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Psychosocial Factors and the Effects of a Structured Injury Prevention Workshop on Coaches' Self-Efficacy to Implement the 11+ Exercise Program

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ABSTRACT

International Journal of Exercise Science 13(5): 1459-1475, 2020. Psychosocial factors have both direct and indirect influence on behavior change. Self-efficacy is a key psychosocial factor driving behavior change. It is an individual's perceived capability of performing a desired action. Structured injury prevention workshops targeting improvements in psychosocial factors in coaches may enhance the dissemination and implementation of the 11+ program in community settings. This study describes baseline psychosocial factors in youth soccer coaches and the effects of a structured 11+ injury prevention workshop on coaches' self-efficacy to implement the 11+. An adapted questionnaire based on the Health Action Process Approach Model was administered to a sample of coaches, before and after an 11+ workshop. Measures of self-efficacy included: their understanding of the 11+; their ability to use the 11+; using the 11+ with limited space, and using the 11+ when players lacked interest. Data from 73 of 81 coaches were retained for analyses. The majority (74%) of coaches knew about the 11+ program before the workshop, mostly through internet resources and colleagues. 40% to 55% of coaches had at least one unit increase (range, 1 to 6); 29% to 48% did not have a change in measures of self-efficacy. Ten percent to 24% had at least one unit decrease (range, -1 to -3). Wilcoxon matched-pairs signed-ranks test (with Bonferroni correction) indicated significant increases in coaches' post-workshop (compared to baseline) mean ranks for three of the four self-efficacy measures ($p \leq 0.013$). A structured workshop significantly improved self-efficacy towards the implementation of the 11+ program in youth soccer coaches.

KEY WORDS: Neuromuscular training, implementation, FIFA 11+, soccer, knowledge translation, behavior change

INTRODUCTION

The 11+ is an exercise program designed to prevent soccer injuries. It is a 20-minute structured neuromuscular warm-up exercise program that comprises running, strength, plyometric, and balance exercises (35). The 11+ program was developed in 2006 (5) and the first randomized controlled trial (RCT) examining its efficacy in reducing the risk of soccer-related injury in youth was published in 2008 (35). The program has since been widely researched for its injury prevention (4, 27, 34) and performance benefits (2, 6–10, 38). In female youth soccer players, the 11+ has been shown to reduce the risk of all injuries (35, 38), lower extremity injuries (38) and overuse and severe injuries (35) when the program is performed at least twice per week. The 11+ program has been shown to significantly reduce the risk of all injuries and lower extremity injuries in male and female youth and adult soccer (1, 27, 34, 36, 40). Coach-led delivery of the 11+ is currently demonstrated as the most effective method of real-world implementation (39). However, to maximize program effectiveness, coaches will need to ensure adequate program adherence in their teams, that is, completing the program 2x or more every week and proper movement techniques when completed (16, 37, 38). Soccer coaches are expected to replace their usual warm-up programs with the 11+. As team managers, they are responsible for coordinating the execution of the 11+ exercises before practice and game sessions in their teams.

Despite extensive evidence supporting the 11+ for injury prevention, bridging the gap between the research setting and everyday practices in the community remains a problem (19, 28, 39). In a cross-sectional study involving 260 Division I male youth soccer players (<20 years) in Nigeria, the level of awareness of the 11+ program was 21% among players (26). In studies conducted in Australia (12) and Germany (43), 11+ awareness among youth soccer coaches was 58% and 43%, respectively. In one study, only one-third (31%) of soccer coaches reported using the 11+ and 44% of them did not follow the recommended dosage frequency of twice per week (12). Lack of coach awareness and limited use of the 11+ is likely due to the current lack of evidence-informed dissemination and implementation strategies to inform the translation of the 11+ program to routine practice among coaches. Studies to improve the real-world translation of proven injury prevention programs such as the 11+ are critical to optimize injury risk reduction in youth soccer.

The real-world implementation of the 11+ cuts across multiple socioecological levels; however, the desired behavior change of implementing (i.e., the adoption and continued use of) the 11+ is primarily at the level of the coach. Although the 11+ program is executed in youth soccer players (i.e., the targets), its application among players and the corresponding benefit of injury reduction will only happen if coaches adopt it and continue to use it as intended (i.e., adhere to it). An understanding of the psychosocial factors that drive adoption and adherence among coaches will be valuable for optimizing the 11+ implementation in real-world settings. Self-efficacy is a key psychological factor that drives behavior change. It refers to an individual's

belief or perceived capability of performing a desired action successfully; individuals with high self-efficacy are more likely to be successful in adopting a new behavior (33).

The Health Action Process Approach (HAPA) is a health behavior change model that is relevant in understanding behavior change towards an improved adoption and adherence of the 11+ among coaches (31). The HAPA Model explains that the adoption, initiation and maintenance of health behaviors is a process that comprises both motivational and volitional phases (31, 32). The motivational phase of the HAPA Model describes the formation of behavioral intention while the volitional phase addresses the intention-behavior gap, both of which appears to be the core issues in the 11+ implementation (32). An intention-behavior gap describes an individual's failure to translate intention to action; indicating that an individual intention to change and maintain a health behavior may not follow through with the actual behavior change (13, 15). In the HAPA model, self-efficacy features across all key behavior change phases, with action self-efficacy driving the motivational phase and influencing intention, whereas coping self-efficacy promotes adherence to the behavior when faced with barriers, in the volitional phase (31, 33). The HAPA model explains that people with self-doubts are more inclined to anticipate failure scenarios and abort their attempts in completing an action prematurely; however, people with an optimistic sense of self-efficacy are able to envisage success scenarios that guide the action and let them persevere in face of contextual barriers (31).

The utility of the motivational phase of the HAPA model in youth soccer coaches and players has been tested (18). In the study by McKay et al., a cross-sectional design evaluating the predictors of 11+ implementation intention in female adolescent soccer players, a strong positive association was seen between 11+ implementation intention and measures of self-efficacy with Pearson correlation coefficients of 0.84 and 0.89 (18). Cognitive and psychosocial factors such as knowledge (17, 23), perceptions (23, 42) and current warm-up practices (21) have been suggested to have both direct and indirect influence on implementation success. Furthermore, educational workshop comprising both theoretical and practical components have been suggested to enhance the implementation of the 11+ program (39). However, the effectiveness of structured coach workshops for improved 11+ implementation is yet to be substantiated and the mechanism by which such workshops potentially facilitate behavior change in coaches is not known. Based on current evidence relating to the strong relationship between self-efficacy and intention/adoption, we hypothesized that a structured workshop impacts behavior change for the adoption of the 11+ through increased participant self-efficacy.

The current study seeks to add to the body of knowledge towards improving the dissemination and implementation of the 11+ program among youth soccer coaches. The specific objectives of this study were to: (i) describe baseline injury risk perception, injury prevention expectancies using the HAPA model, and injury prevention practices and 11+ awareness among youth soccer coaches; (ii) evaluate the effects of a structured 11+ workshop on youth soccer coaches' self-efficacy; (iii) explore the relationship between baseline coach self-efficacy and intention to implement the 11+ and (iv) describe perceived barriers to the use of the 11+ program among youth soccer coaches.

METHODS

Participants

A quasi-experimental (pre-post) study design was executed. A total of 107 tier 1 – 3 and provincial U18 soccer coaches from across Canada who attended an instructional workshop during a nationwide 11+ implementation initiative were invited to participate in this study. Coaches only knew about this study at the workshop sites. Invitees attended one of four coach workshops; two of which were conducted in Calgary, Alberta, one in Toronto, Ontario, and one in Laval, Quebec in spring of 2016, before the start of soccer season. These workshops were facilitated by the Canadian Soccer Association, Public Health Agency of Canada, and the Fédération Internationale de Football Association (FIFA) as a part of a national roll out of the 11+ program. Coaches were nominated by their local associations to attend these workshops. The goal was to train these coaches as master instructors who would subsequently train other coaches in their provinces, and use the 11+ with their teams as role models for other coaches.
This study was approved by the Conjoint Health Research Ethics Board of the University of Calgary, Alberta, Canada (Ethics ID: REB16-0677). Informed consent was obtained from each study participant at the time of completing pre-workshop questionnaire. This research was carried out fully in accordance to the ethical standards of the International Journal of Exercise Science (20).

Protocol

11+ Workshop: The structured 11+ coach workshop, co-designed by FIFA and study researchers at the Sport Injury Prevention Research Centre, comprised both theoretical and hands-on practical components. Each workshop was about 3 hours in length and was completed in one day. The workshops were led by a physical therapist who is an expert in the 11+ from FIFA and assisted by members of the research team and other staff with extensive knowledge of the 11+ program from the Sport Injury Prevention Research Centre and the Canadian Soccer Association. Specifically, members of the research team and other research staff assisted with the practical aspects of the workshops. The theoretical aspect of the workshop was done in a classroom setting and included a lay overview of injury risk, mechanisms, and prevention strategies in youth soccer to improve coaches' knowledge of injury risk and increase their injury prevention expectations. The focus of the injury prevention discussion was on the 11+ as an evidence-based neuromuscular training program in youth soccer (e.g., evidence of program efficacy and effectiveness were described) and a description of the components of the 11+. The practical aspects of the workshop, conducted immediately after the theoretical part, was done in either an indoor or outdoor soccer field. The practical aspect of the coach workshop involved a practical demonstration and coach engagement in each component of the 11+. This was intended to bolster self-efficacy in coaching the 11+ program and using it with youth teams.

The workshop design targeted sources of self-efficacy that may improve coaches' ability to implement the 11+ program (3). This included enabling coaches' mastery in executing the 11+ program, reinforcing vicarious experiences among coaches and arousing positive emotions in coaches through the aforementioned processes. For example, the severity of soccer-related injuries such as anterior cruciate ligaments and long-term consequences of obesity and knee

osteoarthritis were highlighted in the theoretical aspect of the workshop to arouse positive emotions and individual coaches were given the opportunity to demonstrate the 11+ exercises and provide feedback to one another to promote their mastery of the 11+. Other aspects of the workshop intervention included educating coaches on program components and the importance of adhering to exercise volume, intensity and proper technique, including instructions on identifying correct and incorrect techniques for each exercise. They were also given copies of the 11+ program resources for reference.

The instrument used in the current study was an adapted HAPA questionnaire. Two versions of the questionnaire were generated to collect baseline (pre-workshop) and post-workshop data (Appendix 1 and 2). These questionnaires were adapted from one previously used in a study evaluating the utility of the HAPA model in predicting youth soccer coaches' and players' injury prevention behaviors (18). Specifically, additional questions about coach demographics, injury risk perception, injury prevention awareness and prevention practices were included. Other questions relating to HAPA constructs relevant to our study, for example, self-efficacy and intention questions, were used as in the original questionnaire (18, 32). The adapted HAPA questionnaire underwent several rounds of review by the study investigators and two representatives (one administrator and one coach) of a local soccer association to establish both face and content validity before it was administered to participants.

Baseline data collection included demographic information such as age and coaching experience, injury risk perception, prevention practices, awareness of the 11+ program and 11+ action and coping self-efficacy (Appendix 1). Immediately after the 11+ workshop, coaches completed a similar questionnaire that assessed injury risk perceptions, perceived barriers to using the 11+, self-efficacy constructs and their intention to use the 11+ in the next soccer season (Appendix 2).

Coach self-efficacy was measured as perceived confidence in understanding the 11+ (action self-efficacy 1: ASE1); perceived confidence in using the 11+ (action self-efficacy 2: ASE2); perceived confidence in using the 11+ with limited training space (coping self-efficacy 1: CSE1); and perceived confidence in using the 11+ with a lack of player interest (coping self-efficacy 2: CSE2). Coach behavioral intention "…to make injury prevention a priority…" and "…to complete the 11+ warm-up program…" with their teams in the upcoming soccer season was also assessed. Both baseline and post-workshop self-efficacy and behavioral intention constructs were used in exploring the relationship between 11+ self-efficacy and intention. All questions relating to these HAPA constructs were measured using a 7-point Likert scale comprising negative (1 to 3), neutral (4) and positive values (5 to 7).

Statistical Analysis

STATA version 14.2 (StataCorp; College Station, TX, USA) was used to analyze all data. The Likert scale levels used in measuring HAPA constructs were collapsed into three categories of yes (positive responses), no (negative responses) and neutral for baseline variables (due to low numbers in one or more categories and to allow comparison with previous studies). However, all the Likert scale levels of the baseline (pre-workshop) values of self-efficacy were described

(for coaches with post-workshop self-efficacy data only). Descriptive summaries [frequencies (*n*; %), means [standard deviations (SD)] or median (range), depending on data distribution] were calculated to assess demographic characteristics and questionnaire responses (i.e., 'yes' categories) relating to the coaches' injury prevention practices, awareness of the 11+, and HAPA variables (with the exception of self-efficacy) in the baseline measurements. Wilcoxon matched-pairs signed-ranks test was used to assess statistical differences between post- and pre-workshop ratings of self-efficacy. To reduce Type 1 error, alpha level was adjusted to 0.013 for the 4 hypotheses tested (i.e., for the four questions used in assessing the dimensions of self-efficacy) using a Bonferroni correction of 0.05 / 4. Change in ratings of self-efficacy (post-workshop minus baseline) was evaluated and relative frequencies of the differences were plotted. Correlations between measures of self-efficacy and intention were explored using Spearman's rank-order correlation. Finally, themes were identified from the qualitative post-workshop questionnaire responses using frequencies (%).

RESULTS

Study participation consent was obtained in 81 (76%) of the 107 coaches who participated in the 11+ coach workshops. Eight participants were excluded for not completing a baseline questionnaire. Thus, data from 73 coaches (90% of consenting participants) were retained for analysis. However, the number (*n*) of coaches involved in analysis varied between 49 and 73 for different variables. Details of participants' demographics are presented in Table 1.

Table 1. Participants' demographics (n=73)

	Median/*n*	Range/Percentage
Age (years)	38	18–66
Missing	2	2.7
Coaching experience (years)	13	1–40
Missing	9	12.3
Sex (Male)	49	67.1
Total # of Teams Coached		
1 Team	20	27.4
2 Teams	21	28.8
3 Teams	11	15.1
≥4 Teams	9	12.3
Missing	12	16.4
Highest Academic Education		
High School	7	9.6
Trade School	3	4.1
College Diploma	13	17.8
Bachelors' Degree	29	39.7
MSc/PhD	18	24.7
Missing	3	4.1
Highest Coaching Education		
Community Stream	20	27.4
Provincial C License	4	5.5
Provincial B License	12	16.4
National B License	13	17.8
A License	10	13.7
Missing	14	19.2

Perceived Injury Risk, Prevention Expectancies, Practices and Awareness at Baseline. Most coaches (*n* = 55 / 65; 85%) believed the overall risk of injury in youth soccer was high. Knee sprain (*n* = 68 / 73; 93%), concussion (*n* = 62 / 73; 85%) and fracture (*n* = 48 / 73; 66%) were perceived as the most serious injuries in youth soccer; bruise (*n* = 10 / 73; 16%) was considered the least serious (Figure 1).

Overall, 60% (*n* = 44 / 73) of coaches believed that injuries were 'quite' or 'definitely' preventable. About half (*n* = 36 / 68; 53%) of the coaches had used conditioning programs specifically aimed at injury risk reduction during practice/training sessions in the previous season. The majority (*n* = 54 / 73; 74%) of coaches knew about the 11+ program before the workshop. The vast majority of coaches with prior knowledge of the 11+ (*n* = 50 / 54; 93%) believed that the 11+ could decrease the risk of injury in soccer players. The vast majority of coaches also intended to make injury prevention a priority (*n* = 59 / 65; 91%) and complete the 11+ (*n* = 39 / 47; 83%) with their teams during games and practices in the forthcoming soccer season. Details of coaches' injury prevention practices and 11+ awareness are presented in Table 2.

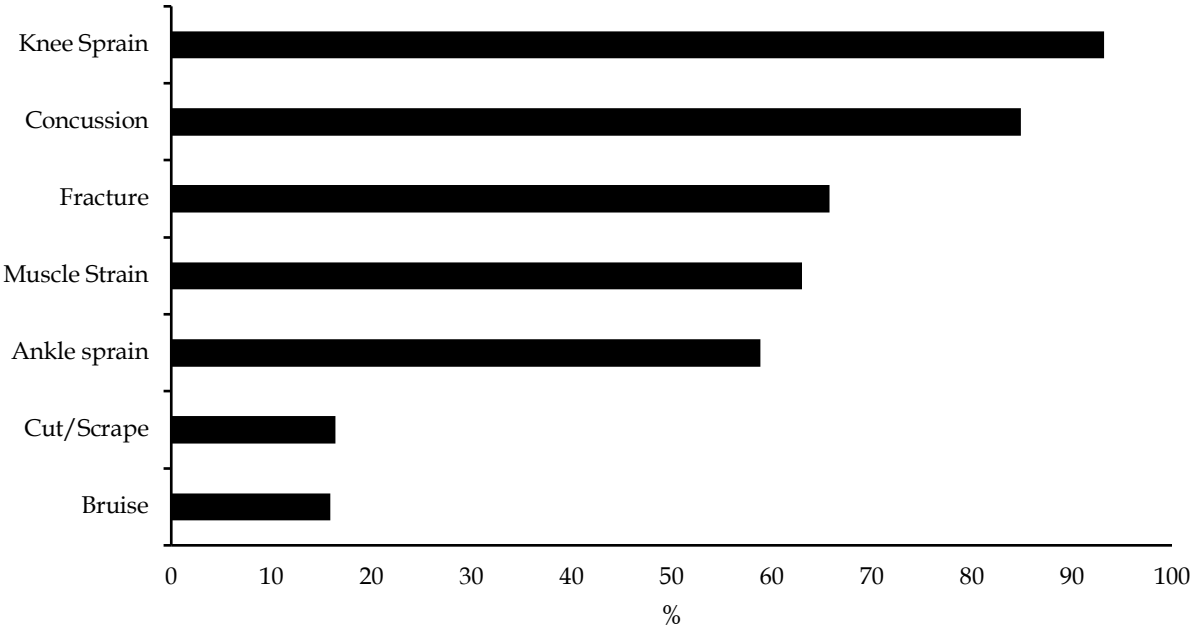

Figure 1. Proportion of coaches based on their perception of the seriousness of specific soccer injuries

Table 2. Injury prevention practices during past soccer season and 11+ awareness among coaches

Description	Total *n*	Frequency (%)	
Used conditioning programs specifically aimed at injury risk reduction during practice/training	68	36 (53)	
Conditioning programs used	36*	11+	15 (42)
		Self/club-designed	12 (33)
		Modified 11+	3 (8)
		Stretching routine	2 (6)
		Proprioception	1 (3)
		No response	3 (8)
Learned sports safety	73	55 (75)	
Sources**	55*	Sports trainer	27 (49)
		Book, magazine	26 (47)
		Fellow coach	19 (35)
		CPD	11 (20)
		Internet resources	10 (18)
		Television	9 (16)
		Friend	4 (7)
		Parent	0 (0)
Prior knowledge of the 11+ before workshop	73	54 (74)	
Sources**	54*	Internet resources	20 (37)
		Fellow coach	20 (37)
		Book, magazine	8 (15)
		CPD	8 (15)
		Sports trainer	7 (13)
		Television	2 (4)
		Friend	1 (2)
		Parent	1 (2)

* Here, n is number of coaches with positive response to preceding question; **More than one selection allowed, hence n or % does not add up; CPD, continuing professional development

Effects of the Workshop on Coaches' Perceived Self-Efficacy. Before the 11+ workshop intervention, a substantial proportion of the coaches reported being confident (i.e., slightly, quite or extremely confident) in all four measures of self-efficacy (Figure 2). Of the four measures of self-efficacy (baseline), ASE2 had the highest proportion of coaches with "extremely confident" response (n = 13 / 52; 25%) while ASE1 had the highest proportion of coaches with "extremely not confident" response (n = 8 / 51; 16%). The effects of workshop on coaches' self-efficacy are shown on Figure 3. Forty percent to 55% of coaches had at least one unit increase (range = 1 to 6 units). Twenty-nine percent to 48% of the coaches did not have a change in measures of self-efficacy and 10% – 24% had at least one unit decrease (range = -1 to -3 units). Post-workshop mean ranks of coaches' ASE1 ($p < 0.001$), ASE2 ($p = 0.013$) and CSE2 ($p < 0.001$) were significantly

higher than baseline values. No significant difference was found between post-workshop and baseline mean ranks regarding CSE1 (p = 0.059).

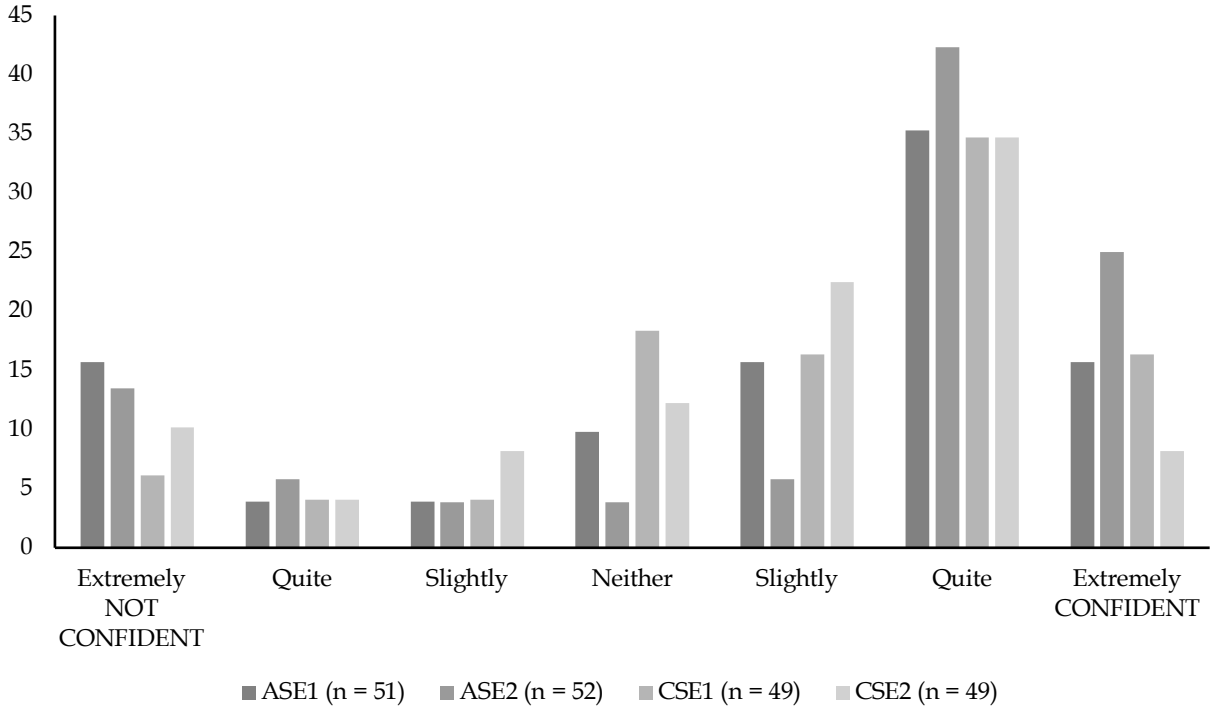

Figure 2. Proportion of coaches' self-efficacy at baseline
ASE1: Action self-efficacy based on coaches' confidence in their understanding the 11+ program
ASE2: Action self-efficacy based on coaches' confidence in their ability to use the 11+ program
CSE1: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance of limited space
CSE2: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance of players' lack of interest

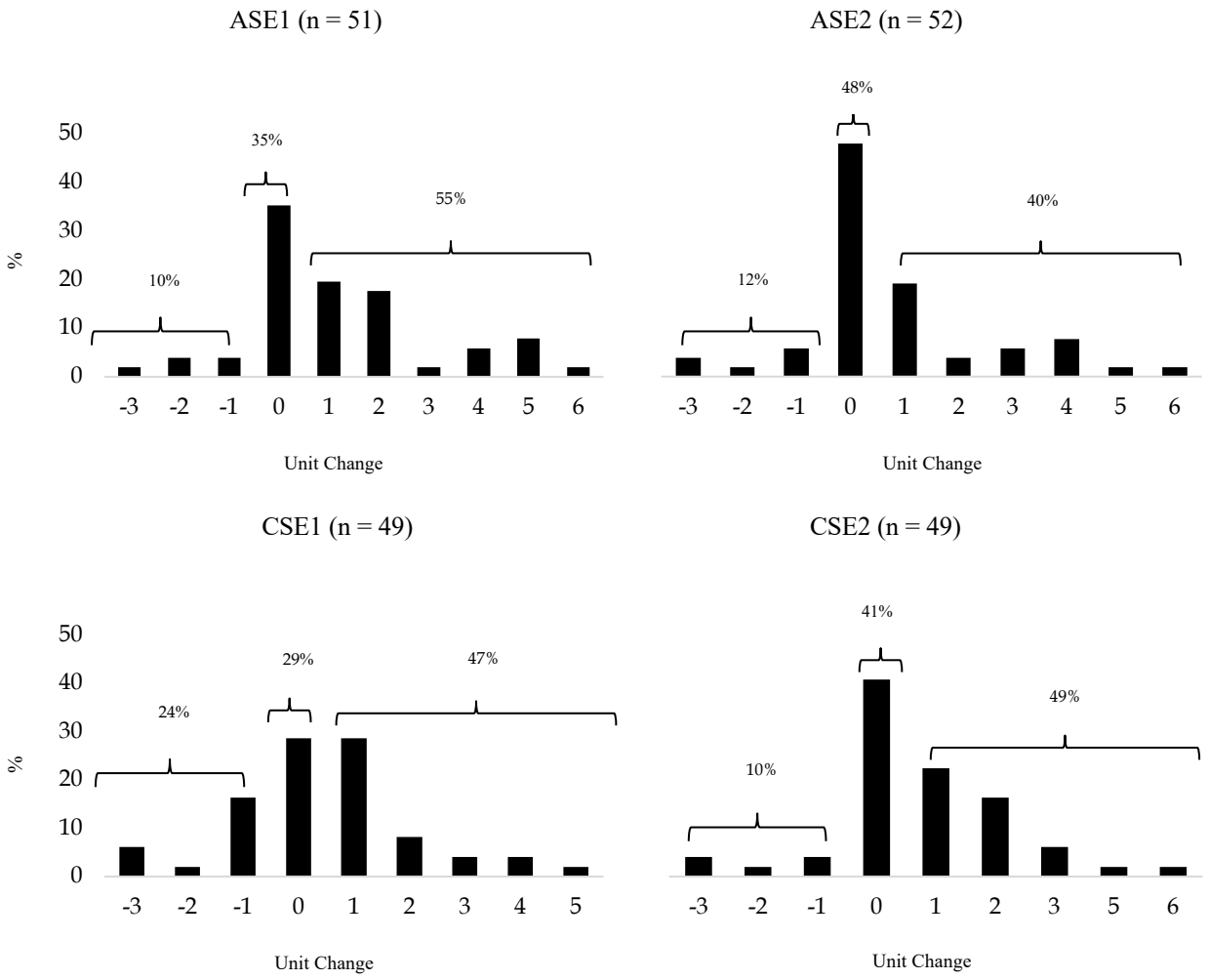

Figure 3. Distribution of change in coaches' perceived self-efficacy (post-workshop minus baseline)
Positive values mean increased self-efficacy while negative values mean decreased self-efficacy
ASE1: Action self-efficacy based on coaches' confidence in their understanding the 11+ program
ASE2: Action self-efficacy based on coaches' confidence in their ability to use the 11+ program
CSE1: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance of limited space
CSE2: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance players' lack of interest

Relationship between Self-Efficacy and 11+ Intention. Results of the exploratory Spearman correlation indicated that there were positive correlations between measures of coach self-efficacy and intention to implement the 11+ in all baseline and post-workshop constructs (Table 3).

Table 3. Correlations#* between Coach Self-Efficacy and 11+ Implementation Intention

Measures of Self-Efficacy	"…intend to make injury prevention a priority…"	"…intend to complete the 11+ warm-up program…"
Baseline (n = 64)		
ASE1	0.42	0.31
ASE2	0.38	0.41
CSE1	0.52	0.46
CSE2	0.40	0.40
Post-Workshop (n = 55)		
ASE1	0.39	0.18
ASE2	0.36	0.27
CSE1	0.29	0.33
CSE2	0.37	0.54

#Correlations (r_s) are based on Spearman's rank-order correlation coefficients
*$p<0.05$ for all correlations except for ASE1 vs. "…intend to complete the 11+ warm-up program…"
ASE1: Action self-efficacy based on coaches' confidence in their understanding the 11+ program
ASE2: Action self-efficacy based on coaches' confidence in their ability to use the 11+ program
CSE1: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance of limited space
CSE2: Coping self-efficacy based on coaches' confidence in using the 11+ program in the instance players' lack of interest

Potential barriers to the use of the 11+ program. The most frequently reported barrier was time constraint (49.2%). Other notable barriers were lack of player interest and limited space (Table 4).

Table 4. Perceived barriers to the use of the 11+ program (n = 58)

Barrier	Frequency (%)
Time constraints (space/facility time)	30 (51.7)
Lack of player interest/buy-in	6 (10.3)
Lateness of players to games/practices	6 (10.3)
Limited space	5 (8.6)
Additional cost of running program/renting space	4 (6.9)
Program monotony	2 (3.4)
Injuries in players	2 (3.4)
None	2 (3.4)
Lack of field staff	1 (1.7)
Illnesses in players	1 (1.7)
Poor weather	1 (1.7)
Lack of hard copies of program materials	1 (1.7)

*Multiple responses were considered in frequency distribution (i.e., participants provided more than one answer), hence total % does not add up to 100.

DISCUSSION

This study described baseline psychosocial variables in a sample of youth soccer coaches across Canada. Furthermore, it evaluated the effects of a structured workshop on measures of self-efficacy, assessed potential barriers to implementing the 11+ program and explored the relationship between self-efficacy and intention among coaches. The study provides knowledge on key psychosocial factors for improved dissemination and implementation of the 11+ program among youth soccer coaches. In the present study, 74% of the coaches were aware of the 11+

before the workshop. This proportion is higher than results from youth soccer coaches in Australia (58%) and Germany (43%) (12, 43). The 11+ program is the most popular neuromuscular training injury prevention warm-up globally, given the extent to which it has been researched in the sport injury prevention field (25) and the promotion it receives at FIFA's international tournaments. It is plausible that coaches are becoming more aware of this program; this is a possible reason for the higher proportion of coaches with knowledge of the 11+ in the current study. Further, the study participants were elite coaches nominated by their local association to attend the workshop and become 11+ ambassadors, this could have also contributed to higher 11+ awareness. It is interesting to note that the 11+ was a popular choice among coaches that used a conditioning program in the previous year. This is a positive finding as awareness is an initial first step towards the successful implementation of evidence-based interventions in community settings (41).

Coaches' baseline injury risk perceptions are consistent with previous findings suggesting that youth coaches are aware of the high risk of injuries in soccer (23, 24). Coaches' injury prevention outcome expectancies reflects the established efficacy and effectiveness of the 11+ in injury prevention, as most coaches believed that using the 11+ would prevent injuries. These findings agree with existing literature (14, 15, 22, 23, 30, 42) and they demonstrate that community coaches hold strong positive beliefs for injury prevention practices. These coach attributes provide a "fertile ground" for the optimization of 11+ implementation. The high proportion of coaches having high 11+ implementation intention at baseline also aligns with previous studies, suggesting that youth coaches are generally receptive to injury prevention initiatives (23, 42). However, the likelihood of behavioral intention falling short of implementation expectations in coaches is high (15). This underpins the need for more research directed at a better understanding of post-intention behavioral determinants in coaches.

This study showed that a structured workshop was related to an improvement in self-efficacy towards the implementation of the 11+ program in a cohort of youth soccer coaches that already had high levels of self-efficacy. While high levels of self-efficacy were reported at baseline, the 11+ workshop further improved the measures of coach self-efficacy evaluated in the current study. Coaches' confidence in their understanding of the 11+ and ability to use it, even in the face of potential barriers such as lack of player interest, significantly improved from the baseline level. Our findings are relevant for future 11+ implementation planning. Our results corroborates Frank et al.'s findings, revealing that a coach workshop increased elite-level soccer coaches' behavioral determinants and intention to implement an exercise-based anterior cruciate ligament injury prevention program (15). The descriptive analysis of the change in self-efficacy from baseline to post-workshop, in the current study, provides insights on the degree to which self-efficacy could be improved in coaches – ranging from a 1-unit change to a 6-unit change, altogether amounting to 40 to 55% improvement in self-efficacy. The lack of improvement in some coaches and majority having 1- or 2-unit increases in self-efficacy may be a result of many of the coaches already having a high perceived self-efficacy at baseline (reporting "quite" or "extremely" confident responses). It would be interesting to know, in future studies, if increases in perceived self-efficacy following a structured workshop are much higher in community coaches with less experience as in the studied sample.

Based on the HAPA model, the relatively high baseline 11+ and soccer injury risk awareness, positive expectations regarding 11+ injury prevention effects, and an enhanced post-workshop self-efficacy demonstrated by the coaches suggests they may be more primed to initiate action towards implementing the 11+ program in their teams. However, these theoretical inferences cannot be established in the current study, given its cross-sectional design. Prospective and longitudinal studies are needed to determine if high values in baseline psychosocial factors and improvements in self-efficacy lead to actual program adoption, adherence and maintenance over time.

Similar to McKay et al.'s findings (18), our results showed positive correlations between all the four measures of coach self-efficacy and intention to implement the 11+. This is consistent with the HAPA model in which self-efficacy is posited as a key predictor of behavioral intention (32, 33). However, given the exploratory nature of these finding, we are unable to make any extrapolations for 11+ dissemination or implementation. Future research should examine this relationship further with adequate sample size and robust statistical analyses.

The most frequently identified barrier for implementation was time constraints; half of the coaches indicated this a barrier. This finding is consistent with previous studies of the 11+ (11, 12, 18) and other exercise-based injury prevention programs (14, 21, 24, 29). In a previous study of the 11+, youth soccer coaches indicated that they did not have time to implement the 11+ and its use would take time away from other important activities of soccer training (12). One factor explaining why time constraints are perceived as a barrier is that coaches do not believe that the time spent doing the 11+ program produces enough benefits (11). Providing extensive information during 11+ workshop may help improve the perception of positive injury prevention expectancies in coaches. Consistent with previous research, limited space, lack of player interest and lateness to sessions were also identified as 11+ implementation barriers (18). Addressing contextual and interpersonal factors and integrating coping plans into workshop designs may improve program implementation.

There are some limitations to this study. First, this study used a convenience sample of coaches. Coaches were chosen to participate in the workshop, following which they would become trainers for other coaches in their clubs. Also, coaches demonstrated high levels of self-efficacy at baseline. This limits the generalizability of our findings with respect to the general population of community coaches in youth soccer. However, the sample frame for the current study is reflective of elite youth soccer coaches. Second, the current study employed a cross-sectional design so we were unable to determine whether self-efficacy was maintained over time and if higher levels of self-efficacy actually translated into 11+ adherence and maintenance. As earlier mentioned, cohort and longitudinal research designs are needed to determine these longer-term outcomes, including evaluating the effect of potential interactions between implementation context and self-efficacy on adherence among coaches. Third, considering that baseline and post-workshop questionnaires were administered to coaches directly by researchers and research staff, social desirability bias is conceivable. The extent to which this impacted our findings was not assessed given the cross-sectional design of our study. Finally, we had missing

data in many of the study variables, and this resulted in a lower sample size for specific variables of interest, potentially impacting our findings on the effect of the structured 11+ neuromuscular training warm-up workshop on coaches' self-efficacy (i.e., resulting in reduced power to detect a change). Nevertheless, three of the four constructs evaluating self-efficacy in the coaches demonstrated a significant improvement from baseline values.

Considering the complexity of implementing evidence-based interventions in community settings, a multifaceted approach (combination of multiple strategies) is imperative for the successful implementation of the 11+. This study highlights the importance of 11+ self-efficacy among coaches and supports the use of a structured coach workshop intervention as one of several discrete strategies when considering a broad-scale implementation of the 11+. Further research is required to know how much this type of workshop contributes to eventual program adherence and maintenance, given the impact of other contextual factors that potentially moderate implementation outcomes. Specific strategies for tackling contextual barriers to the implementation of the 11+ in youth soccer, mainly, time constraint, limited space and lack of player interest, are warranted.

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