The effect of coach and player injury knowledge, attitudes and beliefs on adherence to the FIFA 11+ programme in female youth soccer

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ABSTRACT

Background Injury knowledge and beliefs influence uptake of prevention programmes, but the relationship between knowledge, beliefs and adherence remains unclear.

Aim To describe injury knowledge and beliefs among youth female soccer coaches and players, and to identify the relationship between these factors, different delivery strategies of the FIFA 11+ programme and adherence.

Methods A subcohort analysis from a cluster-randomised controlled trial of 31 female soccer teams (coaches n=29, players (ages 13–18) n=258). Preseason and postseason questionnaires were used to assess knowledge and beliefs. Teams recorded FIFA 11+ adherence during the season.

Results At baseline, 62.8% (95% CI 48.4% to 77.3%) of coaches and 75.8% (95% CI 71.5% to 80.1%) of players considered 'inadequate warm-up' a risk factor for injury. There was no effect of delivery method (OR=1.1; 95% CI 0.8 to 1.5) or adherence (OR=1.0; 95% CI 0.9 to 1.1) on this belief. At baseline, 13.8% (95% CI 1.3% to 26.4%) of coaches believed a warm-up could prevent muscle injuries, but none believed it could prevent knee and ankle injuries. For players, 9.7% (95% CI 6.1% to 13.3%), 4.7% (95% CI 2.1% to 7.3%) and 4.7% (95% CI 2.1% to 7.3%) believed a warm-up would prevent muscle, knee and ankle injuries, respectively. Years of playing experience were negatively associated with high adherence for coaches (OR=0.93; 0.88 to 0.99) and players (OR=0.92; 0.85 to 0.98).

Conclusions There were gaps in injury knowledge and beliefs, which differed for coaches and players. Beliefs did not significantly affect adherence to the FIFA 11+, suggesting additional motivational factors should be considered.

BACKGROUND

In Canada, soccer injuries account for over 10% of all sport injuries in youth aged 11–18 years.[1] Several studies have demonstrated the injury protective effect of a neuromuscular training warm-up programme in youth soccer[2–8]; however, the success of these programmes when implemented in the context of real-world sports is dependent on coach and player adherence. Higher adherence has been shown to positively correspond to greater injury protective effects.[9–11] Despite this, adherence to effective injury prevention measures is an ongoing challenge in community sport settings.

There is an established need for more implementation research on sport injury prevention programmes to maximise adherence and uptake of these strategies.[12–15] Yet, there has been limited attention given to factors that could promote programme adherence.[16] One potential factor is knowledge regarding injury risk and prevention. Orr *et al*[17] examined youth soccer coach and player knowledge of knee injury and safety practices, and found significant gaps in understanding of knee injury prevention in coaches and players. This observation is consistent with previous studies that have found limited injury awareness among coaches[18–21] and athletes[22–24] in a variety of sports.

There is a paucity of research examining how coach and player knowledge directly influences injury prevention behaviour.[25] Arnason *et al*[26] demonstrated that increasing injury awareness did not reduce injury rates in a sample of elite male soccer players, but did not measure the effect of awareness on players' prevention behaviour. In a study of Premier Division Australian football, coaches had poor knowledge of lower limb injury prevention strategies and did not routinely incorporate prevention strategies into their training sessions.[19] Fewer than 75% of players training with these coaches believed that balance, landing or cutting exercises had injury prevention benefit, and only 74% would be willing to perform injury prevention exercises during training.[27] However, with such limited evidence, the extent to which coach knowledge influences prevention behaviour among their players is not yet clear.

Attitudes towards injury risk and prevention are also associated with the uptake of preventive measures among coaches[28 29] and youth sport participants.[22 30–36] Perceived susceptibility to injury,[30 36] social influences[30 32 35] and dislike of prevention strategies[30 31 36] have all been shown to influence prevention behaviours in a variety of competitive and recreational sports. Specifically, lack of perceived need,[30] social pressure[32 35] and protective equipment discomfort[36] have been associated with poor adherence to preventive interventions. Additional factors, such as age, may influence these attitudes.[30] In youth soccer specifically, there is also some evidence that female players report higher levels of perceived injury risk than male players.[37] Interestingly, direct exposure to injury prevention programmes may not be sufficient to change injury prevention attitudes. Gilchrist *et al*[38] found that participating in injury prevention did not influence soccer coaches' knowledge, attitudes, beliefs or prevention behaviours across a season.

The effect of a preventive intervention on coach and player attitudes and beliefs has not yet been

examined in youth soccer, and the relationship between knowledge, attitudes and adherence to injury prevention programmes remains unclear. The purpose of this investigation was therefore twofold. First, the study aimed to describe the baseline levels of injury knowledge, attitudes and beliefs among coaches and players. The second objective was to determine the relationship between intrinsic coach and player factors (ie, personal characteristics and beliefs), different delivery strategies of an injury prevention warm-up programme and adherence to the intervention over the course of one competitive season.

METHODS

This study is a secondary analysis of data from a cluster-randomised controlled trial (cRCT)[39] investigating the effect of different delivery methods of the FIFA 11+ injury prevention warm-up programme[3] on adherence, player injury risk and player performance. The overall design and methods of the cRCT are reported elsewhere.[39]

Participants

The sample was recruited from a target population of 31 female soccer teams (players aged 13–18 years) competing in the 2011 outdoor season. These teams represented 18 clubs from the top three competitive levels (tiers 1–3) of the Calgary and Edmonton Minor Soccer Associations and the Edmonton Interdistrict Youth Soccer Association in Alberta, Canada.

All participants provided informed consent prior to the start of study as per the Office of Medical Bioethics, University of Calgary.

Attitudes and beliefs questionnaire

Coaches and players completed a paper-based questionnaire assessing their coaching/playing experience, injury history, and attitudes, beliefs and knowledge about injury risk and injury prevention in youth soccer. This was administered during baseline performance testing sessions early in the soccer season and again at the conclusion of the 4-month season, allowing an assessment of changes in attitudes and beliefs resulting from exposure to the FIFA 11+ during the season.

The questionnaire was based on a previously developed survey of junior netball coaches in Australia.[28 40] There were separate coach and player versions of the questionnaire, and both underwent face validation. The player questionnaire was also pilot tested among a team of youth soccer players involved in an independent youth soccer study in a neighbouring province. Based on this pilot test, some items were rephrased as required. The study questionnaire is available as online supplementary content.

Different delivery methods of the FIFA 11+

The FIFA 11+ is a 20-min warm-up programme developed by FIFA Medical Assessment and Research Centre (F-MARC) to prevent lower extremity injuries among soccer players, consisting of 15 single exercises with a focus on cutting, jumping and landing technique, and on strength, plyometrics, agility and field balance components.[3] Following baseline questionnaire completion, teams were cluster randomised to one of three intervention groups to evaluate the effect of different delivery methods of the FIFA 11+ on adherence.[39]

Coaches from teams randomised to the 'control' group were provided with details for online access to the FIFA 11+ programme website (http://f-marc.com/11plus/). Coaches randomised to the 'regular, coach-focused intervention group' were provided with one preseason 11+ coach workshop (including programme instruction information about the programme's development and purpose) and copies of FIFA 11+ material (DVD, poster detailing the exercises, website information). In addition to a preseason FIFA 11+ workshop for coaches and receiving copies of the FIFA 11+ material, teams in the 'comprehensive, player-focused intervention group' were also assigned a study physiotherapist who taught the 11+ programme to the players and participated regularly in practice sessions to facilitate correct technique and progression.[39] All participating coaches were asked to perform the FIFA 11+ programme with their team as a warm-up at the beginning of all practice and match sessions, at a suggested minimum of two to three times per week.

Daily exposure sheet

During the season, exposure and adherence data were collected prospectively using a modified version of a previously validated exposure registration form for injury surveillance in youth soccer.[41] All teams appointed a team designate who was responsible for recording individual exposure at each practice and match session, as well as team-level adherence to the FIFA 11+, using the daily exposure sheet.[39] Coach adherence was operationalised as the proportion of team training sessions and games at which the FIFA 11+ exercises were performed. Player adherence was based on the proportion of sessions at which the team performed the FIFA 11+, adjusted for individual attendance at those sessions. Coaches and players were divided into 'low' (<72% of sessions), 'medium' (72–91% of sessions) and 'high' (≥91% of sessions) adherence tertile groups.

Analysis

All analyses were performed using STATA V.12.0 (StataCorp; College Station, Texas, USA). Baseline questionnaire responses were descriptively analysed including all respondents, regardless of whether they completed a postseason questionnaire. Descriptive analyses are reported as proportions with 95% CIs or medians with ranges and IQRs. Lower limits of the 95% CIs were truncated at zero, when necessary.

Analysis of changes between baseline and postseason were restricted to respondents who completed questionnaires at both time points. Knowledge, attitudes and belief changes from baseline to postseason were estimated using McNemar's χ^2 tests. Logistic regression (yielding OR with 95% CIs), adjusting for cluster by team, was used to examine the effect of intrinsic factors (age group, competitive level, years of soccer coaching/playing experience, 1-year injury history), FIFA 11+ delivery method and adherence on postseason injury attitudes and beliefs. Logistic regression, adjusting for cluster by team, was also used to examine the effect of intrinsic factors and delivery method on adherence to the FIFA 11+ programme.

RESULTS

Participant characteristics

Participant flow through the study is presented in figure 1. Forty-three (91.5%) coaches and 385 players (100%) provided questionnaire responses in the preseason period. Twenty-nine coaches (61.7%) and 258 (67%) players completed questionnaires at both time points.

Baseline coach and player characteristics are presented in table 1. The coach sample consisted of 24 head coaches, 21 assistant coaches and 2 team managers (47 'coaches'), but only 43 of these individuals provided baseline characteristic information.

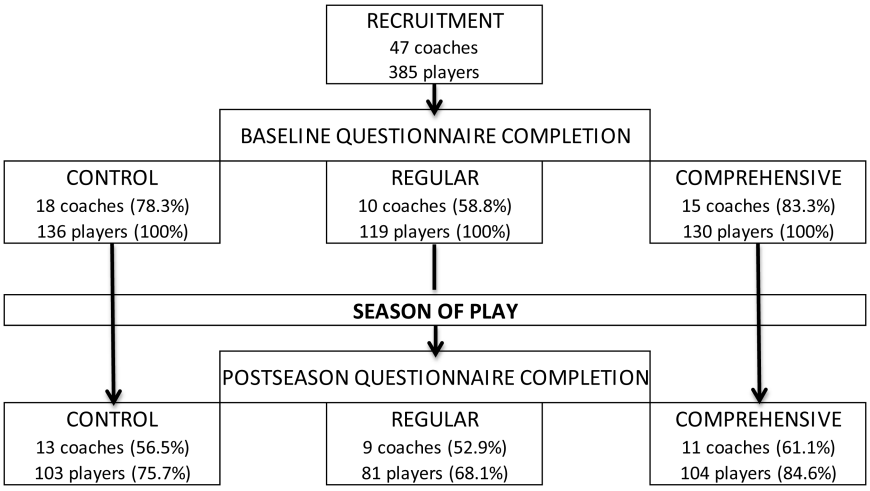

Figure 1 Proportion of coaches and players responding to the baseline and postseason questionnaires, by randomised group.

Baseline injury beliefs

Injury risk beliefs

At baseline, 30.2% (95% CI 16.5% to 44.0%) of coaches and 27.8% (95% CI 23.3% to 32.3%) of players believed that male and female soccer players had the same overall risk of injury. Beliefs about specific injury risk are presented in table 2. Coaches and players selected the category 'knees and ankles' as the most commonly injured body parts.

Injury prevention beliefs

The three injury types (as identified by participants) that were most commonly believed to be preventable were 'muscle injuries, 'knee injuries' and 'ankle injuries'. The most frequently indicated strategies to prevent these injuries are presented in table 3. When asked directly whether they believed that injuries were preventable, coaches were more likely than players to answer 'yes' (z=−3.90, p=0.0001). Attitudes towards who should take responsibility for injury prevention are presented in table 4.

Table 1 Baseline characteristics of n=43 coaches and n=385 players from youth soccer in Canada

Characteristic	Coaches (n=43) Median (range/IQR) or frequency (%)	Players (n=385) Median (range/IQR) or frequency (%)
Age group		
U16	25 (58.1)	214 (55.6)
U18	19* (44.1)	171 (44.4)
Years coaching experience	10 (0–45/5–15)	–
Have previous soccer playing experience	30 (69.8)	385 (100.0)
Years of playing experience	8 (0–54/5–25)	10 (1–15/7–11)
Experienced a personal time loss injury playing soccer in past 12 months	14 (32.6)	194 (50.4)
Time loss duration		
Slight (0–7 days)	3 (21.4)	38 (19.6)
Moderate (8–28 days)	4 (28.6)	73 (37.6)
Severe (>28 days)	5 (35.7)	59 (30.4)
Missing	2 (14.3)	24 (12.4)

*One coach was the head coach of a U-14 and a U-16 team (responses are only counted once in the remainder of the table).

Effect of personal characteristics and 11+ exposure on beliefs

Adherence

Mean team-level adherence to the FIFA 11+ was 73.5% (95% CI 67.4% to 79.6%) for teams in the 'control' group, 81.3% (95% CI 75.7% to 86.9%) for teams in the 'standard' group and 85.6% (95% CI 81.8% to 89.4%) for teams in the 'comprehensive' group.

Injury risk beliefs

More players than coaches considered 'inadequate warm-up' as a risk factor for injury at postseason (table 2). Adjusting for team role (coach or player), there was no effect of randomisation group (OR=1.1, 95% CI 0.8%to 1.5%) or adherence (OR=1.0; 95% CI 0.9% to 1.1%) on the belief that inadequate warm-up was a risk factor.

Injury prevention attitudes and beliefs

At postseason, coaches and players held similar beliefs that injuries were preventable (z=−1.76, p=0.08). Coaches and players continued to believe that muscle, knee and ankle injuries were most likely preventable. Overall, there were no significant changes in the strategies believed to prevent these injuries from baseline to postseason (table 3), although significantly more players than coaches thought that warming up could prevent ankle injuries at postseason. There was no effect of randomisation group or adherence tertile on the postseason belief that a warm-up could prevent an injury, for coaches or players.

After adjusting for cluster by team, age group (OR=0.1; 95% CI 0.003 to 1.2), competitive level (OR=0.6; 0.2 to 2.3), years coaching (OR=1.0; 0.9 to 1.1), years playing (OR=1.1; 0.9 to 1.2) and 12-month personal injury history (OR=2.5, 0.5 to 12.2) were not associated with baseline coach beliefs that injuries are preventable. At postseason, these factors again had no effect on the belief that injuries are preventable, nor did randomisation group (OR=0.6; 0.2 to 1.6) or adherence (OR=1.0; 0.9 to 1.1).

Age group (OR=0.9; 0.3 to 2.3), competitive level (OR=0.6; 0.3 to 1.1), years playing (OR=1.0; 0.9 to 1.2) and 12-month personal injury history (OR=1.6; 0.6 to 4.1) were not associated with player beliefs that injuries are preventable at baseline. These factors had no effect on postseason beliefs that injuries are preventable. Eighty-two injuries were recorded during the study (details published elsewhere[39]); reporting that an injury during the study period had no effect

Table 2 Coach and player injury risk beliefs (significant baseline differences between coaches and players indicated by ^ based on 95% CI; significant postseason differences between coaches and players indicated by § based on 95% CI; significant within-group differences between baseline and postseason at p<0.01 level indicated by *)

	Coach % (95% CI)			Player % (95% CI)		
	Whole sample (n=43)	Precomparison–postcomparison (n=29)		Whole sample (n=385)	Precomparison–postcomparison (n=258)	
	Baseline	Baseline	Postseason	Baseline	Baseline	Postseason
Most commonly injured area						
Knees and ankles	88.4 (78.8 to 98.0)	89.7 (78.6 to 100)	93.1 (83.9 to 100)	86.2 (82.8 to 89.7)	88.0 (84.0 to 92.0)	89.5 (85.8 to 93.2)
Hamstrings and thighs	4.7 (0 to 11.0)	4.7 (0 to 12.4)	0§	7.5 (4.9 to 10.1)	5.4 (2.6 to 8.2)	5.0 (2.3 to 7.7)
Other	7.0 (0 to 14.6)	6.9 (0 to 16.1)	6.9 (0 to 16.1)	3.1 (1.4 to 4.8)	2.7 (0.7 to 4.7)	3.1 (1.0 to 5.2)
Injury risk factors						
Inadequate warm-up	62.8 (48.4 to 77.3)	69.0 (52.2 to 85.8)	51.7 (33.5 to 69.9)§	75.8 (71.5 to 80.1)	77.9 (72.8 to 83.0)	78.7 (73.7 to 83.7)
Lack of stretching/flexibility	0^	0	0§	57.9 (53.0 to 62.8)	57.4 (51.4 to 63.4)	55.8 (49.7 to 61.9)
Aggression/risk taking	16.3 (5.3 to 27.3)^	17.2 (3.5 to 30.9)	20.7 (6.0 to 35.5)	43.4 (38.5 to 48.4)	43.8 (37.8 to 49.9)	37.6 (31.7 to 43.5)
Lack of fitness	81.4 (69.8 to 93.0)^	96.6 (90.0 to 100)*	65.5 (48.2 to 82.8)	43.6 (38.7 to 48.6)	45.0 (38.9 to 51.1)	43.8 (37.8 to 49.9)
Body contact	0^	0	0§	29.4 (24.9 to 34.0)	31.4 (25.7 to 37.1)	32.9 (27.2 to 38.6)
Poor muscle strength	0^	0	0§	23.1 (18.9 to 27.3)	23.6 (18.4 to 28.8)	26.4 (21.0 to 31.8)
Poor technique	30.2 (16.5 to 43.9)^	24.1 (8.5 to 39.7)	31.0 (14.2 to 47.8)	10.1 (7.1 to 13.1)	10.1 (6.4 to 13.8)	13.2 (9.1 to 17.3)
Player's genetics	9.3 (0.6 to 18.0)	6.9 (0 to 16.1)	3.4 (0 to 10.0)	3.1 (1.4 to 4.8)	2.7 (0.7 to 4.7)	5.0 (2.3 to 7.7)

on prevention beliefs (OR=1.1; 0.3 to 4.3), nor did randomisation group (OR=0.6; 0.3 to 1.3) or adherence (OR=1.0; 0.9 to 1.1).

At postseason, there was no difference in coach or player attitudes towards prevention responsibility. Both groups held the coach equally responsible (OR=0.5; 0.2 to 1.4), but players were more likely than coaches to think prevention was the player's responsibility at postseason (OR=7.4; 3.0 to 18.2). Randomisation group and adherence to the 11+ did not affect these relationships.

Table 3 The three injuries most commonly believed to be preventable, and prevention strategies suggested by participants (significant baseline differences between coaches and players indicated by ^ based on 95% CI; significant postseason differences between coaches and players indicated by § based on 95% CI. No significant within-group differences were found)

	Coach % (95% CI)			Player % (95% CI)		
	Whole sample (n=43)	Precomparison–postcomparison (n=29)		Whole sample (n=385)	Precomparison–postcomparison (n=258)	
	Baseline	Baseline	Postseason	Baseline	Baseline	Postseason
Muscle injury	**46.5 (31.6 to 61.4)**	**41.4 (23.5 to 59.3)**	**51.7 (33.5 to 69.9)**	**55.1 (50.1 to 60.1)**	**55.4 (49.3 to 61.5)**	**48.8 (42.7 to 54.9)**
Stretch	23.3 (10.7 to 35.9)	24.1 (8.5 to 39.7)	27.6 (11.3 to 43.9)	40.5 (35.6 to 45.4)	38.8 (32.9 to 44.8)	36.0 (30.1 to 41.9)
Strengthen	2.3 (0 to 6.8)	3.4 (0 to 10.0)	3.4 (0 to 10.0)	8.1 (5.4 to 10.8)	7.4 (4.2 to 10.6)	9.7 (6.1 to 13.3)
Warm-up	18.6 (7.0 to 30.2)	13.8 (1.3 to 26.4)	10.3 (0 to 21.4)	9.4 (6.5 to 12.3)	9.7 (6.1 to 13.3)	9.3 (5.8 to 12.8)
Equipment	0^	0	0	4.4 (2.4 to 6.5)	5.8 (3.0 to 8.7)	2.7 (0.7 to 4.7)
Technique	0^	0	0§	2.9 (1.2 to 4.6)	3.1 (1.0 to 5.2)	5.4 (2.6 to 8.2)
Other	2.3 (0 to 6.8)	0	10.3 (0 to 21.4)	9.6 (6.7 to 12.5)	11.2 (7.4 to 15.1)	8.5 (5.1 to 11.9)
Knee injury	**44.2 (29.4 to 59.0)**^	**41.4 (23.5 to 59.3)**	**51.7 (33.5 to 69.9)**§	**18.7 (14.8 to 22.6)**	**19.0 (14.2 to 23.8)**	**12.0 (8.0 to 16.0)**
Stretch	0^	0	0§	11.7 (8.5 to 14.9)	11.6 (7.7 to 15.5)	9.3 (5.8 to 12.8)
Strengthen	27.9 (14.5 to 41.3)	13.8 (1.3 to 26.4)	27.6 (11.3 to 43.9)	15.3 (11.7 to 18.9)	14.3 (10.0 to 18.6)	9.7 (6.1 to 13.3)
Warm-up	0^	0	0	4.2 (2.2 to 6.2)	4.7 (2.1 to 7.3)	1.2 (0 to 2.5)
Equipment	0	13.8 (1.3 to 26.4)	3.4 (0 to 10.0)	1.3 (0.2 to 2.4)	1.6 (0.1 to 3.1)	0.4 (0 to 1.2)
Technique	9.3 (0.6 to 18.0)	10.3 (0 to 21.4)	6.9 (0 to 16.1)	2.9 (1.2 to 4.6)	3.1 (1.0 to 5.2)	1.2 (0 to 2.5)
Other	7.0 (0 to 14.6)	3.4 (0 to 10.0)	13.8 (1.3 to 26.4)	5.2 (0.2 to 7.4)	4.3 (1.8 to 6.8)	3.1 (1.0 to 5.2)
Ankle injury	**25.6 (12.6 to 38.6)**	**20.7 (6.0 to 35.5)**	**27.6 (11.3 to 43.9)**	**28.8 (24.3 to 33.3)**	**31.4 (25.7 to 37.1)**	**29.1 (23.6 to 34.6)**
Stretch	2.3 (0 to 6.8) ^	3.4 (0 to 10.0)	6.9 (0 to 16.1)	16.4 (12.7 to 20.1)	18.2 (13.5 to 22.9)	18.2 (13.5 to 22.9)
Strengthen	11.6 (2.0 to 21.2)	13.8 (1.3 to 26.4)	10.3 (0 to 21.4)	7.8 (5.1 to 10.5)	9.7 (6.1 to 13.3)	10.9 (7.1 to 14.7)
Warm-up	0^	0	0§	4.2 (2.2 to 6.2)	4.7 (2.1 to 7.3)	4.3 (1.8 to 6.8)
Equipment	0^	0	0§	7.0 (4.5 to 9.6)	6.6 (3.6 to 9.6)	7.8 (4.5 to 11.1)
Technique	2.3 (0 to 6.8)	0	6.9 (0 to 16.1)	3.6 (1.7 to 5.5)	3.5 (1.3 to 5.7)	1.9 (0.2 to 3.6)
Other	9.3 (0.6 to 18.0)	3.4 (0 to 10.0)	3.4 (0 to 10.0)	7.0 (4.5 to 9.6)	6.6 (3.6 to 9.6)	6.2 (3.3 to 9.1)

Bold typeface values highlight the proportion believing that these types of injuries are preventable, whereas the non-bold text gives proportions endorsing various prevention strategies for those types of injuries.
Category 'other' includes rest, less aggressive behaviour, fitness.

Table 4 Beliefs about who is responsible for injury prevention (significant baseline differences between coaches and players indicated by ^ based on 95% CI; significant postseason differences between coaches and players indicated by § based on 95% CI. No significant within-group differences were found)

	Coach % (95% CI)			Player % (95% CI)		
	Whole sample (n=43)	Precomparison–postcomparison (n=29)		Whole sample (n=385)	Precomparison–postcomparison (n=258)	
	Baseline	Baseline	Postseason	Baseline	Baseline	Postseason
Who is responsible for injury prevention?						
Coach	93.0 (85.4 to 100)^	93.1 (83.9 to 100)	86.2 (73.7 to 98.8)	74.5 (70.2 to 78.9)	73.3 (67.9 to 78.7)	77.1 (72.0 to 82.2)
Players	90.7 (82.0 to 99.4)	89.7 (78.6 to 100)	69.0 (52.2 to 85.8)§	95.3 (93.2 to 97.4)	96.1 (93.7 to 98.5)	95.3 (92.7 to 97.9)
Parents	65.1 (50.9 to 79.4)^	62.1 (44.4 to 79.8)	55.2 (37.1 to 73.3)§	13.0 (9.6 to 16.4)	12.4 (8.4 to 16.4)	13.6 (9.4 to 17.8)
League or club administration	18.6 (7.0 to 30.2)^	17.2 (3.5 to 30.9)	20.7 (6.0 to 35.5)	4.7 (2.6 to 6.8)	3.9 (1.5 to 6.3)	5.4 (2.6 to 8.2)
Referee	16.3 (5.3 to 27.3)	13.8 (1.3 to 26.4)	17.2 (3.5 to 30.9)§	30.6 (26.0 to 35.2)	29.1 (23.6 to 34.6)	39.1 (33.2 to 45.1)
Medical personnel	7.0 (0 to 14.6)^	10.3 (0 to 21.4)	0§	36.6 (31.8 to 41.4)	38.0 (32.1 to 43.9)	28.3 (22.8 to 33.8)

Effect of intrinsic factors on adherence

For coaches, there was no significant effect of age group (OR=2.8; 0.4 to 18.5), tier (OR=1.1; 0.2 to 5.3), years of coaching (OR=1.0; 95% CI 0.9 to 1.1), 12-month personal injury history (OR=0.7; 0.3 to 1.6) or belief that injuries are preventable (OR=0.4; 0.1 to 3.7) on being in the upper tertile of adherence, after adjusting for cluster by team. For players, no effect of age group (OR=0.9; 0.6 to 1.4), tier (OR=1.7; 0.9 to 3.2), 12-month personal injury history (OR=0.9; 0.6 to 1.4) or belief that injuries are preventable (OR=0.7; 0.3 to 1.9) on high adherence was found.

Years of playing experience were negatively associated with high adherence for coaches (OR=0.93; 0.88 to 0.99) and players (OR=0.92; 0.85 to 0.98).

DISCUSSION

Coaches and players were accurate in their beliefs that knees and ankles are the most commonly injured body parts in soccer but, contrary to previous studies, there was no effect of personal factors (eg, age group, playing tier, injury history) on their overall injury prevention beliefs.[30 42] Short *et al*[42] examined the relationship between personal injury history and prevention beliefs in college soccer, and found that female players who had a history of injury reported greater risk perceptions than their uninjured peers. Conversely, those without a previous injury exhibited high confidence in their ability to avoid being injured.[42] Our finding that injury history and reporting an injury during the study were unrelated to risk beliefs could reflect age-related differences in prevention self-efficacy or risk perceptions. It could also be the result of social norming within the team, whereby the influence of peer or coach beliefs affects risk perceptions more than one's own experiences. Both of these possibilities bear further investigation in order to identify potentially modifiable factors to target with specific intervention delivery strategies.

Approximately 40–50% of coaches believed that knee injuries could be prevented at baseline and postseason, which is slightly lower than the 62% reported by Orr *et al*[17] in a sample of youth coaches from the same geographical area. However, fewer than 20% of players believed that knee injuries were preventable at baseline and postseason, which is considerably lower than the 46% reported in the Orr *et al*[17] study. Neither coaches nor players demonstrated a significant improvement in knee injury prevention beliefs after exposure to the FIFA 11+ programme. This suggests that the participants in our study were less aware of injury risk than their peers at baseline, and that the delivery strategies for the 11+ were insufficient for translating new injury risk information.[18 27]

Players most commonly endorsed stretching as a prevention strategy. In 1998, a study conducted in English professional soccer found that players believed poor flexibility or lack of stretching to be a risk factor for injury.[23] Despite evidence to the contrary,[43–45] our results suggest that this belief is still prevalent in the sport community, but not for coaches. Only a small proportion of coaches believed stretching would prevent injuries at baseline or postseason, indicating that coaches may have accurate beliefs about the value of stretching, but do not effectively transmit this knowledge to players. This indicates that current delivery strategies for the FIFA 11+ programme do not ensure that accurate evidence is mobilised to the target audience, nor do they effectively address incorrect or outdated prevention beliefs. This is one potential reason that uptake of the programme is low in community sport, and highlights the fact that basic knowledge dissemination is insufficient for changing established thought or action patterns.

Although 'inadequate warm-up' was identified as a risk factor by coaches and players, very few endorsed warming up as a strategy for reducing injuries. Postseason, significantly more players than coaches thought a poor warm-up was a risk factor, but there was no change in the proportions of coaches or players who identified warming up as a prevention technique, regardless of adherence to the FIFA 11+. The reason for this discrepancy is unclear, but it highlights the need for improved understanding of the rationale behind the 11+ in the soccer community. It also indicates that, although delivering prevention programmes through coaches may be the most feasible method of reaching a large group of community-based athletes, additional effort must be made to ensure that coaches are able to accurately translate information, beyond just the content of the intervention, to their teams.

The only personal factor associated with adherence to the 11+ programme was years of playing experience. It appears that the longer coaches and players have been active in soccer, the less likely they are to perform the 11+ at every training and match session. This could suggest either that more experienced individuals think the programme is only suited to novice teams, or that they feel more confident in making their own decisions about the best warm-up to do. FIFA 11+ delivery may therefore need to be tailored to the audience, and focusing on the potential performance benefits associated with the programme may

better appeal to more experienced players and coaches than an injury prevention message alone.[27 46]

Limitations

Participants were not asked directly about previous exposure to the FIFA 11+. It is unclear whether experience with the programme would have increased or decreased risk perceptions, but it is likely that risk awareness would be higher for these individuals, leading to an overestimation of baseline knowledge in our sample. Furthermore, it is possible that self-report beliefs were subject to social desirability bias, considering that the questionnaires were completed in a team setting.[47] All efforts were made to ensure that respondents had adequate privacy in which to complete the questionnaires, but we cannot account for potential under-reporting of risk perception or over-reporting of intention by athletes wishing to conform to social norms within the team. As data were collected as part of a larger injury prevention study, there was also a risk of selection bias. Teams may have chosen to participate in the larger study because of greater baseline injury risk perceptions, which might have inflated our baseline injury risk and prevention belief estimates and, consequently, limited changes between baseline and postseason. As adherence was collected at the team level, we were also unable to relate personal characteristics to individual adherence. Although it is reasonable to assume that all players in attendance at a team session participated in the team warm-up when it was performed, future studies should account for this objectively.

This study is also limited to adolescent female players in a competitive Canadian league, and therefore may not be generalisable to boys, younger or older athletes, different levels of play, different sports or those in other geographical areas.

Future directions

As adherence to the 11+ does not appear to depend on injury knowledge or beliefs on the part of either coaches or players, it is recommended that studies further examine coach and player motivations for engaging in injury prevention programmes.[28] Future studies should also correlate player views to those of their coaches, to account for the influence of coach beliefs on player beliefs, and subsequent team behaviour. It will also be important to understand the apparent discrepancy between believing that an inadequate warm-up is a risk factor for injury, but not believing that a warm-up can prevent injury. Moreover, direct exposure to the 11+ as it was delivered in this study appears to be insufficient for changing beliefs or behaviour over the course of one playing season. Different delivery strategies and longer follow-up periods may yield important information for improving FIFA 11+ uptake in community soccer.

CONCLUSIONS

This study has demonstrated substantial gaps in knowledge and beliefs in the female youth soccer community, particularly related to injury risk factors and effective prevention strategies, and these differ for coaches and players. Yet, these beliefs did not have significant effects on adherence to the FIFA 11+, suggesting that additional motivational factors should be considered. Moreover, personal characteristics such as injury history and exposure to an injury prevention intervention did not influence adherence, although it appears that greater playing experience leads to poorer programme uptake. This has important implications for the implementation of prevention programmes, and suggests a need for population-targeted strategies.

What are the new findings?

- There were different gaps in injury knowledge for coaches and female youth soccer players.
- Injury risk and prevention beliefs did not significantly influence adherence to the FIFA 11+ warm-up programme.
- Coaches and players with more years of experience were less likely to adhere to the FIFA 11+ programme.

How might it impact on clinical practice in the near future?

Delivery strategies for injury prevention programmes must be tailored to coach and player audiences to account for different baseline injury risk knowledge and prevention beliefs, as well as sport-playing experience.

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Competing interests None.

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Soccer Injury Prevention Study

Player Name: _____

Club & Team Name: _____

Date(dd/mm/yy): _____

Sport Injury Prevention Research Centre
UNIVERSITY OF CALGARY

This survey should take you approximately 10-15 minutes to complete. Please answer all questions thoughtfully and as accurately as possible. Please ask the research assistant present to answer any questions you may have.

SECTION A: Players Participation and Injury His tory.

Instructions: Please answer the following questions and provide brief details where appropriate.

Previous Soccer Playing History

1. For how many years have you been playing soccer?
   - ☐ This was my first season
   - ☐ 1 year ☐ 2 years ☐ 3 years ☐ 4 years ☐ 5 years ☐ greater than 5 years
     Please specify _____

2. Please indicate the highest level of play that you have **ever played in**?
   - ☐ Club → ☐ Tier I/Metro ☐ Tier 2/Gold ☐ Tier3/Silver ☐ Tier 4/Selects ☐ Tier 5/Bronze ☐ Tier 6
   - ☐ Provincial team
   - ☐ National team
   - ☐ Other, please specify_____

3. At which level of play did you play in **during the 2011 outdoor season**? *(indicate more than one if appropriate)*
   - ☐ Recreational or social league
   - ☐ Club → ☐ Tier I/Metro ☐ Tier 2/Gold ☐ Tier3/Silver ☐ Tier 4/Selects ☐ Tier 5/Bronze ☐ Tier 6
   - ☐ Provincial team
   - ☐ National team
   - ☐ Other, please specify_____

4. Approximately how many **hours of soccer** did you participate in during training and games per week during the 2011 outdoor season?

   ☐ 2 hours ☐ 3 hours ☐ 4 hours ☐ 5 hours ☐ 6 hours ☐ greater than 6 hours

   Please specify _____

5. Have you ever played in a soccer team that has used, or is currently using, a specific conditioning program at training sessions to **improve players' performance and/or fitness**?

   ☐ No

   ☐ Yes……..Please describe briefly _____

   _____

6. Have you ever played in a soccer team that has used, or is currently using, a specific conditioning program at training sessions to **reduce players' risk of injuries**?

   ☐ No

   ☐ Yes……..Please describe briefly _____

   _____

Previous Soccer <u>Injury</u> History

7. In the past 12 months, have you ever experienced a lower extremity injury (e.g. foot, ankle, calf, shin, knee, groin, thigh or hip) from playing soccer which **resulted in you not being able to participate in a <u>game or training session</u>**?

   ☐ No

   ☐ Yes……..Please describe to the best of your ability the following injury details.

   Approximate date of injury (month & year):_____

   Body part:_____

   Type of injury:_____

   How did it occur:_____

   How long were you unable to participate in soccer practice or games?_____

8. In the past 12 months, have you ever experienced a lower extremity injury (e.g. foot, ankle, calf, shin, knee, groin, thigh or hip) from playing soccer which **resulted in you not being able to attend <u>school or work</u> for at least one day**?

   ☐ No

   ☐ Yes…….. Please describe to the best of your ability the following injury details.

   Approximate date of injury (month & year):_____

   Bodypart:_____

   Type of injury:_____

   How did it occur:_____

   How long were you unable to attend work or school?_____

SECTION B: Players Beliefs and Attitudes

Section B of this survey asks you questions about your attitudes and feelings towards **completing a <u>20min soccer-specific balance, agility and strength training program with your team at every game and training session during the next soccer season</u>.**

The questions use a rating scale with 7 places. You need to circle the number that best describes what you think. For example, if you were asked to rate "The weather in Calgary" and you think it is "extremely good" then you would circle the *number 7*, like this:

The weather in Calgary is

Bad	1	2	3	4	5	6	(7)	**Good**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

Even though some of these questions might seem repetitive, please make sure you answer <u>all</u> the items – don't leave any out.
Only circle <u>one</u> number for each question
Please <u>do not</u> circle in between the numbers

1. Completing a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season would be *(circle one)*

Bad	1	2	3	4	5	6	7	**Good**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. Completing a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season will improve my physical skills such as balance, agility and strength *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Decreasing my risk of sustaining an injury would be *(circle one)*

Good	1	2	3	4	5	6	7	**Bad**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. When it comes to soccer, I want to do what my coach thinks I should do *(circle one)*

Agree	1	2	3	4	5	6	7	**Disagree**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Completing a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season would be *(circle one)*

Pleasant	1	2	3	4	5	6	7	**Unpleasant**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Completing a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season will be boring and repetitive *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

7. Improving my physical skills such as balance, agility and strength would be *(circle one)*

Good	1	2	3	4	5	6	7	**Bad**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

8. Completing a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season will reduce my risk of sustaining an injury *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

9. A boring and repetitive soccer-specific balance, agility and strength training program would be *(circle one)*

Good	1	2	3	4	5	6	7	**Bad**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

10. My coach thinks that *(circle one)*

I should	1	2	3	4	5	6	7	**should not**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

complete a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season

11. I expect to have fun with my team during the next soccer season *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

12. Most soccer teams complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the soccer season *(circle one)*

False	1	2	3	4	5	6	7	**True**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

13. My doctor or physiotherapist thinks that *(circle one)*

I should	1	2	3	4	5	6	7	**should not**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

complete a 20min soccer-specific balance, agility and strength training program with my team at every game and training session during this soccer season

14. I intend to complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the next soccer season. *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

15. When it comes to soccer, I want to do what my doctor or physiotherapist thinks I should do *(circle one)*

Agree	1	2	3	4	5	6	7	**Disagree**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

16. When it comes to soccer, how much do you want your team to be like other soccer teams *(circle one)*

Very much	1	2	3	4	5	6	7	**Not at all**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

17. Most high level soccer players complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the soccer season *(circle one)*

False	1	2	3	4	5	6	7	**True**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

18. When it comes to soccer, how much do you want to be like other high level soccer players *(circle one)*

Very much	1	2	3	4	5	6	7	**Not at all**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

19. Having fun with my team will enable me to complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the next soccer season. *(circle one)*

Disagree	1	2	3	4	5	6	7	**Agree**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

20. I expect I will sustain an injury sometime during the next soccer season *(circle one)*

Likely	1	2	3	4	5	6	7	**Unlikely**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

21. I anticipate that I will complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the next soccer season. *(circle one)*

Disagree	1	2	3	4	5	6	7	**Agree**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

22. Sustaining an injury will enable me to complete a 20min soccer-specific balance, agility and strength training program at every game and training session during the next soccer season. *(circle one)*

Disagree	1	2	3	4	5	6	7	**Agree**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

Please continue onto next page

SECTION C: Players' Knowledge of Injury Risk and Prevention.

1. In your opinion what is the **most common body region injured among** soccer players in general? *Indicate **one** only*

☐ head & face	☐ pelvis & hips	☐ hamstrings & thighs
☐ chest & abdomen	☐ shins & calves	☐ feet & hands
☐ shoulder & arms	☐ knees & ankles	☐ other…please specify _____

2. Do you believe female and male soccer players have the **same risk of injury** in soccer?

☐ No …Please explain your answer _____

_____

☐ Yes …Please explain your answer _____

_____

☐ Don't know …Please explain your answer _____

_____

3. Do you believe female and male soccer players sustain injuries to **similar body regions** in soccer?

☐ No …Please explain your answer _____

_____

☐ Yes …Please explain your answer _____

_____

☐ Don't know …Please explain your answer _____

_____

4. Do you believe female and male soccer players sustain injuries due to **through similar causes** in soccer?

☐ No …Please explain your answer _____

_____

☐ Yes …Please explain your answer _____

_____

☐ Don't know …Please explain your answer _____

_____

5. What are some of the factors that you think **may contribute** to a soccer player's risk of sustaining an injury? (tick up to 3 most important answers)

☐ Inadequate warm-up
☐ Lack of stretching/flexibility
☐ Poor muscle strength
☐ Lack of fitness or training
☐ Player's genetic background
☐ Aggression/ taking risks
☐ Body contact
☐ Lack of skill/poor technique
☐ other…please specify _____

6. Do you believe some soccer injuries are **preventable**?

☐ No …Please explain your answer_____

_____

☐ Yes … which injuries and what are some of the factors that you think **may help prevent** a soccer player's risk of sustaining an injury?

Preventable injury	**How it could be prevented**
1.	1.
2.	2.
3.	3.
4.	4.

☐ Don't know …Please explain your answer_____

_____

7. Who do you think are the people responsible for **preventing** a soccer player's risk of sustaining an injury? (tick up to 3 most important answers)

☐ Coaching staff
☐ Parents
☐ Soccer administration
☐ Players
☐ Doctors
☐ Physiotherapists
☐ Other medical professionals
☐ Referee
☐ other…please specify _____

8. What are some of the things that you **could do (or neglect to do) as a player that may contribute** to your risk of sustaining an injury? (tick up to 3 most important answers)

☐ Ensure I am fit
☐ Ensure adequate recovery/rest
☐ Complete a proper warm-up
☐ Focus on technique
☐ Strengthen muscles
☐ Stretch muscles
☐ Eat healthy
☐ Avoid taking risks
☐ other…please specify _____

SECTION D: Players feedback on the 11+ warm-up program

1. How did you learn about the 11 + warm-up program?
   - ☐ I've never heard about it
   - ☐ From my coach
   - ☐ From participation in this research study
   - ☐ From another source, *please describe* _____

2. Have you ever visited the 11 + warm-up program website?
   - ☐ Yes, only once
   - ☐ Yes, a few times
   - ☐ No, never

   If no, please describe your reason _____

3. On average, how many times a week did your team complete the 11+ warm-up program during the 2011 outdoor season before games and practices?
   - ☐ We never did the program
   - ☐ Less than once a week
   - ☐ Approx. once a week
   - ☐ Approx 2-3 times a week
   - ☐ More than 3 times a week

4. What are some of the things you ***did not*** like about doing the 11+ warm-up program with your team during the 2011 outdoor season before games and practices? *(tick as many as appropriate)*
   - ☐ We never did the 11+ warm-up program
   - ☐ Nothing, I really enjoyed the 11+ program
   - ☐ I didn't understand the reason for the exercises
   - ☐ We had limited time to practice other soccer skills
   - ☐ The exercises were too hard
   - ☐ The exercises were too easy
   - ☐ The exercises were boring
   - ☐ The exercises are not specific enough to soccer
   - ☐ Other, *please describe briefly* _____

5. What are some of the things you ***did*** like about doing the 11+ warm-up program with your team during the 2011 outdoor season before games and practices? *(tick as many as appropriate)*
   - ☐ We never did the 11+ warm-up program
   - ☐ Nothing, I really hated doing the 11+ program
   - ☐ Learning about some exercises that might decrease my chance of injury
   - ☐ Doing some exercises that are different to usual soccer practice
   - ☐ Doing a set warm-up with the same exercises in order each time
   - ☐ Feeling like I was getting better at doing the exercises
   - ☐ The challenge of doing the exercises
   - ☐ Getting an advantage over other soccer teams
   - ☐ Having a therapist complete the warm-up with the team
   - ☐ Other reason, *please describe briefly* _____

6. Is there any other comments or suggestions you would like to make about the 11+ warm-up program?

   _____

   _____

   _____

   _____

Thank you for your time in doing this survey