The Effect of Participation in Gaelic Football on the Development of Irish Professional Soccer Players

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The developmental model of sport participation (DMSP) was proposed by Côté (1999). First, we examined whether the participation profiles of two groups of professional soccer players in Ireland who either had or had not played Gaelic football to an elite level in adolescence provided support for this model. Both groups commenced participation in soccer around 6 years of age and on average participated in two other sports between 6 and 18 years of age, excluding soccer and Gaelic football. A reduction in the number of other sports and an increase in hours devoted to the primary sport were observed between 6 and 18 years of age, as per the predictions of the DMSP. Second, we examined whether players who demonstrated early diversification required fewer soccer-specific hours to achieve expert performance in that sport compared with players who demonstrated less diversification or did not participate in Gaelic football. No significant relationships or differences were reported, which did not provide support for the DMSP, possibly due to the low sample size employed in this study.

Keywords: skill acquisition, developmental model of sport participation, expert performance

Our knowledge of expert performance in sport and how it develops has grown significantly over recent decades, as illustrated by the publication of various edited books (e.g., Ericsson, Charness, Feltovich, & Hoffman, 2006; Starkes & Ericsson, 2003; Williams & Hodges, 2004), reviews (e.g., Ericsson, 2007; Williams & Ford, 2008), and journal special issues (e.g., Ericsson & Williams, 2007; Williams & Ericsson, 2007). Several researchers have attempted during this time to identify the ideal pathway for athletes to pursue as they progress from early engagement in sport in childhood to expert performance in adulthood (for reviews, see Côté, Baker, & Abernethy, 2007; Ward, Hodges, Williams, & Starkes, 2004). In this research, expert athletes have been required to retrospectively recall via interviews and/or questionnaires the activities in which they had participated during their developmental years. Côté (1999; Côté et al., 2007) proposed the developmental...
model of sport participation (DMSP) based on the findings reported in these studies. In this paper, we examine whether the participation profiles of two groups of professional soccer players in Ireland who either had or had not also played Gaelic football to an elite level in adolescence provide support for this model.

In the DMSP, three stages of athlete development are proposed, namely, sampling from 6 to 12 years of age, specializing from 13 to 15 years of age, and investment from 16 to 18 years of age. During the sampling stage, children who later become elite athletes accumulate a large number of hours in a number of sports coupled with a low number of hours in the sport in which they eventually achieve expert performance. This process has been termed early diversification. During the specializing stage, these athletes reduce the number of activities they participate in to one or two sports, including their primary sport. In the investment stage, they accumulate a large number of hours within their primary sport and a low amount of activity across other sports. The model proposes a progression from diversity to specialization as athletes develop into elite performers.

Some researchers have published results that support the DMSP. Baker, Côté, & Abernethy (2003a, see also Baker, Côté, & Abernethy, 2003b; Côté, 1999; Soberlak & Côté, 2003) examined the participation histories of expert and non-expert decision makers from elite Australian athletes in team ball sports. They found evidence for early diversification. The expert decision makers accumulated more hours in sport-specific activities from 12 years of age onward compared with nonexperts. Moreover, there was a significant negative correlation between the number of sports in which participants engaged before making the National team and the number of hours these athletes spent in practice in their primary sport. The elite Australian athletes who reported greater diversity early in their development had accumulated less practice hours in their primary sport compared with those who had reported participating in fewer activities during those years. Côté et al. (2007; see also Baker, 2003) speculated that theory related to transfer of learning may provide insight into the mechanisms by which early diversification benefits skill acquisition in the athlete’s primary sport. For example, Thorndike and Woodworth (1901) proposed that positive transfer would occur if two tasks share common elements, whereas others (e.g., Lee, 1988; Morris, Bransford, & Franks, 1977) have suggested that transfer arises when tasks share common processing strategies or procedures.

At least two published papers report findings that appear to contradict the DMSP (Côté et al., 2007). Ward, Hodges, Starkes, and Williams (2007) employed a participation history questionnaire to assess the contribution of soccer-specific and other activities in the development of elite and recreational English youth soccer players between the ages of 9 and 18 years. Elite players began participating in organized soccer-specific activity earlier than the recreational players. They also accumulated more hours in soccer-specific organized team practice compared with their recreational counterparts, whereas the hours accumulated in other soccer activities, such as match play, did not differentiate the two groups. In the DMSP, elite players would be expected to show greater early diversification compared with their recreational counterparts. Both groups participated on average in two other sports, were not differentiated on hours accumulated in other sports, and stopped participating in other sports at 16 years of age. The lack of a between-group difference in favor of the elite players for the number of, and hours accumu-
lated in, other sports does not support the DMSP. Findings suggest that extended engagement in sport-specific practice activities aimed at improving performance is the most effective pathway when developing elite soccer players.

Law, Côté, and Ericsson (2007) reported similar conclusions in their examination of the participation profiles of both Canadian Olympic and lower skilled International rhythmic gymnasts. The Olympic athletes participated in fewer than two other sports between 6 and 12 years of age, whereas the lower skilled International gymnasts participated in three other sports during this period. Although both the Olympic and International gymnasts started sport-specific practice at around 6 years of age, by 16 years of age the Olympic gymnasts had accumulated almost three times the amount of sport-specific practice activities that were aimed at performance improvement compared with the International gymnasts. They also accumulated more hours in practice activities that were most closely related to performance (e.g., routine training) compared with the International gymnasts. However, Olympic gymnasts reported reduced enjoyment, poorer physical health, and more injuries compared with International gymnasts. As a result of these findings, Côté et al. (2007) revised the DMSP to include a route to expert performance through early specialization in which athletes enter the sport at a young age and engage in large amounts of sport-specific practice activities aimed at improving performance. In gymnastics, where expert performance is typically required before puberty, this early specialization appears a necessary prerequisite (Côté et al., 2007).

In this article, we examine whether early diversification by an athlete in a sport related to their primary sport can lead to a more rapid development of expert performance in the primary sport. We created two groups from male professional soccer players in Ireland. First, those who had diversified by participating both in soccer and Gaelic football from a young age and who had participated in Gaelic football at the elite, youth regional level in early adolescence before deciding to specialize solely in soccer. Second, we created a group of male professional soccer players who had never participated in Gaelic football. In Ireland, both Gaelic football and soccer are immensely popular and it is not uncommon in certain provinces for players to participate in both sports (Fahey, Layte, & Gannon, 2004). Gaelic football and soccer are classified as invasion sports of the football variety (Thorpe, Bunker, & Almond, 1986) and appear to share many common characteristics and elements. For example, both codes of football rely heavily on the technical skill of kicking and game intelligence skills such as anticipation and decision making, and there is empirical evidence to suggest that the players share common physiological and anthropometric characteristics (Strudwick, Reilly, & Doran, 2002).

We used a questionnaire to compare the participation history profiles of the two groups. We examined the average hours per year in soccer, Gaelic football, and in other sports, as well as the number of other sports, in each of the three stages proposed in the DMSP. The study by Baker et al. (2003a) led us to predict that soccer players who had diversified early in their development would require fewer soccer-specific hours to achieve expert performance in that sport compared with soccer players who had taken part in fewer activities in their early years. Moreover, we expected that soccer players who had participated in Gaelic football would benefit from their accumulation of hours in this sport by requiring fewer
soccer-specific hours to achieve expert performance in soccer compared with expert soccer players who did not participate in Gaelic football. Such proposals would support the DMSP. We also predicted that the soccer players’ developmental pathways would progress from diversity to specialization, as per the DMSP. We expected that soccer players who had participated in Gaelic football would achieve certain milestones (e.g., age first took part in supervised training in soccer with an adult) later compared with their counterparts because they would have specialized into soccer at a relatively late age.

Methods

Participants

A total of 20 male professional soccer players with a mean age of 23.61 years ($SD = 3.86$ years) volunteered to participate and provided informed consent. All players competed in the Irish Premier League, the highest level of professional soccer in Ireland. Participants were divided into two groups based on their Gaelic football experience. The first group (Soccer-No Gaelic) comprised 10 soccer players aged 24.15 years ($SD = 4.95$ years) with no experience of Gaelic football. The second group (Soccer-Gaelic) comprised 10 soccer players aged 22.09 years ($SD = 2.49$ years) who had also played Gaelic football at the elite youth regional level. An independent $t$ test revealed that chronological age did not differentiate the Soccer-No Gaelic group from the Soccer-Gaelic group, $t(13.28) = 1.17, p > .05, d = 0.55$. All procedures were conducted according to the ethical guidelines of the university.

To verify that the two groups of players did not differ in their skill levels in soccer, each players’ skills were rated by their coach on a Likert-type scale ranging from 1 (very poor) to 10 (extremely competent) in terms of a number of technical skills (e.g., passing, heading), perceptual-cognitive skills (e.g., decision making, anticipation), and mental skills (e.g., coping with mistakes, discipline). The lists of skills were created by three UEFA-qualified soccer coaches. Separate independent $t$ tests revealed no differences between groups for coach’s ratings of their players’ soccer-specific technical skills, $t(18), 0.12, p > .05, d = 0.06$; perceptual skills, $t(18), 0.39, p > .05, d = 0.19$; and mental skills, $t(18), 1.56, p > .05, d = 0.71$. In order, Soccer-No Gaelic group means for technical, perceptual, and mental skills were 7.04, 7.16, 8.22 ($SDs = 0.45, 0.63, 0.64$, respectively). Soccer-Gaelic group means for technical, perceptual, and mental skills were 7.07, 7.01, 7.73 ($SDs = 0.52, 0.99, 0.75$, respectively).

Questionnaire

A questionnaire was created to trace the developmental activities of participants. The questionnaire was based on published work (e.g., Hodges & Starkes, 1996) and had previously been validated (e.g., Ward et al., 2007). The milestones and activities were chosen in part to match the methodological recommendations of Côté, Ericsson, and Law (2005). The questionnaire contained three sections: soccer/Gaelic football–specific milestones, soccer/Gaelic football activities, and other sports. The soccer-specific milestones and soccer/Gaelic football activities
were verified by qualified soccer \((n = 3)\) and Gaelic football \((n = 2)\) coaches. The first section of the questionnaire was designed to elicit information on soccer/ Gaelic football–specific milestones. Soccer-specific milestones were the age at which the player first: (a) started playing soccer, but not necessarily in an organized league; (b) took part in supervised training in soccer with an adult; (c) participated in a soccer league; and (d) received a professional contract. This section of the questionnaire also elicited Gaelic-specific milestones. Gaelic-specific milestones were the age at which the player first: (a) started playing Gaelic, but not necessarily in an organized league; (b) took part in supervised training in Gaelic with an adult; (c) played at provincial or regional standard, which is the highest standard of Gaelic youth football; and (d) ended playing Gaelic football.

The second section of the questionnaire was designed to elicit information on players’ engagement in soccer activities. The players were required to highlight the number of hours per week and the number of months per year spent in soccer activities. Players were asked to report hours in soccer activity starting from the current year and working backward in 3-year intervals to the first year they had played soccer. Given the large range of ages \((\text{Min} = 18\) years of age, \(\text{Max} = 31\) years of age) and the necessity to collect data for every year of participation, 3-year intervals were used for efficiency as per Ward et al. (2007). Participants were required to provide the number of weeks from each year that they were injured and unable to take part in soccer activity. This part of the questionnaire also contained a section designed to elicit information on the players’ engagement in Gaelic football activities, which were obtained using the same criteria as outlined for soccer.

The third section of the questionnaire was designed to elicit information on players’ engagement in other sports. The players were provided with a list of sports. They were required to indicate the sports in which they had participated regularly for a minimum of 3 months over their entire developmental period, excluding sports in which they may have only participated in on a few occasions, which are unlikely to contribute to the development of expert performance. They provided the age at which they started playing; the number of hours per week; and the number of months per year they had spent participating; and, if appropriate, the age they finished taking part in each sport.

**Procedure**

The questionnaires were handed out to the players before a practice night at their soccer club. Players were instructed to complete the questionnaire in their own time in a quiet room and to return it within 1 month.

**Reliability**

Participants were required to complete a retest on the participation history questionnaire for their hours spent in soccer activity. The retest occurred 1 week after the deadline for the submission of the original questionnaire. Two statistical methods were used to assess measurement error between the two tests. First, the relative reliability, which is the level of association between the two tests, was examined using an intraclass correlation (Atkinson & Nevill, 1998; Thomas, Nelson, &
Silverman, 2005). Second, the absolute reliability, which is the level of agreement between the two tests, was examined using the limits of agreement method (Atkinson & Nevill, 1998; Bland & Altman, 1986, 2007).

A high intraclass correlation coefficient was reported for the hours spent in soccer activity, $R(79) = .98$. The limits of agreement were $6.73 \pm 40.35$ hr, $p < .05$. Participants slightly underestimated their hours in the retest compared with the original test. However, only on one occasion was there a 2-hr difference between participant’s test and retest values for the hours-per-week data in soccer activities over each of the years analyzed. All other errors were of 1 hour per week or less. The number of inputted values on the retest questionnaire that were the same as the inputted values on the initial questionnaire was 85%. We deemed this level of agreement to indicate good reliability.

**Data Analysis**

Separate independent $t$ tests were used to analyze the milestone data sets for the age at which players first: (a) participated in soccer/Gaelic football, but not necessarily in an organized league; (b) took part in supervised training in soccer/Gaelic football with an adult; (c) participated in a soccer league; (d) played Gaelic youth football at elite youth regional standard; (e) received a professional contract at a soccer club; (f) ended playing Gaelic football; (g) started participating in other sports; and (h) finished participating in other sports. The alpha level required for significance was $p < .05$.

We replicated the correlation analysis conducted by Baker et al. (2003a). Pearson’s correlation coefficient was calculated to examine the relationship between the number of other sports including Gaelic football participated in from 6 years of age to when the players first received a professional soccer contract and the hours accumulated in soccer-specific activity during the same period. Pearson’s correlation coefficient was also calculated for the relationship between the hours accumulated in other sports including Gaelic football from 6 years of age to when the players first received a professional soccer contract and the hours accumulated in soccer activity during that period. We also tested the prediction that early diversification by an athlete can lead to a more rapid development of expert performance in the primary sport. First, we calculated Pearson’s correlation coefficient for the relationship between hours accumulated in other sports including Gaelic football between 6 and 12 years of age and hours accumulated in soccer activity from 6 years of age to when the players first received a professional soccer contract. Second, we calculated Pearson’s correlation coefficient for number of other sports including Gaelic football between 6 and 12 years of age and hours accumulated in soccer activity from 6 years of age to when the players first received a professional soccer contract.

To test the predictions of the DMSP, we only examined data for the age range 6–18 years. The hours per year in soccer activity were calculated by multiplying hours per week by weeks per year minus weeks off injured per year. As per Ward et al. (2007), linear interpolation was used to calculate missing data in each of the 2 years in each 3-year interval in which no data were collected. Linear interpolation enables values between two given set of data points to be calculated by averaging the two given data points. We then calculated the average hours per year in
each of the three stages of the DMSP. We did this by dividing the accumulated
hours for a stage by the number of years for that stage (e.g., sampling years from
6 to 12 years of age = 7 years). We also completed this process to calculate the
average hours per year in each of the three stages of the DMSP for Gaelic football
and other sports.

The average hours per year were analyzed using separate factorial ANOVAs
with group (Soccer-No Gaelic, Soccer-Gaelic) as the between-participants factor
and stage of DMSP (Sampling, 6–12 years; Specializing, 13–15 years; and Invest-
ment, 16–18 years) as the within-participants factor. We conducted this analysis
for average hours per year in the activities: (i) all sports including soccer and
Gaelic football; (ii) soccer and other sports excluding Gaelic football; and (iii)
soccer only. We also conducted the same analysis for the number of other sports
including Gaelic football. Any violations to sphericity were corrected using
Greenhouse–Geisser procedures. The alpha level for significance was \( p < .05 \).
Any significant main effects were followed up with pairwise comparisons. The
Bonferroni correction method was used to adjust the alpha level required for sig-
nificance for post hoc pairwise comparisons only. The effect size measures involv-
ing two means were calculated using the Cohen’s \( d \) formula (Cohen, 1988). These
measures were calculated using pooled standard deviation. The effect size mea-
sures involving more than two means were calculated using the Cohen’s \( f \) formula
(Cohen, 1988).

Results

Milestones

**Soccer.** No differences were observed between the Soccer-No Gaelic and Soc-
cer-Gaelic groups for the age at which they first: (a) started playing soccer \( (M =
6.20 \text{ years}, SD = 1.48 \text{ vs. } M = 6.60 \text{ years}, SD = 2.12) \), \( t(18) = 0.49, p > .05,
d = 0.22 \); (b) took part in supervised training in soccer with an adult \( (M = 7.90 \text{ years},
SD = 1.10 \text{ vs. } M = 8.70 \text{ years}, SD = 1.57) \), \( t(18) = 1.32, p > .05, d = 0.60 \); (c)
participated in a soccer league \( (M = 8.60 \text{ years}, SD = 0.70 \text{ vs. } M = 9.30 \text{ years}, SD =
1.83) \), \( t(18) = 1.13, p > .05, d = 0.55 \); and (d) received a professional contract at
a soccer club \( (M = 17.30 \text{ years}, SD = 0.67 \text{ vs. } M = 18.10 \text{ years}, SD = 1.45) \), \( t(18)
= 1.58, p > .05, d = 0.75 \).

**Gaelic Football.** The start age for participating in Gaelic football was 6.80 years
\( (SD = 1.87) \). The age players first took part in supervised training in Gaelic foot-
ball with an adult was 7.60 years \( (SD = 1.78) \). All of the Gaelic footballers played
at elite youth regional standard at an average age of 14.33 years \( (SD = 1.87) \). The
Soccer-Gaelic group finished playing Gaelic football at an average of 15.70 years
\( (SD = 3.59) \).

**Other Sports.** The start age for participating in other sports \( (M = 10.00 \text{ years},
SD = 2.64 \text{ vs. } M = 8.48, SD = 1.18) \) did not differentiate the Soccer-No Gaelic
from the Soccer-Gaelic group, \( t(16) = 1.65, p > .05, d = 0.80 \). The age players
finished participating in other sports \( (M = 13.83 \text{ years}, SD = 1.97 \text{ vs. } M = 13.99
\text{ years}, SD = 1.62) \) also did not differentiate the two groups, \( t(16) = 0.19, p > .05,
d = 0.01 \). A number of players in the Soccer-No Gaelic and Soccer-Gaelic groups
continued to participate in other sports beyond the age of 18 years (i.e., golf, \(n = 4\) and \(n = 2\) respectively; swimming, \(n = 3\) per group; and weight training, \(n = 2\) per group).

**Correlations Between Participation in Other Sports and Soccer-Specific Hours**

The correlation between the number of other sports including Gaelic football participated in between 6 years of age and when the players first received a professional soccer contract (\(M = 3.25\) sports, \(SD = 1.80\)) and the hours accumulated in soccer-specific activity during that period (\(M = 4644.80\) hr, \(SD = 2145.52\)) was not significant, \(r(18) = .19, p > .05\). The correlation between the hours accumulated in other sports including football between 6 years of age and when the players first received a professional soccer contract (\(M = 2600.21\) hr, \(SD = 2140.50\)) and the hours accumulated in soccer activity during that period was also not significant, \(r(18) = .22, p > .05\). There was also no significant relationship between number of other sports including Gaelic football participated in between 6 and 12 years of age (\(M = 2.60\) sports, \(SD = 1.64\)) and hours accumulated in soccer activity between 6 years of age and when the players first received a professional soccer contract, \(r(18) = .23, p > .05\). The correlation between hours accumulated in other sports including Gaelic football between 6 and 12 years of age (\(M = 790.30\) hr, \(SD = 566.85\)) and hours accumulated in soccer activity between 6 years of age and when the players first received a professional soccer contract was also not significant, \(r(18) = .42, p > .05\). However, the latter positive correlation approached significance (\(p = .06\)). Players who reported a high amount of hours in other sports including Gaelic football between 6 and 12 years of age also reported a high amount of hours in soccer activity between 6 years of age and when they first received a professional soccer contract.

**Average Hours per Year as a Function of Stage**

**All Sports Activity.** Average hours per year in all sports activity including soccer and Gaelic football differentiated the Soccer-No Gaelic from the Soccer-Gaelic group, \(F(1, 18) = 6.97, p < .05, d = 0.93\). The Soccer-Gaelic group (\(M = 755.31\) hr, \(SD = 337.45\)) spent more average hours per year in all sports activity including soccer and Gaelic football compared with the Soccer-No Gaelic group (\(M = 500.33\) hr, \(SD = 209.31\)). There was a significant main effect for stage, \(F(1.30, 23.32) = 14.48, p < .05, f = 3.81\). Post hoc tests revealed that both groups had significantly lower average hours per year in all sports activity including soccer and Gaelic football activity during the Sampling stage (\(M = 455.43\) hr, \(SD = 294.60\)) compared with the Specializing (\(M = 708.88\) hr, \(SD = 279.31\)) and Investment (\(M = 719.15\) hr, \(SD = 283.24\)) stages. The Group \(\times\) Stage interaction was not significant, \(F(1.30, 23.32) = 0.87, p > .05, f = 2.70\).

**Soccer and Other Sports Excluding Gaelic Football.** Average hours per year in soccer and other sports excluding Gaelic football did not differentiate the Soccer-No Gaelic (\(M = 500.33\) hr, \(SD = 209.31\)) from the Soccer-Gaelic (\(M = 565.17\) hr, \(SD = 268.10\)) group, \(F(1, 18) = 0.68, p > .05, d = 0.27\). There was a significant main effect for stage, \(F(1.30, 23.29) = 14.92, p < .05, f = 0.91\). Post hoc tests
revealed that both groups had significantly lower average hours per year in soccer and other sports excluding Gaelic football during the Sampling stage (\(M = 376.60\) hr, \(SD = 255.16\)) compared with the Specializing (\(M = 588.58\) hr, \(SD = 194.01\)) and Investment (\(M = 633.06\) hr, \(SD = 193.94\)) stages. The Group \(\times\) Stage interaction was not significant, \(F(1.30, 23.29) = 0.33, p > .05, f = 0.27\).

**Soccer Activity.** Average hours per year in soccer activity did not differentiate the Soccer-No Gaelic (\(M = 404.49\) hr, \(SD = 117.48\)) from the Soccer-Gaelic (\(M = 441.79\) hr, \(SD = 188.97\)) group, \(F(1, 18) = 0.28, p > .05, d = 0.24\). There was a significant main effect for stage, \(F(1.34, 24.11) = 28.95, p < .05, f = 5.38\). Post hoc tests revealed that both groups had significantly lower average hours per year in soccer activity during the Sampling stage (\(M = 263.70\) hr, \(SD = 205.93\)) compared with the Specializing (\(M = 465.70\) hr, \(SD = 173.85\)) and Investment (\(M = 540.03\) hr, \(SD = 160.01\)) stages. The Group \(\times\) Stage interaction was not significant, \(F(1.34, 24.11) = 0.07, p > .05, f = 0.21\) (Figure 1).

**Number of Other Sports Including Gaelic Football.** Between 6 and 18 years of age the Soccer-Gaelic group participated in a total of 4.00 other sports (\(SD = 1.70\)), whereas the Soccer-No Gaelic group participated in a total of 2.50 other sports (\(SD = 1.65\)). The average number of other sports including Gaelic football across the three stages differentiated the Soccer-No Gaelic from the Soccer-Gaelic group, \(F(1, 18) = 9.34, p < .05, d = 1.20\). The Soccer-Gaelic group (\(M = 3.13\) sports, \(SD = 1.36\)) participated in a higher average number of other sports including Gaelic football across the three stages compared with the Soccer-No Gaelic group (\(M = 1.50\) sports, \(SD = 1.06\)). There was a significant main effect for stage, \(F(2, 36) = 7.89, p < .05, f = 0.66\). Post hoc tests revealed that both groups participated in fewer other sports including Gaelic football during the Investment stage (\(M = 1.80\) sports, \(SD = 1.64\)) compared with the Sampling (\(M = 2.60\) sports, \(SD = 1.57\)) and Specializing stages (\(M = 2.50\) sports, \(SD = 1.51\)). No differences were apparent between the Sampling and Specializing stage. The Group \(\times\) Stage interaction was not significant, \(F(2, 36) = 1.80, p > .05, f = 1.03\).

**Discussion**

We examined whether early diversification by athletes in at least one other sport related to their primary sport can lead to a more rapid development of expert performance in their primary sport. We used a participation history questionnaire to compare the profiles of male professional soccer players in Ireland who had either diversified by participating in soccer and Gaelic football from a young age before specializing in soccer with those who had never participated in Gaelic football. The study by Baker et al. (2003a) led us to predict that soccer players who had diversified into other sports or at least into Gaelic football early in their development would require fewer soccer-specific hours to achieve expert performance in that sport compared with soccer players who had taken part in fewer activities in their early years. We further predicted that the developmental pathway followed by professional soccer players would progress from diversity to specialization, thereby providing support for the DMSP (Côté et al., 2007). We also expected that expert soccer players who had participated in Gaelic football would achieve certain soccer-specific milestones (e.g., age first took part in supervised training in...
Figure 1 — Mean (and SE) hours accumulated in soccer, Gaelic football, and other sports at each of the three stages of the DMSP (Côté et al., 2007) for the (a) Soccer–No Gaelic and (b) Soccer-Gaelic group.
soccer with an adult) later compared with their counterparts because they may have specialized into soccer at a relatively late age.

We predicted that soccer players who had diversified early in their development would require fewer soccer-specific hours to achieve expert performance in that sport compared with those who had taken part in fewer activities in their early years. We found no support for this prediction. There were no significant correlations between hours accumulated in soccer-specific activity and the hours accumulated in or number of other sports including Gaelic football in which they participated. The correlations were also in the opposite direction (i.e., positive rather than negative) to those reported by Baker et al. (2003a). We also predicted that athletes who eventually became expert in their primary sport should require fewer hours to achieve expert performance in that sport because during their development they had accumulated hours in another related sport. The Soccer-Gaelic group spent significantly more average hours per year in all sports activity including Gaelic football between 6 and 18 years of age compared with the Soccer-No Gaelic group. However, the between-group differences for the average hours per year in soccer activity from 6 to 18 years of age, as well as at each stage of the DMSP, did not reach significance. Although this indicates that expert performance in soccer is mainly developed through soccer-specific activities (cf. Ward et al., 2007), the finding is possibly due to the small sample size employed in this study and a potential lack of statistical power, although the effect size for this contrast was relatively small.

We further predicted that the developmental pathway followed by the soccer players would progress from diversity to specialization as outlined in the DMSP. The number of sports including Gaelic football reduced from the Sampling stage to the Investment stage, but not between Sampling and Specializing. A reduction in other sports over the three stages supports the predictions of the DMSP. However, the number of sports including Gaelic football was lower than the number of other sports reported previously by Soberlak and Côté (2003, $M = 6.0$) and Baker et al. (2003a, $M = 8.6$). The lower number of other sports may explain why we found no reduction in other sports from the Sampling stage to the Specializing stage. The lower number of other sports compared with others may be a by-product of differences in the procedure used in earlier studies. Baker et al. (2003a) used a semistructured interview procedure and asked their participants to recall “any type of sport activity that they engaged in on a regular basis before specializing in their primary sport” (p. 16). In comparison, we have used a questionnaire in which participants were asked to recall the sports in which they had participated regularly for a minimum of 3 months over their entire developmental period. We also expected an increase in hours devoted to soccer activity across the three stages. Both groups significantly increased their average hours per year in soccer activity from the Sampling stage to the Specializing stage, but there was no significant increase from the Specializing to the Investment stage. However, the effect size for this comparison was large indicating that low sample size may have contributed to this lack of difference. An increase in hours devoted to the primary sport over the three stages supports the predictions of the DMSP.

We expected that if expert soccer players who had participated in Gaelic football had specialized in soccer at a relatively late age compared with expert soccer
players who did not participate in Gaelic football, then they will achieve certain soccer-specific milestones (e.g., age first took part in supervised training in soccer with an adult) later compared with their counterparts. We found no evidence to support this prediction. Both groups began participating in soccer at 6 years of age. The Soccer-Gaelic group could not be differentiated from the Soccer-No Gaelic group for the age they first started supervised training in soccer with an adult, participated in a soccer league, and received a professional contract at a soccer club. The absence of between-group differences for soccer milestones, as well as the data for average hours in soccer activity, suggests that the Soccer-Gaelic group did not specialize at a later age compared with the Soccer-No Gaelic group. However, the effect sizes for these contrasts were medium sized, indicating a potential lack of statistical power. The mean values show that the Soccer-Gaelic group achieved these three milestones at an older age compared with the Soccer-No Gaelic group.

This study had two main limitations. First, the suggestion that Gaelic football is closely related to soccer is largely intuitive and anecdotal. An a priori method of task analysis may be needed to ascertain which sports share common elements or processing strategies (Williams & Ward, 2007). Second, the sample size employed in this study was relatively low, and consequently there is scope to collect additional data to verify these findings. The relatively low sample size and the fact that we have based some of our conclusions on nonsignificant findings mean that we may be committing Type II errors in accepting null hypotheses. Additional research is required to examine whether expert athletes who have participated during their early years in at least two related sports are able to achieve expert performance in one of those sports by accumulating fewer domain-specific hours compared with expert athletes who have participated solely in that sport.

In conclusion, we examined whether the participation history profiles of two groups of Irish professional soccer players who either had or had not played Gaelic football to an elite level provided support for the DMSP. The two sports are presumed to share common elements or strategies, and there are several examples of prominent players who have performed successfully at an elite level in both codes. Both groups commenced participation in soccer around 6 years of age. They participated in two other sports excluding soccer and Gaelic football between 6 and 18 years of age. They demonstrated a reduction in the number of other sports and an increase in hours devoted to the primary sport between 6 and 18 years of age, as predicted by the DMSP. We used correlation and difference testing to examine whether soccer players who had diversified into other sports or at least into Gaelic football early in their development required fewer soccer-specific hours to achieve expert performance in that sport compared with soccer players who had taken part in fewer activities or no Gaelic football in their early years. No significant relationships or differences were reported. Although there were limitations in this study such as the low sample size and the fact that some of our conclusions are based on acceptance of the null hypothesis, the results suggest that expert performance in soccer is mainly developed through soccer-specific activities (cf. Ward et al., 2007).
References


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