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Injury prevention for women and girls playing Australian Football: programme cocreation, dissemination and early adopter coach feedback

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ABSTRACT

Background Adherence to injury prevention programmes may improve with greater end-user involvement and application of implementation frameworks during development. We describe the cocreation, initial dissemination and feedback from programme early adopters (coaches), to develop the first evidence-informed injury prevention programme for women playing community Australian Football (Prep-to-Play).

Methods We used a pragmatic seven-step process for developing sports injury prevention programmes to (1) gain organisational support, (2) compile research evidence, (3) consult experts, (4) engage end-users, (5) test programme acceptability, (6) evaluate against theory and (7) gain early adopter feedback. All Australian Football-registered coaches of women's/girls' teams were sent a postseason survey to determine initial awareness, adoption and implementation (steps 5 and 6). Purposively selected coaches were invited to interviews/focus groups (step 7) to identify competency, organisational and leadership implementation drivers with a deductive thematic analysis applied.

Results Prep-to-Play was cocreated using previous efficacious programmes and expert input (steps 1–4), and disseminated via the national sporting organisation in preseason 2019 to all registered coaches (step 5). 343 coaches (90 women) completed the postseason survey and 22 coaches (5 women) participated in an interview (n=9) or focus group (n=13) (steps 6 and 7). 268 coaches (78%) were aware of Prep-to-Play. Of those aware, 218 (81%) had used (at least one element) Prep-to-Play, and 143 (53%) used it at least twice per week. Competency drivers included local expert-delivered face-to-face workshops complimented by online content and ongoing support. Organisational drivers included coach education integrated into existing league/club. Leadership drivers included compulsory injury prevention education integrated into coach reaccreditation processes or incentivisation via recognition (eg, professional development points).

Conclusions Cocreation and organisational support resulted in high programme awareness and adoption. However, high fidelity implementation and maintenance may need to be facilitated by competency, organisational

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Injury prevention programmes can be effective, but adherence is often poor. The processes used to develop injury prevention programmes are often poorly described, lack input from programme adopters and deliverers, and are not informed by theoretical frameworks.

⇒ Qualitative research typically evaluates barriers to programme use after a clinical trial, with limited opportunity to identify implementation 'drivers' and adapt the programme, or test proposed solutions to increase use.

WHAT THIS STUDY ADDS

⇒ This paper adds to the limited reports of codesign informed by theoretical frameworks in the sports injury prevention field. Prep-to-Play was cocreated for women and girls playing community Australian Football using a structured and pragmatic seven-step programme development process.

⇒ Feedback from early adopters informed modifications to Prep-to-Play and the design of an implementation strategy to be tested in a randomised controlled trial.

⇒ The combination of input from the sport's governing organisation, research evidence and theoretical frameworks, content and clinical experts, and end-users is unique in this field. This was critical to programme development and the dissemination of the Prep-to-Play by the Australian Football League, high rates of initial awareness among coaches and funding acquisition to evaluate its effectiveness.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The competency, organisational and leadership implementation drivers identified by Prep-to-Play early adopters will inform implementation strategies in future research, clinical practice and industry initiatives to increase use of sports injury prevention programmes.

and leadership drivers. Responsibility should be shared among all stakeholders.

INTRODUCTION

Women's participation in all football codes is increasing worldwide, following a rise in professionalism at the elite level.[1 2] The benefits of football participation for women can be offset by the higher risk of serious knee and head injury than for men,[3–5] with associated long-term health consequences such as knee osteoarthritis,[6] lower-limb functional deficits, poor quality of life[7–9] and persistent postconcussive symptoms.[10] The introduction of a national elite women's Australian Football League (AFLW) in 2017 led to a rapid increase in women and girls playing the uniquely Australian game for the first time, at all levels. Australian Football is physically demanding with high-speed running, cutting, collisions and tackling, with concussion and lower-limb injuries (particularly knee) priorities for injury prevention.[11 12] AFLW players have up to six times higher anterior cruciate ligament (ACL) injury risk,[13] compared with men playing elite AFL. Compared with other women's sport (eg, soccer, handball), AFLW players have 3–7 times higher risk of ACL injury.[13] An injury prevention programme specific to women and girls playing community Australian Football, and their support network (eg, coaches, club) was urgently required to mitigate injury risk and promote participation.

Exercise-based injury prevention programmes can reduce the risk of ACL injury by 40%–60%[14 15] and other lower-limb musculoskeletal injuries (eg, ankle, hamstring) by up to 30%[14 16] for women playing elite and subelite team ball sports. However, their uptake by players, coaches and organisations is often low outside of clinical trials.[17] Coaches are aware of the benefits of injury prevention programmes, but they lack the confidence, support and motivation to use them.[18 19] Players and coaches report the exercises are boring, irrelevant to football and take too much time.[18 20] These barriers are amplified by the infancy of women's Australian Football (ie, inexperienced players, coaches and administrators, with lack of women's specific resource allocation). Low programme uptake may be explained, at least partly, by the fact that few injury prevention programmes have employed social and behavioural theoretical frameworks to cocreate the content and delivery strategy with all stakeholders (eg, coaches, players, sporting bodies).[21] Engaging stakeholders to design acceptable and feasible programmes and delivery strategies[22] might bridge the gap from 'awareness and understanding' to 'adoption and implementation' (ie, behaviour change).

Barriers to uptake of sports injury prevention programmes are typically assessed after an intervention period in a clinical trial. However, this limits opportunities to identify implementation 'drivers' from applied experience, adapt the programme and test proposed solutions. To address this gap, we cocreated an injury prevention programme for women and girls playing community Australian Football (Prep-to-Play) using theoretical frameworks[23–27] and gained feedback from coach early adopters after 1 year of independently using Prep-to-Play.

Our objective is to describe how we pragmatically combined and applied components of previous sports injury prevention intervention development frameworks[23 27 28] to create Prep-to-Play. Using a seven-step programme development framework, our study aimed to:

1. Cocreate Prep-to-Play (steps 1–4).
2. Evaluate the acceptability of Prep-to-Play after initial dissemination (steps 5 and 6).
3. Gain early adopter (coach) feedback about their perspectives and experiences on how to increase uptake of Prep-to-Play (step 7).

Through this paper, we aim to provide a transparent report of the process (and associated challenges) of working collaboratively with a sporting organisation and programme end-users (ie, coaches as programme deliverers) to develop and implement an injury prevention programme and conduct high-quality and impactful research.

METHODS

The processes and research activities undertaken at each step of programme development are summarised in figure 1. The seven-step development process[27 28] aligns with stage 3 of the TRIPP (Translating Evidence into Sports Injury Prevention Practice) framework—'develop preventative measures'.[29] However, the TRIPP framework lacks specific guidance on how to develop and implement contextually relevant evidence-based prevention programmes. Our seven-step process was underpinned by Donaldson *et al*'s six-step sports injury prevention intervention development process, which operationalises TRIPP stage 3.[23] An additional step (step 1—gain organisational support) was added based on recommendations from Padua *et al*.[27] The research methodology and stakeholders involved in each step are outlined below, and the outputs of each step are described in the 'Results' section.

All qualitative aspects of this study comply with the Standards for Reporting Qualitative Research (online supplemental appendix 1).

Aim 1: cocreating Prep-to Play (steps 1–4)

Step 1 (gain organisational support)

We approached the AFL in 2017 to start an ACL injury prevention research programme following the announcement of the inaugural AFLW competition. We conducted a systematic review[14] to provide the AFL with the best available evidence (ie, from soccer studies) to reduce the risk of ACL (and all) injuries. Following the development and dissemination of an injury prevention programme for elite AFLW players in 2018 (Prep-to-Play PRO),[28 30–32]

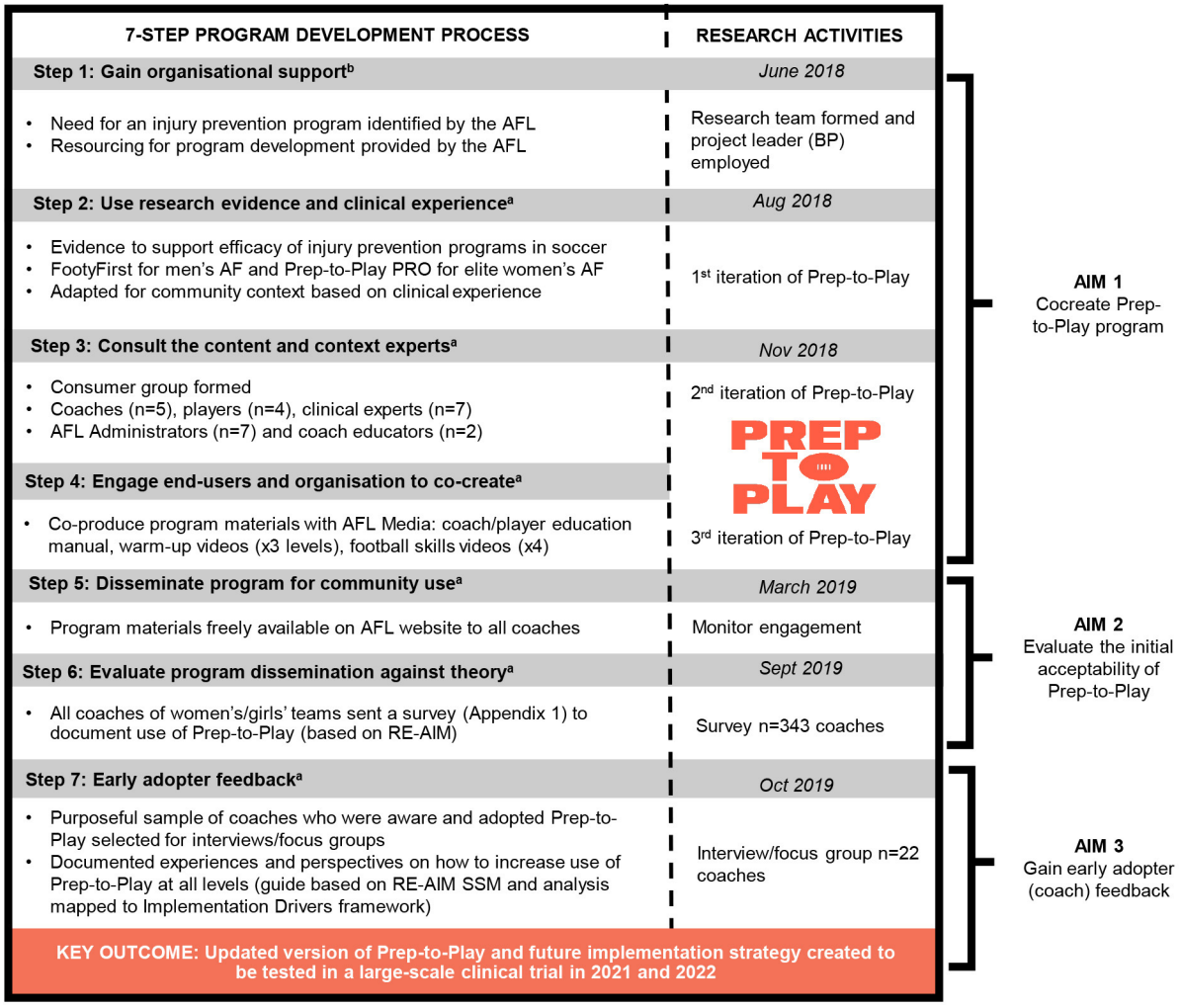

Figure 1 Seven-step Prep-to-Play development process adapted from [a]Donaldson *et al*[23] and [b]Padua *et al*.[27] AFL, Australian Football League; RE-AIM SSM, Reach Effectiveness Adoption Implementation Maintenance Sports Setting Matrix.

we gained AFL support to adapt Prep-to-Play PRO and develop a programme for community women and girls playing Australian Football.

Steps 2–4

Involved meetings and independent tasks for all stakeholders—the sporting organisation (the AFL, and associated league and club administrators), content and context experts (coaches, coach educators, injury prevention clinician researchers) and end-users (community coaches and players), to design and review programme iterations. Author BP kept a research notebook to document all activities. This interdisciplinary codesign approach aligns with existing intervention mapping frameworks.[33]

Step 2 (use research evidence and clinical experience)

We collated ACL injury prevention evidence in football[14] and other sports,[15 16 34–36] and used the clinical experience of the research team to inform the first iteration of an injury prevention programme for community women's Australian Football. The research team includes seven physiotherapists and a health promotion expert with experience in injury prevention programme design and delivery in team sports.

Step 3 (consult content and context experts)

In November 2018, we established a group of content and context experts: coaches (n=5), players (n=4), AFL coach educators (n=2, authors DR and JL) and AFL administrators (n=7) from the AFL Women's, AFL Health and Safety, AFL Community and AFL Victoria Coaching teams. Members of the research team (BP—AFLW player, MH—AFLW physiotherapist) were also context experts.

Step 4 (cocreate the programme)

We worked with the AFL Media team to produce and design the programme materials. End-users (community coaches, n=5; and community players, n=3) provided feedback on the programme exercise options, readability and format.

Aim 2: Evaluate the initial acceptability of Prep-to-Play (Step 5 & 6)

Step 5 (disseminate programme for community use)

The Prep-to-Play resources were uploaded to the AFL website coaches' resources page. A link to the resources was emailed to all AFL-registered coaches of women's and girls' teams (n=2810) and all football development managers (n=16) nationally, before the 2019 community football season (March 2019).

Step 6 (evaluate programme dissemination against theory)

After the 2019 season, we designed an online survey, underpinned by the Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework[26] that the AFL sent to all registered coaches of women's and girls' teams in Australia (n=2810, any age group/competition level), 6 months after Prep-to-Play programme dissemination (September 2019). The 10 min survey included 20 questions—12 demographic (optional); two awareness, 1 perceived effectiveness, 4 adoption/implementation and 1 future intention to use (online supplemental appendix 2).

Aim 3: early adopter (coach) feedback about their perspectives and experiences on how to increase uptake of Prep-to-Play (step 7)

Step 7 (early adopter coach feedback)

An interpretative descriptive approach[37] was used to document coaches' perspectives and experiences of adopting and adapting Prep-to-Play. The interpretive approach is appropriate as it (1) allowed the researchers (eg, BP) to draw on their technical knowledge (eg, coach), clinical and research background (physiotherapist and injury prevention research) and personal experiences (eg, player) to inform the most appropriate study questions and interpretation of data and (2) can inform practical ideas for influencing programme use among other teams, clubs and leagues.

Sampling and context:

25 coaches identified as early programme adopters (based on their survey responses in step 6), were purposively selected from the consenting survey respondents to ensure a sample of coaches that varied in coach age, gender, age group coached and geographical location. To be eligible for interviews/focus groups, coaches needed to report awareness and use of Prep-to-Play. These coaches were likely to have 'had a go' at using Prep-to-Play, consistent with the interpretative approach to solicit data from individuals knowledgeable about or experienced with the phenomenon of interest.[37]

The interview guide was informed by the RE-AIM Sports Setting Matrix RE-AIM framework,[26] which incorporates multiple socioecological levels of the sports delivery system crucial to driving widespread intervention implementation in community sport.[26] Coaches were asked to consider all levels of the system they operate in (eg, what the national organisation could do to increase reach, what a club could do to enhance adoption). The Implementation Drivers framework[24 25] has three key themes: (1) increasing end-user competency, (2) aligning with and building facilitative organisational systems and (3) developing leadership drivers. The interviewer used prompts for competency, organisational or leadership implementation drivers as appropriate.[24 25] For example, for 'drivers' of 'adoption', coaches were asked who or what might convince them (or the players or the club) to start using Prep-to-Play, with prompts about the different types of training, support, processes or policy they have experienced or could be provided at an individual, team, club, organisational or community level (online supplemental appendix 3).

Data collection:

The focus groups were conducted first, followed by interviews which were designed to (1) increase diversity among participants (age, gender, region) and (2) explore topics not covered in depth in the focus groups. The interviewer (AD) directed questions to less explored areas (eg, drivers for maintenance) and reduced exploration of saturated topics (eg, all focus group participants and the first few interviewees agreed the programme resources, were well tailored and based on evidence). Some new ideas were raised, and interviews continued until data saturation. The focus groups were completed face-to-face and interviews via ZOOM, and facilitated by a male, health promotion researcher (AD), experienced in sports injury prevention intervention implementation qualitative research. No coaches had any relation to AD beforehand. On average, the interviews and focus groups lasted 55 min (range 42–66 min) and 93 min (range 92–95 min), respectively. Audio recordings were transcribed and deidentified, using a secure online transcription service (Transcription Australia). Participants were sent a copy of the transcripts for review, with opportunity to add more information or edit what they said.

Data analysis:

Three independent reviewers (BP, AB and AD) analysed the data using a thematic deductive approach applying the predefined implementation driver categories[24 25] (figure 2). Author BP began by reading all transcripts to determine if the themes could be coded to the framework. A constructivist perspective and semantic approach was taken to coding, to acknowledge the active role the authors had in deciding what constitutes data, and considerations of how the data are articulated in the context of community women's Australian Football. While the analysis was deductive, if a quote did not fit with the predefined codes, an inductive approach was overlaid and new codes were permitted. The category definitions were refined (BP, AB and AD) to create the final coding structure. Two reviewers (BP and AB) coded three transcripts independently, before meeting to assess agreement and develop consensus on the final structure. Reviewer BP used the final structure to code

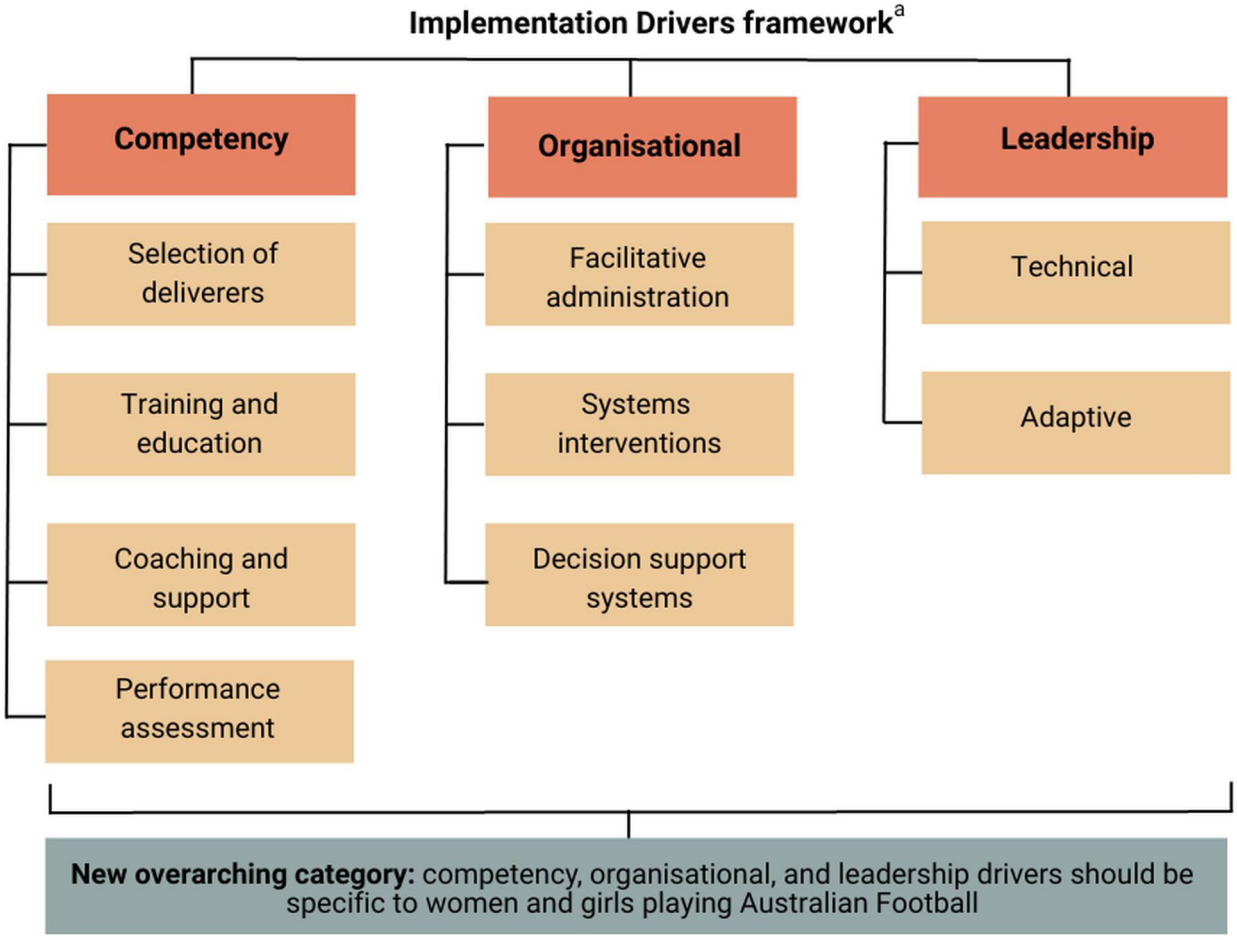

Figure 2 Implementation drivers coding structure. [a]Adapted from Fixsen *et al*[25] and Donaldson *et al*[24] . Competency drivers relate to selection, training, coaching support and performance assessment (eg, activities to increase coach capacity); Organisational drivers relate to facilitative administration (eg, club communication processes), systems interventions (eg, aligning with umpiring) and decision support systems (eg, feedback on intervention effectiveness). Leadership drivers are technical (eg, coaching director providing learning opportunities) or adaptive (eg, club culture). The codebook and definitions for each of the nine categories are in online supplemental appendix 4.

all remaining transcripts. Direct quotes that best aligned with the implementation driver categories and participant consensus were chosen to report, as well as opposing viewpoints. Data were organised by using NVivo V.10.0 (QSR International, 2014).

RESULTS

Aim 1: cocreating Prep-to Play (steps 1–4)

Step 1: gain organisational support

The AFL considered designing and implementing an evidence-informed injury prevention programme in community women's Australian Football to be an organisational priority. The AFL and La Trobe University cofunded a project coordinator (BP) for 6 months to lead the programme development. The AFL Chief Executive Officer, AFL Head of Women's Football, and AFL Head of Health and Safety allocated resources and reviewed and approved the end-products. Weekly meetings (BP and MH) with AFL coach educators (DR and JL) and monthly meetings with AFL administrators were held throughout steps 1–4 to provide project governance, expertise, advice and administrative support specific to community women's Australian Football (eg, optimal coach education formats, communication channels). Buy-in at all levels of the AFL organisation was gained by emphasising both injury prevention benefits, and how Prep-to-Play aligned with other objectives for the AFL Coaching (eg, performance improvement) and Community departments (eg, parent marketing and participation, duty of care)

Step 2: use research evidence and clinical experience

The first iteration of Prep-to-Play was informed by Prep-to-Play PRO[28 31 32] and other programmes known to reduce lower-limb musculoskeletal injuries (eg, ACL, ankle) in women's team sport.[14–16 34–36] Prep-to-Play PRO was the foundation programme to be adapted for community teams, with some features needing modification for the community context. For example, gym-based strengthening activities, while appropriate in the elite football context, are not feasible for non-professional community players and coaches, with minimal medical

or other support staff and limited access to equipment. Similarly, Prep-to-Play PRO is a set of recommendations for the types of activities AFLW high performance/medical staff could design to suit their needs, equipment and resourcing, but our clinical experience and advisory group (figure 1) recommended a more prescriptive and 'recipe-based' programme for coaches and players in community women's and girls' Australian Football.

Common ACL injury mechanisms in the AFLW[38] and women's soccer[39] informed the warm-up activities, which focused on deceleration, change of direction and single-leg landings (with and without contact/perturbations).[38] Sprinting and single-leg balance were included to reduce soft tissue[40] and ankle injuries,[14 41] respectively. The three strength exercises (quadriceps, hamstring/gluteal, core/hip) were informed by previous injury prevention programmes known to reduce all types of lower-limb injuries.[14–16 34–36] Neuromuscular warm-up programmes can reduce concussion in boys playing rugby,[42] but no evidence existed in Australian Football, or in any womens' or girl's sport. Therefore, expert knowledge of the concussion injury mechanisms, and input from the content and context experts informed the programme content for football contact skills. Members of the research team (BP, MH) with personal AFLW experience (player, physiotherapist) created the first iteration of the Prep-to-Play for review by the content and context experts (figure 1).

Step 3: consult the content and context experts

Content and context experts across multiple socioecological levels of the system contributed to the second iteration of Prep-to-Play (figure 1). Coach educators from the AFL (n=3, 6 meetings) and elite AFL coaches (n=5, 2 meetings) provided technical input on the football contact skills, and feedback on the acceptability of the warm-up and strength programme from a community coach's perspective. They reviewed the draft programme from step 2 (based on Prep-to-Play PRO and other evidenced-based programmes) and agreed the community programme needed to be more 'recipe'-based and prescriptive, but with variations and optional extras if the team had time. They suggested the exercises should better mimic game situations (eg, jump off one leg with run up rather than stationary double leg vertical jump, change of direction with ball in hand/dodging other players). An iterative process continued until consensus was reached among the research team (BP, MH and KC) and coach educators about the warm-up (including strength exercises), football contact skills and associated education (eg, technique cues). An idea for an educational video was conceived about the 'duty of care' that coaches have to teach players safer contact and use appropriate language about contact (eg, 'a good tackle is a safe tackle' vs applauding unsafe practices as courageous). The football experts were integral to ensuring that the programme was relevant to, and did not compromise, football performance (eg, movement cues to benefit tackle execution), and did not induce fear among coaches or players. Other clinical experts (SMC, AM, AB and CJB) provided input on the warm-up and education. The AFL Health and Safety, and AFL Community team reviewed the second iteration of Prep-to-Play and provided funding to create the programme materials.

Step 4: engage end-users and organisation to cocreate

Expert clinician researchers (BP, MH and KC) and coach educators (DR and JL) directed professional filming and photography of the programme in December 2018, ensuring correct technique and appropriate cues were used. Elite junior players (n=15, aged 16–17) demonstrated the warm-up and strength exercises, and expert coaches (n=3) directed football-specific contact skills. BP and MH curated the programme resources (coach/player manuals, posters and videos). These were edited by the AFL media team to align with AFL branding style to maximise credibility, appeal and readability. The AFL Health and Safety (n=2), community (n=2), community coaches (n=5) and players (n=3) provided feedback on the exercise options, readability and format. The third iteration of Prep-to-Play was agreed upon and ready for dissemination in February 2019. The AFL Chief Executive Officer, AFL Head of Women's Football, and AFL Head of Health and Safety approved the end-products.

Prep-to-Play included (1) a dynamic training warm-up incorporating strength exercises (20 min), (2) an abbreviated game-day warm-up (10 min), (3) football-specific contact skills and (4) education (eg, programme rationale, technique, how to progress). The warm-up and strength exercises had prescribed sets and repetitions, with three progressive levels of difficulty. The football-specific contact skills included techniques and drill progressions for tackling, being tackled and aerial and ground balls contests. The resources uploaded to the AFL website included a coach manual, a player manual, a duty of care video and three videos and posters for the warm-up and strength exercises (foundation, development and advanced levels).

Aim 2: Evaluate the initial acceptability of Prep to Play (Step 5 & 6)

Of the 2810 registered coaches of women's or girls' teams, 343 (12%) completed the survey after the 2019 season. Of the 268 (78%) coaches who were aware of Prep-to-Play, 218 (81%) had used at least one element of Prep-to-Play (table 1). The top three mechanisms by which coaches had become aware of Prep-to-Play were via an email from the AFL (53%), promotion at a coaching forum (11%) and word-of-mouth from another coach (8%). Of those unaware of Prep-to-Play (n=75), 47% used a self-designed injury prevention programme and 53% were not using a programme.

The coaches were aged 18–74 (73% male, 26% women, 1% other). Most (62%) had played community Australian Football, 27% had played at state or national level, while 11% had no playing experience. Most (70%)

Table 1 Coach survey results

RE-AIM domain	Definition	No (%) of all respondents (n=343)	No (%) of those aware (n=268)
Reach	Aware of Prep-to-Play before survey	268 (78)	-
	Viewed online resources	235 (69)	235 (88)
Effectiveness	Thought injury risk would decrease if they used Prep-to-Play	193 (56)	193 (72)
Adoption and Implementation	Used at least one element of Prep-to Play*	218 (64)	218 (81)
	Using warm-up (including strength exercises)	206 (60)	206 (77)
	Using football-specific contact skills	181 (53)	181 (68)
	Provided education	151 (44)	151 (56)
	Using warm-up/strength exercises≥twice per week	142 (41)	142 (53)
Maintenance	Intend to use Prep-to-Play in the future (ie, 2020)	315 (92)	252 (94)

*Used at least one of element of Prep-to-Play: (1) warm-up/strength, (2) football-specific skills or (3) education about Prep-to-Play (verbal or provided programme posters/videos).

coaches had level 1 accreditation (the most basic of 3 levels), and 60% had a tertiary and/or postgraduate level of education. The majority (72%) had less than 3 years experience coaching women's Australian Football (mean±SD: 2.2±0.9 years). Respondents were mostly head coaches (73%) of a community team (87% community, 11% state, 1% national, 1% social), based in metropolitan (70%), regional (23%) or rural areas (7%). Most were Victorian-based (53%), but all eight Australian states and territories were represented. One-third (33%) were coaches of senior (open-age) teams, while others were coaching U18 (22%), U15 (27%), U13 (14%) and Masters/social (4%) teams.

Aim 3: early adopter (coach) feedback about their perspectives and experiences on how to increase uptake of Prep-to-Play (step 7)

Qualitative interviews and focus groups: participants

Of the 343 survey respondents, 234 consented to be contacted for an interview. Of the 25 purposively selected coaches, 24 agreed to participate (2 of whom did not attend their allocated focus group). Data were collected from 22 coaches (October–November 2019) via 2 focus groups (n=6, n=7) and 9 semistructured interviews. Of the 22 coaches (aged 35–64; 2.5±0.9 years of coaching women's Australian Football), 5 (22%) were women and 10 (45%) coached senior women (12 (55%) coached junior girls ranging from U13 to U18). All eight Australian states and territories were represented (64% Victoria) and 31% of coaches were in regional/rural areas.

Qualitative interviews and focus groups: thematic analysis

All relevant quotes were mapped to the existing nine implementation driver categories (figure 2). A tenth, new category ('Women's Australian Football specific') was overarching to all competency (table 2), organisational (table 3) and leadership drivers (table 4). Minor adjustments were made to the nine existing category definitions to improve clarity. Within the competency category, the theme of 'selection of deliverers' had two subthemes (selecting coaches with capacity and sharing responsibility) and the training and education theme had four subthemes (what, who, when, how to deliver) (table 2). No subthemes were created for the other categories. Although the interview guide focused on identifying implementation drivers, some barriers emerged throughout the discussion and are included in the results tables. An extended list of quotes is in online supplemental appendix 5.

Competency drivers

Selection of deliverers

Coaches agreed responsibility for Prep-to-Play delivery should be shared among coaches, players and the club. Delivery by players may provide opportunities for leadership and empowerment, and reduce known barriers of burden on volunteer coaches and time constraints. Enlisting clubs or leagues to provide the programme resources and recommend use may enhance buy-in, especially from coaches who lack motivation to change their current practice. There was a lack of perceived capability to deliver among coaches, despite the online resources being clear and informative. Programme designers should emphasise that end-users do not need to be healthcare professionals to deliver, but some coaches may need face-to-face support by experts.

Training and education

Coaches reported more training and education is required to increase the competency of some coaches, and provide the confidence, knowledge and skills to adopt Prep-to-Play and implement it as prescribed. Coaches agreed that

Table 2 Competency drivers and barriers to Prep-to-Play use

	Quotes	Summary
Selection of deliverers		
Selecting coaches with the capacity and motivation to deliver	▶ When I was doing my AFL Level 2, to not use a program such as that with female footy players, it was almost negligent. Coaches will say "I'm not a fitness trainer. I can't run that.' But when you read the manual it's self-explanatory. (*P8, W*) ▶ I'm not a fitness and conditioning person. But I felt confident that I could explain the drill, watch the drill, correct performance. I thought Prep-to-Play was fine from that perspective. (*P4, M*) ▶ I know some of our coaches would say 'give me the plan, I'm happy to follow it' whereas [others] are like 'well, no, I'm very tactically focused. I know what I'm doing. I've been doing it for years.' (*P6, M*) ▶ 'The distinction needs to be made between having a male and female footy background. Very few coaches of women have the skills to teach the fundamentals, because they haven't had to. Which I think is one of the wonderful things about coaching women, is that you can teach them.' (P13, M).	▶ Motivated by a duty of care ▶ Barrier: lack of perceived ability ▶ Don't need expertise to deliver Prep-to-Play and current program is easy to follow ▶ Important to consider female-specific coaching style Ongoing barrier: willingness to change
Coaches can share responsibility	▶ It should be player-directed; your captain, rather than the coach. It's part of getting ready to play. (*P7, M*) ▶ Let's not ignore the parents. We're talking duty of care; if you've got an arrogant coach that's not embracing it that's going to stop my child getting injured, your stakeholders have to be parents. (*P11, M*) ▶ Get all the coaches at the club to get on board; otherwise, they feel like stuff's being rammed down their throats, and they don't have enough time. (*P15, M*)	▶ Coaches share role with: – Players (may not be appropriate for younger age-groups) – Difficulty with parent engagement ▶ Club-wide approach
Training and education		
What should the programme, education and training contain?	▶ Aside from the injury benefits. It's just a benefit to have a structure that you make it routine. (*P15, M*) ▶ If you want to show value, base it on elite players, they're doing it, but scale it for your group. (*P18, M*) ▶ If you aren't transparent about the injury risks, then you're not going to get them to do anything. It takes some fear out of people if they know why, and what the outcomes could be. (*P3, W*) ▶ They lack the skill of how to be tackled, how to jump and land. (*P10, M*) ▶ I had three girls in hospital that were knocked out; and somebody from the league said, 'Aren't you teaching these girls how to fall?' and I said, 'Yeah, as well as trying to teach them to kick, to mark, to handball, to tackle, all the things.' Something like this, if I'd had that three years ago, it would have been such a help. (*P12, M*) ▶ It helps me with my players, gives them some specific to do. They appreciate there are people thinking about their experience of football they are being valued as participants with unique needs. (*P4*, M)	▶ Prep-to-Play should be condensed, more structured and prescriptive ▶ Based on elite programs but tailored to community and female needs ▶ Education: why, other benefits, risk without fear ▶ Jump, land, agility and falling activities ▶ Contact skills (eg, tackling) due to lack of exposure and for coach buy-in ▶ Barriers: time, competing with skill training
Who should deliver the education and training?	▶ Physios are good advocates; we listen to them about making our players stronger and faster and more resilient to injuries, or strength and conditioning people. (*P4, M*) ▶ Experts who are more local…they're more likely to have an interest. (*P1, M*) ▶ The fact that it's coming from the AFL is enough. I listened a bit more when the physiotherapist from the state team said 'this is what we're doing to try and prevent injuries' (*P2, W*) ▶ The women and the coaches are the resource. There's 3 or 4 women in our team who have the skillset if you gave them a few hours of training and said, 'Go visit three or four clubs', they'll want to see you; they'll see that you're a grassroots footballer who's learnt this. They'd do it. (*P17, M*) ▶ Not AFL when you're dealing with local clubs…the gap is massive (*P1, M*)	▶ Local external experts, physiotherapists, sport science professionals or students, elite coaches/players ▶ Credible/endorsed by AFL or their league ▶ Opposing views for elite vs 'someone like me' educators ▶ If cost/willingness to pay is a barrier, club level experts and self-education

Continued

Table 2 Continued

	Quotes	Summary
When should education and training be delivered?	► At the start of every season the league run an induction program for new volunteers coming into clubs… that would be a very good place to promote Prep-to-Play. (*P2, W*) ► There's a lot of info, staggered it with warm-ups in pre-season and skills in-season. (*P10, M*) ► Get the newer coaches into it early, they want all the help they can get. (*P18, M*) ► I like the idea of online accreditation, with video examples of technique. (*P2, W*)	► Pre-season with reinforcement in-season ► Staggered feed of information ► Early in learning journey at club (induction) or organisation level (accreditation)
How should education and training be delivered?	► A two, three hour program, a bit of theory and then go out and use a group to practise teaching. Firsthand experience of watching somebody else teach it was invaluable for me. (*P2, W*) ► Less tell and more show. As much as I try and watch the videos, I don't feel confident enough. (*P10, M*) ► The posters you can download and print out are great. I doubt anyone will print them off. Supply those posters to the clubs…in hard copy laminated format, as a pack or kit. (*P6, M*) ► The way to do it is webinars. People ask questions from the safety of their own home, actively discuss and you'll get a much better uptake. (*P1, M*) ► A Prep-to-Play app that keeps things updated and testimonials or ways to use it. (*P3, W*) ► Anything on social media. It needs to be interesting, catch their awareness. (*P20, M*)	► Face-to-face training and hard copy resources ► At club or league level – emails, chat groups ► More practical, less theory ► Alternatives for accessibility—webinars, online, apps, social media
Coaching and support		
Support and mentoring for coaches	► With coaching coordinating, every 4 to 6 weeks, we run a coaching network. It's not about me saying, 'Right, you should be doing this…' They can input and discuss…you get some really rich discussion. That's often how you can get coaches to start changing from those old school ways. (*P8, W*) ► Our league had a coaches shed. They invited all the female teams' coaches. We're all bouncing ideas off each other. To have like-minded people together might be a great idea. (*P19, M*) ► All of us in this room here are really keen on the Prep-to-Play, why aren't we the ambassadors to other clubs? If we're confident enough to do this with our own girls, why can't we be confident enough to show others (*P17, M*)	► Important to get feedback and ideas ► Support from external or internal experts ► Coach-to-coach peer support, mentoring ► Female-specific coach networking Barrier- can be lack of support from the club ► Barrier—time to attend additional events
Performance assessment		
Actual performance assessment	► Trained up physios that would come, and monitor what they're doing, but also reinstating the necessary components of the program and giving them some ideas. (*P8, W*) ► If I put my marketing hat on. Coaches love accreditation so if there a Prep-to-Play workshop, you come along, you demonstrate you know how to utilise the tools or there's some way that you tick off from a club point of view. I'd love to be able to say 'all our female coaches are Prep-to-Play accredited.' (*P6, M*)	► Competency assessment important for coaches ► Strong agreement on integration of Prep-to-Play into accreditation process for coaches and clubs

Table 3 Organisational drivers and barriers to Prep-to-Play use

	Quotes	Summary
Facilitative administration		
Processes and procedures to enhance awareness/uptake	► The new AFL coaching website (Coach AFL) have been putting out good information. I'm aware of Prep-to-Play through that. They could put out more direct to coaches through CoachAFL. (*P12, M*) ► It needs to be promoted from AFL Victoria, then distributed through to your leagues, and then your leagues should be then distributing it through to all the clubs; and then the clubs should distribute it to all the coaches. (*P7, M*) ► Get the coach coordinators. For interested coaches, that's a key way of spreading the news. (*P11, M*) ► Short sharp testimonials from recognisable people is a good way to disseminate to time-poor people. (*P3, W*)	► All levels of the system are required to facilitate dissemination: – National coaching department – State coaching department – League administrators – Club coaching coordinators
Systems interventions		
Alignment with external systems to enhance awareness and uptake	► They get a lot from media. Because a lot of coaches are male, they'll get a piece of information from AFL 360 or On the Coach. Which, for coaching community female footballers is useless. (*P3, W*) ► There is another variable, and that's the umpiring. You can talk about reducing injuries by 50% but our umpires just don't protect women's heads. (*P15, M*) ► A lot play in school football competitions, so it would be finding out who is the head of that and trying to get Prep-to-Play a part of their set up as well. (*P5, M*) ► They could reach out to university students in the first instance who are studying sports science, as part of their practicum. One student goes out to 10 clubs to make it more embedded in a coach's session. (*P3, W*)	► Align with media to promote programme ► Align with umpiring—coaches blame adjudication for injuries ► Implement in school football ► Engage tertiary students for support
Decision support systems		
Feedback on programme use or impact (eg, injury rates) to enhance awareness and uptake	► I convinced the league here to start an injury audit. In year one, the major injuries were shoulder, upper body, head, and concussions. So, they embedded ground ball and tackling technique in pre-season coach education. The following season, it (injury rates) plummeted. (*P3, W*) ► The way you get people to adopt different things is by providing proof through research or coach experience. (*P8, W*) ► I mean, not getting injured is a hard thing to notice. Shortening in the feedback loop and say, "Look, if you can do a plank for 2-minutes, as opposed to 30 seconds". (*P4, M*) ► Most players wouldn't care about the stats, but it's the stories. (*P17, M*) ► General observations by the coach of reduced injury across a season compared to other seasons. Proof in the pudding enough for them. But it's probably unrealistic to get them to measure. (*P8, W*) ► Team managers have to enter the scores online, comments about injuries would be a good place to put that. (*P18, M*)	► Injury surveillance to compare within age group and region, and implement specific strategies based on the injury profile ► Coaches and players are not just motivated by injury data. Stories and other measures of impact (eg, players getting stronger) are valued ► Barrier: Community coaches have limited capacity to contribute to data

Table 4 Leadership drivers and barriers to use of Prep-to-Play

	Quotes	Summary
Adaptive		
Provide strategic and managerial leadership to enhance awareness and uptake	► If it comes from AFL, as the duty of care of coaching women, that's intimidating for coaches. (*P8, woman*) ► The fact that they're researchers and they're AFL branded, helped me to get it up with the playing group and other coaches. To say 'look, this is what we're going to do'. It has been really helpful to show the commitment. It's not just something that I did when I was a 16-year-old and now I'm making you do it. This is modern. This is relevant. (*P4, M*) ► If they (league) have one conference specific to women's footy each year and all coaches have to attend and you did a Prep-to-Play session there, you will have everyone in the same room. (*P10, M*) ► From my other sports coaching accreditation there is an expectation that you must accrue a certain number of points… so that's a way of offering people incentive to learn about it. (*P8, woman*) ► Our involvement was all part of us wanting to be seen in the parents' and players' eyes and the broader local football community as being driven to put together the best program for girls. (*P6, M*) ► We just do it as a club (pay for experts) to get people who are experts in their field. (*P10, M*) ► AFLW Player ambassadors for Prep-to-Play can link the players, especially the teenage girls. (*P20, M*) ► One or two coach ambassadors to talk to other coaches and say 'this is what is working' (*P10, M*)	► National, state and local level organisational endorsement ► Club culture and expectations about duty of care ► Resource allocation to support coach education: – Female-specific league coaches' seminar – Club coaching directors and local experts ► Provide incentives/motivation (eg, accreditation points, compulsory seminars) ► Ambassadors to enhance credibility and player buy-in
Technical		
Provide technical leadership to enhance competency and uptake	► I know they have put mentors in each area to observe coaches, they get paid a little bit, but you don't see them around that much really. It is hard. Resources is one of the biggest things. *Senior's coach (P14, M*) ► Having a coaching coordinator that's got the time to implement a program… I employed a coaching coordinator, and he was paid. But that's his job. (*P21, M*) ► Prep-to-Play should be a compulsory module in all coach education now, not just online and leave it to people to just find it. (*P3, woman*) ► The AFL regions/leagues now conduct a lot of female footy course. I think that would be a really good way of getting it through. It should be a requirement of all coaches. (*P8, woman*)	► Preseason leagues/club seminars/ meetings ► Compulsory coach accreditation module ► Ongoing support from internal/ external ► Barrier: limited by resources at all levels

the programme content needed to be condensed (less options) and the priority exercises should be jumping, landing, agility, contact, tackling and falling. There were opposing views on the format (who, when and how) of injury prevention education and support. Some participants reported online webinars, apps and social media are best for access and reach, and the programme is self-explanatory and easy to follow (even for non-experts). Others stated that, although they can watch videos, they 'don't feel confident to deliver', 'I am not a fitness person', 'it needs to be shown' and recommended including a practical workshop at club or league events early in the season or for new volunteers. Most coaches thought 'experts' (eg, physiotherapists, medical professionals) would be best placed to provide injury prevention training and education. Some coach early adopters believed the 'women players and the coaches are the resource' with the capabilities to educate and support other coaches and players, especially if paying experts is a barrier.

Coaching and support

Coaches agreed peer-to-peer networking would be most valuable to share training strategy experiences and ideas (including injury prevention). Some participants believed they (early adopters who were 'really keen on the Prep-to-Play programme') could be champions or ambassadors to other coaches.

Performance assessment

Coaches believed competency assessment would help optimise adherence to exercise dosage and technique, and provide them with ideas about how they could integrate Prep-to-Play activities into their training structure, level of competition and player abilities.

Organisational drivers

Facilitative administration

Coaches get their injury prevention information from a range of sources (eg, media, club, league, the AFL). Aligning the dissemination of Prep-to-Play with existing communication processes and channels (ie, emails, social media) from national, state, league and/or club administrators was reported as a way to increase reach and adoption. Aligning Prep-to-Play education opportunities with existing (and often compulsory) league/club seminars could enhance maintenance and increase reach to new coaches.

Systems interventions

Three key external stakeholders were highlighted by coaches as having the potential to influence elements of RE-AIM—the media, the education system and umpiring. Ideas included promoting Prep-to-Play in mainstream sports media, and embedding Prep-to-Play in high school sport/physical education, and using tertiary student placements to provide clubs with Prep-to-Play support. Coaches thought community umpires also have a role to reinforce safe skill execution (eg, tackling).

Decision support systems

Coaches were divided on the usefulness of injury or compliance audits to motivate end-users to adopt and/or maintain using Prep-to-Play. They suggested education and/or assessment should focus on other potential benefits (eg, improved performance, looking organised, social and leadership opportunities for the players). However, some coaches did report data on reduced injuries, or improved movement competency or strength could reinforce coaches/players to use Prep-to-Play.

Leadership drivers

Adaptive leadership

Coaches agreed a Prep-to-Play module or workshop could be a compulsory (or incentivised) part of AFL coach accreditation. Incentives could include an AFL 'club tick of approval' if all their coaches are Prep-to-Play accredited, Clubs could use this to market to parents, or in club funding applications (to local government or health promotion agencies). Coaches agreed ambassadors would increase reach and adoption, and some could assist with implementation, but they varied in who they considered the ideal ambassador (eg, elite players/coaches vs community-level champions).

Technical leadership

Coaches suggested funding to employ club coaching directors or mentor/development coaches at an organisational (AFL or league) level to support coaches to implement injury prevention programmes.

New overarching category (figure 1): Coaches highlighted that a strength of Prep-to-Play was the specificity of the programme content to women and girls playing Australian Football, as they have unique needs, particularly in the current context of inexperienced players, coaches and administrators. They emphasised that future delivery strategies that target competency, organisational and leadership drivers should be specific to women and girls.

Discussion

This study describes the cocreation, initial dissemination and evaluation of an injury prevention programme for women's community Australian Football players (Prep-to-Play). The online dissemination of the Prep-to-Play resources to community coaches in 2019 offered a unique opportunity to evaluate the dissemination after one season, and to gain feedback from real-world early adopters (coaches).[43] This comprehensive process is unique to the sports injury prevention field; applying a systematic and pragmatic seven-step programme development framework,[23 27 31] integrated with an implementation drivers framework,[24 25] the RE-AIM SSM[26] and input from end-users and the sport's governing organisation (AFL). Evaluation revealed a high rate of initial awareness of Prep-to-Play (78%) and adoption (81% of those aware) among coaches, but lower rates (53%) of adherence to the twice weekly recommendation. This highlights the importance of both continuing and improving dissemination efforts, while also addressing the identify potential implementation drivers and barriers, to support future implementation efforts (ie, to translate awareness into adoption and adoption into implementation). These identified drivers could be addressed in future research, clinical practice and industry initiatives to increase use of sports injury prevention programmes.

Successes and lessons learnt from the development, initial dissemination and evaluation of Prep-to-Play

This paper overviews the successes and learnings for sporting organisations, researchers and practitioners in developing and evaluating injury prevention programmes and dissemination strategies. For sports that lack existing evidence-based programmes, steps 2–4 are critical. We used components of efficacious programmes to create Prep-to-Play,[14 15] relied heavily on clinical experience (step 2) and consulted content and context experts (step 3) and end-users (step 4).

The success of the cocreation process was evidenced by the high rates of initial awareness (78% aware of Prep-to-Play at the end of the first season it was available) and adoption (81% of those aware). Coaches reported the strengths of Prep-to-Play were that it was specific to women's Australian Football, the manuals and video resources were professional, clear and engaging, and there was visible endorsement by the AFL (via branding, website integration and email communications) and ambassadors. Compared with other nationwide dissemination strategies (eg, Swedish community soccer 21% of coaches used at least three activities, at least once per week), our adoption rates (64% of all coaches, 81% of those aware of the programme)[44] are high. However, definitions of adoption and implementation differ

throughout the sports injury prevention field. Preliminary evidence suggests Prep-to-Play will be embedded into the fabric of women's community Australian Football—it remains on the AFL website, is a part of their National Football Guidelines,[45] Coaching Women and Girls Toolkit,[46] the AFLW 2030 Women's Football Vision statement,[47] and has been included in AFL-led coach education (eg, National Coaches Forum 2019 lecture and practical). Of those unaware of Prep-to-Play, 47% were using a self-designed programme, and 53% were not using a programme, highlighting the gap that Prep-to-Play has filled, and future opportunities for the AFL to increase reach, which will most likely translate into adoption.

Cocreation with industry stakeholders has challenges. We informed the AFL that the first step in programme development should be to evaluate the aeitology of injuries in women and girls playing community Australian Football,[26] particularly as the limited available evidence was gathered prior to the inception of the AFLW competition.[11] Nonetheless, immediate resourcing was made available to develop Prep-to-Play within 6 months. The AFL was motivated by (1) community clubs requesting injury prevention advice for new women's teams; (2) mainstream media highlighting the risk of ACL injuries in the AFLW and (3) reports of injury risk as a barrier to participation. The research team (AM) did conduct an injury surveillance pilot study in community women's football in 2019, which reinforced the ongoing need to focus on serious knee and head injuries. The short time frame for programme creation (6 months, during the 2018 off-season) and dissemination also meant there were limited opportunities to develop additional multilevel implementation strategies (eg, offer workshops, social media promotion or for coaches and players to (physically) trial using Prep-to-Play prior to the release of the resources. Therefore, evaluating the online dissemination strategy after the 2019 season was critical.

Despite the successes of cocreation, only 53% of those coaches aware of Prep-to-Play adhered to the recommendation to use it least twice per week. This suggests there is room for improvement, particularly given the sample who participated in the evaluation were likely to be the more motivated and capable coaches. The dissemination strategy (link sent via email, upload of resources to the coach education website page) may raise awareness and adoption, but not translate into high fidelity implementation. This is supported by the fact that some coaches reported that even though they watch the videos, they still do not feel confident enough to use Prep-to-Play, reinforcing the notion that coach self-efficacy may predict future change in injury prevention practice.[48] Other injury prevention programmes in youth handball,[49 50] male Australian Football[51] and women's soccer[52] have used a similar programme cocreation process,[24] and this did not translate to high rates of implementation.[51 52] Sporting organisations may need to consider social-behaviour change theory[21] and coach learning mechanisms,[53] and not rely on individual coaches to source the information online, train and educate themselves, with no support. This study has provided context-specific evidence to our industry partners that further multilevel implementation strategies are required over time. Programme dissemination, coach education and support may need to become part of the organisation's normal resourcing and operating procedures.[27]

Feedback and ideas from coach early adopters

A strength of our study is the unique opportunity to gain feedback from real-world early adopters (coaches) after the initial Prep-to-Play dissemination, and to use this to inform content modifications and design future implementation strategies.[43] Key changes to the programme before the 2020 season included (1) removing some warm-up activities (eg, sidestepping, high knees) to save time and focus on activities deemed more important for ACL injury and concussion prevention (eg, landing, deceleration, tackling); (2) new warm-up activities such as falling and rolling technique to increase buy-in and specificity for women and girls (ie, lack of exposure in their early years); (3) moving the strength programme from the warm-up to the post-training cool-down (to replace typical activities such as static stretch); (4) prioritising exercises (eg, Nordics) that are quick, have known effectiveness,[54] and involve a partner (i.e. to optimise player engagement and address time barriers).[18 19] Alternatives to Nordics were also provided (eg, hamstring bridges) due to known barriers to use (eg, player soreness),[55] and their effectiveness in women is unknown.[54] Providing coaches with the option to move the strength component from the warm-up to the traditional 'cool down' period of training may optimise uptake and injury reduction effect.[56] We removed the separate game-day warm-up to achieve consistency at trainings and games, and the new condensed warm-up was deemed appropriate for game-day. Clarity of the dosages, readability of the posters and programme material appeal were improved (eg, more fun, upbeat, humour). The new materials were uploaded to the AFL website in April 2021 (https://www.play.afl/coach/resources/prep-to-play/). We used many of the competency, organisational and leadership drivers identified by the early adopters to inform programme modifications and an implementation strategy for a subsequent randomised controlled trial intervention, which was cofunded by the AFL and other industry partners.[43]

Competency drivers

The competency drivers can inform what, how, when and by whom injury prevention education and support could be used to increase coach competency to deliver the programme. Similar to injury prevention programmes in women's soccer,[14] coach workshops,[34 36] with or without with booster visits to training sessions[16 35] in the preseason were reported by coaches as a way of increasing competency. Sport coaches prefer to learn via

practical 'on-the-job' training or informal networking with coaches, compared with self-education via online resources or formal accreditation processes.[53] However, most research has focused on elite settings, and the relationship between delivery format and actual behaviour change requires further evaluation.[53]

Most coaches reported 'experts' (eg, medical and exercise professionals) were best placed to provide injury prevention training and education. Indeed, most sports injury prevention educators in other sports and clinical trials are physiotherapists.[16 34] Some coaches in this study suggested coaches and players have capabilities to educate and support their peers. Social modelling via coach 'champions' and informal learning through peer interaction are dominant forms of coach learning.[53 57] Coaches and/or players may be better educators than physiotherapists particularly for sport-specific skills elements. The American Football 'Heads Up' concussion prevention programme uses player safety coaches, employed by the governing organisation to provide workshops and support at football training,[58] and coach-to-coach education should be considered in future strategies. The use of programme ambassadors may be beneficial, given some coaches may relate better to a 'someone like me' role model[57] than to a 'this is what the elite-level do' approach (adaptive leadership).

Organisational and leadership drivers

A strength of this study is the consideration of organisational administrative and leadership drivers across all socioecological levels. In general, implementation strategies are poorly reported in the literature or focus on 'competency' drivers specific to the programme content and the individual programme deliverer (eg, coach education materials/workshop),[17 23 24] which may not be sufficient to support programme adoption or high fidelity implementation.[52] In schoolboy rugby union, coach workshops effectively increased adoption and adherence of the 'Activate' programme.[59] In women's soccer, workshops improved coach attitudes and perceived capabilities, but not implementation of the ACL injury prevention programme in the first 2 weeks of the season.[52] The 'Heads Up' concussion prevention education programme in male American Football reduced concussion rates when adopted, but a nationwide survey revealed only 45% of coaches attended (free) workshops offered by USA Football.[44 60] The coaches in our study reinforced that organisational processes and leadership are critical to programme uptake, stating that AFL endorsement provided credibility and motivation to use Prep-to-Play. They also suggested the AFL and/or governing local leagues could incentivise Prep-to-Play education and use (eg, financial support, compulsory coach accreditation, professional development points). Successful injury prevention efforts in soccer,[61] ice-hockey,[62] the military[27] and American Football[58] also highlight that buy-in (or permission to implement) from the national governing organisations is imperative. Shared multilevel responsibility was a strong theme in our findings to enhance the achievement of all RE-AIM dimensions. For example, parents, players and coaching directors should be invited to annual coach education and training that is endorsed and/or funded by the organisation to optimise buy-in and cater for coach turnover (facilitative administration, adaptive leadership).

Limitations

Only 26% of survey respondents and 22% of interviewees were women, but this reflects the number of women registered as coaches in Australian Football. Our sample may not represent all coaches, but a response rate of 13% (n=343/2810) is comparable to other evaluations of nationwide sports injury prevention strategies (1%,[58] 18%[63]). The participants may represent a biased sample of early adopters who were motivated to educate themselves and were convinced to use Prep-to-Play. However, the concept of implementation drivers is underexplored and this group of 'positive deviants'[64] was able to highlight a model of best practice. The high rates of self-reported Prep-to-Play awareness (>80%) may not represent the wider coaching community (or desirability bias may be present). Future field-based prospective assessments of actual programme use and injury rates over time are required. For context, 1446 (52%) of the 2810 coaches of women's and girls' opened the email about Prep-to-Play, and 16% clicked on the link to the programme resources. Given greater coach self-efficacy is associated with higher intent to implement,[48] and higher intention may increase programme use,[65] our qualitative study only focused on coaches, and the majority of feedback from coaches was about competency drivers. Future studies should identify organisational and leadership implementation drivers at the individual and interpersonal level, as coaches may not automatically consider the context in which they operate in and how it influences behaviour change.

CONCLUSION

This paper highlights a pragmatic seven-step programme development process informed by theory, incorporating scientific evidence, input from the sport's governing organisation, content and context experts, and end-users, to create an injury prevention programme (Prep-to-Play). While initial awareness and adoption was high, adherence to the twice weekly recommendation was lower. Sporting organisations and research teams may need to think beyond programme development and online dissemination, and consider strategies to translate 'awareness and adoption' into sustained high-fidelity programme use. Coach early adopters identified the use of Prep-to-Play may be facilitated by a variety of competency, organisational and leadership drivers, and the strategies to enhance programme use should be female-specific and shared among all stakeholders. The programme development process and implementation drivers identified can inform clinical practice and industry initiatives in other

sports and settings aimed at increasing injury prevention programme uptake.

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Correction notice The affiliation 1 for co-authors were missing Christian J Barton and Andrea M Bruder. The affiliation has been reinstated.

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