

Coach development programmes to improve interpersonal coach behaviours: a systematic review using the re-aim framework

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► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bjsports-2015-094634>).

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Accepted 19 April 2015
Published Online First
7 May 2015

ABSTRACT

Objective Although evidence supports the effectiveness of interpersonal Coach Development Programmes (CDPs), which are designed to foster coach–athlete relationships, an intervention's impact is shaped by numerous factors over and above effectiveness. The purpose of this systematic review was to examine the extent that published articles describing interpersonal CDP trials reported on indicators of internal and external validity, as conceptualised in the RE-AIM framework (ie, Reach, Effectiveness, Adoption, Implementation and Maintenance).

Methods The search strategy was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines, involving a database search and supplemental manual search of key articles and journals. After initial screening, the full-text search strategy involved identifying articles describing CDP trials and then selecting a specific subgroup of articles involving interpersonal CDP trials and excluding ineligible articles. Resulting trials were coded using a 47-item sport coaching adaptation of the RE-AIM coding sheet.

Results 17 published articles met eligibility criteria, representing 10 distinct CDP trials. After attaining coder agreement, global ratings of RE-AIM indicators within interpersonal CDP trials ranged from the low to moderate quality. Whereas indicators of effectiveness and implementation were reported to some extent across all studies, maintenance within sport organisations and a number of specific indicators from across dimensions were rarely reported.

Conclusions These findings inform the future design and evaluation of CDPs that have the potential to be adopted in numerous settings and reach athletes and coaches who can most benefit.

Ranging from when a child first enters sport through to Olympic competition, athletes' personal development is fundamentally shaped by coaches. Experiences with coaches are not inherently positive, however and poor coach behaviours may have profoundly negative influences on athletic development (eg, burnout¹). With this understanding in mind, coach education mandated by governing bodies is going through a period of growth, and several national sport organisations have developed coaching curriculum encompassing numerous topics—often with intent to improve professional knowledge or ensure coaching ethics and safety.²

As evidenced by the international efforts for coach education, there is applied interest in how to develop *effective* coaches.

Applied to the realm of youth sport, effective coaches are those who combine their professional knowledge (eg, tactics and technique) with their knowledge about forming coach–athlete relationships and personal reflection to facilitate athletes' personal, social and athletic development.^{3–4} This focus toward optimising development highlights the importance of coach–athlete relationships in youth sport. Notably, supportive coaching relationships promote athletes' development of positive psychosocial assets such as confidence and autonomous motivation^{5–7} and protect against negative outcomes such as burnout.^{1–8} Coaches also manage the social bonds within a team that may ensure return to a team in the future.^{9–10} Behaviours used to manage relationships and team environments are thus a vital coach competency, and are referred to as *interpersonal* coaching behaviours.

Whereas interpersonal behaviours are occasionally targeted in certification programmes as one of numerous coach competencies,² they are also the focus of interventions by sport psychology researchers to promote mastery-supportive, transformational or autonomy supportive coach behaviours (eg, Mastery Approach to Coaching¹¹ or Empowering Coaching¹²). Several terms are used to describe these efforts (eg, interpersonal intervention¹³), however the term *interpersonal coach development programmes* (CDPs) is an encompassing term to describe learning activities applied systematically through education, social interaction and/or personal reflection with the goal of changing interpersonal coach behaviours. In contrast with CDPs involving other outcomes such as injury prevention,¹⁴ interpersonal CDPs address the coach–athlete relationship, with the assumption that athletes and coaches will experience psychosocial benefits and positive relationships with teammates and others in the team setting.

In light of this developing field, Langan *et al*¹³ conducted a systematic review to evaluate the effectiveness and intervention quality reported in interpersonal CDP trials. Importantly, conclusions about effectiveness were hindered by limitations to intervention design, diverse intervention approaches and measurement of differing coach and athlete outcomes. Langan *et al*¹³ nevertheless pointed-out evidence that several interpersonal CDP trials changed coaches' observable behaviours,



To cite: Evans MB, McGuckin M, Gainforth HL, *et al*. *Br J Sports Med* 2015;**49**:871–877.

and their athletes reported positive outcomes (eg, reduced anxiety, mastery orientation, intention to return). Although these findings provide theoretical insight about coach–athlete relationships, the most direct application of CDPs is practical: can interpersonal CDPs that are shown to be effective be disseminated on a larger scale?

Although application of interpersonal CDPs on broader levels is a logical progression, translating effective interventions into practice is often challenging—especially so within complex environments with limited resources.¹⁵ To improve this process, researchers in areas such as physical activity promotion¹⁶ and nutrition¹⁷ design and evaluate interventions with a focus on whether they can be generalised and are practical for long-term change (ie, external validity) as opposed to solely assessing effectiveness (ie, internal validity).

The RE-AIM framework is a specific approach used to assess internal and external validity of an intervention. The framework outlines five dimensions that influence the generalisability and impact of interventions in the real world, including Reach, Effectiveness, Adoption, Implementation and Maintenance (see Glasgow *et al*¹⁵ and <http://www.re-aim.org>). Applied to interpersonal CDPs, this framework would ask questions such as: (1) Reach: What is the total number and proportion of coaches and athletes reached through a CDP, and are they representative of the target population?; (2) Effectiveness: What are the positive and negative outcomes for coaches who participate, as well as their athletes?; (3) Adoption: How many sport organisations are willing to use the CDP, and are they representative?; (4) Implementation: What are the costs of a CDP, and is it being delivered as intended?; (5) Maintenance: Are coach and athlete outcomes maintained, and do organisations continue using the CDP over several seasons?

Using the RE-AIM framework to develop, describe and evaluate interpersonal CDPs may inform continued research by providing a direction to guide intervention development.¹⁸ The applicability of the RE-AIM framework to sport research is supported by recent adaptations of the framework to develop and evaluate interventions to mitigate athlete injuries¹⁴ or promote youth physical activity.¹⁹ In the field of psychology and sport coaching, the only existing use of the RE-AIM framework was applied by Van Hoye *et al*²⁰ who used only three of the five dimensions to describe the adoption, implementation and maintenance of coach educators being trained to provide an interpersonal CDP for youth sport coaches. To establish an agenda to ensure broader impact on coach education and policy, it is essential to understand how dimensions of the RE-AIM framework are reported in interpersonal CDP research. The purpose of the current systematic review paper was to examine the extent that articles describing interpersonal CDP trials report on internal and external validity characteristics.

METHODS

Published studies detailing the implementation of CDP trials were reviewed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines²¹ and the process is detailed within [figure 1](#); the current review protocol was not registered prior to conducting the review. Following an initial search phase that identified coach education programmes involving a wide range of coach behaviours, the subsequent search phases focused specifically on *interpersonal* CDP trials. The reporting of RE-AIM dimensions across the resulting group of studies was evaluated.

Search process

Selecting CDP's

The initial process involved selecting a broad range of CDP trials before identifying those that targeted interpersonal coach

behaviours. As a result, broad inclusion criteria ensured the broadest spectrum of CDPs (see [table 1](#)). The search protocol involved a search of electronic databases using EBSCOHost online databases SPORTDiscus and PsychINFO. The search was conducted in September 2014, and was updated in December 2014 to ensure all relevant literature was obtained. The search query combined four groups of terms to ensure that retrieved sources involved the sport context (Group 1: sport), referred to coaching (Group 2: coach*), involved an effort to influence coach behaviour (Group 3: educat*, development, skill*) and finally, that the retrieved sources referred to some kind of intervention (Group 4: intervention*, program*, course*, train*). The database search identified 1579 potentially relevant citations, which were transferred into a folder where initial selection and reduction was conducted independently by the second author (MM) along with a paid research assistant. Any differences in opinion when applying inclusion criteria at the level of title and abstract were discussed between the two researchers, and 72 articles remained after this process.

The lead author (MBE) reviewed the selection process and supplemented the main search to retrieve articles that were missed in the primary search. Additional articles were identified by screening the reference lists of retrieved articles, as well as a manual search of 10 relevant peer-reviewed journals. The list of journals is provided in the online supplementary materials. This process uncovered 26 additional articles for full-text review, and the full texts of 98 articles were reviewed, which were reduced to 61 articles after applying inclusion criteria.

Identifying interpersonal CDP trials

The subsequent selection process involved applying exclusion criteria when reading full-texts of the 61 CDP articles, to identify those that focused on changing coaches' interpersonal behaviours. Using the operational definition presented earlier in this manuscript, MM and MBE identified 29 articles describing interpersonal CDP trials. Exclusion criteria were then applied to identify articles that did not meet criteria for RE-AIM coding and reviewing the final list as an authorship team. Seventeen articles remained after applying exclusion criteria. It is important to note that there were five cases where several publications were based on a single trial.^{11–12 20 22–30} On the other hand, five trials were each published in a single article.^{9 31–34} In cases where a single trial was published numerous times, articles were combined so that coding was applied to the available articles of each single trial, similar to the approach used by O'Brien and Finch.¹⁴ Each single article or collection of articles based on one CDP investigation will, thus, be referred to as a 'trial.'

RE-AIM coding

Coding sheet

The RE-AIM coding sheet for publications was used to code reporting regarding each trial and has been developed over time through reviews across several research domains.^{35–38} Among the differing coding sheets used in past research, the current coding sheet was based on the RE-AIM coding used in the reviews of Harden *et al*.^{39 38} The coding sheet included a general section for reporting descriptive study characteristics followed by a series of yes/no indicators for each RE-AIM dimension. We adapted the coding sheet by removing irrelevant items and by changing wording to reflect the sport coaching context—this is typical in RE-AIM evaluations of interventions spanning novel domains, including reviews by Allen *et al*³⁷ as well as Galaviz *et al*.³⁸ As an example of adapting the coding sheet, an effectiveness indicator titled '*Comparison to public health goal*'

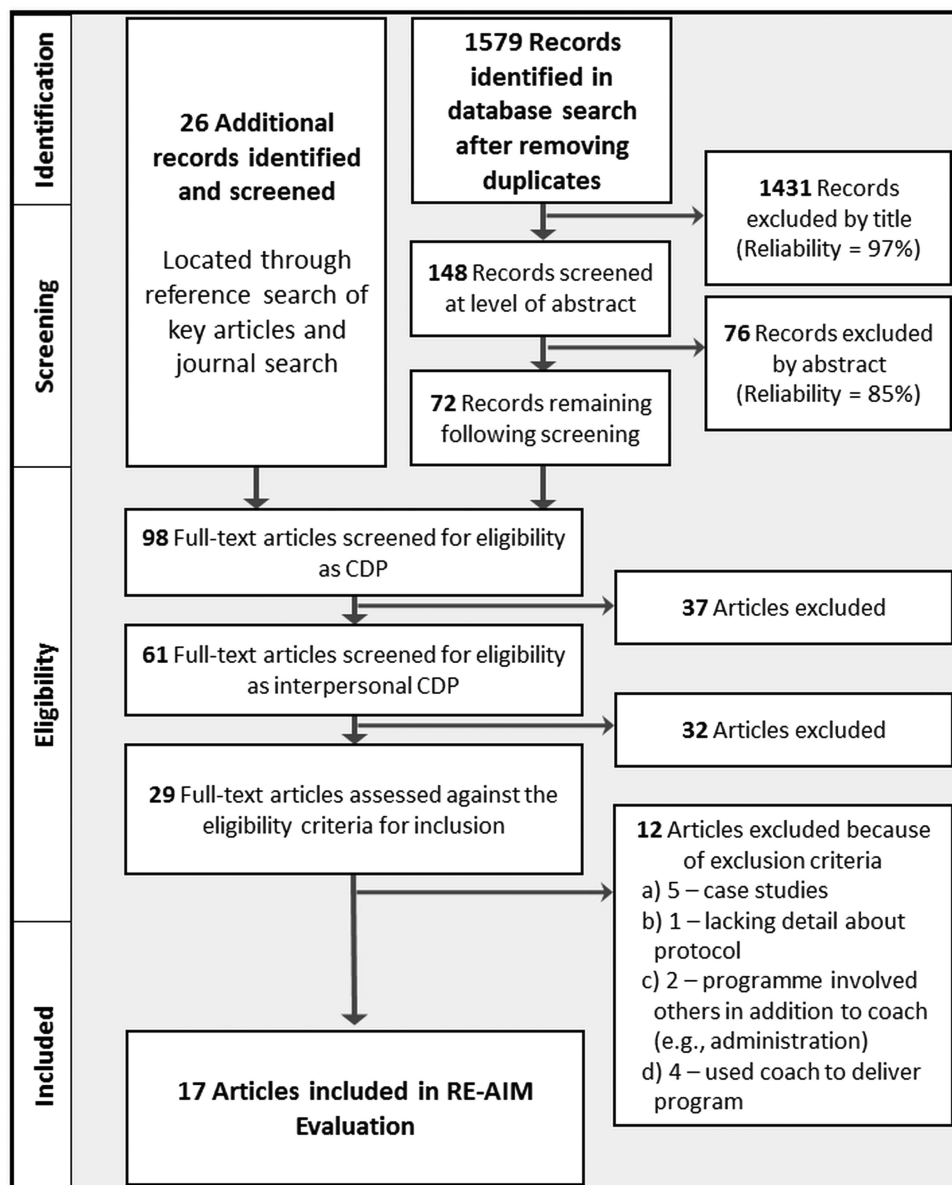


Figure 1 Systematic review flow chart.

in the original coding sheet (for physical activity interventions) was removed because it was not relevant for coach behaviour.

Changes to the coding sheet were also made in relation to a critical discussion by O'Brien *et al*⁴⁰ that identified that sport researchers applying the RE-AIM framework need to: (1) Distinguish who the 'participant' is (eg, is the coach a *participant*, is the coach *delivering* the intervention, or does the coach take-on *both* roles) and (2) Distinguish levels where outcomes may occur (eg, CDPs may influence coach behaviour and personal outcomes, coach knowledge and/or athlete outcomes). Reach, effectiveness and maintenance indicators were conceptualised at both the athlete and coach levels⁴¹ and were thus adapted to include separate columns. The resulting coding sheet included 47 items and is provided in the online supplementary materials. Coding for each dimension is described below.

Reach. Each trial was coded for reach using 11 indicators. These indicators assessed whether a target population was identified, and whether the trial reported on characteristics such as demographic information, inclusion criteria and participation rate. As an example of coding, the criteria for adequately

reporting the target population were met when trials not only described the study sample of coaches and athletes, but also the broader target population from which the sample was taken (eg, what was the nature of coaches who were targeted?). With this in mind, although none of the trials described the target population, participation rate was nevertheless calculated when trials reported the sample size along with the number of coaches who were exposed to recruitment. An important modification to the reach section was that indicators were coded separately according to coach and athlete levels.

Effectiveness. The nine key indicators of effectiveness were also recorded at both the athlete and coach levels. Effectiveness indicators included, for example, whether the trial assessed primary outcomes, conducted mediation or moderation analysis and involved qualitative evaluation of effectiveness. Participant attrition and assessment of coaches who left the CDP were also key indicators.

Adoption. Eleven adoption indicators related to descriptions of where the CDP was conducted and who conducted it, along with characteristics of the organisations involved. An additional key indicator was adoption rate, calculated by dividing the

Table 1 Inclusion and exclusion criteria for articles

Component	Inclusion criteria	Exclusion criteria
Date range	January 1980 to December 2014	–
Language	English-language journals only	–
Intervention type	Descriptions or evaluations of a CDP (ie, an intervention conducted with coaches, and which aims to improve specific types of coach behaviour)	–
Primary outcome	Coach behaviour (observed or self-reported), athlete/coach perceptions of team environment, athlete/coach psychosocial outcomes, athlete participation in sport, coach knowledge	–
Study design	Ranging from randomised controlled trials to efficacy trials and qualitative research	Case studies or incomplete descriptions of study protocol
Target population	Coaches of sport teams were the target population receiving CDP	Trials where coaches were also used to deliver the intervention
Focus of intervention	–	Interpersonal CDP: those directed toward changing coach behaviours used to manage relationships and the team environment
Level of intervention	–	Trials where coaches were only one of several groups targeted (eg, intervention with coaches and organisation administrators)
Detail about study	–	Limited detail regarding protocol

Inclusion criteria were applied throughout the search process (ie, identification, screening, eligibility), whereas exclusion criteria were applied to assess the eligibility of 29 articles identified as interpersonal CDPs.
CDPs, Coach Development Programmes.

number of participating settings (eg, sport organisations) by the total number of settings recruited. Adoption was not coded separately for coach educator and setting levels, and both levels are integrated within the overall adoption dimension.

Implementation. Nine implementation indicators ranged from identifying theory when developing the CDP, to whether the trial reported on important characteristics to describe the implementation process (eg, number of contacts with coach; participant attendance). Cost and reporting the extent the CDP was delivered as intended were two additional key indicators.

Maintenance. Seven maintenance indicators were separated at individual and setting levels. At the individual level, CDP's were evaluated according to whether outcomes and attrition among coaches and athletes were assessed later in the season (eg, after the intervention) or during the following season. At the setting level, maintenance referred to whether the trial reported the extent that a CDP was continued and institutionalised within the organisation or by coach educators.

Coding protocol

Two coders (MM and MBE) independently pilot-coded a single paper by answering yes/no questions and providing descriptions about the extent each indicator was evident. After discussing the coding process and coming to consensus, the authorship group amended the coding protocol. The coding sheet was then independently conducted for each trial by MM and MBE, and reviewed by the authorship team. Coder agreement was assessed using the κ statistic averaged across each dimension.⁴² The lowest agreement was for reach ($K=0.60$, ± 0.09), whereas the highest agreement was for individual level maintenance ($K=0.87$, ± 0.08); setting-level maintenance was never reported on, so it was not assessed for reliability. Provided that this represents inter-rater agreement ranging from 82% to 94%, there was agreement across dimensions. Intra-rater reliability was also calculated by comparing the coding of a single CDP trial across two time points (eg, initial coding compared to coding at a later time), and agreement ranged from 81% to 100% ($K=0.61$ to 1.0) for each dimension across both coders.

Coding analysis

All 47 items from the coding sheet were used to generate descriptions of how each RE-AIM dimension was reported on—in the

written results and in [table 2](#). Whereas 27 of these items were coded primarily to establish descriptive reflections on each trial (eg, 'did the trial report moderators within the results'), the remaining 20 items were distinguished as key indicators to calculate RE-AIM reporting. Similar to an approach used by Galaviz *et al*,³⁸ calculating RE-AIM reporting based on the degree that CDP trials reported 20 consistent indicators may allow coding frequencies to be contrasted with future reviews, and means that frequency values were based on well-established indicators. Whereas 21 items are typically used, the original effectiveness item 'reported quality-of-life or potential negative outcome measures' was not relevant in the current context. By calculating the number of key indicators reported, each CDP trial was assigned a collective score out of 20 and classified within a quality range from low (0–6), moderate (7–13) and high (14–20).³⁸ Effect sizes were not calculated for the purposes of assessing effectiveness, as the wide array of intervention designs and differing dependent variable choices make such comparisons difficult (for a detailed description of the reporting of effect sizes across interpersonal CDP trials, see Langan *et al*¹³).

RESULTS

Across the 10 unique trials described, researchers applied primarily quasi-experimental designs with non-random assignment of coaches to condition, focusing on effectiveness in terms of athlete and coach outcomes after conducting an interpersonal CDP. As described in past research,⁴³ the interpersonal CDPs derived from theory were grounded in a small selection of theories or concepts such as achievement goal theory,⁴⁴ transformational leadership theory⁴⁵ and autonomy-supportive coaching.⁴⁶ All trials were conducted in youth or adolescent sport, and athletes ranged from recreational to competitive levels. Six trials were conducted in North America, three were conducted in Europe, and one was conducted in New Zealand.

Interpersonal CDP trials provided low-to-moderate information across RE-AIM dimensions (ie, reporting 5–10 of 20 key indicators). All trials reported at least one indicator in relation to dimensions of reach, effectiveness and individual-level maintenance. In contrast, adoption went unreported entirely by two trials and setting level maintenance was discussed by a single trial. Furthermore, reporting differed when comparing athlete and coach levels (eg, reach indicators were reported at a

Table 2 RE-AIM indicator reporting across interpersonal CDPs

Indicators	Frequency of indicators reported across 10 interpersonal CDP trials	
	Coach level	Athlete level
Reach	Coach level	Athlete level
Description of target population	0	0
Inclusion criteria	4	2
Exclusion criteria	0	0
Participation rate	7	2
Characteristics of participants/non-participants	0	0
Total proportion	22%	8%
Effectiveness	Coach level	Athlete level
Measurement of coach/athlete outcomes	7	9
Assessed non-completers (eg, CDP dropouts)	2	1
Percent attrition by programme completion	8	4
Total proportion (%)	57%	47%
Adoption	Setting level	
Description of CDP location	0	
Description of staff who delivered CDP	8	
Method to identify staff who delivered CDP	1	
Expertise of staff who delivered CDP	5	
Inclusion/exclusion criteria of sport organisations and/or staff who delivered CDP	2	
Adoption rate	2	
Total proportion (%)	30%	
Implementation	Setting level	
Number of contacts with coach(es)	7	
Extent protocol delivered as intended	1	
Measure of cost	0	
Total proportion (%)	27%	
Maintenance (individual level)	Coach level	Athlete level
Coach/athlete outcomes assessed near end of season, or during the following season	7	9
Total proportion (%)	70%	90%
Maintenance (setting level)	Setting level	
CDP maintained sport organisations	1	
Cost to maintain CDP	0	
Total proportion	5%	

CDPs, Coach Development Programmes; RE-AIM, Reach, Effectiveness, Adoption, Implementation and Maintenance.

proportion of 22% for coaches, and 8% for athletes). Although indicators regarding qualitative methods were coded for every RE-AIM dimension, three trials reported qualitative methods to evaluate effectiveness and only one trial reported qualitative data regarding other dimensions (ie, implementation and maintenance). Furthermore, although indicators were assessed for reporting cost across three dimensions, none of the trials reported on cost to adopt, implement or maintain an interpersonal CDP. Each trial is identified and described regarding each RE-AIM dimension in the online only supplementary material, and the prevalence of reporting the 20 targeted indicators across all CDP trials is illustrated in [table 2](#). The following sections describe results across each dimensions of the RE-AIM framework.

Reach

Although all trials reported demographic information about coach and athlete participants, none of the trials defined their target population beyond general characteristics (eg, youth sport coaches) compared to the criteria needed to describe a target population. For example, in a description of a target population, a study may target inexperienced volunteer soccer coaches (and their male and female players aged 10–12) within a specific geographic region. None of the trials contrasted demographic

characteristics of members of the target population who did not participate in the CDP with CDP participants. Furthermore, athlete-level inclusion criteria and participation rate was less frequently reported compared to reporting at the coach level. Regarding notable reporting, one trial⁹ indicated that a member of the organisation was used to extend reach during recruitment—resulting in the recruitment of a larger number of coaches than the researcher attained while recruiting alone. This provides an example of efforts to extend the reach of that interpersonal CDP.

Effectiveness

Among all RE-AIM dimensions, effectiveness appeared to be the most commonly reported. Athlete outcomes were assessed by nine trials and ranged broadly (eg, self-esteem, precompetitive anxiety, performance), whereas coach outcomes were reported in seven trials and generally related to self-reported coach behaviour or observed coach behaviours.

Although mediation analyses were not reported, three trials indicated moderators including the effect of athlete age or gender on the effectiveness of the interpersonal CDP. Effect sizes of results were, however, only reported in two trials and, although a column within the coding sheet was reserved for assessment of coaches' knowledge, none of the CDP trials

reported assessing this outcome. One notable approach related to effectiveness, which was only fully reported in one trial,^{11 27} involved comparing athletes who completed the entire protocol, with those who did not—an important indicator when assessing effectiveness.

Adoption

Although eight trials reported on the individual who conducted the CDP, only five trials indicated level of expertise and only one trial described the process of selecting the individual who conducted the CDP—who was frequently a member of the research team. Two trials provided information regarding the number of settings or coach educators who were invited to provide the CDP training, which was a necessary characteristic to calculate adoption rate. Furthermore, none of the trials provided a description of location(s) where CDP sessions took place. Regarding an additional indicator, only two trials reported that the CDP was adopted at the level of the sport organisation (eg, coaches were identified through organisation, and CDP was conducted with most coaches in an organisation). This is either an indicator of incomplete reporting, or an indicator that adoption did not take place through sport organisations and that coaches were often independently recruited and voluntarily participated.

Implementation

Seven of the trials provided a range of information detailing the CDP protocol (eg, timing, duration and frequency of contacts with coaches) as well as describing the theory underlying the CDP protocol. Whereas these indicators of 'what' was performed were relatively commonly reported, the remaining implementation indicators were less frequently reported and related to the extent the protocol was delivered as intended, attendance rates, and measures of cost. As an example of limited reporting, only a single trial²⁰ reported on how consistently a CDP was conducted. Although many CDP trials were conducted by a sole individual (eg, the researcher), the way trials were conducted may have nevertheless varied across settings or coaches, and influenced the nature of the intervention with coaches.

Maintenance

Maintenance of individual-level CDP outcomes was commonly reported across trials, and paralleled the assessment of outcomes at the coach and athlete levels. Notably, follow-up assessments to provide an indication of effectiveness generally took place later in the season or across two seasons and, as a result, provided an indication of how outcomes were maintained. A related challenge that was reported in one trial,^{28 29} was that researchers were unable to gain ethical approval to collect identifying information necessary to track individual athlete outcomes across seasons, which limited the ability to glean insights about maintenance.

In contrast to the reporting at the individual-level, a single trial^{12 20 30} assessed maintenance among educators conducting the CDP and compared those who did and did not maintain their use of the CDP over time. Still, none of the trials reported whether or not a CDP was used by sport organisations at later points in time or was institutionalised (eg, related to changes in organisational values).

DISCUSSION

Can we ensure CDPs produce positive long-term outcomes for athletes and coaches, while also being adopted and consistently used in numerous settings—reaching a large number of coaches

and athletes who *need* the education? By exploring the extent that publications describing interpersonal CDP trials reported on each dimension of the RE-AIM framework, the current review was an essential step in translating sport coaching research to practice. Although there are numerous existing efforts to review interventions involving other sport outcomes,⁴⁰ this review was the first to examine RE-AIM reporting applied to CDPs—having direct implications for research on interventions that change coach behaviour. Whereas the effectiveness of interpersonal CDPs was reported across all trials, several RE-AIM indicators were rarely reported and the dimension of maintenance within sport organisations was only reported in a single trial. The latter finding—lack of reporting on maintenance—is a particularly striking result that highlights the limited translation and application of existing interpersonal CDPs within contemporary coach education, despite their potential to influence athlete development.

These findings are in line with the tendency for research in emerging and well-established fields to under-report certain dimensions of the RE-AIM framework, as effectiveness is often the most frequently reported dimension.^{18 38 47} For example, in an evaluation of 32 school health promotion interventions, Estabrooks *et al*⁴⁸ reported that effectiveness was the only component consistently reported. Unfortunately, this focus on internal validity by means of establishing evidence of effectiveness in controlled studies limits the extent that results are suited to advise the translation into practice.⁴⁸ To advance beyond the historical focus on effectiveness, however, numerous steps must be progressed through before accurately and effectively translating interpersonal CDPs. Although research evaluating the external validity of interpersonal CDP trials is promising,²⁰ research translation should involve efforts to integrate representatives from key stakeholder groups within collaborative processes to develop and evaluate CDPs in real-life contexts.⁴⁹

Throughout these phases of translation, reporting a broader range of RE-AIM indicators is essential for guiding understanding of the impact of interpersonal CDPs, and specific indicators may gain particular importance. For example, provided that the use of individuals such as coach educators or existing organisation members to conduct CDPs may extend reach and reduce cost, it will become particularly vital to report characteristics of those who are educating coaches. With increased use of more diverse intervention approaches, it will also be essential to distinguish adoption among coach educators and adoption within broader sport organisations¹⁴—a distinction that was not made in the current review.

Similarly, whereas the cost of small researcher-led CDP trials may be challenging to calculate, such elements are essential components for understanding feasibility and will gain importance if researchers extend reach of interpersonal CDPs in the future. Furthermore, identifying the target population is an essential component for finding those who are most representative of the given population and to inform about how well the findings may translate to other populations. Without identifying and reporting a target population, it is challenging to establish inclusion and exclusion criteria—meaning that participants may not be those who require intervention.

In light of the potential for these findings to inform future research, it is vital to consider the boundaries related to the coding protocol as well as the selection of articles resulting from the systematic search process. From a general perspective, interpersonal CDP trials were generally conducted on small groups of coaches, in controlled settings led by researchers and were conducted in developed countries. As a result, the relevance of

each RE-AIM dimension is not consistent across all research contexts (eg, method to select individual conducting CDP may not seem relevant when a single researcher conducts the CDP). Furthermore, trials examined changes in a wide range of effectiveness outcomes. This variety of outcomes reflects the reality of coaching behaviours and their influence on athlete outcomes, but represents a challenge when contrasting across studies and describing key outcomes. As a result, it is vital for researchers to reflect on what fundamental outcomes should be addressed in CDP trials.

A challenge facing sport researchers that was also faced in the current study relates to the many levels that interact as interventions are conducted, ranging from athletes, parents, coaches and administrators to coach educators, sport organisations and sport governing bodies.^{40 41} Provided that dimensions of the RE-AIM framework may apply at more than one of these levels—similar to many of the trials in the current study—researchers must define the levels that are most appropriate within a specific investigation. In the current review, similarities among the CDPs reviewed meant that coding could be adapted similarly for all trials. In comparison, when coding interventions that differed widely in their design, O'Brien and Finch¹⁴ used a series of screening questions to classify interventions prior to coding (eg, was the target a parent, coach or athlete) so that RE-AIM indicators could be adapted differently across the interventions coded.

Although the current investigation focused on reporting, an important step will be to inform the development of interpersonal CDPs by exploring processes that past trials used to improve external validity—this is indeed an ultimate goal of employing the RE-AIM framework.¹⁵ As an example, Van Hove *et al*²⁰ described how establishing relationships with sport organisations and recruiting coach educators to conduct trials (as opposed to researchers) embedded the CDP within the field; improving reach and maintenance. Indeed, reviews can take a descriptive approach by revealing *how* past research successfully addressed each dimension.¹⁶ By extending beyond the discussion of how each RE-AIM dimension is reported in the current study, future reviews could develop a series of suggestions for developing CDPs that are effective while also reaching target populations and being adopted, implemented, and maintained in sport organisations.

What are the new findings?

- ▶ Interpersonal coach development programmes (ie, interventions conducted to improve coaches' relationships with athletes) have been explored within sport psychology research spanning several decades.
- ▶ Existing interpersonal coach development programme research has primarily focused on examining and reporting effectiveness, and has provided less information in regard to the other Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) dimensions.
- ▶ One particular dimension that was overlooked by nine out of ten existing trials was intervention maintenance at organisational levels (eg, by sport organisations).
- ▶ Given that reporting differed in relation to coach and athlete participant samples, it is important to distinguish the reporting of each RE-AIM dimension in relation to several levels (eg, separately considering outcomes of an intervention for athletes and coaches).

How might it impact clinical practice in the near future?

- ▶ To address issues related to internal and external validity, each dimension of the RE-AIM framework should be addressed by those conducting interpersonal coach development programmes.
- ▶ Interpersonal coach development programmes have demonstrated effectiveness in controlled settings. However, when integrating components of interpersonal coach development programmes into current training processes, coach educators and other knowledge users should consider the limitations to existing trials in relation to reporting and evaluating external validity (eg, limited understanding of how programmes are maintained within organisations).
- ▶ Coach educators and other knowledge users should conduct applied research that targets specific indicators of external validity, to expand knowledge translation of existing and new interpersonal coach development programmes.

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Contributors All authors contributed significantly to the manuscript. The initial idea for the study emerged through discussions of HG, MWB and JC authors. All authors contributed to the study protocol and design, and MBE and MM conducted the majority of the systematic review and RE-AIM coding. All authors contributed significantly throughout the writing and preparation process and approve of the submitted version of the manuscript.

Funding This research was supported by a standard research grant from the Social Sciences and Humanities Research Council of Canada (SSHRC Grant number 435-2014-0038).

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement RE-AIM coding sheets that detail the scores and description of each interpersonal CDP trial are available from the corresponding author, on request.

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Review

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Br J Sports Med 2015 49: 871-877 originally published online May 7, 2015

doi: 10.1136/bjsports-2015-094634

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