Developmental activities that lead to dropout and investment in sport

Article *in* Physical Education and Sport Pedagogy · February 2007

DOI: 10.1080/17408980601060358 · Source: OAI

Physical Education and Sport Pedagogy
Vol. 12, No. 1, February 2007, pp. 77–87

Developmental activities that lead to dropout and investment in sport

Michael Wall and Jean Côté*
Queen's University, Kingston, Canada

Background: Studies suggest that expert performance in sport is the result of long-term engagement in a highly specialized form of training termed deliberate practice. The relationship between accumulated deliberate practice and performance predicts that those who begin deliberate practice at a young age accumulate more practice hours over time and would, therefore, have a significant performance advantage. However, qualitative studies have shown that a large amount of sport-specific practice at a young age may lead to negative consequences, such as dropout, and is not necessarily the only path to expert performance in sport. Studies have yet to investigate the activity context, such as the amount of early sport participation, deliberate play and deliberate practice within which dropout occurs.
Purpose: To determine whether the nature and amount of childhood-organized sport, deliberate play and deliberate practice participation influence athletes' subsequent decisions to drop out or invest in organized sport. It was hypothesized that young athletes who drop out will have sampled fewer sports, spent less time in deliberate play activities and spent more time in deliberate practice activities during childhood sport involvement.
Participants: The parents of eight current, high-level, male, minor ice hockey players formed an active group. The parents of four high-level, male, minor ice hockey players who had recently withdrawn from competitive hockey formed a dropout group.
Data collection: Parents completed a structured retrospective survey designed to assess their sons' involvement in organized sport, deliberate play and deliberate practice activities from ages 6 to 13.
Data analysis: A complete data-set was available for ages 6 through 13, resulting in a longitudinal data-set spanning eight years. This eight-year range was divided into three levels of development corresponding to the players' progress through the youth ice hockey system. Level one encompassed ages 6–9, level two included ages 10–11 and level three covered ages 12–13. Descriptive statistics were used to report the ages at which the active and dropout players first engaged in select hockey activities. ANOVA with repeated measures across the three levels of development was used to compare the number of sports the active and dropout players were involved in outside of hockey, the number of hours spent in these sports, and involvement in various hockey-related activities.
Findings: Results indicated that both the active and dropout players enjoyed a diverse and playful introduction to sport. Furthermore, the active and dropout players invested similar amounts of

*Corresponding author. Queen's University, School of Kinesiology and Health Studies, Kingston, Ontario, Canada K7L 3N6. Email: jc46@post.queensu.ca

ISSN 1740-8989 (print); ISSN 1742-5786 (online)/07/010077–11

DOI: 10.1080/17408980601060358

time in organized hockey games, organized hockey practices, specialized hockey training activities (e.g. hockey camps) and hockey play. However, analysis revealed that the dropout players began off-ice training at a younger age and invested significantly more hours/year in off-ice training at ages 12–13, indicating that engaging in off-ice training activities at a younger age may have negative implications for long-term ice hockey participation.
Conclusion: These results are consistent with previous research that has found that early diversification does not hinder sport-specific skill development and it may, in fact, be preferable to early specialization. The active and dropout players differed in one important aspect of deliberate practice: off-ice training activities. The dropout players began off-ice training at a younger age, and participated in more off-ice training at ages 12 and 13 than their active counterparts. This indicates a form of early specialization and supports the postulate that early involvement in practice activities that are not enjoyable may ultimately undermine the intrinsic motivation to continue in sport. Youth sport programs should not focus on developing athletic fitness through intense and routine training, but rather on sport-specific practice, games and play activities that foster fun and enjoyment.

The development of expertise in sport and other domains can be generally viewed as a longitudinal process requiring the accumulation of skills and knowledge over an extended period of time. Ericsson *et al.* (1993) posited that expert performance in any domain, be it sport, music or art, was the result of long-term systematic engagement in a highly specialized form of training termed deliberate practice. Deliberate practice was defined as 'a highly structured activity, the explicit goal of which is to improve performance' (Ericsson *et al.*, p. 368). Ericsson *et al.* demonstrated that expert violinists and pianists could be reliably distinguished from non-experts based on accumulated deliberate practice hours. These findings have been replicated in sports, such as field hockey, soccer, figure skating, martial arts and wrestling (Starkes *et al.*, 1996; Helsen *et al.*, 1998).

The relationship between accumulated deliberate practice and performance suggests that those who begin deliberate practice at a young age accumulate more practice hours over time and would, therefore, have a significant performance advantage. In fact, Ericsson *et al.* (1993) suggested it would be next to impossible for a late starter to overcome the early advantage provided to those who begin deliberate practice at a young age and maintain a steadily increasing level of practice over time. In sport, intense training in one sport at a young age has been termed 'early specialization' (Hill, 1993). However, retrospective research has shown that early specialization is not necessarily the only path to expert performance in sport (Carlson, 1988; Hill, 1993; Côté, 1999; Baker *et al.*, 2003).

Côté *et al.* (2003) contended that a diverse and playful introduction to sport (e.g. early diversification) is more appropriate than early specialization and deliberate practice. Côté and Hay (2002) coined the term 'deliberate play' to characterize early developmental activities that are intrinsically motivating, provide immediate gratification and are specifically designed to maximize enjoyment in sport. Deliberate play activities are theorized to be essential during early sport experiences because such activities provide an opportunity for young athletes to develop fundamental motor skills, such as running, throwing and jumping, in an enjoyable environment (Côté *et al.*, 2003). Additionally, Côté *et al.* (2003) postulated that the fun and

excitement experienced through participation in various sports and deliberate play are essential for the development of intrinsic motivation for sport, which is necessary for continued commitment to sport participation.

Previous studies have indeed demonstrated that many expert athletes sample a variety of sports during early sport participation. Carlson (1988) examined the background of expert and non-expert tennis players and showed that the non-experts engaged in more tennis during early adolescence than the expert group. Moreover, the non-experts specialized in tennis by age 11, while the experts did not specialize until age 14. Carlson concluded 'early life specialization did not favour the development of elite players in tennis' (p. 252). In a similar study, Hill (1993) found that expert baseball players generally participated in multiple sports throughout adolescence. Côté (1999) qualitatively investigated the development of expert athletes in rowing and tennis and found that early diversification and deliberate play were important features of the athletes' early years in sport. The Developmental Model of Sport Participation (DMSP) grew out of this initial work by Côté.

The DMSP considers three different outcomes of sport participation: (1) elite participation; (2) recreational participation; and (3) dropout. As well, the DMSP proposed four distinct stages: the sampling years (age 6–12), the specializing years (age 13–15), the investment years (age 16+) and the recreational years (ages 13+). Numerous factors delineate each stage, such as the number of activities the child participates in, the structure and design of the child's practices and training, the role of the coach and the influence of parents. Where a sport participant ultimately ends up is determined by the type of activities and psycho-social context they experience at different stages of development. To date, studies using the DMSP as a framework have found that expert athletes in rowing, tennis, basketball, netball, triathlon and ice hockey follow a path consistent with that outlined by the model (Baker *et al.*, 2003; Soberlak & Côté, 2003; Baker *et al.*, 2005). An exception was found in expert rhythmic gymnasts who specialized and invested earlier than suggested by the DMSP; however, consistent with the literature on negative sport outcomes, the elite gymnasts who specialized at younger ages experienced more negative outcomes in the form of physical injuries and less enjoyment than elite gymnasts who specialized at older ages (Law *et al.*, in press). The recreational outcome of the DMSP was also examined in a recent study of active and inactive adult females (Robertson-Wilson *et al.*, 2003). Results indicated that active females participated in significantly more physical activities than inactive females from age 6 to age 18 while no significant differences were found between the two groups in terms of their involvement in other non-physical structured leisure activities. Whereas the DMSP provides guidelines for building and designing youth sport programs that lead to recreation and investment, further research is required to understand better the patterns of activities that lead to youth sport dropout.

Research on sport dropout has traditionally asked dropout athletes to identify their reason for withdrawing from sport (e.g. Klint & Weiss, 1986). Some of the more frequently cited reasons included: conflict of interests with other activities, too much of a time commitment, lack of fun, lack of playing time, excessive pressure, and sport

competence issues (Gould *et al.*, 1982; Klint & Weiss, 1986). More recently, Butcher *et al.* (2002) recognized that reasons for withdrawal might vary according to the level and intensity of previous participation, as well as with the developmental level (i.e. age) of participants. Butcher *et al.* (2002) investigated the sport participation histories of 1387 grade 10 students. Participants completed questionnaires designed to ascertain their sport participation history from grade one up to the most recent year and their reasons for dropping out of various sports. Results revealed that the most important reason for withdrawal for elementary school-aged children was lack of enjoyment; however, 'lack of enjoyment' became a less important reason for dropout as participants aged. More important reasons for dropout as athletes aged included: needing time for studying and jobs, the coach, injuries, and other sports taking too much time.

While Butcher *et al.* (2002) advanced dropout research by recognizing the potential impact of the level and intensity of previous sport participation and developmental differences, the fact remains that the majority of dropout studies utilized designs that simply asked the former participants for the reasons they withdrew. Lindner *et al.* (1991) contend that such designs inevitably lead to intuitive, subjective and superficial reasons rather than the underlying causes of sport dropout. In essence, dropout studies have focused mainly on athlete perceptions at the expense of specific and observable factors in the athlete's environment that may influence dropout. For instance, studies to date have yet to investigate the activity context, such as the amount of early sport participation, deliberate play and deliberate practice within which dropout occurs. The DMSP contends that the amount of sampling, deliberate play and deliberate practice experienced during early sport participation may differentiate those who choose to remain in sport and those who withdraw.

A retrospective interview procedure (Côté *et al.*, 2004) was recently designed to capture, from parents, the overall development of athletes and test some of the assumptions of the DMSP. The interview was designed to identify if and when a change took place in the structure of the sporting experience of athletes at different ages and ability levels. This interview was adapted from guidelines to collect the same information from athletes (Côté *et al.*, 2005). Accordingly, the Côté *et al.* (2004) interview procedure was used with parents in the present study to assess, throughout development, the training and sporting experiences of dropout and still active high-level minor ice hockey players. The following hypothesis was formulated: athletes who choose to drop out of hockey will have experienced early specialization. More specifically, dropout athletes will have sampled fewer sports, spent less time in deliberate play activities and spent more time in deliberate practice activities during childhood sport involvement.

Methods

Parents of 12 current (labelled 'active players') and former (labelled 'dropout players') male minor ice hockey players were interviewed regarding their child's hockey participation. The parent most active in their child's hockey activities was

asked to be the primary participant resulting in 11 fathers and 1 mother. Based on their son's current level of participation in hockey, parents were selected to form two groups: an active group and a dropout group. Parents were selected for the active group if their child played at least one season of Bantam AAA hockey and was still currently playing high-level hockey. The hockey players in this study were characterized as high-level participants, in that they participated in a sport for more than one year at high frequency and duration (Butcher *et al.*, 2002). Bantam AAA represents the highest level of hockey generally available to 13 and 14 year olds. Parents were selected for the dropout group if their child played at least one season of Bantam AAA hockey, but had subsequently ceased playing high-level hockey. Eight parents were placed in the active group (labelled 'active parents') and four parents in the dropout group (labelled 'dropout parents'). Parents were middle-class Caucasian Canadians. Parents of the players were contacted and informed about the purpose of the study. Informed consent was obtained from all parents involved in the study.

Of the eight active players (M = age 13.9 years, $SD = 0.8$), six were members of Bantam AAA teams, and two players moved up to older age group elite-level teams. All dropout players (M = age 14.5 years, $SD = 1.0$, at time of withdrawal from sport; M = age 15.8 years, $SD = 0.1$ at the time of the interview) had played at least one full season at the Bantam AAA level prior to withdrawal. Two of the dropouts left sport altogether (Lindner *et al.*, 1991). The remaining two dropouts were classified as sport-specific dropouts. One continued to play recreational hockey and golf and the other took up competitive auto-racing.

Since the mean age of the dropouts when they withdrew from hockey was slightly older (14.5) than the mean age of the participants in the active group (13.9), it is possible that developmental changes other than the nature of their participation could have influenced their decision to drop out. However, two of the dropout players ceased their participation during their Bantam years (ages 13–14), at a developmental level in hockey that matched five of the six current active players. Although the other two dropout players ceased their participation at a slightly older age (during their Midget years; ages 15–16), their profile matched one current active player who was also playing at the Midget level at the time of the interview. Therefore, developmental factors that could have created differences between the two groups were controlled as much as possible.

Data collection

Structure of the interview procedure. To gather developmental data a structured retrospective interview procedure was used (Côté *et al.*, 2004). The survey and interview procedure elicited information from parents in a methodical and standardized manner. Parents were asked to provide demographic information and a year-by-year account of the players' involvement in sporting activities. Parents provided demographic data including their occupation and that of their spouse, as well as the date of birth for the child in the study. Additionally, parents were asked four questions regarding their child's initial participation in select hockey activities: the age at

which their child started: (1) playing hockey (not necessarily in an organized league); (2) taking skating lessons; (3) playing organized hockey; and (4) off-ice training (e.g. lifting weights, running) related to hockey.

Parents were next asked to provide information about their son's sport participation. Retrospective information on the child's sporting activities was gathered in a year-by-year fashion. Parents first identified all organized sport (excluding hockey), art, music or other activities that their child had been involved in during the first grade and the number of hours/week and months/year spent in each activity. A list of possible sport activities was provided to aid parental recall of their child's activities. Parents then identified all organized hockey activities their child had been involved in during the first grade. A list of possible organized hockey activities was again provided to aid parental recall of the child's activities. Parents provided the number of hours/week and the number of months/year their child spent participating in each hockey activity. Finally, parents identified all unorganized sports or active play activities (e.g. street hockey, bike riding) that their child participated in on a regular basis during the first grade and the hours/week and months/year their child participated in each of these activities. This procedure was repeated for each year up to the most recent.

Validity and reliability. At the end of each activity section of the interview, parents rated their confidence in the accuracy of the information provided. Parental ratings were based on a percentage scale with 100% representing complete confidence in the information provided and 0% no confidence at all. The results of these confidence ratings are presented in the results section where appropriate.

Côté and colleagues (Côté *et al.*, 2004, 2005) asserted that retrospective data could be validated through public records or the use of keepsakes. The interview procedure encouraged parents to use keepsakes, photographs or any records they had to aid in the recall of data. During the interviews, many of the parents retrieved and consulted photographs or records to ensure they were giving accurate responses. Recent studies have used an adapted version of the procedure utilized in the present study and have found acceptable agreement between parental and child reports (Baker *et al.*, 2003; Soberlak & Côté, 2003). For example, Baker *et al.* (2003) reported a correlation coefficient of $r = 0.59$ ($p < .05$) between parental and athlete estimates of time spent training while Soberlak and Côté (2003) showed that a sample of four parents and their children independently agreed on 24 of the 27 sports that athletes engaged in from age 6 to 20.

Data analysis

A complete data-set was available for ages 6 through 13, resulting in a longitudinal data-set spanning eight years. This eight-year range was divided into three levels of development corresponding to the players' progress through the youth ice hockey system. Level one encompassed ages 6–9 (initiation/novice years), level two included ages 10–11 (atom years) and level three covered ages 12–13 (Peewee/Bantam years).

Descriptive statistics were used to report the ages at which the active and dropout players first engaged in select hockey activities. Independent t-tests were used to

assess statistical differences between the mean ages that active and dropout players began the select hockey activities. A 2 × 3 (Group × Level of Development) ANOVA with repeated measures across the three levels of development was used to compare the number of sports the players were involved in outside of hockey and the number of hours spent in these sports. Similarly, a 2 × 3 (Group × Level of Development) ANOVA with repeated measures across the three levels of development was used to compare the players' involvement in each hockey-related activity. The hockey-related activity categories were generated through the parental interviews and were later regrouped to form five categories of organized hockey activities: organized games, organized practices, specialized training (e.g. power skating, hockey camp), off-ice training and hockey play (e.g. road hockey).

The data for each 2 × 3 (Group x Level of Development) repeated measures ANOVA were subjected to Mauchley's test for sphericity. When the Mauchley's sphericity assumption was not met, the ANOVA results were adjusted using the Geisser-Greenhouse correction. Main effects were further investigated with Bonferroni *post hoc* comparisons to assess better where differences occurred. Main effects for group and level, as well as significant interactions, will be reported.

Results

Players' involvement in sport activities

Organized sport activities (other than hockey). Analysis of the players' involvement in organized sports showed no group differences, but did show a main effect for level, $F(2, 20) = 5.05$, $p < 0.05$, $\eta^2 = .08$. Bonferroni's *post hoc* analysis showed a significant increase in the number of sports all players participated in between level one ($M = 1.77$) and level three ($M = 2.63$). Overall, players participated in an average of 4.75 different sports between ages 6–13. The analysis of time spent in organized sport revealed no differences between groups or across the three levels.

Active play activities. Analysis of the players' involvement in active play activities revealed no group differences, but did reveal a main effect for level, $F(1.31, 13.1) = 5.70$, $p < 0.05$, $\eta^2 = .09$. A Bonferroni *post hoc* analysis revealed a significant decrease in the average hours/year of active play between level one ($M = 654.23$) and level three ($M = 445.27$).

Parents indicated how confident they were about the sport activity data reported by providing a rating that went from 'total confidence' (100%) to 'no confidence at all' (0%). For the organized sport activities of their child, parents reported a grand mean of 88.90% ($SD = 8.60\%$). Parents were also confident in the data provided for play activities of their child by reporting a grand mean of 85.76% ($SD = 8.99\%$).

Players' involvement in hockey activities

The active players started playing hockey at a mean age of 5.14 ($SD = 1.77$) years and the dropouts at a mean age of 5.25 ($SD = 1.00$) years. Active players first played

organized hockey at a mean age of 6.29 ($SD = 1.60$) years and dropouts at a mean age of 6.00 ($SD = 0.00$) years. Six of the eight active players and two of the four dropout players reported taking skating lessons. The six active players began skating lesson at a mean age of 4.83 ($SD = 0.98$), whereas the two dropout players started skating lessons at a mean age of 6.00 ($SD = 4.24$). There were no significant differences between the group means for initial hockey participation, organized hockey participation or skating lessons. However, dropout players began off-ice training significantly earlier ($M = 11.75$, $SD = 0.50$) than the active players ($M = 13.8$, $SD = 0.84$), $t(7) = 4.29$, $p < 0.01$, $d = .83$.

Organized games. Hours invested in organized games showed a main effect for level, $F(1.24, 12.36) = 17.08$, $p < 0.01$, $\eta^2 = .40$. Bonferroni's *post hoc* analysis revealed a significant increase in hours/year invested from level one ($M = 41.07$) to level two ($M = 83.54$) and from level two to level three ($M = 113.42$).

Organized practices. Hours invested in organized practices showed a main effect for level, $F(1.29, 12.88) = 15.81$, $p < 0.001$, $\eta^2 = .94$. Bonferroni's *post hoc* analysis showed a significant increase in hours/year invested from level one ($M = 28.78$) to level two ($M = 52.25$) and from level two to level three ($M = 77.83$).

Off-ice training. Only level three data for hours invested in off-ice training could be analyzed due to the lack of time invested in this activity in level one and level two by both the active players and the dropout players. Over the three levels, two of eight active players participated in off-ice training, whereas four of four dropout players participated in off-ice training. An independent t-test of level three data revealed a significant difference, $t(10) = -2.31$, $p = 0.04$, $d = .49$, between the active group ($M = 6.88$, $SD = 16.80$) and the dropout group ($M = 107.00$, $SD = 126.46$).

Hockey-related deliberate play activities. Analysis of the hours invested in hockey-related deliberate play activities demonstrated no main effects for group or level. The active and dropout players invested an average of 183.54 hours/year at level one, 152.96 hours/year at level two and 122.17 hours/year at level three. Parents reported being confident in the hockey activity data provided for each year reporting a grand mean of 88.28% ($SD = 8.41\%$).

Discussion

The objective of this study was to assess the impact of childhood (ages 6–13) organized sport, deliberate practice and deliberate play participation on the investment decisions of current (active players) and former (dropout players) high-level minor ice hockey players. This objective was achieved using a retrospective methodology designed to compare the sport history of these two groups of hockey players. Accordingly, the data revealed interesting findings about the impact of childhood sport participation on dropout that complement and enhance research on dropout and investment in sport.

The hypothesis of the present study predicted that the dropout players would have sampled fewer sports during the sampling years (ages 6–13) than the active players. Contrary to this hypothesis, findings indicated that both the dropout and active players sampled a variety of different sports. Analysis revealed that players from both groups increased the number of sports they participated in throughout the sampling years. The hypothesis also predicted that the dropout players would spend significantly less time involved in deliberate play activities during the sampling years. However, analysis showed that both groups of players spent many hours involved in both active play activities and hockey-specific deliberate play.

Finally, the hypothesis predicted that dropout players would spend significantly more time involved in deliberate practice activities during the sampling years. Deliberate practice activities were divided into organized practice activities, specialized hockey training activities and off-ice training activities. Results demonstrated that both groups of players spent approximately the same amount of time in organized practice and specialized hockey training activities. Players from both groups gradually increased their involvement in organized practice activities over the course of the sampling years, while the time spent in specialized training activities remained constant over this period. With respect to off-ice training activities, however, results showed that dropout players not only began off-ice training at a younger age but also spent more time in off-ice training than the active players. Off-ice training activities (e.g. weight training, running, cycling) are designed to build strength and aerobic power that eventually lead to better performance in hockey. These activities are physically demanding and are specifically designed to improve performance in the long term, often resulting in delayed gratification. Considering the inherent structure of off-ice training, such activities would appear to be less than enjoyable for children.

Studies with expert athletes have examined athletes' subjective perceptions of enjoyment for activities similar to off-ice training (e.g. weight training, running, cycling; Hodges & Starkes, 1996; Starkes *et al.*, 1996; Helsen *et al.*, 1998; Hodge & Deakin, 1998; Helsen *et al.*, 2000). These studies had athletes rate the enjoyment of each activity on a 10-point scale, which was then compared to a grand mean for enjoyment on all activities that athletes participated in (sport specific as well as school work and leisure). In their study with elite field hockey players, Helsen *et al.* (1998) found that the practice activities of weights (individual and team), running (individual and team), swimming (individual) and flexibility (individual) were rated as being low in enjoyment. Similarly, Hodges and Starkes (1996) found expert wrestlers rated cycling alone and flexibility training alone as being low in enjoyment. Hodge and Deakin (1998) found that martial artists rated jogging with others as being low in enjoyment. In fact, an examination of the studies done with expert wrestlers, figure skaters, field hockey players, martial artists and soccer players revealed that the mean subjective rating of enjoyment on general fitness activities done either individually or in a group ($N = 38$; $M = 5.25$, $SD = 1.01$) was below the overall grand mean for enjoyment ratings on all activities ($M = 6.32$).

Côté *et al.* (2003) postulated that the fun and enjoyment experienced through sport participation during the sampling years may be critical to the development of intrinsic

motivation, which in turn becomes increasingly necessary as the athlete engages in more structured and performance-oriented forms of practice in the specializing and investment years. Researchers have shown that lack of fun is a frequently cited reason for withdrawal from sport (e.g. Gould *et al.*, 1982; Butcher *et al.*, 2002). Furthermore, lack of enjoyment becomes a less frequently cited reason for dropout as athletes age, while performance pressure becomes a more frequently cited reason (Butcher *et al.*, 2002). In an analysis of trends in youth sports, De Knop *et al.* (1996) noted that children's sport has become more serious and less playful. To speculate along similar lines, the dropout players' participation in off-ice training at a younger age may be indicative of a larger trend in the players' environment (e.g. parents, peers, coaches) to treat hockey in a more serious and less playful manner, which in time may undermine the intrinsic motivation to participate in hockey.

Conclusion

Consistent with the DMSP, both the active and dropout players enjoyed a diversified and playful introduction to sport. Furthermore, as predicted by the DMSP, the active and dropout players gradually increased involvement in hockey-specific deliberate practice, while at the same time involvement in deliberate play activities decreased. These results are consistent with previous research that has found that early diversification does not hinder sport-specific skill development and it may, in fact, be preferable to early specialization.

The active and dropout players differed on one important aspect of deliberate practice: off-ice training activities. The dropout players began off-ice training at a younger age, and participated in more off-ice training at ages 12 and 13 than their active counterparts. Prior research has demonstrated that athletes often give lower enjoyment ratings on general physical fitness activities, such as off-ice training (e.g. Helsen *et al.*, 1998). To speculate, these findings may indicate a form of early specialization and support the postulate that early involvement in practice activities that are not enjoyable may ultimately undermine the intrinsic motivation to continue in sport (Côté *et al.*, 2003). As a whole, the findings of the present study suggest that youth (ages 6–13) sport programs should focus not on developing athletic fitness through intense and routine training, but rather on sport-specific practice, games and play activities that foster fun and enjoyment.

Acknowledgements

Support for the writing and data collection for this manuscript was given by a standard research grant from the Social Sciences and Humanities Research Council of Canada (SSHRC Grants #410-02-0325 and 410-05-1949) to the second author. The authors gratefully acknowledge the constructive comments on earlier drafts of this manuscript by Nick Holt and Kristin Côté.

References

Baker, J., Côté, J. & Abernethy, B. (2003) Sport-specific practice and the development of expert decision-making in team ball sports, *Journal of Applied Sport Psychology*, 15, 12–25.

Baker, J., Côté, J. & Deakin, J. (2005) Expertise in ultra-endurance triathletes: early sport involvement, training structure, and the theory of deliberate practice, *Journal of Applied Sport Psychology*, 71, 64–79.

Butcher, J., Lindner, K. J. & Johns, D. P. (2002) Withdrawal from competitive youth sport: a retrospective ten-year study, *Journal of Sport Behaviour*, 25(2), 145–163.

Carlson, R. (1988) The socialization of elite tennis players in Sweden: an analysis of the players' backgrounds and development, *Sociology of Sport Journal*, 5, 241–256.

Côté, J. (1999) The influence of the family in the development of sport, *The Sport Psychologist*, 13, 395–416.

Côté, J., Baker, J. & Abernethy, B. (2003) From play to practice: a developmental framework for the acquisition of expertise in team sport, in: J. Starkes & K. A. Ericsson (Eds) *Expert performance in sports: advances in research on sport expertise* (Champaign, IL, Human Kinetics), 89–114.

Côté, J., Ericsson, K. A. & Law, M. (2005) Tracing the development of athletes using retrospective interview methods: a proposed interview and validation procedure for reported information, *Journal of Applied Sport Psychology*, 17, 1–20.

Côté, J., Fraser-Thomas, J., Robertson-Wilson, J. & Soberlak, P. (2004) L'utilisation d'entretiens pour quantifier l'implication des parents dans le développement de compétence sportives chez les athlètes, *Revue Internationale des Sciences du Sport et de l'Education Physique*, 64, 39–52.

Côté, J. & Hay, J. (2002) Children's involvement in sport: a developmental perspective, in: J. M. Silva & D. Stevens (Eds) *Psychological foundations of sport* (Boston, MA, Allyn and Bacon), 484–502.

De Knop, P., Engström, L. & Skirstad, B. (1996) European trends in youth sport: a report from 11 European countries, *European Journal of Physical Education*, 1, 37–45.

Ericsson, K. A., Krampe, R. T. & Tesch-Römer, C. (1993) The role of deliberate practice in the acquisition of expert performance, *Psychological Review*, 100, 363–406.

Gould, D., Feltz, D., Horn, T. & Weiss, M. (1982) Reasons for attrition in competitive youth swimming, *Journal of Sport Behaviour*, 5, 155–165.

Helsen, W. F., Hodges, N. J., Van Winckel, J. V. & Starkes, J. (2000) The roles of talent, physical precocity and practice in the development of soccer expertise, *Journal of Sport Sciences*, 18, 727–736.

Helsen, W. F., Starkes, J. L. & Hodges, N. J. (1998) Team sports and the theory of deliberate practice, *Journal of Sport & Exercise Psychology*, 20, 12–34.

Hill, G. M. (1993) Youth sport participation of professional baseball players, *Sociology of Sport Journal*, 10, 107–114.

Hodge, T. & Deakin, J. M. (1998) Deliberate practice and expertise in the martial arts: the role of context in motor recall, *Journal of Sport & Exercise Psychology*, 20, 260–279.

Hodges, N. J. & Starkes, J. L. (1996) Wrestling with the nature of expertise: a sport specific test of Ericsson, Krampe, and Tesch-Römer's (1993) theory of 'deliberate practice', *International Journal of Sport Psychology*, 27, 400–424.

Klint, K. A. & Weiss, M. R. (1986) Dropping in and dropping out: participation motives of current and former youth gymnasts, *Canadian Journal of Applied Sport Sciences*, 11, 106–114.

Law, M., Côté, J. & Ericsson, K. A. (in press) The development of expertise in rhythmic gymnastics, *International Journal of Sport and Exercise Psychology.*

Lindner, K. J., Johns, D. P. & Butcher, J. (1991) Factors in withdrawal from youth sport: a proposed model, *Journal of Sport Behaviour*, 14(1), 3–18.

Robertson-Wilson, J., Baker, J., Derbyshire, E. & Côté, J. (2003) Childhood physical activity involvement in active and inactive female adults, *Avante*, 9, 1–8.

Soberlak, P. & Côté, J. (2003) The developmental activities of elite ice hockey players, *Journal of Applied Sport Psychology*, 15, 41–49.

Starkes, J. L., Deakin, J. M., Allard, F., Hodges, N. J. & Hayes, A. (1996) Deliberate practice in sports: what is it anyway?, in: K. A. Ericsson (Ed.) *The road to excellence: the acquisition of expert performance in the arts and sciences, sports and games* (Mahwah, NJ, Lawrence Erlbaum Associates), 81–106.