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Research Article

Identifying Coaches' Practice Behaviours and Motivational-Beliefs Associated with Lower Limb Injuries and Their Prevention

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Abstract

Facilitating the development of effective coach delivered sports safety interventions, as part of wider system-level and multifaceted Lower-Limb Injury Prevention (LLIP) efforts, is needed to meet public health priorities of ensuring safe and sustainable sport participation. However little research exists examining the practice behaviours and motivational-beliefs of coaches associated with LLIP, especially in the context of Australian football. The purpose of this preliminary study was to explore and describe the practice behaviours of coaches and their motivational beliefs (self-efficacy, outcome expectancies and risk perceptions) associated with LLIs and their prevention. Community-Australian football (AF) coaches from clubs in two Australian states completed a cross-sectional self-report questionnaire, based on a modified-Health Action Process Approach (HAPA) model. Just over half (58%) of coaches used LLIP strategies with their team. Sixty-nine percent had a formal training plan for the entire season, and most did not explicitly incorporate injury prevention exercise program (IPEP) components into their coaching practices, despite their views being favourable towards IPEPs. Coaches believed their players had a high chance of sustaining a LLI and that they could have serious consequences. They believed it was important to have current knowledge of LLIP approaches such as IPEPs, but many lacked the behavioural capability and self-efficacy to implement them. Sports medicine professionals and coach educators should promote IPEPs to ensure LLIs can be reduced, but need to address why IPEPs are not utilized in community-AF settings. Coach-targeted interventions should focus on strategies such as improving coach self-efficacy, reframing misconceptions, goal-setting and planning.

INTRODUCTION

Lower-Limb Injuries (LLIs) are a major concern for many team sports worldwide [1]. In Australian football (AF), especially at the community-level (i.e. non-elite, recreational, amateur and junior), 40%-68% of all injuries occur to the lower limb [2]. These LLIs are considerably more common than injuries to other body regions; they are also the most common cause of training and game time loss [2]. Such injuries can have long-term impacts, [3] including physical (e.g. inactivity and osteoarthritis development) 4,5] and psychological (e.g. depression, stress and anxiety) [6] consequences. Although there is inherent risk of injury in playing AF [7,8] continued, safe and sustainable AF player participation is achievable when LLI prevention (LLIP) is prioritised [2].

Over the past decade, efficacy results from trials of sports injury prevention exercise programs (IPEPs), based on addressing neuromuscular and biomechanical factors, such as Footy First and FIFA 11+, have been published in the international literature [9,10,11]. Accordingly, there is now a strong empirical base that IPEPs, including components of structured warm-up, balance training, change of direction/side-stepping drills and jumping/landing training, can reduce the incidence of certain LLIs (e.g., knees and ankles) [9-11]. Yet despite the protection they afford, IPEPs have not been embraced or readily adopted [12-15]. This highlights the need for more research aimed at understanding the factors associated with IPEP adoption and maintenance, including facilitators and barriers to its use, in a range of sport-settings [16].

Although there is a diversity of factors at multiple levels (i.e., organisational, team and individual levels) to consider in enhancing the use of IPEPs, [16-18] the coach plays an essential role in promoting and influencing the delivery of sustainable safety programs [19,16]. There is evidence that coaches are under-utilizing LLIP strategies [15]. Little is known about the nature of community-AF coaches' training practices, whether they currently use preventive strategies (e.g. IPEPs) to

prevent LLIs, and what motivational factors might enhance the effectiveness of IPEPs into coach practices in community-AF environments [16,15]. In the context of IPEPs, it is important to understand the underlying determinants of how they could be best integrated into coach-practices, as well as the readiness of individual coaches, to facilitate the development of appropriate behaviour change strategies and interventions targeted at the coach (e.g. coach workshops) [16].

The Health Action Process Approach (HAPA) model represents a useful framework to explore coaches' motivations and behaviours to engage in IPEPs, as it attempts to explain and predict individual adoption, initiation and maintenance of preventive and health-promoting behaviours [20-22]. A major advantage of the HAPA is that it integrates the base concepts of social-cognitive health behaviour models and considers post-intentional factors leading to behaviour adoption [23].

According to the HAPA model, changing health-related behaviours requires two separate processes, involving motivation and volition [22]. First, the motivational phase is the process whereby an individual forms an intention to either adopt a precautionary action or change risk behaviours in favour of others, in part on the basis of self-beliefs (e.g. self-efficacy). Second, in the volitional phase, change must be planned, initiated, and maintained, and lapses must be managed. In addition, self-regulatory processes play a critical role [23]. Recent reviews have demonstrated use of the HAPA as a guiding framework for health behaviour interventions and there is extensive literature supporting its utility for a number of health behaviours and diverse contexts, [23-25] including a more recent study determining the utility of the HAPA in predicting intention to use an IPEP (i.e., the FIFA 11+) in female youth soccer [26]. There is a however a dearth of current research in applying the HAPA in examining the integration of motivational and behavioural-enabling factors in sports injury prevention research overall [16]. Thus, HAPA is yet to be utilised to understand community-AF coach self-beliefs and practice settings to inform safety practices for their players [16].

The aim of this study was to describe the nature of community-AF coaches' volitional behaviours such as their training practices (including strategies used to prevent LLIs), their training plans, coaching goals (distal), intentions (proximal goals) and motivational self-beliefs (self-efficacy, outcome expectancies, risk perceptions). The HAPA was used to provide a foundation for understanding and describing key factors that could be useful in advancing theory applications and designing coach tailored interventions to support the integration of IPEPs in ongoing community-AF training practices to prevent LLIs.

METHODS

After ethical approval was obtained from the **** Human Ethics Committees, a study statement was provided to all coaches and informed consent was obtained prior to their participation. A cross-sectional questionnaire was administered to identify coaches' training practices, intentions, and motivational self-beliefs in the context of community-AF. All coaches were convenience sampled from a larger LLI randomised controlled trial (RCT) conducted in two states in Australia across five Division I and II district leagues (18 community-AF clubs in total).

A 52-item self-report questionnaire was used to collect information on coaches': (a) characteristics, (b) current LLI training practices (e.g. IPEPs), (c) future intentions (proximal goals) to using LLIP in their practices, and (d) salient motivational-belief measures including: self-efficacy (self-regulatory and learning efficacy to prevent player LLIs), risk perceptions (perceived susceptibility/severity of player LLIs), and outcome expectancies (related to planning training, player training attendance, preventing injuries and perceived importance of training skills components). The questionnaire was developed based on tenets of HAPA, related theoretical guidelines (i.e., self-efficacy) [27,22,28] and adapted from previous research on coach behaviour and LLIs [15] (Supplementary Table 1). Face and content validity were established by the study's investigators and three independent coach/sport injury and behavioural experts prior to questionnaire administration. Participation was voluntary and full confidentiality guaranteed. Cooperation and endorsement of the questionnaire was obtained from state-level community-AF bodies. Coaches completed the 15-20 minute self-report questionnaire at football training sessions during the preseason period (January-February).

All data was pre-coded and double entered into a developed Microsoft Access database. Data was cleaned and checked for any inaccuracies before being transferred to Statistical Package for the Social Science. Descriptive statistics were calculated for all close-ended question responses. For Likert scales questions, mean scores, 95% Confidence Intervals (CIs), frequency and percentages were calculated. Analysis of variance (Freidman's test) was conducted to identify and rank differences based on the outcome expectancies of the importance of training skills for team training schedule, team performance and preventing LLIs. Content analysis using both deductive and inductive approaches [29] was conducted on the open-ended responses related to coaches reported use of LLI prevention strategies, common training principles used, and the coach's goals/focus for the season.

RESULTS

Completed questionnaires were received from 31 male community-AF coaches from 13/18 clubs. Across these 13 clubs, the coach response rate was 84% (Table 1).

Twenty-seven coaches (87.1%) indicated that they *planned their training sessions* for their players. However, only 18 (69.2%) stated that they had a formal training plan for the entire 18-week season, and 22 (81.5%) reported they had a formal training plan for each training session. Sixteen coaches (59.3%) indicated that their training plans were periodised, while 21 (77.8%) coaches indicated they used a range of common training principles in their training (Supplementary Table 2).

Only 18 coaches (58%) reported using some type of LLIP strategy with their team/s (Figure 1). The most common LLIP strategies used were warm-up and stretching. Overall, player development and growth was the main coaching goal/focus, followed by teamwork/team cohesion, team/club development and culture. (Supplementary Table 3).

Table 1: Profile of coaches (n = 31).

Characteristics	n (% of all surveyed coaches)
State	
Victoria	13 (41.9)
Western Australia	18 (58.1)
Mean age in years	33.3 (range 22-49)
Coaching position at time of questionnaire	
Senior	20 (64.5)
Reserves	4 (12.9)
U18	1 (3.2)
A Colts	5 (16.1)
Highest current AF coaching qualification	
Level 1	12 (42.9)
Level 2	11 (39.3)
Level 3	1 (3.6)
Not obtained	4 (14.3)
Median years since obtained AF coach qualification	2 (range 0-11 years)
Median years AF coach experience	4 (range <1-22 years)
≤5 years	19 (61.3)
6-10 years	8 (25.8)
>10+ years	4 (12.9)
Highest level coach experience	
Community/Amateur	26 (89.7)
State	3 (10.3)
AF playing experience	
Yes	30 (96.8)
No	1 (3.2)
Median years AF playing experience	19 (range 3-30 years)
Highest level AF playing experience	
Community/Amateur	11 (20.0)
State	10 (32.3)
AFL Reserves/Senior	9 (30.0)

Note: Not all numbers add to 31 within a characteristic due to missing data; There was no statistical difference between age and coach-level profiles across states (age $\chi 2$ 16.29, df 16, p = 0.433; coach level $\chi 2$ 7.79, df 4, p = 0.093).

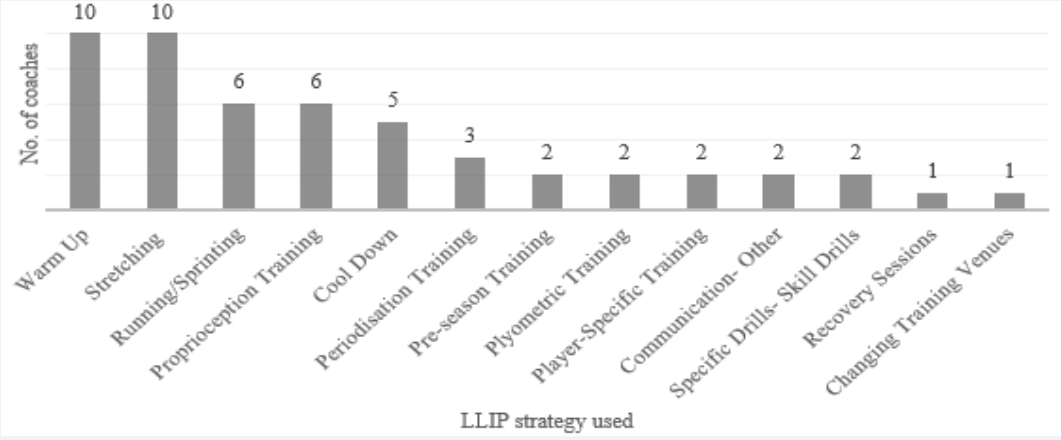

Figure 1 Australian football coaches' self-reported use of LLIP strategies (n = 18).

Note: Total numbers do not add to n=31 coaches as many coaches reported multiple LLIP strategies components; (2) "n" signifies the number of coaches that reported using particular LLI strategies n=18.

LLIP strategy = any strategy or training component that coaches perceived they used in their training sessions as a means of reducing their players risk of injury.

IPEP = IPEPs are a type of LLIP strategy. All IPEPs are different as the training/exercise components are based on the target area of prevention, for example, the knee or ankle, or they can be sport specific, such as Footy First or FIFA 11+. IPEPs, for instance are a sport-specific periodized program including: basic movement exercises (squares, weaving bounds, weaving hops), balance exercises (dura-disc balance, wobble board balance, balance hand passing, balance kicking), hopping exercises (dura-disc hop, hurdle jumps, lateral hurdle jumps, hurdle jump/hops), change of direction exercises (pre-planned/unplanned change of direction (incl. 180 turn), swiss ball exercises (kneeling, squat), min tramp exercises (min tramp land-lateral hop, hop/step, catch/step).

Table 2: Determinants of coach practice behaviours associated with preventing lower limb injuries (LLI), and implementation of a LLI prevention strategies.

Motivations	n	Mean Score	Confidence Intervals (95%)	Strongly Agree/ Agree n (%)	Neither Agree or Disagree n (%)	Strongly Disagree/ Disagree n (%)
Intentions/Proximal Goals I would implement specific types of training in my sessions if they were shown to improve football performance in my players	31	4.42	4.22-4.62	30 (96.8)	1 (3.2)	0 (0.0)
I would implement specific types of training in my sessions if they were shown to prevent LLIs in my players	31	4.42	4.20-4.64	29 (93.6)	2 (6.5)	0 (0.0)
I would implement specific types of training in my sessions if they were shown to improve football performance and prevent LLIs in my players	31	4.45	4.25-4.65	30 (96.8)	1 (3.2)	0 (0.0)
Self-efficacy						
Self-regulatory efficacy I am the best source of information about how to prevent LLIs for my players	31	2.00	1.73-2.27	2 (6.5)	3 (9.7)	26 (83.9)
Players are responsible for preventing their own LLIs	30	3.13	2.76-3.50	16 (53.3)	7 (13.3)	10 (33.4)
Learning efficacy It is important for me to have a current knowledge of LLI strategies	31	4.00	3.80-4.20	26 (83.8)	5 (16.1)	0 (0.0)
Risk Perceptions						
Perceived Susceptibility Players are more at risk of LLIs now than 10 years ago	31	3.87	3.53-4.21	23 (74.2)	4 (12.9)	4 (12.9)
Players are more at risk of LLIs when playing on hard/ dry ground	31	3.42	3.06-3.78	17 (54.9)	9 (29.0)	5 (16.2)
Perceived Severity Players with LLIs are usually not available to play for one or more weeks	31	4.06	3.82-4.30	27 (87.1)	3 (9.7)	1 (3.2)
LLIs negatively influence game performance and end of season results for my team	31	3.90	3.52-4.28	24 (77.4)	4 (12.9)	3 (9.7)
Outcome Expectations						
Incorporating LLIP strategies is important when I plan my training sessions	30	3.67	3.7-3.97	19 (63.3)	8 (26.7)	3 (10.0)
Improving team performance is important when planning my training sessions	31	4.55	4.37-4.73	31 (100.0)	0 (0.0)	0 (0.0)
Preseason training is important for preventing LLIs in my players during the season	31	4.35	4.12-4.58	28 (90.4)	3 (9.7)	0 (0.0)
It is important for players to attend training sessions if they want to play in games	30	4.50	4.32-4.68	30 (100.0)	0 (0.0)	0 (0.0)
LLIs cannot be prevented	30	2.40	1.98-2.82	5 (16.7)	7 (23.3)	18 (60.0)
LLIs are not a problem for my team*	30	3.70	1.91-2.55	22 (73.3)	4 (13.3)	4 (13.3)

Note: SA/ A = strongly agree / agree; NAD = neither agree nor disagree; SD/ D = strongly disagree/ disagree Note: *reverse scored
Note: Mean scores could range from 1-5, higher scores (i.e., 5) indicate higher levels of agreement with each belief measure/ statement.

Overall, coaches' intentions to implement IPEPs into their training routines were favourable (Table 3). Very few indicated that they were undecided about implementing IPEPs. Self-regulatory efficacy beliefs suggested a high proportion of coaches (83.9%) did not believe they were the best source of information about LLIP for their players, with over half of all coaches (53.3%) indicating that players were responsible for their own LLIP. Coaches' learning-efficacy was more favorable than their self-regulatory efficacy, with most (83.8%) reporting that "it is important to have a current knowledge of LLIP strategies" (Table 2).

Salient-risk perceptions about players' susceptibility to, and severity of LLIs was of high concern to most coaches. Over three-quarters of coaches reported LLIs were a problem for their team, and many coaches believed the consequences of LLIs included players not being available to play for one or more weeks (87%), negatively influencing game performance and end of season results (77.4%).

Coaches reported positive outcome expectancies about incorporating LLIP strategies into their coach practices. Nineteen (63.3%) reported that "incorporating LLIP strategies is important

Table 3: Outcome expectations for importance of training skills for teams training schedule, team performance and preventing LLI.

	Team's Training Schedule		Team's Performance		Preventing LLIs		Freidman Test[a]		
Training Skills	Mean	CI (95%)	Mean	CI (95%)	Mean	CI (95%)	χ^2	*df*	p-value
Performing Game Set-Plays	4.00	3.61-4.39	4.33	4.03-4.63	2.59	2.17-3.01	29.288	2	<.001
Marking Skills	4.38	4.13-4.63	4.41	4.15-4.67	2.59	2.12-3.06	28.694	2	<.001
Balance Training	2.75	2.30-3.20	2.78	2.42-3.14	4.11	3.77-4.45	28.212	2	<.001
Ball Handling Skills	4.67	4.45-4.89	4.70	4.50-4.90	3.11	2.69-3.53	25.881	2	<.001
Jumping/Landing Training	3.18	2.79-3.57	3.04	2.60-3.48	4.15	3.83-4.47	23.394	2	<.001
Warm-up Run	4.42	4.12-4.72	4.07	3.71-4.43	4.57	4.21-4.93	17.176	2	<.001
Changing Direction/Side Stepping Training	3.52	3.10-3.94	3.63	3.23-4.03	4.26	3.93-4.59	16.361	2	<.001
Kicking Skills	4.77	4.62-4.92	4.68	4.48-4.88	3.71	3.17-4.25	15.485	2	<.001
Ball Disposal Skills	4.76	4.60-4.92	4.63	4.39-4.87	3.56	3.05-4.07	15.159	2	.001
Weight/Resistance Training	2.90	2.49-3.31	3.22	2.82-3.62	3.96	3.67-4.25	14.384	2	.001
Warm-up Stretches	4.03	3.61-4.45	3.96	3.56-4.36	4.25	3.96-4.54	13.613	2	.001
Body Contact Skills	4.03	3.71-4.35	4.37	4.07-4.67	3.73	3.26-4.20	8.346	2	.015
Endurance/Fatigue Training	4.34	4.08-4.60	4.19	3.74-4.64	3.74	3.39-4.09	7.179	2	.028
Tackling Skills	3.96	3.60-4.32	4.37	4.09-4.65	3.62	3.16-4.08	6.830	2	.033
Cool Down Run/Stretches	4.31	4.07-4.55	4.15	3.84-4.46	4.48	4.05-4.91	5.429	2	.066
Sprint Sessions	3.62	3.24-4.00	3.89	3.48-4.30	4.15	3.61-4.69	3.640	2	.162

Note: a. Analysis of variance (Freidman's test) was conducted to identify and rank differences based on the outcome expectancies of the importance of training skills for team training schedule, team performance and preventing LLI.

when I plan my training sessions" (Table 2). In comparing coaches' outcome expectations related to the importance of various training skills, there was no significant difference in cool down run/stretches and sprint sessions (χ^2=6.830, df=2, p=0.03) (Table 3). There was no significant difference between coaches' outcome expectations for their team's training schedule and team performance for game set-plays, marking skills, balance training, ball handling, jumping/landing training, kicking skills, ball disposal skills and weight/resistance training. However, there was a significant difference in team's training schedule and team performance compared with preventing LLIs (Table 3; Supplementary Table 4).

DISCUSSION

This is the first paper to describe the self-reported practice behaviors and motivational-beliefs (self-efficacy, outcome expectancies and risk perceptions) of community-AF coaches, thus providing a significant contribution to research in the coach and injury prevention area. Its application of the HAPA model provides a basis for understanding coaches' training contexts and motivational self-beliefs that is useful in advancing the cumulative knowledge in this area and should be used in efforts to enhance theory and devise strategies that will support coaches' to integrate LLIP approaches, such as IPEPs, successfully into their practices [16,30,23]. Overall, most coaches reported little experience in implementing IPEPs, but had positive intentions to implement them, despite variability in their motivational-beliefs.

Lower Limb Injury Prevention Strategy Use and Intentions

A range of LLIP strategies were reportedly used by coaches, including warm-up, stretching and proprioception training. However, whilst some LLIP strategies implemented by coaches reflected components of published efficacious IPEPs, most strategies reported appeared to be used in isolation rather than as a specifically-planned IPEP [9,31,32]. As such, if coaches are not using evidence-based strategies or being provided the appropriate resources and training to use IPEPs appropriately, it is unlikely that flow-on effects of preventing injury would be observed [33]. Furthermore, approximately 50% of coaches stated they did not use any LLIP strategies, and most coaches did not include injury prevention of any form as part of their coaching goals for the season, replicating the findings of an earlier study [15]. Such findings highlight challenges in motivating coaches and guiding their attention and behavior to develop the knowledge and training skills to reduce LLI risk in their players [34,35,25,15].

Most coaches had favorable salient-intentions towards implementing IPEP in their football training practices. This finding suggests that coach intention formations may be important when influencing them to adopt LLIP prevention interventions such as IPEPs, despite current or past use [36]. However, it is unclear whether coach intentions alone are enough to lead to, or understand, optimal and habitual LLIP practices in coach-led training [13,36,25]. Notably, coaches were in strong agreement that they would implement specific types of IPEPs in their training sessions if they improved football performance and/or reduced the risk of LLIs. This suggests that interventions aimed at encouraging coaches' decision-making and translation of intentions into IPEPs would be successful if they focused on these benefits of LLIP. Post-intentional factors, such as perceived self-efficacy, strategic planning and coping behaviors, can help bridge the intention-behavior gap [25], and exploring these factors in future investigations in coach situational-contexts is important.

Self-Efficacy, Risk Perceptions and Outcome Expectancies

Self-regulatory efficacy beliefs concern coaches' abilities to exercise influence over their motivation, thought processes, emotional states and patterns of behavior [27]. Although community-AF coaches can have a substantial influence on football player behaviors and play a role in establishing their teams safety culture, salient beliefs held by coaches suggested the majority of coaches in this study did not believe they were the best source of information about LLIP, with most believing that players were responsible for preventing their own LLIs. Consistent with the limited research with coaches in injury prevention, [2,26] such results highlight a gap in coach confidence, skills and knowledge to assist their athletes in reducing LLIs. Coaches' salient self-regulatory beliefs could likely interfere with their decision-making about adopting IPEP to reduce LLIs. This is important to know because self-regulatory efficacy is a strong determinant and predictor of health (e.g. exercise) and injury-related behavior [23,37]. Specific strategies aimed at enhancing coach self-efficacy, e.g., performance accomplishments, vicarious influences, verbal persuasions, emotional arousal, physiological information and imagery [27] need to be emphasized and developed into coach education-learning processes. This will have important practical applications for coaches' ability to facilitate the implementation of IPEPs and prevent LLIs among their players [37]. Further research to understand more about community-AF coaches' roles and resources would shed extra light on these salient-belief measures and provide support for coach educators or sports medicine personnel to intervene at a normative level or identify the need for additional coach support/resources [38,39].

Whilst coaches did not have high perceived self-regulatory efficacy, the fact that coaches believed it was important to have current LLIP knowledge (learning efficacy) attests to the importance of practical applications of IPEPs in ongoing coach education. A strong sense of learning-efficacy (i.e. belief's in one's learning capabilities) on the part of the coaches can accelerate mastering a skill because individuals with this sense will invest more effort in practicing the skill than will those who doubt their learning capabilities [27]. Taken together, the above forementioned efficacy factors suggests it may be that coaches believe they are capable of being a source of LLIP information to their players but vary in their confidence about doing so on a regular basis and in the face of competing demands (self-regulatory efficacy) [27,40,20]. Coaches need to feel confident that they are able to carry out, and exercise personal control, over their training sessions and have few practical impediments to implementing IPEPs [25,37].

Coaches risk perceptions of players' chances of sustaining an LLI (perceived susceptibility) and their beliefs about the seriousness of LLIs and its sequelae (perceived severity) were high. This finding is in accordance with previous studies in coach populations, [2,26,40] and provides opportunistic stimuli to facilitate coaches' intentions to take up LLIP approaches such as, IPEPs [22]. Despite this, not all coaches indicated a strong opinion about players' susceptibility and severity of LLIs. It could be that the information coaches have about LLI has been unclear, so that their level of uncertainty remains high. Education and behavior change strategies (e.g., motivational interviewing) [41,25] to elicit change about perceived LLI risk and its consequences should be emphasised with those without awareness of such information or whose perceptions may differ. Coach perception distinctions are important to recognise and their underlying reasons need to be explored further to facilitate informed decision-making and planned action associated with IPEPs and preventing LLIs among coaches.

Coaches were in strong agreement that a number of outcome expectations related to football-specific team training sessions were important. For instance, they perceived players' attendance at training was important if they wanted to play in games. Coaches need to be well informed about how best to ensure their players attend training sessions and facilitate removal of any barriers to attendance for their players to get the best benefits out of IPEP [42].

Most coaches believed it was important specific training skills had a role to play in either including them in their team's training schedules, improving team performance or preventing LLIs. Overall, and consistent with previous research [15], this indicated a willingness among coaches to adopt IPEP based-skills when they were incorporated into training sessions. However, there still appears a need for coaches to be educated about specific training skills and the inter-related benefits of using these skills in their training, and appropriately communicating the importance of such skills and game-relevance to players.

The majority of coaches had expectations that incorporating LLIP training was beneficial when they planned their training sessions. However, many coaches perceived that LLIs cannot be prevented. This perception could inhibit, or negatively influence behavioral outcomes, such as the use of IPEPs in community-AF [23]. In a sense, it may be that a weak belief about LLIP is reflective of social circumstances not allowing coaches or individuals to do anything about the mechanisms that put their players at risk [43]. The identified coach outcome expectations indicate that further steps need to be taken to promote LLIP in community-AF [44,39,40]. Providing instructional, hands-on workshops and effective communication and mentorship initiatives targeted at community-AF coaches, coach coordinators and coach educators might be some useful strategies to explore to support intentions and integration of LLIP strategies such as IPEPs.

IMPLICATIONS FOR RESEARCHERS

Developing strategies to optimise IPEP effectiveness and delivery by coaches in community-AF is important to reduce the risk and consequences of LLIs and ensure sustainable participation outcomes are achieved for players [16]. However, the beliefs of coaches should be included into prevention programs in order for IPEPs to be enhanced and adopted in practice [18,16]. Designing a range of coach interventions to integrate current information about LLI IPEPs and strategies for achieving necessary behaviour change is needed. Enhancing coaches' effectiveness in improving their self-efficacy to implement IPEPs, overcoming any misconceptions about LLIs and their prevention, supporting coaches' strategic planning/goal-setting, and identifying and overcoming any barrier and resource limitations, may support the successful adoption and maintenance of IPEPs. The HAPA is a useful theoretical approach

that can be applied to inform the development of theory and salient-belief measures to support new coach education and training programs and inform strategies that are relevant and practical in real-world coaching-contexts.

LIMITATIONS

The study has some limitations that need to be acknowledged. First, the sample size of community-AF coaches was small because it was a dictated by the targeted real-world setting and linked to an existing IPEP RCT. It is warranted that care should be taken in extrapolating the study results to other populations, however it did span over two Australian states and 18 clubs and achieved significantly high response rates in comparison to similar studies. Future studies should examine the interplay of HAPA factors in a larger cohort of coaches and determine whether the present results are generalizable to different samples to increase confidence in the robustness of findings. This also has implications for coach intervention development across different contexts. Second, all factors assessed in this study were self-reported, which can introduce social desirability, acquiescence bias or over reporting. Careful administration processes and explicit instructions for coaches to answer candidly were means adopted to allay this bias. In future investigations, additional insight would be gained by using extensive and objective measures for behaviour, [45] such as ecological momentary assessment, [46,47] or actual measurement of behaviours' and coach-player interactions in training sessions. In addition, there are other behaviours' and motivational self-beliefs that could be changed but were not included in this study. Unmeasured factors may explain findings further. Third, the present study was descriptive in nature, so the results need to be interpreted with caution as no conclusions about the causal role of behavioral determinants can be drawn. Nevertheless, the scope to extend this work, including focusing on a range of HAPA (and other critical factors) in the situational-context of coaching practices, is viable.

CONCLUSION

Research examining coaches' training behaviours and motivational-beliefs associated with LLIs and their prevention is limited, and little is known about the nature and the extent of the coaches' role in sport injury prevention [33]. Overall, community-AF coaches in this sample were receptive to delivering LLIP strategies such as IPEPs into their training. The evidence that coaches' risk perceptions about LLIs was high, and they had outcome expectancies about IPEPs in reducing the risk of seriousness of LLIs, provides a stimulus for influencing coaches' decisions and plans to deliver IPEPs in future. Moreover, the importance of coaches needing to be confident and competent in the programs they deliver, and being able to exercise personal control over their training, with few practical impediments to implementing IPEPs, was highlighted. Documenting and addressing these perceptions and beliefs should be key elements in developing proactive strategies to enhance and promote the adoption and implementation of safety initiatives in wider-ecological coach practice settings.

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AUTHORS CONTRIBUTIONS

AM conceived and participated in the design of the study, completed data collection, undertook analysis and led the drafting of the manuscript. DT participated in the design of the study and drafting of the manuscript. All authors read and approved the final manuscript.

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