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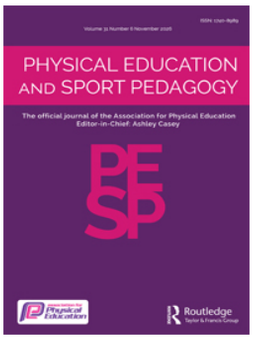
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Barriers and enablers of a formal coach development program: a multi-perspective process evaluation

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ABSTRACT

Background: Formal coach development programs (CDPs) are central to national sports accreditation systems, yet little is known about the implementation fidelity of introductory, policy-based coaching courses. Although such programs follow standardized curricula, variations in delivery and reception are common, shaped by educators' interpretations, differing levels of implementation preparedness, logistical constraints, and the diverse backgrounds of coach learners.

Purpose: This study applied the conceptual framework for implementation fidelity (Carroll et al. 2007. "A Conceptual Framework for Implementation Fidelity." *Implementation Science* 2 (1): 1–9) to examine a nationwide introductory formal CDP delivered within a national ice hockey association. It investigated educators' self-reported engagement with and adherence with the program protocol, and on perceived barriers and enablers as experienced by both educators and coach learners. The study also considered how fidelity frameworks capture implementation realities in structured yet context-sensitive to coach education settings.

Methods: A process evaluation with a partial mixed methods design was used to investigate delivery across four geographical regions (i.e. north, south, east, west) within the national ice hockey association. Quantitative and qualitative data were collected via self-report checklists and semi-structured interviews with educators (N = 8) and coaches (N = 11). Quantitative data were analyzed descriptively, and qualitative data using a codebook thematic analysis.

Results: Checklist findings indicated protocol adherence and active coach engagement in general, although some coaches had difficulties understanding elements of the content. However,

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some educators reported that they did not cover all their assigned materials due to content – and time-related deviations. Qualitative findings expanded on these results, identifying key implementation-related barriers (e.g. limited content individualization, time constraints on delivery) and enablers (e.g. collaborative peer learning, balancing fidelity of form and function). **Conclusion:** This study addresses a recognized gap by evaluating the implementation process of a formal CDP, emphasizing the importance of understanding factors that hinder or support fidelity and participant engagement. The findings provide practical insights for enhancing educator preparation, increasing program adaptability to coach learners' needs, and supporting implementation fidelity in future formal CDPs. Impact statement By integrating the perspectives of both educators and coach learners, this study offers a nuanced understanding of the barriers and enablers of participating in a national formal CDP. The findings provide actionable guidance for policymakers and program designers seeking to align policy expectations with delivery realities through improved onboarding, educator support, and adaptable learning structures. In doing so, this study highlight the potential of structured yet flexible delivery models to support both policy goals and learner-centered practice within national sport systems.

Introduction

Sport coaching involves managing multifaceted demands, including coach-athlete relationships, technical instruction, planning, and providing feedback to support athlete development (Bengtsson et al. 2024a; Lyle 2005). To address this complexity, national governing bodies (NGBs) offer introductory education delivered by coach educators to promote accreditation and policy-based coaching principles (Cushion et al. 2010). While research has explored how educators and coaches perceive their respective roles as teachers and learners within such policy-based programs (Walton et al. 2024; Wang, Casey, and Cope 2023), few studies assess whether they are implemented as intended and under what conditions they facilitate prescribed coaching principles (Griffiths, Armour, and Cushion 2018; Jones, Allen, and Macdonald 2023).

Training programs that combine instructional strategies, including information-based (e.g. lectures, discussions), demonstration-based (e.g. skill modeling), and practice-based approaches (e.g. applied tasks), have demonstrated effectiveness in sport coaching (Li et al. 2025), higher education (Reyes et al. 2019), and organizational settings (Lacerenza et al. 2017). Within the sports literature, such training programs can be referred to as Coach Development Programs (CDPs) encompassing 'learning activities applied systematically through education, social interaction and/or personal reflection' (Evans et al. 2015). The term 'development' reflects integration of content information, demonstration and/or practice-based learning activities delivered by professionals (Evans et al. 2015). NGB-employed educators are progressively tasked with incorporating problem-solving tasks, peer discussions, and applied coaching exercises into formal CDP delivery (Culver, Werthner, and Trudel 2019; Walton et al. 2024), also known as a learner-centered approach (Weimer 2013). However, unclear role expectations and insufficient NGB-

provided instructive training, time constraints, and catering to the learning needs of coaches with diverse backgrounds may challenge educators in delivering a formal CDP as intended by its designers (Culver, Werthner, and Trudel 2019; Watts, Cushion, and Cale 2023). Such structured delivery frameworks risk overlooking educators' recontextualization of CDP content in response to their delivery setting and interactions with coach learners, risking inconsistencies (Griffiths, Armour, and Cushion 2018; Lawrence and Smith 2023). Hence, NGB-provided delivery training, educators' sport-specific knowledge, and structured yet adaptable materials (e.g. incorporating practical examples and adapting to coaches' learning needs; Nelson, Cushion, and Potrac 2013; Wang, Casey, and Cope 2023) can support educators' protocol adherence (fidelity of form), as well as coach learners' understanding of the content (fidelity of function; Hawe, Shiell, and Riley 2004; Jones, Allen, and Macdonald 2023). These aspects are essential to program fidelity (i.e. being delivered as intended; Toomey et al. 2020) while maintaining program integrity (Hawe, Shiell, and Riley 2004).

Although educators' and coaches' perspectives on formal CDP participation have been studied separately, few have examined their perspectives in tandem (Paquette et al. 2019; Walton et al. 2024; Wang, Casey, and Cope 2023). Moreover, recent studies highlight the importance of using implementation frameworks to evaluate fidelity in complex interventions (Toomey et al. 2020). Yet, such frameworks are rarely used in formal CDP research to examine educators' implementation of predetermined curricula designed to promote prescribed coaching principles (Jones, Allen, and Macdonald 2023), with limited attention to the practical facilitators and challenges of delivery (Shaikh et al. 2019). While the sport pedagogy literature emphasizes learner-centeredness, contextualization, and co-construction (Kirk 2013), research on models-based practices shows that core pedagogical intentions (e.g. recontextualization of content to local needs) can be preserved while still evaluating elements of fidelity (e.g. program curricula description, assessment of implementation against intended structures, detailed delivery reporting), promoting understanding of whether the planned delivery structure resonates with actual practice (Casey and MacPhail 2018; Hastie and Casey 2014). In the context of formal CDPs, applying fidelity frameworks can thus illuminate how educators experience the achievability of adhering to the curricular structure, with practical implications for training and support (Dempsey et al. 2021). Nonetheless, even where fidelity is assessed, few studies emphasize participants' program receipt (i.e. their uptake and understanding of the content; Toomey et al. 2020), a gap that also persists in formal CDP research (Culver, Werthner, and Trudel 2019; Jones, Allen, and Macdonald 2023; Wang, Casey, and Cope 2023). Moreover, studies that investigate fidelity often use quantitative assessments without incorporating qualitative elements, limiting comprehensive understanding concerning the intervention delivery and enactment (Jones, Allen, and Macdonald 2023; Toomey et al. 2020). For example, one previous study relied on observations to assess whether educators delivered a large-scale non-formal CDP as intended, but did not explore reasons for protocol delivery deviations or how the coach learners engaged with the content (Søvik et al. 2016). Culver, Werthner, and Trudel (2019) interviewed educators about their preparation and the challenges of delivering a formal CDP, without assessing protocol adherence or coaches' perspectives on participation. Allen, Reid, and Macdonald (2024) combined observations and interviews to examine how educators' delivery and pedagogical strategies influenced coaches' perceived learning

outcomes but did not assess fidelity. To better understand the factors that challenge and enable program fidelity, scholars recommend incorporating an implementation evaluation framework and mixing quantitative (e.g. self-reports of content coverage or adherence) and qualitative modalities (e.g. educator rationales or coach reflections) to explore both what was delivered and how it was received (Allen, Reid, and Macdonald 2024; Griffiths, Armour, and Cushion 2018; Jones, Allen, and Macdonald 2023; Moore et al. 2015; Paquette et al. 2019; Toomey et al. 2020).

To address these suggestions, this study applied the conceptual framework for implementation fidelity (Carroll et al. 2007) to assess whether coach educators in the Swedish ice hockey association delivered the active ingredients of a formal CDP as intended. This framework provides a structured approach to evaluating both program delivery (i.e. by educators) and reception (i.e. by coaches; Carroll et al. 2007; Toomey et al. 2020) including dosage-related factors such as content (i.e. materials delivered as intended), duration (i.e. length of delivery), and coverage (i.e. inclusion of the target population). The framework also identifies moderating factors that can act as barriers or enablers to the delivery process and hence the implementation fidelity, including quality of delivery (how well educators implement program content), participant responsiveness (coach engagement and receptiveness), intervention complexity (perceived difficulty of CDP participation), and facilitation strategies (support structures aiding implementation; Carroll et al. 2007).

This study fills considered research gaps by: (a) applying a framework-based fidelity evaluation to a formal CDP; (b) capturing multiple stakeholder perspectives, including educators' delivery and coaches' reception; and (c) exploring delivery-related moderators that influence how the intended CDP curriculum is experienced and enacted in practice (Allen, Reid, and Macdonald 2024; Culver, Werthner, and Trudel 2019; Griffiths, Armour, and Cushion 2018; Jones, Allen, and Macdonald 2023; Paquette et al. 2019; Shaikh et al. 2019). The study aims to investigate implementation fidelity by examining educators' self-reported adherence to the program protocol, alongside educators' and coaches' perceived barriers and enablers encountered during the delivery of a nationwide, introductory-level formal CDP. It further describes how structured fidelity frameworks can capture delivery processes within socially and contextually shaped coach education environments, particularly in relation to practical tensions between standardization and responsiveness.

Method

This study employed a partial mixed methods equal status design with the 'qual + quan' type, where qualitative data and quantitative data were equally important for addressing the research question. Given the absence of universally validated instruments for measuring fidelity in formal CDP research (cf. Jones, Allen, and Macdonald 2023; Søvik et al. 2016), a mixed-methods approach was considered essential for capturing the delivery process (Moore et al. 2015; Svedberg et al. 2019). Data was collected concurrently, analyzed separately, and integrated during the interpretation and discussion of the findings (Leech and Onwuegbuzie 2009). The study was grounded in a critical realist ontology, which guided our investigation of the structural conditions shaping program enactment, while acknowledging the agency of educators and coaches (Fletcher 2017). We also

adopted a post-positivist epistemology, recognizing that knowledge is theory-laden, shaped by human experiences, and best approximated through systematic inquiry (Chalmers 2013). Our study description conforms to the Template for Intervention Description and Replication (TIDieR; Hoffmann et al. 2014). The summative evaluation of the formal CDP can be found elsewhere (Bengtsson et al. 2024b).

Participants

The participants were 11 ice hockey coaches (Mean age = 30.73; *SD* = 11.51) from eight clubs who participated in the formal CDP delivered by NGB-recruited educators during autumn 2022. Of the 11 educators who were eligible to participate in this study, eight were recruited (Mean age = 45.25; *SD* = 12.62). From each of the four CDP delivery occasions (see Table 1), this study included between one and four coaches, and between one and three educators (see Table 2). In Sweden, CDP accreditation is mandatory for formal ice hockey coaching, and none of the registered coaches had prior experience with the introductory-level CDP. Before the program, the coaches and their clubs were informed via email about random allocation to an intervention or control group (see Bengtsson et al., 2024b for selection and allocation details). After the CDP, only intervention group coaches who agreed to participate were invited to qualitative interviews on their implementation experiences, while all participating educators completed a brief self-report checklist. The sample size was determined by the number of intervention group participants who accepted the invitation. The researchers had no prior relationships with the participants.

Ethics

The study was approved in July 2022 by the Swedish Ethical Review Authority (Dnr: 2022-03235-01) and adhered to the ethical standards of the Declaration of Helsinki. Each participant received written study information followed by informed consent. Before each interview, participants were reminded of the study's purpose and asked for permission to be audio-recorded, which all accepted. To ensure confidentiality, each delivery region was assigned a numerical identifier (1-4; see Tables 1 and 2).

Table 1. Coaches' demographic information.

Coach ID	Region	Age	Gender	Years of coaching experience	Level as a former active player	Having active children playing in the club	The age of players coached
C1	1	24	Male	0	Adult elite	No	J16
C2	1	19	Female	0	Youth and junior	No	U8-11
C3	1	40	Male	4	Adult elite	Yes	U10
C4	3	20	Male	0	Youth and junior	No	J18
C5	2	44	Male	2	Youth and junior	Yes	U7-U9
C6	2	42	Male	7	Adult elite	Yes	U11-13
C7	2	17	Male	1	Youth and junior	No	U11
C8	4	36	Male	4	Youth and junior	Yes	U11 & U13
C9	4	20	Male	0	Adult elite	No	U14
C10	4	48	Male	1	No playing history	Yes	U9
C11	4	28	Male	0	Adult elite	No	U14

Note. 'elite' counts as the highest national level.

Table 2. Educator information and checklist responsiveness reports

Educator ID	Training completed	Playing level	Coaching level	NGB coach accreditation	Region & N coaches trained (% coverage)	Delivery domain	Delivered as intended overall?	Coach prior content experience?	Coach had difficulties with the content?	Coaches express benefits with the content?	Coaches asked questions?
E1	Yes	Adult	Youth and junior & Adult elite	Highest	1, 13 (87%)	Strength and conditioning & Ice planning and practice	Yes	No	No	No	No
E2	Yes	Youth and junior	Youth and junior	2nd highest	1, 13 (87%)	Leadership	Yes	Yes	Yes	Yes	No
E3	Yes	Adult	Youth and junior& Adult	2nd highest	2 & 4, 20 & 14 (93%)	Leadership	Yes	No	Yes	Yes	Yes
E4	No	NA	NA	NA	4, 14 (93%)	Strength and conditioning	Yes	No	No	No	Yes
E5	No	Adult elite	Youth and junior & Adult elite	2nd highest	3, 9 (100%)	Ice planning and practice	Yes	Yes	No	Yes	Yes
E6	Yes	NA	Youth and junior	2nd highest	3, 9 (100%)	Leadership	Yes	Yes	Yes	Yes	Yes
E7	Yes	Adult	Youth and junior & adult elite	Highest	3, 9 (100%)	Strength and conditioning	Yes	No	No	Yes	Yes
E8	Yes	NA	Youth and junior	2nd highest	4, 14 (93%)	Ice planning and practice	Yes	Yes	Yes	Yes	Yes

Note. Non-applicable (NA) = no records available; 'elite' counts as the highest national level.

The CDP implementation

The CDP was delivered across four separate locations in the northern, western, southern, and eastern regions of Sweden. Educators were employed annually by the NGB's regional offices and were considered experienced experts in their respective delivery domains (ice planning and practice, leadership, strength and conditioning). Most had completed NGB training on creating a supportive, mastery-oriented learning environment, informed by self-determination theory (Ryan and Deci 2017), achievement goal theory (Duda and Nicholls 1992), and the International Council for Coaching Excellence (ICCE 2012). Moreover, the educator training included knowledge on adapting protocol delivery by encouraging coach discussions, incorporating real-life examples, and adjusting delivery for group size and individual needs. While most educators specialized in a single domain, one (Educator 1) had cross-domain responsibilities, and another (Educator 3) delivered leadership content on two occasions (see Table 2). Due to scheduling constraints and a lack of timely information about the assigned educators, checklists were not distributed, and no educator data was sampled from the region two CDP delivery. However, due to the coach allocation and recruitment procedure, coach interviews from all regions were completed as planned. Each educator trained an average of 13 coaches ($SD = 3.52$, range 9-20).

The CDP was delivered over two days (Saturday, 11 h; Sunday, 9 h) within ice hockey arenas and conference rooms. Sessions incorporated presentations, videos, practical training, and reflective tasks, covering three domains: (a) ice-practice skills, including planning and structuring season schedules, training sessions, and teaching technical and tactical elements; (b) leadership, emphasizing positive, autonomy-supportive communication to enhance youth motivation and enjoyment; and (c) strength and conditioning, focusing on physical development, motor skills, and risks and injuries. Each domain was structured into modules targeting specific learning objectives. Across all domains, coaches' knowledge acquisition was reinforced through application tasks and structured reflection. Coaches also engaged in small-group discussions moderated by educators to facilitate collaborative learning (for more information on the CDP domains and module deliveries, see Supplementary table S1).

Data collection

Educators first completed an online self-report checklist concerning protocol adherence and dosage, followed by interviews with educators and coaches from all delivery regions on their experienced CDP participation. The checklists and interview guides (see Supplementary Material A-D) were tailored to the CDP and its context informed by previous implementation research (Svedberg et al. 2019), to assess content dosage, protocol adherence, and perceived barriers and enablers.

Educators received a personalized email link to their checklist the day after CDP delivery and completed it within a week. The checklist included two open-ended questions on the number of coaches trained and module duration, followed by binary ('yes' or 'no') items assessing CDP protocol adherence (4 items) and coach responsiveness (4 items). Each response prompted elaboration via free-text fields. For example, 'Was the CDP module delivered as planned?' was followed by 'What contributed to this outcome?' Similarly, 'Did the coaches have any difficulties in understanding any parts of the module

content?' was followed by 'If so, which parts and what was difficult?' The checklist concluded with an open-ended question for additional educator comments on the implementation process.

Educators were also invited to participate in semi-structured interviews (Smith and Sparkes 2016), with seven (E1-7) conducted within one month of CDP delivery. They first reflected on their overall experience and protocol adherence (e.g. 'How did you deliver each module?' 'Did you make any deviations from the protocol?'). They then described coach engagement (e.g. 'How did you experience the coaches' course engagement?' 'What improvements do you think are needed for delivery?'). Lastly, they reflected on their preparation and support from the NGB (e.g. 'Did you feel sufficiently prepared?' 'How did you experience the delivery materials?'). In the concluding part, educators summarized their CDP delivery experience.

The coaches were invited to semi-structured interviews one to two months post-CDP.

They described their overall experience (e.g. 'What parts of the CDP were most challenging?' 'What were the best parts?'), the perceived content relevance (e.g. 'How applicable was the content to your coaching?' 'How did the educators support you during the CDP?') and elaborated on areas where they needed more training (e.g. 'Which parts required more time for adequate learning?').

All interviews were conducted online during autumn 2022, audio-recorded, and transcribed verbatim. Educator interviews ($N = 7$) averaged 51 min ($SD = 11.38$), while coach interviews ($N = 11$) averaged 41 min ($SD = 18.25$). Eight educators finished their checklists while one (E8) did not attend an interview due to non-response to the invitation.

Data analysis

To align with the study's pragmatic methodological approach and focus on systematically examining implementation processes, we applied a codebook thematic analysis to the qualitative interview transcripts and free-text responses from the self-report checklists. The approach sits between reflexive and coding reliability approaches and is informed by structured analytic traditions (e.g. template analysis, King 2012; framework analysis, Ritchie and Spencer 2002; matrix-based analysis Miles & Huberman 1994), supporting identification of patterned meaning in relation to evaluated program components (Braun and Clarke 2022). This analysis was guided by the implementation fidelity framework (Carroll et al. 2007). Checklist quantitative data were analyzed using descriptive statistics in SPSS (version 29.0; IBM), capturing educators' reported adherence to content, coverage, and duration, while the qualitative themes represent moderators of implementation fidelity. A six-phase analytical strategy (Braun et al. 2019) was employed in the following sequence. First, interviews were transcribed and read several times to get familiar with the data. In the second and third steps, a deductive-inductive approach was employed. Meaning units from the interviews and checklist free-text answers were sorted as codes into higher-order themes deductively produced from the implementation fidelity framework moderators (e.g. quality of delivery). The subsequently inductively generated lower-order themes described each of the moderators, for example, '*Balancing fidelity of form and function*' within Quality of delivery, and '*Collaborative peer learning*' in Participant responsiveness (see all moderators and themes to implementation fidelity in Figure 1). During this process, previously coded materials were reviewed for instances of the generated themes. The fourth and fifth steps included iterative revisions of the

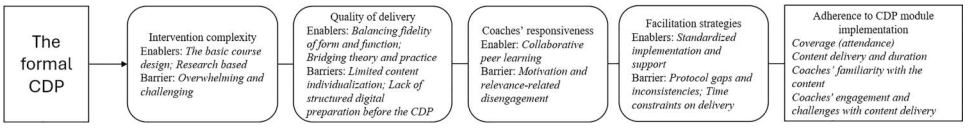


Figure 1. Illustration of enablers, barriers, and adherence informed by Carroll et al.'s (2007) conceptual implementation fidelity framework.

connections between the data set, coded extracts, themes, and the overall analysis. The final analysis was reviewed to align with the study's purpose and included moderators of the implementation fidelity framework across and within all themes. Figure 1 presents an interpretive synthesis of qualitative themes mapped onto Carroll et al.'s (2007) fidelity framework, without claiming a direct one-to-one structural correspondence.

This article is part of the first author's PhD project, who also led the analysis. To ensure consistency and alignment with the study objectives, the last author, an experienced implementation scientist, reviewed the evolving codebook and theme structure, providing feedback on coherence and relevance. The codebook guided structured coding across the dataset and documented theme development. It also supported consensus and team-based analysis, enabling a rich and nuanced understanding of the data (Braun et al. 2019), while maintaining alignment with the implementation fidelity framework (Carroll et al. 2007).

Results

This section presents protocol fidelity, and the enablers and barriers related to CDP delivery, organized according to the moderators outlined in the conceptual framework for implementation fidelity (Carroll et al. 2007). Abbreviations are used in referrals to the coaches (C1-11) and educators (E1-8). We use the term 'participants' when coaches and educators refer to similar focuses; otherwise, the respective subgroup is indicated.

CDP module implementation

The results for the checklists are based on educators' delivery within regions one, three and four. Four educators (E2, E5, E6, E8) reported that some coaches were already familiar with aspects of the ice-practice and leadership CDP content. Even though all leadership and ice-planning and practice educators reported that coaches expressed benefits with the content, four educators (E2, E3, E6, E8) also noted that coaches struggled to grasp certain elements of their delivery. Most educators (E2, E3, and E5-8) observed active engagement from coaches, who frequently asked questions CDP coverage was 100% in regions two and three, while 13 of the 15 enrolled coaches attended in region one (87% coverage), and 14 of 15 in region four (93% coverage; see Table 2). The reported reasons for coaches' absence were illness or unreported absences.

Delivery times, in comparison with the pre-set schedules, varied across modules. Leadership modules 1 and 5 were generally shorter than planned, while module 12 ran longer. The ice-practice module 3 was largely delivered as intended across regions, except for one theoretical goaltending session, which had a different time split (E5).

Module 8a was consistently shorter than planned, whereas module 8b varied; one educator delivered the theory portion in less time, while another extended it. All strength and conditioning modules exceeded their scheduled duration (see Supplementary Table S1). Although most educators followed the planned content, E6 and E5 deviated from protocol in modules 1 and 3. E6 explained: 'This was not in the materials I worked from,' while E5 noted: 'I'm not specialized in goaltender training; I know the basics. Session durations ranged from 15 min to a maximum of 110 min.

Intervention complexity

Enablers

The basic course design. Participants emphasized the CDP's mandatory and structured nature, recognizing its role in ensuring accreditation and scalable competency transfer across clubs: 'The more educated coaches, the more educated players you get, making it all more fun … educating people creates a positive spiral' (C11). As noted by the educators, many coaches, despite prior playing and/or coaching experience, found the content informative and applicable in general: 'It [the CDP] is a good start for those [coaches] with both much and little experience because we can all learn something from the course' (C2). Educators noted that some coaches became aware of their gaps in planning, communication, and instruction, reinforcing that: 'Being a good player is not the same as being a good leader, and all [coaches] need to take the CDP to receive a solid coaching foundation' (E2).

Research-based. The CDP's research-based foundation further reinforced its credibility, providing coaches confidence and trust to integrate the content into their practices: 'The leadership theories made me reflect on myself and gave me an eye-opening perspective on coaching' (C5). Educators similarly emphasized that the research-based modules provided them confidence and clarity in aligning content-delivery with NGB policies and objectives: 'It gives us [educators] a clean start when we show that the materials are research-based and what we want to achieve' (E3).

Barriers

Overwhelming and challenging. Despite its introductory level, the CDP's density and complexity posed challenges, with educators reporting both in the checklists and interviews that the content was not always absorbed equally due to group diversity: 'Sometimes we shoot above the target' (E7). Unclear expectations and prerequisites contributed to uncertainty and self-doubt, making it difficult for some coaches to fully engage in the CDP. This was particularly evident in C10's experience as a newcomer to ice hockey and coaching, as he withdrew from several on-ice tasks he found too difficult: 'I had to stand aside so I wouldn't crash the session … so I renounced … three out of six or seven sessions.' Others struggled to apply theoretical leadership discussions: 'As a new coach, you just haven't been in that many situations yet … sometimes I didn't really know what to say or how to answer the questions' (C9). Even those with prior experience found the content demanding, particularly the theoretical components of leadership and strength and conditioning. The intensive CDP schedule and sheer volume of material overwhelmed even experienced coaches: 'Sometimes it became so

much that you didn't know in and out, it becomes so much you forget things directly after the next comes up' (C6). Leadership domain educators confirmed this issue, noting how exhaustion impacted engagement: 'I often notice this with the motivation block – it comes at the end when they've processed everything … risking lost engagement in the 50–60 min before discussions' (E3).

Quality of delivery

Enablers

Balancing fidelity of form and function. Educators adapted delivery to engage coaches, facilitate discussions, and connect material to real-life hockey experiences: 'One can share anecdotes, ask questions, and let participants share their experiences to engage while sticking to the material' (E2). Some also supplemented the content with domain-specific examples to enhance practical application: 'I added examples on how youths develop physically to deepen [coaches'] understanding of incorporating content' (E4). Correspondingly, coaches reported positive response to such delivery and when educators emphasized key principles rather than rigidly following materials: 'It engaged the whole group better, which made it easier to listen than if reading straight from the materials' (C3).

Bridging theory and practice. Many coaches appreciated learning about how to connect leadership content with on-ice coaching. This integration made more sense to them when sharing ideas on its applicability, and when they enacted the behaviors via roleplaying tasks and through planning, delivering, and evaluating its use in the ice practices. These contextual tasks were described as 'new and very revealing' (C9). Accordingly, educators highlighted the ending module as key to helping coaches consolidate their theory-to-practice learning as it reconnects with previous modules: 'It facilitates the philosophy we want them to use after [CDP]' (E3). Coaches also emphasized learning about age – and level-specific strength and conditioning, gaining a better understanding of how to plan off – and on-ice training to meet their players' physical needs: 'For example … some J18 players might have grown 10 cm in two years, making it relevant to work with the strength coach on body control.' (C4).

Barriers

Limited content individualization. Despite recognizing the CDP's introductory nature, aiming to accommodate coaches working with various player levels and ages, some sought more personalized guidance on using leadership and on-ice principles in their coach settings: 'We need more training on how to coach best on-ice, like 'you do this when this happens' or when to re-do an exercise and communicate effectively' (C11). Educators, in turn, proposed shifting from didactic lecturing to practical discussions with 'tangible principles and case studies throughout modules' (E3), helping coaches apply content in practice.

Lack of structured digital preparation before the CDP. Coaches suggested that introducing them to the theoretical content digitally, synchronously for interactive delivery and/or asynchronously for individually paced digestion, before in-person sessions could

increase the CDPs effectiveness to their learning: 'It would be nice to plunge into deeper discussions, which happens when people have contemplated it beforehand' (C5). Educators agreed that such a flipped learning approach, using pre-course digital materials before the on-site modules, could better prepare coaches. They also noted that it could free up session time to include more case studies, peer discussions, reflective problem-based activities and practical applications to enhance delivery quality. Concerns about inconsistent engagement leading to varying preparation levels have prompted discussions within NGB regional offices about implementing structured pre-course tasks, such as small tests and readings, to ensure consistent preparation among coaches.

Coaches' responsiveness

Enablers

Collaborative peer learning. As noted in the educators' checklists, coaches engagement was largely manifested in peer interactions, particularly in leadership, practice planning and problem-solving as coaches could elaborate on the content relative to everyday coaching challenges. They also appreciated the educators for moderating such discussions which facilitated coaches' engagement to the discussions and understanding of various coaching perspectives: 'It was a good way to gain inputs about how colleagues coach, structure practices, and handle issues [with players] because many of us face similar challenges' (C6). Most educators described that such tasks were a driving force to engagement and thus collaborative learning: 'They [coaches] went right at it during discussions; it was never quiet, and they were engaged when asked questions' (E6). Also, less experienced coaches highlighted learning from more experienced coaches: 'I received many good tips from a more experienced coach how I can think when coaching my players … it was very valuable' (C1).

Barriers

Motivation and relevance-related disengagement. Coaches' motivation and engagement with the CDP was influenced by both its demanding format and the perceived relevance of its content. The weekend-long structure, with full-day sessions and few breaks, was seen as taxing, especially for coaches balancing full-time jobs and family responsibilities. This led to reluctance and calls for a more time-efficient format: 'You receive this schedule and feel like 'wow' … it creates resistance and … it felt like meeting a big wall' (C6). Educators also observed that some coaches attended merely to fulfill a requirement rather than actively engage: 'Many attend the course to check it off … I'm unsure how many will review its materials afterwards' (E7). Checklist data aligned with coaches' interview reports, indicating that many already had extensive ice hockey playing and coaching experience, which made them perceive some specific parts of the CDP content redundant. As one coach put it: 'It was time wasted training the basic [ice-practice] skills' (C4). Educators noted that when coaches questioned the content's relevance, they often became passive, which impacted group dynamics: 'Active participation is important for all coaches' understanding … but when they disengage, it consumes a lot of energy from the group' (E2). In response, coaches suggested adapting the CDP to better align with their prior knowledge, personal coaching goals, and club contexts to enhance its perceived value.

Facilitation strategies

Enablers

Standardized implementation and support. While educators recognized coaches' calls for more individualized CDP content and flexible learning methods, they emphasized the importance of consistent implementation across regions to support nationwide coaching principles: 'This structure enables equal opportunities for all coaches to learn the same knowledge' (E1). At the same time, they acknowledged that delivering standardized learning protocols can create trade-offs with accommodating individual learning needs. The educators valued the support from regional office superiors, who assign materials received from the NGB: 'It is the main responsible person in the regional education committee who assign us our materials which they receive from the NGB' (E2). A key enabler was the NGB-managed digital platform, which streamlined content updates, logistics, and collaboration by providing delivery protocols, course content, and direct access to colleagues and superiors. Its accessibility allowed educators to prepare their sessions and review peers' delivery, enhancing mutual support: 'We often try to have another educator supporting the session so we can start the discussions together which then attracts the coaches to discuss, it's like a drawcard' (E3). All educators also commended their assigned CDP domain content for its structure and relevance, with one noting: 'The material is really good, covering the right topics and giving participants a strong foundation to build on' (E4). Moreover, most of the educators were experienced delivering the formal CDP which boosted their preparedness and confidence. For example, E5 had a long history of CDP delivery within the NGB, while E1 had been involved in developing the ice-practice delivery materials and E2 had apprenticed before leading the leadership module.

Barriers

Protocol gaps and inconsistencies. Checklist reports reinforced the interview findings by capturing how some educators exceeded planned delivery times, particularly during discussions when responding to coaches' requests for clarification or real-life examples. Conversely, E6 had to shorten module 5 due to an early venue closure: 'It prevented me from delivering my last part of the day for as long as needed and we lost valuable time'. As highlighted in the checklist, E6 also did not deliver the first leadership module due to missing content from their regional office, resulting in no reported delivery time. Others struggled to effectively present content that was new to them, which sometimes limited their ability to facilitate discussions of the information-based slides, which some coaches also noticed: 'One educator seemed a bit too nervous and read directly from the text, going point by point, so it felt like a reading session' (C3). Educators emphasized the need for training on their assigned content before delivery, suggesting trial lectures to improve readiness. Additionally, two educators (E4, E5) had not received the educator training, acknowledging its role in aligning delivery with NGB policies: 'It is not given so many times per year and I'm currently waiting to partake in it' (E4). Delivering alone was also challenging: 'We should've worked in pairs because I supported my colleagues, but no one supported me. Having two educators would make delivery more dynamic' (E7).

Time constraints on delivery. In line with checklist reports, educators noted that although they adhered to the schedule, the CDP's rigid pacing constrained their ability to deliver content effectively and adapt to their preferred teaching approaches. The pressure to stay on schedule often rushed sessions, limiting in-depth discussions and participant engagement opportunities. Some educators highlighted that the time pressure was particularly challenging when covering complex topics that required reflection and dialogue: 'It makes it all very forced, I mean … you cannot get stuck on parts too long because then you fall behind the schedule' (E7). Consequently, some suggested scheduling built-in flexibility with a 'plus-minus schedule' (E6), allowing session lengths to vary slightly to help regulate the CDP's flow and reduce the stress of transitioning between sessions.

Discussion

This study addressed gaps in formal CDP research (e.g. Jones, Allen, and Macdonald 2023; Paquette et al. 2019; Wang, Casey, and Cope 2023) by using mixed methods and Carroll et al.'s (2007) framework to examine the implementation and fidelity via educators' self-reported protocol adherence of an introductory CDP in the Swedish ice hockey association. The findings reveal barriers and enablers experienced by educators and coaches, offering insight into how standardized delivery unfolds in nationwide practice.

Educators' principal findings

Echoing prior work (e.g. Allen, Reid, and Macdonald 2024; Nelson, Cushion, and Potrac 2013; Wang, Casey, and Cope 2023), educators who balanced structured content with interactive strategies, such as real-life examples and facilitated discussions, were perceived as delivering higher-quality sessions. Structured materials, digital platforms, communication with regional leaders, domain expertise, and, in some cases, pedagogical training served as key enablers. Educators also highlighted that trial runs, structured feedback, and greater logistical support could help mitigate several barriers. These findings align with important moderators of fidelity (Carroll et al. 2007; Toomey et al. 2020).

However, while all educators reported following the overall protocol, there was notable variability in delivery time and content dosage, along with challenges in engaging coaches, particularly in modules like leadership. Tight schedules and fixed curricula constrained the educators' ability to adhere to the prescribed protocol, be supportive of deeper discussions, and responsive to the coaches' learning needs. Some educators adjusted content or timing depending on their familiarity with the topic, with the intent of preserving core learning goals. Educators who added illustrative examples to support coaches' understanding (e.g. E4) likely enhanced learning relevance and engagement, supporting fidelity of function (i.e. acknowledging learner needs) while maintaining form (i.e. adhering to the protocol). In contrast, educators with limited content expertise who shortened sessions risked undermining both (Hawe, Shiell, and Riley 2004; Weimer 2013). Most educators were experts in their assigned content area, supporting both fidelity and credibility with learners (Nelson, Cushion, and Potrac 2013; Søvik et al. 2016), and had completed NGB-provided pedagogical training prior to CDP delivery. However, they had not received training on how to deliver their specific module content using such pedagogical principles. Delivery-specific

training with structured feedback can strengthen educators' pedagogical competence (i.e. how to adapt the pedagogical principles to content delivery), content understanding, and time management while supporting the recontextualization of content to real-world settings (Griffiths, Armour, and Cushion 2018). Without integrated training on both standardized content and pedagogical adaptation, educators may struggle to deliver the CDP content as intended (Jones, Allen, and Macdonald 2023; Toomey et al. 2020), potentially limiting coaches' learning and professional development (Watts, Cushion, and Cale 2023). Integrating both components into educator training may instead offer the tools needed to balance policy-based delivery and local adaptation, enabling pedagogical flexibility within a standardized structure (Hawe, Shiell, and Riley 2004; Paquette and Trudel 2018).

This fidelity – adaptability dynamic is also evident in sport pedagogy, where teachers implementing models-based practices must uphold core features while adapting to learners and context (Hastie and Casey 2014). Moreover, reducing the volume and pacing of prescribed content may free up time for educators to mantle a more facilitative role in supporting coach-learners' skill development within the NGB's prescribed structure (Dempsey et al. 2021). Together, these findings demonstrate that fidelity in formal CDP delivery is not a binary outcome but a negotiated process, shaped by the social and learning-oriented realities of educators and learners, and raise critical questions about how structured content can coexist with meaningful coach learning in practice.

However, the knowledge about educator training programs and their impact on implementation fidelity is limited (Jones, Allen, and Macdonald 2023; Paquette et al. 2019; Walton et al. 2024). Future research should investigate the feasibility of CDP content-based structured trial deliveries, combined with targeted feedback, to support educator preparedness and high-quality implementation (Moore et al. 2015; Toomey et al. 2020). Educators also valued co-delivery for improving adaptability and instructional quality. Since fidelity moderators interact, either amplifying or attenuating one another (Carroll et al. 2007), such collegial strategies may promote stronger implementation through shared expertise and flexibility.

Coaches' principal findings

Consistent with prior CDP research (Nelson, Cushion, and Potrac 2013; Wang, Casey, and Cope 2023), coaches appreciated the combined information-, demonstration-, and practice-based approaches (cf. Lacerenza et al. 2017), especially those involving reflective and real-world contextual tasks. These approaches can together facilitate coaches' content-based engagement, learning and internalization (Lawrence and Smith 2023; Li et al. 2025; Reyes et al. 2019), being received as intended (Toomey et al. 2020).

As highlighted by previous research (Allen, Reid, and Macdonald 2024; Culver, Werthner, and Trudel 2019; Nelson, Cushion, and Potrac 2013; Wang, Casey, and Cope 2023), this study shows that coaches become more engaged with the CDP content when encouraged to expand upon their ideas collectively. Peer discussions supported collaborative learning and problem-solving by linking formal CDP content with lived coaching experiences. Importantly, this enabled novice coaches to learn from more experienced peers, who in turn could deepen their own reflections – sustaining engagement across different skill levels. Coaches' prior experience shaped their perceptions of

content relevance. Experienced coaches sometimes found elements redundant or overly time-consuming, while novices struggled with some practical on-ice and discussion tasks. This diversity led some coaches to view the CDP as overly generic and insufficiently tailored to their learning needs and club contexts. Such perceptions reflect a broader tension in coach education between standardized delivery protocols and learners' varied backgrounds, echoing previous critiques of rigid implementation models (Culver, Werthner, and Trudel 2019; Dempsey et al. 2021; Lawrence and Smith 2023). Moreover, intervention research on physical education teachers' professional development shows that its effectiveness depends on participants' perceptions of course quality, underscoring the value of tailored approaches that promote equitable learning across diverse groups (Makopoulou et al. 2021). Similar debates exist in the implementation of model-based practices in sport pedagogy, where fidelity involves both preserving core pedagogical intentions and allowing for local adaptation (i.e. learner-centered approaches). This includes accurately describing the delivery model's curricular elements and intended outcomes, the extent to which planned delivery aligns with actual delivery, and the contextual features, including individual learner characteristics (Hastie and Casey 2014). Such a form – function interplay (Hawe, Shiell, and Riley 2004) offers a more inclusive model of fidelity, challenging the 'one-size-fits-all' paradigm and prompting reflection on how protocol adherence can coexist with meaningful coach learning opportunities (Dempsey et al. 2021; Griffiths, Armour, and Cushion 2018; Jones, Allen, and Macdonald 2023).

Coaches generally accepted compulsory CDP participation but found the 2-day format too dense, particularly for theory-heavy modules. Research on need-supportive interventions suggests that brief, skills-focused sessions can be effective (Su and Reeve 2011), supporting the case for shorter leadership modules. Coaches also recommended a hybrid CDP model, with theoretical content delivered online and discussions/practical tasks on-site. For theoretical learning, online programs can be as effective as in-person for theoretical learning (Lacerenza et al. 2017) and efficient for follow-up and feedback mechanisms (Li et al. 2025; Reyes et al. 2019). Digital modules with standardized, embedded quality control (i.e. dose receipt check) can aid assessment of whether theoretical content is absorbed as intended (Toomey et al. 2020), facilitating subsequent on-site application. Implementing a flipped classroom approach, where coaches complete pre-assigned tasks before attending scheduled modules, can foster greater engagement, more positive learning attitudes, and deeper skill development during formal sessions (Hayman 2017). Combining asynchronous (i.e. individual preparation) and synchronous (i.e. shared follow-up) online elements followed by interactive, practice-focused modules could address both design-related challenges and learning needs. Such a delivery model may strengthen learning and application in practice (Lacerenza et al. 2017; Li et al. 2025; Wang, Casey, and Cope 2023).

Limitations

A key limitation was the absence of educator data from region two, limiting implementation fidelity insights for that specific delivery. However, data from other regions provide broad understandings of the formal CDP delivery, with coach interviews from region two providing recipient perspectives. Participant recruitment was tied to

scheduled CDP occasions, meaning our sample was based on availability and willingness, posing a pragmatic approach based on contextual demands (Braun et al. 2019). Nevertheless, Braun et al. (2019) recommend a minimum of six interviews when the research question is addressed, and the sample is relatively homogenous. This study aligns with this rule of thumb by capturing perspectives from coaches and educators across the national regions included from the formal CDP.

Another limitation is the reliance on participants' retrospective self-reports (i.e. interviews, checklists), lacking real-time observation of delivery and reception (Moore et al. 2015). To maximize knowledge, future research could triangulate such self-reports with structured observations to monitor fidelity and how educators' formal CDP delivery quality influences coaches' participation and learning outcomes (Leech and Onwuegbuzie 2009).

Although we did not use statistically validated fidelity measurements, our interview and checklist materials were conceptually grounded in previous implementation research (e.g. Svedberg et al. 2019) and the fidelity framework of Carroll et al. (2007). While this limits generalizability for future replication studies, it does not detract from the trustworthiness of the findings. A potential 'middle way' for future research could be to develop fidelity measurements tailored to the specific CDP delivery context. Such efforts were made by Søvik et al. (2016) in their evaluation, allowing for adaptation to the content and theoretical principles of their program delivery (Toomey et al. 2020).

Conclusion

By applying the conceptual framework for implementation fidelity (Carroll et al. 2007), this study identified key barriers and enablers in the delivery and reception of the NGB's formal CDP. The evaluation clarifies educators' and coaches' perspectives on factors influencing fidelity in structured CDPs (Moore et al. 2015; Toomey et al. 2020) and highlights the dynamic tension between structure and adaptability. Together, these insights offer actionable guidance for formal CDP implementation efforts (Jones, Allen, and Macdonald 2023). The findings suggest that consistent delivery and learning experiences depend not only on structured materials and educator expertise but also on comprehensive onboarding processes and ongoing support. They also emphasize the importance of learner-centered approaches and varied delivery formats, reflecting structural and pedagogical complexities. Overall, the findings underscore the value of using mixed methods to capture multiple perspectives within a framework-guided process evaluation. A flexible yet functionally aligned delivery model, balancing fidelity of form and function (Hawe, Shiell, and Riley 2004), may support policy implementation goals while enabling the integration of learner-centered (i.e. socially constructivist) approaches. Such integration depends not only on program design but also on the resources, training, and pedagogical philosophy upheld by the NGB.

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Data availability statement

The data is available upon request to the corresponding author.

Declaration of AI use

GPT-5 (OpenAI) was used to assist with language refinement and clarity of expression. The authors take full responsibility for all content, and no AI tools were used to generate original ideas, analyses, or conclusions.

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