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Sport Experiences, Milestones, and Educational Activities Associated With High-Performance Coaches' Development

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What experiences are needed to become a high-performance coach? The present study addressed this question through structured retrospective quantitative interviews with 10 team- and 9 individual-sport coaches at the Canadian interuniversity -sport level. Minimum amounts of certain experiences were deemed necessary but not sufficient to become a high-performance coach (e.g., playing the sport they now coach and interaction with a mentor coach for all coaches, leadership opportunities as athletes for team-sport coaches only). Although coaches reported varying amounts of these necessary experiences, general stages of high-performance coach development were traced. Findings serve to identify and support potential high-performance coaches and increase the effectiveness of formal coaching-education programs.

In order to inform coaching-education programs, sport researchers must endeavor to empirically answer two questions: How do coaches become high-performance coaches? and What experiences are necessary for one to become a high-performance coach? Several studies have examined the relationship between developmental experience and expert performance in sport and music (e.g., Bloom, 1985; Côté, 1999; Ericsson, Krampe, & Tesch-Römer, 1993; Helsen, Starkes, & Hodges, 1998). In particular, Côté proposed the developmental model of sport participation (DMSP) to account for the developmental sport activities of elite athletes. According to the DMSP, athletes reach elite levels by progressing through three stages of sport participation (sampling, specializing, and investment years), each characterized by differing amounts of deliberate play (Côté, Baker, & Abernethy, 2003, 2007) and deliberate practice (Ericsson et al., 1993). The same body of knowledge does not yet exist, however, for the development of high-performance coaches (Gilbert, Côté, & Mallett, 2006).

Salmela and colleagues have explored developmental aspects related to coaching excellence, mostly from a qualitative research perspective. Using semistructured interviews, Salmela, Draper, and Desjardins (1994) examined the developmental paths of expert field and ice hockey coaches. They outlined six stages of development: diffused involvement in sports, initial coaching role, passive to active transfer

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of coaching knowledge, established coaching role, specialist coach, and eminent awareness. The latter stage of coaching knowledge acquisition was reflected in a consistent winning record and the production of other expert coaches. In subsequent work, Salmela (1995) identified three experiential stages of expert-coach development, each qualitatively different from its predecessor: early involvement with sport, early career coaching, and mature career coaching. Schinke, Bloom, and Salmela (1995) conducted a more concrete examination of the developmental experiences of six expert basketball coaches. Based on this previous research, we outlined seven stages of athletic and coaching development: early sport participation, national elite sport, international elite sport, novice coaching, developmental coaching, national elite coaching, and international elite coaching. Although all three studies provided stage-based explanations of coaching development, general trends were the focus of the stage delineations, and findings related primarily to the development of coaching knowledge. Because qualitative analysis was used, no conclusions were made with regard to quantifying the experiences of the coaches at each stage.

Gilbert, Côté, and Mallet (2006) recently proposed that sport researchers should quantitatively examine the experiences and activities that facilitate coach development. In fact, few studies have quantified the specific developmental sport experiences of high-performance coaches, despite suggestions that there are a number of experiential factors that might be consistent in most high-performance coaches' development. For example, having previously played the sport that they now coach at the collegiate varsity level and having formal leadership experiences are athletic experiences that are reported by most high-performance coaches (Anderson & Gill, 1983; Richardson, 1981; Schinke et al., 1995). With regard to coaching experience, initial coaching positions at the high school level (Latimer & Mathes, 1985) and being mentored by a more experienced coach (Bloom, Durand-Bush, Schinke, & Salmela, 1998) were also reported by many high-performance coaches. Finally, the prevalence of an undergraduate degree in physical education was noted among high-performance coaches (Anderson & Gill, 1983; Latimer & Mathes, 1985; Richardson, 1981). Although most of these studies examined only team-sport coaches (see Trudel & Gilbert, 2006, for a review), they provide a base of important experiences that might be quantitatively examined in a more diversified coaching population.

Gilbert and colleagues (2006) advocated the use of a structured retrospective interview procedure to examine coaching development according to the general categories of athletic experience, coaching experience, and formal coaching-education experience. According to Werthner and Trudel's (2006) representation of coaches' learning process, these experiences contribute to the development of coaching expertise by affording coaches mediated (e.g., coaching classes), unmediated (e.g., watching other coaches), and internal (e.g., reflecting on their own coaching) learning situations. A similar classification of coaches' learning experiences has also been proposed by Nelson, Cushion, and Potrac (2006) with regard to formal (e.g., coaching classes), nonformal (e.g., coaching clinics), and informal (e.g., athletic and coaching experience) coach learning. Although the relative importance of one type of learning situation over another can vary according to coaching context, both conceptualizations of the processes by which coaches gain knowledge highlight the relatively low impact of traditional coaching education. This conclusion lends

theoretical credence to the examination of a broad range of experiences in the development of high-performance coaches.

Two recent studies examined experiences of different level coaches. Gilbert et al. (2006) used the structured retrospective interview to investigate the experiences of American high school softball coaches, community college football coaches, and NCAA Division I volleyball coaches. Although most coaches had accumulated many hours of experience as athletes and generally rated themselves as better than average athletes, they reported extremely varied coaching experiences across the different contexts. In addition, all coaches spent a minimal amount of time on formal coach education. Using a similar methodology, Lynch and Mallett (2006) reported comparable findings in their analysis of five international-level Australian track and field coaches.

The present study aimed to further the line of research proposed by Gilbert et al. (2006) by (a) expanding on the preliminary findings of what experiences are necessary during high-performance coaches' development, (b) clarifying how much of each experience is required, and (c) clarifying when these experiences should occur during development. Specifically, the present study examined the developmental experiences of team- and individual-sport high-performance coaches and outlined a framework of sport experiences that are necessary for the development of these high-performance coaches.

Method

Participants

Participants included 19 high-performance coaches. For the purpose of this study, a high-performance coach was defined as someone coaching highly skilled athletes in a sport environment that focused primarily on performance, as opposed to fun or athlete development (i.e., higher than secondary school or youth developmental club). Specifically, participants were 19 current or former head coaches from three Canadian universities and one high-performance club. Of these coaches, 10 were team-sport coaches (1 female, 9 male; mean age = 39.8 years, SD = 9.2) and 9 were individual-sport coaches (3 female, 6 male; mean age = 50.4 years, SD = 13.7). Nine different sports were represented (basketball, n = 4; track and field, n = 4; volleyball, n = 3; swimming, n = 2; fencing, n = 2; soccer, n = 1; water polo, n = 1; rugby, n = 1; and figure skating, n = 1). Coaches were recruited via phone or e-mail.

Data Collection

A retrospective interview procedure was used to obtain a quantitative account of the development of each coach. The procedure was first proposed by Côté, Ericsson, and Law (2005) to examine the development of elite athletes. Based on athletes' "recall of factual knowledge about concrete activities they engaged in throughout their development" (Côté et al., 2005, p. 4), the interview was designed to collect quantitative information that could potentially be verified using external sources, specific to each developmental activity. Côté and colleagues provided a detailed review of previous research that supports the accuracy, validity, and reliability of

this methodology. Gilbert et al. (2006) modified this procedure for use with coaches. The modified interview contains preset questions designed to collect demographic information and assess coaches' previous experiences as athletes, as coaches, and in formal education, with questions based on the principles of reliable and valid retrospective data collection outlined by Côté et al. (2005). Thus, only objective, quantifiable, potentially verifiable data (e.g., number of seasons played) were collected, as opposed to subjective information that might be more prone to distortion over time (e.g., enjoyment ratings). In addition, data were gathered in the simplest units possible in an attempt to make recall as objective and straightforward as possible. For example, to determine total number of games played or coached for each team or level, participants were only asked to recall the number of seasons played or coached and the number of games per season, thus requiring some calculation on the part of the interviewer.

Interviews were conducted in person, with a follow-up phone call necessary in one instance to verify collected information. Total time to conduct the complete interview was approximately 2 hr. Sport-experience data were recorded on two separate spreadsheets—one for athletic experiences and one for coaching experiences. Each row represented a discrete sport experience with consistent descriptive values. For example, 2 years of house-league competition was described in one row, and 4 years of university competition was described in another. Columns represented the specific quantitative categories for each discrete experience (e.g., number of years involved, sport level).

Data Analysis

Although the interview was designed to give a complete picture of coaches' sport development up to the current moment, for the purpose of the present study, only experiences before becoming head coaches at the high-performance level were of interest and, thus, selected for this analysis. Of these items, only those deemed representative of separate, discrete experiences were chosen, and redundant items were thrown out, resulting in a total of 18 items to be analyzed separately for individual- and team-sport coaches. Included items are listed in Table 1. Number of seasons of involvement was chosen to represent the temporal dimension of sport experiences, as opposed to number of competitions or hours of training to avoid confounds of differing season lengths and structures between sports (e.g., 3-month basketball season with two competitions per week vs. 2-month track season with three competitions total).

The sample was then divided into two groups: team-sport coaches and individual-sport coaches. For each group of coaches, minimum scores on each experience item were identified. For example, in the sample of team-sport coaches, the lowest reported number of formal leadership opportunities as an athlete in the sport they were now coaching was three; this value became the minimum score. Items for which the minimum score was not zero were noted. More specifically, a nonzero minimum score indicated an item for which all coaches reported some experience before becoming a head coach at the high-performance level. Conversely, a minimum score of zero indicated an item for which at least one coach reported no experience before becoming a head coach at the high-performance level. If a coach recalled no prior experience at a particular level or sport, they were instructed to

Table 1 Descriptive Statistics for Experience Items

Item	*M*	*SD*	*f*
Team-sport coaches			
Number of seasons played (sport coaching)	21.9	11.4	10/10
Number of leadership experiences (sport coaching)	11.1	6.5	10/10
Self-rating of ability/10 (sport coaching)	8.2	0.6	10/10
Number of seasons played (sport coaching, elite)	7.5	9.0	9/10
Number of leadership experiences (sport coaching, elite)	2.3	5.6	4/10
Self-rating of ability/10 (sport coaching, elite)	6.5	2.9	9/10
Number of seasons played (other team sports)	28.9	29.6	10/10
Number of leadership experiences (other team sports)	10.6	18.0	9/10
Self-rating of ability/10 (other team sports)	7.0	0.7	10/10
Number of seasons played (individual sports)	10.0	9.5	8/10
Number of leadership experiences (individual sports)	0.6	1.9	1/10
Self-rating of ability/10 (individual sports)	5.7	3.3	8/10
Number of seasons coaching at recreational level	1.3	3.2	2/10
Number of seasons coaching at developmental level	14.6	11.8	10/10
Number of seasons as AC at elite level	4.7	5.2	7/10
Number of seasons coaching other sports	4.4	5.8	6/10
Total hours of formal coach training	859.3	1,415.7	10/10
Number of mentors	3.2	3.5	9/10
Individual-sport coaches			
Number of seasons played (sport coaching)	17.7	12.8	9/9
Number of leadership experiences (sport coaching)	5.8	11.9	5/9
Self-rating of ability/10 (sport coaching)	8.2	0.8	9/9
Number of seasons played (sport coaching, elite)	8.1	9.2	7/9
Number of leadership experiences (sport coaching, elite)	3.7	8.5	3/9
Self-rating of ability/10 (sport coaching elite)	6.8	4.0	7/9
Number of seasons played (team sports)	15.1	10.5	8/9
Number of leadership experiences (team sports)	2.6	2.8	5/9
Self-rating of ability /10 (team sports)	5.0	2.6	8/9
Number of seasons played (other individual sports)	20.6	25.2	8/9
Number of leadership experiences (other individual sports)	1.1	2.3	2/9
Self-rating of ability/10 (other individual sports)	6.0	3.0	8/9
Number of seasons coaching at recreational level	14.0	39.4	3/9
Number of seasons coaching at developmental level	11.1	13.7	7/9
Number of seasons as AC at elite level	4.9	6.4	7/9
Number of seasons coaching other sports	7.2	16.4	4/9
Total hours of formal coach training	459.3	538.7	9/9
Number of mentors	4.6	2.7	9/9

Note. *f* = frequency of nonzero responses; AC = assistant coach.

report a zero for self-ratings of ability (which were provided out of 10). Means, standard deviations, and frequencies of nonzero scores were calculated for each item by group and are also presented in Table 1.

Level 1 and Level 2 items are outlined in Table 2. Items for which all coaches reported prior experience (i.e., 100% nonzero scores) were designated as Level 1 items, whereas the items for which more than 75% of the sample reported prior experience (i.e., 8/10 team-sport coaches, 8/9 individual-sport coaches) were designated as Level 2 items. For the purpose of equalizing different item-measurement scales, raw scores for all items were converted to percentages of the maximum raw score reported for that item in the same group, also presented in Table 2. That is,

Table 2 Minimum Raw Scores and Percentage Scores on Frequently Reported Experience Items

	Level 1		Level 2	
Item	**Raw**	**%**	**Raw**	**%**
Team-sport coaches				
Number of seasons played (sport coaching)	8.0	18.2	–	–
Number of leadership experiences (sport coaching)	3.0	13.0	–	–
Self-rating of ability/10 (sport coaching)	7.3	18.1	–	–
Number of seasons played (team sports)	4.0	3.9	–	–
Self-rating of ability/10 (team sports)	5.7	71.3	–	–
Number of seasons at developmental level (sport coaching)	3.0	7.1	–	–
Total hours of formal coach training	30.0	40.1	–	–
Number of mentors	1.0	8.3	–	–
Self-rating of ability/10 (sport coaching elite)	–	–	3.0	30.6
Number of leadership experiences (other team sports)	–	–	1.0	1.6
Number of seasons played (individual sports)	–	–	3.0	9.4
Self-rating of ability/10 (individual sports)	–	–	5.1	55.4
Individual sport coaches				
Number of seasons played (sport coaching)	5.0	10.6	–	–
Total hours of formal coach training	90.0	59.8	–	–
Number of mentors	2.0	18.2	–	–
Number of seasons played (sport coaching, elite)	–	–	3.0	11.5
Self-rating of ability/10 (sport coaching elite)	–	–	6.5	65.7
Number of seasons played (team sports)	–	–	7.0	21.2
Self-rating of ability/10 (team sports)	–	–	2.0	23.8
Number of seasons played (other individual sports)	–	–	4.0	5.5
Self-rating of ability/10 (other individual sports)	–	–	2.0	22.2
Number of seasons at developmental level (sport coaching)	–	–	3.0	7.7
Number of seasons as AC at elite level (sport coaching)	–	–	1.0	5.3

Note. Level 1 = 100% nonzero response frequency; Level 2 = >75% nonzero response frequency; % = raw score as a percentage of the maximum reported raw score on that item by group. Minimum scores for Level 2 items refer to minimum nonzero scores.

the maximum raw score of an item for each group became 100%, and a raw score half as great as the maximum score became 50%, and so on. Percentage scores for items measured in hours (i.e., total hours of formal coaching education or training) were calculated from the $\log_{10}$ of raw scores to reduce variability. Finally, a total experience score was calculated for each coach by the summation of percentage scores on all items for each coach. Although this total experience score is a unitless measure, it gives some idea of the overall amount of sport experience obtained before becoming a high-performance head coach.

Results

Developmental Sport Experiences

Means, standard deviations, and frequency scores for all experience items of team- and individual-sport coaches are presented in Table 1. For coaches in both the team and individual sport groups, scores for most experience items were extremely variable, with standard deviations often exceeding mean values. Exceptions were items concerning average ability ratings as an athlete, for which scores were generally more clustered.

Items meeting Level 1 (100% nonzero scores) or Level 2 (75% nonzero scores) conditions for team- and individual-sport coaches are presented in Table 2. Minimum scores for those items are also presented in Table 2. For team-sport coaches, items not reaching Level 1 (100% nonzero scores) or Level 2 (75% nonzero scores) cutoffs were leadership experiences as an athlete at the elite level, leadership experiences as an athlete in individual sports, number of seasons coaching at the recreational level in the sport now coaching, number of seasons as an assistant coach at the high-performance level, and number of seasons coaching other sports. For individual-sport coaches, items not reaching Level 1 or Level 2 cutoffs were leadership experiences as an athlete in the sport now coaching, leadership experiences as an athlete in sport now coaching at the elite level, leadership experiences in team sports, leadership experiences in other individual sports, number of seasons coaching at the recreational level in the sport now coaching, and number of seasons coaching other sports.

As noted in Table 2, all coaches in both groups reported spending time in formal coach training. Furthermore, all coaches reported achieving a minimum of Level 2 accreditation in the Canadian National Coaching Certification Program (NCCP). In addition, 8 of the 10 team-sport coaches had at least an undergraduate degree, 5 had at least a master's degree, and 7 had a sport- or physical-education-related degree, whereas 8 of the 9 individual-sport coaches had at least an undergraduate degree, 6 had at least a master's degree, and 6 had a sport- or physical-education-related degree.

Total Developmental Sport Experience

Mean total sport experience scores (summation of percentage scores on all items) of the team-sport (M = 738.2, SD = 200.1) and individual-sport (M = 729.9, SD = 158.5) coach groups were not significantly different, $t(17) = 0.107$, $p = .91$. Minimum experience summation scores are presented in Table 3. Of note, minimum total experience scores were similar for both team- (min = 500.6) and individual-sport

Table 3 Minimum Experience Percentage Score Summations

Experiences	Team-sport coaches	Individual-sport coaches
Total sport experience	500.6	514.7
Level 1 items	180.0	163.9
Level 2 items	100.7	162.9
Level 1 ± Level 2 items	280.7	326.8

Note. For Level 2 items, minimum nonzero percentage scores (i.e., the lowest percentage score above zero) were used to calculate summation scores.

coaches (min = 514.7). In addition, the sum of Level 1 and Level 2 item percentage scores (min = 280.7 for team-sport coaches, min = 326.8 for individual-sport coaches) was less than the minimum total experience score for both groups (see Table 2 for individual Level 1 and Level 2 item minimum percentage scores).

Developmental Milestones

Based on the observed data, high-performance-coach development was characterized by five stages, each delineated by important milestones (see Figure 1). The first stage, *diversified early sport participation*, started at approximately age 6 (average age of initial organized sport participation = 6.7 years). This stage was characterized by participation in many sport activities, both team and individual in nature and most often on a recreational basis.

The second stage, *competitive sport participation*, occurred at approximately age 13. In this stage, at least one sport was played at a competitive level, with the average entry into competitive sport at 13.1 years. Although the sport now coached often became the main focus, participation in other sports regularly occurred during this stage. For team-sport coaches, in particular, it is during this stage that most formal leadership opportunities (i.e., being a captain) occurred, both in the sport they were currently coaching (average age of initial leadership experience = 15.1 years) and in other team sports (average age of initial leadership experience = 12.4 years).

The third stage, *highly competitive sport participation and introduction to coaching*, occurred at approximately age 19. Although the main focus at this stage was still on individuals' own sport participation, often at the elite level (average age of initial elite participation = 18.8 years), it is during this stage that most coaches first gained coaching experience (average age of initial coaching experience = 20.8 years). Coaches often helped with developmental teams after their own competitive season finished or held other relatively low-responsibility coaching positions.

The fourth stage, *part-time early coaching*, occurred at approximately age 24. As their highly competitive athletic participation ended (average age = 24.5 years), coaches often began other major activities (e.g., job, graduate studies) while coaching part-time. During this stage, most coaching was at the developmental level or as an assistant coach at the high-performance level. Coach mentoring took place during this stage (average age of initial interaction with a mentor coach = 25.9 years). Coaches commonly still participated in sports on a recreational or informal basis at this stage.

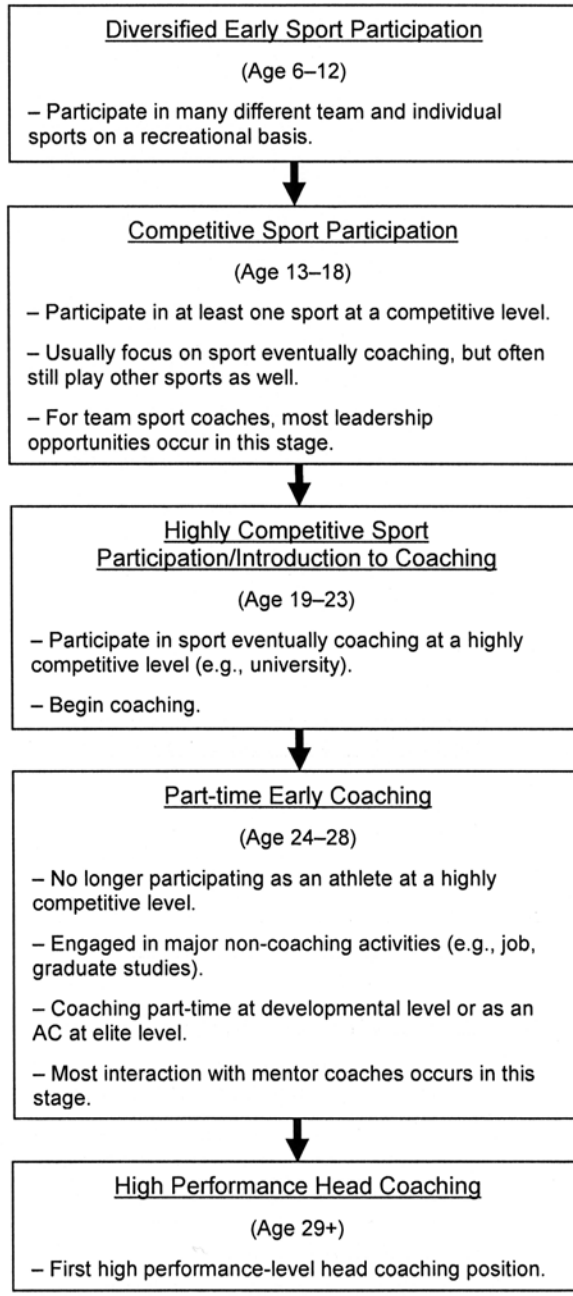

Figure 1 — Stages of developmental sport experiences of high-performance sport coaches.

The fifth and final stage was obtaining a *high-performance head coaching* position, which occurred at approximately age 29 (average age = 28.8 years). This was often a full-time, paid position.

Discussion

With regard to the results presented, we begin by critically discussing the findings concerning specific developmental sport experiences that were reported in our sample in relation to previous coaching literature. Based on the total developmental sport experience data collected, we will propose a minimum threshold of developmental sport experience needed to become a high-performance head coach. Next, we will examine these findings in the context of stages of developmental sport experience with regard to previous stage-based models of coach development. Finally, we will discuss practical implications for coach learning and directions for future investigation.

Developmental Sport Experiences

The fact that there were items on which all coaches in our sample reported experience during their developmental histories (Level 1 items) suggests that there are certain experiences necessary to becoming head coaches at the high-performance level. In particular, these findings suggest that experience as an athlete in the sport that one now coaches and formal coaching education or mentorship are important experiences associated with the development of both team and individual high-performance coaches. These findings are consistent with previous research on high-performance coaches (Bloom et al., 1998; Gilbert et al., 2006; Lynch & Mallett, 2006; Trudel & Gilbert, 2006). Coaches in the present study spent a relatively small amount of time in formal coaching education, however, a finding again consistent with past studies (Gilbert et al., 2006; Lynch & Mallett). Furthermore, the fact that some formal coaching education was reported by all coaches might be a reflection of the fact that Canada has a well established coaching certification program. In addition, given the finding that all team-sport coaches reported leadership experiences and reported playing team sports other than the one that they now coach suggests that coaching a high-performance team sport has more specialized requirements related to leadership and general experience in a team environment than coaching a high-performance individual sport.

It is interesting that, consistent with Salmela's (1995) findings, experience as an athlete at the elite level in the sport that one now coaches was not an absolutely necessary area of experience for individuals who eventually became high-performance coaches in either team or individual sports. In common with several previous studies (Anderson & Gill, 1983; Richardson, 1981; Schinke et al., 1995), however, most of the coaches in our sample had elite-level experience as an athlete in the sport they now coached. Also consistent with previous studies (Gilbert et al. 2006; Lynch & Mallet, 2006), both team- and individual-sport coaches generally had experience playing other team and individual sports as athletes. In terms of coaching experience, the results of the present study support the conclusion of Trudel and Gilbert (2006) that most elite-level coaches had some coaching experience before becoming a high-performance head coach.

These findings also present a question: How did the developmental sport experiences of these coaches help them become high-performance coaches? Previous researchers (Sage, 1989; Werthner & Trudel, 2006) suggest that extensive and diverse sport experiences as athletes aid coaches' development by acting as unmediated learning situations (i.e., provide future coaches with opportunities to observe the coaching, teaching, and interpersonal practices of several different coaches and, as such, to acquire coaching skills, knowledge, and values). High-performance coaches' prior coaching and leadership experiences might also provide them with internal learning situations in which they could have gained knowledge by reflecting on their own coaching practices and behaviors. Specifically, Gilbert and Trudel (2001) suggest that internal learning situations present three different contexts for reflection: reflection in action (during games or practices), reflection on action (after games or practices), and retrospective reflection on action (at the end of the season), with each context affording slightly different opportunities for coaches to gain knowledge. Finally, coaching knowledge might have been gained via mediated learning situations provided by formal education and mentorship in which learners were directed to important information by more experienced teachers. Formal learning situations such as coaching-education classes and clinics, however, have generally been found to be of relatively low overall impact on coaching knowledge and effectiveness compared with more informal learning situations in which coaches spend most of their time (Nelson et al., 2006; Trudel & Gilbert, 2006). This conclusion is partially supported by the findings of the present study, given the relative lack of time spent in formal coach training.

Experiences not reaching Level 1 or 2 cutoffs are also of interest. For example, leadership experience in individual sports as an athlete was not often reported by coaches in either group; however, this might simply be the result of the structure of individual sports, with fewer formal leadership positions available. Prior coaching experience at the recreational level was also not often reported by coaches in either group. That is, coaches who went on to become head coaches at the elite level did not often coach at the recreational level. This suggests a fundamental difference between competitive- and noncompetitive-sport coaching (Côté, Young, North, & Duffy, 2007; Lyle, 2002; Trudel & Gilbert, 2006). In addition, given that most coaches did not report coaching in sports other than the sport they were currently coaching, high-performance coaches were clearly not coaching in the same diversity of sports they had played in as athletes.

Minimum Threshold of Developmental Sport Experience

Gilbert et al. (2006) first proposed the idea of a minimum threshold of necessary experiences based on their preliminary examination of the athletic background of coaches. Assuming that the minimum total experience scores represent a threshold amount of total developmental sport experiences required to become a high-performance head coach, the fact that minimum percentage scores for Level 1 items do not meet the minimum total experience score for either group when summed suggests that these experiences might be necessary but not sufficient to become a high-performance coach. Even with the addition of minimum amounts of Level 2 experiences, only slightly more than half of the minimum total experience score for either group is accounted for. Evidently, the large experience requirement unmet

by minimum amounts of Level 1 and 2 experiences must be made up in other areas for both team and individual coaches.

The wide variation in scores on most of the Level 1 and 2 items suggests that different coaches made up this experience deficit in different areas. That is, coaches in both groups often reported greater than minimum levels of experience for Level 1 and Level 2 items, but different coaches reported these amounts of experience on different items. To illustrate this point, consider two contrasting examples of coaches in our sample: one coach reported much greater than minimum amounts of experience as an athlete, particularly at the elite level, but only minimum amounts of previous coaching experience. Another reported barely more than minimum amounts of athletic experience, no amount of experience at the elite level, and much greater than minimum amounts of previous coaching experience. Both coaches reported at least minimum amounts of all Level 1 items and most Level 2 items, however, and progressed similarly through the stages of development. Thus, the variability reported in the developmental pathways of the coaches in our sample refers not to what activities the coaches engaged in during their development or when they occurred but rather to how much of the common activities each coach experienced.

Stages of Developmental Sport Experience

The stages of developmental sport experiences for high-performance sport coaches (Figure 1) might be considered a coaching equivalent to the DMSP (Côté, 1999; Côté et al., 2007; Côté & Fraser-Thomas, 2007). Both models share a similar purpose: to explain what experiences are needed throughout development to reach a high-performance level. The initial sport experiences outlined by both models (the sampling years for the DMSP and diversified early sport participation for the current model) are essentially the same, with an emphasis on fun and recreational participation in many different sporting activities, suggesting a common developmental thread shared by athletes and coaches. Other stages of athletic participation are also roughly equivalent in both models; however, coaches have additional experiential requirements (e.g., leadership for team-sport coaches during the competitive sport participation stage and initial coaching experiences for all coaches during the highly competitive sport participation/introduction to coaching stage).

The current model also goes beyond the DMSP by providing an introductory explanation of the transitions from athlete to coach and from initial coaching involvement to high-performance head coaching in terms of the experiences needed to successfully navigate through these transitions. Lyle (2002) suggested that understanding these transitions is important to the education and training of high-performance coaches and is in need of clarification. Findings from the present study suggest that the pursuit of a coaching career (e.g., obtaining formal qualifications and engaging in educational coaching experiences) tends to occur during or before the final stage of athletic participation, which also coincides with initial coaching experiences.

The stages proposed by the present study should also be considered in light of previous stage-based coach-development research (e.g., Salmela, 1995; Salmela et al., 1994; Schinke et al., 1995). Although based on a qualitative perspective, the stages proposed by Schinke et al. have much in common with those proposed in the

present study. Both differentiate developmental stages based on objective, concrete experiences rather than inferred knowledge tendencies, and both seek to explain how the experiences at one stage help in progressing to the next. The present study focused on coaches' development before becoming high-performance coaches using a quantitative approach, thus more thoroughly addressing questions relating to what specific experiences are necessary at each stage of development and how much of each experience is required.

The developmental path of high-performance coaches in the present study also provides support for Simon and Chase's (1973) 10-year rule. Specifically, the current model outlines that the difference between average age of initial coaching involvement and average age of obtaining a high-performance head coaching position is approximately 10 years. The present study did not fully support Ericsson et al.'s (1993) suggestion that 10,000 hours of deliberate practice is necessary to become a high-performance head coach, however, given the difficulty of defining which activities constitute deliberate practice with regard to coaching.

Implications

The what, how much, and when analysis provided by the present study is directly applicable to coaching education and structured development. More specifically, findings could prove useful in the development of future coaches by helping to identify and support potentially successful future coaches and to more efficiently educate experientially deficient coaches. For example, formal coaching education might be tailored to meet the specific experiential needs of individual coaches, given their previous experience and current developmental stage. In addition, sport organizations, particularly those with small participation bases who have difficulty developing and retaining high-performance coaches, might look to identify athletes with the experiential potential to become high-performance coaches and tailor their sport experiences appropriately.

The practical implications of each stage of developmental sport experience should also be considered. In the first stage, diversified early sport participation, it seems that future coaches would benefit from exposure to many different sports in a fun-focused environment. A similar conclusion is implicit in the high levels of deliberate play during the sampling years described by the DMSP (Côté et al., 2007; Côté & Fraser-Thomas, 2007), suggesting that such a structure might benefit all athletes, future coach or not. During the second stage, competitive-sport participation, sport environments should be structured to allow as many athletes as possible to hold leadership roles, as this seems to represent a requisite experience for high-performance coaching and is generally seen as a life skill that is beneficial in many professional settings (Lerner, 2004). Given that the final stage of athletic participation, highly competitive sport participation and introduction to coaching, appears to coincide with the decision to pursue a career in coaching, allowing elite-level athletes opportunities to become involved with coaching experiences tailored to fit their still-demanding athletic schedule might be of utmost importance for the development of future coaches. Finally, in the last stage of development before becoming a high-performance head coach, part-time early coaching, the most pressing implication seems to be the pairing of these new coaches with a more experienced mentor coach. Although most of the coaches in our study reported

gaining access to a mentor coach at this stage through chance meetings or previous connections, there might be benefit to working with a mentor coach from the beginning of one's coaching involvement. As such, providers of coaching education might do well to consider making such pairing a part of their mandate to encourage the development of new coaches who might not have access to a mentor coach on their own, rather than leaving what seems to be a vital experience to chance.

Future Directions

The findings of the present study make a solid contribution to the coach-development literature, suggesting that a minimum threshold of total sport experience is needed in order to become a high-performance coach and that in order to meet or exceed this threshold level, certain experiences are required. The findings also suggest that required experiences are not sufficient to meet the threshold level of experience; within the commonly shared experiences, coaches tend to take many different developmental paths in order to gain the extra experience required while progressing through each stage of development. Future research should build on this present study's findings, while correcting for possible limitations. For instance, analysis of gender differences was not possible in this study because of the relatively small sample size and low number of female participants, but it should be investigated in future studies. Similarly, conducting studies in different countries and coaching systems would add depth to our understanding of the development of high-performance coaches. Nevertheless, variations of the Canadian coach-education programs have been adapted in different countries, such as Sports Coach UK (United Kingdom) and the National Coach Accreditation Scheme (Australia), making the findings of the present study applicable in more than one context. Finally, continued examination of high-performance coaches is necessary to provide a more comprehensive account of their development through common sport experiences, milestones, and educational activities.

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