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# FIFA 11+: an effective programme to prevent football injuries in various player groups worldwide—a narrative review

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## ABSTRACT

In 2009, FIFA promoted and disseminated the FIFA 11+ injury prevention programme worldwide. Developed and studied by the FIFA Medical Assessment and Research Centre (F-MARC), the programme was based on a randomised controlled study and one countrywide campaign in amateur football that significantly reduced injuries and healthcare costs. Since the FIFA 11+ launch, key publications have confirmed the preventive effects of the programme and have evaluated its performance effects in female as well as male amateur football players. Furthermore, implementation strategies of this prevention programme have also been studied. The goal of this narrative review was to summarise the available scientific evidence about the FIFA 11+ programme. While FIFA continues to disseminate and implement FIFA 11+ among its Member Associations, adaptations of the injury prevention programme for children and referees have been developed and are currently being evaluated.

## INTRODUCTION

FIFA 11+ was developed in 2006 in cooperation with the Santa Monica Sports Medicine Foundation (SMSMF), and the Oslo Sports Trauma and Research Centre (OSTRC), as a complete warm up programme to prevent injuries in amateur football players.<sup>1</sup> While the first study, a randomised controlled trial (RCT) in young female players, was published in 2008,<sup>2</sup> in the past years other large RCTs (in female as well as male players) have confirmed the initial findings: the FIFA 11+ warm up significantly prevents (non-contact) injuries in football.<sup>2–5</sup> There are now publications on various aspects of FIFA 11+ and this reflects both the important scientific background and the growing interest around this injury prevention programme for amateur football. The FIFA 11+ has also been investigated in other sports; there was a reduced rate of injury in male elite basketball players randomised to warming up with this programme.<sup>6</sup>

The aim of this narrative review was to examine the current evidence relating to the FIFA 11+ programme in terms of injury prevention, performance enhancement and implementation. We also discuss current developments and projects around FIFA 11+.

## METHODOLOGY

Peer-reviewed journal publications on the FIFA 11+ from 9 December 2008 (date of the first published paper on FIFA 11+, at that time called ‘The 11+’) until 29 January 2015 were considered. The literature search strategy was not systematic, and

MB screened the English language publications. A total of 25 papers were found and divided in three groups: (1) injury prevention studies, (2) performance effects studies and (3) implementation strategy studies.

## FIFA 11+ INJURY PREVENTION EVIDENCE IN FEMALE AND MALE PLAYERS

The efficacy of FIFA 11+ was first proven in young female players<sup>2–5</sup> as was the Prevent and Enhance Performance (PEP), a non-contact anterior cruciate ligament (ACL) prevention programme.<sup>7</sup> Soligard *et al*<sup>2</sup> and Steffen *et al*<sup>5</sup> found a significant reduction (up to 50%) of injuries in female players aged 13–18 in large RCTs, when the warm up exercises were performed at least twice a week. In both studies, compliance appeared important—injury risk was lowest in those players with higher adherence to the programme.<sup>2–5</sup>

Recently, the FIFA 11+ was tested in two RCTs among male players.<sup>3–4</sup> Owoeye *et al*<sup>3</sup> found a significantly lower (approximately 40%) incidence of injuries in young Nigerian male players (aged 14–19), and Silvers *et al*<sup>4</sup> reported similar results in American male NCAA Division I-II players (aged 18–25) when performing the programme regularly (2–3×/week). These four RCTs showed how a basic injury prevention programme, when performed, significantly reduces injuries in female and male amateur football players. A cohort study<sup>8</sup> and two recent systematic reviews on structured neuromuscular warm up programmes<sup>9–10</sup> underscore the evidence behind the preventive effects of FIFA 11+ in youth amateur football.

In professional football, we found almost no publications relating to lower limb injury prevention.<sup>11–12</sup> Interestingly, in a survey on the preventative strategies in 44 teams of various premier leagues, the five most rated preventive exercises were components of the FIFA 11+ programme.<sup>13</sup>

In other age groups, especially in children (below 14 years of age), there is a paucity of research in injuries and their prevention.<sup>14–15</sup> Faude *et al*<sup>14</sup> formulated the basis for preventive strategies in children playing football, and after developing an adapted ‘FIFA 11+ Kids’ programme, FIFA Medical Assessment and Research Centre (F-MARC) is currently conducting a large multicentre intervention study (four European countries) in this area.

A recent RCT<sup>16</sup> evaluated FIFA 11+ in veteran male football players (mean age over 40 years) and found little effect in reducing injuries, although low training frequency and compliance



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(programme performed 1×/week) were both recognised as important limiting factors.

### SPECIAL GROUP: THE REFEREES

The match officials are an important part of football. In modern football, referees (especially at elite level) are exposed to considerable amounts of match and training loads, and they suffer lower limb injury.<sup>17–21</sup> Based on the specific injury profile<sup>18–21</sup> and on the successful FIFA 11+, a ‘FIFA 11+ Referee’ injury prevention programme for referees and assistant referees has been developed and pilot tested.<sup>22</sup> While the programme is distributed worldwide (since 2013) within the FIFA Refereeing courses, an investigation on the impact of FIFA 11+ Referee in match officials at different levels is currently being conducted with the Italian Referee Association.

### FIFA 11+ PERFORMANCE AND WARM UP EFFECTS

“Are there performance benefits of such exercises?” is a common question by football coaches when exposed to an ‘injury prevention programme’. In an RCT, Impellizzeri *et al*<sup>23</sup> found significantly better neuromuscular control (quicker stabilisation time of lower extremity and core) in Italian amateur male players after 9 weeks of FIFA 11+ practice. Young Canadian female players who undertook the FIFA 11+ during a season improved in their functional balance.<sup>5</sup> Performing the FIFA 11+ warm up for an average of 2 months led to enhanced knee strength ratios, as well as superior static/dynamic balance and agility skills in Asian male players.<sup>24–28</sup> In a pre–post study in Italian male amateur players, Bizzini *et al*<sup>29</sup> showed how FIFA 11+ induces similar physiological responses as other published warm ups. Recently, two studies reported that FIFA 11+ exercises can trigger core and hip musculature activation, and therefore improve neuromuscular control.<sup>30–31</sup> The FIFA 11+ enhanced performance (better hamstring/quadriceps strength ratios, improved jumping and agility skills) in Portuguese male futsal players.<sup>32–33</sup>

### FIFA 11+ IMPLEMENTATION STRATEGY

The coach—especially at lower levels—has been identified as the key instigator in performing injury prevention programmes with her/his players in all F-MARC activities. The countrywide campaign in Switzerland was the first example to successfully disseminate and implement a programme through coaching education on a large scale in amateur football.<sup>34</sup> In Belgium, the introduction of FIFA 11+ (via coaching courses by the National Football Federation) together with other preventive policies (eg, no matches if weather conditions are bad) reduced football-related injuries.<sup>35</sup>

In an RCT evaluating different delivery methods of FIFA 11+, a preseason coaching workshop was more effective than unsupervised delivery and additional on-field supervision in terms of adherence, and even reduced injury risk in teams performing the injury prevention programme.<sup>36</sup> Delivery strategies should be further tailored to coaches (and players), as other factors (knowledge, beliefs, experience) may also influence their behaviour towards endorsing injury prevention programmes.<sup>37</sup>

### FIFA 11+ IMPLEMENTATION: A VIGOROUS PARTNERSHIP IN GERMANY

Since 2009, FIFA has been promoting FIFA 11+ in its 209 Member Associations (MAs). Guidelines were provided for MAs to disseminate and implement the FIFA 11+ on a larger scale in amateur football successfully.<sup>1</sup>

The four time FIFA World Cup winner, The German Football Association (DFB, Deutscher Fussball-Bund), is the largest MA worldwide. The DFB has a state-of-the-art organisation and knowledge at all levels of football, and decided to promote FIFA 11+ among its nearly 7 million registered amateur players in 2011.

With cooperation from one of the German national insurance companies (Verwaltungs-Berufsgenossenschaft, VBG) and F-MARC, the FIFA 11+ was first presented to executives and representatives of the DFB Amateur Football at a congress in Kassel in February 2012. The dissemination plan was then finalised, with the financial costs (material, course organisation, other) divided equally by the football league (DFB) and the insurance company (VBG). A dedicated manager within the DFB was appointed to support the execution of this project. F-MARC provided full support to create the first two instructor’s courses, targeting the DFB head regional coaches as well as the DFB head talent coordinators (Meschede, October 2012). During 2013 and 2014, 43 courses were conducted in the 21 regions of the DFB, and a total of more than 1100 coaches were certified as FIFA 11+ instructors. This cascade training, ‘teach the teacher’ strategy, as outlined by Junge *et al*,<sup>34</sup> allowed the 26 000 registered clubs in DFB amateur football to be targeted (for a ratio of approximately 1 instructor per 23 teams). An evaluation of the project is ongoing.

### CHALLENGES

Although the scientific evidence has proven that FIFA 11+ prevents non-contact football injuries, its implementation in the field (as for other injury prevention programmes) remains challenging. FIFA has included the programme in all official coaching courses, and presented this concept of prevention at several occasions in all continents.<sup>1</sup> Despite numerous promotional activities in more than 80 countries and two FIFA Medical Conferences (Zürich 2009, Budapest 2012), so far, FIFA 11+ has been endorsed by only 20 FIFA MAs (approximately 10% of all MAs).

Current and past World Cup Champions such as Germany, Brazil and Japan (to cite only three), symbolise that the (political) willingness at MA executive levels is crucial in order to strongly support the message of prevention. Therefore, the firm commitment by an MA to realise a given implementation plan is fundamental. This includes allocating persons and resources for the FIFA 11+ programme. The example set forth by the DFB league in Germany, outlined above, shows that this is also feasible in a large country. Furthermore, implementation strategies at various levels, as illustrated by the RE-AIM Sports Setting Matrix,<sup>38</sup> and implementation drivers, are needed to plan programme adoption, implementation and sustainability.<sup>39–40</sup>

### SUMMARY AND FUTURE DIRECTION

Since the introduction of FIFA 11+, research studies and implementation campaigns have been conducted in four continents (Europe, North America, Africa and Asia). Although some areas are still being investigated (ie, children), substantial scientific evidence supports the dissemination and implementation of FIFA 11+ as a basic injury prevention programme in amateur football. Despite the programme’s success, a higher implementation can be achieved by extending the MAs’ responsibilities. This would involve prioritising ‘injury prevention’ and thereby protecting a football player’s overall health. FIFA and F-MARC will pursue the worldwide promotion of the FIFA 11+ prevention programme among MAs, with the strategic goal “to prevent football injuries and to promote football as a health-enhancing leisure activity, improving social behaviour.”

## What is already known on this topic?

- ▶ Performing the FIFA 11+ as a standard warm up reduces the injury risk in young female football players.
- ▶ Compliance with the programme (at least twice a week) is a key to successful injury prevention.
- ▶ The coach is the key person to promote FIFA 11+ to his/her players.
- ▶ There is limited knowledge on performance effects of FIFA 11+.

## What this paper adds?

- ▶ The efficacy of FIFA 11+ to prevent non-contact injuries has been proven in young male amateur football players.
- ▶ Warm up and performance effects of FIFA 11+ have been evaluated in detail.
- ▶ The strong commitment of the national football governing bodies (Member Associations of FIFA) is necessary to implement FIFA 11+ at the country amateur football level.

**Competing interests** None.

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## REFERENCES

- 1 Bizzini M, Junge A, Dvorak J. Implementation of the FIFA 11+ football warm up program: how to approach and convince the Football associations to invest in prevention. *Br J Sports Med* 2013;47:803–6.
- 2 Soligard T, Myklebust G, Steffen K, et al. Comprehensive warm-up programme to prevent injuries in young female footballers: cluster randomised controlled trial. *BMJ*. 2008;337:a2469.
- 3 Owuoye OB, Akinbo SR, Tella BA, et al. Efficacy of the FIFA 11+ Warm-Up Programme in Male Youth Football: a cluster randomised controlled trial. *J Sports Sci Med* 2014;13:321–8.
- 4 Silvers H, Mandelbaum BR, Adeniji O, et al. The efficacy of the FIFA 11+ program in the Collegiate Male Soccer Players (USA). *Am J Sports Med* 2015. In press.
- 5 Steffen K, Emery CA, Romiti M, et al. High adherence to a neuromuscular injury prevention programme (FIFA 11+) improves functional balance and reduces injury risk in Canadian youth female football players: a cluster randomised trial. *Br J Sports Med* 2013;47:794–802.
- 6 Longo UG, Loppini M, Berton A, et al. The FIFA 11+ program is effective in preventing injuries in elite male basketball players: a cluster randomized controlled trial. *Am J Sports Med* 2012;40:996–1005.
- 7 Gilchrist J, Mandelbaum BR, Melancon H, et al. A randomized controlled trial to prevent noncontact anterior cruciate ligament injury in female collegiate soccer players. *Am J Sports Med* 2008;36:1476–83.
- 8 Grooms DR, Palmer T, Onate JA, et al. Soccer-specific warm-up and lower extremity injury rates in collegiate male soccer players. *J Athl Train* 2013;48:782–9.
- 9 Barengo NC, Meneses-Echavez JF, Ramirez-Velez R, et al. The impact of the FIFA 11+ training program on injury prevention in football players: a systematic review. *Int J Environ Res Public Health* 2014;11:1986–2000.
- 10 Mayo M, Seijas R, Alvarez P. [Structured neuromuscular warm-up for injury prevention in young elite football players]. *Rev Esp Cir Ortop Traumatol* 2014;58:336–42.
- 11 Ekstrand J, Hagglund M, Kristenson K, et al. Fewer ligament injuries but no preventive effect on muscle injuries and severe injuries: an 11-year follow-up of the UEFA Champions League injury study. *Br J Sports Med* 2013;47:732–7.
- 12 Ekstrand J, Hagglund M, Walden M. Injury incidence and injury patterns in professional football: the UEFA injury study. *Br J Sports Med* 2011;45:553–8.
- 13 McCall A, Carling C, Nedelec M, et al. Risk factors, testing and preventative strategies for non-contact injuries in professional football: current perceptions and practices of 44 teams from various premier leagues. *Br J Sports Med* 2014;48:1352–7.
- 14 Faude O, Rossler R, Junge A. Football injuries in children and adolescent players: are there clues for prevention? *Sports Med* 2013;43:819–37.
- 15 Rossler R, Donath L, Verhagen E, et al. Exercise-based injury prevention in child and adolescent sport: a systematic review and meta-analysis. *Sports Med* 2014;44:1733–48.
- 16 Hammes D, Aus der Funten K, Kaiser S, et al. Injury prevention in male veteran football players—a randomised controlled trial using “FIFA 11+”. *J Sports Sci* 2014;1–9. [Epub ahead of print].
- 17 Castagna C, Abt G, D’Ottavio S. Physiological aspects of soccer refereeing performance and training. *Sports Med* 2007;37:625–46.
- 18 Bizzini M, Junge A, Bahr R, et al. Injuries and musculoskeletal complaints in referees—a complete survey in the top divisions of the swiss football league. *Clin J Sport Med* 2009;19:95–100.
- 19 Bizzini M, Junge A, Bahr R, et al. Female soccer referees selected for the FIFA Women’s World Cup 2007: survey of injuries and musculoskeletal problems. *Br J Sports Med* 2009;43:936–42.
- 20 Bizzini M, Junge A, Bahr R, et al. Injuries of football referees: a representative survey of Swiss referees officiating at all levels of play. *Scand J Med Sci Sports* 2011;21:42–7.
- 21 Bizzini M, Junge A, Bahr R, et al. Injuries and musculoskeletal complaints in referees and assistant referees selected for the 2006 FIFA World Cup: retrospective and prospective survey. *Br J Sports Med* 2009;43:490–7.
- 22 Weston M, Castagna C, Impellizzeri FM, et al. Science and medicine applied to soccer refereeing: an update. *Sports Med* 2012;42:615–31.
- 23 Impellizzeri FM, Bizzini M, Dvorak J, et al. Physiological and performance responses to the FIFA 11+ (part 2): a randomised controlled trial on the training effects. *J Sports Sci* 2013;31:1491–502.
- 24 Daneshjoo A, Mokhtar A, Rahnama N, et al. The effects of injury prevention warm-up programmes on knee strength in male soccer players. *Biol Sport* 2013;30:281–8.
- 25 Daneshjoo A, Mokhtar AH, Rahnama N, et al. The effects of injury preventive warm-up programs on knee strength ratio in young male professional soccer players. *PLoS ONE* 2012;7:e50979.
- 26 Daneshjoo A, Mokhtar AH, Rahnama N, et al. The effects of comprehensive warm-up programs on proprioception, static and dynamic balance on male soccer players. *PLoS ONE* 2012;7:e51568.
- 27 Daneshjoo A, Mokhtar AH, Rahnama N, et al. Effects of the 11+ and Harmoknee Warm-up Programs on physical performance measures in professional soccer players. *J Sports Sci Med* 2013;12:489–96.
- 28 Daneshjoo A, Rahnama N, Mokhtar AH, et al. Effectiveness of injury prevention programs on developing quadriceps and hamstrings strength of young male professional soccer players. *J Hum Kinet* 2013;39:115–25.
- 29 Bizzini M, Impellizzeri FM, Dvorak J, et al. Physiological and performance responses to the “FIFA 11+” (part 1): is it an appropriate warm-up? *J Sports Sci* 2013;31:1481–90.
- 30 Nakase J, Inaki A, Mochizuki T, et al. Whole body muscle activity during the FIFA 11+ program evaluated by positron emission tomography. *PLoS ONE* 2013;8:e73898.
- 31 Whittacker JL, Emery CA. Impact of the FIFA 11+ on the structure of selected muscle in adolescent female soccer players. *Phys Ther Sport* 2014. In press.
- 32 Brito J, Figuerido P, Fernandes L. Isokinetic strength effects of FIFA’s “The 11+” injury prevention training programme. *Isokinetics Exerc Sci* 2010;18:211–15.
- 33 Reis I, Rebelo A, Krstrup P, et al. Performance enhancement effects of Federation Internationale de Football Association’s “The 11+” injury prevention training program in youth futsal players. *Clin J Sport Med* 2013;23:318–20.
- 34 Junge A, Lamprecht M, Stamm H, et al. Countrywide campaign to prevent soccer injuries in Swiss amateur players. *Am J Sports Med* 2011;39:57–63.
- 35 Bollars P, Claes S, Vanlommel L, et al. The effectiveness of preventive programs in decreasing the risk of soccer injuries in Belgium: national trends over a decade. *Am J Sports Med* 2014;42:577–82.
- 36 Steffen K, Meeuwisse WH, Romiti M, et al. Evaluation of how different implementation strategies of an injury prevention programme (FIFA 11+) impact team adherence and injury risk in Canadian female youth football players: a cluster-randomised trial. *Br J Sports Med* 2013;47:480–7.
- 37 McKay CD, Steffen K, Romiti M, et al. The effect of coach and player injury knowledge, attitudes and beliefs on adherence to the FIFA 11+ programme in female youth soccer. *Br J Sports Med* 2014;48:1281–6.
- 38 Finch CF, Donaldson A. A sports setting matrix for understanding the implementation context for community sport. *Br J Sports Med* 2010;44:973–8.
- 39 Donaldson A, Finch CF. Planning for implementation and translation: seek first to understand the end-users’ perspectives. *Br J Sports Med* 2012;46:306–7.
- 40 Donaldson A, Finch CF. Applying implementation science to sports injury prevention. *Br J Sports Med* 2013;47:473–5.