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Self-regulation and performance level of elite and non-elite youth soccer players

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Abstract

In the learning and development context, self-regulation can be described as the degree to which individuals are metacognitively, motivationally, and behaviorally proactive participants in their learning process (Zimmerman, 1986, 2006). The purpose of this study was to examine the relationship between self-regulation and performance level in elite (n = 159) and non-elite (n = 285) youth soccer players aged 11 to 17 years (Mage = 14.5, SD =1.4). The players filled in a questionnaire that measured planning, self-monitoring, evaluation, reflection, effort and self-efficacy. A logistic regression analysis, in which we controlled for age, was performed to determine which self-regulatory aspects were associated with players’ performance level (elite vs. non-elite). The results showed that high scores on reflection and effort were associated with a higher level of performance. This means that elite players may be more aware of their strong and weak points and the translation of knowledge into action, and they may be more willing to invest effort in practice and competition. Elite players might learn more effectively, meaning they benefit more from practice and competition. Therefore, they may develop their performance faster than non-elite players, which could be one of the reasons they play at a higher level.
Introduction

Self-regulation involves processes that enable individuals to control their thoughts, feelings, and actions (Baumeister & Vohs, 2004). Self-regulation allows individuals to adapt to their social and physical environment and is, therefore, thought to be a key process in psychological functioning (Schmeichel & Baumeister, 2004). The processes of self-regulation have been studied across many diverse domains, including crime and violence, alcoholism, behavior change, learning, emotional control, and attentional control (e.g., Baumeister & Vohs, 2004; Boekaerts, Pintrich, & Zeidner, 2005; Percy, 2008; Scott, Beevers, & Mermelstein, 2008). This study focused on learning and development. In this context, several studies have been conducted using Zimmerman’s self-regulated learning theory (e.g., Clark & Ste-Marie, 2007; Cleary & Zimmerman, 2001; Schmitz & Wiese, 2006), which led us to adopt Zimmerman’s (1989, 2006) definition of self-regulation.

Self-regulation is described by Zimmerman (1989, 2006) as the extent to which individuals are metacognitively, motivationally, and behaviorally proactive participants in their own learning process. This means that individuals know how to attain their goal of performance improvement, they are motivated, and they take action to achieve their goal. Self-regulatory processes will not produce high levels of expertise immediately, but can assist an individual in acquiring knowledge and skills more effectively (Zimmerman, 2006). Successful learners are able to choose appropriate regulatory strategies when they notice a lack of skills necessary to attain a goal (Ertmer & Newby, 1996). Experts have been shown to be more sensitive than non-experts to the task demands of specific problems, more flexible in their planning, and more reflective with regard to learning (Berliner, 1994).

In the present study, we focused on the metacognitive and motivational processes of self-regulation in the context of performance development using the models of Ertmer and Newby (1996) and Hong and O’Neil (2001). The regulatory component of the expert learner model suggested by Ertmer and Newby (1996) is comprised of the metacognitive aspects of planning, self-monitoring, evaluation, and reflection, which correspond well to the aspects Zimmerman (1989, 2006) employed in his theory. However, self-regulation in learning and development also involves motivation. Therefore, the motivational component was adopted from the trait self-regulation model of Hong and O’Neil (2001), who found support for a three-order factor model of trait self-regulation in which motivation consisted of effort and self-efficacy.

Following Ertmer and Newby’s (1996) model, the metacognitive aspects of self-regulation that we examined were planning, self-monitoring, evaluation, and reflection. Before initiating actions to improve performance, individuals who self-regulate well plan how they want to improve, meaning that they compare the task demands with their personal resources and identify matches between the two. During task performance, they self-monitor what they do, indicating that they mentally check their actions relative to their goal. Following the execution of a plan, individuals who self-regulate well evaluate the process employed and the outcome achieved. During cycles of planning, self-monitoring, and evaluation, these individuals constantly reflect upon the entire process in a continuous effort to translate thought into action and gain strategy knowledge from their actions.
Following Hong and O’Neil (2001), the motivational aspects of self-regulation assessed in the current study were effort and self-efficacy (Hong & O’Neil, 2001). Effort has frequently been investigated both as a component of motivation and as a separate moderating variable. To attain maximum performance, maximal efforts to improve are necessary and must be sustained over years (Ericsson, Krampe, & Tesch-Römer, 1993). Self-regulated learners display extraordinary effort and persistence during learning (Zimmerman, 1990).

Self-efficacy, on the other hand, is one’s belief to be able to successfully execute the behavior required to attain a certain goal (Bandura, 1977), and is concerned with judgments of what a person can do with his or her skills rather than with the skills themselves. Bandura (1993) suggested that self-efficacy beliefs determine the goals individuals set for themselves, how much effort they expend, their perseverance, and their resilience to failure. In other words, individuals need to believe that they can execute a task successfully to be motivated to perform that task successfully (Bandura, 1977).

Researchers focusing on self-regulation and sport performance have shown that self-regulation can have a positive effect on performance (e.g., Anshel & Porter, 1996; Kirschenbaum & Bale, 1986; Kirschenbaum, Ordman, Tomarken, & Holtzbauer, 1982). Successful athletes exhibit an ability to detect differences between where they are and where they can, and want, to be (Chen & Singer, 1992). Athletes who fail to self-regulate in this manner are less likely to perform at their best (e.g., Anshel & Porter, 1996; Kirschenbaum et al., 1982). Therefore, the tendency to self-regulate could make it more likely for some athletes to achieve elite status than others (Anshel & Porter, 1996). As has been pointed out by Ericsson and colleagues (1993), deliberate practice activities (i.e., those activities that are designed to improve performance) are needed to attain the highest levels of performance, which supports the idea that being selected for a talent program may increase the chance to become an elite athlete in the future, because such programs enable access to such things as better training facilities, coaches, and medical guidance. To become selected for a talent program, athletes need to perform successfully to catch the eye of a talent scout. Furthermore, when athletes are part of a talent program, it is important that they are successful, as otherwise they will be released from the program. Thus, youth athletes who self-regulate well may improve their performance faster and perform more successfully, meaning they have a greater chance of becoming selected for and staying in such a talent program.

However, little is known about self-regulation and the performance development of youth athletes. To be able to benefit optimally from practice and competition, self-regulation appears to be crucial for talented youth athletes. Future elite athletes constantly have to improve their performance, thus they need to be motivated and continuously focused on those performance aspects that need to be improved. For example, Kitsantas and Zimmerman (2002) assessed self-regulation in the practice context comparing the self-regulation processes of expert, non-expert, and novice volleyball players as they practiced the volleyball serve. The manner in which experts plan daily practice routines was shown to have greater structure than the strategies used by non-experts or novices. Experts also employed more self-regulatory strategies and self-evaluated more
than both non-experts and novices. In another study on self-regulation during practice, Cleary and Zimmerman (2001) observed differences among basketball experts, non-experts, and novices in the quality of self-regulation. Experts were found to set more specific goals, select more technique-oriented strategies, and display higher self-efficacy than non-experts or novices. These studies indicate that athletes who self-regulate well may benefit more from practice than others.

In their review on talent identification and development in soccer, Williams and Reilly (2000) claimed that a talented player possesses personal characteristics that facilitate learning, training, and competition. Self-regulation with respect to performance development can be a process that facilitates learning, training, and competition, since it is a process that makes it possible for individuals to develop their knowledge and skills more effectively (Zimmerman, 2006). Thus, self-regulation may be associated with faster performance improvement and better performance, which in turn leads to becoming selected for a youth team of a professional soccer club, and which increases the chance of becoming a professional in the future.

The purpose of the present study was to identify the self-regulatory aspects that were associated with youth soccer players’ performance level (elite vs. non-elite). Elite youth soccer players were members of youth teams of professional soccer clubs playing in a year-round competition at the highest national standard in the Netherlands, while non-elite youth soccer players played in regular year-round competitions at a regional level. The following aspects of self-regulation were assessed: planning, self-monitoring, evaluation, reflection, effort, and self-efficacy.

### Methods

#### Participants

Altogether, 444 youth male soccer players aged 11–17 years participated in the study. The mean age of the players was 14.4 years ($SD = 1.4$). The participants’ age and soccer characteristics are presented in Table 1. The participants were classified as elite ($n = 159$) or non-elite ($n = 285$). Elite players were members of youth soccer teams of professional soccer clubs competing at the highest national standard in the Netherlands, whereas non-elite players played in regional competitions several divisions lower.

In the age categories that were examined in the current study (Under-13, Under-15, and Under-17 years), 236,768 boys were playing in year-round competitions in the 2006–2007 soccer season (KNVB, 2007a). A total of 96 teams played at the highest national standard (KNVB, 2007b). About 16–20 players are selected for each youth team of professional soccer clubs at this standard each year (e.g., FC Groningen, 2007), which means that these players represent the best 1.0% of youth soccer players of their age in the Netherlands. There were either 10 or 11 levels of competition in each youth age category in the Netherlands in the 2006–2007 soccer season (KNVB, 2007b). All elite players in the current study played at the highest level, while, on average, the non-elite players were members of teams at the sixth level. Thus, on average, elite players played five divisions higher than non-elite players. In addition, elite players played at least three levels higher than non-elite players. All players had at least 3 years of competitive soccer experience.
Instrument

**General questions.** The general questions enquired about personal and sports characteristics. Participants filled in their name, date of birth, and the number of soccer training hours they undertook each week at their club. In addition, participants listed the number of competitive soccer matches they played per week, the number of hours of competitive sports besides soccer they engaged in per week, and how many years they had been playing competitive soccer.

**Self-regulation questionnaire development.** The aspects of self-regulation that we examined were planning, self-monitoring, evaluation, reflection, effort, and self-efficacy. These aspects were assessed with a questionnaire that was based on English-language questionnaires (Herl et al., 1999; Hong & O’Neil, 2001; Howard, McGee, Shia, & Hong, 2000; Pelletier, Hay & Drago, 2006; Schwarzer & Jerusalem, 1995). We followed the procedures as described by Pelletier and colleagues (1995) when translating the questions into Dutch. First, two bilingual individuals translated the items from English into Dutch. Then, these translations were translated back into English by two other, independent, bilingual individuals without the help of the original scale. After that, the translations of all items were assessed by the translators and their supervisor, who is a professor in human movement sciences, and some minor modifications to the translation were made. This version of the questionnaire was pre-tested on a group of adolescents of the same age as the target population. Participants were asked to mark the words or phrases they found difficult to understand. Thereafter, some items were rephrased to make the questionnaire comprehensible to the youngest participants in the study.

A confirmatory factor analysis was performed with the data of 1,201 adolescents aged 11–17 years, which indicated satisfactory results for an adjusted six-factor model. We considered that discussing the factor analysis in detail was beyond the scope of this paper, and that it warranted more elaborate discussion in a separate article. However, the Cronbach’s α of the subscales in the current study and the Spearman correlations are presented in Table 2. In summary, some questionnaire items were changed for intelligibility and the items were the same for all participants.

<table>
<thead>
<tr>
<th></th>
<th>Elite players (n=159)</th>
<th>Non-elite players (n=285)</th>
<th>Total (N=444)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>14.3 (1.6)</td>
<td>14.4 (1.3)</td>
<td>14.3 (1.4)</td>
</tr>
<tr>
<td>Soccer training hours per week*</td>
<td>7.6 (1.8)</td>
<td>2.9 (1.0)</td>
<td>4.6 (2.7)</td>
</tr>
<tr>
<td>Soccer matches per week*</td>
<td>1.3 (0.4)</td>
<td>1.0 (0.2)</td>
<td>1.1 (0.3)</td>
</tr>
<tr>
<td>Hours of other competitive sports per week*</td>
<td>0.5 (1.1)</td>
<td>1.3 (2.2)</td>
<td>1.0 (1.9)</td>
</tr>
<tr>
<td>Years of competitive soccer experience</td>
<td>8.4 (1.9)</td>
<td>8.2 (2.0)</td>
<td>8.2 (2.0)</td>
</tr>
</tbody>
</table>

*P < .01

Table 1. Means and Standard Deviations of Age and Soccer Characteristics for each Performance Level
Planning, self-monitoring, effort, and self-efficacy. Planning, self-monitoring, and effort were measured with items based on the self-regulatory inventory of Hong and O’Neil (2001) and the Self-Regulation Trait Questionnaire of Herl and colleagues (1999). Since the internal consistency of the self-monitoring subscale was below .70 in Hong and O’Neil’s (2001) study, we decided to adopt the self-monitoring items from the Self-Regulation Trait Questionnaire. Self-efficacy was assessed with items based on the Generalized Self-efficacy Scale (Schwarzer & Jerusalem, 1995). Examples of the items are: “I determine how to solve a problem before I begin” (planning, 9 items); “I correct my errors” (self-monitoring, 7 items); “I work as hard as possible on all tasks” (effort, 9 items); “I can solve most problems if I invest the necessary effort” (self-efficacy, 12 items). Participants responded on a 4-point rating scale: (1) Almost never, (2) Sometimes, (3) Often, and (4) Almost always. High scores indicated high levels of planning, self-monitoring, effort, and self-efficacy in general task situations.

Evaluation. This measure was assessed with items based on the evaluation subscale of the Inventory of Metacognitive Self-Regulation (Howard et al., 2000). The evaluation subscale consisted of eight items. An example of an item is: “I make sure I complete each step”. Participants responded on a 5-point rating scale: (1) Never, (2) Seldom, (3) Sometimes, (4) Often, and (5) Always. High scores indicated a high level of evaluation after executing tasks.

Reflection. This variable was assessed with five items based on the reflection subscale of the Reflective Learning Continuum (Peltier et al., 2006). An example of an item is: “I try to think about my strengths and weaknesses”. Participants responded to the items on a 5-point rating scale: (1) Strongly agree, (2) Agree, (3) Neutral, (4) Disagree, and (5) Strongly disagree. Low scores on the reflection subscale indicated a high level of reflection on previous actions in order to learn from these actions and do things better next time. Before data analysis, the reflection scores were reversed to make them correspond to the scores on the other subscales.

Procedure. Soccer clubs and schools were approached in an effort to recruit participants for the current study. In the Netherlands, there are a number of secondary schools that have extra facilities for elite youth athletes (LOOT schools). Some of the Dutch elite youth soccer players were also attending these schools. We approached the governing bodies of professional soccer clubs and LOOT schools to help recruit participants. Thus, elite players were either approached via their soccer clubs or their LOOT schools. The non-elite players were part of youth teams of regular soccer clubs. These players were approached via their secondary schools. After receiving permission from the governing bodies of the clubs or schools, the parents were asked for permission for the study to proceed. Then, the participants were informed about the procedures of the study, before providing informed consent. 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 in accordance with Hosmer and Lemeshow (1989) was performed to identify the self-regulatory aspects that were associated with performance level. Because the age range could be considered wide given the developmental changes that occur in adolescence, age in years was included as a possible confounder. The variables were checked for linearity of the logits, and if the logits were not linear, the variables were split into categories. To check the linearity of the logits, the predictor variables were divided into groups, creating dummy variables. Thereafter, a logistic regression analysis was performed with the lowest group as a reference point. The midpoints of the groups, on the x-axis, were plotted against the regression coefficients (the β of the reference group being 0). If appropriate, the variables were split at a cut-off point where the curve of the logits showed a clear decrease or increase. From the plot, the shape of the curve (e.g., linear, quadratic) could be derived. This robust eye-ball method was considered accurate enough (see also Frankena & Graat, 1997; Hosmer & Lemeshow, 1989). After the logits were checked, the self-regulatory aspects were divided into three categories (low, moderate, high score), while age in years was considered a linear variable. Spearman correlations between the predictor variables were calculated (Table 2), but no correlations above .60 were found, meaning the model did not need reconsideration (Hosmer & Lemeshow, 1989).

The logistic regression analysis was performed using the enter procedure and involved two steps. First, age in years was included; second, the self-regulatory aspects were added. We decided that to be considered a confounder, the relative change of the β of age after the first step compared with the β after the second step had to be at least 25% when β was larger than 0.40 or -0.40, and the absolute change had to be at least 0.1 when -0.40 < β < 0.40 (Frankena & Graat, 1997). The accuracy of the model was assessed with the Hosmer and Lemeshow goodness-of-fit test (Hosmer & Lemeshow, 1989). Statistical significance was set at \( P = .05 \) and the Bonferroni correction was applied.

| Table 2. Cronbach’s α and Spearman Correlations of the Self-Regulation Aspects |
|-------------------------------|---------|---------|---------|---------|---------|---------|
| Planning | .80 | .43 | .46 | .30 | .39 | .39 |
| Self-monitoring | .75 | - | .51 | .32 | .49 | .36 |
| Evaluation | .83 | - | - | .36 | .47 | .31 |
| Reflection | .90 | - | - | - | .30 | .22 |
| Effort | .87 | - | - | - | - | .37 |
| Self-efficacy | .79 | - | - | - | - | - |

Cronbach’s α and Spearman Correlations of the Self-Regulation Aspects.
<table>
<thead>
<tr>
<th>Self-regulation aspect</th>
<th>Range of scores</th>
<th>OR</th>
<th>P</th>
</tr>
</thead>
<tbody>
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<td><strong>Planning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.00-2.00</td>
<td>1.00</td>
<td>.816</td>
</tr>
<tr>
<td>Moderate</td>
<td>2.01-3.00</td>
<td>0.91</td>
<td>.778</td>
</tr>
<tr>
<td>High</td>
<td>3.01-4.00</td>
<td>1.13</td>
<td>.805</td>
</tr>
<tr>
<td><strong>Self-monitoring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.00-2.50</td>
<td>1.00</td>
<td>.934</td>
</tr>
<tr>
<td>Moderate</td>
<td>2.51-3.00</td>
<td>1.07</td>
<td>.792</td>
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<tr>
<td>High</td>
<td>3.01-4.00</td>
<td>1.15</td>
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<tr>
<td><strong>Evaluation</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>1.00</td>
<td>.014</td>
</tr>
<tr>
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<tr>
<td>High</td>
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<td>.000</td>
</tr>
<tr>
<td>Moderate</td>
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<td>High</td>
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<tr>
<td>Moderate</td>
<td>2.26-3.00</td>
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<td>High</td>
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Table 3. Results of the Logistic Regression Analysis
Results

Table 3 shows the scores (means and standard deviations) for the self-regulatory aspects of elite and non-elite youth soccer players. Overall, elite players had higher scores on all self-regulatory aspects than non-elite players.

Performance level was associated with the self-regulatory aspects of reflection and effort (Table 4). After correction for multiple testing, the results showed that for both reflection and effort, the differences between the high and low scoring groups were significant. For players scoring high on reflection (4.00–5.00), the odds ratios (ORs) indicated that they had a 4.90 times greater chance of belonging to the elite group than players scoring low (1.00–3.50). The proportion of elite players in the group that scored high on reflection was 49.7%, compared with only 22.5% of the non-elite players (Figure 1).

The same trend was visible for the aspect of effort (Table 3). For players scoring high on effort (3.00–4.00), the odds ratios showed that there was a 7.07 times greater chance that they belonged to the elite group than players scoring low (1.00–2.25). The proportion of elite players in the group that scored high on effort was 49.1%, while only 18.5% of the non-elite players had a high score (Figure 1).

The β of age did not change significantly because of the addition of the self-regulatory aspects in the second step of the analysis. Therefore, age could not be considered a confounder, since age did not affect the relationship between the scores on the self-regulatory aspects and performance level. The Hosmer and Lemeshow test revealed that the model fitted the data [$\chi^2(8, n = 444) = 12.12, P = 0.15$]. The Nagelkerke $R^2$ indicated that the model explained 25.3% of the variance.
Discussion

In the present study, we examined the relationship between self-regulation and performance level in youth soccer players. Self-regulation consisted of the aspects of planning, self-monitoring, evaluation, reflection, effort, and self-efficacy. The results revealed that the aspects of reflection and effort were associated with performance level. A higher score on these aspects indicated a greater chance of players belonging to the elite group. Almost half of the elite players scored high on reflection and effort, whereas only a fifth of the non-elite players did so. Furthermore, just a few of the elite players scored low on reflection and effort. Thus, a high score on reflection and effort seems to be associated with a high performance level.

Reflection is the key process of expert learning, which translates knowledge into action, making it possible to gain strategy knowledge from specific activities (Ertmer & Newby, 1996). Experts are not only able to perform effectively, but they also have the ability to reflect on their thought processes and methods (Glaser & Chi, 1988; Zimmerman, 2006). The higher scores on reflection of elite compared with non-elite players indicated that elite players may be more aware of previous actions in order to learn from these actions and do things better next time. This finding means elite players may be more engaged in improving their performance.

Reflection helps future experts to develop tools they can use to improve their performance. Future experts constantly adapt the way that they use and process information, which helps them to acquire greater control over performance aspects deemed relevant (Ericsson, 1998). These tools assist them to attain the highest performance level and to continuously improve their performance during practice and competition (Ericsson, 2003). It has previously been suggested that children who become experts at a relatively young age may have benefited more from practice and competition than their peers (Thomas, Gallagher, & Lowry, 2003). Since they seem to reflect more on their previous actions in order to learn, elite players may benefit more from practice and competition than non-elite players. One cannot become an expert by practicing mindlessly (Ericsson et al., 1993). This is also in line with the findings of Cleary and Zimmerman (2001) and Kitsantas and Zimmerman (2002), who found that experts use better strategies during practice.

Elite players reported that they invested more effort into executing tasks than non-elite players, which indicates that elite players tended to try harder to succeed when performing tasks, even in adverse conditions. Elite players seem to be more persistent when executing tasks, implying that they learn more because they try harder. One characteristic of experts is that they put extreme effort into improving their performance (Feltovich, Prietula, & Ericsson, 2006).

Youth soccer players who develop discipline, commitment, resilience, and social support have the best chance of making the transition to professional adult soccer (Holt & Dunn, 2004). Self-regulation could play a role in the development of these four factors. If players self-regulate more, they take more responsibility for their own learning (e.g., Ommundsen & Lemyre, 2007; Zimmerman, 1989, 2006), meaning they are disciplined, committed, resilient, and they seek social support when necessary. Holt and Mitchell (2006) examined these four factors in youth soccer players who
were to be released from the English professional youth soccer system. One of their conclusions was that players who failed to make the transition to professional adult soccer lacked volitional behavior and the determination to succeed. It would appear that these players were not willing to invest enough effort into soccer to achieve their goal of becoming a professional soccer player. Thus, effort could be the basis for certain factors that have been found to distinguish between youth soccer players who make the transition to professional adult soccer and those who do not.

Furthermore, in the current study, effort was considered a component of motivation (Hong & O’Neil, 2001), and motivation has been shown to distinguish between elite (the best) and sub-elite (very good, but not the best) youth athletes in previous studies (e.g., Elferink-Gemser, Visscher, Lemmink, & Mulder, 2004, 2007; Ward, Hodges, Williams, & Starkes, 2007). According to Baker and Côté (2003), the variable that most consistently distinguished the most successful athletes from their less successful counterparts was hours of training. Sustaining commitment was considered the key variable in continuing to invest large amounts of time into training (Baker & Côté, 2003). Helsen and colleagues Helsen, Starkes, and Hodges (1998) estimated that the amount of accumulated practice that was needed to become a professional soccer player 10 years ago was 9332 h (18 years into their careers). Williams and Hodges (2005) pointed out that these data indicate how committed youth soccer players must be to become professionals. Obviously, the number of soccer training hours in the current study was determined by performance level. However, we do not know whether self-regulatory skills are developed because elite players trained more or more specifically, or whether the elite players already possessed high-quality self-regulatory skills before they were part of a talent program. This could be investigated by studying the development of self-regulation with age. If the differences in self-regulation between performance levels are already apparent at a young age and these differences remain over age, it is likely that the elite players already possessed well-developed self-regulatory skills before they were part of a talent program. In that case, self-regulation could be used as a selection tool.

A limitation of the present study was the use of self-report questionnaires. What we know now is that elite and non-elite players judge their self-regulation skills differently. If or how this is reflected in behavior remains unclear. This would be an interesting topic for future study. Another limitation was that no other soccer performance characteristics were measured. Performance in sports is influenced by many performance characteristics, including physiological, technical, and tactical skills (e.g., Elferink-Gemser et al., 2004, 2007; Reilly, Williams, Nevill, & Franks, 2000). The explained variance in the current study was 25.3%, and Figure 1 indicates that half of the elite players did not score high on reflection and effort, meaning that other factors were also responsible for the differences between elite and non-elite players. Therefore, more research is needed to better understand how self-regulation relates to specific soccer performance characteristics, since youth soccer players who are the best self-regulators may be the ones who make the most progress in their performances. It would also be interesting to determine whether there are differences in self-regulation between elite (the
best) and sub–elite (very good, but not the best) players within a group of talented individuals, because making progress is especially important in this group. Elite coaches could use such information to help youth players to benefit optimally from practice and competition. Furthermore, players who score low on reflection and effort may be trained on these aspects, which would benefit the players as well as the soccer clubs. Currently, little is known about training self-regulatory skills in soccer players, indicating that further research is required.

The present study has some practical implications for coaches as well. In addition to motivation, which has been found to be important to attain optimal performance in many previous studies (e.g., Baker & Côté, 2003; Elferink-Gemser et al., 2004, 2007; Helsen et al., 1998; Williams & Hodges, 2005), reflection seems to play a significant role in becoming an elite soccer player. Therefore, coaches should emphasize this aspect in practice and competition. They should encourage their players to reflect on their performances in order to improve, instead of telling players which aspects they have to work on without making the players themselves think about their strong and weak points. The current study is in line with the deliberate practice theory (Ericsson et al., 1993), because it also makes clear to coaches that what players derive from practice is important combined with a large number of training hours.

In conclusion, the outcomes of the present study are in line with the suggestion that young athletes who become an expert at a relatively young age have benefited more from practice and competition than their peers (Thomas et al., 2003). In addition, the results support the deliberate practice concept (Ericsson et al., 1993), because they emphasize the importance of motivation and practice in the development of expertise. Elite youth soccer players appear to reflect more on their previous actions to learn and try harder to execute their tasks successfully, and thus may benefit more from practice and competition, which could be one of the reasons they play at a higher level. Thus, self-regulation could be a key process in the development of youth soccer players.

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