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## What do coaches want to know about identifying, developing, supporting and progressing athletes through a national performance pathway?

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# What do coaches want to know about identifying, developing, supporting and progressing athletes through a national performance pathway?

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## ABSTRACT

The objective of this study was to explore what coaches wanted to learn about identifying, developing, supporting and progressing athletes through a national performance pathway, before commencing a professional development course. A concept mapping (CM) design was used with Australian national sports organisation coaches undertaking an online professional development course. The coaches: (i) brainstormed what they wanted to know; (ii) grouped the brainstormed ideas around perceived similarity of meaning; and (iii) rated the ideas for importance to know and impact on coaching practice on five-point Likert scales. Data were collected and analysed (including multidimensional scaling and hierarchical cluster analysis) using the Concept Systems groupwisdom™ online platform. Thirty-two coaches brainstormed 42 statements that the research team synthesised and edited to 47 unique statements, with forty coaches sorting and rating these statements. An 8-cluster map best represented the sorted data, with the following clusters: Sport psychology and athlete engagement; Training and competition environments; Athlete wellbeing; Monitoring and modelling; Talent identification; Supporting coaches to work with stakeholders; Transition and significant others; and Benchmarking and performance pathway design. Using a CM system to elicit coaches' needs prior to their professional development has the potential to empower coaches and target specific domains of required knowledge.

## ARTICLE HISTORY

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## KEYWORDS

Coaching; talent; athlete pathways; professional development; concept mapping

## Introduction

### *The coach's role*

The roles coaches play can be framed by key competencies, which are influenced by their working environment and the athletes they coach (Lara-

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Bercial & Mallett, 2016), as they support athletes' technical, tactical and holistic development (Jowett, 2017). These key competencies include setting the vision and strategy, shaping the environment, building relationships with key stakeholders, conducting practices and preparing for competitions, reading and reacting to the playing field, and continually reflecting upon and improving their coaching practice (International Council for Coaching Excellence. The International Sport Coaching Framework, 2021). Coaches can also play a central role in promoting positive and healthy athlete development, including fostering positive relationships with their peers and the community (Côté & Gilbert, 2009).

How coaches provide motivation, training and support is crucial, especially among coaches who play a critical role in the development of high performing athletes (Nash, Sproule, & Horton, 2017; Stodter & Cushion, 2019). Coaches of high-performance athletes are typically considered to be expert coaches, as they have more years of coaching experience, use a broader range of coaching strategies, and hold higher levels of coaching certifications available in their country than their novice counterparts (Nash & Sproule, 2009; Roberts et al., 2021). Expert coaches support an array of athlete outcomes, from technical and tactical development through to holistic athlete development as they form meaningful and optimal coach-athlete relationships (Jowett, 2017). High performance sports coaching has also been characterised by the development and implementation of programmes within highly structured competitive frameworks, involving extensive interpersonal contact and widely accessible performance criteria (Lyle, 2002; Rynne & Mallett, 2012).

### ***A coach's knowledge domains***

Expert coaches learn about their coaching practices and processes in varying knowledge domains (Côté & Gilbert, 2009; Lefebvre, Evans, Turnnidge, Gainforth, & Côté, 2016; Mallett, Rynne, & Dickens, 2014). Côté and Gilbert's (2009) tripartite definition of coaching expertise suggests that coaches consistently apply *professional*, *interpersonal* and *intrapersonal* knowledge during their coaching. *Professional* knowledge has been defined as the ability to teach sport specific skills (Jones, 2007) and elaborated upon to include content knowledge and how to teach it (Gilbert & Côté, 2013). Other scholars have proposed various derivations of professional knowledge to incorporate broader notions of pedagogical and declarative knowledge (Abraham & Collins, 2011), procedural knowledge (Schempp & McCullick, 2010) and decision making (Lyle & Cushion, 2010). *Interpersonal knowledge* is used when relating to and connecting with others across the varying contexts in which coaches operate, predominantly involving interactions with athletes (Cushion et al., 2007), other coaches, medical professionals,

and administrators (Gilbert & Côté, 2013). *Intrapersonal knowledge* has been defined as “the understanding of oneself and the ability for introspection and reflection” (Côté & Gilbert, 2009, p.311) and involves self-awareness (Vickers & Hale, 2010), reflection (Gilbert & Côté, 2013) and emotional regulation (Silva et al., 2020).

### ***Coach continuous professional development: contexts and modes of delivery***

Coach education has previously been defined as ‘any planned or recognised teaching/learning activities by an institution/organisation that contributes to the development of coaches’ (Armour, 2010, p.146). The most popular forms of coach education are large-scale coach education training programmes designed by sport organisations and universities to prepare coaches from the recreational to elite level. Whilst this definition potentially captures the mainstay of a coach’s formal learning opportunities it fails to represent the broader, less-formal, learning associated with a coach’s professional development. Nash et al. (2017) suggest we draw from broader notions of Continuous Professional Development (CPD) to explain a coach’s professional development, as defined and used within vocations such as teaching, nursing and medicine. From this perspective, CPD is defined as the ‘systematic maintenance, improvement and broadening of knowledge, skills and understanding, for the execution of professional and vocational duties to enhance, in the context of lifelong learning, the individual’s contribution to his or her profession or work’. (Construction Industry Council, 1986, p.3). This broader definition offers an opportunity to articulate the myriad of learning opportunities encountered by coaches as part of their Coach Continuous Professional Development (CCPD), beyond those found in what has previously been defined as coach education.

CCPD can be classified based on the context of the development opportunity (e.g. formal, informal, non-formal) (Cushion & Nelson, 2014; Lefebvre et al., 2016; Mallett, Pierre, Lyle, & Rynne, 2009; Silva et al., 2020; Young, 2014) and delivery mode (online, face-to-face, or hybrid) (Lefebvre et al., 2016). Formal CCPD involves pre-determined, scheduled and structured educational support, like that found in university degrees or national sporting organisation coaching courses. This formal learning can be a highly theoretical, one-way, exchange of information from a coach developer to a coach, which may fail to meet the needs of the coach (Bowes & Jones, 2006; Cushion, Armour, & Jones, 2006; Cushion, Stodter, & Clarke, 2021). In such situations, a power imbalance may occur between the wise knowledge holder (i.e., the “coach developer”) and the uneducated knowledge recipients (i.e., the coaches), resulting in disempowered coaches who experience disconnected, irrelevant learning (Cope, Cushion, Harvey, & Partington, 2021; Zehntner & McMahon,

2019). Coaches have questioned the contextual relevance and meaning of formal coach development offered through courses, suggesting they do not meet coaches' needs (Erickson, Bruner, MacDonald, & Côté, 2008), particularly the support and knowledge needed to coach high-performance athletes (Nash et al., 2017). Nash et al. (2017) recommend that effective formal CCPD engender a sense of responsibility for both participating in and valuing CCPD, through which coaches control and self-regulate their learning and, therefore, their CCPD.

Informal learning has been viewed as the best way to learn by the majority of coaches, especially expert coaches (Mallett et al., 2009). This ad-hoc learning occurs through interaction with other coaches in day-to-day routine practice or other informal opportunities for dialogue within the coaching environment, such as pre- and post-competition discussions (Cushion & Nelson, 2014). Expert coaches have also emphasised the power of non-formal learning opportunities (e.g., podcasts, webinars, blogs and clinics), although the authenticity and accuracy of these opportunities has been questioned more recently, particularly as these sources of information have increased in response to the COVID-19 pandemic (Stoszowski, MacNamara, Collins, & Hodgkinson, 2020).

The optimal modalities of CCPD delivery were explored systematically by Cushion et al. (2010) through an extensive systematic review of coach education and development covering the 15 years between 1993–2008. This review concluded that understanding the most effective modalities of CCPD delivery to optimise coach learning is complex, as it involves formal, informal and non-formal contexts of learning, with knowledge being drawn from three main philosophical paradigms: behaviourism, cognitivism and social/constructivism. There appears to be a lack of in-depth understanding of the profession of sport coaching, especially the complexity involved in coaching practice, with some research failing to understand the complexity of the coaching process and therefore oversimplifying it (Cushion et al., 2006). This has led to a gap between the research and real-world application, leaving many sport coaches unconvinced of the value of research and its application to coaching practice (Lyle, 2018). A similar disconnect between CCPD and its impact on coaching practice was identified by Stodter and Cushion (2019) who explored CCPD longitudinally.

## **Context**

Within Australia, formal CCPD is typically provided through coach certifications from National Sporting Organisation (NSOs), with a focus on the professional knowledge required to coach a specific sport. These coach accreditations are obtained through a hybrid model of a self-paced online module and a short face-to-face workshop (e.g. Hockey Australia, 2022;

Sport Australia, 2022; Swimming Australia, 2022). As accreditation levels rise, coaches are introduced to aspects of intra- and interpersonal knowledge as it relates to coaching; however, the primary focus of NSO-led certifications are the rules, techniques and tactics associated with the sport (e.g. Hockey Australia, 2022; Sport Australia, 2022; Swimming Australia, 2022). CCPD in Australia is traditionally developed, provided and led by the national arm of individual sports. There are few facilitated opportunities for coaches to share knowledge and experiences across sports, nor for coaches to identify the knowledge and skills they require to progress their coaching ability.

Coach learning is optimised when CCPD is engaging, relevant, sustained and content rich, yet there is no consensus about what constitutes “content rich” (Griffiths, Armour, & Cushion, 2018). Furthermore, there is limited empirical, coach-generated evidence about what coaches of high-performance athletes perceive they need to learn to fulfil their role. From the limited available evidence, coaches of high-performance athletes welcome psychology-related coaching support and feel it positively impacts their athletes when provided (Burton & Raedeke, 2008; Sheehy, Zizzi, Dieffenbach, & Sharp, 2019). Psychological concepts that support athletes’ mental performance, such as psychological flexibility (Hayes, Luoma, Bond, Masuda, & Lillis, 2006) and mental toughness (Bond, Flaxman, & Bunce, 2008; Henriksen, Hansen, & Larsen, 2019) are recognised by coaches as integral to athlete development, and coaches desire a better understanding of how to support athletes and work with psychologists to develop these skills (Burton & Raedeke, 2008; Henriksen et al., 2019). From an examination of the literature, *what* coaches need to learn is considerably less understood than *how* or *where* they prefer to learn. Engaging coaches in co-designing what they want to learn as part of their professional development can empower coaches (Woods, Rothwell, Rudd, Robertson, & Davids, 2021). Moreover, a review of Coach Education Programmes revealed that coaches positively received situations using interactive and reflective experiences for coaches that positioned them at the centre of the learning process (Ciampolini, Milistetd, Rynne, Brasil, & Do Nascimento, 2019). The crucial role of context and situatedness in a coach’s learning experiences must also be considered (Lave & Wenger, 1991). If the coaching context determines coaching objectives (Côté & Gilbert, 2009), understanding the specific needs of each coach within their role frame across a range of sports, *vis-à-vis* what coaches perceive to be their specific athletes’ needs, is important when designing learning opportunities (Jones, Armour, & Potrac, 2002).

To address the lack of relevant empirical evidence and ensure the coaches’ voice was central in their CCPD, this study aimed to capture the developmental needs of coaches by asking them what they needed to know in relation to their roles, as coaches of performance pathway athletes,



before they participated in a CCPD experience. The CCPD experience has become known as Elevate e-Coach (Australian Institute of Sport, 2020) and was delivered wholly online due to COVID-19 restrictions in place at the time; a phenomenon prevalent across many fields of adult education (Amemado, 2020). Furthermore, this study responds to Cushion and Townsend's (2018) call for research in online learning in coaching that considers the learner, pedagogy, and pedagogic design in context. This online environment offered an ideal opportunity to explore innovative and creative ways to approach CCPD, one of which was how to position the coaches at the centre of their learning, whilst offering input to the design of Elevate e-Coach at every step possible.

## Methods

### *Study design*

This exploratory study employed concept mapping (CM) using the Concept System groupwisdom<sup>TM</sup> (<https://groupwisdom.com/groupwisdom>) online data collection and analysis platform to represent ideas from a defined group on a topic of interest (Kane & Trochim, 2007). We considered CM to be an ideal method for exploring what coaches wanted to learn prior to commencing a professional development course.

CM is an integrated mixed method approach incorporating both qualitative and quantitative research methods. It engages participants in data generation (through brainstorming and statement rating) and data interpretation (through statement sorting). Participant involvement in the data generation (i.e. identifying what they want to learn) in part ameliorates concerns that the formal learning experience will be characterised by the knowledge holder/knowledge recipient dichotomy referred to above (Cope et al., 2021; Zehntner & McMahon, 2019). Flexible conceptual tools, like CM, can enable researchers to seek out, explore and characterise variation in emergent forms (Rosas, 2017).

CM has been used as an effective method to develop the learning outcomes of a multidisciplinary higher education course across multiple institutions (Stoyanov et al., 2014), to develop a national public health framework for cognitive health (Anderson, Day, & Vandenberg, 2011) and to define the competencies required of chronic disease prevention and control professionals (Slonim, Wheeler, Quinlan, & Smith, 2010). As Anderson, Anderson et al. (2011, p.1) noted, "concept mapping is a tool that helps with strategic planning. It consists of a sequence of phases that result in a conceptual framework. A concept map provides a visual picture of strategic planning ideas; the ideas are clustered in groups so that a complex set of ideas can be more readily understood". The process of



determining the learning needs of coaches is much like strategic planning, because at its heart strategic planning is matching internal competencies to external opportunities.

CM is a participatory research method where a set of dynamic interacting, independent agents (i.e., participants, statements) function in a highly integrated system of simple structured rules (i.e., process steps, mathematical algorithms) at the micro-level to produce conceptual models of emergent complexity (i.e., point maps, cluster maps) (Trochim & Cabrera, 2005). Rosas (2017) further suggests that CM embraces an ontology of systemism, rather than holism or individualism (Bunge, 2000), that aligns with complexity theory in the way that everything is a system or component of a system (Trochim & Cabrera, 2005). In this sense, the “mental model” of a group can be extracted and compiled by establishing processes and boundaries, frames of reference and visual representations (Rosas, 2017).

### **Participants**

The participants in this study were a convenience sample (Saumure & Given, 2008) of forty sports coaches (males = 29, 72.5%; females = 11, 27.5%), involved in Australian national sporting organisations (NSOs), aged from 26 to 65 years ( $M = 40.4$  years,  $SD = 9.25$ ) from individual ( $n = 11$ , 27.5%) and team sports ( $n = 29$ , 72.5%). Coaches reported 1 to 30 years coaching experience ( $M = 9.3$  years,  $SD = 7.17$ ). Two-thirds ( $n = 26$ , 65%) of participants had coached an athlete to “international” level, with participants coaching “emerging” ( $n = 33$ , 82%), “developing” ( $n = 32$ , 80%) and “podium potential” ( $n = 30$ , 75%) athletes at the time of the study. On average, participants self-rated their national Performance Pathway knowledge as 3.63 (range 2–5) out of 5. Thirty-six (90%) participants held a sports industry qualification, with 21 (52%) holding a university qualification. Demographic data for all participants is presented in Table 1.

The Human Research Ethics Committee of [*Insert name of university, following review*] (approval number: HEC20183) approved the study and no monetary incentive was provided to participants.

Performance pathway coaches are employed by NSOs to identify, develop, support and progress athletes within a formalised athlete talent development pathway. The sample for this study was all of the performance pathway coaches enrolled in the AIS-funded 24-week online “Elevate e-Coach” programme (Australian Institute of Sport, 2020). Elevate e-Coach focused on enhancing performance pathway coaches’ knowledge and skills to identify, support, progress and develop para or able-bodied athletes at “emerging”, “developing” and/or “podium potential” level on a talent pathway (Australian Institute of Sport, 2020), within individual or team sports.

**Table 1.** Demographic characteristics of study participants.

		Mean	Range
Age		40.4 years	26–65 years
Years coaching in NSO national system		9.3 years	1–30 years
Knowledge about national Performance Pathways <sup>◆</sup>		3.63	2–5
		N	%
Gender	Male	29	73%
	Female	11	27%
Highest level of competition coached an athlete to	Professional	4	10%
	National	2	5%
	International	26	65%
	Olympian	4	10%
	Paralympian	4	10%
Category(s) of athlete/s currently coached <sup>#</sup>	Emerging	33	82%
	Developing	32	80%
	Podium potential	30	75%
	Podium ready	18	45%
	Podium	12	30%
Qualifications or training relate to current role*	None stated	2	5%
	Sports industry qualification <sup>^</sup>	36	90%
	Undergraduate university qualification	21	52%
	Post-graduate university qualification	4	10%

Sports represented (n = 40 as described by respondents): Springboard and Platform Diving; Trampoline Gymnastics; Water polo; Triathlon; Fencing; Softball; Surfing; Goalball and Basketball; Weightlifting; Golf; Canoe Slalom; Modern Pentathlon; Lawn Bowls; Cycling; Boxing; Basketball; Baseball; Rowing; Netball; Badminton; Swimming; Sprint Canoe/Kayak; Skateboarding; Freeski; Volleyball; Sailing; Judo; Squash; Mogul skiing; Rugby 7s; Archery; Shooting; Hockey; Taekwondo; Athletics; Table Tennis; Snowboard; Artistic swimming (synchronised swimming); Football – Soccer; Equestrian Eventing.

<sup>◆</sup>Self-rating from 1 “no knowledge” to 5 “extensive knowledge”; <sup>^</sup>e.g. national coaching accreditation; \*open text response categorised by researcher (multiple categories possible); <sup>#</sup>multiple responses allowed

## Data collection

We followed the two standard data collection procedures as outlined by Trochim and McLinden (2017): statement generation (brainstorming) and statement structuring (sorting and rating). All data collection was conducted using the Concept System’s proprietary (licenced) groupwisdom<sup>TM</sup> online platform and software (The Concept System® Groupwisdom<sup>TM</sup>, 2021).

All coaches who were accepted on to Elevate e-Coach were invited to participate in the statement generation by email in the week before programme commenced (mid-June 2020). The invitation email contained an embedded hyperlink to the project-specific brainstorming data collection platform which remained open for 7 days. Participants were encouraged to brainstorm as many single-idea statements as they could think of in response to the following focus prompt:

*“Something I want to know about identifying, developing, supporting and progressing athletes through a national performance pathway towards medal winning performances in the future is . . . .”*

The focus prompt for this study was developed following the guidance of Kane and Trochim (2007, pp 32–34) including piloting with a small sample

of coaches not involved in the study. Following standard practice when using the groupwisdom<sup>TM</sup> platform, at the time of contributing their own responses to the focus prompt, participants could see the anonymised statements contributed by others who had already completed the activity. Coaches also used the data collection platform to identify the sport they coached in and provide demographic data about their age and gender. They provided information about their coaching qualifications and coaching experience (years of coaching in the NSO national system, highest level of competition coached an athlete to, and category of athletes currently coached) and they self-rated their knowledge about identifying, developing, supporting and progressing athletes through a national Performance Pathway (scale of 1 to 5; 1 = no knowledge; 5 = extensive knowledge).

Once the statement generation activity closed, the research team reviewed and edited the brainstormed ideas to: identify and delete irrelevant ideas; split compound statements; identify multiple statements that represented one idea and select one statement to retain; and edit statements for clarity if required (Kane & Trochim, 2007). To ameliorate the potential for individual interpretation researcher bias, this reviewing and editing process was conducted by a research team including stakeholders from the AIS and academics (Carducci et al., 2020). Whilst the use of multiple perspectives in data analysis can go some way to reduce researcher bias, such biases cannot be completely eradicated from the process and this remains a factor when considering the findings.

The final list of unique, relevant and easy to comprehend ideas retained the participants' voice where possible and was member verified (Mays & Pope, 2000) by participants. This process involved participants reviewing the final synthesised list of statements as the first activity of the Elevate e-Coach online course. Coaches were asked to read all the statements and use the chat function of the Zoom teleconferencing software if they felt any of the ideas they had put forward during the brainstorming were not represented or misrepresented. No one requested any changes or additions. Participants were then asked to identify any statements which they did not understand and the person who contributed the statement was asked to clarify its meaning. Again, no one indicated they did not understand a statement, so no amendments or revisions were made to the final list of statements before it was used for statement structuring.

During statement structuring, the sorting and rating tasks were explained, demonstrated and facilitated online by a research team member experienced in conducting CM studies during the first online Elevate e-Coach session. This was conducted using the "share screen" function within the teleconferencing software. For the statement sorting, participants independently grouped the randomised synthesised ideas based on perceived similarity of meaning. They were asked not to create groups based

on priority or value (e.g. “Hard to Do” or “Not Important”), or dissimilar ideas (e.g. “Other” or “Miscellaneous”). They were informed they could put a statement in a group on its own if they thought it was not related to any other statements. Participants were asked to name each group they created based on its theme or contents. They were informed that as few as five and as many as 20 groups may be appropriate (Rosas & Kane, 2012). After completing the sorting task, participants rated each idea for 1) how important it was for them to know this information: (1 = least important; 5 = most important) and 2) how much impact it would have on their coaching practice if they had this information (1 = least impact; 5 = most impact). We selected this bivariate scaling as we anticipated that there could be aspects of their development in relation to their specific role that coaches thought would be important to know (e.g. perhaps to develop a better understanding of the system they were operating in) that would not necessarily directly transfer to coaching practice. They were asked to use the full scale and rate each idea relative to all other ideas on the list.

### ***Data analysis***

We undertook multi-stage multivariate data analysis (Rosas & Kane, 2012) using the groupwisdom<sup>TM</sup> software. Individual participant’s sorting data was used to create a total similarity matrix of all participants sorting data which was subsequently analysed using multidimensional scaling with a two-dimensional solution. The resulting “point map” displays each idea in two-dimensional (x-y) space based on the frequency with which each idea was sorted with every other idea. Statements grouped together more frequently are usually located closer together on the map and are considered more similar in meaning from the participants’ perspective. Hierarchical cluster analysis using Ward’s algorithm was applied to partition the point map into non-overlapping clusters in two-dimensional space (Kane & Trochim, 2007). To select the most appropriate cluster solution to represent the sorted data, we followed the process outlined by Kane and Trochim (2007, pp. 103–104). This required identifying the upper and lower limits of clusters that would be useful in the context of our study – in this case a 10-cluster solution and a six-cluster solution – to identify the most appropriate and useful data representation. This iterative, negotiated process was undertaken collaboratively by all research team members and focused on the reviewing the clusters that were merged as the cluster levels were reduced. We were looking for the point at which splitting or combining clusters was conceptually inconsistent, informed by the similarity matrix data, previous research and expert knowledge (Rosas & Kane, 2012). The research team named each cluster, informed by the cluster name generated by

groupwisdom™ (based on the group names used by participants) and the cluster content.

Groupwisdom™ was also used to calculate mean importance and impact ratings for each statement and to create a bivariate x- (importance) and y- (impact) graph (known as a “go-zone”) divided into four distinct quadrants using the mean all-idea rating for each scale. The top-right (Q1) and bottom-left (Q4) quadrants contain ideas rated above and below the mean for both importance and impact, respectively. The go-zone is a visual representation of the rating data that is useful for generating discussion about priority topics to include in the subsequent CPD for coaches. Members of the research team with a good understanding of the coaches who participated in this study considered this visual depiction of the rating data to be particularly useful for the coaches as a simple portrayal of their responses and was more suitable for this cohort than other more traditional, numerical methods of displaying these results. The Pearson Product Moment Correlation Coefficient ( $r$ ) was calculated to measure the degree to which the two variables (importance and impact) were related to each other.

## Results

Thirty-two participants (80% of e-Coach participants) brainstormed 42 ideas, which the research team synthesised and edited into a final list of 47 ideas for participants to sort and rate (Table 2). All participants sorted the 47 synthesised and randomised ideas into groups (mean = 7.28 groups; mode = 6 groups (10 participants); range = 3–12 groups).

All 40 coaches rated the 47 ideas for importance and impact, and the mean ratings for all ideas were 3.49 and 3.45 out of 5 respectively. The correlation between the two rating scales was strong ( $r = 0.93$ ) (Schober, Boer, & Schwarte, 2018) suggesting that it is not necessary to ask both these rating questions in similar future studies. The eight statements in the *Develop: sport psychology and athlete engagement* cluster had the highest mean cluster importance (3.98) and impact (4.01) ratings while the seven statements in the *Progress: benchmarking and performance pathway design* cluster had the lowest mean cluster importance (2.93) and impact (2.90) ratings. See Table 2 for the mean importance and impact ratings for all clusters and all statements.

An eight-cluster solution emerged as the most appropriate representation of the participants' sorting data: *Sport psychology and athlete engagement* (8 statements); *Training and competition environments* (5); *Athlete wellbeing* (5); *Monitoring and modelling* (6); *Talent* (7); *Supporting coaches to work with stakeholders* (3); *Transition and significant others* (6); and *Benchmarking and performance pathway design* (7) (Figure 1). The stress

Table 2. Statements by cluster and go-zone quadrant.

Cluster Statement	Bridging index <sup>#</sup>	Importance*	Impact on coaching*	All statement go-zone
<b>Sport psychology and athlete engagement</b>	<b>0.11</b>	<b>3.98</b>	<b>4.01</b>	
10 How to teach critical self-reflection.	0.04	4.17	4.02	1
5 How to develop mental skills as athletes move through the pathway (Emerging, Developing and Podium Potential).	0.32	4.15	4.25	1
1 What are proven methods to enhance sustainable self-drive or motivation in athletes?	0.30	4.15	4.10	1
19 How to develop the ability of athletes to problem solve.	0.02	4.07	4.15	1
2 How to improve ongoing self-confidence in athletes.	0.00	4.07	4.07	1
25 What are the emotional attributes that athletes need to succeed, and how to develop them?	0.19	3.90	3.97	1
11 How to effectively empower athletes to own their journey through encouraging their questioning and input.	0.03	3.80	4.12	1
40 What strategies are there to help the athlete to actually commit when they say they want it?	0.03	3.52	3.40	2
<b>Training and competition environments</b>	<b>0.77</b>	<b>3.84</b>	<b>3.87</b>	
4 How to simulate competition like environments, including the stress/pressure of a competition environment.	0.91	4.12	4.25	1
41 Creative ways to develop a professional daily training environment (DTE) with limited or no funding at each stage of the pathway.	0.79	4.12	3.83	1
42 How to get the most effective timing and level of competition and/or training exposure for the athlete throughout the pathway.	0.73	3.92	3.87	1
17 What are the 'best practice' guidelines for training (practice) vs. competition ratio, and how that may change as they progress up the Pathway?	0.55	3.80	3.77	1
14 How to safely optimise and maximise strength conditioning and loading for young athletes.	0.88	3.22	3.60	3
<b>Athlete wellbeing</b>	<b>0.12</b>	<b>3.63</b>	<b>3.55</b>	
20 How to develop our squad members as great people first and excellent players secondly.	0.11	3.83	3.80	1
18 How to identify signs that an athlete may be heading towards early burnout.	0.22	3.77	3.46	1
3 How to create a healthy perspective for the athlete to stay focused while having fun.	0.04	3.65	3.87	1
12 How to support athletes to overcome adversity, racism, gender-biases that arise.	0.10	3.50	3.22	2
46 Strategies to help athletes to get through challenging academic periods whilst still maintaining their conditioning and performance.	0.14	3.41	3.40	4
<b>Monitoring and modelling</b>	<b>0.37</b>	<b>3.48</b>	<b>3.40</b>	
39 How to monitor and track holistic athlete development (e.g. commitment, mental preparation etc.) across the pathway	0.62	4.05	3.95	1
43 How can we keep fast-tracked athletes in the system (and performing well)?	0.43	3.47	3.25	4
23 How other sports have successfully supported pathway athletes.	0.36	3.45	3.55	3
13 What are the pros and cons of adding talented and fast developing younger athletes to older training groups?	0.37	3.37	3.32	4
24 What are the latest athlete development models?	0.20	3.35	3.27	4
29 How do we use current development models in relation to current Australian high-performance pathways and structures?	0.25	3.17	3.07	4

(Continued)

Table 2. (Continued).

Cluster Statement	Bridging index <sup>#</sup>	Importance*	Impact on coaching*	All statement go-zone
<b>Talent identification</b>	<b>0.26</b>	<b>3.42</b>	<b>3.22</b>	1
45 What quantitative measures - other than fitness testing, anthropometric measurements, competition results and rankings - can be used to track the progress of athletes through the pathway?	0.32	3.77	3.80	
8 What might you see from an athlete after identification, that might show a higher likelihood of reaching podium success?	0.14	3.70	3.40	2
36 What are the key criteria during talent identification, and how to weight them?	0.10	3.65	3.42	2
27 How to identify youth athletes who are not successful early on in their career but do have potential.	0.11	3.50	3.22	2
26 How do we develop the use of "coach's eye" during talent ID.	0.56	3.47	3.32	4
15 How to determine if athletes who test well for certain disciplines at a certain age have a higher chance of progressing through the pathway.	0.14	3.07	2.87	4
44 How to appropriately analyse athletes' relevant genetics (e.g. height/build) to determine whether their body will develop in a way that complements a sport.	0.47	2.75	2.51	4
<b>Supporting coaches to work with stakeholders</b>	<b>0.95</b>	<b>3.37</b>	<b>3.52</b>	1
6 How to develop leadership skills in other coaches and service team members	1.00	3.85	3.95	1
7 What are the emotional attributes that coaches need, and how to develop them?	0.93	3.80	4.10	1
31 What data is there for sports or guidance for coaches to understand why or why not an athlete is supported?	0.93	2.47	2.50	4
<b>Transition and significant others</b>	<b>0.38</b>	<b>3.25</b>	<b>3.15</b>	1
30 How can we as a sport, better support and engage with athletes during the transition from junior to senior competition?	0.28	3.87	3.52	1
33 Strategies to ensure athletes from an early age have access to the necessary support services and quality of coaching required to achieve world class success.	0.47	3.72	3.37	2
35 Strategies to support athletes who live in remote areas with a quality program without having to relocate.	0.44	3.32	3.32	4
37 The importance of parental support (financial, time commitments, etc).	0.46	3.05	3.20	4
38 How to best support athletes to transition from one coach to another.	0.25	2.80	2.87	4
21 What are the pros and cons of changing coaches during the pathway?	0.35	2.72	2.57	4
<b>Benchmarking and performance pathway design</b>	<b>0.16</b>	<b>2.93</b>	<b>2.90</b>	4
34 ....that development programs have been road tested and shown to produce high quality athletes/team.	0.13	3.57	3.17	2
16 How to benchmark Australian athletes against international athletes across pathway.	0.21	3.42	3.25	4
28 How to match current development models to individual athlete needs.	0.20	3.00	3.10	4
9 How to see past variations in progression speed to determine potential.	0.17	3.00	2.80	4
32 How can we fast-track athletes for early success?	0.11	2.80	3.02	4
47 For my sport, how long does an athlete usually takes to move from one pathway category to the next?	0.11	2.47	2.47	4
22 How to quickly transition athletes from non-sporting background to elite performance.	0.16	2.20	2.47	4
<b>All statements</b>		<b>3.49</b>	<b>3.45</b>	

1 = above mean on importance, above mean on impact; 2 = above mean on importance, below mean on impact; 3 = below mean on importance, above mean on impact; 4 = below mean on importance, below mean on impact.

#Values range between 0.00 and 1.00. Values closer to 0 indicate an anchoring statement closely related to others in the cluster. Values closer to 1 indicate bridging statements more connected to other clusters in the map.

\*Mean rating (N = 40).



value was 0.2582, suggesting that the two-dimensional point map is unlikely to be random or without structure and was a good representation of the original participant sorting data (Rosas & Kane, 2012).

The statements in the *Sport psychology and athlete engagement* (bridging index: 0.11) cluster and the *Athlete wellbeing* (bridging index: 0.12) cluster had the lowest mean bridging index. The bridging index is a measure of whether a statement was generally sorted with nearby statements (values close to 0) or with statements located in other areas of the concept map (values closer to 1) (Kane & Trochim, 2007). Therefore, these two clusters of statements are statistically more stable and can be considered to have a tighter thematic content. Conversely, statements in the *Supporting coaches to work with stakeholders* cluster had the highest mean bridging index (0.95) indicating that the statements in this cluster were frequently linked to others across the cluster map.

Nineteen statements were rated above the all-statement mean for both importance and impact. These statements appear in Q1 of the go-zone (Figure 2). The five individual statements rated as the most important for coaches to know were: #10. *How to teach critical self-reflection* (4.17); #5. *How to develop mental skills as athletes move through the pathway (Emerging, Developing and Podium Potential)* (4.15); #1. *What are proven methods to enhance sustainable self-drive or motivation in athletes?* (4.15); #4. *How to simulate competition like environments, including the stress/pressure of a competition environment.* (4.12); and #41. *Creative ways to*

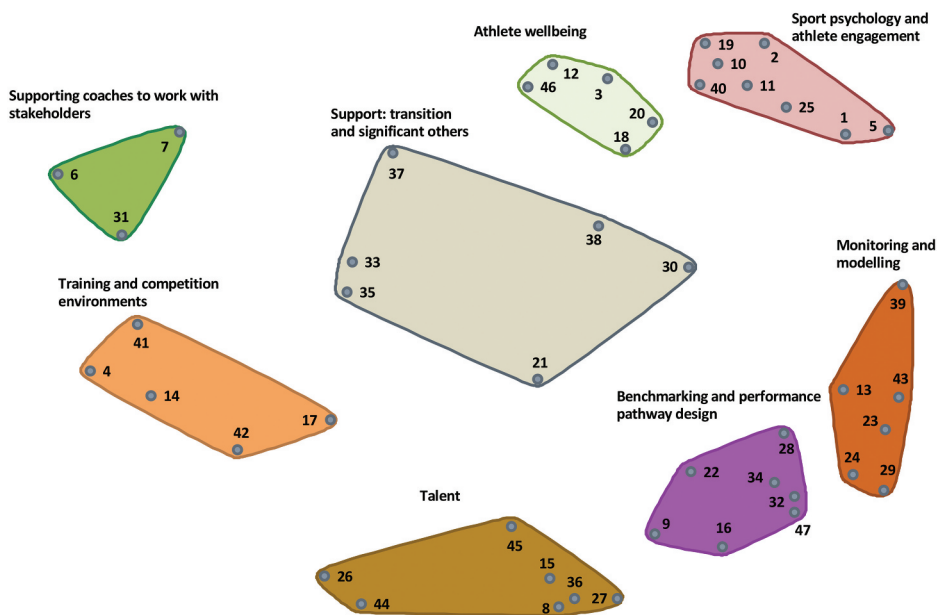


Figure 1. Cluster map of pathway coaches' needs.

develop a professional daily training environment (DTE) with limited or no funding at each stage of the pathway. (4.12). The statement rated as the least important to know was: #22 How to quickly transition athletes from non-sporting background to elite performance. (Figure 2)

## Discussion

This study aimed to capture the developmental needs of coaches by asking them what they needed to know in relation to their roles as coaches of performance pathway athletes, before they participated in a CCPD experience. The concept map from this study represents coaches' perceptions of their own developmental needs and indicates a broad spectrum of needs. Critiquing the findings in this study using Côté and Gilbert's (2009) tripartite definition of coaching expertise is revealing, particularly in terms of professional knowledge. The coaches in this study did not directly identify developmental needs, from a content perspective, in terms of their ability to develop their athletes technical or tactical competences within a specific sport. Rather, they were generally more interested in developing their understanding of the systems and processes that are contained within their role frame. Furthermore, these systems and processes typically relate to recruiting the athlete into the pathway, providing athletes with an

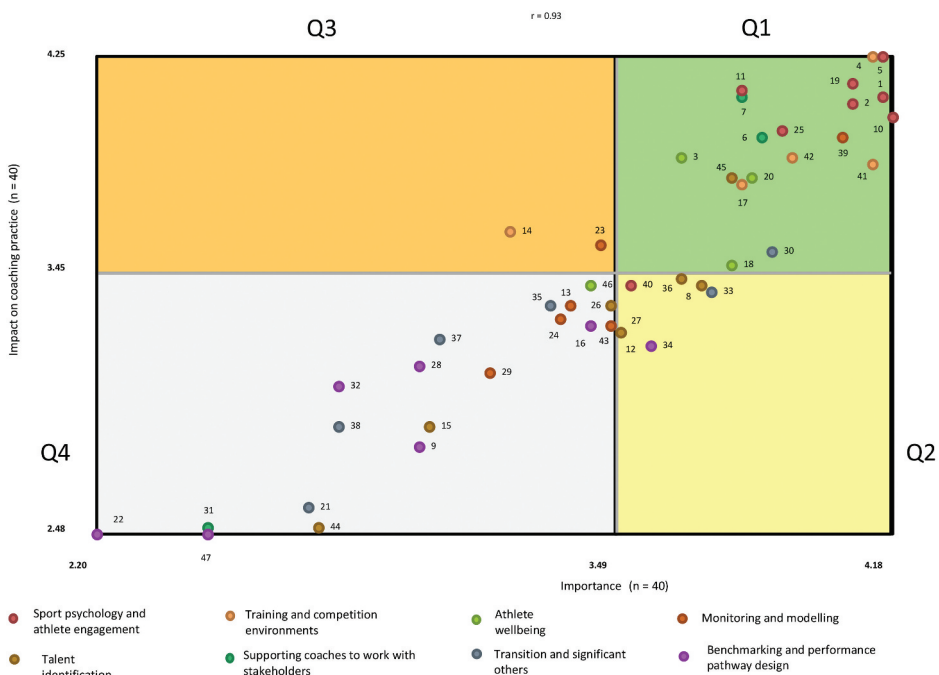


Figure 2. All-statement go-zone of pathway coaches' needs.

appropriate balance of training and competition and then effectively monitoring their navigation through a pre-determined set of performance milestones.

By broadening the definition of professional knowledge to include knowledge of organisational systems and processes, we categorised the eight clusters that emerged from our findings as follows: *Professional Knowledge* = 4 clusters (Identifying talent, Benchmarking and performance pathway design, Training and competition environments, Monitoring and modelling); *Interpersonal Knowledge* = 4 clusters (Sport psychology and athlete engagement, Athlete wellbeing, Supporting coaches to work with stakeholders, Transition and significant others); and *Intrapersonal knowledge* = 0 clusters.

An obvious question arising from this categorisation is why coaches in our study did not explicitly identify any intrapersonal developmental needs. This finding is unsurprising in the context of the existing literature, given that most coach development programmes primarily aim to improve professional skills and technical knowledge, with scant regard for the development of intrapersonal coach behaviours (Lefebvre et al., 2016; Silva et al., 2020). Furthermore, previous studies have suggested that time spent in reflection, a focal aspect of intrapersonal knowledge, is considered of secondary importance to that of perceived essential work, such as the management of athletes' emotions (Knowles, Tyler, Gilbourne, & Eubank, 2006; Rynne & Mallett, 2012).

However, it could be argued all of the themes postulated from the results relate to intrapersonal knowledge, as many of them could easily be facilitated using intrapersonal pedagogical tools. Furthermore, it has been argued that intrapersonal knowledge is pivotal for the other two facets of interpersonal and professional knowledge (Côté & Gilbert, 2009). Some of the themes (i.e., "How to teach critical self-reflection") at the very least described a developmental need relating to supporting athletes through intrapersonal processes. Thus, it could be argued that the coaches in the training programme were voluntarily involved in a programme that was designed to develop intrapersonal knowledge, and the content they described reflected on how they could develop athletes' intrapersonal knowledge. An example of how this emerges in practice has been evidenced by coaches who reported an increased frequency of contact with athletes during rehabilitation and how they needed to use interpersonal knowledge to learn about their athletes (Maurice, Voelker, Kuklick, & Byrd, 2021).

There are other potential reasons for the lack of explicit reference to interpersonal needs by the coaches in our study; none of which can be confirmed by our study but are worth further exploration. The first half of the prompt – '*something I want to know about identifying, developing, supporting and progressing athletes*' – may have led coaches to focus on

their athletes and not consider that developing themselves (i.e., their intrapersonal knowledge) was central to developing their athletes. Second, the results might suggest that the participants were highly self-aware and consider themselves reflective practitioners requiring little or no development in this knowledge domain. Finally, the participants may not have conceptualised that their intrapersonal developmental needs would be addressed in typical CCPD opportunities. This is an interesting finding given recent evidence that to reflect critically support for coaches is required from trained facilitators who can add structure to the reflective process (Da Silva, Mallett, Sánchez-Oliva, Dias, & Palmeira, 2022). Perhaps intuitively, coaches focused on knowledge domains external to themselves that could be improved by better understanding the systems and processes they operated within.

The *Sport psychology and athlete engagement* cluster received the highest mean cluster importance (3.98) and impact (4.01) ratings. This is unsurprising as sport psychology support has been highlighted in CPD research more than other areas (Anthony, Gordon, Gucciardi, & Dawson, 2018). However, it is difficult to determine why participants identified development needs around this cluster as particularly important and impactful; was it because (a) they felt their knowledge and understanding of this topic was deficient, (b) previous support on this topic was ineffective and/or (c) this topic is an ever-present within the daily training environment? Further research is needed to understand why coaches responded to the needs analysis in the way they did.

Interestingly, the cluster with the highest mean bridging index in our study involved stakeholder engagement. This result emphasises the role that performance pathway coaches play in orchestrating support for the athlete from others, such as parents and medical professionals and that they currently lack support within these part-time environments (Bjørndal & Ronglan, 2018). It is reasonable to suggest that coaches in this study need to influence stakeholders as part of their role and that leadership within sport coaching is generally a process of exerting influence (Gilbert, 2016). Research suggests that a coach's ability to use transformational leadership to exert idealised influence on stakeholder engagement can positively affect an athlete's performance outcomes in terms of the development of personal and social skills, cognitive skills, goal setting skills, and initiative (Turnnidge & Côté, 2018). It is no surprise, therefore, that coaches in this study linked the ideas in this cluster to a range of needs for the coach.

These findings provide a form of consensus on the developmental needs of the participants and it is telling that certain aspects of previously identified coach development needs were absent. For example, it has been reported that coaches should understand the financial constraints experienced by their

athletes (Morley et al., 2018) and provide psychosocial support for anti-doping compliance (Nicholls et al., 2014). Whilst it is difficult to pinpoint why these topics were not brainstormed by coaches in our study, it may be that, given data was collected during the COVID-19 pandemic, coaches prioritised some developmental needs over others. For example, coaching multiple athletes unable to train in typical environments for long periods and supporting their return to daily training environments were, potentially, more immediate in their lived experiences and, therefore, influenced the development needs they identified.

Another perspective on these omissions is that coaches may lack explicit awareness of some aspects of their role when their role is, perhaps, dominated by operational and organisational requirements. Therefore, they prioritise what they believe is most important to them at that moment in time to fulfil their roles and did not consider a broader range of developmental requirements beyond those that they stated (Nash et al., 2017). Whilst the presentation of a broad cohort's responses to their needs to the whole group, through the use of sorting and rating within the concept mapping exercise, goes some way to ameliorate this dilemma, it is likely that the coaches' reported needs are heavily contextually driven and limited to their own experiences and expertise. This has implications for their future development, as coaches' prior learning and experiences affect what and how they want to learn in the future (Stodter & Cushion, 2019; Werthner & Trudel, 2009). Therefore, exposing coaches to what others in similar positions to themselves perceive appropriate for their role may be an acceptable way of building on the use of concept mapping, which could be further framed around existing coach development frameworks, (e.g., International Council for Coaching Excellence (International Council for Coaching Excellence. The International Sport Coaching Framework, 2021)). However, it is essential to balance these broadly identified CCPD needs with coach-generated input, through needs analysis, to ensure that the constraints of overly formalised and externally directed CCPD do not emerge.

## Limitations

Whilst this study employed an innovative approach to elicit responses from a sizeable sample of coaches of performance pathway athletes across multiple national sports organisations, it is not without its limitations. Participating coaches were from Olympic and Commonwealth sports financially supported by the AIS. Therefore, coaches from some major national team sports (e.g., cricket, Australian football and rugby league) were not eligible to participate. In addition, the sample contained an over representation of Olympic sports relative to Paralympic sports, and an over representation of male compared to female coaches.

The socio-political constraints of the AIS likely influenced the coaches' brainstorming choices, and the Division of the AIS that organised the Elevate e-Coach programme explicitly focused on athlete development (as opposed to coach development), thus the course focused on the knowledge coaches need to develop their athletes, rather than themselves. Another way to define the knowledge that the coaches in this study need, and something that could influence these results, is how NSOs ask coaches to approach their role, given the impact an organisation can have on a coach's practice (Griffiths et al., 2018). Given the suggestion that high performance coaching is influenced by the interdependence between the engagement of coaches and the external structures that exist where they practice and learn (Mallett et al., 2014), it's highly likely that the coaches in this study have multiple and competing perspectives when highlighting their needs. Therefore, further insight is needed into the influence organisational culture has on coaches' perceptions of their developmental needs. It should also be acknowledged that concept mapping is by its nature a group process. Therefore, the resultant map of coach CCPD needs that emerged from the analysis of the participants sorting data in this study reflects the needs of the group as a whole and may not reflect the specific needs of individual coaches.

Given the paucity of research examining the derivation of content of coach education courses, it is difficult to compare this cohort's data to others. Therefore, it is important to conduct further research to understand the nuances that might exist between coaches with varying levels of expertise and experience as well as those working with athletes at a range of performance levels and within different socio-political and organisational environments.

## Conclusion

The findings of this CM study provide crucial information about the perceived developmental needs of coaches to enable them to support athletes at the emerging, developing and podium potential stages of a talent pathway. These findings illuminate previously unknown developmental needs that can underpin co-created, contextually relevant, learning outcomes. Mapping the learning needs of coaches from an eclectic group of national sports provides a richness and depth to a discussion rarely found in the extant literature.

There could be a lot to gain by integrating stakeholders in efforts to define the scope of coach education and to define coach education priorities; this is novel and, whilst not without its limitations, proved valuable in situating coaches in a co-creative environment at an early stage. Co-creation of CCPD can be used to ensure that the content of education sessions is contextually relevant for the stage of development of the coaches and their athletes.

Involving key stakeholders, such as coaches and sport organisations, within and throughout the research process has been called for in the past with a view that such an approach would ensure accessibility to findings and maximise the impact of coach development programmes more generally (Pope et al., 2015).

These findings can inform future CCPD opportunities for coaches of performance pathway athletes and raise awareness among NSOs of the need to provide coaches with opportunities to examine and convey their needs as part of their CCPD planning.

### **Practical implications**

- Coaches of athletes on performance pathways in this study perceive they need to develop their knowledge across eight distinct developmental clusters.
- Needs analysis, through CM, can be used to ensure co-created, needs-based, CCPD content and provides coaches with contextualised support appropriate to their role frame.
- Mapping coaches' needs from this study to existing coach knowledge frameworks reveals some anomalies, which reflect the contextual needs of coaches in a variety of roles and this evidence could be used to update such frameworks.
- More research is needed to understand the influence of organisational culture on coaches' perceived developmental needs.

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No potential conflict of interest was reported by the author(s).

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