicable diseases across the lifespan through football. *Scand J Med Sci Sports*. 24(S1): 147-150.
- 16) Krstrup P, Randers MB, Andersen LJ, et al. Soccer improves fitness and attenuates cardiovascular risk factors in hypertensive men. *Med Sci Sports Exerc* 2013;45(3):553–560.
- 17) Uth J, Hornstrup T, Schmidt JF, et al. Football training improves lean body mass in men with prostate cancer undergoing androgen deprivation therapy. *Scand J Med Sci Sports* 2014; 24(S1):105-112.
- 18) Mohr M, Lindenskov A, Holm PM, Nielsen HP, Mortensen J, Weihe P, Krstrup P (2014). Football training improves cardiovascular health profile in sedentary, premenopausal hypertensive women. *Scand J Med Sci Sports*. 2014;24(S1):36-42.
- 19) Bennike S, Wikman JM, Ottesen L. Football Fitness - a new version of football? A concept for adult players in Danish football clubs. *Scand J Med Sci Sports* 2014;24(S1):138–146.
- 20) Castagna C, de Sousa M, Krstrup P, Kirkendall D. Recreational Team Sports: The motivational medicine. Editorial. 1-4. *J Sport Health Science*, April 1, 2018.
- 21) Reddy P, Dias I, Holland C, et al. Walking football as sustainable exercise for older adults - A pilot investigation. *Eur J Sport Sci*. 2017;17(5):638-645.
- 22) Krstrup P, Skoradal MB, Randers MB, et al. Broad-spectrum health improvements with one year of soccer training in inactive mildly hypertensive middle-aged women. *Scand J Med Sci Sports* 2017;27:1893–901.
- 23) Hunt K, Wyke S, Gray CM, et al. A gender-sensitised weight loss and healthy living programme for overweight and obese men delivered by Scottish Premier League football clubs (FFIT): a pragmatic randomised controlled trial. *Lancet* 2014; 383(9924):1211-21.
- 24) Van Nassau F, van der Ploeg, Abrahamsen F, et al. Study protocol of European Fans in Training (EuroFIT): a four-country randomised controlled trial of a lifestyle program for men delivered in elite football clubs. *BMC Public Health* 2016;16:598.