Self-regulation of learning and the performance level of youth soccer players

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Self-regulation of learning and relative age in elite youth soccer: International versus national level players

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Abstract

This study examined the relationship between self-regulated learning and performance level of 256 elite youth soccer players aged 12 to 17 years ($M_{\text{age}} = 14.2$, $SD = 1.2$). As relative age may affect this relationship through its association with maturation, experience, and performance level, we controlled for relative age. International ($n = 76$) and national level ($n = 178$) players’ practice and match experience was equal. A logistic regression analysis revealed that players scoring high on reflection and players born in the first half of a selection year were more likely to belong to the international group (OR = 1.69 and 2.18, respectively). Relative age did not affect the relationship between reflection and performance level. We suggest that, given international players’ higher reflection scores irrespective of relative age, reflection may be a psycho-behavioral marker of talent. Additionally, international players may benefit more from practice than national players through reflective thinking.
Introduction

“Usually, I start with how players see themselves. What is their self-image? (…) You have to teach them to get a correct self-image, because then you can work with them. They must be motivated to improve something. (…) It is not important what I think, but what they think, that’s the foundation” (Foppe de Haan, coach of the Dutch U21 team that became European Champion twice; ‘t Hart, 2007).

Soccer is played at a high level in the Netherlands, which is reflected by the second place the Dutch national team currently holds in the FIFA World Ranking (FIFA, 2010). For Dutch youth soccer players, therefore, it is very difficult to become selected for a youth academy team of a professional soccer club (i.e., top 1%; Toering, Elferink-Gemser, Jordet, & Visscher, 2009), where resources such as high-quality coaching and training facilities are provided (e.g., Stratton, Reilly, Williams, & Richardson, 2004). Self-regulation of learning is associated with effective learning (Zimmerman, 1989, 2006), and it has been found that elite youth soccer players score higher on self-assessed self-regulated learning than non-elite players (Toering et al., 2009). Another factor that seems to reliably predict performance level in elite-level youth soccer is the relative age effect (RAE), which is stronger at high soccer skill levels and the adolescent age range as compared to younger and older age groups (e.g., Cobley, Shorer, & Baker, 2008; Cobley, Baker, Wattie, & McKenna, 2009; Helsen, Starkes, & Van Winckel, 1998, 2000; Helsen, Van Winckel, & Williams, 2005; Simmons & Paull, 2001). This indicates that players who were born early relative to the selection cut-off date were by far overrepresented in selection teams aged 12 to 18 years. Thus, youth soccer players seem to be selected primarily on the basis of variables related to maturation and experience (Cobley et al. 2008, 2009; Helsen et al., 2005). Here we suggest that self-regulated learning is related to development potential. Relative age may affect this relationship through its association with maturation, experience, and performance level. When examining self-regulated learning and performance level, it may therefore be important to control for relative age. To that end, the aim of the present study was to examine the relationship between self-regulation of learning and performance level of elite youth soccer players whilst controlling for relative age.

Helsen and colleagues (2005) suggested that players born in the first months of a selection year get more and better practice, leading to more opportunities to develop their performance and causing them to ultimately become better players. First, being born early relative to the cut-off date is thought to be advantageous because players are physically more mature (e.g., Cobley et al., 2008, 2009). To the authors’ knowledge, only one study has examined the relationship between relative age, selection, and maturation. Sherar and colleagues (2007) found that selected ice hockey players were taller, heavier, and more mature than those that were not selected and age-matched controls. Furthermore, peak height velocity predicted being selected at selection camps. Sherar et al. concluded that early mature players who were born early relative to the cut-off date were preferentially selected. Second, being born early relative to the cut-off date is advantageous as players gain more experience from earlier practice and competition experience (e.g., Cobley et al., 2009). Helsen et al. suggested that having more practice and
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Competition experience facilitates opportunities to develop, for example, technical skills and game intelligence. Third, being born in the first months of a selection year may be beneficial because players have had more success experiences. Having had more success experiences has been suggested to positively affect motivation (e.g., Cobley et al., 2008, 2009; Helsen et al., 2005).

The soccer talent identification system’s focus on discrete performance measures, such as speed, endurance, and technique, yields little information about players’ adaptive skills and development potential (e.g., Morris, 2000). Only a small minority of players labeled as talented will ultimately make it into professional soccer (e.g., Siebelink, 2008). Abbott, Button, Pepping, and Collins (2005) pointed out that current talent identification systems put too much emphasis on variables associated with maturation and experience, and that as a consequence of this overemphasis many promising players may be overlooked. They stated that developmental processes typically are non-linear and that performance becomes unstable during developmental transitions that performers make through their careers. Therefore, they argued, the timing of selection procedures plays an important role in talent identification. Large fluctuations have, for instance, been found between athletes in the consistency of performance (e.g., Kreiner-Phillips & Orlick, 1993). Abbott et al. suggested that the key variable to successful transition to the next stage of development is athletes’ ability to cope with unstable periods in their development, and that athletes should be monitored on the “psycho-behaviors” that account for this coping ability.

One of these “psycho-behaviors” may be self-regulation of learning, which has been shown to discriminate between elite and non-elite youth soccer players (Toering et al., 2009). Self-regulation has been proposed to refer to processes that enable individuals to control their thoughts, feelings, and actions (Baumeister & Vohs, 2004). According to Zimmerman (2008), self-regulation of learning refers to self-initiated processes that make it possible for individuals to transform their mental abilities into performance skills. In the sports context, experts have been shown to be better self-regulators than non-experts and novices, while self-regulation failure has been found to decrease performance (e.g., Anshel & Porter, 1996; Cleary & Zimmerman, 2001; Jordet, 2009a, 2009b; Kitsantas & Zimmerman, 2002). Self-regulated learning processes have been suggested to assist individuals to learn more effectively (Zimmerman, 1989, 2006) and are therefore thought to be associated with development potential. Self-regulation of learning may be related to relative age among elite-level youth soccer players. First, players born early relative to the selection cut-off date may report higher self-regulation scores, because they have more experience in regulating their learning. This indicates that they may be better able to cope with transitions in their development. As opposed to this, a second possible association between self-regulated learning and relative age is that selected players born in the last months of a selection year score higher on self-regulated learning because they must compensate for their lower physical capacities. Third, self-regulation of learning and relative age may be unrelated.

According to the self-regulated learning model used by Toering et al. (2009), youth soccer players who self-regulate their learning well: a. Plan how they want to improve before
initiating actions, b. Self-monitor their actions relative to their goal, c. Evaluate the process employed and the outcome achieved after task execution, and d. Reflect upon the entire process during cycles of planning, self-monitoring, and evaluation. Furthermore, the model assumed that players expend high levels of effort into task performance and possess high levels of self-efficacy in general task situations. Elite youth soccer players reported higher self-regulated learning scores than non-elite players, indicating that self-regulation is related to players’ performance level. In particular, differences were found on two aspects of self-regulation: reflection and effort. This implies that elite youth players are more engaged in what they have learned and the adaptation of their knowledge and actions, and more willing to invest effort into task execution (Toering et al., 2009). However, it remained unclear whether self-regulation of learning can distinguish between the good and very best within a group of elite-level players, who may particularly benefit from effective learning. Progression seems crucial for these players to retain the lead over their competition, which means that self-regulation of learning is an important factor to consider in this group.

To increase insight into whether the relationship between “psycho-behaviors” and the performance level of youth soccer players is affected by RAEs, the purpose of the current study was to examine the relationship between self-regulation of learning and performance level, whilst controlling for relative age. International and national level players aged 12 to 17 years (all elites) were compared on the following aspects of self-regulation: planning, self-monitoring, evaluation, reflection, effort, and self-efficacy. International level players were expected to obtain higher self-regulation scores than national level players. Furthermore, the RAE was expected to be stronger at the international level.

**Methods**

**Participants**

A number of 256 youth male soccer players who were selected in the 2007/2008 soccer season for youth academy teams of Dutch professional soccer clubs (top 1% of players of their age; Toering et al., 2009) with a mean age of 14.2 years (SD = 1.2; range = 12-17) participated in this study. The best of these players (as indicated by talent scouts) were also selected by the Royal Netherlands Football Association (KNVB) to represent their district (district team) or the country (national team), meaning that they belonged to the top 0.4% of players in their age category (KNVB, 2007). We called these latter players “international level players”. The ones who were playing at professional youth academies, but who were not selected for a KNVB representation team were called “national level players”. This resulted in a number of 76 international (Mage = 14.0, SD = 1.2) and 178 national level players (Mage = 14.3, SD = 1.2).

Means and standard deviations of the number of soccer training hours per week players attended at their club, the number of competitive soccer matches they played per week, the number of years they had been playing competitive soccer, and the number of hours per week they practiced their soccer skills during leisure time are presented in Table 1. In the latter case, it was made clear that we meant soccer practice hours in addition to practice at their clubs. Results of ANOVAs performed for each age group separately indicated that there were no differences in soccer characteristics between performance levels.
## Table 1. Means and Standard Deviations of Soccer Characteristics of International and National Level Youth Soccer Players per Age Group

*Note.* No significant differences between International and National Level players \((P > .05)\). At the highest competition level, the Dutch youth soccer competition structure uses one-year age groups up to the age of 15, and two-year age groups for older ages.
In addition, players were classified according to their relative age (born in the first or second half of a year relative to the cut-off date of January 1). In Table 2 the number of players across performance levels and relative age groups are shown for each age category (U13-U17). A relative age effect appeared at both performance levels, as the spread of birth dates in the international level group was 78.9% first half of the year and 21.1% second half, $\chi^2(1, n = 178) = 21.60, P < .001$. In the national level group the spread was 67.4% first half and 32.6% second half of the year, $\chi^2(1, n = 76) = 26.30, P < .001$.

Instrument

Self-regulation of learning was assessed with the Self-Regulation Scale (SRS; Toering, Elferink-Gemser, Jonker, Van Heuvelen, & Visscher, in press). This 46-item questionnaire comprised the subscales of planning, self-monitoring, evaluation, reflection effort, and self-efficacy. The planning subscale (8 items; range (1) Almost never to (4) Almost always) assessed the participants’ awareness of the task requirements in advance of task performance. The self-monitoring subscale (6 items; range (1) Almost never to (4) Almost always) measured the respondents’ consciousness of progress during task execution. High scores on the evaluation subscale (8 items; range (1) Never to (5) Always) indicated that participants often evaluated the process and outcome following task execution. Low reflection scores (5 items; range (1) Strongly agree to (5) Strongly disagree) appointed to a high level of reflection upon previous actions in order to learn from these actions and improve performance. Reflection scores were reversed before data analysis to make them correspond to the scores on the other subscales. The effort subscale (9 items; range (1) Almost never to (4) Almost always) gauged participants’ preparedness to expend effort in task performance. The self-efficacy subscale (10 items; range (1) Almost never to (4) Almost always) examined how respondents judged their abilities to successfully execute tasks. Examples of the items are: “I determine how to solve a problem before I begin” (planning); “I correct my errors” (self-monitoring); “I work as hard as possible on all tasks” (effort); “I can solve most problems if I invest the necessary effort” (self-efficacy). A confirmatory factor analysis among 601 adolescents aged 11 to 17 years revealed sufficient reliability and validity (i.e., CFI = .95, NNFI = .94, RMSEA = .060, SRMR = .063; Cronbach’s $\alpha = .73 - .85$; Toering et al., in press).

Procedure

The soccer clubs or secondary schools that the participants attended were approached for participation in the current study. After permission of the governing body of the clubs or schools for the study to proceed, the parents were asked for permission. Participants completed the questionnaire in a group setting with test leaders present. The procedures were in accordance with the ethical standards of the Medical Faculty of the University of Groningen.

Data Analysis

A logistic regression analysis was conducted to identify the self-regulation aspects that were associated with performance level. As we aimed to control for relative age, relative age was included as a possible confounder, that is, whether players were born in the first vs. second half of a year relative to the cut-off date. In addition, chronological age (age in years) and the
number of practice hours per week were included as possible confounders. The age range was considered wide with respect to developmental changes that occur during adolescence and the amount of practice may also influence the relationship between self-regulation and performance level. The variables were checked on linearity of the logits, which revealed that the assumption of linearity was met for the six self-regulation aspects, chronological age, and number of practice hours per week. Relative age was included as a categorical variable with first half of the year as reference category (born in first vs. second half of the year relative to cut-off date). Tolerance and VIF statistics indicated no multicollinearity problems.

The logistic regression analysis involved two steps: The first step was performed using the enter procedure, whereas in the second step a forward LR procedure was executed in order to identify the self-regulation aspects that were the best predictors of performance level. The possible confounders were included in the first step and the self-regulation aspects were added in the second step. To be considered a confounder, the relative change of $\beta$ of the confounders following

<table>
<thead>
<tr>
<th></th>
<th>International Level (n = 76)</th>
<th>National Level (n = 178)</th>
<th>Total (N = 256)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Under 13</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born first half of year</td>
<td>26 (83.9%)</td>
<td>29 (65.9%)</td>
<td>55 (73.3%)</td>
</tr>
<tr>
<td>Born second half of year</td>
<td>5 (16.1%)</td>
<td>15 (34.1%)</td>
<td>20 (26.7%)</td>
</tr>
<tr>
<td><strong>Under 14</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born first half of year</td>
<td>14 (66.7%)</td>
<td>33 (62.3%)</td>
<td>47 (63.5%)</td>
</tr>
<tr>
<td>Born second half of year</td>
<td>7 (33.3%)</td>
<td>20 (37.7%)</td>
<td>27 (36.5%)</td>
</tr>
<tr>
<td><strong>Under 15</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born first half of year</td>
<td>13 (86.7%)</td>
<td>37 (77.1%)</td>
<td>50 (79.4%)</td>
</tr>
<tr>
<td>Born second half of year</td>
<td>2 (13.3%)</td>
<td>11 (22.9%)</td>
<td>13 (20.6%)</td>
</tr>
<tr>
<td><strong>Under 17</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born first half of year</td>
<td>8 (80.0%)</td>
<td>21 (63.6%)</td>
<td>29 (67.4%)</td>
</tr>
<tr>
<td>Born second half of year</td>
<td>2 (20.0%)</td>
<td>12 (36.4%)</td>
<td>14 (32.6%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born first half of year</td>
<td>62 (78.9%)</td>
<td>120 (67.4%)</td>
<td>82 (71.1%)</td>
</tr>
<tr>
<td>Born second half of year</td>
<td>16 (21.1%)</td>
<td>58 (32.6%)</td>
<td>74 (28.9%)</td>
</tr>
</tbody>
</table>

Table 2. Number of Players across Performance Levels and Relative Age Groups for each Age Category, and the Proportion of Players for both Relative Age Groups

Note. At the highest competition level, the Dutch youth soccer competition structure uses one-year age groups up to the age of 15, and two-year age groups for older ages.
the first step compared with \( \beta \) after the second step had to be at least 25\% when \( \beta \) was larger than 0.40 or -0.40, and the absolute change had to be at least 0.1 when \(-0.40 < \beta < 0.40\) (Frankena & Graat, 1997). The accuracy of the model was assessed with the Hosmer and Lemeshow Goodness-of-Fit Test (Hosmer & Lemeshow, 1989). A significance level of \( \alpha = .05 \) was used.

**Results**

The mean scores and standard deviations of international and national level players on the self-regulation aspects are presented in Table 3 as well as the effect sizes. International level players scored higher on reflection than national level players (\( P < .05 \)) with a small-to-moderate effect size of 0.31. The logistic regression analysis revealed that the self-regulation aspect of reflection was the best predictor of performance level (Table 4). The odds ratio indicated that players had a 1.69 times greater chance to belong to the international level group for each point they scored on reflection.

The \( \beta \)'s of relative age, chronological age, and practice hours per week did not change significantly when the self-regulation aspects were added in the second step of the analysis. Relative age, chronological age, and practice hours per week were, therefore, not considered confounders, because these variables did not affect the relationship between the self-regulation scores and performance level. Relative age and chronological age did appear to be associated with performance level (Table 4). Players born in the first half of the year relative to the cut-off date had a 2.18 times greater chance to belong to the international level group compared to players born in the second half of the year, and younger players were more likely to belong to the international level group (OR = 0.68). The Hosmer and Lemeshow Goodness-of-Fit Test revealed that our model fitted the data, \( \chi^2(8, n = 251) = 6.16, P = .63 \). The Nagelkerke \( R^2 \) indicated that the variance that the model explained was 8.1\%.

**Discussion**

The purpose of the current study was to assess the relationship between self-regulation of learning and performance level, whilst controlling for relative age. Performance levels of elite youth soccer players aged 12 to 17 years were compared (international versus national level). The logistic regression analysis revealed that higher reflection scores were associated with a greater chance that players belonged to the international level group. Results also indicated that a RAE was present in both groups, and that the RAE was stronger among international level players. Relative age, chronological age, and the number of practice hours per week did not affect the relationship between self-regulation of learning and performance level. Furthermore, the international level group, on average, was younger than the national level group. An important reason for this latter finding is the Dutch, pyramid-shaped competition structure, in which the number of youth academy teams at the highest competition level and the number of representation teams decrease with age. That is, there are relatively more of these teams in younger age groups compared to older age groups.

The results of the present study replicated findings of previous research, in that the RAE was found to be stronger at the international level (e.g., Cobley et al., 2009; Helsen et al., 2005). This indicates that the Dutch soccer talent identification system selects players primarily
based on maturation and experience (e.g., Helsen et al., 2005). The system’s focus is on discrete performance measures that only provide limited information about players’ adaptability and development potential (e.g., Morris, 2000). Abbott et al. (2005) argued that current talent identification systems overlook variables related to development potential and that athletes should be monitored on the “psycho-behaviors” that account for their coping ability during unstable periods in their development. Reflection may be one of these “psycho-behaviors”, as it is related to development potential and performance level, and seems to be unrelated to relative age. We speculate that reflection may help players cope with unstable periods in their development and that this could be one of the reasons why international level players perform better than national level players.

Baker and Côté (2003) pointed out that the variable most consistently distinguishing between the most successful athletes was hours of training. However, the current study revealed that soccer practice characteristics were similar for both international and national level players. That is, the number of practice hours

### Table 3.

<table>
<thead>
<tr>
<th></th>
<th>International Level (n = 76)</th>
<th>National Level (n = 178)</th>
<th>Total</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning (Range 1-4)</td>
<td>2.63 (0.54)</td>
<td>2.58 (0.53)</td>
<td>2.59 (0.53)</td>
<td>0.09</td>
</tr>
<tr>
<td>Self-Monitoring (Range 1-4)</td>
<td>2.76 (0.51)</td>
<td>2.69 (0.51)</td>
<td>2.71 (0.51)</td>
<td>0.14</td>
</tr>
<tr>
<td>Evaluation (Range 1-5)</td>
<td>3.61 (0.63)</td>
<td>3.53 (0.56)</td>
<td>3.56 (0.59)</td>
<td>0.13</td>
</tr>
<tr>
<td>Reflection (Range 1-5)*</td>
<td>4.25 (0.55)</td>
<td>4.06 (0.66)</td>
<td>4.12 (0.64)</td>
<td>0.31</td>
</tr>
<tr>
<td>Effort (Range 1-4)</td>
<td>3.07 (0.50)</td>
<td>3.00 (0.49)</td>
<td>3.02 (0.49)</td>
<td>0.14</td>
</tr>
<tr>
<td>Self-efficacy (Range 1-4)</td>
<td>2.90 (0.45)</td>
<td>2.87 (0.39)</td>
<td>2.88 (0.41)</td>
<td>0.07</td>
</tr>
</tbody>
</table>

*P < .05

### Table 4.

<table>
<thead>
<tr>
<th></th>
<th>β (SE)</th>
<th>OR</th>
<th>95% CI of OR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflection</td>
<td>0.52 (0.25)</td>
<td>1.69</td>
<td>1.04 – 2.75</td>
<td>.04</td>
</tr>
<tr>
<td>Relative Age</td>
<td>0.78 (0.34)</td>
<td>2.19</td>
<td>1.12 – 4.27</td>
<td>.02</td>
</tr>
<tr>
<td>Chronological Age</td>
<td>-0.38 (0.16)</td>
<td>0.68</td>
<td>0.50 – 0.93</td>
<td>.02</td>
</tr>
<tr>
<td>Practice hours per week</td>
<td>0.22 (0.15)</td>
<td>1.25</td>
<td>0.92 – 1.68</td>
<td>.15</td>
</tr>
</tbody>
</table>

**Note.** 95% CI of OR = 95% Confidence Interval of the Odds Ratio.
per week, number of matches per week, years of competitive soccer experience, and number of practice hours during leisure time per week were comparable for both groups. Reflection, however, was found to distinguish between performance levels, without the amount of practice affecting this relationship. International level players reported to reflect more upon their performance and may consequently be more aware of effective learning strategies that fit the learning situation. Therefore, they may have high levels of control over their performance development (Ericsson, 1998; Ericsson, Krampe, & Tesch-Römer, 1993; Ertmer & Newby, 1996; Feltovich, Prietula, & Ericsson, 2006). Note that in the current study we could not control for players’ complete practice history. We suggest that, although an extensive number of hours in soccer practice is indeed necessary to reach the highest level of performance (e.g., Ford, Ward, Hodges, & Williams, 2009; Helsen, Starkes, & Hodges, 1998; Helsen, Hodges, Van Winckel, & Starkes, 2000; Ward, Hodges, Williams, & Starkes, 2007), it is not sufficient, and what players derive from practice may distinguish players with an equal amount of accumulated practice hours. Previous research has also proposed that children who become experts at a relatively young age have benefited more from practice and competition than their peers (Thomas, Gallagher, & Lowry, 2003).

Using a sample of elite players warranted the ecological validity of the current study (e.g., Abernethy, Thomas, & Thomas, 1993). The comparison of homogenous groups also meant, however, that two groups with relatively small variances were compared. This indicates that it is easier to find an effect, because smaller variances lead to higher values of test statistics (e.g., Field, 2007). Taken together, this means that we used an ecologically valid sample in which finding an effect may be easier because of the small variances. Although the model only explained 8.1% of the variance in performance level and the effect of reflection was small-to-moderate, the difference in reflection found is definitely considered relevant for practice given the homogeneity and high performance level of the group (e.g., Abernethy et al, 1993). It is possible that small differences in reflection as measured in the current study are associated with small, but potentially decisive advantages of one player over another.

The current study does not answer the question of whether playing at high performance levels leads to more reflection or whether reflection leads to higher performance levels. The international level players were selected for representation teams where they practice with and compete against the best players of their age. Playing at a higher standard may inspire these players to reflect more upon their performance. On the other hand, reflection could be one of the reasons why the international level players become such good players in the first place, which in turn leads to becoming selected for a representation team.

As reflection could be a psychobehavioral marker for talent, an implication for future research is to investigate the relationship between reflection and progress on soccer-specific variables, such as technical and tactical skills. Youth soccer players who reflect much upon their performance may be the ones who improve most over time and, consequently, the ones with the best development potential. An implication for practitioners working with elite youth soccer players is to make their teams aware
of the importance of self-regulation of learning, in particular reflection. It is suggested that players may gain from coaches who encourage them to think about their strengths and weaknesses and act accordingly.

Conclusions

The present study provides some first evidence of the relationship between a cognitive-behavioral variable and attainment in elite youth sport. The study replicated findings of previous research with respect to RAEs, showing a stronger effect at the international level (e.g., Cobley et al., 2008, 2009; Helsen et al., 2005). Current soccer talent identification systems may overlook variables related to development potential because of its focus on variables associated with maturation and experience. We speculate that reflection may be one of the “psycho-behaviors” accounting for players’ coping ability during unstable periods in their development. The finding that international level players scored higher on reflection, irrespective of the RAE, lead us to suggest that it may be more informative to use variables associated with development potential in addition to discrete performance measures in talent identification procedures. Previous research has suggested that sustaining commitment to practice is the key variable in continuing to expend large amounts of time in practice (Baker & Côté, 2003). From the results of our study in soccer, however, it seems that what distinguishes the best from the “almost best” Dutch youth soccer players is not only the amount of practice (all the players practiced equally much), but also the self-regulation aspect of reflection. The equal amounts of practice and competition combined with the differences in reflection scores lead us to propose that international level players may benefit more from practice than national level players through reflective thinking.

Acknowledgement

This study was supported by a grant of the Dutch National Olympic Committee NOC*NSF. The authors thank all the students for their assistance in collecting the data. Furthermore, we wish to thank the participants, coaches, and staff of the youth academies, Stichting LOOT, and the secondary schools for their cooperation.
Abernethy, B., Thomas, K. T., & Thomas, J. T. (1993). Strategies for improving understanding of motor expertise (or mistakes we have made and things we have learned!!). In J. L. Starkes, & F. Allard (Eds.), Cognitive issues in motor expertise. (pp. 317-356). Amsterdam, Netherlands: North-Holland/Elsevier Science Publishers.


