

# INJURY PREVENTION IN FOOTBALL AND THE FIFA 11+

## A MODEL FOR INTERNATIONAL SPORTS FEDERATIONS?

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Football is the most popular sport in the world and is played at an amateur or recreational level by almost 300 million people. While football can be considered a healthy leisure activity, as a contact team sport, it also entails a certain risk of injury. The medical treatment of football-related injuries can have a significant socio-economic impact in terms of related healthcare costs<sup>1</sup>.

In 1994, FIFA founded its Medical Assessment and Research Centre (F-MARC) to create and disseminate scientific knowledge on various medical topics in football, to reduce football injuries and thus

to promote football as a health-enhancing leisure activity<sup>2</sup>.

This paper presents the theoretical background, the development, scientific evaluation, implementation and dissemination strategies of FIFA's injury prevention programme ('FIFA 11+') in order to provide a model of how an international sports governing body can make its sport safer.

### DEVELOPMENT OF INJURY PREVENTION PROGRAMMES

The first scientific study on injury prevention in football was Jan Ekstrand's

thesis published in the 1980s<sup>3</sup>. For about 20 years, no other author followed on the prevention of football injuries in general and only very few studies on the prevention of recurrent ankle sprains and/or severe knee injuries were published. In 2000, F-MARC conducted its first study on the prevention of football injury in male Swiss youth teams, showing 21% fewer injuries in the intervention compared to the control group<sup>4</sup>. The interventions were focused on improving the structure and content of training, by educating and supervising the coaches and players. The prevention programme included general interventions



such as improvement of warm-up, regular cool-down, taping of unstable ankles, adequate rehabilitation, promotion of the spirit of fair play and 10 sets of exercises designed to improve co-ordination, stability of the ankle and knee, flexibility and strength of the trunk, hip and leg muscles. Based on the experiences of this pilot study and in co-operation with international experts, F-MARC developed a simple injury prevention programme for amateur football players called 'The 11' in 2003.

'The 11' comprised 10 evidence-based or best-practice exercises (core stability, balance, dynamic stabilisation and eccentric hamstring strength) and the promotion of fair play. The programme was designed to reduce the most common football injuries (ankle and knee sprains, hamstring and groin strains). It can be completed in 10 to 15 minutes and requires no equipment other than a ball. 'The 11' was implemented in two country-wide campaigns (Switzerland and New Zealand) in co-operation with the respective national accident insurance company and the national football association<sup>4</sup>.

In Switzerland, the implementation of 'The 11' and its effect on the injury rates were evaluated by an independent research institute. Four years after the launch of the programme, teams that included 'The 11' as a part of their warm-up had 11.5% fewer match injuries and 25.3% fewer training injuries than teams that warmed-up as usual<sup>5</sup>. In New Zealand, the implementation of 'The 11' resulted in a NZ\$8.2 per invested dollar return on investment for the national accident insurance company after 7 years<sup>1</sup>.

In two randomised controlled trials (RCTs) on 'The 11', no statistically significant effects were found in terms of injury prevention in male and female players. Compliance issues and exercise dosage were discussed as the main points of concern<sup>1</sup>.

Based on the experiences with 'The 11', the Prevent Injury and Enhance Performance programme<sup>6</sup> and other exercised-based programmes to prevent football injuries, an advanced version of 'The 11' the 'FIFA 11+' was developed in 2006 together with the Oslo Sports Trauma Research Centre and the Santa Monica Orthopaedic and Sports Medicine Research Foundation. 'FIFA 11+' is a complete warm-up programme with

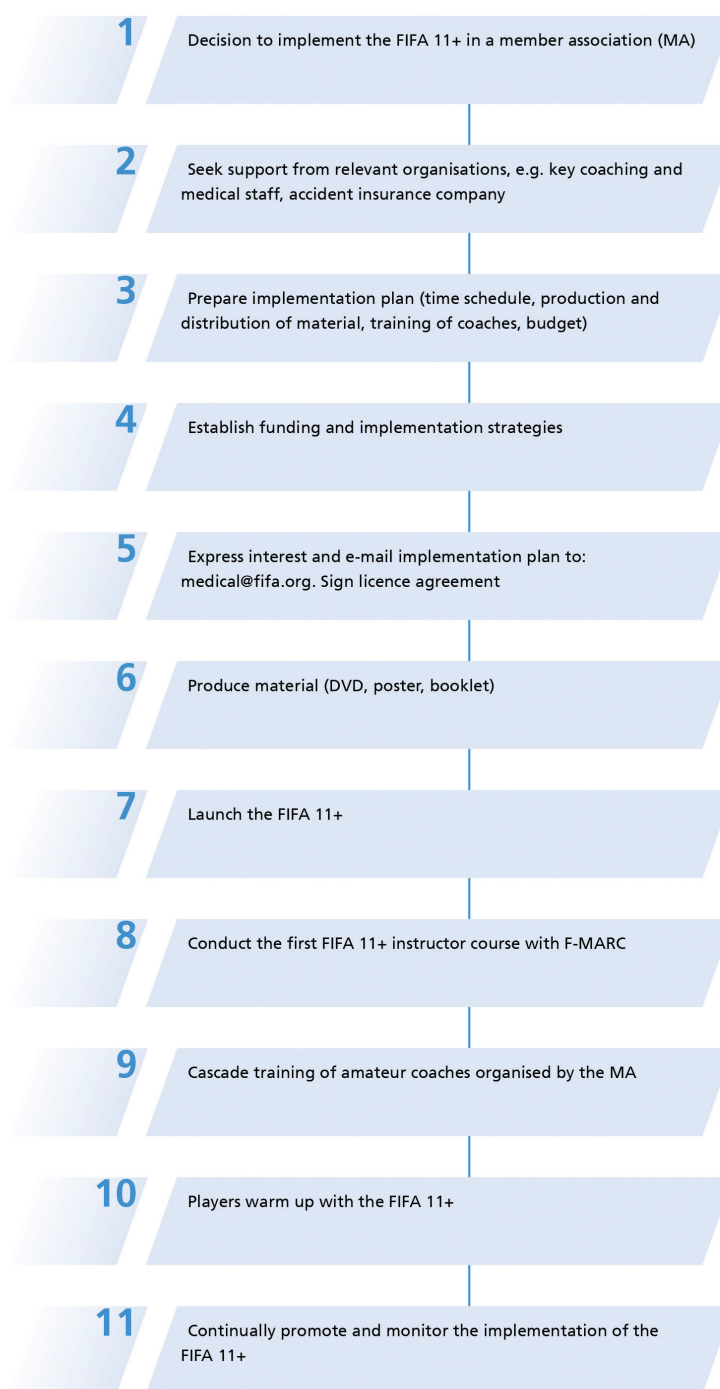
running exercises at the beginning and end to activate the cardiovascular system. It features specific preventive exercises focusing on core and leg strength, balance and agility, each of them at three levels of increasing difficulty to provide variation and progression. It takes about 20 to 25 minutes to complete and requires minimal equipment (a set of cones and balls). 'FIFA 11+' should replace the usual warm-up for a few sessions each week<sup>1</sup>.

From 2007, different research groups worldwide evaluated the preventive and performance effects of this programme<sup>7</sup>.

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

The efficacy of 'FIFA 11+' was first proven in young female players and was similar to the Prevent Injury Enhance Performance programme, a non-contact ACL prevention programme. Soligard et al<sup>8</sup> and Steffen et al<sup>9</sup> found a significant reduction (up to 50%) of injuries in young female players in large RCTs, provided that the warm-up exercises were performed at least twice a week. In

## 11 steps to implement the FIFA 11+ in a member association



**Figure 1:** 11 steps to implement the FIFA 11+ in a member association.

both studies, the role of compliance was documented, showing a further reduction of injury risk in those players with higher adherence to the programme. Recently, a similar impact of the 'FIFA 11+' was reported in two RCTs involving male players<sup>10,11</sup>. Owomeye et al<sup>10</sup> found a significantly lower (ca. 40%) incidence of injuries in young Nigerian male players and Silvers et al<sup>11</sup> reported similar results in American male NCAA Division I and II players – when performing the programme regularly (two to three times per week). These 4 RCTs showed how a basic injury prevention programme, with proper compliance, significantly reduces injuries both in female and male amateur football. Two recent systematic reviews on structured neuromuscular warm-up programmes underline the evidence behind the preventive effects of 'FIFA 11+' in youth amateur football<sup>7</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>12,13</sup>. Faude et al<sup>12</sup> formulated the basis for preventive strategies in children playing football and developed an adapted 'FIFA 11+ Kids' programme. F-MARC is currently conducting a large multicentre intervention study (in four European countries) in this area.

#### THE REFEREES

Match officials are an important but often unrecognised part of football. In modern football, referees (especially at elite level) are exposed to considerable match and training loads. While several studies have addressed different aspects of performance and training in referees (although to a lesser extent than in players), recently, the associated injury risk in referees has been investigated. Based on their specific injury profile 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>14</sup>. The programme has been distributed worldwide since 2013, through FIFA Refereeing courses. An investigation on the impact of 'FIFA 11+ Referee' in match officials at different levels is currently being conducted by the Italian Referees Association.

#### PERFORMANCE AND WARM-UP EFFECTS OF 'FIFA 11+'

'What are the performance benefits of such exercises?' is one of the most common questions by football coaches, when exposed to an injury prevention programme. Various studies have investigated the performance effects of 'FIFA 11+' in male and female players. In an RCT, Impellizzeri et al<sup>15</sup>

found significantly better neuromuscular control (quicker stabilisation time of lower extremity and core) in amateur male Italian players after 9 weeks of 'FIFA 11+' practice. Steffen et al<sup>9</sup> showed significantly better functional balance in young Canadian female players performing 'FIFA 11+' during the season in another RCT. Other studies found improved knee strength ratios, static/



dynamic balance and agility skills in male Asian players after performing the 'FIFA 11+' warm-up for an average time of 2 months. In a pre-post study in amateur male Italian players, Bizzini et al<sup>16</sup> showed 'FIFA 11+' induces similar physiological responses as other published warm-ups. Recently, two studies showed how 'FIFA 11+' exercises can trigger core and hip musculature activation, therefore improving neuromuscular control. Other studies have found positive performance enhancement effects of 'FIFA 11+' in male futsal players<sup>7</sup>.

While epidemiological data are available in professional football, almost no prevention studies in elite level players have been published so far. Recently published surveys by McCall<sup>17,18</sup> on the preventative strategies in Premier Leagues clubs and national teams showed that most of the exercises rated as being preventive were components of the 'FIFA 11+' programme.

#### DEVELOPMENT OF AN IMPLEMENTATION STRATEGY

From the beginning of F-MARC activities in injury prevention, the coach – especially at lower levels – was identified as the key instigator in performing injury prevention programmes with their players. The successful countrywide campaign in Switzerland was the first example to demonstrate how a basic injury prevention programme can be disseminated and implemented on a large scale in amateur football through coaching education<sup>5</sup>. For the countrywide campaign in Switzerland, 'The 11' was integrated in the coach education of the Swiss Football Association (Schweizerischer Fussballverband) using a 'teach-the-teacher' strategy or 'cascade approach'. All instructor coaches were educated by sports physical therapists on how to deliver the programme to the coaches in their licensing or refresher courses. During a 3-year period, 5000 licensed amateur coaches were subsequently instructed on performing 'The 11' with their teams and received information material<sup>5</sup>. The same strategy was used in New Zealand, where 'The 11' was implemented as part of the 'SoccerSmart Programme'. In Belgium, the introduction of 'FIFA 11+' (via coaching courses by the National Football Association)

together with other preventive policies (i.e. no matches if weather conditions are bad) has led to an overall reduction of football-related injuries<sup>7</sup>.

Steffen et al<sup>19</sup> conducted an RCT evaluating different delivery methods of 'FIFA 11+'. It found that a pre-season coaching workshop was more effective than unsupervised delivery and/or additional on-field supervision in terms of adherence and reduced injury risk in teams performing the injury prevention programme. 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.

'FIFA 11+' is best taught to coaches in a workshop that includes theoretical background knowledge and practical demonstration of the exercises. After raising the coach motivation and awareness of injury prevention, the exercises should be briefly explained and demonstrated. It is helpful to select a participant to perform the exercise, while the instructor highlights the correct execution of the exercises. The participating coaches should then perform the exercises themselves and be corrected by the instructor(s). The participants should get 'a feel' for the exercises and appreciate the challenges behind each exercise. In the second half of the workshop, each of the participants should teach at least one of the exercises to the group and get feedback on this from the instructor<sup>1</sup>.

Information material on 'FIFA 11+' was developed, produced and made available for coaches and players. The material includes a detailed manual, an instructional DVD, a poster, a website and a promotional booklet with DVD. All material is available in the four FIFA languages (English, Spanish, German and French) and can be accessed on [www.F-MARC.com/11plus](http://www.F-MARC.com/11plus).

#### WORLDWIDE DISSEMINATION OF 'FIFA 11+'

In 2009, FIFA started the dissemination of the programme among its 209 Member Associations (MAs). Based on the experience with the countrywide implementation in Switzerland and New Zealand, a guideline on how to implement the 'FIFA 11+' injury prevention programme on a large scale in amateur football was developed (Figure 1). The implementation is conducted either through close co-operation between F-MARC and MAs or via FIFA Coaching Instructor courses. F-MARC supports the MAs in the preparation of the educational material in the local language and the workshops for the first group of instructors to initiate the cascade training<sup>1</sup>.

Various important national Football Associations (such as Germany, Brazil, Italy and Japan) integrated 'FIFA 11+' into their coaching curriculum or their physical training/education curriculum. Despite implementation problems, other countries followed these role models and, in general, the interest towards injury prevention in football has increased over the years<sup>1</sup>.



***The political willingness at Member Association executive levels is crucial in order to strongly support the message of prevention. Therefore, firm commitment by a Member Association to execute a given implementation plan, allocating persons and resources for the FIFA 11+ 'project' is fundamental***



## IMPLEMENTATION OF 'FIFA 11+'

*Germany*

The German Football Association (Deutscher Fussball-Bund, DFB), a four-time FIFA World Cup™ winner, is the largest MA in world football. The DFB has for many years had state-of-the-art organisation and knowledge at all levels of football; nevertheless, the Association (at its highest levels) decided in 2011 to promote 'FIFA 11+' among its nearly 7 million registered amateur players. Following the co-operation of one of the German national insurance companies (Verwaltungs-Berufsgenossenschaft) and F-MARC, the 'FIFA 11+' was first presented to executives and representatives of DFB Amateur Football at a congress in Kassel (February 2012). The dissemination plan was then finalised, with the financial costs (material, course organisation, other) divided between the DFB (50%) and Verwaltungs-Berufsgenossenschaft (50%). The position of a dedicated manager within the DFB was crucial to ensure the realisation of this project. F-MARC provided full support in organising the first two instructors' courses targeting the DFB head regional coaches

and the DFB head talent co-ordinators (October 2012). Between 2013 and 2015, 45 courses were conducted in the 21 regions of the DFB and a total of 1300 coaches were certified as 'FIFA 11+ instructors' (Figure 2). This cascade training ('teach-the-teacher' strategy, as outlined by Junge et al<sup>5</sup>) allowed the 26,000 registered clubs in DFB Amateur Football to be subsequently targeted (with a ratio of approximately 1 instructor per 23 teams), thus making the outreach of the programme to all clubs easier (an evaluation of the project is ongoing).

*New Zealand*

New Zealand has a government-funded national insurance company: the Accident Compensation Corporation (ACC). The ACC provides comprehensive, no-fault personal injury cover. In 2013, the ACC paid out approximately NZ\$25 million for football-related injuries. Approximately 10 years ago, the 'The 11' was rolled out in New Zealand, in association with ACC and F-MARC. The ACC was able to show an NZ\$8.20 return on every dollar they invested, despite a limited uptake of this initiative. Following the FIFA Congress in 2012, New Zealand Football (NZF)

committed to a nationwide implementation of the 'FIFA 11+' programme. Having learned from the earlier experience with 'The 11', the NZF realised the need for a more co-ordinated implementation programme. The 'FIFA 11+' is now being delivered by NZF in partnership with the ACC.

The dissemination strategy involves the incorporation of the 'FIFA 11+' into a quality assurance programme for clubs – the 'Quality Club Mark'. This is a national partnership with New Zealand's seven regional federations as well as 17 Regional Sports Trusts. It aims to promote continuous improvement in the way football is delivered and to support clubs as they adopt standards of best practice. To attain 'Quality Club Mark' status, clubs must now demonstrate that they have a 'FIFA 11+' instructor at their club and that the programme is being delivered to their club's teams. The NZF implementation programme has also involved the 'FIFA 11+' being integrated into all coaching courses (at both junior and senior levels), delivery at all National Talent Centres and the programme being completed by all the domestic-based national age group and senior teams.



**Figure 2:** German coaches participating at a FIFA 11+ instructor course organised by the DFB in Lautrach (2014).



The first 'train-the-trainer' course was held in February 2014. More than 70 full-time coaches from around the country, including representatives from futsal, the referees department and women's football attended this session. The implementation programme has been adapted to include an emphasis on performance enhancement (as shown in 'FIFA 11+' studies) rather than simply injury prevention. This is a more appealing proposition for coaches. There is also discussion about hamstring and anterior cruciate ligament injuries. This change has also been well received as coaches can directly relate the content of the injury prevention programme they are learning to these common injuries. In 2015, NZF delivered three train-the-trainer sessions in each of their seven regional federations. In this way, NZF have been able to establish a pool of more than 500 trainers nationally. Additionally, trainer sessions have been delivered to doctors, physiotherapists and other allied health professionals at national sports medicine conferences. In 2016, the 'FIFA 11+' will be rolled out nationally as part of a combined NZF and ACC initiative to develop injury prevention strategies in all sports (not just football). NZF and the ACC have also been working with New Zealand's other major sporting codes (rugby, rugby league and netball) to roll out this programme in these sports. NZF and ACC are also engaging with the Ministry of Education to pilot the 'FIFA 11+' in all secondary schools in two major cities and to integrate this into the secondary school physical education curriculum. In 2016, NZF aims to have a dedicated administrator for these initiatives as well as seven full-time federation injury prevention specialists. An evaluation of the programme (based on ACC injury incidence and healthcare costs) is planned.

### Iran

With more than two million male and female players, football is the most popular sport in Iran. The medical committee of the Iran Football Federation (IFF) became interested in the 'FIFA 11+' programme during the First FIFA Medical Conference in Zürich, 2009. The first step was to translate the educational material into Persian. Since 2011, under the leadership of the IFF and



**Figure 3:** New Zealand national team players warming up with FIFA 11+ before a match in Auckland (2013).

its medical committee, 'FIFA 11+' has been systematically disseminated (via coaching courses) in the 20 youth football academies in the country. The programme is also being distributed in the 1000 official football schools of the IFF (in 35 provinces and 9 major regions) and, as of September 2015, more than 60% of all schools were implementing 'FIFA 11+'. Additionally, approximately 20 'FIFA 11+' educational courses for coaches, doctors and physiotherapists have been conducted per year since 2011.

The establishment of the Iran Football Medical Assessment & Rehabilitation Center (IFMARC) in 2013 by the IFF, in co-operation with its medical committee, represented a milestone for all medical-related activities in Iranian football. In 2014, IFMARC distributed the 'FIFA 11+' for men's and women's referees and, since the beginning of 2015, IFMARC has held monthly 'FIFA 11+' courses and seminars for interested national teams, professional clubs and also for athletes from sports other than football.

### CHALLENGES

While 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 a challenging task. FIFA has included the programme in all official coaching courses and presented this concept of prevention at several events worldwide. Despite numerous promotional activities in more than 80 countries and three FIFA Medical Conferences (Zürich 2009, Budapest 2012, Zürich 2015), so far 'FIFA 11+' has been endorsed by only 20 MAS (ca. 10% of all MAS) of FIFA<sup>7</sup>. Current and past World Cup Winners such as Germany and Brazil show that (political) willingness at MA executive level is crucial in order to strongly support the message of prevention. Therefore, the firm commitment by an MA to execute a given implementation plan, allocating persons and financial resources for the FIFA 11+ 'project' is fundamental. The example of the DFB in Germany, shows that this is also feasible in a large country.





**Figure 4:** Iranian coaches during a FIFA 11+ instructor course organised by the IFF in Tehran (2012).

Furthermore, implementation strategies at various levels – as illustrated by the ‘RE-AIM Sports Setting Matrix’<sup>20</sup> – and implementation drivers, are needed to plan programme adoption, implementation and sustainability.

#### CONCLUSIONS AND FUTURE DIRECTIONS

Since the introduction of ‘FIFA 11+’, research studies and implementation campaigns with this programme have been conducted in four continents (Europe, North America, Africa and Asia). While some areas are still being investigated (i.e. children), substantial scientific evidence supports the dissemination and implementation of ‘FIFA 11+’ as a basic injury prevention programme in amateur football. Although important

results have been achieved, a lot still remains to be done, especially in prioritising injury prevention in the overall enhancement of the health of football players within the MA’s responsibilities. The two countrywide campaigns in Switzerland and New Zealand represent successful examples of injury prevention in amateur football: not only can the incidence of football injuries be reduced, but the health-related costs can also be impressively diminished.

FIFA and F-MARC will therefore pursue the worldwide promotion of the ‘FIFA 11+’ prevention programme, in the spirit of its original aim “to prevent football injuries and to promote football as a health-enhancing leisure activity, improving social behaviour”.

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