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THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE FOOTBALL PLAYERS IN SOUTH AFRICA



By

Bakare Ummukulthoum (1035750)

A Thesis submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy Johannesburg, South Africa.

November 2022

DECLARATION

I, Bakare Ummukulthoum, with this declare that the work in this dissertation is mine unless acknowledged. This work is submitted in fulfilment for the degree of Doctor of Philosophy, Department of Physiotherapy, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any degree or examination at this or any other University.

Signed at the University of the Witwatersrand, Johannesburg, South Africa



On this day November 10, 2022

DEDICATION

To almighty Allah, the beneficent and the merciful.

To my parents: Ismaila and Olawunmi Bakare

To my siblings and sister-in-love: Sakeenat, Ali and Biola, Ibrahim and Shareefat

To Aunty Bridget Birabi. Gone too soon.

To my mentors and mentees.

To my entire ecosystem of human resources and support.

This journey would not have been possible without you all.

Thank you.

PUBLICATIONS AND PRESENTATIONS FROM THIS THESIS

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ABSTRACT

Injury prevention programmes are challenging to execute in real-life settings and low-resource areas due to limited resources and infrastructure. Numerous factors account for injury prevention interventions or lack thereof in any team setting. Due to low income and human resources accessible and affordable in Sub Saharan Africa and increasing participation in women's football, it is essential to investigate how injury prevention uptake can be optimised. It is common knowledge that crucial factors for the larger ecological environment are critical when conducting any injury prevention programme implementation.

Aim

The study aimed to develop an implementation guide for the FIFA11+ injury prevention programme in women's football teams in South Africa.

Participants

All women teams (players and their support staff) participating in the USSA Women's football League in the Gauteng Region were invited to participate in study

Methodology

The study was conducted in three phases using a mixture of research methods. The first phase was a cross sectional survey which included two studies aimed to determine the injury prevention knowledge, beliefs and practices in women's football teams and summarise the available evidence for implementation strategies and compliance to the FIFA11+ injury prevention programme in football teams. The second phase was a modified Delphi approach aimed at determining consensus for the content to develop the implementation guide, and the third phase was to assess the feasibility of the implementation guide developed.

Results

Study one (Phase1): One-third of the participants reported perceived knowledge of basic injury prevention practices in football. Only 24.9% of the respondents indicated that they had heard about

the FIFA 11+ injury prevention programme (IPP), while the majority (83.2%) stated that they would be willing to adopt it if they were to gain access to detailed information.

Study two (Phase 1**)**: A total of 22 articles were included in this scoping review, and most of the studies (91%) were randomised controlled trials (RCTs) whilst two were cohort studies. Our study showed that main implementation strategy for the FIFA11+ injury prevention programme is a preseason coach targeted education facilitated by an instructor. Details of the content and duration of workshops were not consistent. The procedure to ensure compliance was also narrated in most of the studies however there was no consistent assessment or documentation. Mode of measurement.

Study three (Phase 2): This was a modified Delphi approach with fifty-five panel members invited across the stakeholder's expert population spanning four continents. In round one, the consensus was achieved for 16/16 statements (100%), arising from adoption (3/3), implementation (9/9) and maintenance (4/4) domains. In round two, the consensus was 17/21 statements (81%) arising from domains on the role of the stakeholders (6/6), education on sports injury prevalence (3/4), surveillance and injury prevention (4/4), FIFA 11+ adoption and implementation (4/4), compliance and adherence (3/3) and motivation strategies (0/3). Our study showed that consensus was achieved amongst experts in areas identified as components of developing an implementation guide to provide support adaptable to the context and setting of low resources such as South Africa for the implementation of the FIFA11+.

Study four (Phase 3): This is a feasibility study which seven coaches from two consenting teams participated and 43% were female (n=3). All the coaches possess a coaching license certification from the South African Football Association (SAFA) with coaching experience ranging from two to ten years. Coaches provided their opinion about the implementation guide, adjustments they think should be considered as well as facilitators and barriers of implementation in their setting. Our study showed that the coaches who participated in the interviews welcomed the idea of the implementation guide positively suggesting that it is a guidance document which provided clarity and direction for the purpose it was intended for

Conclusion

The overall aim of this study was to develop an implementation guide for the FIFA 11+ comprehensive warm up injury prevention programme in women's football teams in the USSA League in South Africa. Our studies showed that teams had perceived adequate knowledge of basic injury prevention practices. Less than a third of the respondents had heard about the FIFA11+ injury prevention programme, whilst the majority are willing to adopt it if they are more knowledgeable about the programme. This indicated gaps in education and implementation of a basis comprehensive injury prevention programme such as the FIFA 11+. It also showed that the key implementation strategy for the FIFA 11+ is coaches targeted education through preseason workshops with indicative supporting roles for team captains. The measure of compliance of the FIFA 11+ is however not consistently documented or standardized in available research within the time frame of our scoping review. The stakeholders and experts identified components and reached consensus to develop the implementation guide in the contextual setting of low resource. It was also showed that the coaches who participated in the structured interviews in the feasibility study welcomed the idea of the implementation guide positively suggesting that is a guidance document which provided clarity and is adaptable. The implementation guide is a useful tool to provide support to facilitate implementation of the FIFA11+ in the contextual setting of the women's football teams in the USSA league in Gauteng.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CG	Control group
EPL	English Premier League
FIFA	Fédération Internationale de Football Association
F-MARC	FIFA-Medical and Assessment Research Centre
HGH	Human Growth Hormone
IG	Intervention group
IPEP	Injury Prevention Exercise Programme
IPP	Injury Prevention Programme
IRR	Incidence rate ratio
IRRM	Injury Risk Reduction Measures
LAL	Lateral ankle ligament
OSTRC	Oslo Sports Trauma Research Centre
RR	Relative Risk
RCT	Randomized Controlled Trial
RE-AIM	Reach. Effectiveness. Adoption. Implementation. Maintenance
RE-AIM SSM	Reach. Effectiveness. Adoption. Implementation. Maintenance- Sports Setting Matrix
SAFA	South African Football Association
USSA	University Sport South Africa

"If we really want to achieve viable and sustainable growth in women's football, we have to run the rule over every factor in its ecosystem. Of course, more funding would be a tremendously positive change, but in most countries what we actually need is a cultural change, a change in perception."

Sarai Bareman, FIFA's Chief Women's Football Officer.
FIFA Women's Football Convention 2019

1. CHAPTER ONE: BACKGROUND AND NEED

1.1. Introduction to chapter

This chapter justifies the need for this study. The evolution of football's evidence-based basic injury prevention programmes is discussed. Despite established effectiveness of randomised control trials (RCTs), the limitations of compliance and commitment to evidence-based injury prevention programmes in real-life settings are apparent. As a result of increased participation in women's football, there is a need to minimize the burden of injuries and adopt injury prevention programmes such as the FIFA 11+ in a growing nation like South Africa. The background of the research, the problem statement, the research questions, the study's goal, objectives, and relevance, the research's theoretical and conceptual framework, and the research's methodological procedure are all covered in this chapter.

1.2. Background

The most popular team sport across gender and age worldwide is football, synonymously, also known as soccer, with 300 million registered football players in estimated projections (Dvorak, 2015). Football's growing popularity indicates that a significant number of the world's populace will continue to participate in the sport. The present figures on the number of football players are unknown, although grey literature estimates that it will reach 500 million by the 2022 FIFA World Cup™ in Qatar (REPUCOM, 2014). Much of the present growth can be attributed to the significant increase in women's participation in the sport, as well as participation in nations where football does not have a long-standing history.

Women's football participation has exploded in recent years, with an estimated 30 million players worldwide and roughly 5 million registered by national federations who are member organization of Fédération Internationale de Football Association (FIFA) (FIFA, 2014). The Confederation of

African Football (CAF) accounts for over one million registered women footballers of this total, and it is expected that this number will continue to steadily rise (FIFA, 2014). As a result, football involvement is linked to a significant number of injuries, necessitating the need to address the problem and progress the injury prevention paradigm shift. (FIFA, 2014).

Ekstrand et al. (1983a) completed the first injury prevention study in football which was a seven-part injury prevention programme that resulted in a 75% reduction in injuries compared to the control group. Tropp et al. (1985) found that after a balance training programme, the number of ankle sprains in football players was 8% in the intervention group and 17% in the control group. In the literature, orthoses, proprioceptive, and eccentric strength training programmes have been shown to have a positive prophylactic effect on ankle, knee, and hamstring injuries (Surve et al., 1994, Caraffa et al., 1996, Arnason et al., 2008). Following a specific proprioceptive training programme, Caraffa et al. (1996) discovered a decreased frequency of anterior cruciate ligament (ACL) injuries in semi-professional and amateur football players with an incidence of 1.15 ACL injuries per team per year in the proprioceptively trained group. Heidt et al. (2000) studied female athletes and found that those who participated in an injury prevention programme (pre-season conditioning programme) had a lower injury rate (14%) than those who did not. Following an intervention programme targeted at overseeing players and coaches, there were 21% fewer injuries recorded in male juvenile football players (Junge et al., 2002).

Football, in comparison to other sports, is a physically demanding sport with a high injury rate (Hawkins and Fuller, 1999, Rahnama et al., 2002). To reduce the frequency of injuries, avoid early retirement, and offer a healthy and safe environment for athletes, preventive programs are strongly recommended (Rahnama et al., 2002). Evidence-based injury prevention programmes have begun to alter the paradigm for addressing the burden of non-contact injuries sustained while participating in sports. The FIFA Medical Assessment and Research Centre (F-MARC) was established primarily to perform scientific research on injury prevention and player health protection. Over a decade ago, FIFA developed the FIFA 11+, a thorough warm-up programme for injury prevention in football. It consists of 15 exercise-based components, including running, strength, plyometrics, and balance. It was created by consensus by a group of experts enabled by the F-MARC as part of

FIFA's strategy to safeguard players' health. The injury prevention programme is reasonably inexpensive to implement. It requires cones, footballs, and a playing surface, all of which are readily available to most teams. Numerous scientific investigations have established the FIFA 11+'s efficacy indicating a range between 35 and up to 50% reduction in non-contact lower limb injury rates (Al Attar et al., 2016, Bizzini and Dvorak, 2015). It is currently evolving and it's FIFA's exercise-based perceived gold standard for injury prevention in football due to its significant reduction of non-contact injuries in the lower limbs. The programme was initially evaluated in a countrywide implementation study in 2008 in a female league in Norway. Significant findings from the first study showed that a structured basic comprehensive warm up programme could reduce non-contact lower limb injuries by up to 50%. When the injury incidence between the intervention and the control group were compared, the result showed that the incidence of injuries non-contact injuries was significantly higher in the control group 0.71[0.49-1.0] than in the intervention group 0.47[0.26-0.88] (Soligard et al., 2008)

Compliance with an injury prevention programme is critical for optimising performance and protecting players' health. The results of randomised controlled trials indicate the preventative impact of injury-prevention exercise programmes (IPEP)s in team ball sports and emphasise the difficulty of getting good compliance. Additionally, it has been proven that identifying the precise implementation components that influence the interventions' adoption, execution, and maintenance is a vital procedure for maximizing the final impact of team ball sport IPEPs (O'Brien and Finch, 2014). The enormous disparities in illness burden and life expectancy in low-resource settings such as sub-Saharan Africa are assumed to be reflective of underlying variables (eg, quality, affordability access, infrastructure, availability), which produce broad inconsistencies and systematic differences in health and health care delivery (Barreto, 2017, Organization, 2008). The African football landscape is developing despite the challenges of the terrain, low resources and limited scientific research in women's football in general, its popularity is on an upward trajectory.

With this in view it becomes imperative to be purposeful about injury prevention in women's football in Africa to support the exponential development to of the game despite the dearth of research in the domain.

1.3. Problem statement

The significant public health impact will not be realised unless sports injury prevention is widely established and adopted by the target population. A fundamental reason for this is that performing implementation research presents substantial obstacles; more standard approaches to sports medicine may not be relevant, and new ways of thinking about designing, conducting, and reporting such research are required. Additionally, real-world implementation of sports injury interventions and evaluation of their effectiveness must begin with an examination of the broader ecological context into which they are introduced and the most effective method for disseminating this knowledge to the audiences who most need it (Finch, 2011). Implementing evidence-based injury prevention programmes must take into account the broader context of accomplishing injury prevention goals (O'Brien and Finch, 2014).

Football has a large global following (Sports, 2014). Musculoskeletal injuries are widespread in team ball sports and are associated with high treatment expenses, loss of participation, and long-term negative consequences (Kuijt et al., 2012, Lohmander et al., 2004, Von Porat et al., 2004) . Randomised controlled trials show the preventative impact of injury-prevention exercise programmes (IPEPs) in team ball sports, but also demonstrate how difficult it can be to maintain good compliance. Identifying the exact implementation components that influence the acceptance, execution, and maintenance of team ball sport IPEPs is a critical first step for increasing the final impact of these interventions (O'Brien and Finch, 2014).

Thus, "Can an exercise-based programme that requires a thorough understanding of the concept, high compliance from coaches and players to perform it on a consistent basis, coaches' knowledge of proper exercise execution, and the ability of players to do so be implemented effectively in Africa's football reality?" is a question that continues to be asked (Grimm, 2014). An

implementation guide for the context and environment may assist in bridging some of the knowledge gaps.

1.4. Significance of study

The goal of this study was to create an implementation guide for a team sport IPEP, such as FIFA 11+, to aid in translating research findings for ease of implementation of injury prevention in a low-resource context in the sub-Saharan terrain. There is a rise in women's football involvement in the landscape, indicating a higher risk of injury burden (FIFA, 2014). Due to inadequate resources, accessibility, affordability, and limited access to appropriate medical care, injury prevention is a viable way to mitigate this burden (Owoeye et al., 2013). Its goal was to close the gap between the FIFA 11+ comprehensive injury prevention programme and implementation in the African context by ensuring that factors directly affecting the implementation processes are considered from the various perspectives of stakeholders, as well as utilizing the RE-AIM framework to develop the guide to provide the support needed to stakeholders. This study's findings are expected to best equip the target end-users to achieve injury prevention goals.

1.5. Research questions

- What are the injury prevention practices, knowledge and beliefs in Women's Football teams in South Africa?
- What are the implementation strategies and compliance to the FIFA 11+ injury prevention programme available in the existing literature?
- What are the context-specific components to consider in developing an implementation guide in a low resource setting such as South Africa?
- What is the opinion of end users on the content and feasibility of the implementation guide developed?

1.6. Aim of study

This study aimed to develop an implementation guide for the FIFA 11+ injury prevention programme among women football players in South Africa.

1.7. Objectives of study

The specific objectives of this study were to:

1. Establish the injury prevention knowledge, beliefs and practices among women soccer players and their support staff in the University Sports South Africa (USSA) League in the Gauteng Region (PHASE 1, STUDY 1).
2. Identify from available evidence the implementation strategies and compliance to the FIFA 11+. (PHASE 1, STUDY 2).
3. Develop an implementation guide of the FIFA 11+ for the USSA women's football league in the Gauteng Region (PHASE 2, STUDY 3).
4. Assess the feasibility of the implementation guide for the FIFA 11+ developed in phase 2 with women's team in the USSA football league in the Gauteng Region (PHASE 3, STUDY 4).

1.8. Theoretical framework

The lack of a comprehensive assessment framework appropriate for public health and community-based treatments has been identified as creating delays in significant progress of intervention outcomes, which is why the RE-AIM FRAMEWORK was created. Multilevel interventions with policy, environmental, and individual components are being measured using appropriate assessments for their settings, goals, and purposes.

RE-AIM was first proposed by Glasgow and colleagues (1999) over two decades ago to translate the outcome of research into practice and to help plan programmes and improve chances of

working in "real-world" settings. Reach, efficacy, adoption, implementation, and maintenance are the five factors assessed by the RE-AIM approach for evaluating public health initiatives (Figure 1.1). Finch and Donaldson (2010) determined that the RE-AIM framework needed adaptation that allows for the reality that many sports injury interventions must be addressed at many levels of sports delivery. The RE-AIM Sports Setting Matrix (RE-AIM SSM) was proposed as a novel expansion to the RE-AIM paradigm. As a result, all tiers of possible influence on the rate of uptake and effectiveness must be examined for the RE-AIM components. Coach-delivered exercise training interventions are described in detail. The RE-AIM SSM is tailored to the implementation environment of community sports and might be used to guide future sports safety and other health promotion programs in this area (Finch and Donaldson, 2010).

The use of proven implementation science models and frameworks can improve sports injury prevention efforts (Finch, 2011). This framework has been recommended and adapted for sports injury prevention research. The reporting of injury prevention exercise programmes (IPEPs) trials must cover all components of programme delivery, as specified by the RE-AIM framework, to improve the eventual impact of team ball sport IPEPs (O'Brien and Finch, 2014).

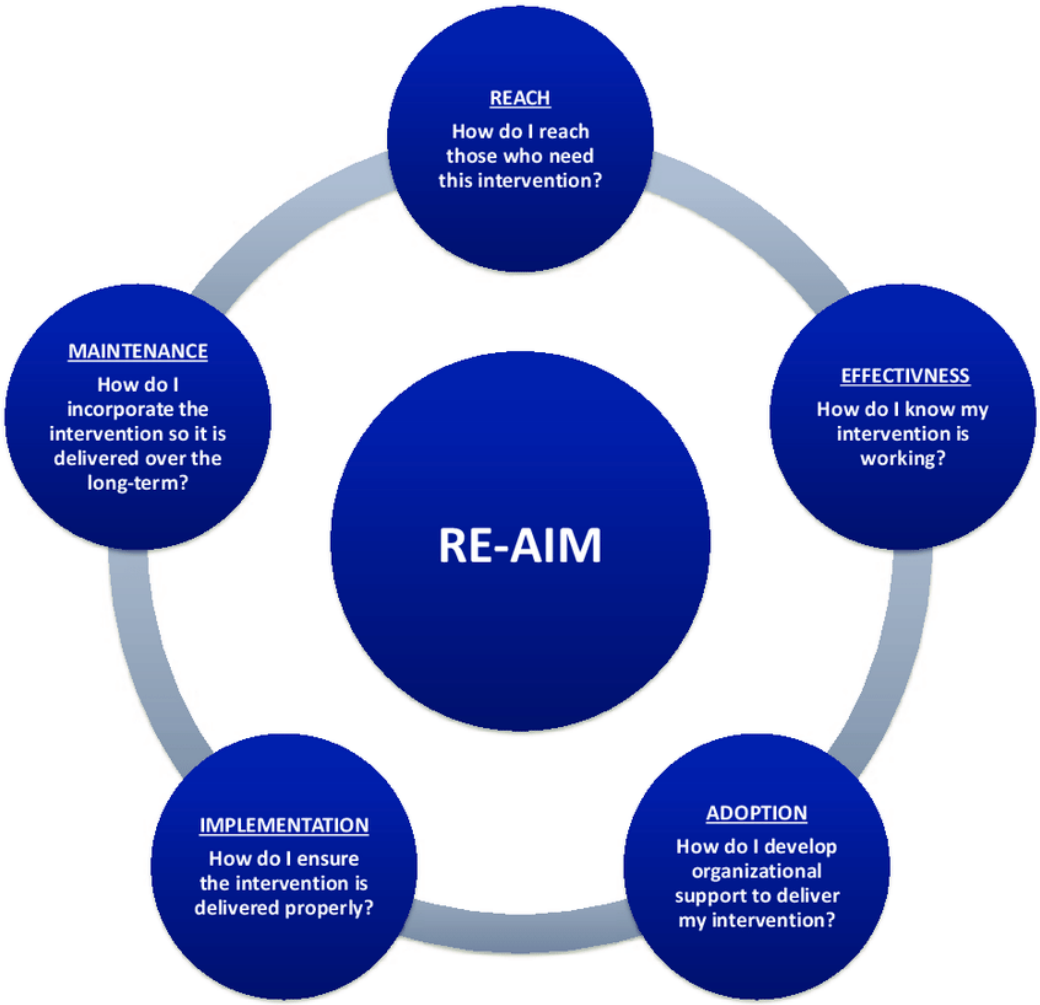


Figure 1.1: The RE-AIM Framework (Ory et al., 2015)

1.9. Conceptual framework

The conceptual framework of this research endeavour is based on the attempt to bridge the gaps of injury prevention implementation in women's football teams in South Africa. Firstly, integrating the outcomes of the cross-sectional survey to determine the injury prevention practices in women football players in South Africa and the scope of literature to established implementation strategies and compliance of a basic structured, evidence-based comprehensive exercise programme (FIFA 11+) in phase 1. The outcomes of the two studies in phase 1 will form the foundation alongside experts and stakeholders' inputs to develop the content of an implementation guide through establishing consensus via a modified Delphi process. Lastly, tailoring interventions

by engaging end-users to provide feedback on the content of the implementation guide to achieve the desired injury prevention goals in the specific context and setting.

The first study evaluates the injury prevention knowledge, beliefs, and practices in women's football. This helps to establish the existing baseline knowledge, beliefs and practices in this population context and low resource setting. The outcome of this study could help determine the need for an appropriate, affordable, and accessible, evidence-based intervention for injury prevention, such as the FIFA 11+, which has been proven to be effective in an array of scientific studies. The outcome of the second study was to help bridge the implementation gaps of injury prevention hence a scoping review of the literature to determine the implementation strategies and compliance factors for the FIFA 11+ in existing literature. This attempts to pull together information in the literature and summarize the evidence to achieve sustainable injury prevention goals as one of the biggest challenges for implementation is compliance and maintenance. The outcome of studies one and two will then form the baseline of questions that the stakeholders and expert group will respond to in the modified Delphi process to determine the components of developing of the implementation guide in study three. Following the development of the content for implementation guide, a feasibility study will be conducted amongst end-users in study four to review the content and understand the challenges and gaps that might be posed in a real-life setting.

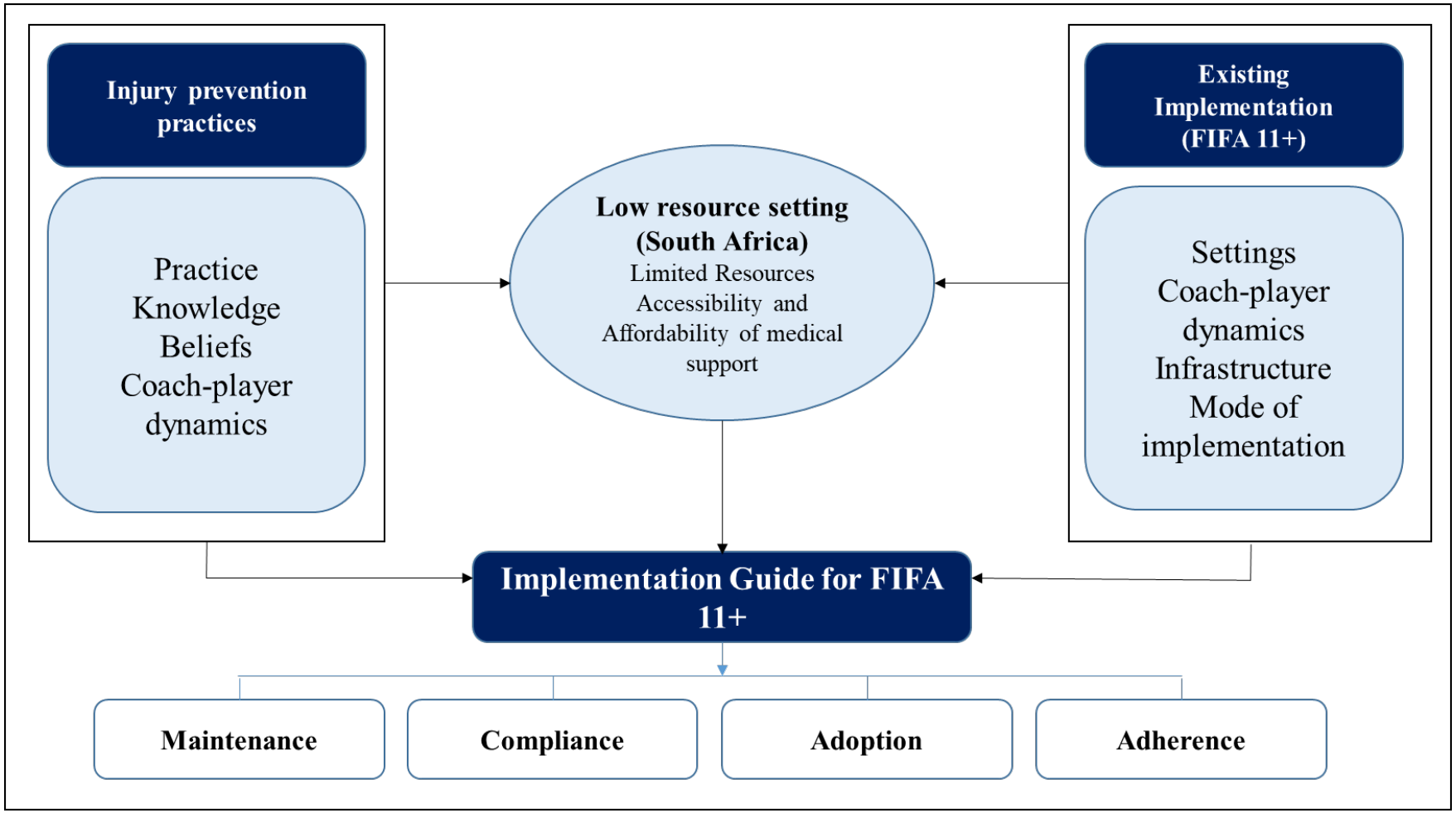


Figure 1.2: Conceptual Framework

1.10. Overview of methodology

The research was conducted in three phases accounting for four studies. The first phase included two studies whilst the second and third phases included one study each. The first study was a cross-sectional survey to determine the injury prevention practices, knowledge and beliefs in women's football in South Africa. The second study was a scoping review to summarise the evidence of implementation strategies and compliance for the FIFA 11+. The third study was a modified Delphi process to determine a consensus for implementation guide in a low resource setting. The fourth study was a descriptive exploratory study using semi-structured interviews to determine assess the feasibility of the content of implementation of the guide developed. The summary is outlined in the Table 1.1.

1.11. Ethical Considerations

This research study was given approval by the University of the Witwatersrand Human and Research Ethics committee M161146 (Appendix one). Verbal and written (Appendix three) permissions to approach the USSA women's football teams was received from USSA and participating schools. Written project information was explained to the participants, and all participants included in the study consented to participate. The information documents and the informed consent forms can be found in Appendix three. Participants could drop out of the study at any stage of the data collection process without prejudice. The data collection forms were kept anonymous, confidential, and coded.

1.12. General Outline of Thesis

Below is the summary of the general outline of the thesis:

- Chapter 1: Background and need.
- Chapter 2: Literature Review Supporting the Rationale for the Study.
- Chapter 3: Study one (Phase 1): Injury Prevention Knowledge, Beliefs and Practices in Women's Football teams in South Africa.
- Chapter 4: Study two (Phase 1): Implementation Strategies and Compliance for the FIFA 11+ Comprehensive Warm up Injury Prevention Programme in Football teams: A Scoping Review.
- Chapter 5: Study three (Phase 2): Development of the Implementation Guide in Low-resource setting: A modified Delphi Study.
- Chapter 6: Study four (Phase 3): Assess the feasibility of the content of the implementation guide for the FIFA 11+
- Chapter 7: Discussion.
- Chapter 8: Conclusion and Recommendations.

1.13. Summary of chapter one

This chapter provided an overview of the study objectives as well as the research goals. This chapter established the conceptual basis for the justification of research. The overall research methodological process as well as the overall outline of the thesis were also provided. The next chapter outlines the literature review that forms the detailed background of the research.

2. CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

This chapter focuses on the review of the literature supporting the overall rationale of the study. The chapter is divided into three major sections. The first section is the review of literature detailing the epidemiology of football-related injuries in women. It also highlights the risk factors of injuries in football. The second section of the review covers women's participation in football as well as injury prevention programmes employed in reducing the burden of injuries in football. The third section includes the review of literature on economic implications of injury prevention and football participation in low-resource settings. The search strategy of the narrative review is outlined in Section 2.2. The flowchart of the literature review is outlined in Figure 2.1.

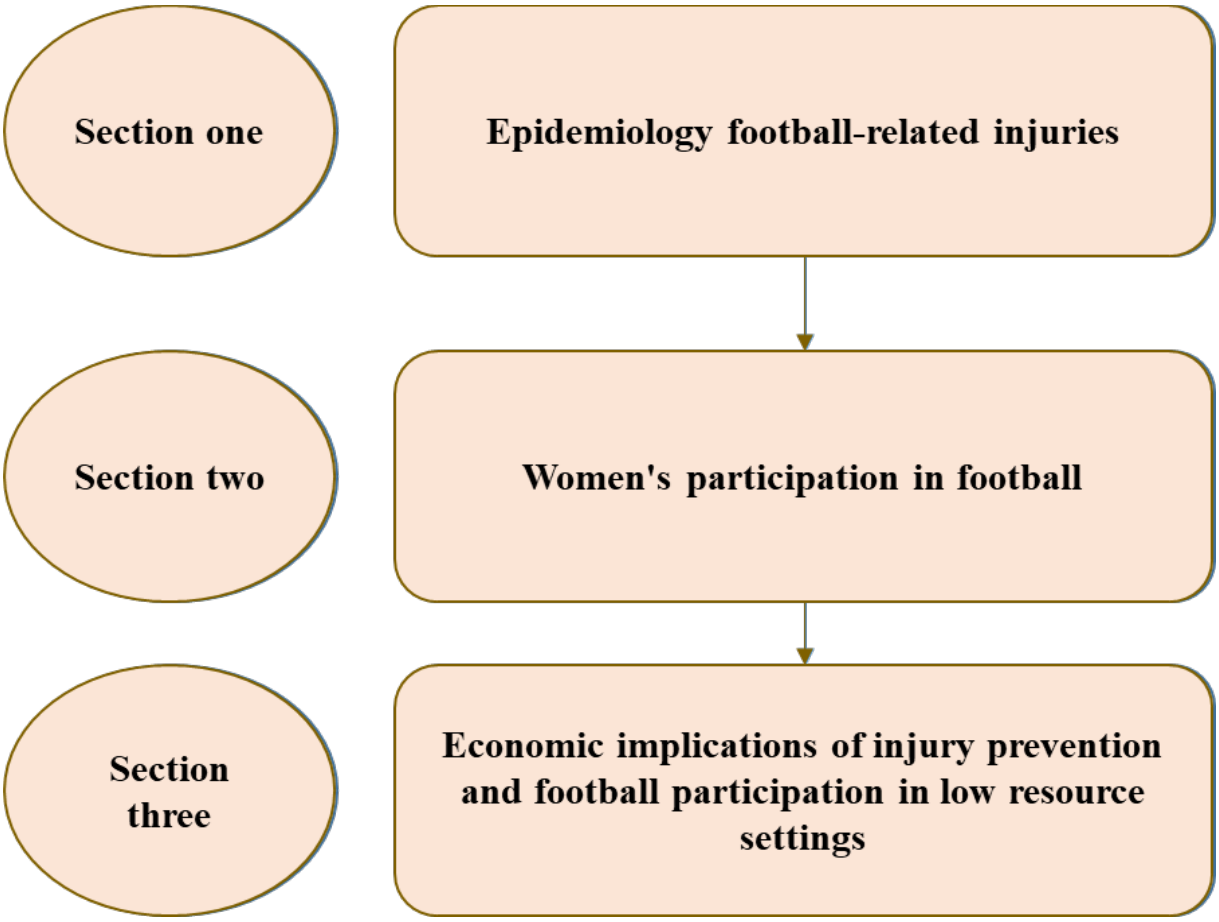


Figure 2.1: Flowchart of the outline of the literature review

2.2. Search Strategy

Research databases with related topics of interest in football and injury prevention were accessed for publications. These included PubMed, PEDro, Scopus, Science direct, CINAHL, Web of Science, SPORTdiscus, Cochrane reviews, EBSCO Host, and Google Scholar. This review includes relevant published literature in English from inception till 2021. Additionally, specific websites such as the Fédération Internationale de Football Association (FIFA), the FIFA-Medical Assessment and Research Center (F-MARC) publications, the FIFA Medical Network online resources were also reviewed Publications such as British Journal of Sports Medicine (BJSM), Injury Prevention, ASPETAR Sports Medicine Journal, The American Journal of Sports Medicine and research registries were searched to gather information on various areas related to the scope

of research or ongoing efforts. Textbook sources such as Springer, Elsevier and Wiley were also searched. Key words and MESH terms used to search data bases include “FIFA11+”, “FIFA11”, “Neuromuscular exercise programme”, “Injury prevention”, “warm-up programme”, “Implementation”, “Compliance”, “Football/Soccer”, Women/Female”, “Epidemiology”, “ Injury rates”, Athletic Injuries”, “Humans”, “Man/Male”, Programme/Program Evaluation”, “ Sports Medicine”, “Prevention & Control”, “Athletic Injuries”, “ Risk Factors”,” Lower extremity/Injuries”,” Incidence”, “ Efficacy/Effectiveness”, “Anterior Cruciate Ligament/Injuries”, “ Primary Prevention/Methods”. “Cost of illness”, “Sports/statistics and numerical data”, Athletic Injuries/economics”

SECTION ONE

2.3. Epidemiology of football related injuries in women

This section is a narrative review of the epidemiology football related injuries and as it is applicable in women’s football. The prevalence and risk factors are also explained. There is a dearth of knowledge about epidemiological data and scientific studies in women’s football at all levels and particularly in sub-Saharan Africa where the sport has grown exponentially over the last two decades (FIFA, 2014). A consensus statement was developed in 2006 to improve agreement in the definition and reporting of injuries in football (Fuller et al., 2006). Most epidemiological studies in football have now followed this suggestion, allowing researchers to compare injuries across genders, age groups, and performance levels. An injury in football is defined as “Any physical complaint sustained by a player that results from a football match or football training, irrespective of the need for medical attention or time-loss from football activities. An injury that results in a player receiving medical attention is referred to as a “medical-attention” injury and an injury that results in a player being unable to take a full part in future football training or match play as a “time-loss” injury” (Fuller et al., 2006)

In male, female, and youth football, injuries persist across all age groups and performance levels. In a systematic review of injuries in football conducted for studies between 1 January 2014 until 15 October 2017, 46 of the 53 included studies reported epidemiological data (Klein et al., 2018). The overall number of observed player seasons was around 41,212, in addition to 11 more competitions with 7122.5 observed matches and around 126,748.5 player match hours. A total of 30,844 injuries were considered in the review which comprised of studies including male, female, and youth players. The overall injury incidence ranged from 0.6 to 20.3 injuries per 1000 hours of exposure (Klein et al., 2018). The risk of injury was higher during match play (2.84–101) than during training (0.61–11.6), however the proportion of injuries obtained during training was slightly higher than the proportion gained during matches (26.9–79.5 percent vs. 20.5–73.1 percent). Overall, football injuries were most common in the lower limbs (affected in 65–100% of cases) (Klein et al., 2018).

Furthermore, the overall injury rate in professional male football players was 8.1 injuries per 1000 hours of exposure. The match injury rate (36 injuries/1000 hours of exposure) was nearly ten times higher than the training injury rate (3.7 injuries/1000 hours of exposure). Lower extremity injuries were the most common (6.8 injuries per 1000 hours of exposure). Muscle/tendon injuries were the least common (4.6 injuries/1000 hours of exposure), and they were commonly connected with traumatic occurrences. The most prevalent injuries were minor (1–3 days of lost time). The incidence rate of injuries in the top five European professional leagues was comparable to that of other nations' professional leagues (6.8 vs 7.6 injuries/1000 hours of exposure, respectively).

In a similar study reviewing the injury profile in elite women's football, the overall injury rate in players was 6.1 injuries per 1000 hours of exposure. The match injury incidence rate (19.2 injuries/1000 hours of exposure) was nearly six times greater than the training injury incidence rate (3.5 injuries/1000 hours of exposure). Lower extremity injuries were the most common (4.8 injuries per 1000 hours of exposure). Muscle/tendon injuries (1.8 injuries/1000 hours of exposure) and joint (non-bone) and ligament injuries (1.5 injuries/1000 hours of exposure) were the most

common types of injuries, which were usually connected with traumatic occurrences. The most common injuries were minor/minor (1–3 days of time loss) (López-Valenciano et al., 2021).

Women have a different injury risk profile than men when it comes to football exposure. Regardless of exposure or involvement level, the risk of significant knee injury (such as ACL rupture) is at least twice as high in women as it is in males. Female athletes have a higher relative risk (RR) for ACL injury compared with males (RR=1.5; 95% CI 1.2 to 1.9; P<0.01) and a higher incidence rate ratio (IRR) of ACL injury compared with males over 1 season–25 years (IRR=1.7; 95% CI 1.4 to 2.2; P<0.010). When accounting for participation level, the disparity in the IR between female and male athletes was highest for amateur athletes compared with intermediate and elite athletes (IRR=2.1; 95% CI 1.3 to 3.4; P<0.01; I^2=82%).(Montalvo et al., 2018). There is a high risk of concussion injuries in women. Specifically, there was a higher percentage of concussions resulting from player contact in men (81%vs 66%) and a higher percentage of concussion resulting from surface (13% vs8%) or ball(18%vs8%) contact in women(Dick, 2009). Women also record more knee and ankle injuries compared to men (Boling et al., 2010, Murphy et al., 2003) , with a greater risk burden of hamstring injuries(Cross et al., 2013) as well higher rates of groin injuries in men (Waldén et al., 2015). Anterior cruciate ligament rupture and the related burden are more higher in football codes (Ardern et al., 2014) compared to what prevails in other sports (Moses et al., 2012)

2.4. Risk factors

Football-related injuries are widespread, regardless of the level of professionalism. Also, regardless of gender, the most common football injuries are knee, hamstring, groin, and ankle injuries (Pfirrmann et al., 2016, Crossley et al., 2020). Apart from the typical injuries linked with men's and women's football, there are also specialised injuries suffered primarily by women, such as ACL injuries. As a result of their unique hormone status and waist-hip ratio, they have a higher Q-angle and more joint laxity. Women have been reported to have a higher risk of ACL injury than men (Crossley et al., 2020). Several studies have identified risk factors for injury among

football players. In general, it is often classified broadly as intrinsic (person-related) and extrinsic (environment-related) risk factors (Dvorak et al., 2016). Intrinsic risk factors are defined but not limited to a person's specific biological or psychosocial features, such as joint flexibility (including pathologic ligament laxity and muscle tightness), functional instability, past injuries, and poor rehabilitation. Extrinsic risk variables include the quantity of training and number of games played, climatic elements, pitch surface, playing field conditions (for example, dry, wet, uneven), equipment (for example, shin guards, taping, shoes), and game rules and foul play (Dvorak et al., 2016).

2.4.1. Intrinsic risk factors

Intrinsic factors such as previous injuries are reported to be associated with new football injury to the same anatomical location (Faude et al., 2006, Nilstad et al., 2014). Joint laxity (hypermobility) was investigated (Faude et al., 2006, Söderman et al., 2001, Östenberg and Roos, 2000) and a significant association between this factor and injury risk was documented. Significant anatomical risk factors for a hamstring to quadriceps (H/Q) ratio that is less than 55% during concentric contraction of both quadriceps and hamstring tested at 90 degrees of knee flexion (Söderman et al., 2001). Increased body mass index (BMI) (Nilstad et al., 2014) and increased age has been found to be significantly associated with injury risks in soccer (Söderman et al., 2001).

Anthropometric characteristics and exposure data includes (Faude et al., 2006):

- Height: The tallest players showed a significantly increased injury risk compared with those of intermediate height.
- Weight: Players who sustained a non-contact injury had a significantly higher body weight and played substantially more games during the previous season.
- Match exposure: The players with the highest match exposure had significantly reduced injury risk.

The chance of having an anterior cruciate ligament (ACL) rupture was significantly elevated among athletes who reported a previous ligament injury. Players with a history of ankle and knee sprains had a marginally increased risk of the same injury, but not one that was statistically significant. (Faude et al., 2006).

2.4.2. Extrinsic risk factors

Extrinsic risk factors which are also often considered as modifiable risk factors include the player's environmental conditons, equipment and playing surfaces , which can also include the level of competition: how much, how hard, and how long they play.

Playing surfaces are extrinsic risk factors implicated in injuries. In a study by Mears et al. (2018), the kind or condition of a surface was thought to enhance injury risk by 91% of participants. Artificial turf was thought to be more prone to abrasive injuries, as well as soreness and pain. The players discovered and considered surface type, surface characteristics, and age as possible risk factors. Weather conditions also cotribute to injury risk increase. The cold reduces the flexibility of muscles hence increasing the risk of injury. Exercising in cold weather places additional demands on the body, and energy is expended to keep core body temperatures stable while also supporting active muscles. Exercising too hard in the cold can create muscle exhaustion, resulting in muscle strains and joint damage.

Protective equipment is essential in sports participation, therefore lack there-of increases injury risks. Lack of adequate protective equipment also contributes significantly to the high risks of injury in football. Rules of the game is primarily focused on keping the players safe and enhancing fair play. The rules of the game significantly impact play to protect players from injury (ISSF, 2021). The training load has also been implicated in injury risks in football. Rapid increases in training loads, it is established clinically, expose an athlete to an elevated risk of injury. (Drew and Finch, 2016). Additionally, playing position is an important extrinsic risk factor. Defenders and forwards suffered far more injuries than goalkeepers and midfielders. The majority of goalkeeper injuries (15 of 20) were caused by non-contact mechanisms, but defenders and forwards were at

heightened risk in contact scenarios (4.5 injuries per 1000 hours exposure each) (Faude et al., 2006).

In the male game, goalkeepers are at a lesser risk of injury than outfield players. Current evidence, independent of goalkeepers, is inconclusive when it comes to the link between player position and injury risk; nonetheless, attackers tend to be at a higher risk during matches than other outfield players (Della Villa et al., 2018).The dominant limb was involved in significantly more injuries particularly for overuse and contact injuries. Ankle injuries were shown to be more common on the dominant leg. In addition, the dominant side had more ligament ruptures and contusions (Faude et al., 2006).

2.4.3. Psychological risk factors

Players face enormous physiological, biomechanical, and psychological demands when they participate in competitive sports. The inability to cope with these demands is linked to an increased risk of injury (Johnson and Ivarsson, 2017). The impact of psychological aspects on football injuries has become apparent over the years but a lot is still needed to be known about the domain. Players who identify their colleagues as a cause of stress are more likely to suffer an acute injury. In contrast, players who report their coach as a source of stress are more likely to suffer an overuse injury (Pensgaard et al., 2018). The majority of studies on psychological risk factors for sport injuries have concentrated on acute injuries (Johnson and Ivarsson, 2017).

Researchers have hypothesised that acute and overuse injuries may have different psychosocial risk factors. According to the Stress and Injury model, acute injuries are linked to an athlete's cognitive assessment of a potentially stressful circumstance (Andersen and Williams, 1988). Risk factors for overuse injuries, on the other hand, may be more closely linked to stress responses resulting from a lack of recuperation (Richardson et al., 2008, van der Does et al., 2017). Reduced general recovery was linked to an increased risk of acute injuries, whereas decreased sport recovery was a statistically significant risk factor for overuse injuries among elite and sub-elite team sport players of both genders, according to (van der Does et al., 2017).

Environmental elements (e.g., interpersonal interactions such as a poor coach-athlete relationship, culture, and norms) will impact the athletes' stress levels and, as a result, the amplitude of the stress responses (Johnson and Ivarsson, 2017). Environmental factors, rather than intrapersonal stressors like self-doubt and negative thoughts, may have a more negative impact on elite athletes (Mellalieu et al., 2009, Pensgaard, 1999). This may be related to athletes' apparent lack of control when stressors arise from their social environment rather than their own internal thought processes (Pensgaard and Ursin, 1998). Communication issues between athletes and coaches were mentioned by both athletes and coaches as a contributing factor in the development of overuse injuries (Pensgaard et al., 2018) .

Over the last 30 years, there have been two major advancements in a psychological study on sports injuries. On the one hand, it has aided in a better understanding of the elements that contribute to an athlete's susceptibility to sustaining a sports injury. On the other hand, has aided in the study of athletes' emotional and other reactions to injury, as well as how these reactions affect the healing process and their capacity to return to training and competition (Almeida et al., 2014). According to reports, 65-91% of elite soccer players in Sweden sustain at least one injury per year (Ivarsson and Johnson, 2010). Several studies have identified various physiological and psychological components that influence athletic injury risk (Ivarsson and Johnson, 2010, Johnson and Ivarsson, 2011, Junge, 2000). A variety of models include proposals for links between psychological issues and an increased risk of athletic injury. Williams and Andersen's stress-injury model (Williams and Andersen, 1998) and Johnson and Ivarsson's empirical model of injury risk variables (Johnson and Ivarsson, 2011), which posits that trait anxiety and inadequate coping abilities are relevant, are two examples .

An 8-month prospective cohort study investigated if psychological player qualities measured by a self-administered questionnaire are risk factors for injury (Steffen et al., 2009). Female football players (14-16 years old) were asked to complete a lengthy questionnaire at the start of the study, which covered player history, past injuries, perception of success and motivational climate, life stress, anxiety, and coping techniques. During the 2005 season, 1430 players were tracked to report injuries. A previous injury history [odds ratio (OR)=1.9 (1.4; 2.5), P0.001] enhanced the probability of another injury to the same region (Steffen et al., 2009). There were significant

variations in disfavour between previously injured and non-injury players for ego orientation (P=0.007), perception of a performance climate (P=0.003), and stressful life experiences (P=0.001). Only high life stress (P=0.001) and impression of a mastery climate (P=0.03), on the other hand, were significant risk factors for new injuries. The study showed that in a group of young female football players, a perceived mastery atmosphere and a high degree of life stress were significant predictors of future injuries (Steffen et al., 2009).

SECTION TWO

This section is a narrative of women's participation in football, the FIFA Women's football strategy and intervention strategies for injury prevention in football are also explained.

2.5. Women participation in football

One of the fastest-growing sports globally is women's professional, semi-professional, and community football (FIFA, 2019). It is the single most significant growth opportunity in football today, and FIFA continues to place a high priority on it. Even though the game has developed exponentially at all levels, the sport's growing popularity and enthusiasm provide huge untapped potential. To move women's football into the mainstream, FIFA is investing in dedicated financing, human resources, and innovative, tailor-made development programmes. Girls and women play football with zeal all around the world. Football is the global game for women and girls, cutting across all boundaries in terms of society, race, religion, ethnicity, and socioeconomic circumstances. In stadiums and on village pitches, with world-class equipment or hand-me-downs, with a professional player's consummate skill or a beginner's enthusiasm – football is the global game for women and girls, cutting across all boundaries in terms of society, race, religion, ethnicity, and socioeconomic circumstances (FIFA, 2019).

The FIFA Women's World Cup™ is the pinnacle of women's football at the highest level. The 2015 edition in Canada received significant attention, with over 750 million viewers tuning in from

across the world to watch on TV and 1.35 million spectators purchasing tickets to watch it in person. The 2019 edition of the Women's world cup showed staggering numbers in viewership and stadium attendance. A combined 1.12 billion viewers tuned into official broadcast coverage of the FIFA Women's World Cup 2019 across all platforms – a record audience for the competition. Women's leagues are growing in popularity around the world, with more women able to earn money while playing the sport they love. There are increasing investment in women's football-related projects at the grassroots level. Member associations of FIFA have been able to commit unprecedented levels of investment to women's football projects thanks to the FIFA Forward Programme, with new leagues and competitions being made possible because of the additional funds. CAF accounts for over one million registered women footballers as of the last FIFA Women's football Survey in 2014, and it is expected that this number will continue to steadily rise (FIFA, 2014). In 2020, CAF launched a five-pronged strategy to grow women's football on the continent and launched a Women's Champions League in 2021. The plan includes promotion, training and ensuring more women get more opportunities in football. The plan, for an initial four-year period, 2020-2023, is tailor-made taking into consideration peculiarities of the continent with a commitment to develop women's football at levels to new heights (CAF, 2020). With these developments imminent in CAF, the trajectory for women's football may continue to the rise.

The FIFA Women's Football Strategy, which is highlighted in the objectives of FIFA 2.0 laid out how FIFA will engage with all stakeholders to take tangible steps to empower girls and women, make football a sport for everyone, and combat gender discrimination. Its primary objectives include increasing participation and increasing female involvement in football worldwide, with the declared target of 60 million players by 2026. With these projected numbers it is pertinent that injury prevention is an integral part of the process as well to keep the women on the field rather than off it.

2.6. Intervention strategies for injury prevention in football

Intervention strategies to prevent injury in football are broad and strive to be all encompassing. To the demands of the game and the exertion on the musculoskeletal systems indicates that multi-factorial interventions are needed to achieve injury prevention. Stretching as part of a warm-up plan before exercise has long been recommended to avoid injury (Shehab et al., 2006, Witvrouw et al., 2004). However, evidence has suggests that stretching alone may not provide any advantage in terms of injury prevention (Thacker et al., 2004). One of the key goals of all professional athletes after an injury or surgery is to recuperate as rapidly as possible and return to play. Trainers and coaches keep track of the athlete's recovery and make every effort to use the most effective techniques and resources available (Kloubec and Harris, 2016).

Nutrition

Nutrition is frequently underutilised in this process, and guiding athletes back to healthy foods is one of the tasks that health experts play. Because of their synergistic value, whole foods provide the best nutrition, typically at a lower cost than supplements, and contain components not found in pills or powders. It's vital to get athletes to eat healthier after an injury or surgery since it will help them heal faster and perform better once they return to play (Kloubec and Harris, 2016). Nutritional components of healing are often disregarded, especially when it's evident that a serious injury changes a person's nutritional needs. For example, after an injury or minor surgery, an athlete's metabolic rate increases by about 15% to 20%. Major surgery can practically double these requirements (Kloubec and Harris, 2016). The body's "gearing up" to repair the wounded tissues causes this rise in energy consumption. Thus, an athlete who requires 2,000 kcal on a typical day with minimal training may require 2,400 kcal following minor surgery. When an athlete is injured, a decent rule of thumb is that they should consume less than when they were exercising hard but more than they would if they were completely idle. Nutrition continues to play a central role in keeping athletes game-ready and expediting their return to sport following injury. Whole foods have a synergistic and therapeutic effect on inflammation, tissue regeneration and anabolism, as well as healing and recovery. Assisting athletes in gaining access to a wide variety of healthy meals that satisfy their energy, macronutrient, and micronutrient needs and guiding them to make

appropriate nutritional decisions can enhance athletic performance and speed their return to play. (Andrews and Itsiopoulos, 2016).

Sleep and recovery

There is an increasing body of evidence indicating that sleep plays a role in performance and recovery, as well as risk of injury in athletes. Sleep has been found to have wide-ranging effects on sports performance and overall well-being (Huang and Ihm, 2021). Recent research has found evidence relating chronic suboptimal sleep with the risk of musculoskeletal pain and sports injury. The amount of sleep that consistently has been found to be associated with increased risk of injury is ≤7 h of sleep, which when sustained for periods of at least 14 days has been associated with 1.7 times greater risk of musculoskeletal injury (Huang and Ihm, 2021).While sleep quality is important to consider when assessing an athlete's injury risk, it should be considered as only one of many factors that can impact an athlete's overall health and well-being. Evaluating an athlete's injury risk will require reviewing multiple aspects of what the athlete is doing to achieve optimal health and performance. Despite a growing body of literature demonstrating a positive relationship between sleep and optimal performance, athletes often have low sleep quality and quantity. Insufficient sleep among athletes may be due to scheduling constraints and the low priority of sleep relative to other training demands, as well as a lack of awareness of the role of sleep in optimizing athletic performance (Simpson et al., 2017).

The pituitary gland secretes hormones like human growth hormone (HGH) and testosterone (in both males and females) to stimulate muscle regeneration while we sleep (Leproult and Van Cauter, 2010). We shunt the optimal advantage of sleep when our sleep is disrupted, especially non-REM sleep. These hormones control the body's tissue renewal. Furthermore, sleep permits the body to digest meals with less energy expenditure, focusing that energy on making proteins and transferring the fatty acids required for muscle regeneration (Leproult and Van Cauter, 2010).Sleep can aid in preventing sporting injury in a variety of ways. For starters, the more sleep you get, the more time your body has to generate growth hormones, that mend and strengthen your muscles, tendons, and ligaments after a strenuous game or workout. In this sense, sleep is one of the most effective preventative measures against overuse injuries (Dwivedi et al., 2019). Sleep can also be beneficial to one's mental health. The good and negative relationship between sleep and mental health is nuanced and complex. However, evidence repeatedly suggests that adequate sleep is

related with higher mood, more productivity, and even greater overall pleasure with life. (Facer-Childs et al., 2021). Sleep, for example, improves response speeds, which are critical for athletes to adjust on the fly and stay out of harm's way. Another important precaution against injuries on the court or on the field is improved reaction time (Charest and Grandner, 2020).

Neuromuscular warm-up exercise programmes have been identified over the years as an important component of achieving injury prevention. In conditioning and rehabilitation programmes geared for injury prevention in sports, exercises that help build neuromuscular control and increase functional joint stability are essential. Mechanoreceptors in the skin, muscles, tendons, ligaments, and joints offer information about joint movement and position, combined with input from the vestibular and visual systems to maintain balance (Etty Griffin, 2003) . Inadequate motor system response due to insufficient neurologic input or poor processing of that data at the spinal, brain stem, or cognitive centres can result in damage. As a result, workouts that improve neuromuscular control are now commonly incorporated into typical sports training, conditioning, and rehabilitation regimens. Different neuromuscular exercise programmes have been developed and used in research over time identified and outlined in Table 2.1.

Table 2.1 summarises injury prevention trials in football excerpts from a study conducted by Kirkendall et al. (2010).

18 prevention trials on football players, ten injury-specific and eight generalized injury prevention projects were identified

Table 2:1: Summary of trials in football injury prevention

Author	Location	Gender	Population	Objective	Intervention content	Outcomes
Hölmich et al. (2010)	Muscle	male	Adult professional football players	Prevent groin strain injuries	Strengthening, synchronization, and stabilization of the abdominal and pelvic muscles through exercises	The intervention group experienced 31% fewer groin strains. Injury risk rose with a history of previous strains and as the intensity of play increased.
Gilchrist et al. (2008)	Knee	female	College football players	Prevention of ACL injury	Guided exercises for neuromuscular control as part of the warm-up	Reduction in the frequency of ACL injuries. There were 41% fewer ACL tears and 70% fewer non-contact ACL tears.

Fredberg et al. (2008)	muscle-tendon	male	Adult football players	Prevention of muscle-tendon injury to the patellar and Achilles' tendons	stretch and eccentric muscle strengthening	No disparities in injury rates. The intervention diminished ultrasonic indications of aberrant tissue. elongation and eccentric muscle strengthening
Engebretsen et al. (2008)	ankle, knee, hamstring, or groin	male	Adult professional football players	Prevent re-injury to the ankle, knee, hamstring, or groin	Strengthening exercises for core stability and proprioception balance	No variation in injury frequency or severity, inadequate compliance
Steffen et al. (2008)	lower limbs	female	High school football players	Prevention of lower limb injuries	agility, neuromuscular control, core stability, lower extremity strength exercises	No difference in the rate of injuries; compliance is poor

Soligard et al. (2008)	lower limbs	female	High school football players	Prevention of lower limb injuries	Systematic warming exercises for muscular strength, balance, neuromuscular control, and core stability	Substantial declines in the incidence of overall (-32%), overuse (-43%), and severe (-45%) injuries among intervention players.
Mohammadi (2007)	ankle	male	Adult football players	Prevention of recurrent ankle sprains	Resistance training, use of orthosis, and proprioceptive exercise	The proprioceptive group had significantly fewer sprains than the control group.
Hägglund et al. (2007)	overall	male	High school- adult amateur football players	Prevent reinjury	Education and a ten-step progressive rehabilitation plan (risk factors, rehabilitation principles)	Reinjury to the lower extremities for intervention teams had 75% reduction in the incidence

McGuine and Keene (2006)	ankle	Male and female	high school football and basketball players	Prevention of ankle injuries	A five-phase balance board programme protocol. Eyes open or closed on the floor (phases 1-2) and on a balance board (phases 3-5) respectively.	Substantially lower occurrence of ankle injuries in the experimental group compared to the control group.
Pfeiffer et al. (2006)	Knee	female	High school football players	Prevent of ACL injury	Biweekly during the season, plyometric routines	No difference in ACL injury rates between the two groups
Mandelbaum et al. (2005)	Knee	female	High school football players	Prevention of ACL injuries	A guided warmup programme that includes stretches, strength, plyometric training, and agility exercises.	Substantial reductions in ACL injuries. 88 percent decrease in the first year and 74 percent decrease in the second.
Askling et al. (2003)	muscle	male	Adult professional football players	Prevent hamstring strains	Hamstrings overloaded in an eccentric manner	The intervention group had significantly less hamstrings (3/15) than the control group (10/15).

(Junge et al., 2002)	overall	male	High school football players	Prevention of injuries	Core stabilization, lower extremity strengthening, neuromuscular control, and agility workouts	36% fewer injuries occurred in the intervention group. The effect is greatest on players with low skill levels. Fewer overuse and training-related minor injuries.
Söderman et al. (2000)	overall	female	Adult in football players	Prevent lower extremity injuries	10-15 minutes of balancing board exercises in addition to regular football practice	No changes in injury incidence or type. Poor conformity
Heidt et al. (2000)	overall	female	High school football players	Prevention of injury	7-week monitored preparatory speed and agility workout	Considerably lowered incidence in the treatment group (14 percent vs. 34 percent)

Hewett et al. (1999)	Knee	female	High school football, volleyball, and basketball	Prevent of ACL injuries	Considerably lowered incidence in the treatment group (14 percent vs. 34 percent)	In the intervention group, the relative incidence of serious knee injuries was significantly reduced. There were no non-contact knee ligament injuries among soccer or basketball players in the intervention group.
Caraffa et al. (1996)	Knee	male	Adult football players	Prevention of anterior cruciate ligament (ACL) injury	Protocol for proprioceptive education utilizing various types of instability boards	The treatment group experienced significantly fewer ACL injuries than the comparison group.
Ekstrand et al. (1983a)	overall	male	Adult professional football players	Prevention of injury in	Therapist oversight of a multifactorial equipment and training improvement programme	75% decline in player injuries within the treatment group

Attempts to establish a more comprehensive warm-up or preseason-training programme have met with varying degrees of success. The preventative programme utilised in Ekstrand's early work (Ekstrand and Gillquist, 1983, Ekstrand et al., 1983b, Ekstrand et al., 1983a) on male Swedish professionals was quite complete, incorporating a variety of interventions that included specialised prophylactic exercises, training modifications, and equipment improvements that were all overseen by medical personnel. All injuries suffered by Swedish professional footballers were reduced by 75% because of Ekstrand's preventative programme (Ekstrand and Gillquist, 1983, Ekstrand et al., 1983b, Ekstrand et al., 1983a) on male professional footballers. The interventions included specialised prophylactic exercises, training modifications, and equipment improvements that were all overseen by medical staff. With such a broad approach to prevention, it was difficult to distinguish whether ankle exercises or preventative bracing played the most important role in reducing ankle sprains (Ekstrand et al., 1983a).

Soderman and colleagues (Söderman et al., 2000) published their findings from a balance board programme on 221 female adult players in 2000. The programme comprised of 10-15 minutes of balance board exercise added to their regular training in an attempt to replicate Caraffa et al 33's favourable findings where there was a decreased frequency of anterior cruciate ligament (ACL) injuries in semi-professional and amateur football players year in the proprioceptively trained group. Unfortunately, the intervention group had a higher raw incidence of serious anterior cruciate ligament injury, while the difference was not statistically significant. A problem was the high number of dropouts and the subjects' low programme compliance. Heidt et al. (2000) used a different strategy, evaluating the efficacy of a pre-season fitness programme on probable eventual injury rates. Female high school football players (n = 300, 14-18 years old) were tracked for a year (an August-September high school season and their March-August club season). Prior to the club season, 42 players were chosen at random to participate in a 7-week training programme that emphasised endurance, plyometrics, flexibility, and resistance trainings to increase the subjects' speed and agility. Other players went about their usual business and functioned as a control group. For both groups, the kind and location of time loss injuries were reported. 14% of the trained players were injured, compared to 34% of the control group ($p = 0.008$). There were 32 knee injuries in all, with just three occurring in the intervention group. Only

one player in the intervention group suffered a season-ending injury, but 11 players in the control group did. Unfortunately, while injury incidence was recorded, exposure was not, therefore rates and dangers were not provided.

Junge et al. (2002) created the first comprehensive curriculum for 14–19-year-old male footballers of varying ability levels. Over the course of a year, weekly injury reports were compiled. In the intervention group, there were 36% fewer injuries per player (p 0.01). There were also roughly 50% fewer mild injuries, 41% fewer overuse injuries, 55% fewer training injuries, and 80% less groin injuries. Furthermore, the players with the greatest skill had the lowest injury rates. This was one of the first studies to show the value of a comprehensive injury prevention programme. The success of this programme sparked a number of more research and publications. Hägglund et al. (2007) explored a different strategy in a study which 20 Swedish male fourth level amateur teams participated, was an attempt to prevent repeated injury in football players. A history of that particular injury is most likely the most important risk factor for most injuries. 46-48 Every player's personal injury history was recorded. Players on the intervention teams were given information about re-injury risk factors and rehabilitation principles, as well as a 10-step rehabilitation regimen. The programme included nine progressive running and sport-specific workouts, as well as return-to-play criteria based on the severity of the injury. For the teams participating in the intervention programme, the coach was the controlling figure. As a result of the programme, there was a 66% reduction in re-injury risk. The authors also followed the interval between the index injury and re-injury and found that the intervention was most helpful in preventing re-injury within the first week of return to play.

Engebretsen et al. (2008) concentrated on professional athletes with a history of previous injury. Each player's injury history was examined to determine if he or she was at a high or low risk of re-injury. The high-risk players were randomly assigned to one of two groups: control or intervention, while the low-risk players acted as a separate control group. Injury-specific progressive regimens were created for players who were at high risk of suffering an ankle, knee, groyne, or hamstring injury. For players who were at high risk of numerous injuries, programmes were consolidated.

During the 10-week preseason period, the interventions were performed three times per week, then once per week for the duration of the competitive season. The low-risk control players, as expected, had a considerably lower injury incidence than the high-risk players. There were no differences in overall or specific injuries between the high-risk intervention and control groups. Only 19-29% of the participants in the intervention group completed 30 or more training sessions. No exercise sessions were reported by 16%, 23%, 63%, and 68% of the players at high risk for ankle, knee, hamstring, and groin injuries, respectively. This project demonstrates the significance of adhering to a preventative programme.

The FIFA medical research programme created "The 11," a broad fitness programme based on the initial work of Junge et al. (2002). Steffen and colleagues conducted a cluster-randomized experiment of "The 11" on female youth players (14–18yr of age) (Steffen et al., 2008). A total of 113 teams (2,092 players) were randomly assigned to either the control or intervention groups, with the intervention teams receiving instructions about "The 11." The intervention teams were to use this 15-minute warm-up session for the duration of the eight-month season. There were no differences in the overall injury rate or the rates of particular injuries across groups. Compliance was once again a constraint. The training programme was employed in 60% of the training sessions during the first half of the season, but by the end of the season, just one in every four teams had completed 20 sessions.

For this research, the injury prevention programme in focus is the FIFA 11+ comprehensive warm-up programme in football. It is a neuromuscular evidence based comprehensive warm up programme developed by a team of experts facilitated by FIFA. It is considered low cost, easy to comprehend with proven efficacy in scientific studies (Al Attar et al., 2016, Bizzini and Dvorak, 2015, Soligard et al., 2008)

2.7. THE FIFA 11+: Development and Evolution

In 2000, the F-MARC conducted its first study on the prevention of football injuries, which revealed that the intervention group had 21% fewer injuries than the control group (Junge et al., 2002). A cluster-randomized study of "The 11" on female youth players (14–18 years old) was conducted with a total of 113 teams (2,092 players) who were randomly assigned to one of two groups: control or intervention. The intervention teams were given instructions on "The 11." The intervention teams were supposed to use this 15-minute warm-up programme throughout the eight-month season. There were no changes in the overall injury rate or the rates of injuries between the groups. Compliance was once again a stumbling block. The training programme was employed in 60 percent of training sessions during the first half of the season, but by the end of the season, only one out of every four teams had completed 20 sessions (Kirkendall et al., 2010).

The interventions aimed to improve the training organisation and content by teaching and supervising coaches and athletes. Preventive interventions included improving warm-up, regular cool-down, taping of unstable ankles, adequate rehabilitation, promoting the spirit of fair play, and ten sets of exercises designed to improve coordination, ankle and knee stability, flexibility, and strength of the trunk, hip, and leg muscles. Based on the findings of this pilot study and in collaboration with international specialists, F-MARC created 'The 11', a basic injury-prevention programme for amateur football players. 'The 11' consists of ten evidence-based workouts (core stability, balance, dynamic stabilisation, and eccentric hamstring strength) plus a fair play promotion. The programme was created to reduce the most prevalent football injuries (ankle and knee sprains, hamstring and groin strains). It takes about 10-15 minutes to finish and requires only a ball. In collaboration with the national accident insurance company and the national football association, 'The 11' was deployed in two countrywide campaigns (Switzerland and New Zealand) (Dick et al., 2009, Junge et al., 2011). An impartial research company meticulously analysed the implementation of 'The 11' and its effect on the injury rate in Switzerland(Junge et al., 2011) Four years after the program's inception, teams that included 'The 11' in their warm-up had 11.5% fewer match injuries and 25.3% fewer training injuries than teams that warmed up normally. After two years, the introduction of 'The 11' in New Zealand resulted in a 2.4 dollar return on investment for the national accident insurance company (Dick et al., 2009)

In 2006, an advanced version ('FIFA 11+') was developed in collaboration with Oslo Sports Trauma and Research Center (OSTRC) and the Santa Monica Orthopaedic and Sports Medicine Research Foundation. This three-part generalised warm-up was revised after researchers noticed some limitations with earlier programmes (e.g., lack of progression of exercises) and based on the experiences with 'The 11', 'PEP' (Prevent Injury and Enhance Performance programme) (Gilchrist et al., 2008, Mandelbaum et al., 2005) and other exercise-based programmes (Heidt et al., 2000, Söderman et al., 2000, Hewett et al., 1999, Caraffa et al., 1996) to prevent football injuries. 'FIFA 11+' is a comprehensive warm-up programme that includes running exercises at the start and end to activate the cardiovascular system, as well as specific preventive exercises focusing on core and leg strength, balance, and agility, with three levels of increasing difficulty to provide variety and progression. It takes around 20 minutes to complete and requires very little equipment (a set of cones and balls). 'FIFA 11+' saves time by replacing the traditional warm-up. An RCT found that young female teams who performed the 'FIFA 11+' at least twice a week (as a routine warm-up before training) had 37% fewer training injuries, 29% fewer match injuries, and nearly 50% less severe injuries (Soligard et al., 2008). 'FIFA 11+' compliance was high, and players with higher compliance had a much lower injury risk than others (Soligard et al., 2010)

Part 1 consists of six slow-paced running workouts that should take no more than eight minutes to complete. Part 2 consists of six strength, plyometric, and balancing exercises. Each of these six workouts has three degrees of difficulty that increase as the player's aptitude and capacity increase. This portion of the warm-up should last approximately 10 minutes. Part 3 of the warm-up closes with three more challenging running exercises than those in Part 1. The increased intensity of activity puts the participant closer to the regular football training's running needs. This last section should take no more than two minutes. The full warm-up programme should take about 20 minutes once the players have learned the activities. This does not lengthen the training period because this programme took the place of whatever warm-up programme was in place. The FIFA11 + programme was the name of the programme (Fig. 2.1).



Figure 2:1: The FIFA 11+ Programme (Kirkendall et al., 2010)

2.7.1. Content of the FIFA 11+

The content of the FIFA 11+ includes running, strength, plyometrics and balance exercises. These exercises and its dosage were carefully selected by a consensus meeting of a team of experts and stakeholders. Running exercises have been documented in warm-up exercise components with multiple benefits, but the key one is improving cardiovascular health in football. It is the most effective aerobic exercises available. Running for at least 10 minutes a day can considerably reduce cardiovascular disease risk (Lee et al., 2014). Physical performance, movement control, walking speed, functional independence, cognitive ability, and self-esteem are advantages of strength training to improve performance (Westcott, 2012). Plyometric training is a fast, strong movement involving a series of reactive exercises and an eccentric contraction followed by an explosive concentric contraction. Improved running speed, agility, and quickness, as well as injury prevention, are just a few of the many advantages of plyometric training (Chu and Meyer, 2013). In a healthy population, improving balance through training has been shown to reduce injury. In many populations, poor balance, or postural control, is linked to injury or falls and is thus seen as an essential component of basic motor skills (DiStefano et al., 2009).

2.7.2. Efficacy of the FIFA 11+

Numerous scientific studies (Al Attar et al., 2016, Nuhu et al., 2021, Zarei et al., 2020, Akbari et al., 2020, Arsenis et al., 2020, Lopes et al., 2020) have shown the effectiveness of the FIFA 11+ in reducing the injury rates significantly more than a decade ago since the first large-scale study by Soligard et al. (2008). In a cohort of young female footballers in the Norwegian league, the programme reduced overall injury rates by one-third and severe injury rates by up to 50% (Soligard et al., 2008). Other studies that have examined the efficacy of the programme include (Longo et al., 2012) in elite basketball players, the intervention group's injury rates per 1000 athlete-exposures were much lower than those of the control group. For total injuries (0.95 vs 2.16; P =.0004), training injuries (0.14 vs 0.76; P =.007), lower extremity injuries (0.68 vs 1.4; P =.022), acute injuries (0.61 vs 1.91; P.0001), and severe injuries (0 vs 0.51; P =.004), there was a statistically significant difference. Steffen et al. (2013) in their study conducted in Canada reported

that compared to players with low adherence, players with high adherence to the 11+ had a 57% lower injury risk (IRR 0.43, 95% CI 0.19 to 1.00). This study measured adherence as defined by Soligard et al. (2010) that player adherence to the FIFA11+ programme was categorised into high, medium, and low adherence levels according to the players' number of single 11+ exercises completed across all team sessions, independent of the study group. Grooms et al. (2013) in their study conducted in collegiate soccer athletes in America found reduced overall risk and severity of lower extremity injury compared with controls.

In a youth football study in Nigeria, Owoeye et al. (2014) found that the FIFA11+ programme significantly reduced the overall rate of injury in the intervention group by 41% and all lower extremity injuries by 48%. Silvers-Granelli et al. (2015) investigated efficacy in the male collegiate soccer players in the United States and found that the FIFA 11+ significantly reduced injury rates by 46.1% and decreased time lost to injury by 28.6% in the competitive male collegiate soccer player (rate ratio, 0.54 [95% CI, 0.49-0.59]; P.0001) (number needed to treat = 2.64). Recent studies by Lopes et al. (2020) conducted in futsal players in Portugal found that the overall incidence of injuries per 1000 player-hours was significantly higher in the control group than the intervention group. The 11+ group had a significantly lower incidence of acute (11.2 vs 5.7) and lower limb (8.7 vs 4.4) injuries per 1000 player hours compared to the control group. Nuhu et al. (2021) reported in their Rwandan study that a lower proportion of players sustained injuries in the intervention group (52%) compared to the control group (63%). A significantly lower rate ratio was observed in the intervention group for overall (RR = 0.6; 95%CI: 0.5–0.8) and match (RR =0.6; 95%CI: 0.5–0.8) injuries.

SECTION THREE

This section is a narrative review of the economic implications of injury prevention and football participation in low resource settings are also explained. This section is concluded by a chapter summary.

2.8. Economic implications of Injury prevention

There is no information on economic implications of injury prevention in the sub-Saharan African context to our knowledge. It is however common knowledge that prevention is better than cure. Despite the health advantages of sports, sports injury and fear of injury are significant barriers to sports participation. Men and women, as well as the different age groups, have different rates, prevalence, and types of sports injuries. Due to insufficient data, it is often difficult to investigate these many elements of sports injuries. In terms of direct and indirect expenses, sports injuries, according to a study by Witvrouw et al. (2004), might be regarded a significant economic burden. As a result, strong and effective techniques for preventing sports injuries are required. Sports medicine has continued to evolve over the years. The relevance of sports injuries and their economic repercussions, as well as the role of sport medicine as a technique of preventing sports injuries are pertinent (Witvrouw et al., 2004).

In a study conducted in rugby by Brown et al. (2015), although only a small percentage of players sought care after the championships, the costs of these injuries were significant. Lower prices for players without medical insurance could imply that they did not receive comprehensive management. Injury prevention measures need to consider high-cost injuries as well as the care of players who do not have medical insurance. Injury prevention measures that are realistic, time-efficient, and cost-effective are needed to lessen the resulting personal and economic burden. An English Premier League (EPL) team loses an average of £45million due to injury-related decrement in performance per season. Professional football clubs have a strong economic incentive to invest in injury prevention and rehabilitation programmes. Statistically significant relationship between the number of days out due to injuries suffered during a season and the difference between their actual and expected league table finish position. (Eliakim et al., 2020).

Football injuries constitute an important public health problem and cause a high economic burden. The average cost of an injury in nonprofessional soccer amounted to €4030 (bias-corrected and accelerated 95% confidence interval (BCa 95%CI): 3427-4719). Persons aged 30 years and older experienced 35% of soccer injuries but accounted for 49% of all costs. A total of 58% of all costs

were the result of injuries that occurred during amateur games (Gebert et al., 2020). In particular, game injuries sustained by players in separate leagues for players aged 30+/40+ years led to high average costs of €8190 (BCa 95%CI: 5036-11,645). Knee injuries accounted for 25% of all injuries and were responsible for 53% of all costs. Although contact and foul play did not lead to above-average costs, twisting or turning situations were highly cost relevant, leading to an average sum of €7710 (BCa 95%CI: 5376-10,466) per injury (Gebert et al., 2020).

2.9. Football participation in low resources setting

In low-resource environments, the effects of healthcare-related inequities are particularly visible. Lack of basic infrastructure and resources pose serious challenges to the populace (van Zyl et al., 2021). Such contexts are frequently not explicitly specified, and umbrella phrases that are easier to operationalize, such as 'low-to-middle-income countries' or 'developing countries,' are frequently employed. Without a deeper grasp of context, such proxies are laden with assumptions, infer unwarranted homogeneity, and impede knowledge translation across settings (van Zyl et al., 2021).

There is a dearth of knowledge and data for women football participation in low resource setting. However, common knowledge establishes challenges compared to the developed countries in the sport. There is limited or lack of basic infrastructure to support the growing women's footballing population. Many of the women who play football do so largely out of passion are not able to focus on the sport as a source of income because there is limited or no funding for the amateur leagues. Even for the professional leagues the women still need other day jobs to be able to augment their income. The income from playing football if any is not commensurate with the engagement and effort required to play at top level. Inadequate medical support systems and professionals sports medicine expert's availability and affordability is a challenge. Lack of capacity to cater for the needs of managing sports related illness and injuries contributes to diminishing potential of the sport in low resource setting.

2.10. Injury Prevention and Risk Reduction

Injury risk reduction measures (IRRM) (e.g., neuromuscular exercises, psychological therapies) are effective in preventing sports-related injuries, as indicated by a substantial body of scientific research. (Gledhill et al., 2018, Lauersen et al., 2014). Randomized controlled trials and meta-analyses have demonstrated that, at the group level, athletes in intervention groups (i.e., those who are meant to engage in IRRM) have lower injury risks than athletes in control groups (i.e., supposed not to do IRRM) (Gledhill et al., 2018, Lauersen et al., 2014). In the context of scientific studies (Hespanhol et al., 2018), as well as in the context of applied practise, IRRM compliance has been reported to be low (Owoeye et al., 2020a).If the intended end-users do not embrace, implement, and maintain IRRM in applied sport settings, it may not be possible to reduce sports injuries (Finch, 2006) Individualize the implementation of IRRM to increase athlete buy-in. Individualization of IRRM and its application is a promising method for improving both the efficacy and adherence of IRRM among athletes. Although IRRM has demonstrated benefit at the group level, (Gledhill et al., 2018, Lauersen et al., 2014) its performance at the individual level may vary. The physical, psychological, and social attributes of each athlete vary. Consequently, it is plausible to hypothesise that IRRM affects them differentially. Some athletes may be "non-responders" who demonstrate no injury risk reduction. This is backed by primary (Hespanhol et al., 2018) and secondary prevention context-based data.

Consequently, IRRM should be adapted to the athlete's characteristics in all dimensions (i.e. multifactorial: physical, psychological, and sociological, to match the nature and reality of sports injuries), focusing on the individual athlete's risk factors and deficiencies/deficits in order to better meet the athlete's individual needs (Roe et al., 2017). Part of the success of IRRM deployment is the improvement of athlete adherence (Owoeye et al., 2020a) Following the individualization of IRRM, the next stage is to assist the athlete in accepting, adopting, and executing IRRM. Knowledge of both (i) behaviour-change theories regarding motivation, beliefs, and intentions (i.e., determinants) to adopt IRRM, and (ii) context, environmental, social, and delivery factors (e.g., culture, other end-users' behaviour, resources, time) that may facilitate or impede successful outcomes, is essential for adherence in a sport setting (Finch, 2006, Gledhill et al., 2018)These

characteristics may vary on an individual basis.(Kok et al., 2016) Consequently, the technique of presenting the measure to the athlete and the levers to encourage adjustments in their habits should also be tailored to each individual. In practise, the promotion of IRRM might be founded on determinants and principles of behaviour change (i.e., strategies) that can be adopted more effectively(Kok et al., 2016). This strategy is considered person-centered, particularly user-centered. It primarily implies that the athlete is at the centre of the individualization (athlete-centered approach), although other individual levels, such as the coach or health professional, may also be addressed. Individualisation of IRRM could be achieved through individual screening in several domains (e.g., physical, psychological, social) to identify individual deficiencies/deficits, which could differ from the mean group-level (Welch et al., 2020) Additionally, it should address the known and valid injury risk and protective factors for a sport or disease. Such an approach could assist IRRM better address pertinent demands(Welch et al., 2020, Roe et al., 2017)

Individualisation of IRRM implementation could be achieved through individual screening of socio-cognitive determinants of behaviour, by identifying adherence's barriers and facilitators, taking into account programme-related (e.g., intervention components), socio-cognitive (e.g., behaviour change determinants such as intention and self-efficacy), social (e.g., socioeconomic status), and organisational (e.g., club structures) factors (Finch, 2006). This screening procedure may be repeated on a frequent basis to accommodate potential changes in an athlete's attributes over time (Esmaeili et al., 2018).The content and frequency of screenings should be tailored to practical considerations (e.g., equipment, human resources, athlete age and skill level), scientific evidence, and fluctuations in measured data. The development of the overall strategy necessitates a collaborative effort involving researchers, clinicians, end-users (e.g., coach, player, healthcare professional), and members of the target community, i.e., public participation (Finch, 2006). The athlete must be the focal point of the project. It also involves educating end-users, particularly athletes. The learning process and experiences of each individual, as part of their routine and culture, can play a role in the adoption and implementation of the IRRM programme, despite the fact that an increase in knowledge of the health determinants or the preventative effect does not automatically lead to altered behaviour (Van Tiggelen et al., 2008).

Sports injuries are among the most prevalent injuries in contemporary western nations. Treatment of sports injuries is frequently difficult, costly, and time-consuming; therefore, preventative measures and activities are both medically and economically warranted (Parkkari et al., 2001). "Prevention is better than cure" is a well-known adage. Despite widespread initiatives aimed at tackling the complex issue of injury prevention, it is still a major problem in the sporting world (Edouard and Ford, 2020).

According to controlled studies, it is possible to prevent sports injuries (Soligard et al., 2008, Owoeye et al., 2014, Lopes et al., 2020). On the basis of current understanding of injury profiles and causes, education of recreational and competitive players on the dangers associated with common sports-specific injuries. Dedicated injury monitoring for all new athletic activities to obtain this information. In addition to group-level preventative efforts, athletic trainers, coaches, and team physicians have the ongoing issue of identifying injury-prone individuals and customising their training and recovery programmes in order to decrease injury risk. Cooperation between investigators, clinicians, sports organisations, and policymakers is also essential (Régnier and Goulet, 1995, Bizzini and Dvorak, 2015), and there is an ongoing need to study the potential for rule modifications and laws pertaining to protective and other equipment. Video investigations of the mechanics underlying sports injuries would certainly offer novel methods to reduce the incidence of injuries.

There are still many unanswered concerns surrounding the prevention of sports injuries in real life settings. In future investigations, it is of the utmost importance that researchers engage with epidemiologists and statisticians to ensure that the study hypothesis is appropriate, and that the methodology employed can provide accurate and trustworthy data. Common preventive activities and devices, such as preseason medical exams, warming up, proprioceptive training, stretching, muscular strengthening, taping, protective equipment, rehabilitation programmes, and education campaigns, require further well-designed randomised studies (such as increasing general injury awareness among a team). In addition, the effect of a planned rule change on injury risk in a

particular sport could be evaluated through a randomised controlled trial prior to its implementation.

2.11. Implementation of injury prevention in football

Time-loss, huge financial losses and significant impact on players health careers have all been identified as part of the key reasons for injury prevention (Bizzini and Dvorak, 2015, Al Attar et al., 2016, Hägglund et al., 2005, O'Brien et al., 2018). In the last three decades, injury prevention has become the paradigm shift in sports participation in general and specifically football. To achieve reducing the burden of injuries in football, numerous studies have established that being proactive about injury prevention is recommended and fidelity to these programmes is key (Al Attar et al., 2016). Despite the health benefits of injury prevention programmes, the uptake of these programmes is still very limited due to various factors identified by researchers. There have been numerous efforts to disseminate and implement the FIFA11+ by F-MARC and stakeholders through educational programmes and training as well as other stakeholders in football but there are still significant challenges with achieving the desired goals. The public health h of injury prevention programmes will not be felt if the context and setting for implementing the programme is not taken to account (O'Brien et al., 2016). The successful implementation of the FIFA 11+ has multifactorial and multi-level implications in any setting which needs to be tailored accordingly (O'Brien et al., 2018, Donaldson et al., 2016). It is not enough to know the efficacy of any injury prevention programme in an RCT setting but its adoptability and adaptability to real-life setting is pivotal in achieving injury prevention goals (Donaldson and Finch, 2013, O'Brien and Finch, 2017, O'Brien et al., 2016, O'Brien and Finch, 2014).

2.12. Summary of chapter two

This chapter provided a summary of the literature for the doctoral research in a narrative form. This chapter established the background and the focus area for the research. Summary of the landscape of injury prevention interventions were also provided as well as the football participation in low resources settings. Women's participation in football and the FIFA Women's football strategy was also presented. The next chapter discusses the injury prevention knowledge, beliefs, and practices in women's football in South Africa. The implementation strategies and compliance

of injury prevention in football team settings is explored extensively in the scoping review in chapter four.

3. CHAPTER THREE: INJURY PREVENTION KNOWLEDGE, BELIEFS AND PRACTICES AMONG WOMEN'S FOOTBALL TEAMS IN SOUTH AFRICA

3.1. Manuscript details

This chapter aimed at describing the injury prevention knowledge, beliefs, and practices among women's football teams in South Africa and was published in the South African Journal of Sports Medicine.

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Injury prevention knowledge, beliefs, and practices among women's football teams in South Africa

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Background: Numerous factors account for injury prevention or lack thereof in any team setting. With the increasing burden of injuries in women's football, and limited human resources accessible in sub-Saharan Africa, it is important to investigate the ways in which standardised injury prevention practices can be achieved.
Objectives: The study aimed to evaluate injury prevention knowledge, beliefs, and practices in women's football teams in the University Sport South Africa (USSA) Football League in Gauteng Province, South Africa.
Methods: A cross-sectional self-administered survey was conducted among women's football teams registered to participate in the USSA Football League in South Africa's Gauteng Province.
Results: A total of 107 respondents participated in the study, which included both players (n=98; 92%) and their support staff (n=9; 9%). The median (interquartile range) age of the participants was 22 (20-25) years. In the population sampled, 36% of the participants perceived that they had adequate knowledge of injury prevention practices in football, while others felt they had limited knowledge of the basic injury prevention programmes (IPPs). The results also indicated that the injury prevention practices of coaches (93%) and their beliefs in this regard (70%) are sufficient for achieving the basic injury prevention goals. Most of the respondents (89%) indicated that a medical support system is important in attaining the goals of injury prevention.
Conclusion: Members of women's teams in the USSA Football League have recognised limited knowledge about the basic IPPs, while they do employ some of the basic injury prevention practices in football. These practices could be influenced by the beliefs of the coaches and the players, and most of them believe that IPPs are important. It is essential as key stakeholders that coaches' and players' education and knowledge of injury prevention strategies should be considered as an integral part of the process to succeed. It should be strongly highlighted and implemented, thus augmenting the credibility, trust and compliance for IPPs in the sport.

Keywords: FIFA 11+, soccer, female, sport, implementation

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Football is the world's most popular sport, with an estimated 300 million registered players globally.[1] Regardless of the level of professionalism, football-related injuries are common. Also, irrespective of gender, the most common injuries reported in football are knee, hamstring, groin and ankle injuries.[2, 3]Apart from the common injuries associated with men's and women's football, there are also other specific injuries, such as anterior cruciate ligament (ACL) injuries, that are sustained mainly by women.[2] Owing to the increased Q-angle and increased joint laxity arising from their particular hormone status and waist-hip ratio,.[2] women have been found to be at higher risk of presenting with ACL injuries.

The estimate of 30 million women players across the globe is an indication of the significance of their participation in football. As reported by the Fédération Internationale de Football Association (FIFA), about 4.8 million women are registered by national federations worldwide. [4] The Women's Football Survey of 2014 shows that the Confederation of African Football (CAF) comprises 1 255 400 members and these numbers have been projected to continue to rise.[4] In an annual European study of the Professional Women's League in Germany, 246 injuries were reported, thus accounting for an injury rate of 3.3 per 1 000 hours (games: 18.5 per 1 000 hours; practice: 1.4 per 1 000 hours).[5] Injury prevention at any level in football is of utmost importance given the challenges of reduced performance, adverse financial impact, team success and the long-term health of the players.[6] Structured generalised warm-up programmes have been shown to prevent common injuries in football [7] Although injury prevention programmes (IPPs) are highly effective in structured randomised control trials (RCTs) and prospective controlled studies, this does not guarantee their effectiveness in the real-world context of implementation.[7] In addition to the knowledge of the various IPPs, their permutations and strategies, a better understanding of the implementation context is important for success in this regard in the real world.[7]

Injury prevention in sports holistically entails using structured interventions and a multidisciplinary approach to improve the intrinsic and extrinsic risk components to optimise performance and protect the health of players.[8] Some of these intrinsic factors include flexibility, endurance, strength, agility, coordination, and balance, while extrinsic factors include the kits of the players, the available equipment and training surfaces, weather conditions, and the rules of the game. Prevention strategies are comprised of but are not limited to interventions that involve training and prehabilitation. Both include neuromuscular exercises for warm-ups and cool-downs, flexibility, agility, strength, and conditioning. Other considerations include hydration, nutrition, and psychotherapy.[8, 9]

Compared to other sports, football is a vigorous sporting activity, with a relatively high incidence of injury, so that preventative programmes to reduce the number of injuries,

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limit early retirement, and provide a healthy and safe environment for players, are highly recommended.[10] Based on the current literature, the FIFA 11+ comprehensive warm-up programme is a leading IPP which has been proven in scientific studies to significantly mitigate the burden of injuries and reduce time-loss in football.[11] Previous studies were carried out mainly in settings associated with superior human and infrastructural resources, and the results are therefore not comparable to those in sub-Saharan Africa generally.[12-14] The FIFA 11+ programme was first implemented on a large scale in a women's football population in Norway.[14] Thereafter, the programme was implemented and tested on mainly male football populations in countries such as the Netherlands, [15] Nigeria, [16]USA [13] and Australia.[12] There is generally a dearth of knowledge on injury prevention, injury prevention practices and implementation studies on the African continent. In 2014, in their research conducted in Canada, McKay et al. concluded that gaps in injury knowledge and beliefs differ for coaches and players.[17]

A paradigm shift in the realm of injury prevention in football and other sports now manifests as a global phenomenon that has made a substantial positive public health impact in that it reduces the burden of injuries, thereby optimising performance and subsequently translates into team success. To understand the existing body of knowledge and practices of injury prevention, it is important to identify the core components if the relevant implementation strategies are to succeed. Each environment and each demographic is unique, considering the existing parameters that could promote compliance in attaining the injury prevention goals, which require access to the current baseline knowledge and the practices that can be accessed.[18] To enhance the ultimate impact of team ball sport exercise-based IPPs, the future reporting of exercise-based IPP trials must clearly address all aspects of programme delivery, as outlined by the Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework.[18]

Apart from the implementation of a comprehensive IPP, some basic injury prevention principles, such as warm-ups, stretching, cool-downs and jogging, are also beneficial in reducing injuries in football. Women's football is currently in a developing phase, and there have recently been reports of local professional leagues gathering momentum in South Africa. With limited resources and access to healthcare facilities proving to be expensive, injury prevention strategies will help to lighten some of the burdens associated with participation in football.

The aim of our study was to evaluate the knowledge, beliefs and practices pertaining to injury prevention among members of women's football teams in the USSA Football League in Gauteng Province, South Africa.

Methods

Study design and setting

This study is a cross-sectional survey of injury prevention knowledge and practices among women's football teams in the USSA Football league in Gauteng Province, South Africa.

Participants

All women's teams and their support staff, consisting mainly of head coaches, assistant coaches, team managers and occasional medical staff in the USSA Football League in Gauteng, were invited to participate. The USSA Football League is a competitive football competition consisting of university teams playing in a league format. Ten women's football teams were eligible to participate in this study, consisting of an estimated population of 180 players and 20 coaches and support staff. All participants who gave their written informed consent were eligible to participate.

Ethical consideration

The University of the Witwatersrand Human Research Ethics Committee (Medical) approved the study (M161146). Permission was granted by the USSA Football League and all the participating football team managers. All participants read, understood, and signed a written informed consent form.

Questionnaire

The self-administered questionnaire was adapted from a study by McKay et al. [17] The questions included the domains of socio-demographic attributes, playing and training characteristics, injury prevention practices, other injury prevention aspects and associated beliefs. The questionnaire was structured to include a dichotomous 'Yes' and 'No' two-point scale, while a five-

Table 1. Socio-demographic characteristics of the participants (n=107)

Characteristics	n (%)
Gender	
Female	102 (95)
Male	5 (5)
Designation	
Assistant coach	4 (4)
Head coach	3 (3)
Player	98 (92)
Team Manager	2 (2)
Team	
North West-Vaal	15 (14)
Sefako Makgatho University	9 (8)
Tswane University of Technology	8 (8)
University of Johannesburg	22 (21)
University of Pretoria	24 (22)
Vaal University of Technology	9 (8)
Wits University	20 (19)
Player position (n=98)*	
Defender	41 (42)
Goalkeeper	11 (11)
Midfielder	21 (21)
Striker	25 (26)

**Player position is number of players, less number of support staff.*

point Likert scale was used to measure agreement across the extremes of 'strongly agree' to 'strongly disagree'. The questionnaire was validated for content and face validity with sports medicine experts and was piloted with an amateur male football team that did not form part of the study.

Procedure

A total of 10 teams regularly participates in the USSA Football League, and of the ten teams, seven teams consented to participate in the study. Informed consent was sought from the individual players and support staff, and the questionnaire was administered at the respective practice venues for each of the teams. Data were collected through site visits to training sessions between July 2017 and March 2018. Appointments were scheduled with the respective team managements for the researcher to administer the questionnaires.

Statistical analysis

Data analysis was performed using the IBM SPSS 25.0® programme. The Shapiro-Wilk test was used to determine the normal distribution of the continuous data i.e. age and years of experience. Descriptive statistics of the median and interquartile range (IQR) were used to summarise the continuous data, as these data were not normally distributed. The interquartile range was presented as the difference between the 75th and 25th percentiles.[19] Percentages and frequencies were used to summarise the categorical variables. Missing data were regarded as missing.

Results

The estimated population size was initially envisaged to be 200 participants, but only 54% (n=107) eventually participated in the study. The median (IQR) age and years of experience of all the participants was found to be 22 (20-25) years and 36 (12-48) months, respectively. The median (IQR) ages of the players and support staff were 22 (20-24) years and 32 (25-39) years, respectively. The socio-demographic characteristics of the participants are outlined in Table 1.

Of the 107 participants, 36% (n=38) reported they perceived that they had an adequate knowledge of injury prevention. It was also shown that 76% (n=81) of the participants were engaged in football IPP at the time of the research, with the following injury prevention practices being relevant: warm-ups (95%), stretching (90%), cool-downs (80%) and jogging (81%). Most of the participants (67%) generally engage in injury prevention practices daily and 87% reported carrying out injury prevention practices during matches and team training sessions (70%). Only 25% of the respondents indicated that they had heard about the FIFA 11+ IPP, while the majority (83%) stated that they would be willing to adopt it if they were to gain access to detailed information on the programme (Table 2).

In Table 3, most participants (87%) strongly agreed that IPPs are important, and 66% believed that medical support is important in achieving injury prevention goals. Most of the participants (65%) also strongly agreed that their coach's

Table 2. Injury prevention knowledge and practices (n=107)

Questions	n (%)
Do you engage in any football injury prevention practices? (Yes)	81 (76)
Type of injury prevent practices*	
Warm-ups	77 (95)
Stretching	73 (90)
Cool-downs	65 (80)
Jogging	66 (81)
Did you receive any training in the injury prevention practices that you are currently engaged in? * (Yes)	59 (72)
How many times do you engage in the injury prevention practices that you use? *	
Daily	54 (67)
Weekly	17 (21)
Monthly	10 (12)
Frequency per week∞	
Once	24 (30)
Twice	26 (32)
Thrice	11 (14)
Other	18 (22)
When do you carry out IPPs? *	
Match days	7 (9)
Training	17 (21)
Both	57 (70)
During which training session do you carry out IPP? *	
Self-training	11 (14)
Team training	60 (74)
Both	10 (12)
Are your injury prevention choices based on your personal beliefs about preventing injury? † (Yes)	35(33)
Do you think that the injury prevention practices that you engage in are based on scientific research? † (Yes)	56 (52)
Do you think that you would be willing to adopt a different injury prevention strategy from that which you are already engaged in? † (Yes)	64 (60)
Do you think that your knowledge about injury prevention in soccer is adequate? † (Yes)	38 (36)
Do you think that you are effectively applying this knowledge as a football player/coach? † (Yes)	65 (61
Do you think that your current injury prevention strategy works? † (Yes)	52 (49)
Have you heard about the FIFA 11+ Football IPP? † (Yes)	26 (25)
Are you interested in adopting the FIFA 11+ Football IPP? † (Yes)	89 (83)

**; n=81, percentage based on participants that answered 'Yes' to the preceding question "Do you engage in any football injury prevention?".*
∞; n=79, missing data, less participants who did not complete the question in the self-administered questionnaire.
†; n=107, percentage based on the total number of participants.

Table 3. Injury prevention beliefs (n=107)

Beliefs		Strongly agree	Agree	Don't know	Disagree	Strongly disagree
1	Injury prevention practices are important in football.	93(87)	9(8)	1(1)	2(2)	2(2)
2	A medical support system is important in achieving the goals of injury prevention.	71(66)	24(22)	7(7)	3(3)	2(2)
3	The coach's injury prevention practices are sufficient for achieving injury prevention goals.	70(65)	29(27)	6(6)	-	2(2)
4	The player's knowledge is important in achieving injury prevention goals.	67(63)	31(29)	5(5)	2(2)	2(2)
5	Identifying injury risk factors and modifying them contributes to achieving injury prevention goals.	62(58)	33(31)	11(10)	-	1(1)
6	It is key to work as a team to achieve the goals of injury prevention.*	67(63)	36(34)	2(2)	-	1(1)
7	Injury prevention is directly related to team success.	59(55)	35(33)	11(10)	1(1)	1(1)
8	Compliance to an IPP is important in achieving its set goals.	59(55)	40(37)	6(6)	1(1)	1(1)
9	The coach's beliefs are important in achieving injury prevention goals.*	37(35)	37(35)	19(18)	8(8)	5(5)
10	The FIFA 11+ Football IPP is important in achieving injury prevention goals.*	73(69)	31(29)	2(2)	-	-
11	An implementation guide is important in achieving injury prevention goals.*	56(53)	38(36)	11(11)	-	-
12	African beliefs significantly affect injury prevention practices.*	26(25)	20(19)	44(42)	9(9)	6(6)
13	Injury prevention practices enhance performance optimisation.*	56(54)	31(30)	17(16)	-	-

*Data displayed as n (%). * indicates missing data (Q6, Q7 and Q 10: n=106); (Q11 and Q12: n=105); Q13: n=104) – less participants who did not complete the question in the self-administered questionnaire.*

prevention practices are sufficient for attaining injury prevention goals. A considerable number of the participants reported 'Don't know' in the following instances: African beliefs significantly affect injury prevention practices (41%), and the coach's beliefs are important in achieving injury prevention goals (18%). It was also shown that the majority (66%) of the respondents indicated that a medical support system is important in achieving the injury prevention goals (Table 3).

Discussion

Knowledge of injury prevention practices

In our study, only 36% of the participants reported that they perceived themselves as having adequate knowledge of basic injury prevention practices in football. Other studies on injury prevention have reported similar results.[17, 20] In the research conducted in Canada by McKay et al.[17] they showed a dearth in the perception of knowledge and beliefs in young amateur female soccer players, emphasising effective prevention strategies and injury risk factors, but with significant differences in feedback from coaches and players. A study conducted in Nigeria among a youth football league reported that most players fall within the poor and fair knowledge categories.[20] Another study in South Africa, which evaluated the coach's knowledge, attitude, and perceptions regarding injury prevention among amateur footballers, showed that knowledge perception about injury prevention in coaches is limited.[21] This indicates that knowledge may still be a challenge irrespective of geographical location. However, in a study by Geertsema et al.[22] conducted to evaluate knowledge, beliefs and strategies in a cohort of players at the FIFA Women's World Cup, concluded that elite female footballers reported awareness of the level of risk and the types of injuries in women's football. The authors also suggested that players hold positive attitudes towards injury prevention. The good knowledge score demonstrated in the study by Geertsema et al.[22] might be because the study was conducted amongst elite female footballers who have access to better economic resources and support staff.

The perceptions of knowledge concerning football injury prevention reported in our study are in tandem with those recorded in some previous studies.[20, 23] In the South African context, this might be because the participants are primarily students and amateur players. In addition, there is limited infrastructural and financial support in the growing women's football league in South Africa.[24] A systematic review conducted by Al Attar et al.[11] concluded that adequate knowledge about injury prevention in football reduces the incidence of injury and improves performance. Studies that have implemented exercise-based IPPs in sports have recorded a significant reduction in injury incidence.[25] Therefore, it is imperative that adopting and implementing a standard IPP needs to take into account and include the improvement of the knowledge base of the programme by educating the players and coaches about injury prevention practices and injury risk factors. Thus, adequate education in injury prevention strategies directed at all role players, particularly the coaches, is paramount.[25]

Injury prevention practices employed by members of women's football teams

The common injury prevention practices reported by participants include warm-ups, cool-downs, jogging, and

stretching. These injury prevention practices have also been reported in the literature to reduce the incidence of football-related injuries.[2, 11] However, a more comprehensive warm-up protocol that encompasses all these components has been developed and its efficacy has been proven in several studies.[11] Warms-ups physically prepare athletes for the competition, and influence their mental state of mind, which is crucial to optimising performance. A well-designed warm-up programme will achieve physiological responses in the cardiovascular, musculoskeletal, respiratory, nervous, and metabolic systems.[26] These responses include a raised tissue temperature, increased circulation to working muscles, and enhanced oxygen supply from the oxy-haemoglobin and myoglobin breakdown. Cool-downs are the first step in the recovery process, the gradual tapering down of activities from an intense session of exercise, and the commencement of a 'reverse phase' of the warm-up process. A cool-down is effectively the tapering-off phase at the end of explosive physical activity and is typically at low intensity.[26]

Another key component is stretching, which may be static or dynamic. Stretching aims to return muscles that have typically been shortened because of contractions during explosive sporting activity back to their resting length or their pre-activity state.[26] Although it is important to note that these injury prevention practices are helpful in isolation, each component combined with the others will constitute a concerted effort towards achieving the injury prevention goals. Very few of the participants in our study were aware of the FIFA 11+, which is a comprehensive injury prevention programme, but the majority were keen to learn more about it and adopt it.

Beliefs about injury prevention

From our results, coaches and players believe IPPs work, and that they would be willing to adopt them. It has been shown that the coach plays the most important role in adopting and implementing injury prevention practices.[25] The majority of the participants identified that their coach's beliefs are important in achieving injury prevention goals, and they believe that compliance is a key component of IPPs. Interestingly, in our study, the participants expressed that their coach's IPP strategy is adequate even though only 36% reported that their particular knowledge about injury prevention in football is based on their own perceptions. This is not surprising, as often in sports, the relationship between the coach and the player follows a one-directional pattern where the coach is considered as the mentor, leader and guide in the career of the players.[25] In addition, the majority of the coaches are males, and the female-male dynamic element in sports usually influences the communication strategy and interpretation.[27] When a coach is keen on a programme, he/she will tend to influence the team's knowledge and training regarding injury prevention, hence achieving the injury prevention goals.

Professional women's football in South Africa is in the developmental stage, with the amateur leagues showing considerable improvement in terms of personnel and infrastructure.[24] Currently, because of limited personnel, the coach plays multiple roles in managing the team by providing medical support, leading the strength and conditioning programmes, and the injury prevention practices. This study also shows the lack of adequate medical personnel available on the team's support staff, which might be largely due to the economic circumstances of the team. Therefore, it is pertinent that for the successful implementation of an IPP strategy in a low- to middle-income setting in countries such as South Africa, the coach will play a pivotal and integral role in the implementation plan, adoption, compliance, and overall implementation of such a programme.

Limitations

This study was limited to women's football teams in the USSA Football League in Gauteng Province; therefore, the findings should not be generalised to other populations, sports, and demographics. The questionnaire used in this study was self-administered and is based on the individual perceptions of participants and therefore might be subject to bias.

Recommendations

The potential burden of injuries will continue to grow within the current environment and the increasing participatory numbers in women's football in South Africa. To mitigate this burden of injuries associated with football participation, it would be pertinent to incorporate evidence-based IPPs to achieve the desired goals of injury prevention. There needs to be a paradigm shift to the effect that the adoption and implementation of holistic injury prevention practices would reduce the incidence of injury and improve the performance of the players and the overall achievements of their teams. As key stakeholders, coaches' and players' education and knowledge of injury prevention strategies should be considered an integral part of the process to succeed, strongly highlighted and implemented, thus augmenting the credibility, trust, and compliance for IPPs in the sport. Proper understanding might lead to a simple screening process that would be meaningful for IPPs. It is also important to ensure that medical support should be an integral part of the process of achieving the injury prevention goals. Therefore, as recommended by the RE-AIM framework for implementation, it is important to be purposeful and devise an implementation strategy for IPPs.

Conclusion

Most members of women's football teams perceived their level of knowledge as inadequate. Although the respondents engage in various injury prevention practices, such as warm-ups, stretching, cool-downs and jogging, very few are aware of the FIFA 11+ Football IPP. Most players and coaches believe that IPPs are essential, which are crucial first steps towards developing and implementing injury prevention awareness programmes.

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Author contributions:
All the authors were involved in the conceptualisation and the design of this study, the analysis, and interpretation of the data, the drafting of and/or the critical revision of the important intellectual content incorporated in the study, and the approval of the version to be published. The study constitutes part of candidate UB doctoral research, and BO, CB and LG were the supervisors on the project.

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3.4. Summary of chapter three

This chapter presents the results of the study in a published manuscript about the injury prevention knowledge, beliefs and practices in women's football teams in South Africa. Our study showed that there is perceived limited knowledge for evidence-based comprehensive injury prevention programmes such as the FIFA 11+ . This programme has been proven to reduce the incidence of non-contact lower limb injuries. The respondents believe that coaches' knowledge play a key role in achieving injury prevention in team settings. They are also willing to adopt the FIFA 11+ injury prevention programme if they become more knowledgeable about it. The next chapter is a scoping review that summarises evidence available for implementation strategies and compliance for the FIFA 11+ injury prevention programme in football.

4. CHAPTER FOUR: IMPLEMENTATION STRATEGIES AND COMPLIANCE TO THE FIFA 11+ COMPREHENSIVE WARM-UP INJURY PREVENTION PROGRAMME IN FOOTBALL TEAMS: A SCOPING REVIEW

4.1. Manuscript details

This chapter aimed at describing implementation strategies and compliance to the FIFA 11+ programme is presented as a manuscript. The study is under review in the Research in Sports Medicine Journal.

Bakare U, Olivier B, Brandt C: Implementation Strategies and Compliance to the FIFA11+ Comprehensive Warm-up Injury Prevention Programme in Football Teams: A Scoping Review.

4.2. Abstract

Injury prevention has become the paradigm shift for reducing the burden of football participation. Little is known about the summary of existing evidence available for the implementation strategies and compliance for the FIFA11+ programme. This study reviewed all primary intervention studies for the FIFA11+ conducted on male and female football players from January 2008 till July 31, 2021 that met the inclusion criteria. Only articles written in English or that had available English translations were considered. A total of 22 articles were included in this scoping review and most of the studies were randomised controlled trials. The main implementation strategy for the FIFA11+ injury prevention programme is preseason coaches' targeted education facilitated by an instructor with the provision of additional resource materials. Our study showed that the main implementation strategy for the FIFA11+ is coaches' targeted education. Targeting coaches' education may be pivotal in disseminating the knowledge to achieve injury prevention. Compliance was reported, but the measurement varied and was not standardised or consistent. Ensuring a standardised way to measure compliance will allow researchers to determine the effectiveness of their implementation strategies objectively.

Keywords: FIFA11+, Injury Prevention, Compliance, Implementation, Football

4.3. Introduction

Football, also known as soccer, is the most popular sport globally, with millions of fans and players participating professionally and recreationally in the multi-billion-dollar industry. The sport's increasing popularity indicates that the participation numbers will continue to grow (REPUCOM, 2014). The sport has an estimated 300 million registered players across national federations (Dvorak, 2015). Much of the present growth can be attributed to the quick increase in female participation in the sport and involvement in nations where football does not have a long history. The current statistics on the number of players in football are not known, but there are projections of 500 million by the next FIFA World Cup in 2022 (REPUCOM, 2014). Football is a vigorous sporting activity with a relatively high incidence of injury compared to other sports, and preventative programs are highly suggested to reduce the number of injuries, avoid early retirement, and offer a healthy and safe environment for players (Rahnama et al., 2002).

With increasing participation comes the burden of injuries in football which are associated with significant treatment costs, time loss and long-term adverse side effects. The incidence of injuries in football has been reported as 12 - 35 injuries per 1 000 hours of matches played. Furthermore, 1.5 - 7.6 injuries occur per 1000 hours of exposure, and most injuries occur in the lower extremities (Constantinou, 2010). It is estimated that 50 injuries cause time loss from play each season in a professional football team with a 25-player squad translating to a ratio of two injuries per player in a season (Ekstrand et al., 2011). Professional soccer leagues have suffered significant financial losses due to injuries, player withdrawal, and diminished team performance at both the professional and amateur levels (Hägglund et al., 2005). The economic cost of a player on a top professional team being injured for a month is believed to be over €500,000, therefore the financial burden and avoidance of injuries to football clubs cannot be overstated (Ekstrand, 2013).

The evolution of injury prevention in football is ongoing though it has made significant strides in the last three decades in football (O'Brien et al., 2018). A comprehensive injury prevention programme, the FIFA 11+ complete warm-up programme, was only developed almost two decades ago, accounting for a significant reduction in injuries recorded in the sport but there is still a long way to go (Bizzini and Dvorak, 2015). The public health burden of injuries that come with participation in football has been documented across gender, age and level of competition over

time in an array of scientific papers (Silvers-Granelli et al., 2017, Soligard et al., 2008, Steffen et al., 2008, Owoeye et al., 2014, Al Attar et al., 2016, Silvers-Granelli et al., 2015). Randomised controlled trials have shown that injury-prevention exercise programs (IPEPs) have a protective impact in team ball sports over time, but getting appropriate compliance can be difficult (O'Brien and Finch, 2014).

In the first large scale study conducted in Norway, the neuromuscular exercise programme, the FIFA 11+, developed by the FIFA Medical Assessment and Research Centre (F-MARC), Soligard et al. (2008) showed a significant 32% reduction in injury rates across teams who participated. He further demonstrated a positive relationship between high adherence and protective effect, estimating an injury risk reduction by 35% by the players who participated in at least 1.5 times structured warm-up sessions per week (Soligard et al., 2008). In Canada, a study that evaluated how different implementation strategies regarding the FIFA 11+ impacted team adherence and injury risk in Canadian female youth football players reported similar findings in a cluster-randomised trial (Steffen et al., 2008). Owoeye et al. (2014), in a study conducted in Nigeria, indicated that there are similar injury reduction rates, reporting a significant reduction in youth male football players.

Although these programmes have shown to be effective in randomised control trials (RCTs) and prospective controlled studies, there is no guarantee that they will be helpful in the real world (Finch and Donaldson, 2010). To succeed in the real world, you must have a greater grasp of the implementation context (Finch and Donaldson, 2010). The process of identifying the precise implementation components that influence the adoption, execution, and maintenance of team ball sport IPEPs is a critical step in improving the overall impact of these interventions (O'Brien and Finch, 2014). Developing an implementation strategy that best facilitates adoption and compliance based on current evidence may help bridge the gaps of injury prevention and optimise performance. A preliminary search of databases (PROSPERO, MEDLINE, COCHRANE, SCOPUS and JBI Databases) for existing scoping reviews were conducted on implementation for the FIFA 11+ programme. Although, systematic reviews exist on the FIFA 11+ to determine efficacy (Thorborg et al., 2017, Sadigursky et al., 2017, Gomes Neto et al., 2017, Al Attar et al.,

2016), none has addressed compliance and implementation strategies of the FIFA 11+ injury prevention programme.

O'Brien and Finch in 2014 deduced that information on specific components in the reporting of sports injury prevention exercise programmes (IPEPs) in trials are scarce (O'Brien and Finch, 2014), and these gaps are perceived to exist still. The significant knowledge gaps identified by O'Brien and Finch (2014) are the acceptance and maintenance of these programmes, implying that future IPEP trial reporting must address all areas of programme delivery as described by the RE-AIM framework. This review hoped to present the overview of the evidence available for implementation and compliance for the FIFA11+.

This scoping review aimed to summarise available evidence on the FIFA 11+ Injury prevention programme in football players in a team setting. The review questions were as follows:

a. What implementation strategies are used in the FIFA 11+ Injury prevention programme in football players?
b. What is the compliance of football players with the FIFA 11+ Injury prevention programme?

4.4. Inclusion criteria

4.4.1. Participants

The scoping review considered primary intervention studies using the FIFA 11+ injury prevention programme, which included male and female players, regardless of playing level. Age considerations included participants of at least 13 years and above, which is the minimum age documented in the preliminary large-scale study (Soligard et al., 2008).

4.4.2. Concept

The concept of interest was the FIFA 11+ comprehensive warm-up programme injury prevention approach in football. It is an exercised based comprehensive warm-up programme consisting of three parts; Running Exercises, Strength, Plyometric and Balance, which also includes room for progression from Levels 1-3. It is recommended to be performed for at least 20mins and not less

than twice a week during training sessions. On match days, it is recommended that the running exercises alone be carried out.

4.4.3. Context

This scoping review considered primary intervention studies using the FIFA 11+ completed in football team settings. Studies from all countries were considered for inclusion.

4.4.4. Types of Studies

This review considered both quantitative and qualitative research approaches. The following peer-reviewed quantitative designs were included; experimental, quasi-experimental, prospective, retrospective, case-randomised control, cohort studies, and comparative studies. Conference proceedings, narrative reviews and opinion pieces were excluded. Only articles written in English or with available English translations were considered from January 1, 2008, till July 31, 2021.

4.5. Methods

Literature was included from all countries but delimited to English language only or available translations of the text in English spanning January 2008 to July 2021. The JBI methodology for conducting scoping reviews (Peters et al., 2020) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018) were employed to guide the conduct of this review. The scoping review protocol was registered at the Open Science Framework (https://osf.io/r9mfq).

4.5.1. Search strategy

The search strategy targeted both published and unpublished data (grey) in literature, written in the English Language from January 1, 2008 to July 31, 2021. The rationale for the time frame is that the first large scale study published on the FIFA 11+ was in 2008 and included all relevant and recent studies in this field within the set criteria.

The sources of information were from peer-reviewed journals, bibliographic databases, trial registers, the reference list of eligible studies, and review articles and this was done in a 3-step strategy as recommended by JBI Methodology.

1. A preliminary search of online databases using the Boolean search method to search MEDLINE via PubMed, Biomed Central, the COCHRANE Library, Web of Science, CINAHL via EBSCO HOST, EMBASE via Ovid, SPORTDiscus, SCOPUS, Google Scholar was conducted, followed by the analysis of the text words contained in the title and abstract, and of the index MeSH terms such as [Athletic Injuries/Prevention Control], [Programme Evaluation], [Male/Female], [Sports Medicine/Methods], [Warm-up Exercise], [Adult],[Soccer/Injuries] used to describe the articles. This informed the development of a search strategy that was tailored for each information source.
2. The extensive search concepts included initial keywords such as "FIFA 11+", "Injury prevention", "football/soccer", "neuromuscular exercise" "program/programme", "players", "teams" "effectiveness/efficacy"," compliance" and "implementation". The databases searched using the Boolean search method included MEDLINE via PubMed, Biomed Central, the COCHRANE Library, Web of Science, CINAHL via EBSCO HOST, EMBASE via Ovid, SPORT DISCUS, SCOPUS. Grey literature databases such as Google Scholar, Open Grey, TRIP Database and NYAM Grey Experts in the field were also contacted and the websites of key organisations reviewed as grey literature. The search was re-run prior to the final analysis to include new information that might have been published after the initial search. A full search strategy for an online database is outlined in Appendix seven.
3. The reference lists of the included full-text studies were hand-searched for additional references, which the electronic database search may not have captured.

4.5.2. Study selection

Once all searches were completed, all identified citations were collated and uploaded into Endnote X9 (Clarivate Analytics, USA), with duplicates noted and removed. The library was then exported to an excel spreadsheet Microsoft Excel 2016 (Redmond, Washington, USA). UB and NM assessed titles and abstracts to identify studies that satisfied the inclusion criteria indicated for the review. All articles screening were blinded and conducted independently by the two reviewers. The level of agreement was rated on a scale of 1-10 with a minimum score of 6 and above .Articles that met the inclusion criteria were retrieved in full text and details imported into the JBI System for the Unified Management, Assessment and Review of Information (JBI SUMARI) (Joanna Briggs Institute, Adelaide, Australia) (Munn et al., 2019). These full texts were adjudged comprehensively against the inclusion criteria. Full text that fell short of the inclusion criteria were excluded. The results of the search and reasons for exclusion were reported using a PRISMA flow diagram (Page et al., 2021) in Figure 1. Two articles were without consensus and the reviewers resolved through discussion. There were no further disputes even though, a third reviewer BO who had been pre-determined would have been invited to decide.

4.5.3. Methodological quality assessment

Since this scoping review aimed to provide an overview of the existing evidence, regardless of quality, rather than finding only the best evidence to address the research questions, no formal methodological quality assessment or confidence assessment was conducted (Peters et al., 2020).

4.5.4. Data extraction

Data were extracted using a standardised data extraction form. Information from the identified sources that fit this scoping review's inclusion criteria were extracted in structured tables. The full text of the publications that met the inclusion criteria were selected and reviewed. Data were extracted using a pre-structured data extraction form created by Microsoft Excel 2016 (Redmond, Washington, USA). The primary data extracted from the studies included authors, country, study

type, study year, and outcomes related to the review questions were further refined and revised accordingly.

4.5.5. Data Analysis

Results was summarised and presented in tabular format and using a narrative synthesis

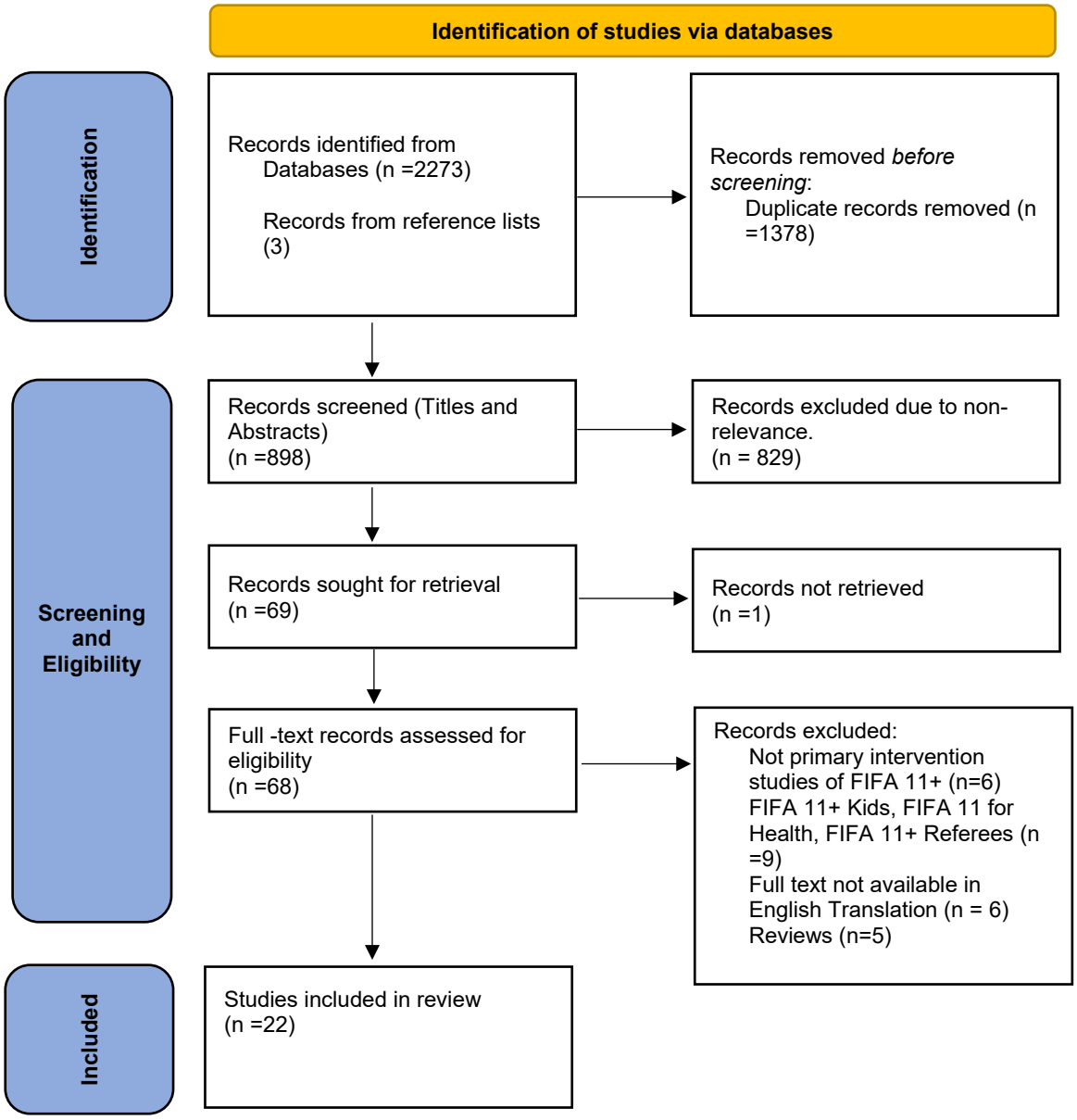


Figure 4:1: PRISMA flowchart for the scoping review process (Page et al., 2021)

4.6. Results

4.6.1. Characteristics of the included studies

A total of twenty-two articles were included in this scoping review. Twenty articles were RCTs (Soligard et al., 2008, Impellizzeri et al., 2013, Whalan et al., 2019, Steffen et al., 2008, Nuhmani, 2021, Nuhu et al., 2021, Silvers-Granelli et al., 2017, McKenzie et al., 2019, Gatterer et al., 2012, Steffen et al., 2013, Al Attar et al., 2017, Arsenis et al., 2020, Lopes et al., 2020, Owoeye et al., 2014, Longo et al., 2012, Nawed et al., 2018, Ayala et al., 2017, Hammes et al., 2015, Silvers-Granelli et al., 2015) and two cohort studies (Nouni-Garcia et al., 2018, Grooms et al., 2013). The studies were distributed across five continents. Majority (90.9%) of the studies were from high income countries and only two studies from Africa (Nigeria and Rwanda) with Europe accounting for (50%) followed by USA (18%), Oceania (14%), Asia (9%) and Africa (9%). More than half (68%) of the studies were conducted on amateur football players. One study was conducted on semi-professional players in Australia and another study was in Switzerland was on veteran football players. The FIFA 11+ programme was also adapted and implemented in other sports such as futsal, netball, and basketball respectively (McKenzie et al., 2019, Lopes et al., 2020, Longo et al., 2012). Most of the intervention studies were conducted among male players (all male articles n=17), only a few were conducted among female players (all-female articles n=5). Table 1 shows the characteristics of all the included studies.

Sixteen studies had the primary focus to determine the efficacy of the FIFA 11+ used the following outcomes - lower-limb injury rates, incidence, muscle strength, severity of injury, match exposure per 1000hrs, and time-loss (Soligard et al., 2008, Whalan et al., 2019, van Beijsterveldt et al., 2012, Nuhu et al., 2021, Silvers-Granelli et al., 2017, Gatterer et al., 2012, Steffen et al., 2013, Al Attar et al., 2017, Arsenis et al., 2020, Grooms et al., 2013, Nouni-Garcia et al., 2018, Owoeye et al., 2014, Longo et al., 2012, Lopes et al., 2020, Hammes et al., 2015, Silvers-Granelli et al., 2015). Five studies evaluated performance indices and used the following outcome measures: vertical jump, 20-yard sprints, Illinois agility run, t-tests and Y-balance tests, Star Excursion Balance Test (SEBT), single-leg balance, triple hop, and jumping-over-a-bar tests (Ayala et al., 2017, Nawed et

al., 2018, McKenzie et al., 2019, Impellizzeri et al., 2013, Nuhmani, 2021). One study measured both injury and performance parameters (Steffen et al., 2008).

Table 4.1 describes the characteristics such as author names, country of study, study design, study population and demographics of the included studies.

Table 4:1: Characteristics of the included studies

S/N	Author(s)	Country	Setting (World Bank Classification according to income)(Fantom and Serajuddin, 2016)	Study design	Population	Demographics
1.	Nuhu et al. (2021)	Rwanda	Low	Cluster RCT	Sports: Soccer Level: Amateur	Intervention group: 12 teams (309 players) Control group: 12 teams (317 players) Mean age: 20±1 years Gender: Male
2.	Nuhmani (2021)	India	Lower middle	RCT	Sports: Basketball Level: Amateur	N = 59 Mean age: 20.21 ± 2.31 years Gender: Female
3.	Arsenis et al. (2020)	Greece	High	RCT	Sports: Soccer Level: Amateur	N=32 Age: 19±1 years Gender: Male
4.	Lopes et al. (2020)	Portugal	High	RCT	Sports: Futsal Level: Amateur	N=71 (from six amateur clubs) Intervention group (n = 37, age: 27.0±5.1 control group (n = 34, age: 26.0±5.1 years Gender: Male
5.	McKenzie et al. (2019)	New Zealand	High	Cluster RCT	Sports: Netball Level: Amateur	N=81 Mean age: 13.33 (intervention) and 13. 25 Gender: Female

6.	Whalan et al. (2019)	Australia	High	Cluster RCT	Sport: Football Level: Semi-professional	N=806 Mean age: 24.8 (standard) and 23.8 (contr Gender: Male
7.	Nawed et al. (2018)	India	Low	RCT	Sport: Soccer Level: Amateur	N=57 Age: 20.63± 2.11 years. Gender: male
8.	Nouni-Garcia et al. (2018)	Spain	High	Analytical observational retrospective cohort study	Sport: Soccer Level: Amateur	N=92 Gender=Male Age: 18to less than 40 years.
9.	Ayala et al. (2017)	Spain	High	A parallel, two-group, pre-post, RCT	Sport: Football Level: Amateur	N=41 Mean age: 16.8 ± 0.7 Gender: Male
10.	Al Attar et al. (2017)	Australia	High	Cluster RCT	Sport: Soccer Level: Amateur	N=344 (21 teams) Age: 14 – 35 years Gender: Male
11.	Silvers-Granelli et al. (2017)	USA	High	Prospective cluster RCT	Sport: Soccer Level: Amateur	N=1625 Age: 18 to 25 years Gender: Male
12.	Hammes et al. (2015)	Switzerland	High	RCT	Sport: Football	N=265 Male

					Level: Amateur	Age: not younger than 32 years (20 teams) Gender: Male
13.	Silvers-Granelli et al. (2015)	USA	High	RCT	Sport: Soccer Level: Collegiate	N=396 Age: 18 – 25 years Gender: Male
14.	Owoeye et al. (2014)	Nigeria	Lower middle	Cluster RCT	Sport: Football Level: Amateur	N=414 Age: 14-19 years Gender: Male
15.	Impellizzeri et al. (2013)	Italy	High	RCT	Sport: Soccer Level: Amateur	N=81 Mean age: 25.5 years Gender: Male
16.	Grooms et al. (2013)	USA	High	Prospective single-cohort study	Sport: Soccer Level: Collegiate	N=41 Age: 18-25 Gender: Male
17.	Steffen et al. (2013)	Canada	High	Cluster RCT	Sport: Soccer Level: Amateur (Youth)	N=226 Age: 13-18 Gender: Female
18.	Gatterer et al. (2012)	Italy	High	Cluster RCT	Sport: Soccer Level: Amateur	N=60 (from 20 teams) Age:

						Gender: Male
19.	Longo et al. (2012)	United Kingdom	High	Cluster RCT	Sport: Basketball Level: Elite	N=121 Mean age: 13.5 years Gender: Male
20.	van Beijsterveldt et al. (2012)	Netherlands	High	Cluster RCT	Sport: Soccer Level: Amateur	N=456 Age: 18 to 40 years Gender: Male
21.	Soligard et al. (2008)	Norway	High	Cluster RCT	Sport: Soccer Level: Amateur	N=1892 (Intervention group: n=1055; n=837) Age: Gender: female
22.	Steffen et al. (2008)	Norway	High	Cluster RCT	Sport: Football Level: Amateur (youth)	N=2100 Gender: Female Age: 13 – 17 years

RCT- Randomised Control Trial

Table 4.2 describes the implementation strategy, intervention, control where applicable, period and frequency and summary of findings.

Table 4:2: Components of implementation strategies for the FIFA 11 +

Author(s)	Implementation Strategy	Intervention	Comparison/ control	Period and Frequency of Intervention	Outcome measures	Author's summary of findings
Nuhu et al. (2021)	Delivery method: Preseason Instructional meeting. Procedure: Pre-season. Training and clarification of roles Facilitator: FIFA11+ Instructor Target: Coaches, players, and medical personnel.	FIFA 11+	Conventional Warm-up	At least 3 times a week for 28 weeks.	Comparison of the incidence of overall, training, and match injury per 1000 hours of exposure.	The odds of sustaining injuries reduced significantly, and the severity of sustained injury was lower in the intervention group compared to the control group. A lower proportion of players sustained injuries in the intervention group (52%) compared to the control group (63%) (Odd ratio: 0.7; 95%CI: 0.5–0.9). A significantly lower rate ratio was observed in the intervention group for overall (RR = 0.6; 95%CI: 0.5–0.8) and match (RR = 0.6; 95%CI: 0.5–0.8) injuries.
Nuhmani (2021)	Delivery method: Preseason Familiarisation Procedure: Exposure to FIFA 11+ via online resource Facilitator: Unclear	FIFA 11+	Conventional Warm-up	3 times a week for 12 weeks.	20m sprint run, vertical jump test and a t test.	The intervention programme showed no improvement in the sports performance outcomes measured. No statistically significant difference in the sports performance parameters (sprint test p=0.21, t test p=0.16, vertical jump test p=0.09)

	Target: Players					was found between groups' posttest measurements.
Arsenis et al. (2020)	Delivery method: Preseason Training Course Procedure: Two-day course (including a theoretical part and a practical part of FIFA 11+ exercises) Facilitator: Researcher Target: Coaches	FIFA 11+ (Level 2)	Conventional Warm up	3 times a week for 8 weeks.	Muscle strength and balance ability was assessed in all subjects at baseline.	Balance ability, concentric hamstring strength and muscle ratio was increased. Statistical significant differences were found, after the completion of the FIFA 11+ training program, in stability index (total and anterior – posterior) ($p < .05$), in concentric and eccentric flexors strength ($p < .05$) and conventional H/Q ratio ($p < .05$).
Lopes et al. (2020)	Delivery method: Preseason Workshop Procedure: Oral and practical presentation. 11+ programme manual, posters, and video support were provided. Facilitator: Researcher Target: Coach	FIFA 11+	Conventional Warm-up	2 times a week for 20 weeks.	Players' baseline characteristics. Exposure and Injury Registration	The incidence of injuries was reduced. the overall incidence of injuries per 1000 player-hours was significantly higher in the control group (11.6 vs 6.5; mean difference (95% CI) −5.1 (−9.1 to −1.1), P = .014). The 11+ group had a significantly lower incidence of acute (11.2 vs 5.7; −5.5 (−9.4 to −1.6), P = .007) and lower limb (8.7 vs 4.4; −4.2 (−8.1 to −0.4), P = .032) injuries per 1000 player-hours. Players from the control group had a

						higher number of days injured (20.4 ±17.3 vs 10.5±9.1, P = .036).
McKenzie et al. (2019)	Delivery method: Unclear Procedure: Delivered twice a per week (trainer) and once a week (coach). Facilitator: Unclear Target: Qualified Trainer and Coach.	Netball Dynamic Smart Warm-up (Adapted from FIFA 11+)	Conventional Warm-up	3 times per week for 7 weeks	The Y-balance, the 20-meter straight line sprint (split sprint timings), the T-test (change of direction speed), jump performance (vertical and horizontal jump), the prone hold, and the time-to-stabilisation are all evaluated (TTS).	There was improvement in some of the physical performance outcomes measured. Significant improvements in prone hold (β=20.46 s; p =0.01) and vertical jump (β = 6.73 cm; p = 0.01) were found in the intervention group compared to the control group, while horizontal jump was found to significantly decrease (β =-9.86cm; p = 0.03) in comparison to the control group.
Whalan et al. (2019)	Delivery methods: Preseason Workshop Procedure: Showed videos of all exercises in the 11+ programme, explained the goal and needed technique for each exercise, instructed on the method and criteria for stage progression in Part 2, and emphasised the positive influence coach delivery has on the programme's efficacy. Facilitator: Researcher	FIFA 11+	Modified FIFA 11+ Part 2 of the programme rescheduled after training	2 times a week for one season (28-34 weeks)	Injury count, injury severity, injury incidence (total number of injuries/total football exposure (h) 1000 h), days lost due to injury, and injury type, locations, and methods	The occurrence of serious injuries was reduced. Compliance of the players to the programme was improved. No significant between group difference in injury incidence rate (P2pos*t* vs Standard-11+ = 11.8 vs 12.3 injuries/1000 h) was observed. Severe time loss injuries > 28 days (33 vs 58 injuries; *P* < .002) and total days lost to injury (4303 vs 5815 days; *P* < .001) were lower in the P2post group. A higher 11+ program dose was observed in the P2post (29.1 doses; 95% CI 27.9-30.1) versus Standard-11+ group

	Target: Coaches and medical staff.					(18.9 doses; 95% CI 17.6−20.2; *P* < .001).
Nawed et al. (2018)	Delivery method: Familiarization session Procedure: Unclear Facilitator: Unclear Target: Players	FIFA 11+	Conventional Warm-up	5 times a week for 12 weeks	Vertical jump, 20-yard sprint run, Illinois agility run and t-test.	There was an improvement in vertical jump and sprint ability of the players. Vertical jump and sprint speed were significantly improved in the FIFA 11+ program group compared to the control group (p< 0.05). No statistically significant difference in agility parameters (p> 0.05) was found between the groups.
Nouni-Garcia et al. (2018)	Delivery method: Exposure and provision of DVDs Procedure: Club started to implement 'the 11' protocol twice a week in the in 2010. Facilitator: Team Physiotherapist Target: Players	FIFA 11+	N/A	2 times a week for 2 seasons	Incidence of hamstring and Lateral Ankle Ligament injury. The type of injury and the position field.	Occurrence of hamstring and lateral ankle ligament injuries were reduced. 18 hamstring injuries (injury rate (IR) of 2.26 injuries/1000 training+competition hours) and 15 LAL injuries (IR of 1.88 injuries/1000) were registered in the exposed group. In the unexposed group, there were 25 LAL injuries (IR of 3.14 injuries/1000) and 35 hamstring injuries (IR of 4.39 injuries/1000). The number needed to treat to prevent one new case was 3.9 in LAL injuries, 3.31 in biceps

						femoris injuries and 10.7 in recurrent hamstring injuries.
Ayala et al. (2017)	Delivery Method: Workshop Procedure: Unclear Facilitator: A trained rehabilitation specialist Target: Players	FIFA 11+	Harmoknee	3 times a week for 4 weeks.	13 physical performance measures (range of motion [hip, knee, and ankle joints], dynamic postural control [measured throughout the Y-balance test], single legged hop limb symmetry, sprint times [10 and 20 m], jumping height and agility).	The intervention programme showed better improvement in reducing poor physical performance in postural control and neuromuscular control which are risk factors for the development of injuries among soccer players. Significant between-group differences (in favour of the FIFA 11 + players) were found for dynamic postural control (anterior [2.5 %] and posteromedial [7.2 %] distances), single legged hop limb symmetry (side-to-side symmetry during a triple hop test [8.3 %]), 10 (8.4 %) and 20 (1.8 %) sprint times and jumping height (9.1 %) neuromuscular outcomes. For the Harmoknee, significant differences (in comparison to its paired control group) were found only for 10 (2.7 %) and 20 (2.9 %) m sprint times and jumping height (9.7 %).

Al Attar et al. (2017)	Delivery Method: Preseason Instruction by researcher. Procedure: pre-training exercises for 20 minutes before training sessions and for 10 minutes as post-training exercises after training sessions Facilitator: Researcher Target: Coaches, Physiotherapists	Pre-Training FIFA 11+ and post training exercise programme	Pre-Training FIFA 11+	2 to 3 times per week for one season (24 weeks)	Incidence of overall injuries; incidence of initial and recurrent injuries and injury severity.	Injury occurrence was reduced post intervention. The pre and post FIFA 11+ program reduced the total number of injuries ($x2(1) = 11.549$, $p = 0.001$) and the incidence of initial injury ($x2 (2) = 8.987$, $p = 0.003$) significantly more than the pre-FIFA 11+ program alone. However, the odds of suffering a recurrent injury were not different between the two groups ($x2 (1) = 2.350$, $p = 0.125$). Moreover, the severity level of injuries was not dependent upon whether or not the pre and post FIFA 11+ program was implemented ($x2 (1) = 0.016$, $p = 0.898$).
Silvers-Granelli et al. (2017)	Delivery Methods: Exposure Procedure : received an instructional FIFA 11+ DVD, prevention manual, and explanatory placards describing the FIFA 11+ intervention (www. f-marc.com/11plus). Facilitator: Researcher Target: Team	FIFA11+	Conventional Warm-up	2-3 times per week for a season	A secure Internet-based system was used to gather and document compliance with the FIFA 11+ programme, sports exposures, specific injuries, ACL injuries, and time lost due to injury.	The programme showed potential to reduce the rate of ACL injuries among the population. A lower proportion of athletes in the intervention group experienced knee injuries (25% [34 of 136]) compared with the control group (75% [102 of 136]; relative risk [RR],0.42; 95% confidence interval [CI], 0.29-0.61; p\0.001).

Hammes et al. (2015)	Delivery Method: Training Procedure: The intervention group performed "FIFA 11+" at the beginning of each team training session. Facilitator: Sport Scientists Target: Players	FIFA 11+	Conventional Warm-up	1 day per week for 1 season (36 weeks).	In accordance with the international the consensus statement, player exposure hours and injuries were reported.	Performing the intervention programme once a week was not effective in preventing injuries. . No significant difference was found between INT and CON in overall injury incidence (incidence rate ratio [IRR]: 0.91[0.64–1.48]; P = 0.89). Only severe injuries reached statistical significance with higher incidence in CON (IRR: 0.46 [0.21–0.97], P = 0.04).
Silvers-Granelli et al. (2015)	Delivery Method: Exposure Procedure: an instructional FIFA 11+ DVD, an injury prevention manual, and explanatory placards describing the FIFA 11+ intervention at length (www.f-marc.com/11plus). Facilitator: Researcher Target: Team	FIFA11+	Conventional Warm-up	3 times a week for the season	A database for injury surveillance was used (HealtheAthlete™, Overland Park, Kansas). Every sports exposure, injury, use of the 11+ programme, and compliance statistics were recorded weekly.	Injury rate reported was significantly reduced by 46.1% and the time loss to injury was significantly reduced by 28.6%. In the CG, 665 injuries (mean 6 SD, 19.56 6 11.01) were reported for 34 teams, which corresponded to an incidence rate (IR) of 15.04 injuries per 1000 AEs. In the IG, 285 injuries (mean 6 SD, 10.56 6 3.64) were reported for 27 teams, which corresponded to an IR of 8.09 injuries per 1000 AEs. Total days missed because of injury were significantly higher for the CG (mean 6SD, 13.20 6 26.6 days) than for the IG (mean 6 SD, 10.08 6 14.68 days) (P = .007). There was no difference for time loss due to

						injury based on field type (P = .341).
Owoeye et al. (2014)	Delivery Method: Preseason workshop Procedure: Practical sessions were organized and materials such as posters, booklets manuals and DVD were also as reference guide Facilitator: Researchers Target: Head Coaches and Assistant Coaches.	FIFA11+	Conventional Warm-up	At least twice very week for a season (36weeks)	Time-loss injury to the players, injuries by type of exposure (match/training) and all injuries to the LEs. The secondary outcomes were injuries by body location, injuries by onset (acute or overuse), injuries by aetiology, mechanism, and severity.	The occurrence of injuries was reduced. the FIFA 11+ programme significantly reduced the overall rate of injury in the INT group by 41% [RR = 0.59 (95% CI: 0.40 – 0.86; p = 0.006)] and all lower extremity injuries by 48% [RR = 0.52 (95% CI: 0.34 – 0.82; p = 0.004)].
Impellizzeri et al. (2013)	Delivery Method: Preseason Training Procedure: assigned to each team for administrating "FIFA 11+". Facilitators: Fitness Coaches. Target: Teams	FIFA11+	Conventional Warm-up	3 times per week for 9 weeks	Time-to-stabilisation test and eccentric/concentric flexors strength. Secondary outcomes were eccentric/concentric extensors strength, star excursion balance test, core-stability test, vertical jump, sprint, and agility.	The participants that performed the intervention programme for 9 weeks showed improvement in neuromuscular control and strength of the flexors. After controlling for covariates, significant between-group differences after the intervention (in favour of the "FIFA 11+" players) were found for time-to-stabilisation (-2.8%, 90% confidence interval [CI] -4.4 to -1.2%) and core-stability (-8.9%, -14.6 to -3.1%). Differences were also found for eccentric (3.8%, 1.4 to 6.2%) and concentric flexors strength (3.2%, 0.6 to

						5.9%) at 60° · s-1 but this difference was only possibly meaningful (62.4%) from a practical point of view.
Grooms et al. (2013)	Delivery Method: Exposure to the FIFA 11+ Procedures: Clinician (a certified athletic trainer and strength and conditioning specialist with 3 years' experience) supervised and instructed participants in both the referent standard warm-up and F-MARC 11intervention for each season. Facilitator: Athletic trainer and Strength and conditioning specialist Target: Team	FIFA11+	Conventional Warm-up	Done before every training for 2 seasons	Lower extremity injury risk and time lost to lower extremity injury.	The risk of injury and the severity of lower limb injuries were reduced in the intervention group compared to the control group. The injury rate in the referent season was 8.1 injuries per 1000 exposures with 291 days lost and 2.2 injuries per 1000 exposures and 52 days lost in the intervention season. The intervention season had reductions in the relative risk (RR) of lower extremity injury of 72% (RR ¼ 0.28, 95% confidence interval¼0.09, 0.85) and time lost to lower extremity injury (P ,.01).
Steffen et al. (2013)	Delivery Method: Preseason Exposure and Coach Focused Workshop Procedure: online access. coaches randomised to the 'regular, coach-focused intervention group' teams in the 'comprehensive, player-focused intervention group' were assigned a study	FIFA 11+ with supervision	FIFA11+ without supervision	2-3 times a week for 4.5months (18 weeks)	Playing exposure, adherence to the 11+, and injuries were recorded for female 13-year-old to 18-year-old players. Performance testing included the Star Excursion Balance Test (SEBT), single-leg balance, triple hop, and	The implementation of the programme was successful in both groups with a reduction in injury occurrence and improved functional balance. Although, the various delivery methods did not affect the players physical performance significantly. Overall, the high adherence to the programme was reported by both groups.

	physiotherapist who assisted the coach in the instruction and supervision of the 11+ programme. Facilitator: Researcher Target: Coaches, Players, Physiotherapists				jumping-over-a-bar tests.	Teams in the comprehensive and regular intervention groups demonstrated adherence to the 11+ programme of 85.6% and 81.3% completion of total possible sessions, compared to 73.5% for teams in the control group. Compared to players with low adherence, players with high adherence to the 11+ had a 57% lower injury risk (IRR 0.43, 95% CI 0.19 to 1.00).
Gatterer et al. (2012)	Delivery method: Training Procedure: Unclear Facilitator: Exercise Physiologist Target: Team	FIFA 11	Conventional Warm-up	3-4times per week for 20 weeks	Incidence of injury Severity of injury. Jump and flexibility tests	There was no significant effect of the programme on injury reported. The total injury rate for team (P=0.081). The relative risk was 2-fold higher in the 7thcompared to the 6thleague team (P=0.0285 one tailed). The intervention and the control team in the 6th league was 3.3 (CI 0.7-5.9) and 4.3 (CI 1.3-7.3) injuries/1000 h, respectively (P=0.841). The 6thleague control team tended to have a lesser injury rate compared to the 7thleague
Longo et al. (2012)	Delivery method: 1-day instructional course Procedure: The coaches were familiarised with the	FIFA11+	Conventional warm-up	3-4 times a week for a 9-month season (36 weeks)	The primary outcome was any injury to the athletes. Type of exposure (match or training), location in the	There was a reduction in reported injuries. In the intervention group, injury rates per 1000 athlete-exposures were lower than

	programme during the seminar to teach the exercises to team members. Additional materials downloaded from the FIFA website was provided. Facilitator: Training conducted by researchers. Target: Coaches and Team Captains				body, and type of injury (acute or overuse). The secondary outcomes were any injury to the lower extremity (foot, ankle, lower leg, knee, thigh, groin, and hip).	those in the control group, with statistical significance, for overall injuries (0.95 vs 2.16; P = .0004), training injuries (0.14 vs 0.76; P = .007), lower extremity injuries (0.68 vs 1.4; P = .022), acute injuries (0.61 vs 1.91; P\.0001), and severe injuries (0 vs 0.51; P = .004). The intervention group also had statistically significant lower injury rates for trunk (0.07 vs 0.51; P = .013), leg (0 vs 0.38; P = .007), and hip and groin (0 vs 0.25; P = .023) compared with the control group.
van Beijsterveldt et al. (2012)	Delivery method: Preseason workshop. Procedure: Instruction to integrate The11 in the warm-up of each practice session. In addition, coaches received a detailed information package (DVD, poster, and reader) presenting the basic elements of the injury prevention programme. Facilitator: Training conducted by researcher Target: Coaches	FIFA 11	Conventional Warm-up	At least twice a week for a season September to May (36 weeks)	Injury incidence per 1000 h of soccer participation (I). This was calculated according to the formula I=(n/e) ×1000, where n is the number of soccer injuries and the total exposure time expressed as total hours of soccer participation.	There was no significant difference in the incidence and severity of injury between the groups. Players in the intervention group reported less knee injuries. In total, 427 injuries were recorded, affecting 274 of 456 players (60.1%). Compliance with the intervention programme was good (team compliance=73%, player compliance=71%). Contrary to the hypothesis, injury incidences were almost equal between the two study groups: 9.6 per 1000 sports hours (8.4–11.0) for the intervention group and 9.7 (8.5–11.1) for the control group.

Soligard et al. (2008)	Delivery Method: Pre-season Instructional Course Procedure: Coaches and team captains from all clubs in the intervention group were invited to a three-hour instructional course They received an instructional DVD showing all the exercises in the programme, a loose-leaf exercise book, and small exercise cards attached to a neck strap as well as a poster explaining every exercise. Facilitator: Certified instructors. Target: Coaches and team Captains	FIFA 11+	Conventional Warm-up	2 times a week for the season. (32 weeks)	Injuries to the lower extremity (foot, ankle, lower leg, knee, thigh, groin, and hip)	The risk of severe injuries, overuse injuries and injuries in general was reduced. 121 players in the intervention group and 143 in the control group (rate ratio 0.71,95%confidence interval 0.49 to 1.03). In the intervention group there was a significantly lower risk of injuries overall (0.68, 0.48 to 0.98), overuse injuries (0.47, 0.26 to 0.85), and severe injuries (0.55, 0.36 to 0.83).
Steffen et al. (2008)	Delivery Method: Preseason Seminar Procedure: Certified instructors had been introduced to the intervention programme during a seminar, where they received theoretical and practical training in the programme and were instructed in how to teach the	FIFA 11	Conventional Warm-up	20 minutes every training session for 15 consecutive sessions and there after once a week for the rest of the season.	Injury incidence and rate	The intervention showed no effect on the occurrence of injury. No difference was observed in the overall injury rate between the intervention (3.6 injuries/ 1000 h, confidence interval (CI) 3.2–4.1) and control group (3.7, CI 3.2–4.1; RR51.0, CI 0.8–1.2; P50.94) nor in the incidence for any type of injury. During the first 4 months of the season, the training program was used during 60% of the

	exercises to the teams. All coaches and players received a detailed brochure describing the intervention programme, how the exercises should be performed properly, as well as common errors. Facilitators: Certified instructors Target: Coaches and Players					football training sessions, but only 14 out of 58 intervention teams completed more than 20 prevention training sessions

N/A= Not applicable; Conventional Warm-up= described by authors as the regular warm-up the teams usually carried out.

Delivery method in the context of this study was considered as what was done to transfer the information about the FIFA11+ to the target audience.

Procedure in the context of this study was how the delivery method was executed.

4.6.2. Implementation strategy

The following components for the implementation strategy were extracted (Table 2) and detailed below.

Delivery methods: Most studies used workshops, training sessions, and information sessions to deliver the FIFA 11+ to coaches and players, organized mainly by the researcher or research team (Table 2). However, some studies were not very clear regarding the procedures and format of the delivery of the workshop. Some were able to classify the workshop delivery as coaches and captains targeted and indicate the duration of such workshops. In contrast, others only stated a workshop was conducted without providing additional details like frequency or duration. In some other cases, medical staff were involved in the workshop training. Supplemental materials on the FIFA 11+ and after the workshops were also provided alongside in some instances, i.e., DVDs, manuals, posters, and online resources for FIFA11+ for the coaches, medical personnel, and players to reference. Some studies only indicated coaches were instructed to implement the programme or were exposed to the programme. Details of how these exposures to FIFA 11+ were conducted are unclear in many instances. Some studies indicated providing the information to the coaches' players and medical staff and describing how the exercises are carried out correctly. However, some indicated the workshops format conducted were 3-hour instructional courses (Soligard et al., 2008) , one day (Longo et al., 2012) and two day sessions (Arsenis et al., 2020) involving oral and practical presentations .

Procedure: Most of the studies, 18 (82%) explained how the delivery of the programme was done. Few of the studies (18%) did not include details of how information about the FIFA 11+ was transferred.

Facilitators: As most of these studies are randomised control trials, the researchers and their team often conduct the workshops. These facilitators train the coaches, team captains, teams, and medical staff where available. The coaches and medical staff then train players, in some other instances players are also trained directly by the research team.

Period and frequency: Over 90% of the studies implemented the FIFA11+ programme at least two times per week for a duration of a minimum of 20 minutes per session when players are

familiar with the programme. However, it was not clear the period required when the players are being trained and taught before they could learn effectively. Most studies indicated the programmes were performed twice a week as recommended by F-MARC, but others reported once, thrice, and up to four times a week.

4.6.3. Compliance/Follow Up

Most of the studies (73%) indicated what was done to ensure compliance during the implementation process (Table 3). Eleven studies reported compliance results (Soligard et al., 2008, Whalan et al., 2019, Steffen et al., 2008, van Beijsterveldt et al., 2012, Nuhu et al., 2021, Silvers-Granelli et al., 2017, McKenzie et al., 2019, Gatterer et al., 2012, Al Attar et al., 2017, Longo et al., 2012, Owoeye et al., 2014). For instance, the researcher checks on the teams to ensure they perform the exercises correctly and the minimum recommended frequency of twice a week. This was either on the phone or e-mail and scheduled or unscheduled on-site visits to the teams. Sometimes coaches are asked to fill out a compliance form that includes how many sessions of the programmes were carried out, for how long, and how many players participated. Most of the studies also reported team and player compliance percentages as well. However, the definition and measure of compliance do not seem to be standardised.

Understanding that behaviour is influenced by social circumstances in addition to individual knowledge, motives, abilities, and resources, we can say that 'adherence' is a process shaped by the environment (Vrijens et al., 2012). This definition emphasises that the suggested intervention is just one of many options, and that the extent to which an individual chooses to act on that option might vary over time and between different contexts (McKay and Verhagen, 2016). The term "compliance" is used to describe when a patient follows the advice of their healthcare provider in terms of the dosage, timing, and frequency of an intervention (Sackett and Haynes, 1976) This requires the measurement of behaviour relative to a fixed standard, and the results must be interpreted with reference to deviations from this standard. Researchers frequently use the terms "compliance" and "adherence" interchangeably without distinguishing between them.

Although 'uptake' measurement is a developing paradigm, research terminology and operationalization should be appropriate for the topic at hand. 'Compliance' is appropriate in efficacy studies since they are conducted under controlled conditions with defined intervention prescriptions to assess versus real behaviour (McKay and Verhagen, 2016). When things get down to brass tacks, though, coaches and athletes often have divergent goals when it comes to things like results, health, team chemistry, and the ethos of the sport as a whole. This means that, despite the intentions of the studies, the extent to which interventions are adopted will be influenced by factors such as the values and priorities of individuals and organisations. As a result, the term "adherence" should be used instead of "compliance" in pragmatic trials, effectiveness studies, and discussions of implementation outside of research settings (Zwarenstein et al., 2008).

Table 4.3 shows the description of the procedures to ensure compliance, as well as the compliance results were reported. The compliance procedure was reported verbatim as explained by the authors for each of the studies.

Table 4:3: Reported compliance outcomes

Author(s)	Compliance/Follow Up	Author reported compliance outcomes
Nuhu et al. (2021)	"The instructor and the principal investigator visited the intervention group coaches once a week for the first month of the season, followed by monthly visits to foster implementation and compliance. Additional instructions were provided where necessary. The research assistants collected the completed forms twice a month. The medical personnel recording the injuries and research assistants were blinded to the group".	Compliance level was reported as 77% based on the training and match sessions.
Nuhmani (2021)	Not detailed	Not reported
Arsenis et al. (2020)	"Two external fitness coaches were assigned to each team for administrating the programme and for checking the warm-up"	Not reported
Lopes et al. (2020)	"All teams were visited at least once a week (approximately 20 minutes per visit) by the researcher and an assistant to ensure the correct delivery of the programme, to provide support regarding the programme, and to record the exposure to 11+ and injury registration"	Not reported
McKenzie et al. (2019)	Not detailed	Compliance, recorded as the presence of the player at each training session was 56% and 67% in the intervention and control group respectively.
Whalan et al. (2019)	"Collected by an allocated on-site primary data collector (PDC), a qualified sports trainer, who attended all training sessions and matches. All PDCs completed at least 6 hours of training including how to record programme compliance, injury and exposure data recording, injury definitions, and details regarding the correct delivery of the 11+ programme".	Compliance measured as player dose exposure was 32.7% and 57.7% for standard and P2 post group respectively.
Nawed et al. (2018)	Not detailed	Not reported
Nouni-Garcia et al. (2018)	Not detailed	Not reported
Ayala et al. (2017)	"A trained rehabilitation specialist was assigned to each team for checking the warm-ups and assisting the coaches during the normal warm-up (control group)".	Not reported

Al Attar et al. (2017)	"The investigator visited one team selected randomly from each group each week throughout the study period (once a week for the control group and twice a week for the experimental group) to motivate the teams and to ensure that the programme was being followed conscientiously and correctly".	Compliance measured as the players' participation rate was 83% and 77% for the experimental and control group respectively.
Silvers-Granelli et al. (2017)	"Compliance to the FIFA 11+ programme, athletic exposures, specific injuries, ACL injuries, and time loss resulting from injury were collected and recorded using a secure Internet-based system".	Not reported
Hammes et al. (2015)	Not detailed	Not reported
Silvers-Granelli et al. (2015)	"The Certified Athletic Trainer (ATC) indicated on which days the FIFA 11+ programme was completed, and which athletes participated in the training".	Compliance was measured by the reporting utilisation consistency. The mean utilisation per team was 30.47±12.16 FIFA 11+ sessions.
Owoeye et al. (2014)	"Weekly information on the extent of team and player compliance with the FIFA 11+ programme was obtained from the coaches in the INT group on separate compliance forms. Teams in the INT group were constantly reminded and encouraged through their coaches to implement the exercise programme through regular phone contacts by one of the authors and during weekly data collection by study physiotherapists at training venues".	Team and player compliance was reported as 60% and 74%. The outcome measured was not clear.
Impellizzeri et al. (2013)	"The research assistant made unannounced and random visits to the teams during the study to check the correct execution of the study protocol".	Not reported
Grooms et al. (2013)	"Compliance with the training programme was tracked at every in-season practice and game by the attending athletic trainer".	Not reported
Steffen et al. (2013)	"All teams identified a team designate who was responsible for daily and individual exposure registration (participation in practices and matches (in minutes), 11+ sessions, including single 11+ exercises)".	Compliance was not specifically reported but the authors reported that teams with coach focussed intervention (4.7) completed more 11+ exercises than teams in the player focussed delivery intervention (3.5).

Gatterer et al. (2012)	Not detailed	Compliance was reported as less than 90%.
Longo et al. (2012)	"During the season, coaches were contacted by the researchers at least twice a month by e-mail and telephone to increase their compliance to the programme. In this way, coaches could have questions answered about the warm-up programme and/or injury and exposure data collection. To boost compliance, we also used information material for coaches and players downloaded from the FIFA website and encouraged them to personally look at the FIFA website. Furthermore, the fact that all teams belonged to the same club allowed us to facilitate follow up visits throughout the season to make sure that the 11+ programme was correctly implemented".	Compliance was reported as 100%.
van Beijsterveldt et al. (2012)	"During the season, practice sessions of each team were visited by observers and members of the research staff each month. The purpose of these visits was to monitor the actual use of implementation of the The11 injury prevention programme in the intervention group".	Compliance measured as rate of completion of the intervention programme of all practice sessions was 73% and 71% for team and player respectively.
Soligard et al. (2008)	"Each session the coaches quantitatively recorded whether the warm-up programme was carried out, as well as the participation of each player in the programme (yes/no)".	Team and player compliance was 77% and 59.4% respectively.
Steffen et al. (2008)	"The instructors visited the teams in the intervention group three times during the initial training period, with a booster visit immediately after the 7-week summer break to encourage the teams to continue using the training programme. In addition, the first author (K. S.) was in regular contact with the coaches, i.e., by phone/mail and by site visits on the pitch. Implementation of the prevention programme in the selected teams by the instructors took about one and half months. At the first prevention training session, the coaches in the intervention group received a compliance form to record participation in the prevention programme. Detailed information was requested on the duration of each session in minutes, and the number of attending players".	Team and player compliance was reported as 60% and 67±10% respectively. Team compliance was measured as the use of the programme at all training sessions and player compliance was measured as the average player attendance.

4.6.4. Summary of findings

This scoping review primarily indicated across studies that the implementation strategy of the FIFA 11+ consisted of a task-shifting approach, coach-focused and team education where the researchers/instructors train mainly the coaches to disseminate and implement the programme with

the teams. Coaches seem to have a recurring role as the key figures in impacting the training of the FIFA 11+ to their teams. These training programmes were also typical conducted in the preseason period as teams prepare for the season ahead. This strategy might be to enable teams integrate the programme with their existing regimen and have enough time ahead before the season kicks off. To monitor compliance, teams were visited periodically by the researcher/research team or followed up remotely to encourage the team to carry out the programme and answer any questions during feedback. Compliance as a construct was often used interchangeably with adherence even though they have different meanings from literature narratives. The mode of measurement of compliance were not indicated in some studies and sometimes only just mentioned. Where compliance was measured, there were no consistent way of measuring or documenting it.

4.7. Discussion

This scoping review aimed to evaluate the implementation strategies and compliance for the FIFA 11+ used in football team settings. There is established knowledge that the burden of injuries associated with football can be mitigated by engaging in injury prevention (O'Brien and Finch, 2014). Studies have shown expansively that injury prevention using the FIFA 11+ has proven its efficacy in reducing the burden of non-contact injuries in football by up to 50% (Soligard et al., 2008, Bizzini and Dvorak, 2015). As these results are endearing in controlled RCT settings, the challenges of injury prevention and implementation are still evident in real-world settings and a better understanding of the implementation context is important to succeed (Finch and Donaldson, 2010).

Our results showed that since the inception of the FIFA 11+, over 80% of the studies reviewed and included in this study were conducted in developed countries and high resourced environments, with only two studies conducted in Sub Saharan Africa. The main implementation strategy inferred for the FIFA 11+ is a preseason structured education for coaches and teams to be empowered. The coaches are often targeted with the knowledge to translate to their teams, occasionally with the support of team captains and medical personnel where available using a task-shifting approach. The coach has been identified to play a critical and vital role in the implementation plan, adoption, compliance, and overall implementation of such a programme (Bakare et al., 2021). The concept

of task shifting as defined in health care delivery is a process of delegation whereby tasks are moved where appropriate or from a highly specialised workforce to less specialised healthcare workers due to scarce human resources. Specific responsibilities are transferred, shared, or delegated from highly skilled health practitioners to persons with less training or qualifications, such as lay people (Orkin et al., 2021). This can also be useful for sports injury prevention, especially in low-income settings, as there are very limited sports medicine experts and resources to address the burden of injuries that may arise because of football participation. Investing in coaches' and teams' education and empowerment needs to be purposefully driven by the football associations and stakeholders.

The commitment of the Football Federations/Associations in sub-Saharan Africa in providing support within the scarce resources to amateur teams in general and particularly to Women's football hence a need to actively promote injury prevention in football within these limitations to enhance participation and development in line with FIFA's Women's Football agenda (FIFA, 2019). To improve adoption of the FIFA11+ several components of the implementation strategy such as education, awareness, improving self-efficacy to influence behavioural changes are needed. It might also be useful to have the FIFA 11+ integrated into the coaches' educational curriculum when getting their license to practice.

4.7.1. Adoption

Over 80% of the studies were carried out in developed countries with substantial material and human resources, which might be responsible for the broad awareness and use of the FIFA 11+. Only two studies have been conducted in sub-Saharan Africa, and lack of awareness and resources may account for limited studies in this area. They, however, reported similar outcomes in their result, reporting its efficacy in the region but being limited to two studies alone makes it difficult to generalise. The efficacy reported could be because F-MARC provided physical materials to the researcher in Nigeria who also benefited from training of the cohort by a train-the-trainer programme supported by F-MARC and a CAF certified instructor provided support for the study in Rwanda facilitated by the Football Federation. This corroborates the narrative review by Bizzini and Dvorak (2015), stating a future direction for the programme needs a substantial commitment

of the national football governing bodies (Member Associations of FIFA) to implement FIFA 11+ at the country amateur football level.

The commitment of the Football Federations/Associations in sub-Saharan Africa in providing support within the scarce resources to amateur teams in general and particularly to Women's football hence a need to actively promote injury prevention in football within these limitations to enhance participation and development in line with FIFA's Women's Football agenda (FIFA, 2019). To propagate the message of injury prevention in football to end-users, it is important that all stakeholders are aware of it and the right messaging approach is used. It might also be useful to have it integrated with the Coaches' educational curriculum when they are getting their license to practice. Enabling coaches the freedom and flexibility to adapt and modify the exercises also enhance adoption of the programme, (O'Brien et al., 2017) and rescheduling aspects of the FIFA11+ does not negatively impact the efficacy of the programme (Whalan et al., 2019).

4.7.2. Implementation

Most of the studies adopted preseason targeted education to enlighten teams about the benefits of injury prevention and use of FIFA 11+ programmes. Specifically providing additional information to the stakeholders largely coaches, players, and sometimes medical staff were available with additional materials in the form of online resources, flyers, posters, and DVDs for reference. Many of these sessions targeted coaches as the lead who essentially play a pivotal role in the success of the implementation of this programme with teams with or without additional supervision (Steffen et al., 2013). Similarly, in the African studies, this approach was adopted, and they reported similar outcomes to their other counterparts around the globe reporting the effectiveness of the programme. Using a 'teach the teacher' technique, 'The 11' was incorporated with the Swiss Football Association's (Schweizerischer Fussballverband™ (SFV)) coach education for the countrywide campaign in Switzerland. Sports physical therapists trained all SFV instructor coaches on how to administer the programme in their licensing or refresher courses. Over the course of three years, 5000 licensed amateur coaches were taught how to do 'The 11' with their teams and given the necessary knowledge (Junge et al., 2011). The same technique was utilised in New Zealand, where the 'SoccerSmart™ Programme' included the implementation of 'The 11 (Dick et al., 2009).

Some of the key factors that contribute to the barriers to the implementation of the FIFA 11+ is the coaches' knowledge of the FIFA 11+ and time constraints, amongst other things (Donaldson et al., 2019). A workshop provides the avenue for coaches to learn the programme from experts and build confidence in taking charge of the team whilst also improving their knowledge base on the importance of injury prevention and how it directly contributes to their team's success. The workshops were facilitated as theory and practical sessions, emphasis on the education of correct performance of the exercises and the minimum number of sessions per week required. Many studies were suggestive that the coaches are positioned to lead the injury prevention programmes in their teams with shared responsibility alongside other stakeholders knowing the coach's leadership position. In sports, the relationship between the coach and the athlete is frequently one-sided, with the coach serving as the player's mentor, leader, and guide throughout his or her career (O'Brien et al., 2018). Other studies indicated that coaches were "exposed" to the FIFA 11+ or instructed to implement the programme in their teams, but it is unclear how exactly this was done in detail.

4.7.3. Compliance

To effectively maintain the implementation of the FIFA 11+, measure of compliance and adherence were highlighted. At the same time, researchers frequently use the terms "compliance" and "adherence" interchangeably; the two words have different connotations (McKay and Verhagen, 2016, World Health Organisation, 2003). When describing the dynamic and intricate changes that are required to evaluate interventions over time, the concept of adherence has been chosen as the more applicable concept. (McKay and Verhagen, 2016).

The strategy to target team coaches in the pre-season education is most likely linked to improving team adoption, compliance, and adherence. Some of the studies measured compliance but did not indicate clearly how. Compliance was often used synonymously with adherence in many of the studies, and there was no standardised measure of compliance. In an instance it was reported to have been measured using a self-report questionnaire or a compliance sheet indicating Yes or No that the FIFA 11+ was carried out. A compliance officer within the team was also reported to be assigned to ensure the report form is completed, and team captains have been named in a couple of instances. High adherence to the FIFA 11+ has been demonstrated to be more effective in the reduction of injury rates. Coach-led FIFA 11+ delivery was as successful with or without the

oversight of a physiotherapist on the field following a coaches' workshop. When coaches were properly informed during a detailed preseason session, the FIFA11+ programme was more effective in terms of team adherence (Steffen et al., 2013). Coaches are a constant figure in the low resource setting in Women's football, and they play a key role in this task-shifting approach to transfer the knowledge and expertise of injury prevention to end-users. Provision of other support structures such as the researcher following up with teams via e-mail and phone as well as site visits to training sessions to engage with coaches and provide then adequate support to build confidence administering the FIFA11+ was also reported (Longo et al., 2012).

4.8. Conclusion

The outcome of this scoping review identified that coach-targeted educational workshops is the main strategy of implementing the FIFA11+ injury prevention programme in team settings. This was proven successful with or without additional supervision by medical support staff. Additional materials provided to teams to support the implementation initiative such as flyers, posters and online resources prove useful as well. Compliance was reported in some studies, but there was no standardised measure of for reporting it. It was also used interchangeably with the term adherence. Compliance was measured from the individual (player) and as a group (team) standpoint in certain instances. Most studies that measured compliance or had compliance measures in place reported efficacy of the programme. This indicates that compliance is a key factor for the programme to be effective.

4.9. Summary of chapter four

This chapter is the results of the scoping review presented in a manuscript format. It summarises the available evidence within the set time frame of the review for implementation strategies and compliance for the FIFA11+_ injury prevention programme. Our study reported that targeting coaches' and team' education often facilitated by a preseason workshop is the main implementation strategy for the FIFA 11+ dissemination. Compliance was in some instances also reported but it did not have a standardized reporting format to ensure consistency. It was also however reported that it is still a major challenge with implementation of injury prevention

programmes across most studies. The next chapter explores the modified Delphi study to develop the implementation guide for the FIFA 11+ programme in low resource setting.

5. CHAPTER FIVE: DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ IN A LOW-RESOURCE SETTING: A MODIFIED DELPHI STUDY.

5.1. Manuscript details

This chapter aimed at describing the development of an implementation guide for FIFA 11+ in a low resource setting - presented as a manuscript.

5.2. Abstract

Background: Low-income settings experience challenges of implementing injury prevention programmes. It is widely known that key considerations for the broad ecological context of implementing any injury prevention programme is essential. The aim of this study was to establish consensus amongst key stakeholders and develop an implementation guide for the FIFA 11+ comprehensive warm-up programme in low resources setting such as the USSA women's' football league in South Africa.

Methods: Thirty-eight statements were developed for the modified Delphi process from themes related to adoption, implementation, maintenance, stakeholder roles, educational and training format, and compliance with a consensus defined at ≥ 50% for round one and ≥ 80% agreement for round two. Panel members were stakeholders in football, injury prevention and sports medicine (e.g., coach, player, physician, physiotherapist, and sports scientist) across a broad range of practice settings. Two Delphi rounds were conducted via email invitations with the RedCap™ survey. Results from round one was collated, and anonymised comments were synthesised at the commencement of round two.

Results: Fifty-five panel members were invited across the stakeholder's expert population spanning four continents. Forty-two experts responded to the invitation and were recruited for the Delphi study (76.4% of target), with 28 (66.7% of target) respondents at the end of the first round of the Delphi and 20 (71.4% of target) respondents at the end of the second round. In round one, the consensus was achieved for 16/16 statements (100%), arising from adoption (3/3), implementation (9/9) and maintenance (4/4) domains. In round two, the consensus was 17/21 statements (81%) arising from domains on the role of the stakeholders (6/6), education on sports

injury prevalence (3/4), surveillance and injury prevention (4/4), FIFA 11+ adoption and implementation (4/4), compliance and adherence (3/3) and motivation strategies (0/3).

Conclusion: Our study showed that consensus was achieved amongst experts in the key components of developing an implementation guide tailored to the low resource setting in South Africa. This might provide the much-needed template from the implementation guide to provide the direction and support for stakeholders in the implementation of the FIFA 11+ programme in a low resource setting to aid compliance and adherence in achieving injury prevention goals.

Keywords: FIFA11+, Implementation Guide, Football, Delphi, Compliance

5.3. Introduction

Football-related injury is widespread, regardless of the level of professionalism. Also, regardless of gender, the most common football injuries are knee, hamstring, groin, and ankle injuries (Crossley et al., 2020, Pfirrmann et al., 2016). In addition to the usual injuries seen in both men's and women's football, there are injuries that have persistently high incidence seen in women, such as anterior cruciate ligament injuries (Crossley et al., 2020). As a result of their hormone state and pelvic-hip ratio, they have a higher Q-angle and more joint laxity. Women have been reported to have a higher risk of ACL injury than men (Crossley et al., 2020). The burden of injuries in football participation is of significant public health concern with equally significant economic implications.

Football is a demanding, high intensity, contact sport that has a high probability of injury. The lower extremities account for 82.9 percent of football player injuries, with 68.5 percent of those being acute (Stubbe et al., 2015). Knee injuries are the most dangerous in terms of lost time, whereas muscle and tendon injuries are the most prevalent lower extremity injuries (Stubbe et al., 2015). A total of 30,844 injuries were considered and taken into account in a review which comprised of studies including male, female and youth players. The overall injury incidence ranged from 0.6 to 20.3 injuries per 1000 hours of exposure (Klein et al., 2018). The risk of injury was higher during match play (2.84–101) than during training (0.61–11.6), however the proportion of injuries obtained during training was slightly higher than the proportion gained during matches (26.9–79.5 percent vs. 20.5–73.1 percent) (Klein et al., 2018). Overall, football injuries were most common in the lower limbs (affected in 65–100% of cases) (Klein et al., 2018).

A significant number of injuries have a direct impact on the team's performance in football (Carling and Orhant, 2010). A high injury rate can have major ramifications for players, clubs, and public health systems (Faude et al., 2006). A study found the overall injury cost for 3864 knee injuries was US$ 4,268,014 in a sample of 3611 people from various team sports (Loes et al., 2000). Female football players incurred the largest costs for knee injuries, averaging US$ 1,861 per injury (Loes et al., 2000). These statistics demonstrate that injuries are a substantial concern in team sports, and that effective preventive measures must be implemented. Football injuries constitute an important public health problem and cause a high economic burden. The average cost of an injury in nonprofessional soccer amounted to €4030 (bias-corrected and accelerated 95% confidence interval (BCa 95%CI): 3427-4719). Persons aged 30 years and older experienced 35%

of soccer injuries but accounted for 49% of all costs. A total of 58% of all costs were the result of injuries that occurred during amateur games (Gebert et al., 2020).

In particular, game injuries sustained by players in separate leagues for players aged 30+/40+ years led to high average costs of €8190 (BCa 95%CI: 5036-11,645). Knee injuries accounted for 25% of all injuries and were responsible for 53% of all costs. Although contact and foul play did not lead to above-average costs, twisting or turning situations were highly cost relevant, leading to an average sum of €7710 (BCa 95%CI: 5376-10,466) per injury (Gebert et al., 2020).

To implement an injury prevention programme such as the FIFA11+ a host of factors need to be considered specific for the context and setting (Finch and Donaldson, 2010). While much time and effort have been spent describing the details of interventions and the evidence that supports them, implementation research also necessitates detailed information on what specific implementation strategies were implemented, why and how they were chosen and delivered, and how effective they were in reaching and influencing the behaviour of the targeted audience (Finch, 2011). It is not enough to describe implementation activities in broad terms (e.g., 'instructors were familiarized with the programme during a 2-hour seminar, during which they received theoretical and practical training on how to conduct the programme' (Olsen et al., 2005) and 'football/soccer coaches received SoccerSmart™ education and the above resources from a trained presenter/ facilitator' (Gianotti et al., 2010). Important information on how these methods were implemented should also be included (Donaldson and Finch, 2013).

There is growing interest in developing, extensively implementing, and evaluating evidence-based injury prevention programmes in sports. Navigating the literature to evaluate the evidence and bridging the gap between the research setting and the real-world implementation context, on the other hand, is difficult (O'Brien and Finch, 2014). The impact of any injury prevention programme is determined by the programme and how it is implemented. There are however unique challenges with implementation of health intervention programmes in a low resource setting compared to developed countries (Pantoja et al., 2017). There are limited resources, accessibility, and affordability for health care, and it can be inferred that there is also limited sports medicine support to cater for the injuries associated with football participation. As participation in football is increasing in sub-Saharan Africa (SSA), it is key to mitigate the burden of injuries associated with participation and injury prevention education is pertinent (Bakare et al., 2021).

The goal of providing an implementation guide is to assist in identifying and summarising typical requirements that can provide support for the coaches and teams to achieve injury prevention goals. The purpose of this study was to create, based on expert opinion and practical experience, an implementation guide to efficiently deploy FIFA 11+ in the target landscape using a methodical and scientific methodology by means of a Delphi study.

5.4. Methods

5.4.1. Study design

A consensus-based strategy was used, based on a modified Delphi procedure in this study. Consensus, sometimes known as 'collective agreement,' designs are used in a range of settings, including developing recommendations and regulations in instances when there is minimal evidence. The Delphi technique necessitates numerous administrations of anonymized surveys, usually in two or three rounds (Clayton, 1997). The modified Delphi technique was chosen over the consensus development technique and the nominal group technique as these techniques need participants to meet face to face. Due to the necessity to collect data across the globe where the diverse experts come from, a Delphi study seemed most suitable for the aim of this study.

5.4.2. Population and sampling

Appropriate selection of `expert panel members', or participants, is critical in promoting robustness and data validity. For this Delphi, the inclusion criteria of the expert panel were at least 2 years of experience their specialty domain. The expert population was diverse to include stakeholders in the FIFA11+, injury prevention, football, implementation which included sports medicine, sport physiotherapy, sports science etc. as the stakeholders and end users who are coaches and players. The expertise required for the Delphi included being knowledgeable in the area of interest of football, injury prevention and the FIFA 11+.

The researcher employed several approaches such as contacting authors of scientific articles on implementation of injury prevention, conference proceedings related to injury prevention in football and searches on social media including their professional networks, those of colleagues as well as in the research domain of the FIFA 11+. The potential participants were contacted via email and phone. In addition, those unable to participate were requested to nominate other like individuals that fit into the inclusion criteria. This was continued until the required number and types of panel members were recruited. Each potential panel member was provided with full study

information, outlining the aim of the Delphi, the extent and timing of their expected involvement as well as provision of informed consent to participate.

The expert panellists who participated in this modified Delphi study were in two groups. Sports medicine professionals who belong to the FIFA Medical Network across the globe and stakeholders in USSA Women's football in South Africa. They were invited to participate via e-mail and phone. No identifiers for participant information, and there was minimal to no risk to the participants. No compensation was provided to participants and they could withdraw their participation at any time during the process.

5.4.3. Procedure

This was phase two of the overall research of this doctoral research. It was a modified Delphi process aimed at arriving at a consensus for contents to develop an implementation guide for the FIFA 11+ injury prevention programme. Key outcomes and recommendations from phase one (Study 1 and Study 2) were extracted in addition to information from literature review to develop the statements in round 1. These were used in the development of the structured items of the modified Delphi study in round one. These included:

Study 1: Cross Sectional Survey

Injury Prevention Practices in women's football teams

Study 2: Scoping Review

Implementation strategies and compliance for the FIFA 11+ Injury prevention programme.

Literature review

Studies showed that the positive effect of these programme is dependent on players and teams complying with the prescribed minimum number of injury prevention sessions (Bizzini and Dvorak, 2015).

Knowledge of structured comprehensive injury prevention exist, but the use of comprehensive structured injury prevention protocols such as the FIFA11+ is poor.

FIFA 11+ is effective in preventing non-contact injuries using lower limb injury rates and time-loss.

The ecological context is an important consideration in implementing evidence-based injury prevention exercise programmes (Finch, 2011).

Practice of injury prevention is an integral part of a teams' process

FIFA 11+ for assessment of efficacy were conducted in a team setting and commenced "exposure" or training for the FIFA 11+ programme pre-season.

Barriers such as poor compliance, adherence, uptake are challenges. Time constraints are the main barriers to adherence, while knowing that the programme enhances performance is seen as a major facilitator (Shamlaye et al, 2020).

Coaches are perceived as authority figures by players and the players believe the coach's injury prevention knowledge is sufficient.

Coaches directed and or players workshops were conducted for the implementation of the FIFA11+ pre-season.

Task shifting approach is adopted. Experts train coaches and or players (team captains) Coaches/Team Captains train the team after acquiring the knowledge for a period and they carry on through the season (Al Attar et al, 2016).

Teams acknowledged that having medical support for teams is essential in achieving injury prevention goals and access to medical support is poor or non-existent.

Implementation was carried out during the sporting season or over a determined period of time.

99% of the studies were implemented in upper middle income and high-income countries.

The key steps along the path from a successful RCT to large-scale, real-world injury reductions are neatly outlined in the Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework, which was developed to improve the transfer of evidence-based programme into practice (O'Brien et al, 2018).

Compliance officer within the teams to monitor implementation

Intervention of FIFA 11+ was done at least twice a week and intervention period ranging from 7 weeks to 36 weeks.

After the first round of the survey with additional input and revision from the experts, the feedback was synthesized to develop the implementation guide draft. The components of the draft were then sent out as round two of the Delphi. Two rounds of input were sufficient to collect the information required and to achieve consensus. An online survey via Red Cap™ was administered for each round to determine consensus (Day and Bobeva, 2005).

Maintaining Rigour

To reach a predetermined consensus criterion, a set of questions were posed repeatedly in each round. Experts were provided with regulated feedback, with the previous round's outcomes presented as aggregated statistical indices. All the material supplied in the controlled feedback with the expert panel was presented in an aggregated way to encourage collaborative thought without identifying or singling out any one participant.

Round one: Each panel member received an email with a link to the online questionnaire via RedCap™. In addition to the Delphi statements, each panel member's biographical information, country, practise environment, and qualification were all recorded in the online questionnaire. Each statement had a three-week deadline for ranking levels of agreement or disagreement. Each statement had a comment area that allowed for justification of responses as well as the suggestion of new statements. At weekly intervals, all panel members received a reminder email. Data from the online questionnaire was exported to Microsoft Excel for descriptive analysis (frequencies and percentages) to determine whether each statement had reached consensus. Written responses were subjected to a content analysis (Graneheim and Lundman, 2004).

Round two: The round two questionnaire required participants to rate the domains of the implementation guide developed from the feedback in round one. A three-week deadline was given for completion and return. Reminders were sent weekly to the participants. All 28 respondents of round 1 Delphi study were invited to participate. There were a total of 20 respondents accounting

for 71% of the target. Following the results of round two, areas of disparity and conformity were identified.

A total of twenty-one items for the second round of the Delphi were developed from the findings and suggestions that achieved consensus from the experts to constitute the draft of the implementation guide.

The content of the implementation guide was divided into three sections and it includes:

- Section one: Role of the stakeholders – the role of the individual and goals.
- Section two: Education on sports injury prevalence, surveillance, and injury prevention
- Section three: FIFA 11+ Adoption, Implementation,
- Section four: Compliance and Adherence
- Section five: Motivation strategies

5.4.4. Development of statements

A total of 17 statements for the first round of the Delphi were developed from the findings generated from outcomes and recommendations in studies in phase 1 and literature review by the researcher and research team. The statements focused on adoption, implementation, and maintenance of the FIFA 11+ considering the broad ecological context of the low resource setting in South Africa. Draft statements were developed and reviewed by the authors for appropriateness, content, and clarity. These statements where then included in the first round of the Delphi with additional options to provide open ended feedback by experts. The Round one questionnaire was developed in RedCap™ and functionality pilot tested by the researcher.

5.4.5. Consensus determination

Participants rated their level of agreement or disagreement with each statement on a five-point Likert scale (Reips and Funke, 2008) : strongly disagree; disagree; undecided, agree, and strongly agree. A set number of rounds; subjective analysis; a certain level of agreement; average percent of majority opinions cut-off rate; mode, mean, median ratings and rankings; interquartile range; coefficient of variance; and post-group consensus; are all means of identifying consensus available in literature for Delphi studies (Heiko, 2012). While there is no consensus on the optimum strategy,

a "certain level of agreement" is the most utilised and deemed suitable for the purpose of this study. Furthermore, whereas 70 percent (sum of agree and strongly agree) is typically reported in the literature (Diamond et al., 2014) , the consensus for the first round was set at 50 percent and the second round was set at 80 percent (summative of agree and strongly agree) for each individual statement.

5.5. Data analysis

Data was summarised using measures of central tendency (mean, median, and mode), frequencies and percentages to present information relating to descriptive statistics and the collective judgments of participants in this study. The experts' opinions were analysed using thematic content analysis (Braun and Clarke, 2006) to summarize their suggestions and present in a tabular form.

5.6. Results

5.6.1. Response rate

Sixty experts were identified to be recruited for the modified Delphi study. Forty-two experts responded to the invitation and were recruited (76.4% of target), with twenty-eight (66.7% of target) respondents at the end of the first round of the Delphi and twenty (71.4% of target) respondents at the end of the second round. The recruitment process is seen in Figure 5.1.

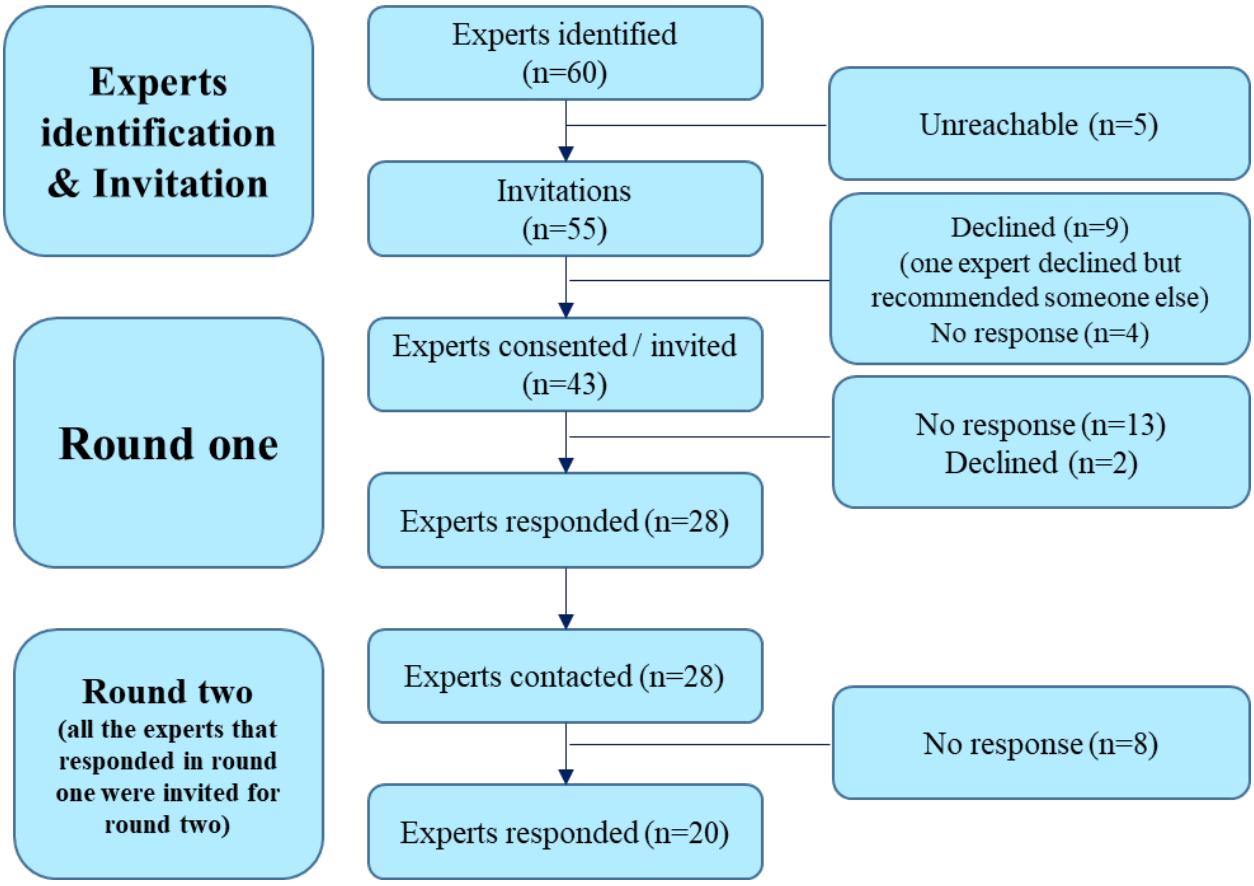


Figure 5:1: Modified Delphi recruitment and process.

DELPHI ROUND ONE

5.6.2. Demographic characteristics of the participants

A total number of 28 participants responded to the open-ended questions for the Delphi round one. Physiotherapists represented the highest number of respondents (60.7%) followed by players (17.9%) and Sport Scientists (10.7%). The educational background of experts was diverse with 35.7% with doctoral degrees followed by 28.6% with masters' degrees. They also represent an array of practice settings with research settings leading the way at (46.4%), followed by football teams (35.7%) and Sports Clinics (35.7%). Many of the participants work in multiple work settings hence chose all that is applicable to them. The median (interquartile) years of experience of the participants was 15 (9.5 – 21.5) years. Table 5.1 shows the demographics of participants in round 1 of the modified Delphi study. This includes designation, educational levels, and work settings.

Table 5:1: Demographic characteristics (n=28)

Designation	n	%
Coach	1	3.6
Medical doctor	1	3.6
Exercise Scientist	1	3.6
Physiotherapist	17	60.7
Player	5	17.9
Sports Scientist	3	10.7
Education		
Bachelor's degree	5	17.9
Doctorate (Ph.D.)	10	35.7
Master's degree	8	28.6
Postgraduate diploma	3	10.7
Matric / Grade 12 / High school leaving certificate	1	3.6
Habilitation degree	1	3.6
Gender		
Lesbian	2	7.1
Man	15	53.6
Woman	11	39.3
Settings*		
Research	13	46.4
Football team	10	35.7
Sports clinic	10	35.7
Education	12	42.9
Hospital	6	21.4
Others (player and external expert)	3	10.7
Private practice	7	25

Performance center	1	3.6
*n=62 (some participants work in multiple overlapping work settings hence chose more than one.		

5.6.3. Geographical distribution of the participants

A total of 28 experts responded to the Delphi study round one. Majority of the experts (61%) were from Africa (South Africa, Nigeria, Zambia, and Tunisia) representing the highest percentage of participants. European experts represented 29% of the population whilst Australia and North America represented 7% and 3% respectively as shown in Figure 5.2.



Figure 5:2: Geographical distribution of the participants

5.6.4. Frequency of training and proposed facilitator of the FIFA 11+ programme

Most (75%) of the experts indicated that the FIFA11+ should be conducted at least 2-3 times a week. Coaches were considered as the leading facilitator with 75% of responses followed by medical personnel (64.3%) and players (42.9%). Table 5.2 indicates the frequency of training and proposed facilitator of the programme in the team setting.

Table 5:2: Frequency of training and proposed facilitators of the FIFA 11+ programme

How often should the FIFA 11+ training be carried out?	**n (%)**
Once a week	1(3.6)
Twice a week	8(28.6)
Three times a week	13(46.4)
Four times a week	1(3.6)
Other	2(7.1)
No response	3(10.7)
Who should facilitate the FIFA 11+ implementation programme in the team?	
Coaches	21 (75)
Players	12 (42.9)
Medical personnel	18 (64.3)
Others	3 (10.7)

The experts had the option to select more than one item from the list.

5.6.5. Adoption, implementation and maintenance of the FIFA 11+

Table 5.3 shows the responses to the statements in the sections of adoption, implementation, and maintenance.

Table 5:3: Adoption, Implementation and Maintenance of the FIFA 11+

Adoption	Strongly agree n (%)	Agree n (%)	Undecided n (%)	Disagree n (%)	Strongly disagree n (%)	Agree n (%)	Strongly agree n (%)
The adoption of the FIFA 11+ is largely based on players' and coaches' perception that it contributes to team success.	7(25)	13(46.4)	3(10.7)	3(10.7)	0	2(7.1)	71.4%
The adoption of the FIFA11+ is based on the coach's personal commitment to injury prevention.	10(35.7)	10(35.7)	5(17.9)	1(3.6)	0	2(7.1)	71.4%
The Player's reduction of non-contact injuries because of the FIFA 11+ programme could be an incentive to adopt the programme.	8(28.6)	15(53.6)	3(10.7)	0	0	2(7.1)	82.2%
Implementation	**Strongly agree n (%)**	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**	**Strongly agree n (%)**
There should be provision for off-field sessions or on field (practical) sessions	9(32.1)	9(32.1)	4(14.3)	3(10.7)	1(3.6)	2(7.1)	64.2%
There should be provision for on and off field (practical) sessions	12(42.9)	5(17.9)	7(25)	2(7.1)	0	2(7.1)	60.8%
The FIFA11+ should be done on match or training days considering time challenges as reported by coaches.	5(17.9)	10(35.7)	8(28.6)	1(3.6)	1(3.6)	3(10.7)	52.7%
The FIFA 11+ should be done on match and training days considering time challenges reported by coaches.	5(17.9)	13(46.4)	4(14.3)	2(7.1)	1(3.6)	3(10.7)	64.3%
The FIFA 11+ should be modified and adapted to suit coaches' adoptability and adherence.	7(25)	11(39.3)	5(17.9)	1(3.6)	1(3.6)	3(10.7)	63.4%
The FIFA11+ should be self-training or team training focused.	5(17.9)	7(25)	7(25)	3(10.7)	1(3.6)	5(17.9)	42.9%
The FIFA 11+ should be self-training and team training focused.	10(35.7)	10(35.7)	1(3.6)	3(10.7)	0	4(14.3)	71.4%
A certified FIFA 11+ instructor should expose the team to the programme.	7(25)	11(39.3)	1(3.6)	4(14.3)	1(3.6)	4(14.3)	64.3%
Maintenance	**Strongly agree n (%)**	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**	**Strongly agree n (%)**
The workshop should adopt the task shifting approach.	2(7.1)	19(67.9)	2(7.1)	1(3.6)	0	4(14.3)	75%
The frequency of the programme would help with adherence and compliance.	4(14.3)	17(60.7)	4(14.3)	0	0	3(10.7)	75%

The team captains should be assigned to oversee compliance.	4(14.3)	10(35.7)	8(28.6)	3(10.7)	0	3(10.7)	50%
Emphasizing team performance and injury prevention is important to maintain the FIFA 11+ programme	12(42.9)	12(42.9)	1(3.6)	0	0	3(10.7)	85.8%

Adoption: All the experts had > 70% consensus agreement on all the items of this section indicating factors that enhance adoption.

Implementation: The experts had > 50% consensus agreement on all the items of this section indicating the plan for the FIFA 11+ implementation except for the statement "The FIFA11+ should be self-training or team training focused" and this was disregarded for the next round as there was agreement on a similar statement that considered "The FIFA 11+ should be self-training and team training focused" at 71%.

Maintenance: The experts had ≥ 50% consensus agreement on all the items of this section indicating the plan for maintenance of the programme.

Figure 5.3 shows the synthesis of all additional comments by the experts.

Synthesis of suggestions from round one

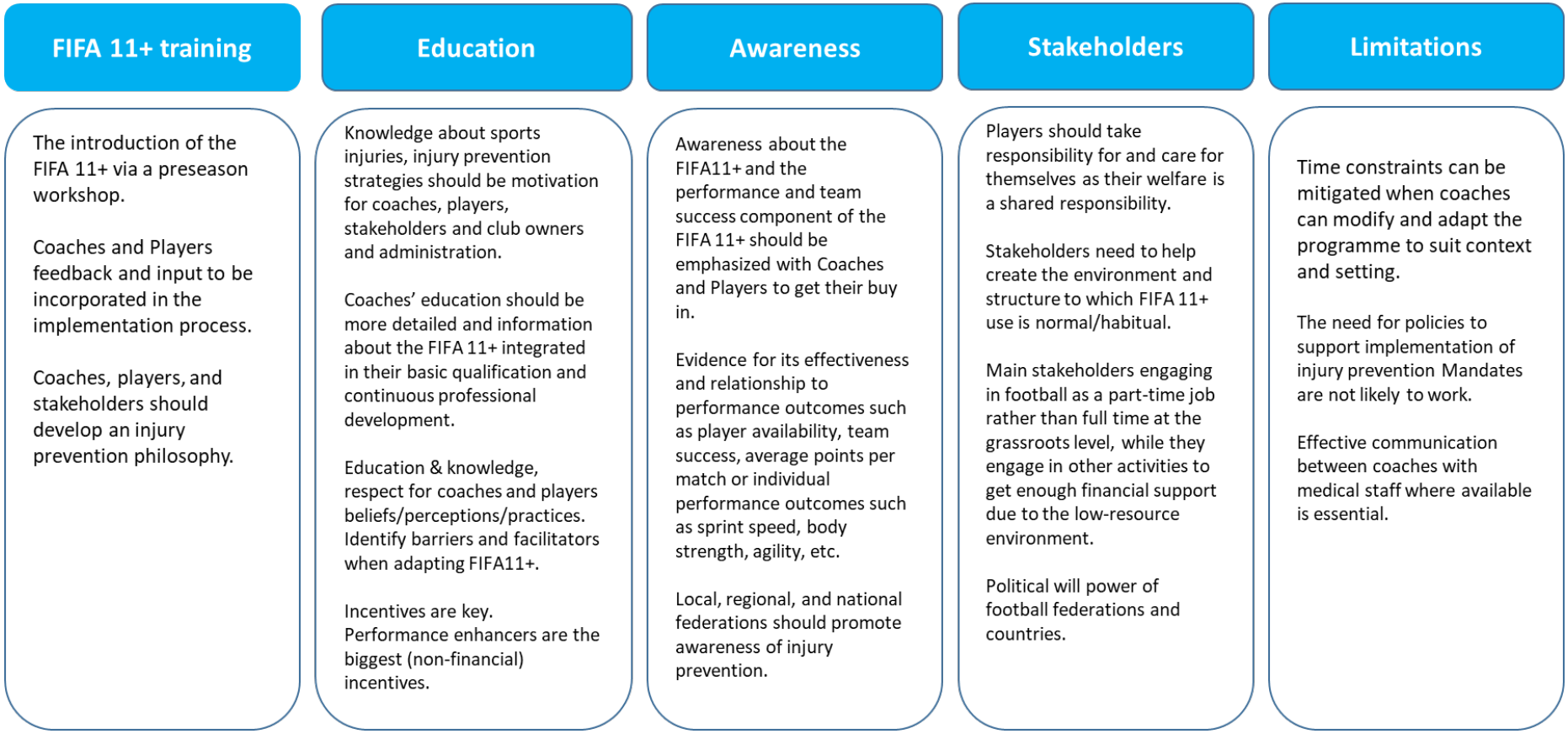


Figure 5:3: Summary of all the suggestions from Delphi one

Synthesis and collective feedback of all panel members' Round 1 responses was used to develop the implementation guide draft.

DELPHI ROUND TWO

5.6.6. Demographic characteristics of the participants

A total number of 20 participants responded to the 2nd round of the modified Delphi. Physiotherapists represented the highest number of respondents (70%) followed by players (15%) and Sport Scientists, Exercise Scientist and a Coach which was the lowest representation (5%). The participants also represented an array of practice settings with research leading the way at (40%), followed by football teams (35%) and Private practice settings (30%). Many of the participants work in multiple work settings hence chose all that is applicable to them. The median (interquartile) years of experience of the participants was 11 (8.5 – 24). The demographics of all participants in round 2 of the Delphi is highlighted in Table 5.4.

Table 5:4: Demographic characteristics of the participants (n=20)

Designation	**n**	**%**
Coach	1	5
Exercise scientist	1	5
Physiotherapist	14	70
Player	3	15
Sports scientist	1	5
Highest level of qualification		
Bachelor's degree	4	20
Doctorate (Ph.D.)	4	20
Master's degree	3	15
Other	5	25
Post-doctorate	2	10
Postgraduate diploma	2	10
Gender		
Man	11	55
Woman	9	45
Settings		
Research	8	40
Football team	7	35
Sports clinic/performance center	3	15
Hospital	5	25
Private practice	6	30
Education	1	5

*some participants identified more than one work setting (n=29)

5.6.7. Domains of the implementation guide

Domain statements for the implementation guide were suggested in round one by the panel experts under additional comments. All the feedbacks were grouped and synthesized to provide the statements in the sections in round two as content of the implementation guide.

Table 5.5 shows the responses to the statements in the sections of role of stakeholders and individuals, education on sports injury prevalence, surveillance and injury prevention, FIFA 11+ adoption and implementation, compliance and adherence and motivational strategy.

Table 5:5: Responses to the domains of the implementation guide (n=20)

Role of stakeholders and individuals (n=20)						
	Strongly agree n (%)	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**
Do you agree with the identified stakeholders?	10(50)	8(40)	1(5)	0	1(5)	90%
Do you agree with the role of the facilitators?	8(40)	8(40)	2(10)	2(10)	0	80%
Do you agree with the role of the coaches?	6(30)	13(65)	0	1(5)	0	95%
Do you agree with the role of the players?	8(40)	10(50)	1(5)	1(5)	0	90%
Do you agree with the role of the volunteers?	6(30)	11(55)	2(10)	1(5)	0	85%
Do you agree with the role of the goals?	6(30)	12(60)	1(5)	1(5)	0	90%
Education on sports injury prevalence, surveillance, and injury prevention (n=20)						
	Strongly agree n (%)	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**
Do you agree with the content of the educational programme?	8(40)	12(60)	0	0	0	100%
Do you agree with the mode of delivery?	5(25)	9(45)	6(30)	0	0	70%*
Do you agree with the learning outcomes?	7(35)	12(60)	1(5)	0	0	95%
Do you agree with the designated facilitator of the education programme?	8(40)	9(45)	2(10)	1(5)	0	85%
FIFA 11+ implementation (n=18)						
	Strongly agree n (%)	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree % n (%)**	**Agree n (%)**
Do you agree with the description of the content of the FIFA 11+?	7(38.89)	10(55.55)	1(5.55)	0	0	94.4%
Do you agree with the mode of delivery of the FIFA 11+?	8(44.44)	8(44.44)	2(11.11)	0	0	88.9%
Do you agree with the learning outcomes of the FIFA 11+?	9(50)	8(44.44)	1(5.56)	0	0	94.4%
Do you agree with the designated facilitators in this section?	6(33.33)	10(55.56)	2(11.11)	0	0	88.9%

Compliance and adherence (n=18)						
	Strongly agree n (%)	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**
Do you agree with the action plan for compliance?	8(44.44)	7(38.89)	2(11.11)	1(5.56)	0	83.3%
Do you agree with the goal of compliance?	8(44.44)	9(50)	0	1(5.56)	0	94.4%
Do you agree with the action plan for adherence?	6(33.33)	10(55.56)	2(11.11)	0	0	88.9%
Do you agree with the goal of adherence?	8(44.44)	9(50)	1(5.56)	0	0	94.4%
Motivational strategy (n=17)						
	Strongly agree n (%)	**Agree n (%)**	**Undecided n (%)**	**Disagree n (%)**	**Strongly disagree n (%)**	**Agree n (%)**
Do you agree with the motivational strategy?	6(35.29)	7(41.18)	2(11.76)	2(11.76)	0	76.5%*
Do you agree with the action plan of the motivational strategy?	6(35.29)	7(41.18)	2(11.76)	2(11.76)	0	76.5%*
Do you agree with the goal(s) of the motivational strategy?	6(35.29)	7(41.18)	3(17.65)	1(5.88)	0	76.5%*

*** Accepted as consensus**

Role of stakeholders, individuals, and goals

All the experts had ≥ 80% consensus agreement on all the items of this section highlighting the role of stakeholders, individuals, and goals.

Education on sports injury prevalence, surveillance, and injury prevention

All the experts had ≥ 80% consensus agreement on all the items of the educational programme and the content of the programme except for the question, "Do you agree with the mode of delivery". The statement had 70% consensus and was accepted as meeting the consensus threshold as there were no disagreements and 70% is often considered as achieving consensus in literature (Murray et al., 2020, Shearsmith et al., 2020).

FIFA 11+ implementation

All the experts had ≥ 85% consensus agreement on all the items of this section indicating the plan for the FIFA 11+ implementation.

Compliance and adherence

The experts had ≥ 80% consensus agreement on all the items of this section indicating measures for compliance and adherence.

Motivational strategy

None of the items met the set consensus of 80%, however all the experts had ≥ 75% agreement on all the items of this section of motivational strategies. This was accepted as consensus agreement as it was close to the predetermined 80% which is acceptable in literature (Beiderbeck et al., 2021).

5.6.8. Synthesis of suggestions from round two

Figure 5.4 shows the synthesis of all additional comments by the experts. The suggestions were categorized into themes using thematic content analysis.

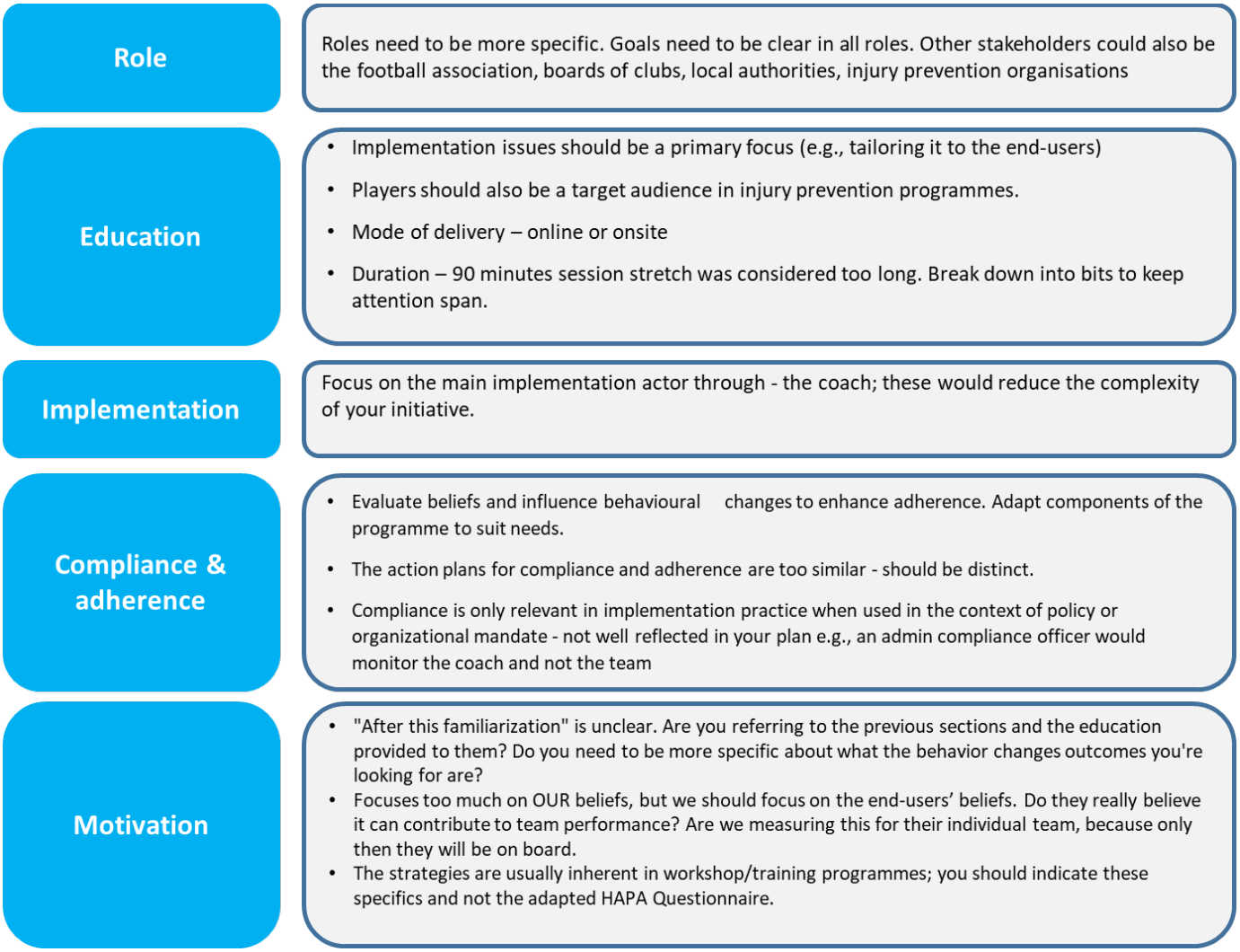


Figure 5:4: The synthesis of all additional comments by the experts.

The developed implementation guide is attached in the supplementary file (Appendix five).

5.7. Discussion

The aim of the study was to develop an implementation guide to the FIFA 11+ in the low-income and -resource landscape such as South Africa, with consideration of amateur women's teams. Experts were recruited across the different areas of expertise from the FIFA Medical Network and stakeholders from the USSA Women's Football League. The panel was to contribute to the process across injury prevention, implementation, football, FIFA11+, rehabilitation, training, and sports medicine. Literature has shown that in creating IPEPs implementation strategy, key personnel from all target levels should be involved. Understanding their objectives, views, and environment can aid in the identification of potential implementation roadblocks and the development of acceptable solutions (O'Brien, 2017). The implementation guide sought to draw on research findings as well as experience to enable the target population to have a better understanding of the how to navigate implementing injury prevention programmes in their specific context and setting.

The draft implementation guide developed was divided into five sections based on the domains identified to become a guideline for implementation of the FIFA 11+ in a low resource setting such as South Africa. The sections of the guide focused on components addressing the role of stakeholders, educational content, the FIFA11+ implementation, compliance, adherence as well as motivational strategies as identified and contributed from the feedback from the expert panel.

5.7.1. Role of the stakeholders – the role of the individual and goals.

Stakeholders by the expert panel identified included, facilitators, coaches, support staff, players, medical personnel, management staff, football associations and volunteers. As this is a diverse group of people with different levels of responsibilities in achieving injury prevention goals, it is important to clarify roles of everyone along with the projected goals. These findings indicate there are numerous individuals and hurdles to navigate in implementing injury prevention programmes, and barriers might occur at multiple levels (O'Brien et al., 2018). Understanding the causes behind these limitations is necessary for improving the real-world impact of these programmes (O'Brien et al., 2018). With roles and responsibilities being clearly defined for each stakeholder, it makes the collective effort more productive and goals attainable.

Having a clear description of roles could improve the overall productivity of the team. This enhanced productivity will eventually contribute to the team's increased momentum and success. Preparing the team for success is key by effectively delegating important responsibilities and

maintaining a fixed timetable (Indeed, 2021). When tasks are clearly defined and stakeholders succeed in their roles, the entire team benefits. Team success is an excellent method to generate momentum for future projects, resulting in increased productivity. The team's confidence will grow as a result of their success. Along with increasing team efficiency, creating functional roles and responsibilities provide several other benefits that could help a team and understanding these benefits motivates team leaders to implement them (Indeed, 2021).

The facilitator has been identified as the anchor/teacher/trainer who is knowledgeable about the FIFA 11+ and teaches the rest of the stakeholders focusing on coach led workshops in adopting a task shifting approach (Orkin et al., 2021). The coach has been identified as the leader of the team in numerous studies who is able to give direction to the rest of the team when they buy-in themselves (McKay et al., 2014, Steffen et al., 2013, Bakare et al., 2021). Coach-led FIFA 11+ delivery following a coaches' workshop, was equally successful with or without the supervision of a physiotherapist on the field. The FIFA11+ programme was more effective in terms of team adherence when coaches were fully educated during a detailed preseason session. (Steffen et al., 2013). The role of support staff, medical staff and volunteers are supportive personnel assisting, the coach in this team leading role. The players are the end-users of the intervention and their support and co-operation are also needed to achieve set goals for injury prevention using an exercised based programme like the FIFA11+.

5.7.2. Education on sports injury prevalence, surveillance, and prevention

The experts agreed that basic education on injury prevalence, surveillance and prevention is important. Stakeholders must have background information and an overview of injury prevalence in their teams using standard injury surveillance methods as well as plan to initiate injury prevention to minimise the burden of injuries associated with football participation. The purpose of the educational section is to provide the much-needed awareness and knowledge about the programme so that the teams can appreciate the why, when, and how to achieve the goals of the programme. Ensuring coaches' and players' education and awareness of injury prevention measures should be treated as an intrinsic component of the process to succeed as major stakeholders (Bakare et al., 2021). The emphasis in both study and practise has been on delivering injury prevention content to coaches, who may subsequently transmit information to players and injury risk information is frequently communicated to the target population as part of prevention programme promotion techniques. (McKay et al., 2016). A systematic review conducted

concluded that adequate knowledge about injury prevention in football reduces the incidence of injury and improves performance (Al Attar et al., 2016).

The educational programme is divided into three sessions to cover topics on, but not limited to: common sports injuries in football and knowledge about basic injury prevention; the introduction to FIFA 11+; and implications of injury prevention. The sessions are proposed to be a pre-season workshops that studies have demonstrated to be effective (Ayala et al., 2017, Lopes et al., 2020, Steffen et al., 2013) and it will be executed in online, onsite or hybrid formats. The cumulative period of any session will be 90mins and sessions will not be longer than 30mins inclusive of breaks to mitigate boredom. The online sessions could be on Zoom, Microsoft Teams or Google meets as these are the current available and accessible online meeting applications. Onsite locations will be determined based on accessibility for teams. Division into smaller groups at the end of every teaching session to recap and engage participants in group activity for reflective learning. Additional educational and reference materials to be provided for all participants that will include but not limited to flyers, newsletters, posters, and instructional videos, online resources (Social Media, websites, YouTube, and Blogposts) linked via QR Code as part of the implementation guide. Injury prevention methods must target a variety of audiences, including players, programme deliverers (e.g., coaches/team staff members), and policymakers (e.g., club officials/governing bodies) (O'Brien et al., 2018). Injury prevention programmes can be integrated into coach education, as well as promoted through social media, applications, and websites, as well as through the endorsement of preventative programmes by football organisations and high-profile figures. More than 95% of health practitioners and academics feel social media has a role in disseminating and gathering research evidence (Tunnecliff et al., 2015).

5.7.3. FIFA 11+ Adoption, Implementation, Compliance and Adherence

The FIFA 11+ is a cost-effective exercise-based injury prevention programme and the equipment needed are footballs, agility cones and a playing field or gym. To improve compliance, it was identified that a compliance officer be designated within the team to monitor team compliance and an accountability partner within the team to monitor individual player compliance. Previous studies used similar measures and compliance has been measured as team and individual player compliance (Owoeye et al., 2014, Steffen et al., 2008, Soligard et al., 2008). Other support mechanisms are in place for follow-up such as the researcher supporting with teams via e-mail and phone feedback (Longo et al., 2012), as well as site visits at training sessions to engage coaches

and provide enough assistance to create confidence in administering the FIFA11+ (Lopes et al., 2020, Impellizzeri et al., 2013, Longo et al., 2012, Al Attar et al., 2018). Improving coaches and players knowledge and confidence about self-care is also a key to take ownership of their sense of responsibility towards themselves. Coaches are encouraged to adopt protocol integration into regular training routine and with flexibility for modification/adaptation (O'Brien, 2017) and well as adapt components to suit needs such as re-schedulling (Whalan et al., 2019).

5.7.4. Motivational Strategies

The experts suggested motivational strategies as factors that can improve adoption, implementation, compliance, and adherence. Motivational strategies employed may include assessment of pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention. Literature has shown that there is potential for improved adoption and compliance when interventions to influence behavioural changes are a component of the implementation programme (McKay et al., 2016, Owoeye et al., 2020b).

Understanding the underlying drivers of behaviour change may aid in informing the content of coach workshops to promote improved programme uptake and retention considering recognized barriers to programme use. Evaluating the behavioural change model using the health promotion framework of the health action process approach (HAPA) questionnaire for coaches and players to assess their perceptions and intentions as part of the implementation strategy can prove useful. In a study by McKay and colleagues, their findings imply that the HAPA model is appropriate for application in this setting, and they emphasise the need of focusing on task self-efficacy and outcome expectancies in FIFA 11+ implementation tactics (McKay et al., 2016).

5.8. Conclusion

This is the first study to our knowledge that is developing an implementation guide for the FIFA11+ injury prevention programme. Our study showed that consensus agreement was achieved amongst experts in areas identified as components an implementation guide to develop a tailored support to the context and setting of South Africa. It is imperative to adopt the holistic approach of clarifying roles of stakeholders, developing an educational component for the whys, when's and how's as well as including a compliance, adherence, and motivational considerations.

This might provide the much-needed support from the implementation guide developed to provide the direction for stakeholders in the implementation of the FIFA 11+ programme.

5.9. Strengths and weaknesses

One of the strengths of this modified Delphi study was the diversity of experts from across the globe with experience and backgrounds in sports medicine. Additionally, most experts are leading researchers and have conducted primary studies with the FIFA11+ injury prevention programme. End-users like the coaches/team managers and players were also part of the Delphi process but limited participation by the end users is a weakness. Other stakeholders who could have provided their perspective to the programme would have been the football team administration given their identified role in providing support for the implementation process of the programme.

5.10. Summary of chapter five

This chapter maps out the modified Delphi process of developing an implementation guide for the FIF 11+ in low resource setting in the context of the women's teams in USSA League football in South Africa. Roles of stakeholders are identifiers as well as other components relevant in the implementation process. It was established that coaches should lead on injury prevention implementation in the team, though support from other members of the team are also important with emphasis on clarity of roles. A task shifting approach is recommended to be employed for the process where the expert trains the coaches and the coaches filter down the knowledge to the rest of the support structure and the team. Factors that may enhance compliance and adherence are also identified and integrated in the implementation guide. Motivational strategies were also identified an integral process to positively influence behavioural change towards injury prevention in a team. The next chapter describes the feasibility testing of the implementation guide with coaches in the setting with which context it was developed.

6. CHAPTER SIX: ASSESSING FEASIBILITY OF THE IMPLEMENTATION OF THE GUIDE FOR THE FIFA 11+

6.1. Introduction to chapter

The overall objective of this study was to assess the feasibility of the implementation of the guide developed for the women's football teams in South Africa. This chapter focuses on the acceptability of implementation guide for the FIFA 11+ in a low resource setting, involving the women's football teams within the context of the USSA league. The chapter is divided into three sections. The first section covers the procedure of training with the teams to familiarise with the implementation guide contents and the demographics of participants. The second section is the results of the study. The third section includes the discussion, conclusion of the chapter and the summary of the chapter.

6.2. Aim and objectives

This phase of the overall study aimed to explore the opinion of coaches on the usability of the guide, the facilitators, and barriers they envisage in implementing the FIFA 11+ women's football teams in South Africa. The focus of the feasibility study is to cover acceptability, implementation, and adaptation of the programme.

6.3. Methodology

Semi-structured interviews (Dearnley, 2005) were used to assess the feasibility of the implementation of the guide by exploring the opinion of coaches on its usability, facilitator and barriers and other issues they might envisage in implementing the FIFA 11+ in their context. A training workshop was conducted foe teams to familiarize them with the content of the implementation guide draft.

6.3.1. Study design

A qualitative exploratory design using semi-structured interviews (Dearnley, 2005) was used. The researcher used a prepared set of questions to obtain data in the structured interview method. The same question set was used for each interview, which allows comparison of transcripts without the interviewee controlling the conversation (St. John et al., 2014). The reporting on this study was guided by the Consolidated Criteria for Reporting Qualitative Studies (COREQ) (Booth et al., 2014).

6.3.2. Setting

The setting was the women's USSA football league teams in the Gauteng Province in South Africa. USSA is the controlling body of all sports played at tertiary institutions in South Africa. The USSA football women's league in the Gauteng province is a flagship amateur football league consisting of typically ten teams in the competition playing in a round-robin format over eighteen weeks.

6.3.3. Population and sampling

A purposive sampling of eligible teams in the women's teams participating in USSA football league was conducted and they were invited to participate in the study. Coaches and teams from the USSA Women's football League in the Gauteng region were invited to participate. Those who provided informed consent were included after reading the detailed information documents provided by the researcher about the study. Participation was voluntary and participants could drop out anytime during the course of the study. Participants were approached via email, phone calls, WhatsApp messaging, short messaging service (SMS) and face to face meetups to participate. The participants who consented were scheduled for interviews after the training to expose them to the implementation guide accordingly. Coaches of the seven teams consented to participate in the interviews to assess the feasibility of implementation of the guide for the FIFA 11+. For confidentiality and anonymity, the coaches were identified as Coach 1-7 and the teams as Team A and B.

6.3.4. Study participants

Coaches from the women's teams participating in USSA football league were invited to participate. Participants were made aware of the purpose of the study which is end goal is to empower them to minimise injury rates in the setting. Potential participants who declined could not provide concrete commitment to participate during the time frame of recruitment, and others declined due to time constraints.

6.3.5. Procedure

The researcher facilitated trainings workshops for teams to introduce them to the implementation guide draft document. Feedback was gathered during the training workshop session from the teams and notes were taken. This was then followed up with interviews with the coaches. The background of the study and the implementation guide development procedure was explained to the participants prior to seeking their opinion on the potential usefulness of the guide and implementation strategies for the FIFA11+. The participants were sampled from the USSA women's football teams and approached to participate in the study. The aim and the process of the study were explained in detail. The interviews were conducted at the convenience of the participants. using semi-structured interview questions (Appendix nine). Workshop training using the implementation guide was conducted on-site at their locations. Interviews were recorded for a minimum of 20 minutes with the Sony ICD-UX570 recorder and transcribed verbatim. Portable storage media an encrypted SD card was used for data storage electronically and all appropriate care taken to ensure data security.

Participating teams received training in the same pre-season on, and off-field workshop conducted at their convenience in their respective locations that lasted between 95-110minutes (Off-field session) and 110 minutes (On-field session), respectively. Team A could not receive the on-field training the same day due to school commitments, but Team B did have their session on the same day. All trainings and interviews were conducted in English. The detailed outline of the off-field and on-field workshops is in the attached supplementary material (Appendix six). Only coaches participated in the interviews. The transcribed report was coded into themes and categories.

6.3.6. Interviewer's personal characteristics

The interviewer was the principal investigator and a female doctoral student of Physiotherapy and a full-time student with clinical and research methods experience spanning over 10 years. The interviewer has additional training on qualitative research methods during studentship. A working relationship was developed between the participants and the interviewer over the course of time during the time span of this research. The participants were briefed in detail about the goals of the research and why the lead researcher is keen to contribute to minimizing the injury burden in teams. The participants were made familiar and reminded with the aim of the research before the commencement of the data collection in this phase.

6.3.7. Maintaining rigour

Data triangulation, peer debriefing to evaluate the data collection method, member checking of obtained data with peers and participants, providing a thorough description of the setting, and using information from past research were all used to ensure credibility (Lincoln and Guba, 1985). At the end of each session, peer debriefing was conducted with a colleague with no interest in the project. Participants' comments were transcribed verbatim, and the accuracy of the opinion validated by the participants when their transcripts was sent to them. A detailed description of the technique was supplied to guarantee that the study could be replicated (Guba, 1981). During the data-gathering phase, field notes were kept. The background and demographic characteristics of the participants were presented in full for transferability.

6.3.8. Ethical considerations

A clear description of the study and procedure was explained to the participants in addition to provision of a copy of the information sheet. All the participants provided informed consent to participate in the interview an audio recording. The researcher explained to the participants that confidentiality could not be entirely guaranteed in qualitative research but would ensure that identifiers would be removed from the transcribed document and in the data presented.

6.3.9. Data analysis

Demographic characteristics of the participants were described using the descriptive statistics. Data were transcribed by the researcher using manual transcription of the audio recording. Two people coded the data. The transcript was coded manually using thematic content analysis, which is a descriptive presentation of qualitative data (Anderson, 2007), with new codes given to emerging themes. The lead researcher read and reread all the transcripts to ensure accurate transcription and to get a sense of the content. One interview transcript was coded inductively by the lead researcher and a colleague vast in qualitative research methods independently. After that, we discussed the broad codes, and developed a preliminary coding framework manually. We discussed the differences in the concepts used and adapted the coding framework. The deductive analysis was conducted on the subsequent transcripts. Similar codes were grouped into sub-categories and categories. A manual display of the categories, sub-categories and codes was conducted by the lead researcher.

Participants' quotes were not identified. Major themes are clearly discussed in the findings.

6.4. Results

6.4.1. Description of the participants

Seven coaches from two teams with an average year of coaching experience of 5.14 ± 3.98 SD years participated in this study, and 43% were females (n=3). All the coaches have a coaching license certification from the South African Football Association with coaching experience ranging from two to ten years. The description of the participants is outlined in Table 6.1.

Table 6:1: Description of participants

Coach	Team	Age (years)	Gender	Education	Coaching experience (years)	Coaching license	Playing experience
Coach 1	A	44	Woman	Grade 12	10	yes	yes
Coach 2	A	30	Woman	B Tech	10	yes	yes
Coach 3	A	22	Woman	Diploma	2	yes	no
Coach 4	B	26	Man	Masters	2	yes	yes
Coach 5	B	24	Man	Bachelors	2	yes	yes
Coach 6	B	26	Man	Honours	2	yes	no
Coach 7	B	28	Man	Bachelors	8	yes	yes

6.4.2. Themes and categories

The main theme that emerged was " Education". The five categories linked to the main theme were:

- Access to education materials
- Capacity Building
- Clarity of roles of stakeholders
- Awareness
- Empowerment
- Clarity
- Knowledge

Other sub themes include:

- Time Management
- Management Responsibility
- Economic and Financial Implication
- Environmental factors
- Technical Limitations

6.4.3. Opinion about the programme

The coaches in the study provided positive feedback about the implementation guide considering it as a guidance document; they felt that it impacted their education about injury prevention, empowerment, awareness, and capacity building and provided feedback within these themes as seen in Table 6.2

Table 6:2: Thematic content analysis - opinion about the implementation guide

Quotes	Code	Themes
"It is good to have a useful guidance document from the experts to help check off boxes especially when you need to learn new things and engage the team to get better…"	Access to educational material or manual	Education
"I think having a manual is great to in providing support to do just about anything which provides support as a team leader to give direction"	Access to educational material or manual	Education
The guide is with detailed educational pointers and will be helpful in many ways. Knowing what to do and how to get it done"	Access to educational material or manual	Education
"For me having all this information will definitely influence the ability to integrate injury prevention programmes with our training"	Access to educational material or manual	Education
"It is very eye opening for capacity building which clearly is needed for us as coaches. Often, we want to try new things, but resources are limited"	Capacity building	Capacity Building
"It is great to see especially with clarity of roles of all stakeholders involved as injury prevention is a collective effort …"	Clarity of role of all stakeholders	Clarity
"It makes sense to have a broad perspective of everyone involved in injury prevention. When we know who everyone contributes to achieve a common goal it is motivating …"	Awareness	Awareness
"The programme is very detailed and relatable in my opinion as a coach who is keen to support the team to the best of my ability…"	Awareness	Awareness
"When you think about it clearly, it puts a lot of things in perspective about the need for injury prevention and considering the context of implementing it tailored for the specific area …"	Empowerment	Empowerment

6.4.4. Adjustment of the programme

The coaches suggested some adjustments to be made to the programme and these adjustments included areas involving role of management, time management, capacity building, technical and coaching, awareness, and education (Table 6.3).

Table 6:3: Thematic content analysis - opinion about what adjustments can be made

Quotes	Code	Themes
"Administrative staff of team management need to be here with us for this session so they can know as they are the ones who will provide other necessary support for the team to succeed on this journey…"	Management responsibility	Role of management
…The executive board and management of the team are key stakeholders too. They should also be part of the target audience for training. That way they are aware of what needs to be done and the technical team won't have to face resistance in getting their support"	Management responsibility	Role of management
"Seems the sessions are for the football felid. Sometimes there is a clash of schedule with other school teams using the field. Can we do the on-field sessions in the gym as possible indoor sessions?"	Venue options	Role of management
"There is just a lot out there. Teams want to play and win. We have learnt so much during this time it is like an information overload."	Knowledge	Knowledge
"The warm-up programme has many things we do already just not in this sequence. Can there be a technical warm-up component included as time is often limited. The ladies are often dealing with works and study commitments and training times are tight knowing we don't have our own grounds"	Technical limitations	Technical and coaching
"What can help us understand as coaches how to positively impact of behavioural changes. I can appreciate the injury prevention works but there is more that needs to be done that just knowing it works. A proactive change needs to be made"	Capacity building	Capacity building
" There is hardly enough time to get through trainings because we don't have our own space.	Time constraints	Time constraints

We share with other teams. We also have full time jobs to sort out before coming here…"		
"We need to be considering time factor challenges as many of us have other side hustles that has to pay the bills. The incentives at the moment are not very encouraging hence resources are limited wena …"	Time constraints	Time constraints
"It is clear that more emphasis is needed on time management. When we have only 90 mins for training in a space w e do not own. We often will need to prioritize but additional information is clear that injury prevention is priority …"	Time constraints	Time constraints
"I think we need this hands-on as more emphasis on reflective learning for the end-users is making it practical for us. Even when we know all the theory in a workshop, we still need regular guidance"	Access to educational materials	Education
". I think there should be an elite version of the FIFA 11+ for professional players…Is there? I see a lot of the programmes have worked with amateur and semi-professionals. The exercises may not match the level of competition at that level'	Access to educational material	Education
"What can help us understand as coaches how to positively impact of behavioural changes. What do we need to do proactively to make changes"	Awareness	Awareness
"It is clear that more emphasis is needed on time management. As we all know the end goal to continue to win and have injury free players, we have to find time…"	Awareness	Awareness

6.4.5. Facilitators

The coaches recognized that there are facilitators that would enable them to succeed in implementing the programme. They suggested factors that would help them implement the programme in their teams including more knowledge about injury prevalence, surveillance and prevention and the sense of empowerment to engage management (Table 6.4).

Table 6:4: Thematic content analysis – facilitators

Quotes	Code	Themes
"The entire team structure including the management needs to come on board with support and co-operation to ensure that the team gets the support needed to sustain the programme…"	Clarity	Clarity
"Can you clarify the distance between parallel cones? It is not clear in the manual for the FIFA11+. The distance between cones was clearly stated"	Clarity	Clarity
"It all seems straightforward, but we may need support from the expert from time to time to help us this process. At least until we are able to get a hang of the process and can run it on our own"	Capacity Building	Capacity Building
As we team, we need better co-ordination and effective communication. To make things work"	Awareness	Awareness
"I am glad I am here now. Injury ended my playing career and if prevent it from happening to my girls with this detailed information, I will do everything to see that happen. I want to do everything within my power to protect the generation I have been lucky to take charge of"	Awareness	Awareness
"I feel that getting empowered to educate players enough and to get their commitment towards this process is very important to take the first step to help prevent injuries in the team and promote the sport"	Empowerment	Empowerment
I feel like I am gaining some confidence as we progress in educating players enough to also get their commitment and they are the ones we are here for, man"	Empowerment	Empowerment
"I am really excited with the knowledge that non-contact injuries risks can be minimized doing the programme. I didn't understand this before now. The programme has only been mentioned once or twice when I was hanging out with colleagues. But no one to really train us and open our eyes like this"	Education	Education
"In my opinion making management understand they will save money is what they always want to hear. Investing in injury prevention will do just that. We can only be able to ensure we upskill out knowledge with their support and in turn help the team to be more productive"	Economic / financial implications	Role of management
"Perhaps we can get SAFA to integrate knowledge in the license courses. There are things mentioned but not enough. We need more detailed training incorporated to give us the necessary capacity we need to support our teams"	Capacity Building	Capacity Building

6.4.6. Barriers

The coaches identified factors that they considered would prevent them from implementing the programme effectively in their teams including time constraints and lack of funding and environmental factors (Table 6.5).

Table 6:5: Thematic content analysis – barriers

Quotes	Code	Themes
"I am the head of the women's programme for soccer in my school. The time to juggle other administrative tasks with training can be challenging"	Multitasking	Time management
"A big issue for us is that players don't arrive on time for training and sometimes matches due to school and or work commitments' It is understandable they have to pay bills when football doesn't pay them for now"	Time constraints	Time constraints
"Getting the team together for preseason on time is always tough. We don't know how to resolve this yet as management may be the one to solve it"	Time constraints	Time constraints
"A big issue for us is that players don't arrive on time for training and sometimes matches due to school and or work commitments' It is understandable they have to pay bills when football doesn't pay them for now"	Time constraints	Time constraints
"I need time to build confidence with the knowledge being transferred to the team to gain their confidence"	Empowerment	Empowerment
"It is often too hot in summertime assumed players don't need to spend much time to warm up because they are already hot…"	Environmental factor consideration	Environmental factors
"The programme is low cost as you mention but the administration still needs to provide enough fund to get new balls from time to time…"	Economic implications	Role of Management
"Let's be honest with ourselves women's team don't enjoy the same privileges as the men's team This needs to change"	Lack of support	Role of Management
"Biggest problem is lack of funding and support from the management hierarchy because they constantly don't have budget"	Lack of support	Role of Management
"We don't get the same privileges for preseason detailed medical screening. We have to battle with a lot of injury worries"	Lack of support	Role of Management

6.5. Discussion

This phase of the study aimed to explore the opinions of teams on the usability of the guide, the content, facilitators, and barriers they might envisage in implementing the FIFA 11+ women's football teams in South Africa. The guide's assessment was unanimously positively received by the cohort of coaches who participated in the study, which they considered a helpful document. They believed that it would help improve their injury prevention knowledge and education to aid injury prevention implementation, capacity building and empowerment.

Our study showed that the coaches are keen to improve their education and their perception is that the guide will help them achieve this. This agrees with the findings of our study conducted to determine the injury prevention knowledge, beliefs, and practices of women's football teams in South Africa. It was found that there was a dearth of knowledge about comprehensive injury prevention programmes and coaches are keen to adopt them if they are more knowledgeable (Bakare et al., 2021). Other studies (Lindblom et al., 2018, Kerr et al., 2018, Mtshali et al., 2015, Donaldson et al., 2019, Owoeye et al., 2017) have identified coaches' education as pivotal to achieving injury prevention implementation so it can be inferred that the guide is positioned to improve their knowledge and will have a positive impact.

Our study has also identified that the team's executive management participation is crucial from the onset of a team's commitment to implement injury prevention. The coaches identified that the role of executive management needs to be explicit and clear in relating to their responsibilities in the guide's implementation and could serve as a facilitator or barrier. They perceived that team management should be actively part of the process of implementation training as this could facilitate adoption.

The role of management is one of the key recurring themes in the thematic analysis. This indicates that the earlier the management's responsibilities are integrated to the training section of the guide, it might be easier to get their commitment to providing the much-needed support for the teams. Players, programme implementers (e.g., coaches/team staff members), and policymakers (e.g., club officials/governing bodies) are all targets for injury prevention measures (O'Brien et al., 2018). Therefore, it is important that the role of management be revised in the implementation guide to add more clarity and identify their other responsibilities that would help facilitate the implementation process. Even though management's role was identified in the guide, they were

not part of from the introductory training workshops. This recommendation will be adopted and revised in the guide's draft.

Our research also revealed that coaches were identified facilitators of implementing the FIFA 11+ during the assessment of implementing the guide. They considered the need to have support and co-operation of the entire team structure with periodic support from the expert on injury prevention to communicate and clarify aspects of the programme they need further support. This is understandable as adoption is not guaranteed by knowledge of a programme or even good intentions to utilize it (Frank et al., 2015). It has been established that in previous studies that the processes of planning and organising programmes as well as how, when and where it will be delivered are critical (O'Brien et al., 2018). Including all target levels in the development phase of injury prevention programmes can identify potential hurdles to acceptance. Different messages for different target levels may be required to improve adoption (O'Brien et al., 2018). The need for an expert to be on hand to provide support from time to time is also an essential component. Studies have shown that follow-ups by an expert have the potential to improve team compliance and adherence to the FIFA 11+ (Ayala et al., 2017, Silvers-Granelli et al., 2015, Al Attar et al., 2017, Longo et al., 2012). The implementation guide has catered for this need and made provision for follow-ups with teams.

They also indicated that educating players enough to get their commitment towards implementation and integrating detailed knowledge about injury prevention in the coaching license courses are also important. Providing detailed education for coaches has been identified in scientific studies as an integral process of facilitating injury prevention (Owoeye et al., 2017, Owoeye et al., 2020). Though coaching education is identified as pertinent in the implementation guide the improvement of their coaching license curriculum by the football association is not detailed in the guide. Therefore, the importance of the coaches' education in injury prevention alongside their certification will be included in the revision of the implementation guide.

Coaches identified the following as barriers where management plays a key role: lack of support, planning, access to facilities/venues and funding for the team as shown in our study. However, the funding concerns can be mitigated as the FIFA11+ is a low-cost evidence-based neuromuscular exercise programme that does not require expensive equipment (Bizzini et al., 2013). Most of the materials necessary all come at a relatively low cost; however, still needs management to make necessary provision which can be a barrier.

They also affirmed making team management understand that it saves money to invest in injury prevention, contributes to facilitation factors. It has been established that injury prevention is a collective effort, and everyone involved with the team needs to play their part in ensuring a successful process with the team management roles identified (O'Brien et al., 2018, Bekker et al., 2019).

The coaches also considered barriers to implementing the guide: which includes time constraints as the ability to juggle other administrative tasks as coaches, players coming in late to training due to work and school commitments, and the pre-season phase of preparation not converging on time which makes time very short before the season kicks off. Task-shifting can assist in mitigating the challenges of time constraints where the coach as the leader of the team can delegate tasks to other members of the support staff including team captains. Team captains have been found to be co-opted in assisting the coaches with the implementation of the FIFA11+ programme (Longo et al., 2012, Soligard et al., 2008). Another way to overcome time constraints is to adapt the programme and reschedule some parts that may not be completed in one single session. A study by Whalan et al. (2019) investigated the effect of rescheduling part two of the FFA11+ found that it was equally effective in reducing injuries.

Interestingly it was raised during the feedback that environmental factors such as weather conditions and heat during summer could pose a barrier to the implementation of the programmes. The coaches expressed that the weather is already very hot in the landscape and players do not need an intense warm-up activity. To the best of our knowledge, there are currently no studies that have examined the impact of tropical summer weather considerations on the FIFA 11+ programme. However, the most significant adjustment to your warmup regimen in the heat is to drastically shorten it. In cycling, a warmup routine of 45-60 minutes , but this should be reduced to roughly 20 minutes in a hot atmosphere (CTS, 2018). There is still a need to spend some time around lactate threshold and make a few high-intensity efforts to engage the lactate-producing and lactate-processing processes, but little as possible is needed to get there (CTS, 2018). The implementation guide will take into account weather considerations and will suggest on-field sessions be adapted for indoor activities in extreme weather conditions, where feasible.

6.6. Summary of the findings

The coaches welcomed the initiative of the implementation guide and considered it a useful guidance document. The coaches suggested that key facilitators of the programme include detailed education, which is perceived as empowerment, and capacity building. Support from the entire team structure and hierarchy was also identified.

The coaches suggested that key barriers of the programme include lack of management support and funding, time constraints and multitasking as well environmental factors such as summer in the sub-Saharan landscape. The areas deficient in the draft were adopted and included in the final version.

Based on the suggestions of the coaches on the guide the researcher will revise key areas of the document including the role of management in the entire process to achieve injury prevention, the inclusion of injury prevention and the FIFA11+ in the coaches' education curriculum to secure their coaching license.

6.7. Strength and weaknesses

The strengths of the study are that coaches who participated all received formal coaching certifications through SAFA as well formal education and these factors may have aided the understanding of the guide. There were also coaches who had playing experience which may have contributed to the perspectives. Years of coaching experience could limit the coaches' feedback on the programme as five out of eight coaches had only two years of experience. Players who are also key stakeholders declining to participate due to work and school commitments. The disproportionate or biased distribution of stakeholders might have impacted the outcome of this study as potential biased responses.

6.8. Conclusion

The aim of this study was to assess the feasibility of implementation of the developed guide to facilitate the implementation of the FIFA 11+ injury prevention comprehensive warm up programme in women's football teams in the USSA League. The coaches who participated in the interviews welcomed the idea of the implementation guide positively suggesting that is a guidance document which provided clarity. They identified suggestions which some will be adopted for the revision of the guide whilst others have been catered for but may require further details. The implementation guide is a useful tool to provide support to facilitate implementation of the FIFA11+ in the contextual setting of the women's football teams in the USSA league in Gauteng.

6.9. Summary of chapter six

This chapter provided the insights into the feasibility of the implementation guide developed for the facilitation the FIFA11+ implementation in the context of the women's football teams in the USSA League. The coaches who participated found the guide useful and considered it a guidance document to empower them and improve their education as well as the teams. The coaches identified facilitators for implementation of the FIFA11+ include detailed education, empowerment and capacity building with support from the entire team structure. The barriers of implementation include role of management in lack of support and funding, time constraints and multitasking as well environmental factors such as summer in the sub-Saharan landscape. The suggestions for revision will be implemented in the final draft of the guide for use. The next chapter will be focussed on an integrated discussion of the findings of all studies that led to the development of the implementation guide.

7. CHAPTER SEVEN: DISCUSSION

7.1. Introduction to the chapter

This chapter includes a consolidative combination of this doctoral research study outcomes entitled "The Development of An Implementation Guide for The FIFA 11+ Injury Prevention Programme Among Female Soccer Players in South Africa". Data were collected mainly from the USSA women's football teams in Gauteng Regions for studies one and four. While study two is a summary of available evidence and study three was a modified Delphi process with an expert panel. The synthesis will explain the findings considering existing literature, as well as the study's limits and strengths. Table 7.1 outlines the summary of the study conducted.

This study aimed to develop an implementation guide for the FIFA 11+ injury prevention programme among women football players in South Africa to facilitate the implementation of a basic evidence-based, comprehensive injury prevention programme in low- resource setting. The overall study results are from a collective of four studies whose results are delineated and represented as chapters in Figure 7.1.

Table 7:1: Summary of the study

	Study I (Phase1)	Study 2 (Phase 1)	Study 3 (Phase2)	Study 4 (Phase 3)
Objectives	To determine the injury prevention practices, knowledge and beliefs in women's football in South Africa	To determine the implementation strategies and compliance factors to the FIFA 11+	To develop an implementation guide for the FIFA 11+ in a low resource setting.	To assess the feasibility of the implementation guide developed.
Data needed	Injury prevention practices, knowledge, and beliefs in women's football teams	Implementation strategies and compliance reported in intervention studies involving the FIFA 11+	Triangulated data from study I to II	Feedback from end-users assessing the content of implementation of the FIFA 11+ guide
Study design	Cross-sectional study	Scoping review	Delphi process	Descriptive exploratory
Target Population	USSA Women's Football Teams Gauteng Region	Databases	Stakeholders and Experts	Selected teams (Participants from Study 1)
Source of data	Validated Questionnaire	Relevant data (published and unpublished) All study designs	RedCap™ until consensus is reached	Semi-structured Interviews
Sample size	107 participants from seven teams	22 articles	Round 1 28 participants Round 2 20 participants	Seven participating teams to be invited
Inclusion criteria	Participants (18 years and above). If below 18 for a player, a guardian assent form required. Must be registered with the teams in the USSA football league in Gauteng. All consenting teams and support staff.	Population: primary intervention studies on the FIFA 11+ Injury prevention programme, which include male and female soccer players, regardless of playing level. Players in other sports who may have used or adapted the programme were considered within the set criteria. Concept: FIFA 11+ Injury prevention approach in football. Context: Team settings	Experts in the field of injury prevention and the FIFA 11+ including stakeholders such as coaches and players in the setting.	Participants (18 years and above). All consenting coaches and players in teams that met the inclusion criteria for study 1.

Procedure and instrumentation	Validated questionnaires were used to collect information on the demographic data, knowledge about injury prevention and practices.	The JBI methodology for conducting scoping reviews was employed to guide the conduct of this review. This scoping review protocol is registered with Open Science Framework https://osf.io/r9mfq.	This Delphi process is aimed at developing an implementation guide for the FIFA 11+ injury prevention programme. Recommendations from Phase 1 was extracted, and contributions was sought from an expert review panel in the development of the implementation guide. The Delphi process can be continuously gone through until consensus is reasonably achieved. Three rounds of input are often sufficient to collect the information required and to achieve consensus as well.	A qualitative research design using semi-structured interviews.
Data analysis	Descriptive statistics of mean, standard deviation, and frequency. Inferential statistics.	A narrative review of the number of studies found that addressed the research topic, study designs, and the key components of implementation and compliance.	Data was summarised using measures of central tendency (mean, median, and mode) and level of dispersion (standard deviation and inter-quartile range), frequencies and percentages to present information relating to the collective judgments of participants in the modified Delphi process.	Thematic analysis
Outcome	An understanding of the injury prevention knowledge, beliefs, and practices to help set a baseline for intervention with an evidence-based injury prevention programme	Data from this study will identify and provide knowledge on the research gaps in the literature regarding the implementation strategies and compliance factors for the FIFA 11+. Understanding the factors associated with physical activity participation would be used to design a need-based rehabilitation programme.	Data from this study helped provide insights to develop an implementation guide in the context and low resource setting in South Africa.	The usability and acceptability of the implementation guide was understood for further research.

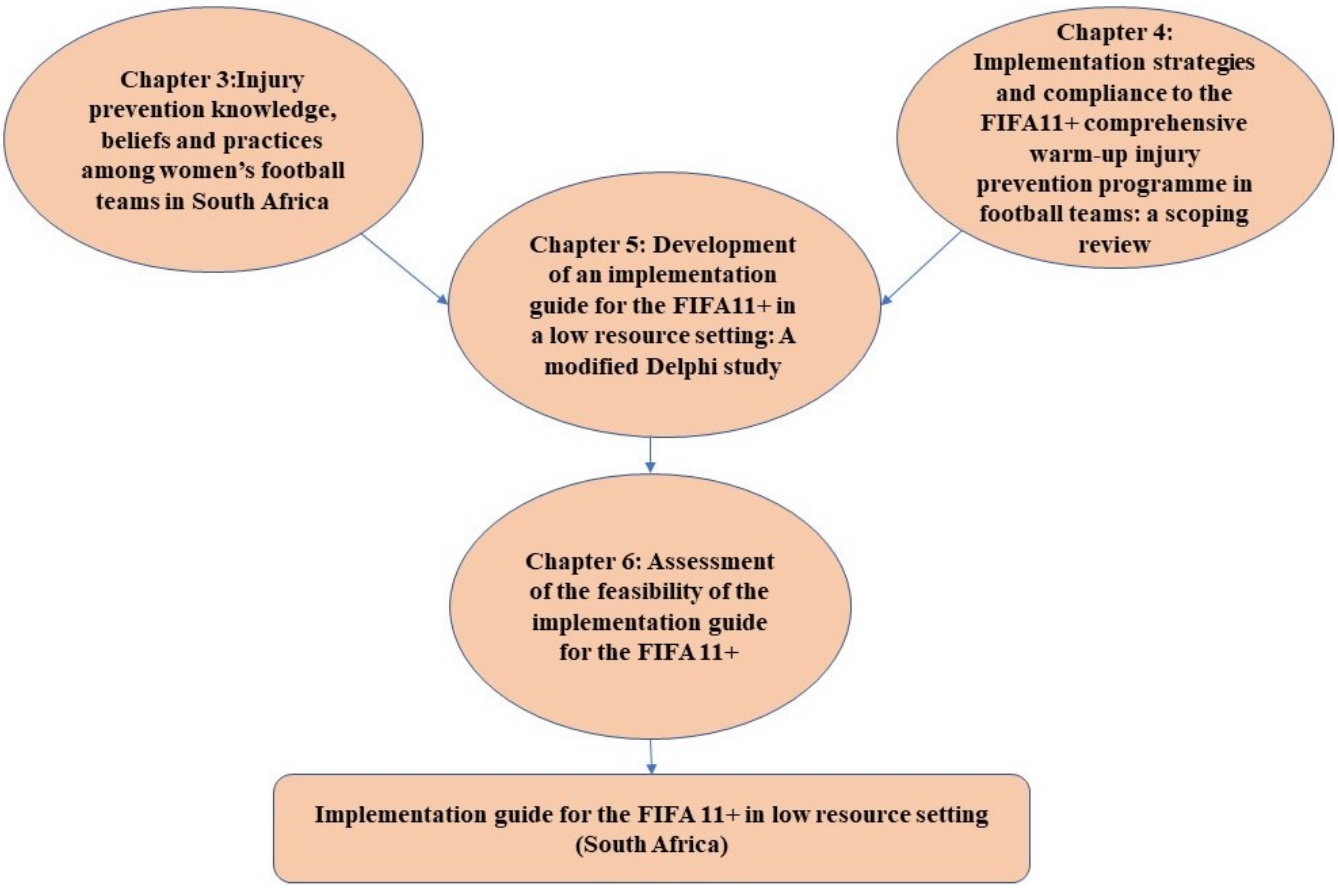


Figure 7.1: Schematic diagram of the studies conducted in the research

To achieve the study aim, the injury prevention knowledge, beliefs, and practices were identified in the study setting in Chapter three. In Chapter four, the available evidence implementation strategies and compliance was summarised. Chapter five provided insights from an expert panel to develop the content of implementation guide and chapter six was to assess the feasibility of implementation guide with end-users such as players and coaches. This integrated discussion will be examined to reflect on the key findings in each study and a robust follow -up discussion. This discussion will focus on the overview of studies' findings, with a summary of the most important findings followed by a detailed discussion of the findings.

7.2. Summary of the results

In Study 1, we investigated the injury prevention knowledge, beliefs, and practices only 35.5% of the participants reported that they perceived themselves as having adequate knowledge of basic injury prevention practices in football. The common injury prevention practices reported by participants included their perception of warm-ups (95.1%), stretching (90.1%), cool-downs (80.2%) and jogging (81.4%) of which were reported to be carried out more at training than match days. Less than a quarter of the respondents indicated that they had heard about the FIFA 11+ injury prevention programme (IPP), while more than 75% stated that they would be willing to adopt it if they were to gain access to detailed information.

Our study showed that most members of their women's football teams perceived their level of knowledge as inadequate. Although the respondents engage in various injury prevention practices such as warmups, stretching, cool-downs and jogging, very few are aware of the FIFA 11+ Football IPP. Most players and coaches believe that IPPs are important, which is an important first step towards identifying the gaps and bridging the needs required for implementation of injury prevention programmes in the sample population.

In Study 2, we conducted a scoping review of literature to summarise the evidence available for the implementation strategies and compliance to the FIFA 11+ comprehensive warm-up programme. A total of 22 articles were included in this scoping review, and majority of the studies (91%) were randomised controlled trials (RCTs), whilst only two were cohort studies. The studies conducted were distributed across five continents and high resource settings. The majority (90%) of the studies were from Europe, North America, Asia, and Oceania. Only two studies were conducted in Sub-Saharan Africa (Nigeria and Rwanda). Our study showed that main implementation strategy for the FIFA11+ injury prevention programme is preseason coaches' targeted education. This is often facilitated by an instructor with the provision of additional resource materials from the FIFA Medical Assessment and Research Centre (F-MARC) in the form of manuals, DVDs, posters, and online resources. Details of the content, structure and duration of workshops were not consistently documented. Compliance

evaluation of the programme in cases where reported did not documented a consistent format. Some studies indicated team and player compliance to the programme as well as the procedure to ensure compliance was also narrated in most of the studies.

In study three, we sought the opinion related to contents for the implementation guide through an expert panel in a modified Delphi process. Fifty-five panel members were invited across the stakeholder's expert population spanning four continents. Forty-two experts responded to the invitation and were recruited for the Delphi study (76.4% of target), with 28 (66.7% of target) respondents at the end of the first round of the Delphi and 20 (71.4% of target) respondents at the end of the second round. The structured statements were developed following the output of Study 1, 2 and excerpts from literature review for the overall research. In round one, consensus was achieved for 16/16 statements (100%), arising from adoption (3/3), implementation (9/9) and maintenance (4/4) domains. In round two, the consensus was 17/21 statements (81%) arising from domains on the role of the stakeholders (6/6), education on sports injury prevalence (3/4), surveillance and injury prevention (4/4), FIFA 11+ adoption and implementation (4/4), compliance and adherence (3/3) and motivation strategies (0/3). Our study showed that consensus was achieved amongst experts in areas identified as components of developing an implementation guide. This guide is adaptable to provide a tailored support to the context and setting of low resource such as South Africa.

Finally in study four, we assessed the implementation guide draft developed with the proposed end users of the document. Seven coaches from two teams participated in this study and 43% were females (n=3). All the coaches possess a coaching license certification from SAFA with coaching experience ranging from two to ten years. Coaches provided their opinion about the implementation guide, adjustments they thought should be considered as well as facilitators and barriers of implementation in their setting. Our study showed that the coaches who participated welcomed the idea of the implementation guide positively, suggesting that the document provided clarity and could help them navigate the implementation of the FIFA11+. They made suggestions which some were be adopted for the revision of the guide whilst others had already been catered but needed to be clarified.

7.2.1. Study one: Injury prevention knowledge, beliefs, and practices in women's football teams in South Africa

In our study, more than a third of respondents perceived having adequate knowledge of basic injury prevention practices in football. A similar study conducted by McKay et al. (2014) in Canada showed a dearth in the perception of knowledge and beliefs in young amateur female soccer players, emphasising effective prevention strategies and injury risk factors, but with significant differences in feedback from coaches and players. A study conducted in Nigeria among a youth football league reported that most players fall within the poor and fair-knowledge categories (Owoeye et al., 2014). Another study in South Africa, which evaluated the coach's knowledge, attitude, and perceptions regarding injury prevention among amateur footballers showed that knowledge perception about injury prevention in coaches is also limited (Mtshali et al., 2015). This indicates that knowledge may still be a challenge irrespective of geographical location. However, in a study by Geertsema et al. (2021), which was conducted to evaluate knowledge, beliefs and strategies in a cohort of players at the FIFA Women's World Cup in 2019, it was concluded that elite female footballers reported awareness of level of risk and the types of injuries in women's football, and that they hold positive attitudes towards injury prevention. The good knowledge score demonstrated in the study might be because it was conducted amongst elite female footballers who have access to better economic resources and support staff.

The perceptions of knowledge concerning football injury prevention reported in our study are similar to those recorded in some previous studies where knowledge was also limited (Owoeye et al., 2013, Barron et al., 2009) In the South African context, this might be because the participants are primarily students focused on educational content related to earning their degrees as well as being amateur players with limited resources. In addition, there is limited infrastructure and financial support in the growing women's amateur league in South Africa (Motshoene, 2020). A systematic review conducted by Al Attar et al. (2016) concluded that adequate knowledge about injury prevention reduces the incidence of injury and improves performance. Studies that have implemented exercise-based IPPs in sports have recorded a significant reduction in injury incidence (O'Brien et al., 2018). Therefore, it is imperative that adopting and implementing a comprehensive evidence based IPP needs to consider and include the improvement of the

knowledge base of the programme by educating the players and coaches about injury prevention practices and injury risk factors. Thus, adequate education in injury prevention strategies directed at all role players and particularly the coaches is paramount (O'Brien et al., 2018).

Common injury prevention practices reported by participants include warm-ups, cool-downs, jogging, and stretching. These practices have been reported in the literature to reduce the incidence of football-related injuries (Crossley et al., 2020, Al Attar et al., 2016). However, a more comprehensive warm-up protocol that encompasses all these components has been developed, and its efficacy is proven in several studies (Al Attar et al., 2016). Warms-ups physically prepare athletes for the competition and influence their mental state of mind, crucial to optimising performance. A well-designed warm-up programme will achieve physiological responses in the cardiovascular, musculoskeletal, respiratory, nervous, and metabolic systems (Hedrick, 1992). These responses include a raised tissue temperature, increased circulation to working muscles and enhanced oxygen supply from oxy-haemoglobin and myoglobin breakdown. Cool-downs are the first step in the recovery process, the gradual tapering down of activities from an intense exercise session and the commencement of a 'reverse phase' of the warm-up process. A cool-down is effectively the tapering-off phase at the end of explosive physical activity and is typically at low intensity (Hedrick, 1992).

Another key component is stretching, which may be static or dynamic. It aims to return muscles that have typically been shortened because of contractions during explosive sporting activity back to their resting length or their pre-activity state (Hendricks et al., 2017). Although it is important to note that these injury prevention practices are useful in isolation, each component combined with the others will constitute a concerted effort towards optimizing achieving the injury prevention goals. Very few of the participants in our study were aware of the FIFA 11+, a comprehensive injury prevention programme, but the majority are keen to learn more and adopt it.

From our results, coaches and players believe that IPPs work and they would be willing to adopt them. It has been demonstrated that the coach plays the most important role in adopting and implementing injury prevention practices (O'Brien et al., 2018, Bizzini and Dvorak, 2015, Lindblom et al., 2018, Kerr et al., 2018, Norcross et al., 2016). The majority of the participants

identified that their coach's beliefs are important in achieving injury prevention goals. They believe that compliance is, in fact, a key component of an IPP. Interestingly, in our study, the participants expressed that, in their opinion, their coach's IPP is adequate even though only 35.5% reported that their knowledge about injury prevention in football is based on their own perceptions. This is not surprising as often in sports, the relationship between the coach and the player adopts a one-directional pattern where the coach is considered as the mentor, leader and guide in the career of the players (O'Brien et al., 2018). In addition, the majority of the coaches are males, and the female-male dynamics element in sports usually influences the communication strategy and interpretation (Murray et al., 2018). When a coach is keen on a programme, they will tend to influence the team's knowledge and training in respect of injury prevention, hence achieving the injury prevention goals.

Professional women's football in South Africa is in the developmental stage, with the amateur leagues showing considerable improvement in terms of personnel and infrastructure (Motshoene, 2020); however, there is still much to be done. Currently, because of limited personnel, the coach plays multiple roles in managing the team, providing medical support, leading the strength, and conditioning programme and the injury prevention practices where applicable. This study also shows a lack of adequate medical personnel available on the team's support staff which might be largely due to the economic circumstances of the team. Therefore, it is pertinent that for the successful implementation of an IPP in a low to middle-income setting in countries such as South Africa, improving the coach's education and knowledge will play a pivotal and integral role. This may facilitate the implementation plan, adoption, compliance, and overall implementation of such a programme like the FIFA11+.

Key findings

- Coaches and players believe the injury prevention programmes work with compliance being a key component.
- There is limited knowledge about basic evidence-based injury prevention programmes like the FIFA11+.
- Players perceive that coaches take the lead and have adequate knowledge about basic injury prevention.

- The coaches and players are willing to adopt the programme if they are more knowledgeable.

7.2.2. Study two: Implementation Strategies and Compliance for the FIFA 11+ Comprehensive Warm-up Injury Prevention Programme in Football teams: A Scoping Review

Our results showed that since the inception of the FIFA 11+, over 80% of the studies reviewed were conducted in developed countries and high resourced environments, with only two studies conducted in Sub Saharan Africa. A total of 22 studies were included in the scoping review summarising evidence for the implementation strategies and compliance for the FIFA11+ basic injury comprehensive injury prevention programme. The main implementation strategy identified for the FIFA 11+ is to train coaches to be empowered with the knowledge. They will in turn translate to their teams occasionally with the support of team captains and medical personnel where available using the task-shifting approach. The coach will play a critical role in the implementation plan, adoption, compliance, and overall implementation of such a programme (Bakare et al., 2021). The concept of task shifting, as defined in health care delivery, is a process of delegation whereby tasks are moved where appropriate or from a highly specialised workforce to less specialised healthcare workers due to scarce human resources. Specific responsibilities are transferred, shared, or delegated from highly skilled health practitioners to persons with less training or qualifications, such as lay people (Orkin et al., 2021).

This can also be useful for sports injury prevention, especially in low-income settings, as there are limited sports medicine experts and resources to address the burden of injuries that arise because of football participation. Investing in coaches' education and empowerment needs to be purposefully driven by the football associations (Bizzini et al., 2013). The commitment of the Football Federations/Associations in sub-Saharan Africa is to provide support within the scarce resources to amateur teams in general. Particularly to women's football hence a need to actively promote injury prevention in football within these limitations to enhance participation and development in line with FIFA's Women's Football agenda (FIFA, 2019).

Over 80% of the studies were carried out in developed countries with substantial material and human resources, which might be responsible for the broad awareness and use of the FIFA 11+ programme. Only two studies have been conducted in sub-Saharan Africa, and a lack of awareness and resources may account for limited studies in this area. They, however, reported similar outcomes in their result, reporting its efficacy in the region. This may be because F-MARC provided physical materials to the researcher in Nigeria, who also benefited from training of the cohort by a train-the-trainer programme supported by F-MARC and a CAF certified instructor for the study in Rwanda supported by the Football Federation. This corroborates the narrative review by Bizzini and Dvorak (2015), stating a future direction for the programme needs a substantial commitment of the national football governing bodies (Member Associations of FIFA) to implement FIFA 11+ at the country amateur football level.

Enabling coaches the freedom and flexibility to adapt and modify the exercises also enhance adoption of the programme, (O'Brien et al., 2017) and rescheduling aspects of the FIFA11+ does not negatively impact the efficacy of the programme (Whalan et al., 2019).

Implementation

Most of the studies adopted preseason targeted education to enlighten teams about the benefits of injury prevention and use of FIFA 11+ programmes. Many of the studies identified the coach as a recurring decimal to take the lead in the team training sessions whilst supporting roles are provided by team captains. Provision of additional resources in the form of online resources, flyers, posters, and DVDs for reference was also documented. Many of these sessions targeted coaches who play a pivotal role in the success of the implementation of this programme with teams with or without additional supervision (Steffen et al., 2013). Similarly, in the African studies, this approach was adopted, and they reported similar outcomes to their other counterparts around the globe reporting the effectiveness of the FIFA 11+ programme in reduction of injury rates (Owoeye et al., 2014, Nuhu et al., 2021).

Key factors that contribute to the barriers to the implementation of the FIFA 11+ is the coaches' knowledge of the FIFA 11+ and time constraints, amongst other things (Donaldson et al., 2019). A workshop provides the avenue for coaches to learn the programme from experts and build

confidence in taking charge of the team whilst improving their knowledge base on the importance of injury prevention and how it contributes to their teams' success. The workshops were facilitated as theory and practical sessions, ensuring that emphasis is on the education of correct performance of the exercises and the minimum number of sessions per week required. Many studies were suggestive that the coaches are positioned to lead the injury prevention programmes in their teams with shared responsibility alongside other stakeholders knowing the coach's leadership position (O'Brien et al., 2018). Other studies indicated that coaches were "exposed" to the FIFA 11+ or instructed to implement the programme in their teams, but it is unclear how exactly this was done in detail.

To effectively maintain the implementation of the FIFA 11+, measure of compliance and adherence were highlighted. At the same time, researchers frequently use the terms "compliance" and "adherence" interchangeably; the two words have different connotations (McKay and Verhagen, 2016, World Health Organisation, 2003). When it comes to describing the dynamic and intricate changes that are required to evaluate interventions over time, the concept of adherence has been chosen as the more applicable concept. (McKay and Verhagen, 2016). Compliance was often used synonymously with adherence in many of the studies, and there was no standardised measure of compliance. It was reported to have been measured using a self-report questionnaire or a compliance sheet indicating Yes or No that the FIFA 11+ was carried out. A compliance officer assigned within the team was also indicated to ensure the report form is completed, and team captains have been named in a couple of instances. Compliance to the FIFA 11+ has been demonstrated to be more effective in the reduction of injury rates. Coach-led FIFA 11+ delivery was as successful with or without the oversight of a physiotherapist on the field following a coaches' workshop. When coaches were properly informed during a detailed preseason session, the FIFA11+ programme was more effective in terms of team adherence (Steffen et al., 2013). Coaches are a constant figure in the low resource setting in Women's football, and they play a key role in this task-shifting approach to transfer the knowledge and expertise of injury prevention to end-users.

Key findings

- Majority of the studies conducted on the FIFA11+ are in high resource settings.
- The major implementation strategy for the FIFA 11+ implementation is coach-led preseason educational workshops.
- Team captains are identified as a key stakeholder to support coaches with implementation in the team setting
- Multiple ways to improve compliance is documented but there is no consistent measure or reporting it documented.

7.2.3. Study three: Development of an Implementation Guide for the FIFA 11+ in a Low-resource setting: A modified Delphi Study

The burden of injuries in football participation is huge and taking the steps for actively integrating evidence-based injury prevention programmes can minimise the risks associated. The aim of the study was to develop an implementation guide to the FIFA 11+ in the low-income and -resource landscape such as South Africa, with consideration of amateur women's teams. Experts were recruited across the different areas of expertise to contribute to the process across diverse experience and proficiency in injury prevention, implementation, football, FIFA11+, rehabilitation and sports medicine. Other stakeholders such as end-users like coaches and players were also invited to participate. Literature has shown that in creating IPEPs implementation strategy, key personnel from all target levels should be involved. Understanding their objectives, views, and environment can aid in the identification of potential implementation roadblocks and the development of acceptable solutions (O'Brien, 2017).

The implementation guide sought to draw on research findings as well as experience to enable the target population to have a better understanding of the why, when and how to implement injury prevention programmes in their specific context and setting. This is in accordance with ensuring coaches' and players' education and awareness of injury prevention measures (Bizzini and Dvorak, 2015) should be treated as an intrinsic component of the process to succeed as major stakeholders when their education is improved (Bakare et al., 2021). The implementation guide developed was considered into five sections proposed to be a guiding document for implementation of the FIFA

11+ in a low resource landscape such as South Africa. The sections of the guide focused on components addressing the role of stakeholders, educational content, the FIFA11+ implementation, compliance, and adherence, as well as motivational strategies.

Stakeholders identified were the facilitators, coaches, support staff, players, medical personnel, management staff, football associations and volunteers. As this is a diverse group of people with different responsibilities in achieving injury prevention goals, it was important to clarify roles of everyone along with the projected goals. Findings indicate numerous hurdles to implementing injury prevention programmes, and barriers might occur at multiple levels (O'Brien et al., 2018). Understanding the causes behind these limitations is necessary for improving the real-world impact of these programmes (O'Brien et al., 2018). Roles and responsibilities were identified by the experts and clearly defined for each stakeholder at the end of round 1 with the bid to making the collective effort more productive and goals attainable. When tasks are clearly defined, and stakeholders succeed in their roles, the entire team benefits. Team success is an excellent method to generate momentum for future projects, resulting in increased productivity. The team's confidence will grow as a result of their success. Along with increasing team efficiency, creating functional roles and responsibilities provide several other benefits that could help a team and understanding these benefits motivates team leaders to implement them (Indeed, 2021).

The facilitator has been identified as the anchor teacher/trainer who is knowledgeable about the FIFA 11+ and teaches the rest of the stakeholders focusing on coach lead workshops in adopting a task-shifting approach (Orkin et al., 2021). The coach has been identified as the leader of the team in numerous studies which is able to give direction to the rest of the team when they buy in themselves (McKay et al., 2014, Steffen et al., 2013, Bakare et al., 2021). Coach-led FIFA 11+ delivery following a coaches' workshop was equally successful with or without the supervision of a physiotherapist on the field. The FIFA11+ programme was more effective in terms of team adherence when coaches were fully educated during a detailed preseason session. (Steffen et al., 2013). The role of support staff, medical staff and volunteers are supportive personnel in assisting the coach in this team leading role. The players are the end-users of the intervention and their support and cooperation are also needed to achieve set goals for injury prevention using an exercised based injury prevention programme like the FIFA11+.

The experts agreed that basic education on injury prevalence, surveillance and prevention is important. It is important for all stakeholders to have background information and an overview of injury prevalence in their teams using standard injury surveillance methods and a plan to initiate injury prevention to minimise the burden of injuries associated with football participation. The purpose of the educational section is to provide the much-needed awareness and knowledge about the programme so that the teams can appreciate the why, when, and how to achieve the goals of injury prevention. The emphasis in both study and practise has been on delivering injury prevention content to coaches, who may subsequently transmit information to players and injury risk information is frequently communicated to the target population as part of prevention programme promotion techniques. (McKay et al., 2016). A systematic review conducted concluded that adequate knowledge about injury prevention in football reduces the incidence of injury and improves performance (Al Attar et al., 2016).

The educational programme is divided into three sessions to cover topics on, but not limited to: common sports injuries in football and knowledge about basic injury prevention; the introduction to FIFA 11+; and implications of injury prevention. The sessions are proposed to be a pre-season workshops which studies have demonstrated to be effective (Ayala et al., 2017, Lopes et al., 2020, Steffen et al., 2013) and it will be executed in online, onsite or hybrid formats. The cumulative period of any session will be 90mins, and sessions will not be longer than 30mins inclusive of breaks to mitigate boredom. The online sessions could be on Zoom, Microsoft Teams or Google meets as these are the current available and accessible online meeting applications. Onsite locations will be determined based on accessibility for teams. The division into smaller groups at the end of every teaching session serves the purpose to recap and engage participants in group activity for reflective learning. Additional educational and reference materials will be provided for all participants which will include but not limited to flyers, newsletters, posters, and instructional videos, online resources (Social Media, websites, YouTube, and Blogposts) linked via QR Code as part of the implementation guide. Injury prevention methods must target a variety of audiences, including players, programme deliverers (e.g., coaches/team staff members), and policymakers (e.g., club officials/governing bodies) (O'Brien et al., 2018). Injury prevention programmes can be integrated into coach education, as well as promoted through social media, applications, and

websites, as well as through the endorsement of preventative programmes by football organisations and high-profile figures. More than 95% of health practitioners and academics feel social media has a role in disseminating and gathering research evidence (Tunnecliff et al., 2015).

To improve compliance, a compliance officer was identified to be designated within the team to monitor team compliance and an accountability partner within the team to monitor individual player compliance. Previous studies used similar measures, and compliance has been measured as a team and individual player compliance (Owoeye et al., 2014, Steffen et al., 2008, Soligard et al., 2008). Other support mechanisms are in place for follow-up, such as the researcher supporting teams via e-mail and phone feedback (Longo et al., 2012), as well as site visits to training sessions to engage with coaches and provide enough assistance to create confidence in administering the FIFA11+ (Lopes et al., 2020, Impellizzeri et al., 2013, Longo et al., 2012, Al Attar et al., 2018) Improving coaches and players knowledge and confidence about self-care is also a key to take ownership of their own sense of responsibility towards themselves. Coaches are encouraged to adopt the protocol integration into regular training routine and with flexibility for modification/adaptation (O'Brien, 2017) as well as adapt components to suit needs such as re-scheduling (Whalan et al., 2019).

Motivational strategies were also identified as an integral part of the process of implementation. Some of the motivational factors indicated were supported by the experts as factors that can improve adoption, implementation, compliance, and adherence. Motivational strategies that will be employed include assessment of pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention. Literature has shown that there is potential for improved adoption and compliance when interventions to influence behavioural changes are a component of the implementation programme (McKay et al., 2016, Owoeye et al., 2020b).

Understanding the underlying drivers of behaviour change may aid in informing the content of coach workshops to promote improved programme uptake and retention, considering recognised barriers to programme use. Evaluating the behavioural change model using the health promotion framework of the health action process approach (HAPA) questionnaire for coaches and players to assess their perceptions and intentions as part of the implementation strategy can prove useful.

In a study by McKay and colleagues, their findings imply that the HAPA model is appropriate for application in this setting. They emphasise the need of focusing on task self-efficacy and outcome expectancies in FIFA 11+ implementation tactics (McKay et al., 2016). The RE-AIM framework was to identify how an effective implementation process should be tailored which was the context of interest. Reach: Educational component of the guide to create awareness and knowledge. Effectiveness: The programme in focus the FIFA 11+ has been proven effective in many RCTs but real-life settings are still unclear, underpinning the research process. Adoption: Factors to consider for teams to adopt the implementation of the FIFA 11+ in the setting and Maintenance: How to make it sustainable from holistic standpoint to achieve desired goals.

Key findings

- There was consensus by the panel of experts on key areas identified as the content of the implementation guide.
- Key stakeholders for implementation of the FIFA 11+ in team settings were identified and role established.
- Provision of a detailed educational component of the implementation guide to include knowledge of injury prevalence, surveillance, and prevention.
- A motivational strategy component of the guide is identified for implementation to succeed.

7.2.4. Study four: Assessing the feasibility of the Implementation Guide for the FIFA 11+

A feasibility study was conducted among the cohort of coaches in the eligible teams who received the implementation guide draft document. The implementation guide developed was considered into five sections proposed to be a guiding document for implementation of the FIFA 11+ in a low resource landscape such as South Africa. The sections of the guide focused on components addressing the role of stakeholders, educational content, the FIFA11+ implementation, compliance, and adherence, as well as motivational strategies They believed that it would help improve their injury prevention knowledge and would aid injury prevention and help with capacity building and empowerment. The implementation guide was conceptualized using the task-shifting approach. This may also be useful for sports injury prevention, especially in low-resource settings,

as there are very limited sports medicine experts and resources to cater for the burden of injuries that may arise from football participation.

Pre-season education of coaches has also been pivotal to successfully improving adherence to any injury prevention initiative in team settings (Steffen et al., 2013). Studies have shown to utilise provision of additional information on injury prevention as a background in a bid to improve adopt injury prevention programmes (McKay et al., 2014, Steffen et al., 2013, Owoeye et al., 2017, McKay et al., 2016). The coaches in this study considered that the programme was clear and created awareness, adding to their knowledge. They also remarked that the implementation guide purposefully positioned and has additional information to educate on injury prevention apart from the FIFA11+ training itself. The coaches perceived that they gained capacity building, which empowers them for injury prevention leadership in their teams.

The coaches identified that the role of administrative team management needs to be explicit and clear relating to their responsibilities in the implementation of the programme and could serve as a facilitator or barrier. They perceived that team management should be actively part of the process of implementation training as this could facilitate adoption. The coaches identified the following as barriers where management plays a key role in lack of support, planning, access to facilities/venues and funding for the team. The funding concerns however can be mitigated as the FIFA11+ is a low-cost evidence-based neuromuscular exercise programme which does not require expensive equipment (Bizzini et al., 2013). Most of the required materials to set up for the warmup include agility cones, footballs, tape measure to map out the field all come as a relatively low cost however still needs management to make necessary provision which can be a barrier is they do not. They also affirmed that making team management understand that is saves money to invest in injury prevention contributes to facilitation factors.

It has been established that injury prevention is a collective effort, and everyone involved with the team needs to play their part in ensuring a successful process with team management role identified (O'Brien et al., 2018, Bekker et al., 2019). Though management was identified as a stakeholder with a role in the implementation guide, their role was not expatiated beyond the identification. Therefore, it is important that the role of management be revised in the implementation guide to

add more clarity and identify other responsibilities that would help facilitate the process of implementation. The coaches identified facilitators of implementing the FIFA 11+ in team setting and considered the need to have support and co-operation of the entire team structure with periodic support from the expert on injury prevention to communicate and clarify things related. Studies have shown that follow-ups by an expert have the potential to improve team compliance and adherence to the FIFA 11+ (Ayala et al., 2017, Silvers-Granelli et al., 2015, Al Attar et al., 2017, Longo et al., 2012). The implementation guide has catered for this need and had made provision for follow-ups with teams. They also indicated that educating players enough to get their commitment towards implementation and integrating detailed knowledge about injury prevention in the coaching license courses are also important. Providing detailed education for coaches has been identified in scientific studies as an integral process of facilitating injury prevention (Owoeye et al., 2017, Owoeye et al., 2020). Though coaching education is identified as pertinent in the implementation guide the improvement of their coaching license curriculum by the football association is not detailed in the guide. Therefore, the importance of the coaches' education in injury prevention alongside their certification will included in revised in the implementation guide.

The coaches considered barriers of implementing the programme, which include multitasking such as the ability to juggle other administrative tasks as coaches and time constraints where players come in late to training due to work and school commitments, pre-season phase of preparation not converging on time which makes time very short before the season kicks off. The task-shifting approach can assist in mitigating the challenges of time constraints where the coach as the leader of the team can delegate tasks to another member of the support staff, including team captains. Team captains have been found to be co-opted in assisting the coaches with the implementation of the FIFA11+ programme (Longo et al., 2012, Soligard et al., 2008)

Other factors considered include lack of funding and support from administrative team management as the coaches perceived women's teams do not receive enough attention from the team management compared to their male counterparts. Interestingly it was raised that environmental factors such as summer cool pose a barrier to the implementation of the programmes since the coaches presume that the weather is already very hot in the landscape and players of not need an intense warm-up activity. There are currently no studies to the best of our knowledge that have examined the impact of tropical summer weather considerations on the FIFA

11+ programme. However, the most significant adjustment to your warmup regimen in the heat is to drastically shorten it. In cycling, a warmup routine of 45-60 minutes is very usual, but in a hot atmosphere, this should be reduced to roughly 20 minutes. There is still a need to spend some time around lactate threshold and make a few high-intensity efforts to engage the lactate-producing and lactate-processing processes, but little as possible is needed to get there (CTS, 2018). The implementation guide will consider weather considerations and will suggest on field sessions be adapted for indoor activities in extreme weather conditions were feasible.

Key findings

- The implementation guide is a welcomed development by coaches
- The coaches take the leadership of injury prevention in the team setting
- Components necessary to implement injury prevention programmes in team settings are identified and detailed.
- Suggested adjustments to the programmes include the role of management.
- Support and commitment are required from all stakeholders in the team hierarchy.

7.3. The developed implementation guide

The study aimed to develop an implementation guide for the FIFA 11+ injury prevention programme. This was borne out of a need to enable teams minimize the risks and reduce the burden of injuries in women's football in the landscape and setting of study. As coaches have been identified as the pivotal figure in the team to champion prevention implementation in team settings, a guide was projected to help in navigating the process of implementation better to achieve desired goals. Women's football is gaining momentum, and participation is increasing in sub–Saharan Africa, accounting for the rise in the number of registered players in the sport. Women's involvement in football has continued to grow exponentially, with an estimated 30 million players across the globe and about 4.8 million registered by national federations with Fédération

Internationale de Football Association (FIFA) (FIFA, 2014). The Confederation of African Football (CAF) constitutes 1,255,400, with growth projections to continue to increase (FIFA, 2014). The question of the potential burden of injuries in now apparent, and the need to be proactive in mitigating these challenges. The research background is in a low-resource setting where there are limited infrastructural, human, and financial resources to cater for the needs required to support the teams. This set the stage for what need to be done in bridging the gaps of comprehensive injury prevention programme like the FIFA 11+ in the study sample, what is the current evidence available for implementation strategies and how can the information be utilized along with best practices and the RE-AIM framework to develop a guide to facilitate implementation of injury prevention.

This is the first study to our knowledge that has developed a guide to support low resource setting teams facilitate implementation of the FIFA 11+. To begin the journey that culminated to developing the guide, it was essential to establish the knowledge, beliefs, and practices at baseline and identify the gaps with the end users (Study 1). These key factors have also been shown in the literature to affect the adoption of injury prevention programmes (McKay and Verhagen, 2016, McKay et al., 2014, Barden et al., 2021, Steffen et al., 2013, McKay et al., 2016). This information is to better prepare the fundamentals of engagement with the teams to update knowledge and skills needed to implement injury prevention.

The scoping review of literature helped us to identify the available evidence on implementation strategies and compliance for the FIFA11+ programme. This was essential to figure out what has been done previously to implement the FIFA11+ programme and how compliance was monitored and documented. It is widely known that injury prevention programmes will not achieve the desired health benefits if compliance is poor (Steffen et al., 2013, Donaldson and Finch, 2013, Donaldson et al., 2019, O'Brien et al., 2016). Hence, we had a template to draw from the evidence of the implementation strategies that are available in literature and compliance measures to draw ideas from to include in the implementation guide.

The modified Delphi process helped to lay the foundations for the implementation guide with excerpts from the previous studies to populate the draft. We also needed to consider the RE-AIM framework which describes the key components of an implementation process to be effective as a

framework. This has an extension known as the RE-AIM Sports Setting Matrix (SSM), first proposed and described by Finch and Donaldson (2010). There are five different sections of the implementation guide draft from identifying the role of the stake holders, developing an educational content that provided knowledge on injury prevalence, surveillance, and preventions, detailed outline, and training on the FIFA11+ programme, as well as compliance and adherence and motivational strategies that will complement the overall relevance of the guide. Compliance, adherence, and motivational strategies have psychosocial components that heavily rely on behavioural changes from end users. One of the things also identified in the Delphi process is that messaging about injury prevention needs to be tailored, which may influence behavioural changes. Some of this include how injury prevention is related to performance and how this impacts team success and player availability for selection.

This is a novel initiative in the field of injury prevention implementation research. However, we need to bear in mind that successful implementation is not a once-off and true success is measured with the maintenance of the programme for a long time to come. Using the RE-AIM SSM for an intervention that requires coaches to offer an evidence-based exercise training programme to participants during regular training sessions to reduce the risk of lower limb injury in players has an array of things to consider. While the individuals who participate in the exercises during training sessions gain, the success of the intervention is strongly reliant on the structures and background activities in place to support the training programme's delivery (Finch and Donaldson, 2010).

Coaches should periodically undergo comprehensive training on the programme's components, including the rationale for both preventative and performance benefits and how to deliver it effectively to ensure high participant compliance/uptake (Finch and Donaldson, 2010). Coaches should also include the programme into regular training sessions and ensure that it is given in the right manner. Regional associations/leagues, and even state sporting organizations, must design an overall programme that is evidence-based and focused on the specific sport, as well as formal training opportunities for coaches, to make this possible. This will very certainly necessitate the creation and dissemination of resources and other programme support materials that are evaluated and updated regularly. In some situations, this may also require the endorsement of a national or state athletic organization. Individually, participants must attend training, participate in the coach-

led exercise training programme, and incorporate the programme into their regular personal training and participation habits (Finch and Donaldson, 2010).

7.4. Study strengths and limitations

Multiple study designs were used to attain the overall aim of this doctoral research. A cross-sectional survey design was used to identify the injury prevention knowledge, beliefs, and practices amongst women's football teams in South Africa. The results were based on subjective assessment and perceptions by the participants, who are the players and support staff in the teams that consented to participate. The study was limited to the USSA League in the Gauteng region of South Africa hence outcomes may not be generalized. Low response rate to the questionnaire used to sample despite provision of hard copies. Despite the stated limitations, this is the first study to identify the injury prevention knowledge, beliefs, and practices in Sub-Saharan Africa.

The scoping review considered only published primary studies of intervention using the FIFA 11+ programme to evaluate its efficacy. There may have been other studies conducted not available in the databases during the time frame that the review was conducted as they may be yet to publish. To understand the content of the implementation guide, a modified Delphi process was utilised. The response rate for participation for coaches as players was very poor compared to the sports medicine team. Having the diversity to include a significant percentage of end users may have improved the process considerably.

The narratives from the semi-structured interviews facilitated our understanding of the usability of the implementation guide using qualitative study design which helped answer questions. However, we cannot generalise the findings to other contexts. Limited number of teams in the study population participated and this could translate to not having the diversity of views that could help improve the final version of the implementation guide document.

7.5. Conclusion

The aim of the study was to develop an implementation guide for the FIFA 11+ injury prevention programme with the aim of facilitating implementation of evidence-based comprehensive warm-up programmes in the women's teams in the USSA Football League. Women are at higher risks of non-contact lower limb injuries due to biological and biomechanical factors and there is a need to integrate injury prevention at all levels. Our overall study has shown that there is dearth of knowledge about evidence basic based injury prevention programmes such as the FIFA 11+ in the study setting. For these programmes to work in real-life context, it is important to consider context specifics which our study has attempted to do. This alongside the background of the available evidence for implementation strategies and compliance to optimize achieving injury prevention goals and the RE-AIM framework. Furthermore, to facilitate injury prevention in a team setting is a multi-factorial task and the ability to integrate roles of stakeholders with clarity. The provision of adequate educational programmes to enable coaches to make informed decisions about engaging in injury prevention and triggering positive behavioural changes enhances the implementation of the FIFA 11+ in the team setting. The implementation guide was welcomed with positive feedback from coaches, and they considered it as a guidance document that would help them navigate the implementation of the FIFA11+ injury prevention programme. The implementation strategy should be assessed through rigorous research to determine the most appropriate measures for scaling-up in the long term.

7.6. Summary of chapter seven

This chapter discussed in depth the outcomes of all the studies that culminated in achieving the aim of the study of this doctoral research. In this chapter, we discussed the study findings against the available evidence in the literature. The next chapter will be highlighting the overall conclusions and recommendations for the study.

8. CONCLUSION AND RECOMMENDATIONS

8.1. Introduction

The purpose of this study was to develop an implementation guide (Appendix five) for the FIFA11+ injury prevention programme in women's football teams in South Africa. This study was delimited to the University Sports South Africa (USSA) League. Data were collected utilising a cross-sectional survey, a scoping review of literature, a modified Delphi process and semi-structured interviews for the feasibility of the implementation guide. In this chapter, the implementation guide final draft is presented, and the implications of the study are outlined.

The key findings of the overall study is that:

1. There was a dearth in the knowledge and practices of evidence-based basic comprehensive injury prevention programme like the FIFA 11+ in the women's football teams in the USSA League.
2. The main implementation strategy of the FIFA 11+ injury prevention programme is coaches targeted and teams pre-season workshops and compliance was not documented in a consistent manner.
3. There was consensus from the expert panel in the modified Delphi process on the content of the implementation guide draft developed.
4. The implementation guide was considered a guidance document and welcomed by coaches that participated in the feasibility assessment via semi-structured interviews.

The results from the three studies (Chapter 3-5) informed the development of the implementation guide.

To begin with, the majority of members of the USSA League's women's football teams perceived their knowledge of injury prevention was inadequate. Although most of the respondents participate in various injury prevention techniques such as warm-ups, stretching, cool-downs, and jogging, only a small percentage are aware of the evidence-based basic complete FIFA 11+ football injury prevention programme (IPP). They are willing to accept it, though, after they have more information and are more familiar with the programme.

In addition, the key implementation strategy for applying the FIFA11+ injury prevention programme in team settings with or without additional supervision is to hold targeted preseason workshops for coaches. Compliance was reported, but there was no standardized method for doing so. It was often used as a synonym for the phrase adherence. Compliance was assessed both on an individual (player) and group (team) level. All stakeholders have responsibility for the success of fundamental injury prevention programmes such as FIFA11+ in a team setting, and roles for job assignment and completion should be clearly defined. For the squad to be successful in this endeavour, the coach should take the lead in driving the approach. When coaches adopt an injury-prevention mentality, the rest of the squad is compelled to follow suit. Football organisations, for example, should ensure that the coach's education path is vital, with injury prevention included in the curriculum.

To our knowledge, this is the first study to produce an implementation guide for the FIFA11+ injury prevention programme. Our research revealed that our expert panel in areas designated as components of building an implementation guide to create personalised support to the context and setting of low resource countries like South Africa reached a consensus. The FIFA 11+ implementation guide was created with context-specific factors in mind to help women's teams in low-resource settings implement the FIFA 11+ with the hope that it will effectively and efficiently. It is critical to take a holistic approach to stakeholder responsibilities, establish an instructional component for the whys, whens, and hows, as well as address compliance, adherence, and motivational factors. This could provide a much-needed guidance document from the FIFA 11+ programme implementation guide, which was created to provide direction and support for stakeholders in the implementation of the FIFA 11+ programme in low-resource settings in order to aid compliance and adherence in achieving injury prevention goals.

The study's final goal was to see if the implementation guide designed to help women's football teams in the USSA League follow the FIFA 11+ injury prevention comprehensive warm-up programme was feasible. The coaches who took part in the interviews reacted favourably to the idea of an implementation guide, implying that it is a guidance document that provides clarity. They identified ideas, some of which will be implemented in the guide's version, while others have been addressed but may require more information. The FIFA11+ implementation guide is a useful tool for assisting with FIFA11+ implementation in the context of women's football teams in the USSA league in Gauteng.

8.2. Study implications

Limited knowledge of the women's teams that participated in the study about the FIFA11+ indicates a need for the stakeholders to facilitate bridging knowledge gaps and implementing policies that will assist in the development of the women's game. The FIFA Women's football strategy set to kick-off in 2022 has outlined capacity building as a key strategy for development (FIFA, 2019). If teams are up to date with the latest information regarding the protection of players' health, they may likely make it an integral part of their football-related activities to optimize performance and minimise the risks of potential overuse injuries when there is no adequate medical support. The football team management and the football associations need to be proactive in empowering teams to ensure that there is an injury prevention philosophy that is integral to team preparations, and coaches as team leaders should have this component as part of their licensure education and certification.

The implementation guide is intended to be adopted as a flexible working document to assist teams in implementing the FIFA11+ programme through the systems in place for team management. It however needs to be evaluated periodically to ensure it meets the needs to facilitate injury prevention for the low resource setting for which it was developed. The FIFA11+ was developed over a decade ago to minimise the risks of non-contact lower limb injuries in amateur football players so it is only understandable that it would be subject to improvements and re-evaluation as the demands of the game continues to evolve. Some of the developments the programmes has seen

over time includes the following. Harøy et al. (2017) added the Copenhagen adduction exercise in the FIFA 11+ provides missing eccentric hip adduction strength effect in male soccer players in a randomized control trial. They found that including the Copenhagen adduction exercise in the FIFA 11+ programme increases eccentric hip adduction strength compared to the standard FIFA11+. For now, the programme has expanded to various versions to cater for specific population needs within football including the one for kids known as FIFA11+ Kids (Rössler et al., 2016), adaptation for goalkeepers to prevent shoulder injuries known as the FIFA11+ S (Ejnisman et al., 2016) and one for referees known as FIFA11+ Referees (Al Attar et al., 2021).

8.3. Recommendations for future research

Our recommendations for future research include but are not limited to determining the injury map and rates in women's football in sub–Saharan Africa. This to provide local data for the women's football population and have a better understanding of the prevailing injuries, how to minimise the risks and why being proactive is useful. Additionally, evaluating the of implementation and compliance for the FIFA11+ using the implementation guide developed. This might help with deducing the impact of the injury prevention programme in the target setting. Where there is room to improve, the guide has the flexibility for teams to adapt it. As women's football continues to develop and increase in population of players and participation; it is important to focus on minimizing the burden of injuries to ensure longevity of the women's careers.

The implementation guide developed could be adopted as a working document and its effectiveness evaluated for low resource settings to facilitate the implementation of the FIFA11+ injury prevention programme. The template provides detail about an approach that might help in achieving injury prevention goals in low resource setting. This is to make it easier for the target population to navigate implementation of the FIFA11+ and hopefully minimise the injury rates and improve compliance.

Furthermore, recommendation for future studies should include evaluating the implementation of the FIFA 11+ in the low resource setting using the RE-AIM framework sports setting matrix (SSM)

as well as assessment of the health outcomes to determine if there will be a decrease in prevalence of injuries rates in the long-term if it is implemented successfully and as intended.

Finally, evaluation of remote follow-up by sports physiotherapists with teams for compliance to the FIFA 11+ since many teams cannot afford to have sports physiotherapists embedded with the team. Sports physiotherapists play a key role in injury management and rehabilitation and understanding if remotely they can also support teams may be beneficial. This is in the hope that a virtual support in place may still be able to support the team to significant extent to achieve injury prevention goals.

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APPENDIX ONE: ETHICAL CLEARANCE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms B Ummukulthoum

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M161146

NAME: (Principal Investigator)	Ms B Ummukulthoum
DEPARTMENT:	School of Therapeutic Sciences Department of Physiotherapy Medical School University
PROJECT TITLE:	*The development of an implementation guide for the FIFA 11+ injury prevention programme amongst female football players in South Africa* **Change of study title noted on 04/03/2022**
DATE CONSIDERED:	25/11/2016
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Professor B Olivier & Dr C Brandt (change noted 04/03/2022)
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	05/05/2017

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and therefore reports and re-certification will be due in the month of **November** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

APPENDIX TWO: APPROVAL OF STUDY TITLE

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

20 January 2022
Person No: 1035750
TAA

Miss U Bakare
P.O.Box 530
Sabo
Yaba
101212
Nigeria

Dear Miss Ummukulthoum Bakare

Doctor of Philosophy: Change of title of research

I am pleased to inform you that the following change in the title of your Thesis for the degree of **Doctor of Philosophy** has been approved:

From:	**The development of a teaching and implementation guide for the FIFA 11+ injury prevention programme among female soccer players in South Africa**
To:	**The development of an implementation guide for the FIFA 11+ injury prevention programme among female football players in South Africa**

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX THREE: INFORMATION SHEET AND CONSENT FORMS

For Players and Support Staff

INFORMATION DOCUMENT

Phase 1(Study 1)

STUDY TITLE:

THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE FOOTBALL PLAYERS IN SOUTH AFRICA

Good day Sir/Madam

Introduction

I am a PhD student at the Department of Physiotherapy, University of the Witwatersrand. I am carrying out a study to determine the injury prevention practices of female football players and their support staff in the USSA female League in the Gauteng Region. Studies have shown that significant public health impact will not be attained if sports injury prevention interventions are not extensively established and adopted by intended target group. The overall aim of this study is to develop an implementation guide for the FIFA 11+ injury prevention programme. The objective of this phase is to determine the injury prevention practices of female football players and their support staff in the USSA Female League in the Gauteng Region.

I am inviting you to take part in this study.

Participants will volunteer to complete a self-administered questionnaire with questions on injury prevention knowledge, belief, and practices. It should take about 20 minutes to complete the questionnaire.

Benefits

The participant will be given pertinent information on the study while involved in the project and after the results are available. Participants get to have a clearer understanding about the importance of injury prevention and the role of the FIFA 11+ in football.

Participation in this study is voluntary and refusal to participate has no negative effects. Participants may discontinue participation at any time. There will be reimbursements for out-of-pocket expenses such as travel allowances to and from the site of study for research assistants

Confidentiality
Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher/s – for further information / reporting of study related adverse events

Bakare Ummukulthoum
Department of Physiotherapy,

University of the Witwatersrand,
Johannesburg

07741279643

ubakare@nigeriaphysio.org

Contact details of REC chair and administrator – for reporting of complaints / problems.

HREC (Medical) Chairperson
Prof. Cleaton Jones

E-mail: peter.cleaton-jones@wits.ac.za
(011) 717-2635

HREC Administrator
Augustina Hennessy
Tel:(011) 274-9279
E Mail:
ahennessy@witshealth.co.za

INFORMATION DOCUMENT

Phase 2

STUDY TITLE:

THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE FOOTBALL PLAYERS IN SOUTH AFRICA

Good day Sir/Madam

Introduction

I am a PhD student at the Department of Physiotherapy, University of the Witwatersrand. I am doing a study involving a panel of expert review to contribute to the process of developing a teaching and implementation guide for the FIFA 11+ injury prevention programme. A key process in enhancing the ultimate impact of team ball sport injury prevention exercise programmes (IPEP) is identifying the specific implementation components that influence the adoption, execution, and maintenance of these interventions. The overall aim of this study is to develop an implementation guide for the FIFA 11+ injury prevention programme. The objective of this phase you are being invited to participate in is to determine the feedback of stakeholders involved in football medicine, exercise science and rehabilitation in developing an implementation guide in a modified Delphi study.

I am inviting you to take part in this study.

This phase of the study is a panel of experts review and participants will be consulted to provide insights on the proposed implementation guide. This will continue till saturation of opinions is reached.

Benefits

The participant will be given pertinent information on the study while involved in the project and after the results are available. Participants will be able to contribute their expertise in the development of an implementation guide the FIFA 11+ in football. There will be reimbursements for out-of-pocket expenses such as travel allowances to and from the site of study for research assistants.

Participation in this study is voluntary and refusal to participate has no negative effects. Participants may discontinue participation at any time.

Confidentiality
Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher/s – for further information / reporting of study related adverse events

Bakare Ummukulthoum
Department of Physiotherapy, University of Witwatersrand, Johannesburg

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ubakare@nigeriaphysio.org

Contact details of REC chair and administrator – for reporting of complaints / problems.

HREC (Medical) Chairperson
Prof. Cleaton Jones

E-mail: peter.cleaton-jones@wits.ac.za
(011) 717-2635

HREC Administrator
Augustina Hennessy
Tel:(011) 274-9279
E Mail: ahennessy@witshealth.co.za

Dear Expert,

Thank you for participating in our Delphi study that aims to develop a consensus in developing an implementation guide for the FIFA 11+ injury prevention programme in a low-resource setting such as South Africa. We really appreciate you completing the first survey for this study.

We have analyzed the responses from the second survey and have used the feedback to update the attached implementation guide. Your opinion will be needed to arrive at a consensus for the implementation guide in the document below.

We greatly appreciate your participation in the second survey of this Delphi study. This survey will take about 15-20 minutes. Your responses will be used to develop the expert consensus. After all participants complete this, we will provide you with the outcome of the developed implementation guide.

If you have any questions about the survey or your participation in this study, please contact me via email at ummukulthoum.bakare1@students.wits.ac.za or ummubakare@gmail.com

Thank you again for participating. We really appreciate your time and input.

Kind regards,

Ummukulthoum Bakare

INFORMATION DOCUMENT

Phase 3

STUDY TITLE:

THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE FOOTBALL PLAYERS IN SOUTH AFRICA

Good day Sir/Madam

Introduction

I am a PhD student at the Department of Physiotherapy, University of the Witwatersrand. I am carrying out a study to assess the feasibility of the implementation guide for the FIFA 11+ in female football players and their support staff in the USSA female League in the Gauteng Region. Studies have shown that significant public health impact will not be attained if sports injury prevention interventions are not extensively established and adopted by intended target group. The overall aim of this study is to develop an implementation guide for the FIFA 11+ injury prevention programme. The objective of this phase you are being invited to participate in is to assess the feasibility of the implementation guide developed to disseminate the injury prevention programme of the FIFA 11+. I will be conducting an on and off field workshop that will last about 90mins per session. I will then conduct a semi-structured interview afterwards for about 20 minutes.

I am inviting you to take part in this study.

Benefits

Participants get to have a clearer understanding about the importance of injury prevention and the role of the FIFA 11+ in football. Participants will also be able to carry out the programme effectively and efficiently to achieve its purpose of injury prevention. Participation in this study is voluntary and refusal to participate has no negative effects. Participants may discontinue participation at any time. The participant will be given pertinent information on the study while involved in the project and after the results are available. There will be reimbursements for out-of-pocket expenses such as travel allowances to and from the site of study for research assistants

Confidentiality
Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher/s – for further information / reporting of study related adverse events

Bakare Ummukulthoum
Department of Physiotherapy,
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Johannesburg

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HREC Administrator
Augustina Hennessy
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E Mail:
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For Players and Support Staff Phase 1

Consent Form

I…….. …… (Full names of participants) hereby confirm that I understand the nature of the research project, and I consent to participate in this study.

I understand that I can withdraw from the project at any time, should I so desire. Questionnaires will be coded and there will be no identifiers.

Participant's Signature Date:

_____

Phase 2 - For
Panel of Experts

Consent form

I……. …… (Full names of participant) hereby confirm that I understand the nature of the research project, and I consent to participating as an expert this modified Delphi study. I understand that I can withdraw from the project at any time, should I so desire. Confidentiality cannot be assured in a panel of experts review.

Participant's Signature Date:

Phase 3 (For Players and Support Staff)

Consent form

I…….. …… (Full names of participant) hereby confirm that I understand the nature of the research project, and I consent to participating in the pilot study to assess the feasibility of the implementation guide developed for the FIFA 11+. I understand that I can withdraw from the project at any time, should I so desire. Confidentiality cannot be assured in pilot study.

Participant's Signature Date:

_____

Information sheet and consent form for the interview

Good day,

My name is Bakare Ummukulthoum, and I am the lead researcher on this project titled THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE FOOTBALL PLAYERS IN SOUTH AFRICA

Thank you for your interest in participating in this interview focused on feedback provision for the implementation guide developed in the course of this study. This interview will also be recorded for transcription to capture all the information provided. Do I have your consent to proceed with the interview?

I will ask you a series of questions related to the feasibility of the implementation guide developed for the purpose of reducing the injury burden in women's football in South Africa. This interview will take about 20-30 minutes will be audio recorded, please feel free to provide additional information. Please ensure the interview you remain anonymous by avoiding the use of your own name or other identifiers. Please try to speak loudly, clearly, slowly so that your comments can all be audio recorded.

Thank you very much do you have any questions before we proceed? Please feel free to ask questions at any time.

I will now begin the interview.

Permission for audio recording.

I am seeking for your permission to audio record the interview/ group discussion as per this study which is part of my doctoral research.

I agree that Miss Bakare Ummukulthoum may tape record my interview/group discussion with her and that she will keep information anonymous when the interview is transcribed for data extraction

……	……	……
(Signature of participant)	(Date)	(Printed name)

……	……	……
(Signature of PI)	(Date)	(Printed name)

APPENDIX FOUR: CONTENT OF THE FIFA 11+

Details of the programme are as follows; the warm-up area for Part 1 is two parallel lines of 6-10 cones set about five to six meters apart. Players would navigate through the course in pairs, with the next pair starting when the pair ahead of them has passed the second cone. The participant jogs back to the starting location after completing each workout. As each player warms up, the jogging speed of the return leg can gradually rise.

Exercises for Running (Part 1)

This section will take approximately 8 minutes to complete. Every exercise is repeated twice in pairs.

Straight ahead: The players jog through the course until they reach the last set of cones.

Hip out: Players should walk or jog comfortably, then pause at each cone, elevate their knee, and rotate their hip outward. At each cone, alternate between the left and right legs.

Hip in: Players should walk or jog comfortably, then stop at each cone, lift their knee, and rotate their hip inward. At each cone, alternate between the left and right legs.

Players sprint forward to the first set of cones, shuffle sideways 90 degrees inwards and meet in the middle, then shuffle one whole circle around each other before returning to the cones. For each pair of cones, repeat the process. Staying on your toes, keeping your centre of gravity low, and bending at the hips and knees are all things that players should remember.

Players run forward to the first pair of cones, shuffle sideways 90 degrees, and meet in the middle, then jump sideways towards each other, making shoulder to shoulder contact. It's important to note that players should land on both feet with their knees bent. Knees should not be bowed inwards. As they jump and land, players should perform a full jump and synchronize their time with their teammate.

Players run swiftly forwards and backwards to the second set of cones. Repeat the activity, running two cones ahead and one cone backwards, while maintaining their hips and knees slightly bent. Always remember to take tiny, rapid steps.

Part 2: Plyometrics, Strength, and Balance

Many of these will necessitate the assistance of a partner. Each workout contains three degrees of difficulty that increase in difficulty. Start with the first level of each exercise. Increase the difficulty of any specific exercise as the player's fitness develops. It should take roughly 10 minutes to complete one level of each exercise.

The Seating Area

The first level is static.

Players begin by lying on their backs, supported by their forearms and both feet. They should have their elbows directly under their shoulders.

Players push their bodies up on their forearms as an exercise. They should tuck their stomachs in for 20–30 seconds and hold the position. Their bodies should be in a straight line with no sway or arched back for 3 sets

Level 2: Switch legs.

Players begin by lying on their backs, supported by their forearms and both feet. They should have their elbows directly under their shoulders.

Players push their bodies up on their forearms as an exercise. They should tuck their stomachs in and alternately lift each leg, holding for two seconds each time. Repeat for another 40–60 seconds. Three pairs of their bodies should be in a straight line with no sway or arched back.

Level 3: Lift and hold one leg.

Players begin by lying on their backs, supported by their forearms and both feet. They should have their elbows directly under their shoulders.

Players push their bodies up on their forearms as an exercise. They need to tuck their stomachs in. Raise one leg 10–15 cm above the ground and hold it there for 20–30 seconds. Their bodies should be in a straight line. They should not wobble or arch their low back, nor should they let the opposing hip drop. Allow them to rest for a few moments, then switch legs and repeat for three sets.

Bench with a Slant

The first level is static.

Players begin by lying on one side with the lowermost leg's knee bent to 90 degrees. Their bodies are supported by their forearms and knees. Their support arm's elbow should be squarely beneath their shoulder.

Lift the player's upper leg and hips until their shoulder, hip, and knee are all in a straight line. For 20–30 seconds, stay in this position. Change sides after a short rest and repeat; 3 sets on each side.

Raise and Lower Hips (Level 2)

Players begin by lying on their side with both legs straight. The players should maintain a straight line from shoulder to foot by leaning on their forearm and the side of their foot. Their support arm's elbow should be squarely beneath their shoulder.

Players must lower their hip to the ground and then raise it back up. Rep for a total of 20–30 seconds. Change sides after a short rest and repeat; 3 sets on each side.

Level 3: Includes a leg raise.

Players begin by lying on their side with both legs straight. The players should maintain a straight line from shoulder to foot by leaning on their forearm and the side of their foot. Their support arm's elbow should be squarely beneath their shoulder.

Lift the topmost leg and slowly lower it back down as an exercise. Rep the exercise for a total of 20–30 seconds. Change sides after a short rest and repeat; 3 sets on each side.

Hamstrings

Beginner's level

Starting position: Players kneel on a soft surface with their ankles securely held down by a partner.

Throughout the workout, players must keep their bodies totally straight from shoulders to knees. They should lean forward as far as possible, using their hamstrings and gluteal muscles to regulate the action. They softly take their weight on their hands and collapse into a push-up position when they can no longer hold the position. 1 set consists of 3–5 repetitions or 60 seconds.

Intermediate (Level 2)

1 set consists of 7-10 repetitions or 60 seconds of the same exercise performed by the players.

Advanced (Level 3)

1 set consists of 12–15 repetitions or 60 seconds of the same exercise performed by the players.

Stance on One Leg

Level 1: Keep the ball in your hand.

The players begin by standing on one leg.

Players balance on one leg while holding a ball in their hands as an exercise. Their weight should be distributed evenly across the ball of their foot. Inward buckling of the knee is not recommended. Hold this position for 30 seconds before switching legs and repeating the process. Pass the ball around their middle and/or beneath the opposite knee to make this exercise more difficult; 2 sets.

Level 2: Ball Throwing with a Partner

Two players stand 2–3 meters apart, each on one leg, in the starting position.

Players throw the ball to one another while maintaining their balance and keeping their stomachs in. Their weight should be distributed evenly across the ball of their foot. Their knees should only be minimally flexed and not buckle inwards. Continue for another 30 seconds. Rep with the other leg for a total of two sets.

Level 3: Put Your Partner to the Test

Starting position: Partners stand on one leg, arm's length apart, facing each other.

Exercise: With players attempting to retain their balance, each player attempts to knock their partner off balance in various directions. They should put their weight on the ball of their foot and keep their knee from collapsing inwards. Continue for another 30 seconds. Rep with different foot for a total of two sets.

Squats

Level 1: Raise your toes

Players should begin by standing with their feet hip-width apart. If they choose, they can put their hands on their hips.

Players should pretend to be about to sit down in a chair for this exercise. Squats are performed by bending their hips and knees to 90 degrees while keeping their knees from buckling inward. Slowly descend and soon straighten up. They should stand up on their toes and slowly descend once their knees are completely straight. Repeat the exercise for a total of two sets of 30 seconds each.

Walking Lunges (Level 2)

Players should begin by standing with their feet hip-width apart. If they choose, they can put their hands on their hips.

Players should lunge forward slowly and evenly as an exercise. As they lunge forward, the lead leg should bend to 90 degrees at the hip and knee. Knees should not be bowed inwards. The players should work their way across the pitch (about 10 times on each leg) while keeping their upper body and hips steady; 2 sets.

Squats on one leg (Level 3)

Starting position: Partners stand side by side on one leg, holding hands loosely.

Both players should slowly bend their knees as far as they can. Players must focus on keeping their knees from collapsing inwards. They should slowly bend their knee and then straighten it somewhat faster, maintaining their hips and upper body in line. Repeat the exercise 10 times on each leg, for a total of two sets.

Jumping

Vertical Jumps (Level 1)

Players should begin by standing with their feet hip-width apart. If they choose, they can put their hands on their hips.

Players should pretend to be about to sit down in a chair for this exercise. They should slowly bend their legs until their knees are flexed to around 90 degrees and hold this position for 2 seconds. Allowing the knees to buckle inwards is not a good idea. They jump as high as they can from this squat stance, landing softly on the balls of their feet and bending their hips and knees. Repeat for a total of two sets of 30 seconds each.

Lateral Jumps (Level 2)

Players begin by standing on one leg with their upper body slightly bent forward and their knees and hips slightly bent.

Exercise: From the supporting leg to the free leg, each player should jump roughly 1 meter sideways. They should land softly on the ball of their foot, slightly bending their hips and knees but not buckling their knees inwards. With each jump, they should keep their equilibrium. Repeat for a total of two sets of 30 seconds each.

Box Jumps (Level 3)

Players should begin by standing with their feet hip-width apart. They should visualize themselves standing during a cross drawn on the ground.

Players should hop forward and backward, side to side, and diagonally across the cross as an exercise. They should jump as rapidly as possible and with as much force as feasible. Knees and hips should be bent slightly. Players should land softly on the balls of their feet and avoid bending their knees inwards. Repeat the exercise for a total of two sets of 30 seconds each.

Part 3: Running Workouts

It takes roughly 2 minutes to finish the final running workouts.

Across the Pitch: Players run across the pitch at 75–80 percent of maximum speed in two sets, from one side to the other.

Players should take high bounding steps with a high knee lift and land lightly on the ball of the foot when bounding. For each step, they should utilize an exaggerated arm swing (opposite arm and opposite leg). They should not cross their midline with their lead leg, nor should their knee buckle inwards. Repeat until they reach the opposite half of the pitch, then jog back to recover; 2 sets.

Players jog 4–5 steps before planting on the outside leg and cutting to alter direction. Before decelerating and going into the following plant and cut, players accelerate and sprint 5–7 steps at high speed (80–90 percent maximum pace). They should not bend their knees inwards. Repeat the exercise until they reach the opposite side of the pitch, then jog back for two sets.

APPENDIX FIVE: DEVELOPED IMPLEMENTATION GUIDE

Developed implementation guide draft

Section 1: Role of the stakeholders

Target audience: Coaches, team captains, volunteers, management/administration
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on field and off field)
Stakeholders are defined as everyone involved in playing roles to ensure injury prevention goals are achieved.
The key role of the stakeholders is outlined in Table 1.

Table 1: Role of stakeholders

Stakeholders	**Person Description**	Role Description	Prospective Goals
Facilitator	Anyone who is willing to acquire detailed understanding and knowledge with the intention to train others or has a detailed understanding and knowledge of the FIFA 11+. Possess the capacity to transfer knowledge to other stakeholders. They could have been trained directly or indirectly by FMARC. Should be proficient in English and other languages local to the terrain.	Provides the needed education and knowledge to the stake holders	Minimizing the impact and burden of non-contact lower limb injuries. Optimizing player and team performance Improving players' availability for selection Promoting players' health in general. Improving the chances of team success.
Head Coach	The head of a football team who takes charge of the standard operations of planning and execution of team training. Liaises with the administrators on behalf of the team to	Takes charge as the team leader in coordinating continuous team capacity building on injury prevention, injury	

	provide the needed support for implementation	surveillance and implementation	Promotion to a higher level of competition. Potentials of career longevity Potentials of additional income and bonuses from team success. Foster teamwork
Coaches including but not limited to Assistant Coaches, Fitness Coaches, Goalkeeper Coaches and Team Managers	Supporting technical personnel who are aiding the Head Coach.	Supports the head coach in his charge as the team leader in coordinating continuous team capacity building on injury prevention, injury surveillance and implementation	
Players	The end-users of the injury prevention programme.	Support the coaches and back-room staff collectively and commit to the programme for their own health and safety promotion and performance optimization. Help with on-field and off-field set ups.	
Volunteers	Anyone who is trainable and willing to assist the teams during training sessions.	Where available to work closely under the coach's instructions with supporting the team sessions	

Management / administration including but not limited to Football association, local authorities, injury prevention organizations	The board of directors and administrative staff who take charge of funding and logistics operations of the team.	Participate in sessions and provide morale booster for the team. Provide the team with the funds for low-cost equipment ie cones /footballs and moral support needs. Liaise with football associations/federations for up-to-date information from FIFA/FMARC	

This section of the implementation guide includes identifying the key stake holders with a person and role description and their roles in the implementation process for the FIFA 11+ injury prevention programmes in the low resource setting. The projected goals of this section were also highlighted.

Section 2: Educational Programme

Target audience: Coaches, team captains, volunteers
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on field and off field)

The contents of the education programme are outlined in Table 2.

Table 2: Educational Programme

Item	Content	Mode of delivery	Learning Outcomes	Facilitator	Target Audience
Common sports injuries in football and knowledge about basic injury prevention	Common sports injuries in football -introduction to common sports injuries. -epidemiology of injuries. -injury surveillance -Introduction to injury prevention -Overview of Injury prevention Strategies Injury prevention strategies and importance.	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures	Knowledge about common sports injuries, injury surveillance and injury prevention strategies. Shared responsibilities and roles as a team.	FIFA 11+ Expert/personnel	All stakeholders

		Educational materials: flyers, newsletters, posters, and instructional videos, online resources (Social Media, websites, YouTube, and Blogposts) linked via QR Code. Sessions not longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions			

		Cumulative Duration: 90mins			
The FIFA 11+	-Introduction to the FIFA11+ -Parts 1,2,3: Running, strength, plyometrics and balance. -Progression. Levels: 1,2,3. Adaptability of the FIFA11+ Integration into team existing programmes. Teamwork and Shared Responsibilities in Implementation -Role of coaches in implementation -Role of players in implementation -Role of volunteers	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Social	Knowledge about the FIFA 11+ and implementation Shared responsibilities and roles as a team.	FIFA 11+ Expert/personnel	All stakeholders

	-Role of team management Shared decision making about adopting an injury prevention philosophy Behavioural adaptations and impact on compliance and adherence	Media, websites, YouTube, and Blogposts) linked via QR Code. Sessions no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions			
Implications of Injury Prevention	Implications of injury surveillance. Implications of adopting the FIFA 11+	Preseason Workshop: Online and Onsite Sessions	Improving team performance Improving players' availability	FIFA 11+ Expert/personnel	All stakeholders

	-Performance related: How does it affect individual and team performance Team Succes related: How does it affect team success -Economic related: How does it affect the economic situation of coaches, players, and team	Via Administrative structures How to use injury surveillance tools. (F-MARC Injury Surveillance forms) Educational materials: flyers, newsletters, posters, instructional videos and online resources Social Media, websites, YouTube, and Blogposts) linked via QR Code. Sessions no longer than 30mins inclusive of breaks. Division into smaller group at the	Promoting player's health Improving the chances of team success Economic implications of team success Potentials of career longevity		

		end of every teaching session to recap and engage on hands-on sessions Cumulative Duration: 90mins			

This section outlines the content of the pre-season workshops which includes topics on common sports injuries in football and knowledge about basic injury prevention, the FIF 11+ and implications for injury preventions. The trainings are proposed to be conducted online or onsite and additional educational materials will be provided to participants. It also included the learning outcomes and who oversees the sessions.

Section three: The FIFA 11+ programme

The FIFA 11+ is the intervention of interest that will be promoted to be adopted as part of the injury prevention strategy for women football in South Africa. The programme is easy to learn, accessible and cost effective to execute. The task shifting approach will be used to help disseminate knowledge about this injury prevention programme as adopted in public health interventions. This approach is deployed when a lack of qualified and accessible health professionals poses a threat to health and health equity. Specific responsibilities are transferred, shared, or delegated from highly skilled health practitioners to persons with less training or qualifications, such as laypeople (Orkin et al., 2021)

Description of "The FIFA11+"

“The FIFA11+ “has three parts: Part 1: running exercises at a slow speed combined with active stretching and controlled partner contacts; Part 2: six sets of exercises, focusing on core and leg strength, balance, and plyometrics/agility, each with three levels of increasing difficulty; and Part 3: running exercises at moderate/high speed combined with planting/cutting movements. A key point in the programme is to use the proper technique during all the exercises. Pay full attention to correct posture and good body control, including straight leg alignment, knee-over-toe position, and soft landings. “The FIFA 11+” should be completed, as a standard warm-up, at least two time a week and should take approximately 20 minutes to complete.

The content of the FIFA 11+ programme can be accessed online https://www.yrsa.ca/wp-content/uploads/2019/11/pdf/Fifa11/11plus_workbook_e.pdf.

Target audience: Coaches, team captains, volunteers
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on field and off field) and home programmes
Materials needed: Cones, footballs, training ground (basic training materials)

This implementation guide will adopt the task shifting approach where the facilitator will transmit information to the primarily coaches, in addition team captains and volunteers who will assist in the transfer of the knowledge to the rest of the team.

Table 3 outlines contents of the training component of the FIFA 11+. This included the mode of delivery, learning outcomes and the facilitator responsibilities.

Table 3: The FIFA 11+ programme

Item	Content	Mode of delivery	Outcomes	Facilitator
FIFA 11+	Overview of FIFA 11+ Running, Strength, Plyometrics and Balance	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks.	Awareness of the FIFA11+ programmes. Structure of the programme. Improve Coaches' task self-efficacy (Owoeye et al., 2020)	FIFA 11+ Expert/personnel

		Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Running Exercises	Part 1&3	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources.	Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively.	Coaches/Team Captains

		Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Strength Plyometrics and Balance	Part 2 Level 1to3	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures	Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively. Detailed of exercise progression. Progression is indicated when previous level of difficult is performed with relative ease.	Coaches/Team Captains

		Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Home programmes	Exercises to be revised individually at home to master techniques by coaches and players Materials: Posters, Manuals, DVDs	Preseason Home programmes	Consolidate knowledge gained and revise individually were feasible in the home setting.	Coaches/Team Captains

Type of exercise equipment	Cones, footballs, training ground (basic training materials)	Preseason Team management to facilitate through coaches	Familiarize with basic items needed or improvise where not feasible. i.e., using a gym facility if a training pitch is unavailable.	Coaches/Team Captains
Follow-up	Provision of feedback channels	Phone, emails, on site face to face discussions.	Communication channel and forum with stakeholders to have a two-way communication established to discuss challenges and progress	FIFA 11+ Expert/personnel
	Off field Sessions	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures	Reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2.,3 Progression Levels 1,2,3	Training by a FIFA 11+ Expert where available or self-taught using materials available i.e., posters DVDs and Manuals. Online resources

		Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
	On field Sessions	Pre-season Workshop: Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions.	Demonstrations on field reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2,3 Progression Levels 1,2,3	On field demonstrations and practice sessions. Training by a FIFA 11+ Expert where available or self-taught using materials available i.e.,

		Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		posters DVDs and Manuals. Online resource

This section outlines the implementation training programme of the FIFA 11+ which is divided for ease of learning into different parts covering the Part1 and 3 Running exercises and Part 2 strength, plyometrics and balance aspects of the programme. There will be on and off-field sessions with each session being a cumulative period of 90 minutes. Sessions will be broken into sets of 30mins with breaks

inclusive after which division into smaller group for activities and reflection will be initiated. It also included the learning outcomes and who oversees the sessions.

Compliance and adherence

The table four outlines the action plan and goals of compliance and adherence in the implementation of the FIFA11+.

Table 4: Outline of compliance and adherence strategy

Item	Action Plan	Outcome Measures	Goal	Facilitators
Compliance	Assign compliance officer within the team to monitor team compliance and accountability partner within the team to monitor individual player compliance. Improve coaches and players knowledge and confidence about self-care.	Use a self-report questionnaire/ compliance sheet. Improve Coaches' task self-efficacy (Owoeye et al., 2020)	Map out a compliance routine within the team based on human resources available. Provision of incentives by the coaches and management.	Coaches/Team Captains
Adherence	Encourage protocol integration into regular training routine and room	Use of structured forms completed by individual adherence and team	Incorporate into team's routine as a continuum	Coaches to lead and Player's support.

	for modification/adaptation (O'Brien et al., 2017). Adapt components of the programme to suit needs. Re-schedule Part II (Whalan et al., 2019)	adherence. (Steffen et al., 2013) Evaluate beliefs and influence behavioural changes to enhance adherence. (McKay et al., 2014)	rather than a different activity Provision of incentives by the coach and management	

This section identifies the compliance and adherence factors of the implementation guide and the action plan to address them. It also provided the outcome measures and goals of this section and indicates the key facilitators.

Motivational strategies

The table below highlights the motivational strategies for behavioural changes for the implementation of the FIFA 11+ using the constructs of HAPA Model (McKay et al, 2016)

Table 5 outlines the content for the motivational strategy

Table 5: Outline of content for motivational strategy

Item	Action Plan	Outcome measure	Goal
Behavioural Changes for Coaches and Players	After the training and capacity building, coaches to complete a questionnaire to assess demographic characteristics, perceptions about football injury, and the HAPA constructs. An adapted questionnaire with separate versions for coaches and players (McKay et al, 2016) Section A of the questionnaire will capture demographic, football coaching/playing experience, and injury history information. Section B will focus on the HAPA constructs, with questions assessing self-efficacy, outcome expectancies, risk perceptions, behavioural intentions, and barriers and facilitators to FIFA 11+ implementation.	Cross-sectional questionnaire to measure HAPA constructs including pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention.	To encourage coaches to adopt a holistic approach including behavioural adjustments ensuring that they understand there will be overall success when everyone plays their part. They should also embrace the notion that prevention of injuries is a cost-effective proactive initiative which contributes to team success.

This section identifies the motivational strategies to be considered that may facilitate behavioural changes for coaches and players by accessing their including pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention. An adapted questionnaire with HAPA constructs will be used and the goals are identified as well.

Developed implementation guide – Final draft

Section 1: Role of the stakeholders

Target audience: Coaches, team captains, volunteers, management/administration
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on-field and off-field)
Stakeholders are defined as everyone involved in playing roles to ensure injury prevention goals are achieved.
The key role of the stakeholders is outlined in Table 1.

Table 1: Role of stakeholders

Stakeholders	**Person Description**	Role Description	Prospective Goals
Facilitator	Anyone who is willing to acquire detailed understanding and knowledge with the intention to train others or has a detailed understanding and knowledge of the FIFA 11+. Possess the capacity to transfer knowledge to other stakeholders. They could have been trained directly or indirectly by FMARC. Should be proficient in English and other languages local to the terrain.	Provides the needed education and knowledge to the stakeholders	Minimising the impact and burden of non-contact lower limb injuries. Optimising player and team performance Improving players' availability for selection Promoting players' health in general. Improving the chances of team success. Promotion to a higher level of competition.
Head Coach	The head of a football team takes charge of the standard operations of planning and execution of team training. Liaises with the administrators on behalf of the team to provide the needed support for implementation	Takes charge as the team leader in coordinating continuous team capacity building on injury prevention, injury surveillance and implementation	

Coaches including but not limited to Assistant Coaches, Fitness Coaches, Goalkeeper Coaches and Team Managers	Supporting technical personnel who are aiding the Head Coach.	Supports the head coach in his charge as the team leader in coordinating continuous team capacity building on injury prevention, injury surveillance and implementation	Potentials of career longevity Potentials of additional income and bonuses from team success. Foster teamwork
Players	The end-users of the injury prevention programme.	Support the coaches and back-room staff collectively and commit to the programme for their own health and safety promotion and performance optimisation. Help with on-field and off-field set ups.	
Volunteers	Anyone who is trainable and willing to assist the teams during training sessions.	Where available to work closely under the coach's instructions with supporting the team sessions	

Management / administration including but not limited to Football association, local authorities, injury prevention organizations	The board of directors and administrative staff who take charge of funding and logistics operations of the team.	Provide the team with the funds for low-cost equipment i.e., cones /footballs and moral support needs. Liaise with football associations/federations for up-to-date information from FIFA/FMARC	

This section of the implementation guide includes identifying the key stake holders with a person and role description and their roles in the implementation process for the FIFA 11+ injury prevention programmes in the low resource setting. The projected goals of this section were also highlighted.

Section 2: Educational Programme

Target audience: Coaches, team captains, volunteers
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on-field and off-field)

The contents of the education programme are outlined in Table 2.

Table 2: Educational Programme

Item	Content	Mode of delivery	Learning Outcomes	Facilitator
Common sports injuries in football and knowledge about basic injury prevention	Common sports injuries in football -introduction to common sports injuries. -epidemiology of injuries. -injury surveillance -Introduction to injury prevention -Overview of Injury prevention Strategies Injury prevention strategies and importance.	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on- and off-field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online	Knowledge about common sports injuries, injury surveillance and injury prevention strategies. Shared responsibilities and roles as a team.	FIFA 11+ Expert/personnel

		resources (Social Media, websites, YouTube, and Blogposts) linked via QR Code. Sessions not longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative Duration: 90mins		
The FIFA 11+	-Introduction to the FIFA11+ -Parts 1,2,3: Running, strength, plyometrics and balance. -Progression. Levels: 1,2,3. Adaptability of the FIFA11+ Integration into team existing programmes.	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets	Knowledge about the FIFA 11+ and implementation Shared responsibilities and roles as a team.	FIFA 11+ Expert/personnel

	Teamwork and Shared Responsibilities in Implementation -Role of coaches in implementation -Role of players in implementation -Role of volunteers -Role of team management Shared decision making about adopting an injury prevention philosophy Behavioural adaptations and impact on compliance and adherence	Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Social Media, websites, YouTube, and Blogposts) linked via QR Code. Sessions no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions		

Implications of Injury Prevention	Implications of injury surveillance. Implications of adopting the FIFA 11+ -Performance related: How does it affect individual and team performance Team Succes related: How does it affect team success -Economic related: How does it affect the economic situation of coaches, players, and team	Preseason Workshop: Online and Onsite Sessions Via Administrative structures How to use injury surveillance tools. (F-MARC Injury Surveillance forms) Educational materials: flyers, newsletters, posters, instructional videos and online resources Social Media, websites, YouTube, and Blogposts) linked via QR Code.	Improving team performance Improving players' availability Promoting player's health Improving the chances of team success Economic implications of team success Potentials of career longevity	FIFA 11+ Expert/personnel

		Sessions no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative Duration: 90mins		

This section outlines the content of the pre-season workshops which includes topics on common sports injuries in football and knowledge about basic injury prevention, the FIF 11+ and implications for injury preventions. The trainings are proposed to be conducted online or onsite and additional educational materials will be provided to participants. It also included the learning outcomes and who oversees the sessions.

Section three: The FIFA 11+ programme

The FIFA 11+ is the intervention of interest that will be promoted to be adopted as part of the injury prevention strategy for women football in South Africa. The programme is easy to learn, accessible and cost-effective to execute. The task-shifting approach will be used to help disseminate knowledge about this injury prevention programme as adopted in public health interventions. This approach is deployed when a lack of qualified and accessible health professionals threatens health and health equity. Specific responsibilities are

transferred, shared, or delegated from highly skilled health practitioners to persons with less training or qualifications, such as laypeople (Orkin et al., 2021)

Description of "The FIFA11+"

"The FIFA11+ "has three parts: Part 1: running exercises at a slow speed combined with active stretching and controlled partner contacts; Part 2: six sets of exercises, focusing on core and leg strength, balance, and plyometrics/agility, each with three levels of increasing difficulty; and Part 3: running exercises at moderate/high speed combined with planting/cutting movements. A key point in the programme is to use the proper technique during all the exercises. Pay full attention to correct posture and good body control, including straight leg alignment, knee-over-toe position, and soft landings. "The FIFA 11+" should be completed, as a standard warm-up, at least two time a week and should take approximately 20 minutes to complete.

The content of the FIFA 11+ programme can be accessed online https://www.yrsa.ca/wp-content/uploads/2019/11/pdf/Fifa11/11plus_workbook_e.pdf.

Target audience: Coaches, team captains, volunteers
Facilitator: FIFA 11+ Expert / personnel
Mode of training: Workshop (on-field and off-field) and home programmes
Materials needed: Cones, footballs, training ground (basic training materials)

This implementation guide will adopt the task-shifting approach where the facilitator will transmit information to the primary coaches, in addition team captains and volunteers who will assist in the transfer of the knowledge to the rest of the team.

Table 3 outlines contents of the training component of the FIFA 11+. This included the mode of delivery, learning outcomes and the facilitator responsibilities.

Table 3: The FIFA 11+ programme

Item	Content	Mode of delivery	Outcomes	Facilitator
FIFA 11+	Overview of FIFA 11+ Running, Strength, Plyometrics and Balance	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks.	Awareness of the FIFA11+ programmes. Structure of the programme. Improve Coaches' task self-efficacy (Owoeye et al., 2020b)	FIFA 11+ Expert/personnel

		Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Running Exercises	Part 1&3	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources.	Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively.	Coaches

		Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Strength Plyometrics and Balance	Part 2 Level 1to3	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures	Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively. Detailed of exercise progression. Progression is indicated when previous level of difficult is performed with relative ease.	Coaches

		Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
Home programmes	Exercises to be revised individually at home to master techniques by coaches and players Materials: Posters, Manuals, DVDs	Preseason Home programmes	Consolidate knowledge gained and revise individually were feasible in the home setting.	Coaches and Players

Type of exercise equipment	Cones, footballs, training ground (basic training materials)	Preseason Team management to facilitate through coaches	Familiarize with basic items needed or improvise where not feasible. i.e., using a gym facility if a training pitch is unavailable.	Coaches
Follow-up	Provision of feedback channels	Phone, emails, on site face to face discussions.	Communication channel and forum with stakeholders to have a two-way communication established to discuss challenges and progress	FIFA 11+ Expert/personnel
	Off field Sessions	Pre-season Workshop: Online and Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions. Via Administrative structures	Reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2.,3 Progression Levels 1,2,3	Training by a FIFA 11+ Expert where available or self-taught using materials available i.e., posters DVDs and Manuals. Online resources

		Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		
	On field Sessions	Pre-season Workshop: Onsite Sessions Online: via Zoom, Teams, Google meets Onsite: Designated location for on and off field sessions.	Demonstrations on field reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2,3 Progression Levels 1,2,3	On field demonstrations and practice sessions. Training by a FIFA 11+ Expert where available or self-taught using materials

		Via Administrative structures Educational materials: flyers, newsletters, posters, and instructional videos, online resources. Sessions broken into sets no longer than 30mins inclusive of breaks. Division into smaller group at the end of every teaching session to recap and engage on hands-on sessions Cumulative time per engagement: 90mins		available i.e., posters DVDs and Manuals. Online resource

This section outlines the implementation training programme of the FIFA 11+, which is divided for ease of learning into different parts covering the Part1 and 3 Running exercises and Part 2 strength, plyometrics and balance aspects of the programme. There will be on and off-field sessions, with each session being a cumulative period of 90 minutes. Sessions will be broken into sets of 30mins with

breaks inclusive after which division into smaller group for activities and reflection will be initiated. It also included the learning outcomes and who oversees the sessions.

Compliance and adherence

The table four outlines the action plan and goals of compliance and adherence in the implementation of the FIFA11+.

Table 4: Outline of compliance and adherence strategy

Item	Action Plan	Outcome Measures	Goal	Facilitators
Compliance	Assign compliance officer within the team to monitor team compliance and accountability partner within the team to monitor individual player compliance. Improve coaches and players knowledge and confidence about self-care.	Use a self-report questionnaire/ compliance sheet. Improve Coaches' task self-efficacy (Owoeye et al., 2020b)	Map out a compliance routine within the team based on human resources available. Provision of incentives by the coaches and management.	Coaches to lead and Player's support
Adherence	Encourage protocol integration into regular training routine and room for	Use of structured forms completed by individual adherence	Incorporate into team's routine as a continuum rather than a different activity	Coaches to lead and Player's support.

	modification/adaptation (O'Brien et al., 2017). Adapt components of the programme to suit needs. Re-schedule Part II (Whalan et al., 2019)	and team adherence. (Steffen et al., 2013) Evaluate beliefs and influence behavioural changes to enhance adherence. (McKay et al., 2014)	Provision of incentives by the coach and management	

This section identifies the compliance and adherence factors of the implementation guide and the action plan to address them. It also provided the outcome measures and goals of this section and indicates the key facilitators.

Motivational strategies

The table below highlights the motivational strategies for behavioural changes for the implementation of the FIFA 11+ using the constructs of HAPA Model (McKay et al, 2016)

Table 5 outlines the content for the motivational strategy

Table 5: Outline of content for motivational strategy

Item	Action Plan	Outcome measure	Goal
Behavioural Changes for Coaches and Players	After the training and capacity building, coaches to complete a questionnaire to assess demographic characteristics, perceptions about football injury, and the HAPA constructs. Determine at which level each participant is in terms of behavioural change prior to implementing the workshop as the content of the workshop is customised to accommodate for different levels of readiness to change behaviour. An adapted questionnaire with separate versions for coaches and players (McKay et al, 2016) Section A of the questionnaire will capture demographic, football coaching/playing experience, and	cross-sectional questionnaire to measure HAPA constructs including pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention.	To encourage coaches to adopt a holistic approach including behavioural adjustments ensuring that they understand there will be overall success when everyone plays their part. They should also embrace the notion that prevention of injuries is a cost-effective proactive initiative which contributes to team success.

	injury history information. Section B will focus on the HAPA constructs, with questions assessing self-efficacy, outcome expectancies, risk perceptions, behavioural intentions, and barriers and facilitators to FIFA 11+ implementation.		

This section identifies the motivational strategies to be considered that may facilitate behavioural changes for coaches and players by accessing their including pre-season risk perceptions, outcome expectancies, task self-efficacy, facilitators, barriers, and FIFA 11+ implementation intention. An adapted questionnaire with HAPA constructs will be used and the goals are identified as well.



Additional resources

FIFA11+ Manual

https://www.yrsa.ca/wp-content/uploads/2019/11/pdf/Fifa11/11plus_workbook_e.pdf.

FIFA 11+ Videos

https://www.youtube.com/playlist?list=PL-fHxyUgDO-bRCKBCpMxGn2XJvcoYMWoE

Injury surveillance forms. Pgs. 64,65,67, &68

http://static.onemansblog.com/wp-content/uploads/2016/06/FIFA-Medicine-Manual.pdf

The HAPA Model

https://userpage.fu-berlin.de/gesund/publicat/ehps_cd/health/hapa.htm

Coaches and Players Questionnaire Template from McKay et al, 2016. This will be adapted to suit the context and setting

https://www.mdpi.com/1660-4601/13/7/657/s1

APPENDIX SIX: DETAILED OUTLINE OF THE OFF-FIELD AND ON-FIELD WORKSHOPS

TASK	ACTION PLAN	TIME	PROGRESS NOTES
Interaction with **Coaches and Team** **OFF FIELD SESSION**	Introduce the implementation guide and why it was developed.	5min	
	Discuss the roles of stakeholders identified. Group Activity: Discuss team context and assign roles as applicable	5mins	
	Common sports injuries in football -introduction to common sports injuries. -epidemiology of injuries. -injury surveillance -Introduction to injury prevention -Overview of Injury prevention Strategies	15mins	

	Injury prevention strategies and importance.		
	ERGONOMIC BREAK AND STRETCHES	5 mins	
	Historical background of the FIFA 11+ neuromuscular exercise-based programme. Introduction to the FIFA11+ -Parts 1,2,3: Running, strength, plyometrics and balance. -Progression. Levels: 1,2,3. Adaptability of the FIFA11+ Integration into team existing programmes.	20mins	
	Group Activity. Q and A/ Feedback from team	10 mins	
	Teamwork and Shared Responsibilities in Implementation -Role of coaches in implementation -Role of players in implementation -Role of volunteers -Role of team management	5 mins	

	Shared decision making about adopting an injury prevention philosophy Behavioural adaptations and impact on compliance and adherence		
	ERGONOMIC BREAK AND STRETCHES	5 mins	
	Implications of injury surveillance. Implications of adopting the FIFA 11+ -Performance related: How does it affect individual and team performance Team Success related: How does it affect team success -Economic related: How does it affect the economic situation of coaches, players, and team	20 mins	
	Group Activity. Q &A /Feedback	10 mins	
	Overview of Session/Take Home Messages Total Running time 105mins Projected time 90mins	5 mins	

	ACTION PLAN	TIME	PROGRESS NOTES
Interaction with **Coaches and Team** **ON FIELD SESSION**	Overview of the FIFA 11+	5 mins	
	Field-setup. Map the areas of running exercises (Part1 and 3) and Strength, plyometrics and balance (Part 2)	5mins	
	Part 1 and 3 Running Exercises	20 mins	
	Group Activity. Qand A/ Feedback from team	10 mins	
	WATER BREAK	5 mins	
	Part 2 Strength, plyometrics and balance	20 mins	
	Group Activity. Qand A/ Feedback from team	10 mins	
	WATER BREAK	5 mins	
	Overview of Session/Take Home Messages Total Running time 90 mins Projected time 90mins	5mins	

APPENDIX SEVEN: SCOPING REVIEW SEARCH STRATEGY

DATA BASE: MEDLINE VIA PUBMED
FILTERS: JAN 01, 2008- DEC 31, 2020

SEARCH DATE: JULY 30, 2021

KEYWORDS: INJURY PREVENTION, NEUROMUSCULAR EXERCISE PROGRAM, FIFA 11+, FOOTBALL, SOCCER

MeSH Terms: ATHLETIC INJURIES [Major Topic] PREVENTION/CONTROL [Sub Heading], FOOTBALL or SOCCER [Major Topic], Injuries [Sub Heading]

Search	Query	Results	Time
#11	Search: ((((FIFA 11+) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat])) AND (((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]))) AND (((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat])) Filters: from 2008/1/1 - 2020/12/31	5	23:46:53
#10	Search: ((((FIFA 11+) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat])) AND (((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat]))) AND (((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat])) Filters: from 2008/1/1 - 2020/12/31	4	23:46:20
#9	Search: (((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) AND	136	23:44:29

Search	Query	Results	Time
	(2008/1/1:2020/12/31[pdat])) OR (((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat])) Filters: from 2008/1/1 - 2020/12/31		
#8	Search: (((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat])) OR (((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat])) Filters: from 2008/1/1 - 2020/12/31	17	23:44:01
#7	Search: (((FIFA 11+) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat])) OR (((FIFA 11+) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat])) Filters: from 2008/1/1 - 2020/12/31	30	23:43:35
#6	Search: ((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (SOCCER) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) Filters: from 2008/1/1 - 2020/12/31	84	23:42:30
#5	Search: ((INJURY PREVENTION) AND (IMPLEMENTATION)) AND (FOOTBALL) AND (2008/1/1:2020/12/31[pdat]) AND (2008/1/1:2020/12/31[pdat]) Filters: from 2008/1/1 - 2020/12/31	105	23:42:01
#4	Search: ((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (SOCCER) AND	13	23:41:02

Search	Query	Results	Time
	(2008/1/1:2020/12/31[pdat]) Filters: from 2008/1/1 - 2020/12/31		
#3	Search: ((neuromuscular exercise program) AND (IMPLEMENTATION)) AND (FOOTBALL) Filters: from 2008/1/1 - 2020/12/31	12	23:39:57
#2	Search: ((FIFA 11+) AND (IMPLEMENTATION)) AND (SOCCER) Filters: from 2008/1/1 - 2020/12/31	29	23:39:21
#1	Search: ((FIFA 11+) AND (IMPLEMENTATION)) AND (FOOTBALL) Filters: from 2008/1/1 - 2020/12/31	24	23:38:55

Terms connected by **Population** **OR**	**AND**	**Terms connected by** **Intervention** **OR**	**AND**	**Terms connected by** **Comparator** **OR**	**AND**	**Terms connected by** **Outcome**
Soccer/ Football Players		FIFA 11+ Complete Warm up Program NOT FIFA 11+ for Kids NOT FIFA 11+ for Referees		Conventional Injury prevention Program None		Lower limb Injury Rates Lower limb Injury incidence Performance Time-loss

		NOT FIFA 11 for Health				

Developing an implementation guide for FIFA 11+ injury prevention program in women's football

Dear Participant,
My name is Ummukulthoum Bakare, and I am conducting this study as part of the fulfilment for a PhD in Physiotherapy at the University of the Witwatersrand under the supervision of Prof Benita Olivier and Dr Corlia Brandt.

Ethical clearance: I have received ethical clearance for this study from the University of the Witwatersrand Human Research Ethics Committee (Medical) (M161146).

Aim of the study: The aim of this study is to develop an implementation guide for the FIFA 11+ Injury prevention program in South Africa specifically to guide coaches and stakeholders in the footballing community in low resource settings to adopt the program efficiently and effectively.

Methods: The Delphi technique will be used to reach consensus among purposively sampled experts in the field of injury prevention, implementation, and rehabilitation. Experts in this field such as researchers, doctors, physiotherapists, stakeholders such as coaches and players will also be invited to share their opinions to arrive at a consensus.

Description of procedures: RedCap® will be used to gather data. Informed consent to participate will be sought and obtained before proceeding with the survey. A three round Delphi method will be used to reach consensus and if consensus is not reached a final fourth Delphi round will be carried out. Upon completion of the first round Delphi, statistical analysis will be performed, and you will receive a summary of the results in a feedback email. A limited time period will be allowed for the completion of the questionnaire. In addition, there will be time period between the first and second round to allow the researcher and statistician to analyze the results and forward the summary of findings to you. Included in the questionnaire will be demographical questions followed by questions to establish the agreement of participating experts on included questions on a five-point Likert scale ranging from 1 - strongly disagree, 2 - disagree, 3 - neutral, 4 - agree and 5 - strongly agree.

Voluntary participation: Your participation is voluntary, and you will not be negatively affected by your choice. You have the right to withdraw from the research at any point. Explicit withdrawal must be sent to Bakare Ummukulthoum, the lead researcher (contact details below), and only after receiving the written withdrawal will correspondence be stopped. Absent responses will be seen as non-interest and no further information will be sent. Experts not responding to the first round Delphi, but who indicated an interest to participate, will receive two reminders and questionnaire links in the form of emails before this will be viewed as non-participation. There will be no renumeration associated with your participation.

Participant responsibility: Your responsibility will include: Completing a RedCap® questionnaire in at least three rounds of the Delphi technique. Upon completion of each round Delphi, each participating expert will receive a summary of the results.

Anonymity: The results of the questionnaire will be kept confidential, and your name will not be seen on any documentation. The results will be published in an article and thesis, but anonymity will be maintained. Anonymity principles throughout the Delphi study will be assured by using numbers and separate emails.

Yours sincerely,

Bakare Ummukulthoum (PhD candidate)
ummukulthoum.bakare1@students.wits.ac.za
ummubakare@gmail.com

Thank you for your prompt attention and co-operation.

Do you consent to participate in this study?

- ◯ Yes
- ◯ No

Preamble

The FIFA 11+ injury prevention programme is a comprehensive, structured warm-up exercise programme consisting of 15 different exercises covering the scope of running, strength, plyometrics and balance-related exercises. This programme has been proven to be effective in several randomised control trials largely conducted in higher income countries. Two studies (Study 1 and 2) conducted as part of the larger study of this research reported the following results:

Literature review

Study 1: Cross Sectional Survey

Injury Prevention Practices in women's football teams

Study 2: Scoping Review

Implementation strategies for the FIFA 11+ Injury prevention program.

Studies showed that the positive effect of these programmes is dependent on players and teams complying with the prescribed minimum number of injury prevention sessions (Bizzini and Dvorak, 2015).

Knowledge of structured comprehensive injury prevention exist, but the use of comprehensive structured injury prevention protocols such as the FIFA11+ is poor.

FIFA 11+ is effective in preventing non-contact injuries using lower limb injury rates and time-loss.

The ecological context is an important consideration in implementing evidence-based injury prevention exercise programs (Finch, 2011).

Practice of injury prevention is basic.

FIFA 11+ for assessment of efficacy were conducted in a team setting and commenced "exposure" or training for the FIFA 11+ program pre-season.

Barriers such as poor adherence, uptake are challenges. Time constraints are the main barriers to adherence, while knowing that the programme enhances performance is seen as a major facilitator (Shamlaye et al, 2020).

Coaches are perceived as authority figures by players and the players believe the coach's injury prevention knowledge is sufficient.

Coaches directed and or players workshops were conducted for the implementation of the FIFA11+ pre-season.

Task shifting approach is adopted. Experts train coaches and or players (team captains) Coaches/Team Captains train the team after acquiring the knowledge for a period and they carry on through the season (Al Attar et al, 2016).

Teams acknowledged that having medical support for teams is essential in achieving injury prevention goals and access to medical support is poor or non-existent.

Implementation was carried out during the sporting season or over a determined period of time.

99% of the studies were implemented in upper middle income and high-income countries.

The key steps along the path from a successful RCT to large-scale, real-world injury reductions are neatly outlined in the Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework, which was developed to improve the transfer of evidence-based programmes into practice (O'Brien et al, 2018).

Compliance officer within the teams to monitor implementation

Intervention of FIFA 11+ was done at least twice a week and intervention period ranged from 7 weeks to 36 weeks.

First round of Delphi study

This first round in the Delphi process will be the brainstorming round to obtain the understanding of the key components necessary for consideration in the process of developing the implementation guide of the FIFA 11+ in a low resource setting. A 50% cut off point will be used in the first round as agreement. There are two sections in this first round of the Delphi study. The first section asks about your socio-demographic characteristics and the second section asks about the components necessary for the implementation of the FIFA 11+ injury prevention programme in low resource settings in South Africa. These questions are posed in the context of a low resource setting. Questions that have been posed based on the summary of finding of the first study (cross sectional survey of injury prevention practices), a second study (scoping review of the implementation strategies of the FIFA 11+) and literature review.

Operational definition of terms

Certified FIFA 11+ instructor: Trained personnel directly or indirectly by the experts at FMARC.

Acronyms

RE-AIM: Reach. Effectiveness. Adoption. Implementation. Maintenance.

PARTICIPANT CHARACTERISTICS

What is your designation?

- ◯ Medical doctor
- ◯ Physiotherapist
- ◯ Exercise scientist
- ◯ Sports scientist
- ◯ Coach
- ◯ Player
- ◯ Other

If other

_____

What is your highest level of qualification?

- ◯ Doctorate (PhD)
- ◯ Master's degree
- ◯ Postgraduate diploma
- ◯ Bachelor's degree
- ◯ Other

If other

_____

What is your gender?

- ◯ Woman
- ◯ Man
- ◯ Lesbian
- ◯ Gay
- ◯ Bisexual
- ◯ Transgender
- ◯ Queer / questioning
- ◯ Two spirit
- ◯ Rather not say
- ◯ Other

If other

_____

How many years of experience do you have in your field?

_____

What is your country of practice?

_____

What setting do you work in?

◯ Research
◯ Football team
◯ Sports clinic
◯ Hospital
◯ Private practice
◯ Education
◯ Other

If other

_____

ADOPTION

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The adoption of the programme largely based on end user's perception on team success.	○	○	○	○	○
The adoption of the programme based on the coaches personal commitment to injury prevention.	○	○	○	○	○
The incentives of adoption be highlighted as availability of players for selection.	○	○	○	○	○

Are there any coaches' factors that should be considered in the adoption of the programme?

_____

Are there any player factors that should be considered in the adoption of the programme?

_____

Are there any other stakeholder factors to be considered in the adoption of the programme?

_____

Are there any other factors that should be considered in the adoption of the programme?

_____

Additional comments on adoption of the programme?

_____

IMPLEMENTATION

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
There should be provision for off-field sessions or on field (practical) sessions	◯	◯	◯	◯	◯
There should be provision of on and off field practical sessions	◯	◯	◯	◯	◯
The FIFA11+ should be done on match days or training days considering time challenges as reported by coaches.	◯	◯	◯	◯	◯
The FIFA 11+ should be done on match days and training days considering time challenges reported by coaches.	◯	◯	◯	◯	◯
The FIFA 11+ should be modified and adapted to suit coaches adoptability and adherence.	◯	◯	◯	◯	◯
The FIFA11+ should be self-training or team training focussed.	◯	◯	◯	◯	◯
The FIFA 11+ should be self training and team training focussed.	◯	◯	◯	◯	◯
The workshop should be facilitated by a certified FIFA 11+ instructor?	◯	◯	◯	◯	◯

How often should the FIFA 11+ training be carried out?

◯ Once a week
◯ Twice a week
◯ Three times a week
◯ Other

If other

_____

Who should facilitate the FIFA 11+ implementation programme in the team?

☐ Coaches
☐ Players
☐ Medical personnel
☐ Others

Are there any other coaches' factors that should be considered in the implementation of the programme?

_____

Are there any player factors that should be considered in the implementation of the programme?

_____

Are there any other factors that should be considered in the implementation of the programme?

_____

Are there any stakeholder factors be considered in the implementation of the programme?

_____

MAINTENANCE

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The workshop should adopt the task shifting approach and the responsibility lies with the coach.	○	○	○	○	○
The frequency of the programme would help with adherence and compliance.	○	○	○	○	○
The team captains should be assigned to oversee compliance.	○	○	○	○	○
Emphasizing team performance and injury prevention is important to maintain the FIFA 11+ programme	○	○	○	○	○

Are there are any coaches' factors that should be considered in the maintenance of the programme?

_____

Are there any player factors that should be considered in the maintenance of the programme?

_____

Are there are any stakeholder factors to be considered in the maintenance of the programme?

_____

Are there any other factors that should be considered in the maintenance of the programme?

_____

GENERAL COMMENT AND SUGGESTION

General comment and suggestion

_____

IMPLEMENTATION GUIDE FOR THE FIFA 11+ IN LOW RESOURCE SETTING (SOUTH AFRICA) DELPHI 2

Dear Expert,

Thank you for participating in our Delphi study that aims to develop a consensus in developing an implementation guide for the FIFA 11+ injury prevention program in a low resource setting such as South Africa. We really appreciate you completing the first survey for this study.

We have analyzed the responses from the first survey and have used the feedback to develop the attached implementation guide. Your opinion will be needed to provide consent of the implementation guide in the document below.

We greatly appreciate your participation in the second survey of this Delphi study. This survey will take about 15-20 minutes. Your responses will be used to develop the expert consensus. After all participants complete this, we will provide you with the outcome of the developed implementation guide.

If you have any questions about the survey or your participation in this study, please contact me via email at ummukulthoum.bakare1@students.wits.ac.za or ummubakare@gmail.com

Thank you again for participating. We really appreciate your time and input.

Kind regards,

Ummukulthoum Bakare

Please complete the survey below.

Thank you!

Do you consent to participate in this study?

◯ Yes
◯ No

Background: The aim of this implementation guide is part of the strategy to enable women football teams in low resource settings such as South Africa to implement an injury prevention programme like the FIFA11+ comprehensive warm-up.

The challenges of low resource settings are broad and not limited to inadequate material and human resources to support the women's football teams to reach peak performance and productivity. This study attempt to provide a guide to support stakeholders in this demographic to enable them to bridge the gaps in achieving injury prevention goals with context specifics in consideration

Aim: The purpose of this implementation guide is for use in the low resource-setting context to help translate injury prevention in football teams using the FIFA11+ as the evidence-based basic injury prevention protocol to achieve injury prevention goals.

The guide is developed using feedback from the Delphi process in STUDY 2, the RE-AIM framework for implementation (Glasgow et al, 1999), the Consensus of Exercise Reporting Template (CERT) (Slade et al., 2016) and the and the Health Action Process Approach-Model (Schwarzer, 2016)

Below are the details of the implementation guide which will be relevant to this Delphi round:

Target audience: Coaches, team captains, volunteers, management/administration

Facilitator: FIFA 11+ Expert / Personnel

Mode of training: Workshop (on the field and off the field)

End-users: Players

Protocol of Interest: FIFA 11+ Comprehensive Warm-up Programme.

The content of this FIFA 11+ implementation guide in low resource settings will be divided majorly into four sections:

Section one: Role of the stakeholders - the role of the individual

Section two: Education on sports injury prevalence, surveillance and injury prevention

Section three: FIFA 11+ Adoption, Implementation, Compliance and Adherence

Section four: Motivation strategies

ABBREVIATIONS

FIFA- International Federation of Association Football

FMARC- FIFA Medical Assessment and Research Center

RE-AIM- Reach, Effectiveness, Adoption, Implementation and Maintenance

CERT- Consensus of Exercise Reporting Template

HAPA- Health Action Process Approach

What is your contact email address?

_____

What is your designation?

- ◯ Medical doctor
- ◯ Physiotherapist
- ◯ Exercise scientist
- ◯ Sports scientist
- ◯ Coach
- ◯ Player
- ◯ Other

Other

_____

What is your highest level of qualification?

- ◯ Post-doctorate
- ◯ Doctorate (PhD)
- ◯ Master's degree
- ◯ Postgraduate diploma
- ◯ Bachelor's degree
- ◯ Other

Other

_____

What is your gender?

- ◯ Woman
- ◯ Man
- ◯ Lesbian
- ◯ Gay
- ◯ Bisexual
- ◯ Transgender
- ◯ Queer / questioning
- ◯ Two spirit
- ◯ Rather not say
- ◯ Other

Other

_____

What setting do you work in? (Choose as many that apply)

- ☐ Research
- ☐ Football team
- ☐ Sports clinic / performance center
- ☐ Hospital
- ☐ Private practice
- ☐ Education
- ☐ Other

Other

_____

How many years of experience do you have in your field?

_____

SECTION ONE: ROLE OF THE STAKEHOLDERS - THE ROLE OF THE INDIVIDUAL

Please kindly review the information below and provide your feedback using the Likert scale provided at the end of the section.

Target audience: Coaches, team captains, volunteers, management/administration

Facilitator: FIFA 11+ Expert / personnel

Mode of training: Workshop (on field and off field)

The key role of the stakeholders is outlined in the below table.

Stakeholders

Roles

Prospective Goals

Facilitator

Has a detailed understanding and knowledge of the FIFA 11+ and possess the capacity to transfer knowledge to other stakeholders.

Improving team performance

Improving players' availability for selection

Promoting player's health

Improving the chances of team success

Potentials of career longevity

Potentials of income from team success

Foster teamwork

Coaches

Take charge as the team leader in coordinating continuous team capacity building on injury prevention, injury surveillance and implementation

Players

Teamwork: Support the coach collectively and commit to the programme for their own health and safety. Help with field and classroom set ups.

Volunteers

Where available to work closely under the coach's instructions with supporting the team sessions

Management / administration

Provide the team with the funds for equipment and moral support needs. Liaise with football associations/federations for up-to-date information from FIFA/FMARC

Kindly give your opinion by using this Likert scale about the role of the stakeholders described above.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Do you agree with the identified stakeholders?	○	○	○	○	○
Do you agree with the role of the facilitators?	○	○	○	○	○
Do you agree with the role of the coaches?	○	○	○	○	○
Do you agree with the role of the players?	○	○	○	○	○
Do you agree with the role of the volunteers?	○	○	○	○	○
Do you agree with the role of the goals?	○	○	○	○	○

Additional comment / suggestion:

SECTION TWO: EDUCATION ON SPORTS INJURY PREVALENCE, SURVEILLANCE AND INJURY PREVENTION

Please kindly review the information below and provide your feedback using the Likert scale provided at the end of the section.

Target audience: Coaches, team captains, volunteers

Facilitator: FIFA 11+ Expert / personnel

Mode of training: Workshop (on field and off field)

Table 2: The contents of the education programme is outlined in the table below.

Item	Content	Mode of delivery	Learning Outcomes	Facilitator
	Common sports injuries in football and knowledge about basic injury prevention			
	Common sports injuries in football -introduction to common sports injuries. -epidemiology of injuries. -injury surveillance -Introduction to injury prevention -Overview of Injury prevention Strategies Injury prevention strategies and importance.			
	Pre-season Workshop: Online and Onsite			
		Via Administrative structures		
		Educational materials: flyers, newsletters, posters, and instructional videos		
			Duration: 90mins	
			Knowledge about common sports injuries, injury surveillance and injury prevention strategies. Shared responsibilities and roles as a team.	

FIFA 11+ Expert/personnel

The FIFA 11+

-Introduction to the FIFA11+

-Parts 1,2,3: Running, strength, plyometrics and balance.

-Progression. Levels: 1,2,3.

Adaptability of the FIFA11+

Integration into team existing programmes.

Teamwork and Shared Responsibilities in Implementation

-Role of coaches in implementation

-Role of players in implementation

-Role of volunteers

-Role of team management

Shared decision making about adopting a injury prevention philosophy

Behavioral adaptations and impact on compliance and adherence

Preseason Workshop: Online and Onsite

Via Administrative structures

Educational materials: flyers, newsletters, posters, and instructional videos

Duration: 90 minutes

Knowledge about the FIFA 11+ and implementation Shared responsibilities and roles as a team.

FIFA 11+ Expert/personnel

Implications of Injury Prevention

Implications of injury surveillance.

Implications of adopting the FIFA 11+

-Performance related: How does it affect individual and team performance

Team Succes related: How does it affect team success

-Economic related: How does it affect the economic situation of coaches, players and team

Preseason Workshop: Online and Onsite

Via Administrative structures

How to use injury surveillance tools.

Educational materials: flyers, newsletters, posters, and instructional videos

90mins

Improving team performance

Improving players' availability

Promoting player's health

Improving the chances of team success

Economic implications of team success

Potentials of career longevity

FIFA 11+ Expert/personnel

Kindly give your opinion by using this Likert scale on the educational programme described above.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Do you agree with the content of the educational programme?	○	○	○	○	○
Do you agree with the mode of delivery?	○	○	○	○	○
Do you agree with the learning outcomes?	○	○	○	○	○
Do you agree with the designated facilitator of the education programme?	○	○	○	○	○

Additional comment / suggestion

_____

SECTION THREE: FIFA 11+ ADOPTION, IMPLEMENTATION, COMPLIANCE AND ADHERENCE

The FIFA 11+ is the intervention of interest that will be promoted to be adopted as part of the injury prevention strategy for women football in South Africa. The programme is easy to learn, accessible and cost effective to execute. The task shifting approach will be used to help disseminate knowledge about this injury prevention programme as adopted in public health interventions. This approach is deployed when a lack of qualified and accessible health professionals poses a threat to health and health equity. Specific responsibilities are transferred, shared, or delegated from highly skilled health practitioners to persons with less training or qualifications, such as laypeople (Orkin et al., 2021)

Description of "The FIFA11+"

"The FIFA11+"has three parts: Part 1: running exercises at a slow speed combined with active stretching and controlled partner contacts; Part 2: six sets of exercises, focusing on core and leg strength, balance, and plyometrics/agility, each with three levels of increasing difficulty; and Part 3: running exercises at moderate/high speed combined with planting/cutting movements. A key point in the programme is to use the proper technique during all of the exercises. Pay full attention to correct posture and good body control, including straight leg alignment, knee-over-toe position and soft landings. "The FIFA 11+" should be completed, as a standard warm-up, at least two time a week and should take approximately 20 minutes to complete.

The content of the FIFA 11+ programme can be accessed online https://www.yrsa.ca/wp-content/uploads/2019/11/pdf/Fifa11/11plus_workbook_e.pdf.

Please kindly review the information below and provide your feedback using the Likert scale provided at the end of the section.

Target audience: Coaches, team captains, volunteers

Facilitator: FIFA 11+ Expert / personnel

Mode of training: Workshop (on field and off field) and home programmes

Materials needed: Cones, footballs, training ground (basic training materials)

This implementation guide will adopt the task shifting approach where the facilitator will transmit information to the primarily coaches, in addition team captains and volunteers who will assist in the transfer of the knowledge to the rest of the team.

The table below outlines contents of the training component of the FIFA 11+. This included the mode of delivery, learning outcomes and the facilitator responsibilities.

Table 3: The FIFA 11+ programme

Item	Content	Mode of delivery	Learning Outcomes	Facilitator
FIFA 11+	Overview of FIFA 11+ Running, Strength, Plyometrics and Balance	Preseason: Theory and practical (on-field and off-field) Duration of session 90 mins	Familiarization to be conducted at least thrice a week for 2 weeks. Awareness of the FIFA11+ programmes. Structure of the programme.	FIFA 11+ Expert/personnel
Running Exercises	Part 1&3	Preseason: Theory and practical (on-field and off-field) Duration of session 45mins		

Familiarization to be conducted at least thrice a week for 2 weeks.

Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively.

Coaches

Strength Plyometrics and Balance

Part 2

Level 1to3

Preseason Theory and practical (on-field and off-field)

Duration of session 45mins

Familiarization to be conducted at least thrice a week for 2 weeks.

Detailed knowledge of the running exercises. Ability to perform the exercises efficiently and effectively. Detailed of exercise progression.

Progression is indicated when previous level of difficult is performed with relative ease.

Coaches

Home programmes

Exercises to be revised individually at home to master techniques by coaches and players

Materials: Posters, Manuals, DVDs

Preseason Home programmes

Consolidate knowledge gained and revise individually were feasible in the home setting.

Coaches and Players

Type of exercise equipment

Cones, footballs, training ground (basic training materials)

Preseason Team management to facilitate through coaches

Familiarize with basic items needed or improvise where not feasible. ie using a gym facility if a training pitch is unavailable.

Coaches

Follow-up

Provision of feedback channels

Phone, emails, on site face to face discussions.

Communication channel and forum with stakeholders to have a two way communication established to discuss challenges and progress

FIFA 11+ Expert/personnel

Off field Sessions

Pre-season Workshops

Theory and practical (off-field)

Duration of session 90 mins

Reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2.,3

Progression Levels 1,2,3

Training by a FIFA 11+ Expert where available or self-taught using materials available ie posters DVDs and Manuals. Online resources

On field Sessions

Pre-Season Workshops

Theory and practical (on-field)

Duration of session 90 mins

Demonstrations on field reviewing all that has been learnt in the FIFA 11+ sessions for Part 1, 2,3

Progression Levels 1,2,3

On field demonstrations and practice sessions. Training by a FIFA 11+ Expert where available or self-taught using materials available ie posters DVDs and Manuals. Online resource

Kindly give your opinion by using this Likert scale about the FIFA 11+ as described above.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Do you agree with the description of the content of the FIFA 11+?	○	○	○	○	○
Do you agree with the mode of delivery of the FIFA 11+?	○	○	○	○	○
Do you agree with the learning outcomes of the FIFA 11+?	○	○	○	○	○
Do you agree with the designated facilitators in this section?	○	○	○	○	○

Additional comment / suggestion

COMPLIANCE AND ADHERENCE

Please kindly review the information below and provide your feedback using the Likert scale provided at the end of the section.

The table below outlines the action plan and goals of compliance and adherence in the implementation of the FIFA11+.

Table 4: Outline of compliance and adherence strategy

Item	Action Plan	Goal
Compliance	Compliance officer and accountability partner within the team.	Use a self-report questionnaire/ compliance sheet.
		Map out a compliance routine within the team based on human resources available.
		Provision of incentives by the coaches and management.
Adherence	Encourage protocol integration into regular training routine and room for modification/adaptation (O'Brien et al., 2017).	Improve coaches and players knowledge and confidence about self-care.
		Use of structured forms completed by individual adherence and team adherence. (Steffen et al., 2013)
		Evaluate beliefs and influence behavioral changes to enhance adherence. (McKay et al., 2014)
	Adapt components of the programme to suit needs.	Re-schedule Part II (Whalan et al., 2019)
		Incorporate into team's routine as a continuum rather than a different activity

Provision of incentives by the coach and management

Kindly give your opinion by using this Likert scale about the compliance and adherence as described above.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Do you agree with the action plan for compliance?	◯	◯	◯	◯	◯
Do you agree with the goal of compliance?	◯	◯	◯	◯	◯
Do you agree with the action plan for adherence?	◯	◯	◯	◯	◯
Do you agree with the goal of adherence?	◯	◯	◯	◯	◯

Additional comment / suggestion

SECTION FOUR: MOTIVATION STRATEGIES

Please kindly review the information below and provide your feedback using the Likert scale provided at the end of the section.

The table below highlights the motivational strategies for behavioral changes for the implementation of the FIFA 11+ using the constructs of HAPA Model (McKay et al, 2016)

Table 5: Outline of content for motivational strategy

Item	
Action Plan	
Goal	
Behavioral Changes for Coaches and Players	
	After this familiarization, coaches to complete a questionnaire to assess demographic characteristics, perceptions about football injury, and the HAPA constructs.
	An adapted questionnaire with separate versions for coaches and players (McKay et al, 2016)
	Section A of the questionnaire will capture demographic, football coaching/playing experience, and injury history information. Section B will focus on the HAPA constructs, with questions assessing self-efficacy, outcome expectancies, risk perceptions, behavioral intentions, and barriers and facilitators to FIFA 11+ implementation.
	To encourage coaches to adopt a holistic approach including behavioral adjustments ensuring that they understand there will be overall success when everyone plays their part.
	They should also embrace the notion that prevention of injuries is a cost-effective proactive initiative which contributes to team success.

Kindly give your opinion by using this Likert scale about the role of the motivational strategies as described above.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Do you agree with the motivational strategy?	◯	◯	◯	◯	◯
Do you agree with the action plan of the motivational strategy?	◯	◯	◯	◯	◯
Do you agree with the goal(s) of the motivational strategy?	◯	◯	◯	◯	◯

Additional comment / suggestion

_____

Additional resource

FIFA 11+

https://www.yrsa.ca/wp-content/uploads/2019/11/pdf/Fifa11/11plus_workbook_e.pdf.

Injury surveillance forms. Pgs 64,65,67, &68

http://static.onemansblog.com/wp-content/uploads/2016/06/FIFA-Medicine-Manual.pdf

The HAPA Model

https://userpage.fu-berlin.de/gesund/publicat/ehps_cd/health/hapa.htm

Coaches and Players Questionnaire Template from McKay et al, 2016. This will be adapted to suit the context and setting

https://www.mdpi.com/1660-4601/13/7/657/s1

Additional comment / suggestion on the implementation guide

_____

APPENDIX NINE: SEMI-STRUCTURED INTERVIEW GUIDE

Age:

Role in team:

Player/Coaching Experience

Highest Level of Education

Gender

	yes	no	unsure
Do you currently carry out injury prevention in your team?			
Do you know about the FIFA11+?			
Have you received any training in the FIFA 11+?			
Are you willing to integrate injury prevention in your regular training programme			

What do you think about the implementation guide and how acceptable do you find it?

How do you think the programme can be implemented effectively as planned?

What do you think we can change or adjust in the programme to ensure practicability?

What do you think will help you facilitate the implementation in your team setting?

What do you think will prevent you from implementing the programme in your team setting?

Any additional comments you may wish to add overall?

APPENDIX TEN: PERMISSION FROM STUDY SITES

USSA FOOTBALL

Office of the Chairperson

UNIVERSITY SPORT SOUTH AFRICA

30.05.2017

Dear Ms Bakare

FIFA 11+ RESEARCH

We are pleased to inform you that the USSA-Football NEC has agreed to grand you permission to conduct your FIFA 11+ research particularly on women football teams. We support your project and hope to benefit from the thesis upon publication, we anticipate a presentation of your findings and recommendations.

We are aware that you have already been given permission by other member institutions, and we extend our gratitude, however please be mindful that during the tournament it is the prorogetive of the team and its management to give access to their players and technical staff, during the tournament most team are not very welcoming to their camp sites and that might be a bearer that is out of our reach. We will however plead with our members for understanding and support.

Please feel free to introduce yourself to the LOC for accreditation and a reminder of such discussion prior to the tournament so that it can be mentioned during managers meetings.

We wish you all the best

Thomas Thema

USSA-NEC Chairperson

Chairperson: Mr. Thomas Thema, **Vice-chairperson**:Ms Sanel Sobahle, **General-Secretary**: Mr. Mark Tommy, **Treasurer**: Ms. Nneile Nkholise, **Development officer**: Ms. Gabisile Hlumbane and **Tournament Convener**: Mr. Khulekani Mabuza

NORTH-WEST UNIVERSITY ®
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
VAAL TRIANGLE CAMPUS

PO Box 1174, Vanderbijlpark
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Tel: 016 910-3111
Fax: 016 910-3116
Web: http://www.nwu.ac.za

Department
Tel: 0169103199
Cell 0603231800
Fax: 0865378957
Email: thomas.thema@nwu.ac.za

03 Apr. 17

Bakare Ummukulthoum

PERMISSION

This serves to grand you permission and offer support to enable you conduct your FIFA 11 + research as apllied for. We support your initiative to conduct research using our female football players, we will be available to offer support in making sure players are available when needed.

We wish you all the best

Regards

Thomas Thema
Sport Officer: NWU Vaal FC Manager



University of Johannesburg Football Club

Bunting Road Campus, P.O. Box 524, AUCKLANDPARK, 2006, Tele: 011 559 1460, Cell: 073 479 4313, Fax: 011 559 1314 Email: joelk@uj.ac.za

May 2, 2017

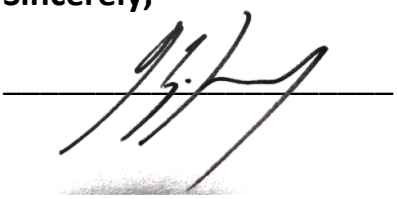
To: Bakare Ummkulthou

Re: Research Confirmation Letter

Dear Sir/Madam

The letter serves to confirm that UJ Football Club gives consent for the Injury Prevention research of its female football players by Bakare Ummkulthou.

Sincerely,



Joel Kgokong

Sports Manager: Football

VUT

Vaal University of Technology

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Memorandum

Senior Sport Officer
Sport and Recreation
Tel: +27(0)16 950 7541
Fax: +27(0)16 950 9763

To: Bakare Ummukulthoum

CC: N/A

From: Eric Mofokeng: Senior Sport Officer

Date: 19 April 2017

Subject: Permission to conduct research with Vaal University of Technology ladies team

---

This letter serves as a Permission to conduct research with our University Football Women's team. As the Sport and Recreation and the Football Technical Team we grant you that opportunity to talk to the players and the technical Team.

We do believe and have hope that the research will be able to help our players and coaches to enhance performance and proper understanding to manage injuries.

I wish you well on your process of research and looking forward to help.

Regards,

Mr. Eric Mofokeng
Senior Sport officer
Basketball, Football, tennis and Table Tennis

WITS UNIVERSITY

Ummukulthoum Bakare <1035750@students.wits.ac.za>

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Kegoikantse Kgomo <KgomoKK@tut.ac.za> 15 October 2017 at 22:28
To: Lerato Mokae <MokaeL@tut.ac.za>, Tebogo Mokae <MokaeTA@tut.ac.za>, Tshiila Mulaudzi <MulaudziT@tut.ac.za>, Bushy Moloi <MoloiBP@tut.ac.za>, Mzwandile Prescott Mahlangu <MahlanguMP@tut.ac.za>
Cc: Ummukulthoum Bakare <1035750@students.wits.ac.za>

Dear Colleagues,

Could you kindly look at Ms Bakare's request (below and attached) who is doing her Doctorate at Wits and needs our expertise and assistance to help her succeed.

After months of pursuing and endless phone calls, Ms Bakare took it to her herself to travel to PTA and visit my office to seek assistance.

Ms Bakare has also met one or two of our coaches at the USSA Football National Club Champs of which she was referred to me.

I do not have a problem with us assisting her and with guidance from Mr Mahlangu, we will appreciate an urgent response in order for her to start as soon as possible.

NB: She is copied in the mail.

Kind Regards

Mr Kegoikantse K. Kgomo

Directorate: Sport & Recreation

Senior Sport Organiser

Tshwane University of Technology

Private Bag X680 | PRETORIA | 0001 | South Africa

Building 51 | Room 112 | Pretoria West Campus

(+27 12) 382 – 5662 +27 76 369 2101 (+27 12) 382 – 5993

kgomokk@tut.ac.za



[Quoted text hidden]

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2 attachments

PERMISSION REQUEST ADDITIONAL INFO.doc
3120K

USSA SOCCER PERMISSION FOR INJURY PREVENTION RESEARCH.docx
362K

WITS UNIVERSITY

Ummukulthoum Bakare <1035750@students.wits.ac.za>

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Kenneth Neluvhalani <Kenneth.Neluvhalani@up.ac.za> 31 March 2017 at 13:55
To: 1035750@students.wits.ac.za, Boitumelo Lekalakala <Boitumelo.Lekalakala@up.ac.za>

Dear sir,

This email serves to confirm that your request to conduct research in our program has been granted, please do liaise with Boitumelo who will be of assistance to you going forward.

Regards,

Mr Kenneth. N. Neluvhalani
Head of Football Programme
TuksSport
University of Pretoria
Pretoria
0002
Tel: 012 420 6086
Fax: 012 420 6095
Email: Kenneth.neluvhalani@up.ac.za

>>> Boitumelo Lekalakala 2017/03/31 11:54 AM >>>

Boitumelo Lekalakala
TuksFootball Administrator
Tel: 012 420 6001
Fax: 012 420 6095

"Nothing is impossible with God"

>>> Ummukulthoum Bakare <1035750@students.wits.ac.za> 2017/03/31 11:36 AM >>>
[Quoted text hidden]

WITS
SPORT

MARK HASKINS
Head of Football

Tel : +27(0) 11- 717 9436 / +27(0) 83 399-3384 e-mail : mark.haskins@wits.ac.za

WITS
UNIVERSITY

Miss Bakare Ummukulthoum
Department of Physiotherapy
Faculty of Health Sciences
Wits University
Johannesburg
South Africa

Dear Researcher,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

This is to inform you that permission has been granted to you for your proposed research entitled "THE DEVELOPMENT OF AN IMPLEMENTATION GUIDE FOR THE FIFA 11+ INJURY PREVENTION PROGRAMME AMONG FEMALE SOCCER PLAYERS IN SOUTH AFRICA" with our women's' team.

We are happy to co-operate and support you in any way that we can going forward. Please feel free to liaise further in the time ahead with the team liaison with specifics of scheduling for what is required to participate in the study.

All the very best.

Sporting Regards,

Mark Haskins
Head of Wits Football

06/04/2017.