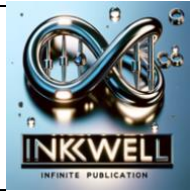




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Original Article

Injury Risk and Prevention Strategies Among Saudi and Irish Amateur Women Soccer Players - A qualitative study

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Abstract

This qualitative study aimed to explore how Saudi and Irish women amateur soccer players perceive soccer-related injury risk and prevention, including barriers and facilitators to the implementation of prevention strategies. Online individual interviews were conducted with 36 amateur women soccer players (20 Saudi and 16 Irish) of 18 years and older. Findings were analyzed using Reflexive Thematic Analysis. Three main themes were identified; (1) “we don’t have enough knowledge about injury prevention” (2) implementing injury prevention measures varies across players and teams, and (3) “we love the game...but we are undervalued”. The three themes related to players' insufficient knowledge about injury prevention, variable injury prevention implementation and feeling undervalued. Biological, psychological, and social factors which influenced the players' experiences of injury prevention. Tailored educational programmes for women, their coaches, and parents of younger players, as well as provision of the required support for amateur teams are recommended to encourage participation and implementation of evidence-based injury prevention strategies, taking player’s biopsychosocial characteristics into account.

Keywords: Injury Prevention, Amateur Soccer, Women, Perception, Behavior.

Introduction

Over the past decade, a reduction in gender discrimination and increased support from football

federations have led to an increase in females' participation in soccer globally (Ruiz-Esteban et al., 2020) across all levels of play (FIFA, 2019). However, this increase in participation by women in this contact

sport has led to an increase in the risk of injury (Saeidi, 2016). "Amateur soccer has been shown to facilitate a players' physical activity and improve their well-being (Rowe et al., 2013)." Amateur women involved in soccer are playing for fun and fitness (Piermattéo et al., 2020), however, they sustained higher injuries per 1000 hours of soccer exposure (0.7-20.3 vs. 3.19-8.40) compared to their elite peers (Klein et al., 2018). Despite this, research exploring injury prevention in amateur women's soccer is uncommon (Al Attar et al., 2016). Despite this, research exploring injury prevention in amateur women's soccer is uncommon (Al Attar et al., 2016). Soccer injury can have a negative impact on affected players, teams and leagues of all levels (Gebert et al., 2018) including outcomes for players such as fear of movement, re-injury anxiety, negative mood (Tripp et al., 2011), quitting sport early (Sadigursky et al., 2017), and financial burden of treatment and rehabilitation (Gebert et al., 2018). To decrease the incidence of injuries, football federations are encouraging the implementation of injury prevention strategies among soccer players at all levels (Bisciotti et al., 2019).

Soccer injuries can be reduced by implementing several strategies that help to improve the players' tolerance of soccer demands (Talpey and Siesmaa, 2017). For instance, an adequate warm-up can reduce the risk of muscle fatigue and increase muscle elasticity (Soligard et al., 2009). A healthy diet (Gravina et al., 2012), hydration (Aragón-Vargas et al., 2009), and adequate sleep (Silva et al., 2020) are all required to avoid fatigue, and to reduce concentration and attention deficits. In addition, neuromuscular training programmes have been applied to reduce the risk of knee injuries among soccer players from both genders (Voskanian, 2013). The 'Prevent Injury and Enhance Performance (PEP)' resulted in an 88% reduction of contact and non-contact ACL injuries ($p = 0.0003$) among female soccer players (Mandelbaum et al., 2005). The 'Knee Injury Prevention Programme' (KIPP) resulted in a 65% reduction in non-contact lower limb injuries ($p = 0.04$) among female soccer and basketball players (LaBella, 2012). The FIFA 11+ programme reduced the overall risk of soccer injuries among players from both genders and all age groups, by 35%, $p < 0.001$ (Al Attar et al., 2018). Specific information on implementing these injury prevention strategies/programmes among amateur women teams is lacking. The level of players' adherence to the preventive measures (preventive behavior) influences the effectiveness of these evidence-based strategies

(Wiese-Bjornstal, 2010). Thus, a nuanced understanding of how women soccer players perceive and manage injury risk is required, and the biopsychosocial factors influencing preventive behaviors should be identified (Duminica, 2020) and addressed (Finch, 2006).

Biopsychosocial factors are the individual's characteristics, including biological factors such as age and physical abilities, psychological or behavioral factors such as lifestyles and health beliefs, and social factors such as culture, environment and social support (Hatala, 2012). These individual characteristics can affect human behaviors (Hatala, 2012). The biopsychosocial model suggests that to understand a person's medical condition (e.g., a sports injury), it is essential to consider their biological, psychological, and social factors (Engel, 1980). This model provides an evidence-based framework for understanding the interaction between the individual characteristics of the sports players and their contexts of play and rehabilitation (Muller et al., 2023). Also, it can help us to identify and address the barriers and facilitators of players' behaviors for effective injury prevention interventions.

Culture is an individual characteristic that affects human behavior. It represents the beliefs, norms, behaviors and values that characterize a group of people and is shaped by religion, environment and level of education (Al-Shahri, 2002). Variations in cultures, habits and religious practices may influence sports injury risk, players' preventive behaviors and incidence of injuries (Eirale et al., 2017). For instance, the incidence of soccer injuries during Ramadan fasting showed contrasting findings among male soccer players from different cultures (Eirale et al., 2017). Cross-cultural studies can provide a deeper understanding of how cultural differences moderate human perception and behaviors (Berry et al., 2011). To the authors' knowledge, studies exploring injury prevention in the context of biopsychosocial factors among women soccer players are lacking.

Players' knowledge of injury risk and prevention is another factor that can influence their preventive behaviors (Finch, 2006). According to the theory of planned behavior (TPB), lack of knowledge about injury risk and prevention can inhibit the player's preventive behaviors (Ajzen et al., 2011) therefore increasing the risk of injuries. This may explain the findings of a recent cross-sectional study, which identified a higher number of injuries per player with a lack of knowledge

about the effect of some risk factors (i.e., playing position, joint hypermobility, and playing during menses) among amateur women soccer players (Alahmad et al., 2021). However, clear understanding of the players' level of knowledge and real-life preventive behaviors among amateur women remains absent.

Despite qualitative methods providing information about human behaviors by exploring the circumstances and beliefs about various activities (Bolling et al., 2020), there are limited qualitative studies in amateur women's soccer. One such study among amateur women soccer players explored how playing soccer affected their leisure, work, and family identities. This study reported that while players valued the sense of team and confidence playing gave them, they felt constrained by organizational aspects which could prioritize skill level over the more social aspects (Ledlin, 2007). To the author's knowledge, qualitative studies are lacking which investigate injury prevention behaviors and the barriers and facilitators of that behavior among amateur soccer-playing women. Such studies are required to inform tailored risk management and injury prevention interventions among this cohort (Corrigan et al., 2023). Therefore, the primary aim of this study was to develop an understanding of amateur women soccer players' preventive behaviours and the factors influencing these behaviours, thereby informing strategies to support women soccer players to engage in injury prevention. A second aim was to compare the experiences on injury risk and prevention of amateur women players from Saudi Arabia (a Middle Eastern Muslim country) and Ireland (a European predominantly Christian country). This comparison of Middle Eastern Muslim and European predominantly Christian women soccer players can inform more appropriate recommendations for real-world application for soccer practice among amateur women. In addition, the religious, cultural, and geographic contrast between the two countries can lead to a better understanding of the effect that culture might have (Al-Bannay et al., 2014) about injury prevention perception and experiences of amateur women players.

Methods

Design: A qualitative interpretative research study was conducted, using Reflexive Thematic Analysis (RTA), to analyze interviews gathered using semi-structured online methods. Ethical approval was

granted by the relevant Irish and Saudi Research Ethics Committees [2020_06_18_EHS], [2020-12-24]. The constructivist paradigm informed the overall study (Wisdom & Creswell, 2013), which encouraged us as researchers to recognize during analysis that one's understanding of a concept (like injury prevention) is embedded within one's socio-cultural environment (Kim, 2001). Women players aged 18 years and over who were currently playing in Irish and Saudi amateur soccer teams, were invited to participate in this study.

Research team: The first author TA is bilingual, from a Saudi background, has lived in Ireland for three years and was thus somewhat familiar with Irish cultural nuances (See supplementary 1 for more details about the positionality of the first author). Other members of the team were AT, PB and AC who were all health professionals from a white Irish background. PB is an expert in qualitative research while AC and AT are experienced in mixed methodologies.

Participants: Participants of this study were adult women currently playing in amateur soccer teams. Only adults (18 years and older) were recruited in this study to eliminate the impact of physical, physiological, and psychological changes associated with maturity that could affect the possibility of injury (Mandorino et al., 2022). For better understanding of the impact of the player's biopsychosocial characteristics on her injury prevention behavior, no exclusion criteria were used. Thirty-six women participated in this study. The mean age of the sample was 27.8 ± 8.2 years, with a wider age range among Irish (19-55 years) compared to Saudi (20-37 years) players. Participant's demographic characteristics and self-reported injuries are detailed in Table 1.

Procedure

Piloting :To ensure clarity of questions in the interview guide, and interview technique refinement for both proposed groups (Majid et al., 2017), the first author (TA), conducted pilot interviews with seven volunteers from Saudi Arabia (n=3) and Ireland (n=4). Piloting identified the need for the interviewer to use more and a greater variety of prompts to gain sufficiently in-depth information from participants about the phenomena of interest.

Recruitment: The first author contacted gatekeepers (team coach or team manager for the Irish group, and coordinators from the Football Federation for the Saudi group) to explain the study and request the

distribution of information to eligible players. Players were informed that providing their contact details would be considered as their consent of participation. Due to the initial lack of responses from Irish players,

an incentive was offered to encourage participation, where participants could enter a draw for a €150 gift card.

Table 1: Demographic characteristic of the participants

Group	Player No.	Age (year)	Playing Position	Injured	Location	Type	Severity based on days lost
Saudi Players	1.	24	Midfielder	No	N/A	N/A	N/A
	2.	25	Goalkeeper	Yes	Little finger	Fracture	Severe
	3.	30	Attacker	No	N/A	N/A	N/A
	4.	26	Attacker	Yes	Ankle	Sprain	Moderate
	5.	24	Defender	Yes	Knee	Contusion	Severe
	6.	26	No specific position	Yes	Ankle	Sprain	Moderate
	7.	26	Defender	No	N/A	N/A	N/A
	8.	24	Goalkeeper	No	N/A	N/A	N/A
	9.	25	Midfielder	Yes	Ankle	Sprain	Moderate
	10.	24	Attacker	No	N/A	N/A	N/A
	11.	30	Attacker	No	N/A	N/A	N/A
	12.	21	Attacker	Yes	Ankle	Sprain	Moderate
	13.	20	Attacker	Yes	Ankle	Sprain	Mild
	14.	20	Attacker	No	N/A	N/A	N/A
	15.	24	Goalkeeper	Yes	Middle finger	Fracture	Severe
	16.	23	Attacker	Yes	Ankle	Sprain	Severe
	17.	37	Goalkeeper	Yes	knee	Contusion	Severe
	18.	32	Attacker	Yes	Ankle	Sprain	Severe
	19.	28	Midfielder	Yes	Knee	Torn ligament	Severe
	20.	29	Attacker	No	N/A	N/A	N/A
Irish Players	21.	21	Midfielder/defender	No	N/A	N/A	N/A
	22.	19	Goalkeeper	Yes	Head	Concussion	Severe
					Back	Spinal cord	Moderate
					Face	Slit	Minimal
	23.	21	Goalkeeper	Yes	Knee	Unclear	Severe
	24.	21	Attacker	Yes	Knee	Meniscal tear	Severe
	25.	30	Midfielder/attacker	Yes	Knee	Torn ligament	Severe
	26.	43	Defender	No	N/A	N/A	N/A
	27.	29	Midfielder	No	N/A	N/A	N/A
	28.	46	Defender	No	N/A	N/A	N/A
	29.	41	Forward	Yes	Rib	Crack	Severe
	30.	28	Defender	Yes	Thigh	Pulled ligament	About 3 weeks
					Knee	Pulled muscle	
					Ankle	Sprain	
					Foot	Bruise	
	31.	24	Midfielder/defender	Yes	Toe Knee	Fracture popped	Severe
32.	21	Midfielder	No	N/A	N/A	N/A	
33.	55	Defender	Yes	Knee	Torn ligament	Severe	
34.	38	Attacker	No	N/A	N/A	N/A	
35.	20	Defender	No	N/A	N/A	N/A	
36.	24	Attacker	No	N/A	N/A	N/A	

The incentive was ethically approved and included to increase recruitment to have a sufficient breadth and richness of data. Snowballing was also used to recruit more participants from the Irish teams.

The first author (TA) conducted online audio (no video calls) semi-structured interviews via MS Teams or Zoom using an interview guide (Gratton, 2014), and probing questions to gain more in-depth information (Ivarsson et al., 2021). The interview guide included three sections; 1- perceived risk factors for soccer injuries, 2- reported injury prevention measures and how are they implemented, 3- barriers and facilitators to implementing injury prevention measures. (See supplementary 2 for the interview guide details).

The demographic data outlines injury incidents for Saudi and Irish team, providing insights into the prevalence and severity of injuries among them during the previous playing season. For the Saudi athletes, who are younger on average with an age range from 20 to 37 years and a mean age of 25.9, injuries were somewhat less diverse. This group experienced a higher incidence of ankle injuries, particularly sprains, which were often classified as moderate in severity. However, severe injuries such as fractures and contusions were also reported, indicating some significant health setbacks for the team.

The Irish athletes, with a broader age spectrum stretching from 19 to 55 years and an average age of 30.1, endured a wider variety of injuries. This older and possibly more experienced group faced severe injuries more frequently, including concussions, which are particularly concerning given their long-term impact on health. Knee injuries were common, with several players suffering from torn ligaments, an injury that typically requires a lengthy recovery period and may denote a more aggressive or physically demanding playing style or perhaps less optimal training and preventive measures.

Table 2: Interview length and transcribed pages for the two groups

Team	Interview duration (min.)		Transcribed pages		
	Avg.	Range	Total	Avg.	Range
Saudi	40.6	24-60	177	8.9	4-16
Irish	43.2	29-56	157	9.8	6-14

*Avg.-Average

Thirty-six participants were interviewed (20 Saudi and 16 Irish); the average interview duration was 43.8 minutes with length of time for interviews ranging from 24-60 minutes. The total transcribed pages were 334 for both groups, with an average of 9.3 pages per interview ranging between 4-16 pages. See table 2 for further details. No participant was re-interviewed.

Data analysis

The first author (TA) conducted data preparation. She transcribed the Irish group's interviews verbatim, then sent a transcript copy to each participant to read and approve the text (Al Dandan et al., 2021). TA transcribed the Saudi group's interviews verbatim in Arabic first, and then translated the whole text in English, then translated the whole text back into Arabic to ensure equivalence of meanings between the source and target texts, a recognized approach (Choi et al., 2012). During the interview, the interviewer recounted the main points (concepts and ideas) she had understood from the participant's responses to ensure that she captured the meanings intended by the interviewee.

Each participant's identity was anonymized and represented during data analysis and reported by her nationality and interview number (e.g., Irish 33). Transcription was conducted immediately after each interview to inform subsequent interviews (for example, some minor changes included re-ordering of the questions or increase in probing queries).

Data was analyzed using Reflexive Thematic Analysis (RTA) approach (Braun & Clarke, 2020). This approach enables production of a rich detailed description about a phenomenon and the factors influencing that phenomenon. It is a method that enables researchers to describe the experiences of a group, highlighting similarities and differences across participant accounts (Braun & Clarke, 2020) and existing theories can be incorporated into analysis using this approach. As one of the aims of this study was to explore players' knowledge about injury prevention, the theory of planned behavior (Ajzen et al., 2011) underpinned the rationale for the study and was used to help support the interpretation of the findings, which is an approach consistent with creative use of RTA (Braun & Clarke, 2020).

TA completed all six stages of RTA developed by Braun and Clarke (2020) (Braun & Clarke, 2020). Stage one entailed deep engagement with the data (conducting

the interviews, listening to the recordings, transcription of interviews, translation, and back translation of the Arabic interviews into English. Stage two consisted of coding of all transcripts line-by-line, making sure that the codes represent the underlying text, with each member of the research team (TA, AC, AT and PB) independently coding two transcripts from each group, to discuss what they recognized as principal codes at this point. In stage three, codes were reviewed to generate candidate themes, reflecting consistently on the research question and the unique lens of each person involved in the analysis, to develop a thematic map. Data analysis in stages 1,2 and 3 was mainly inductive (codes were data driven). In stages 4,5 and 6 a more deductive approach was undertaken (Byrne, 2021), in which the theory of planned behavior was used to ensure that the identified themes were meaningful to the research aims. In stage four, candidate themes were evaluated in relation to the codes, the original data and the research aims, (and the theory of planned behavior) making sure that the themes were related but distinct from one another. Stage five involved refining the themes by writing a clear definition for each and in stage six the themes were constantly reviewed during the writing of the final report, which is consistent with this approach to analysis (Nowell et al., 2017). Steps of analysis were continually recorded in a reflective diary by TA and shared with the research team (AC, AT and PB) for their feedback. Identification and establishing

the main themes were done through an iterative process with online peer debrief meetings occurred at each step of the process. To discuss and refine codes into key Themes. NVivo 12 pro software was used to import transcript, organize, store, and retrieve data for analysis.

Rigor

Several strategies recommended by Shenton (2004) were used to ensure methodological rigor. For credibility, steps of analysis were continually recorded in a reflective journal throughout the research and shared with the research team. For reflexivity, TA’s beliefs, interest in injury prevention, the importance of client education and using the biopsychosocial model in prevention and intervention, as well as her previous clinical and academic physiotherapy experience, were all noted in a self-reflection journal. For confirmability the reflective journal and self-reflection of TA, and the continuous discussions between the research team supported an iterative approach to analysis and interpretation. For dependability two randomly selected transcripts from both groups were independently coded by each member of the research team, with the main codes discussed in a consensus meeting (Peer- debriefing). In addition, Braun and Clarke’s 15-Points Checklist of Criteria for Good Thematic Analysis (Braun & Clarke, 2006) was used during planning and reporting of findings.

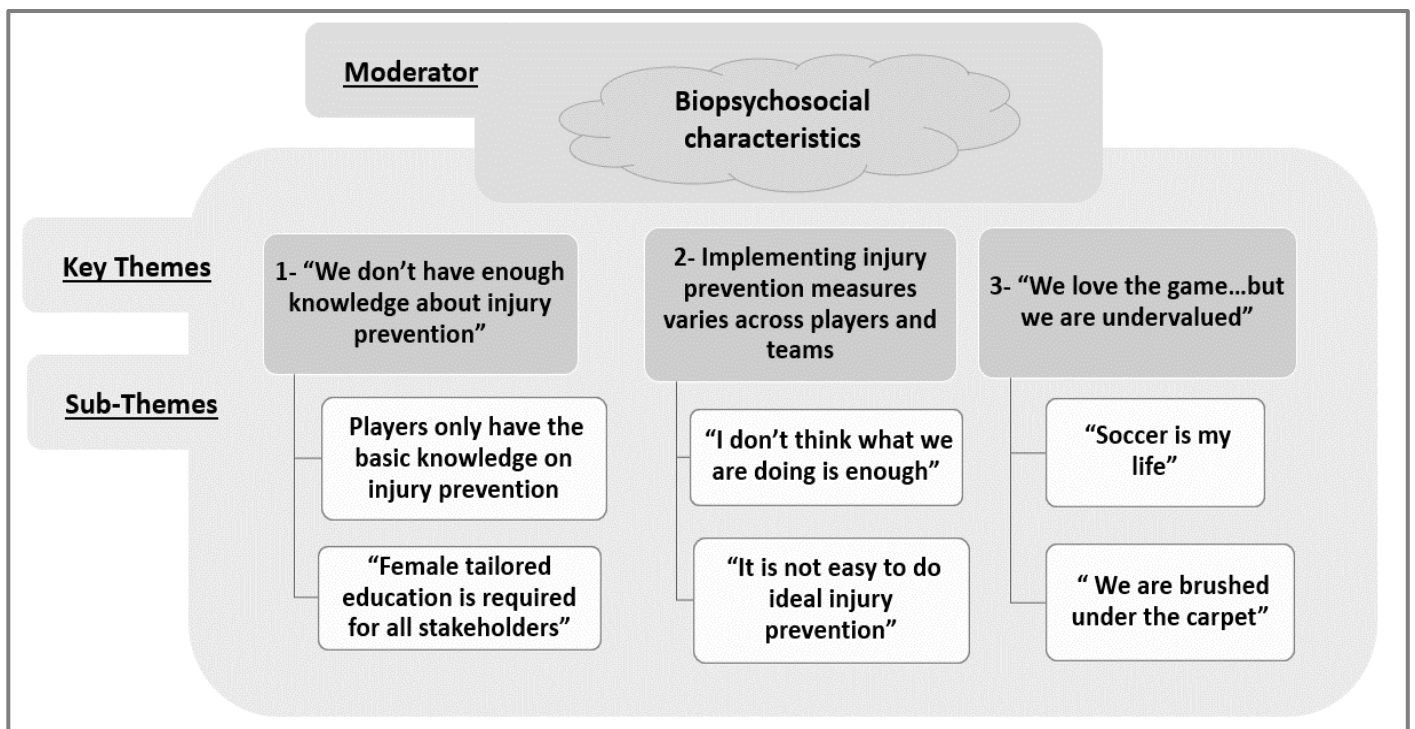


Figure 1: Summary of findings

Result

Three key themes were identified: (1) “we don’t have enough knowledge about injury prevention” (2) implementing injury prevention measures varies across players and teams, and (3) “we love the game...but we are undervalued”. Each key theme has two sub-themes. Biopsychosocial characteristics such as beliefs, culture, age, and a previous injury experience influenced (moderated) the players’ perceptions of the causes of injury and measures to prevent injury as well as their implementation of injury prevention measures as illustrated in Figure 1. These characteristics were interlinked, for example, a player’s beliefs were in turn influenced by age and culture. Players’ implementation of prevention strategies was sometimes referred to as “preventive behavior”.

Similarities in the experiences on injury prevention were found between the majority of Saudi and Irish players across the three themes. Differences between the two groups and the effect of the biopsychosocial characteristics (moderators) were highlighted when found within each theme.

Similarities were also found during analysis between players from both groups in the same age group (the age groups identified were 18-19 years, 20-30 years, over 30 years, and over 40 years). These age-related similarities could relate to their beliefs, physical abilities, play style, soccer experience and stage of life including commitments to family and work. Most importantly, similarities were found in the players’ perceptions and experiences in injury risk and prevention in each of these age groups.

Summary of Findings

Theme 1: “We Don’t Have Enough Knowledge about Injury Prevention”

In this theme, the players’ described their knowledge about injury risk and prevention, and the sources of this knowledge. They also, highlighted their need for detailed education tailored for female players to promote safe playing practice. The effects of moderators on the players’ knowledge about injury risk and prevention were explained in this theme as well.

Subtheme 1: Players Only Have the Basic Knowledge on Injury Prevention

In this subtheme, the players discussed their knowledge on injury risk which they perceive as “not enough” to inform adequate preventive behavior: “I don’t feel I know enough to do more” (Irish 28). Teams’ coaches were the main source of players’ knowledge about injury risk and prevention. Other less common sources included physiotherapists, websites, or peers who had previously experienced a similar injury. Formal education on sport injury prevention (i.e., in the collage of Sport or Medicine) was also reported among few players who discussed detailed knowledge about the effect of risk factors and preventive measures from both groups. However, seeking knowledge about prevention and management of injuries was reported more often among the Saudi players: “In the beginning I was searching google and looking for information, trying to find the maximum amount of information that will help me to avoid injury and how to manage my injury, if I have one” (Saudi 3).

Players from both groups described different former knowledge about soccer skills depending on extent of playing mixed gender sports which varied across groups. In the Irish group, knowledge developed earlier as some Irish players participated in girls’ teams or grew up with a soccer-playing brother “I knew that from my brother. He uses Dioralyte [oral rehydrating supplement] to prevent dehydration and cramps” (Irish 16). In contrast, Saudi players learned soccer skills later when they joined a team.

If a player had sustained a previous injury, this could influence their knowledge on injury risk and prevention and increased the perceived susceptibility of injuries and perception of risk factors among some participants. The players’ perceived susceptibility of injuries was moderated also by their age. Players over 30 years believed that they were at higher risk of injury as they developed fatigue earlier than younger players. In contrast, younger players (18-19 years of age) were perceived to be less likely to expect injuries or recognize their consequences: “the younger girls think ‘I won’t get hurt’” (Irish 29).

Players cited many internal and external causes of soccer injuries, such as a previous injury, poor sleep, fatigue, inadequate implementation of injury prevention measures (e.g., warm-up) and less experience playing soccer: “if you are newer to the sport of soccer and you’re not properly trained. For whatever reason, you would definitely be more prone to an injury” (Irish 27). Saudi players reported young players -with lower playing skills- appeared to be more

injury-prone and possibly causing a risk to others in the field (mostly through an aggressive playstyle).

The players' environment influenced their perception of some risk factors. The nature of the playing surface, such as holes in a grass field, was reported as an external cause of injury by both groups. However, only Irish players mentioned that weather changes (i.e., a muddy field after rain) could influence their injury risk: "Well, I suppose the weather, in Ireland there's lot of rain. Some of the pitches can get very waterlogged. Your feet are kind of really heavy in the ground. You can kind of get injured that way" (Irish 9)

Subtheme 2: Female Tailored Education Is Required for All Stakeholders

In this subtheme, players clarified their need for education on injury risk and prevention, suggesting essential topics and methods of delivering future educational programmes. All players recommended that formal education on injury risk, management and prevention should be enhanced, to reduce injuries: "Education and knowledge will encourage the correct and safe practice" (Saudi 18). They insisted that education should be delivered for all associated with soccer: "Coaches' education, parents, players. All three of them are so important" (Irish 23). The players highlighted the importance of female tailored education about injury risk and prevention: "The nature of women and their life routine is different from that of men, also their bodies and hormones are different. Education providers should consider these differences" (Saudi 15). Priorities for education included: causes of injury, risk factors, and how the female player's body functions. The players recommended providing education on injury prevention from the very start of playing soccer and include campaigns and interactive education with qualified educators. Unlike their Irish peers, Saudi players reported lack of basic soccer knowledge and cited the basics of soccer skills as a part of their future educational programmes: "It is very important for each player, when they start to participate in the game, they need to know the basics" (Saudi 6).

Theme 2: Implementing Injury Prevention Measures Varies Across Players and Teams

In this theme, the players described how they were implementing injury prevention measures at both individual and team levels. They explained the factors limiting their implementation of preventive measures

and suggested several facilitators for their preventive behaviors. The effects of the biopsychosocial moderators such as age and culture on players' preventive behaviors were also highlighted.

Subtheme 1: "I Don't Think What We Are Doing Is Enough"

In this sub-theme, the players mentioned that injury is a part of playing soccer and explained that most of their current methods of implementation were inadequate.

Most players believed that injury was an inevitable part of playing soccer. However, their beliefs about soccer injuries were influenced by their cultures (including religion). Saudi players believed that they had limited control to prevent an injury as God was their only protector directing whether they would become injured or not: "I do my stretches and I pray to God to spare me and my team from any injury" (Saudi 2). They also believed that there must be a hidden benefit after negative events like injuries: "I have been accepted for the coaching license after this injury. I believed that God permitted this to happen for my benefit" (Saudi 19). In comparison no religious explanation for injury were reported by the Irish players.

For most participants, injury prevention behavior was guided by the team's coach with a focus on preventing lower limb injuries. The players cited three categories of prevention strategies: pre-game, during game, and after-game. The first were the pre-game -and training-strategies which were performed off pitch as a preparation:" We were just told by our coach to rest, drink a lot of water, eat healthy and just you know, preparing yourself physically and mentally for the football" (Irish 32). The second were strategies used during play, such as wearing shin guards and maintaining concentration. The final group of strategies applied after playing to reduce the effects of fatigue and optimize recovery, such as cool-down exercises and adequate recovery period. However, they described varying levels of implementing these injury prevention strategies. For example, some players reported performing more than one measure for cooling-down (recovery) such as a slow run, muscle stretching and a cold bath while other players did not perform cool-down: " No, there is no cooldown at all" (Saudi1). In general, players described their implementation of more preventative strategies before and during the game than afterwards. Most players recognized that their implementation of injury

prevention measures was not adequate. The majority of players highlighted that coaches should take a lead on ensuring adequate implementation of injury prevention measures: “The period of cool-down with the team is short, they [coaches] don’t consider individual needs of the players. I noticed that with longer stretching time I gain more comfort and release of muscles” (Saudi 5). Few players who played for various teams reported that the implementation of prevention measures was different across different teams: “I noticed that different teams are following different orders of [warm-up] exercises, and I don’t know which one is the ideal” (Saudi 10).

Player’s age moderated their preventive behaviors.

All players over 30 years of age mentioned adopting a safer playstyle to avoid injuries: “It’s not worth making a tackle, it would mean I wouldn’t be able to be in work myself, to attend to my three kids, to drive or to be able to do anything. I was kind of conscious of that”. (Irish 34)

However, few players over 30 years reported taking part in other injury prevention measures. Also, players over 40 years and those who were mothers reported that weak pelvic floor muscles affected their performance and influenced their water consumption at times.

Players’ preventive behaviors were also moderated by their culture or having a previous injury experience. An injury experience seemed to increase the preventive behavior of some participants: “After my injury, I started to concentrate more on my stretches especially after the heavy work out. During our training, I drink water and do extra stretches to avoid accumulation of fatigue in my muscles” (Saudi 20). In addition, cultural differences inspired the players’ implementation of some preventive measures, as sleeping and diet issues were reported among some Saudi players: ‘Unfortunately, unhealthy diet is an issue among the Saudi community’ (Saudi 20). However, when accounts from the two groups were compared, more Saudi players reported using more prevention strategies compared to their Irish peers.

Subtheme 2: “It Is Not Easy to Do Ideal Injury Prevention”

In this sub-theme, the players described the challenges to injury prevention such as carelessness, lack of motivation, stress of competing commitments

(e.g., childcare and work) with playing or practice, and lack of encouragement from the coach: “The coach doesn’t ask us to ever do a warm down” (Irish 35). Another reported barrier was the players’ beliefs against the effectiveness of some preventive measures: “I think it is an issue of beliefs. Some players in my team do not see the importance of warm-up and cool-down and do not do them” (Saudi 3).

Some players perceived that their sport was undervalued with sporting authorities, which could further reduce the players’ motivation to implement prevention. Culture-related beliefs also limited the players’ preventive behavior: “To be honest, ignoring the upper limbs during training except for goal keepers is common among Saudi female teams, because they think they will get bulky like men, which is totally wrong” (Saudi 20).

Parental control was another culture-related barrier reported for some Saudi players: “Sometimes the time of training is not appropriate for all the girls, some parents don’t permit their daughter to attend trainings at night” (Saudi 19). Also, frequent social events such as family visits were reported to interfere with implementing prevention strategies only among Saudi players.

Most players reported some organizational rules for amateur women’s soccer as barriers to ensuring adequate recovery period between the games, often only 1-2 days: “...I think that’s a really big downfall of the leagues. They just don’t take into account the recovery periods the athletes need” (Irish 22). This barrier was notably reported by all players over 40 years.

The players also suggested several facilitators for implementing injury prevention on the player’s level. Education on injury risk and prevention, previous injury experience and management of time and external commitments were the major facilitators cited by most players.

Player’s age (life stage and related commitments) influenced the perceived facilitators of their preventive behaviors. For example, collage students reported cooperation from their college professors in timing their exams as a facilitator of their preventive behavior: “Sometimes, I skip cooldown if I have an exam the next day. cooperation from the university in timing and load of studies will help a lot ” (Saudi 14). Support from one’s family (often partners, in particular) was a facilitator for

players who were mothers from both groups, however, support from parents was a facilitator for some Saudi players only.

Theme 3: “We Love the Game...but We Are Undervalued”

In this theme, the players explained their passion of playing soccer and how they thought that they were not given deserved recognition, despite sacrifices made for the game. They compared their teams to amateur men’s and professional women’s teams and described the challenges they were facing in their amateur level teams which could inhibit implementation of injury prevention.

Subtheme 1: “Soccer Is My Life”

In this sub-theme, the players described the reasons for their passion of playing soccer, primarily that playing soccer improved both their physical and psychological states and, for some, decreased the pain associated with menstruation. These observed benefits reinforced players’ dedication to the game, which encouraged many to attend games and training sessions even on difficult days: "Passion of the game encourages the players to attend training during rain or dust storms" (Saudi 18).

The players were most interested in attending the ‘playing part’ of the games and training sessions. Some players may have skipped the pre- or post-playing injury prevention strategies e.g., leave the pitch before cooling-down, but never missed playing. A few players reported playing even with injuries to stay in the game and support their teams: "I played with pain from my ankle sprain and showed that to my coach so I convince him that I can continue playing and support my team" (Saudi 12). Playing for sporting achievement seemed generally higher among the Saudi compared to the Irish players. However, motivations varied among players based on their age. Younger players and those over 20 years were more motivated to reach higher levels of play and develop skills compared to players who were over 30 years, especially working mothers, who reported their priority was to have a fun time and a break.

I was delighted if I got any bit of time on the pitch and the whole idea of me going back to soccer was just for a bit of head space and to get away from the house and the craziness that was going on (Irish 34).

Subtheme 2: “We Are Brushed Under the Carpet”

In this subtheme, all players stated that they did not feel valued by the soccer community compared to amateur men or professional women which made their teams lack support and resources such as training facilities and health services. They added that their skills were under-estimated despite the sacrifices they made, such as the regular payments to support their teams (e.g., fees to use the playing field): “Unlike professional players, we lack lots of things because we are amateur. We don’t have a medical team, fitness coach or financial support. We pay for everything” (Saudi 15).

Most players compared their teams with amateur men’s teams, and male dominance on the game was the main perceived cause of undervalue in the two groups. However, Saudi players added the low recognition of the women’s game in the wider society, due to its late establishment in Saudi Arabia, as a further reason for feeling of undervalued. Players reported that they were responsible for identifying and managing their own injuries, due to the lack of medical staff and equipment (like cold packs or splints) in their teams. The shortage of support staff forced some players to fulfil further roles in their teams such as coaching and managing injuries.

The players stated that providing more recognition and related resources for their teams could create a more facilitating environment for injury prevention. The presence of female coaches was preferred by both groups (more by the Saudi group) to ensure understanding of the female related issues such as menses and childcare: " Most of coaches in Saudi teams are men. Gender differences affect performance, the female coach will understand me, and the effect on menses on me, even if she didn’t give me a good training like the male coach" (Saudi 9). Culture again influenced the perceived requirements for ideal facility set-up, with Irish players preferring equal access to the facilities of the clubs as their male colleagues: “I think... kind of accessibility to equipment and stuff is the big thing” (Irish 25). However, Saudi players mentioned that they needed provision of facilities in their -women only- clubs.

Discussion

The current study provides an insight into the experiences of amateur women soccer players about soccer injury risk and prevention, highlighting the impact of the players’ biopsychosocial characteristics including age, beliefs, previous injury experience and culture as moderating factors throughout thematic

areas. The potential barriers and facilitators to the uptake of prevention strategies are identified, as well as offering tangible ways to enhance injury prevention strategies for women soccer players.

Most Players Do Not Have the Knowledge Required to Implement Adequate Injury Prevention

Players' knowledge on injury risk and prevention

The reported causes and preventive measures of injuries in the current study were consistent with other evidence about preventing soccer injuries (DeMarco et al., 2011; Ekstrand et al., 2006; Borges et al., 2015; Foster et al., 2007; Ndlec et al., 2012; Mutz et al., 2020). However, the level of knowledge about injury risk and prevention varied among participants. Low implementation of injury prevention measures and lack of adequate knowledge on injury risk and prevention were reported by most participants. Our findings support the evidence recommending accurate detailed knowledge to inform adequate preventive behavior (Ajzen et al., 2011). Also, the increased knowledge and implementation of injury prevention after an injury experience was consistent with research about risk and preventative behavior (Verhagen et al., 2010).

Players' injury prevention behavior

Participation in injury prevention strategies was found to be a common challenge among sports communities (Owoeye et al., 2018). Our findings were consistent with a qualitative study among coaches of female soccer teams, which identified lack of time, coaches' knowledge, and resources about implementing injury prevention (Donaldson et al., 2019). For instance, participants in the current study were familiar with some strategies, such as running in the field with various speeds (Soligard et al., 2009), soccer drills and stretching as warm-up strategies (Soligard et al., 2009; Ferraz et al., 2021). However, most of them were not familiar with the adequate time and the correct sequence of warm-up exercises. Coaches' accreditation of an evidence-based comprehensive warm-up programme with a fixed time and components (FIFA 11+) in their teams, can help to encourage the players' implementation of adequate warm-up (Al Attar et al., 2018). Another explanation for the lower implementation of prevention strategies is that most of these players were not knowledgeable about the range of effective injury prevention measures. In this study, the players were familiar with

some cool-down strategies that require extra time in the field, such as slow running, and stretching (Van Hooren & Peake, 2018). However, they did not report additional cool-down strategies such as low intensity cycling (Rey et al., 2018) which can be performed on their way home.

Behavioral modifications are required to encourage the implementation of injury prevention measures/programmes among amateur women soccer players (Finch, 2006). Human behavior theories such as the theory of planned behavior (TPB), health beliefs model, or the self-determination theory, can be used to understand and support changes to player's behavior, based on information about their biopsychosocial characteristics (Santi and Pietrantonio, 2013; Duminica, 2020). In the current research, the TPB was used in framing and interpretation of findings which was accepted in the RTA (Braun and Clark, 2019). The TPB was used to explain why the players adopt their own injury prevention behavior considering the influence of the biopsychosocial factors of each player on her preventive behavior (Renzi and Klobas, 2008). Education and increasing awareness of injury risk and prevention are essential facilitators of players' preventive behaviors (Ajzen et al., 2011). Based on the theory of planned behavior, improving the players' knowledge of injury risk and prevention would encourage better preventive behavior (Ajzen et al., 2011). Suggested strategies include formal educational courses to improve the players' level of knowledge on the mechanism of action of risk factors, consequences of not implementing injury prevention, the various options of implementing injury prevention measures, in addition to the correct and adequate implementation of these measures (Donaldson et al., 2019). The content of these programmes should be tailored to amateur women players and linked to real-life soccer practice at the amateur level such as incorporating prevention strategies into a busy life. In addition, to the players, education for injury prevention should include parents of younger players and teams' coaches (Donaldson et al., 2019) as they could support the players' implementation of prevention strategies (DeMarco et al., 2011).

Players' Preventive Behaviors Were Influenced by Their Biopsychosocial Characteristics and the Low Provision of Resources at the Amateur Level

Players' life stage

In the current study, similarities in injury prevention behaviors were reported among players in the same life stage (e.g., early adulthood at 18-19 years) from both groups. It has been reported that younger players (18-19 years of age) could be aggressive in the field, due to their lower recognition of the risk of soccer injuries. In contrast, players over 30 years believed that they are at a greater risk of injury, due to an earlier development of fatigue. They adopted a safer playstyle to avoid injuries that can interfere with their family and work commitments. Life stage can moderate individuals' behaviors, cognition, and intellectual abilities as well as their physical and emotional characteristics (Gonzalez-Jimenez, 2017). Aggressive play is an established risk factor of sports injury (Schwebel et al., 2007) and may be associated with life stage in younger athletes. Aggressive play can be due to perceived lower risk of injury (Rolison et al., 2014), higher motivation for achievement in the game (Molanorouzi et al., 2015) frustration, anger, overexcitement, or imitating the behavior of a social idol (Gencheva, 2015). Therefore, monitoring, and effective communication from coaches with youth players will help to increase their emotional intelligence (Rutkowska & Bergier, 2015) and improve their preventive behavior (Abade et al., 2014). Teams' administrations are advised to educate young players about the consequences of injuries and how to overcome frustration and anger using appropriate education format for this age group, such as hosting a soccer star figure to talk about these topics (Gencheva, 2015) is recommended.

Players over 20 years of age have a higher recognition of injury risk compared to their younger peers. This was supported by the evidence that the individuals' recognition of injury risk increases with their age (Rolison et al., 2014). However, the players' motivation to play varied after the age of 30 years. Players between 20-30 years have the motivation to play for achievement. Therefore, these players from both countries reported higher preventive behaviors compared to the other age group. Whereas players over 30 years have a different motivation to play which was more about enjoyment due to family and/or work commitments which might alter their priorities for performance during games. Our findings were consistent with previous studies about motivation and constraints to adults' participation in sports (Molanorouzi et al., 2015; Mutz et al., 2020; Ruseski et al., 2011). Also, players over 30 years in this study reported that they recognized that they were at higher

risk of injury due to the early development of fatigue. This can be related to the reduced physiological adaptation of their tissues to stress and exertion that increases with age (Foster et al., 2007). Hence, these players adopted a safer playstyle in the field to avoid injuries. Considering the player's life stage, including its associated characteristics and commitments from the coaches and rehabilitation staff, are recommended for effective injury prevention intervention among amateur women.

Players' beliefs on injury risk and prevention

Players' beliefs can influence their experiences on injury prevention (McClure et al., 2010). Beliefs can be described as "an inner feeling that something is true, even if that thing was irrational or unproven" (Moise, 2014). Individuals' beliefs -in turn- can be influenced by their experiences (Hatala, 2012). Players with a previous injury experience (an individual difference) discussed a higher perceived probability of injury and a greater implementation of injury prevention strategies compared to their pre-injury situation and their uninjured peers. Our findings were supported by the Health Beliefs model which states that Individuals' health beliefs can predict their decision to perform behavioral changes to avoid injury (Munro et al., 2007). Similarly, a study among college athletes showed a perception of higher risk and stronger beliefs in their inability to avoid injuries and the importance of injury prevention compared to their uninjured peers (Short et al., 2004). Therefore, the rehabilitation team should provide injured players with accurate evidence-based education on injury risk and effective rehabilitation programmes that include injury prevention. This education should consider the biopsychosocial factors contributing to their injuries and the challenges at the amateur level. Examples of these educational programmes include alternative warm-up/ cool-down measures for players who cannot perform with their teams provided by their coaches. Also, specialists in sports medicine could provide early injury management courses for players who don't have medical staff in their teams.

Players' culture

Cultural differences have a great influence on sport, exercise, players' performance (Gill, 2017) and beliefs (Hatala, 2012) therefore, moderate the players' experiences on injury prevention (McClure et al., 2010). It was reported that some Saudi players avoided training their upper bodies to avoid hypertrophy, which they

perceived would make them look less feminine. According to the Health Beliefs model (Hartley, 2018), this false belief can limit the participation of these players in upper body training. This belief could be partially explained by the Saudi culture which considered upper body building as an indication of masculinity (Donnelly et al., 2018). This is consistent with gender stereotypes which are prevalent in sports and do not accept women's participation in strength, endurance, or physical contact (Gill, 2017). Another explanation for the players' avoidance of upper-body training could be the lack of knowledge about the impact of these upper body exercises on women's physical appearance (Ajzen et al., 2011). Upper body strength is essential for soccer players to avoid injury during collisions with other players (Ruivo et al., 2016). Clarifying the differences between upper body strength training as a part of body building and as a part of soccer training should be a part of the educational programmes designed for Saudi women soccer players. Poor sleep and diet described by Saudi players were in agreement with the evidence among the Saudi community. A study among 2095 Saudi adults from both genders showed that one in every three Saudi adults reported short sleep duration per night (Ahmed et al., 2017). In addition, healthy diet is uncommon among Saudi people (Moradi-Lakeh et al., 2017). Exploring the barriers of implementing these preventive measures (e.g., knowledge about healthy diet and sleep hygiene) from rehabilitation teams and coaches are recommended to inform intervention plans to facilitate healthy sleep and dietary habits for the Saudi group.

There are additional significant cultural differences between Saudi Arabia and Ireland that moderated the experiences of the players on injury prevention. Saudi culture demonstrated separation and unequal distribution of power between genders within institutions and families (Lefdahl-Davis & Perrone-McGovern, 2015) compared to Europe. Also, some parents have gender-stereotyped beliefs, leading to the provision of more support to practice sport for their sons than their daughters (Fredricks and Eccles, 2005). This could explain why the Saudi players viewed their game as different from the men's. These players recognized that the women's game is new in the country and required time to be recognized and fully developed (Lysa, 2020). The late establishment and low recognition of the game could explain the variations in the provision of facilities between the main and the small cities as well as the lack of staff in some specialties in the team. It could also explain the lower

knowledge base of some Saudi players about the basics of soccer game compared to their Irish peers. It is recommended that Saudi players are educated about the basics of the game such as soccer skills and maneuvers to reduce the risk of injuries (Giza & Micheli, 2005). Parental control and social commitments and events such as family visits are common in the Saudi culture -individuals depend on group support- (Lefdahl-Davis & Perrone-McGovern, 2015). These could negatively influence the player's adherence to implementing prevention such as having adequate sleep or attending at the team's training sessions. Regular attendance of the training sessions with the team is crucial for soccer players to increase their physical fitness and optimize their performance in their specific playing positions (Di Salvo & Pigozzi, 1998). Team coaches are advised to inform the players and parents of young players about the advantages of regular attendance of team's training sessions as one of the aims of injury prevention educational programmes.

In Ireland, people of different genders are generally mixed in public settings (Murphy et al., 2003), and people accept and expect more equal distribution of power (Connolly et al., 2019). However, there is still a dominance of men in the soccer game in Ireland (Liston, 2006). This could be explained by the gender stereotype validation which expects a lower performance of girls in soccer than boys (Chalabaev et al., 2009). Unexpectedly, despite the equal distribution of power between the two genders in Ireland compared to Saudi culture (Connolly et al., 2019), Irish women players described the lack of equity with their male peers as one of their primary challenges to their implementation of prevention measures. Furthermore, there was variation in the provision of facilities between Irish teams in the same city. The lack of facilities and support (including health services) to the Irish amateur women soccer players may in part explain the higher prevalence of fatigue and anxiety as well as the number of injuries per player reported in a recent study among this group (Alahmad et al., 2021). Socio-environmental factors such as lack of support or value are known causes of anxiety (Giritlioğlu & Erzeybek, 2020), while the inability of the player to attend regular training could result in low fitness, early fatigue (Wan et al., 2017) and related injuries. Development of self-confidence, physical performance (Sajedi & Kirkbir, 2020) and coping strategies are recommended for these players. Also, playing on a muddy field was reported as a risk factor among Irish players only. This factor was perceived

more by Irish players due to the frequent weather changes in Ireland compared to Saudi (Kottek et al., 2006). The impact of the weather changes on the playing floor is an environmental factor that increases the risk of soccer injuries (Waldén et al., 2013). Playing on a wet surface (after raining) was found to increase the risk of ACL injuries among athletes due to reduced shoe-surface friction (Smith et al., 2012). This may explain the higher knee and ligament injuries as well as number of injuries per player reported during a winter season among amateur Irish women soccer players (Alahmad et al., 2021). These players should be educated about causes and prevention of soccer injuries, in a way that make sense to them and their cultural background, social support and being cognizant of different playing environments (such as climate, floor, shoe type and shoe-floor interaction). Also, frequent maintenance of the pitches and their facilities (e.g., lights) is recommended for the team's administrations of the Irish group (Blanchard et al., 2018).

Challenges at the amateur level

The lower support and facilities described by both groups was consistent with the reported lower levels of financial support, health services, provision of facilities and equipment as well as qualified staff for female compared to male sports teams (Swanepoel et al., 2015). Shortage of staff in the team reported by both groups placed more pressure (Michie, 2002) on the players as they try to fulfill these vacancies based on their qualifications such as coaching their colleagues. The time, commitment, effort, and stress of this extra work interfere with the implementation of prevention among these players e.g., the player who coaches the team will be under higher stress due to her responsibilities compared to other players (Michie, 2002). It is recommended that supports are put in place for amateur women soccer teams, so the players do not have to fulfill any other distracting non-player roles, such as administration, in their teams. In addition, providing advice on stress and time management strategies to these players is recommended, to reduce the impact of their extra duties and responsibilities. Support for amateur women's soccer from the Football Federations or Ministries of Sport, which includes the provision of resources (e.g., private pitches, and pitch-side area for the players' children), healthcare (e.g., medical staff in the team), and funding are required to prevent injury in these teams (Donaldson et al., 2019).

Limitations

This novel study is the first study that included cross-cultural comparison on injury prevention using qualitative data from amateur women soccer players. The relatively large sample size was a strength of this study, which provided a broad understanding of the players' experiences (Vasileiou et al., 2018), as was the presence of researchers from both Irish and Saudi backgrounds during analysis. A limitation of the study is that Irish interviewees had to remember their injury occasion from the last playing season (9 months) due to Covid-19 restrictions of soccer practice, possibly leading to a reduction in clarity for some injury characteristics (not experiences or opinions). However, the period was less than one year which allow the player to remember more than 80% of their injury characteristics (Hassan, 2005). Also, there was an insufficient depth of detail in the initial Saudi interviews (about the mechanism of action of risk factors). Hence, five more participants were recruited to gain more in-depth information. In addition, as with all research, the population who volunteered to take part may not be representative of all who play women's soccer in Ireland or Saudi Arabia (volunteers are often more confident, able to discuss their experiences etc.) (Callahan et al., 2007).

Recommendations for future research

Future research on amateur women soccer players would benefit from prospective studies investigating risk factors for soccer injuries, especially female-related ones (e.g., menses), are essential to inform tailored injury prevention programmes (Sedgwick, 2014a). A comparison of age groups among amateur women soccer players is also required to ascertain the effect of age on the injury risk profile and player's preventive behavior in this cohort. Qualitative studies in this field that include stakeholders and are conducted in various regions are recommended to increase the understanding of the potential barriers and facilitators to players' preventive behavior (Finch, 2006). Finally, development of educational guidelines for injury prevention and behavioral changing programmes tailored towards amateur women players, and studies to examine their effect on soccer injury incidence are recommended.

Conclusion

This study showed how biopsychosocial characteristics can influence perceptions about injury

risk and prevention, as well as the preventive behaviors of amateur soccer players, despite the differences in length of establishing soccer practice in both countries. Female and age-appropriate tailored educational programmes for players, coaches and parents of younger players must be facilitated to encourage implementation of prevention. Providing

the required support and resources for amateur teams and considering the player's biopsychosocial characteristics, should lead to an increased adherence of amateur women soccer players to implementing preventive measures and reduce risk of injury as well as enhance enjoyment of the sport for more players with longer careers.

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