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Achievement Goals and Self-Regulation in the Sport Context

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Introduction and Overview of Basic Principles

Sport offers a compelling context in which social psychological principles make an important contribution to understanding human emotion, judgment, and behavior. In sport, *"…. the rules of the game are understood by all participants and enforced in a purportedly unbiased manner. There are clear winners and losers. Different teams and players are easily recognized by their distinctive uniforms and unique numbers or by their particular territorial boundaries. And to top things off, individual and team performance records are meticulously kept … Sport offers a type of controlled "living laboratory" to study individuals and groups"* (Day, Gordon, & Fink, 2012, pp. 398-399). Because of these features, the sport context is different from other performance contexts such as work, school, and art. However, there are also commonalities. One of the purposes of the present chapter is to mine those connections, similarities, and convergences to help to understand how and why performers think, feel, and act as they do in different performance contexts (for a discussion on this generalizability issue, see Hays, 2012).

Social psychological research in the sport context began at the end of the 19th century when Norman Triplett (1898) observed that racing cyclists performed faster in a competitive context (*i.e.,* when racing against another racer) than when racing against the clock alone. In follow-up studies, he discovered that simply the presence of others (*i.e.,* an audience) had the same effect, a social psychological principle that we now know as social facilitation (Allport, 1924; Zajonc, 1965). The social psychological research in the sport context that has been done ever since cannot be exhaustively reviewed in a single chapter. Hence, the present chapter focuses and elaborates on 10 basic social psychological principles of high performance and effective self-regulation that are central in sport and other performance contexts. By

following these principles, coaches and their athletes likely increase athletes' chances to develop a successful sports career. These 10 principles are:

1. Enhance performance and self-regulation through goal setting.
2. Structure the multifaceted nature of achievement goal pursuit into a hierarchical goal system.
3. Differentiate achievement goals on the basis of evaluative standard and valence.
4. Set approach goals rather than avoidance goals.
5. Develop interventions that focus on self-based and task-based approach goals.
6. Delineate athletes' idiosyncratic developmental trajectories to better understand the process of goal attainment and self-regulation.
7. Work on strengths and weaknesses simultaneously.
8. Distinguish between high pressure situations and athletes' psychological reactions to pressure.
9. Accept fluctuating internal states and focus on goal-relevant cues and contingencies.
10. Control the controllables.

Principle 1. Enhance performance and self-regulation through goal setting.

Setting goals, or cognitive representations of a desired endpoint that impacts evaluations, emotions, and behaviors (Fishbach & Ferguson, 2007), is generally considered one of the most effective performance enhancement strategies in the behavioral sciences (Burton, Pickering, Weinberg, Yukelson, & Weigand, 2010; Locke & Latham, 1990; 2013). A core finding is that specific, difficult goals lead to higher performance than no goals or vague "do your best" goals. Specific and difficult

goals determine the direction of an individual's behavior, an individual's level of intensity or effort, and an individual's level of persistence (Locke & Latham, 2013).

In sports, performance (*e.g.*, score, time, pace, distance, points) is relatively easy to measure so that discrepancies between the current situation and the desired end state can be relatively easily and objectively determined and monitored. This is one of the reasons why both short-term goals (*e.g.,* master a skill) and long-term goals (*e.g.,* qualify for the world championships) are ubiquitous in the sport context. Remarkably, however, early meta-analyses suggested that goal setting is less effective in enhancing performance in the sport context than in business settings, in which most of the goal-setting studies have been conducted (Burton, Naylor, & Holliday, 2001; Kyllo & Landers, 1995; Williams, 2013). One explanation was that, because of the intrinsic nature of sport activities, goal interventions may not have incremental effects. That is, people choose to be involved in sport, but they have to work for a living (Hall & Kerr, 2001; Moran & Toner, 2017). In addition, sport-like tasks inherently provide intrinsic task feedback to the performer so that spontaneous goal setting is likely to occur, also in control conditions in intervention studies (Locke, 1991). In more recent studies in sports and physical activity contexts, controlling for such effects resulted in about equally strong goal-setting effects as typically observed in non-sports settings (Burton & Weiss, 2008). That is, in more than 80% of the goal-setting studies, moderate to strong goal-setting effects were observed (Williams, 2013). Note that the majority of goal-setting studies in sports and physical activity contexts used non-athlete or recreational samples. Only a quarter relied on sport populations, and in these latter studies, high-level athletes were typically not represented (Burton et al., 2010). This is unfortunate because goal setting may become more valuable when goals become harder and take longer to attain: that is,

when the competitive level increases and conditions become more demanding. For example, in a sample of 338 athletes from different sports who had a strong probability of making the next U.S. Summer Olympic team in 2 years, Burton et al. (2010) found that athletes highest in self-confidence and career success consistently perceived different types of goals as highly effective for themselves.

Principle 2. Structure the multifaceted nature of achievement goal pursuit into a hierarchical goal system.

The process whereby individuals activate and sustain behaviors, cognitions, and affects that are systematically oriented toward the attainment of their goals is known as *self-regulation* (Zimmerman, Schunk, & DiBenedetto, 2017). In this process, a major self-regulation challenge is how to cope with failures and losses. Athletes, including the most successful ones, share the experience of a negative balance between winning and losing. To illustrate, more than 11,000 athletes competed at the Olympics in Rio 2016, and only a handful returned home with a medal. A specific example is Ranomi Kromowidjojo, Dutch triple Olympic champion (50m, 100m, and 4×100m freestyle) and multiple world record holder (50m, 4×50m, 4×100m, and 4×200m freestyle Short Course). At the World Aquatics Championships 2017, she finished fifth with a personal best of 52.7. At the press conference after the race, Ranomi reflected on her race, and explicitly addressed the issue of how to cope with her loss: *"When are you satisfied with your performance? When you win gold, or when you achieve a personal best? At the London Olympic Games I managed to secure a gold medal. It wasn't my best race ever, but I was happy with my time of 53.0 seconds. Now I did very well and reached my potential, but I am disappointed not to finish on the podium"* (Volkers, 2017).

Ranomi's mixed feelings about her performance reflect the multifaceted nature of achievement goal pursuit, and accordingly, the complex process of self-regulation. In the sport psychological goal-setting literature, three types of achievement goals are distinguished: *outcome goals, performance goals, and process goals* (Filby, Maynard, & Graydon, 1999; Hardy, 1997; Moran & Toner, 2017; Williams, 2013). Individuals with *outcomes goals* rely on social comparison (Festinger, 1954). That is, outcome goals (or other-based goals) are typically grounded in *inter*personal or normative standards such as winning a match or competition, or a particular position on a ranking. This type of goal represents the *why* of motivational processes (Filby et al., 1999; Moran & Toner, 2017). As humorously underlined by former Liverpool manager Bill Shankly, a defining feature of sport is competition: *"Some people believe football is a matter of life and death, I am very disappointed with that attitude. I can assure you it is much, much more important than that"* (MailOnline, 2009). This quote is clearly an overstatement, but sports are typically zero sum games (i.e., the outcome is either win or lose). Hence, a *winning is all* mentality is almost automatically enforced in a sport context, and there is no doubt that *winning* is very much appreciated by any participant in any sport context.

From this perspective, Ranomi Kromowidjojo's feelings of disappointment and dissatisfaction are understandable. She did not manage to secure a medal position (*i.e.*, a top 3 rank) at the World Aquatics Championships 2017. She swam her best race ever, but her opponents performed (slightly) better. Indeed, the problem with *winning* as outcome goal is that athletes largely lack control over the outcome. Winning or losing is obviously a function of one's own talent and effort, but other variables also have substantial impact, including opponents, referees, game conditions, and chance. Therefore, from a self-regulation perspective, an outcome

goal may be best considered a dream or desire. Like surfers who hope for sunshine and wind, athletes may hope that their own performance will ultimately be good enough for the victory. Like Ranomi, you may complete your perfect race but nevertheless lose because your opponents, who are also extremely talented and skilled, perform even better than you.

Accordingly, an exclusive focus on largely uncontrollable outcome goals may shift the athlete's attention away from the task through task-irrelevant interfering thoughts. Such thoughts typically undermine performance attainment, and in the longer term make athletes vulnerable to structural frustration, chronic fear of failure, and burnout (e.g., Deffenbacher, 1980; Hatzigeorgiadis & Biddle, 2002; Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). This does not imply that outcome goals should be neglected. In contrast, particularly among elite athletes, the goal to win inspires, energizes, and directs, and should be utilized at the right moment. For example, this strong motivational force may help athletes to deal with tough conditions (rain, cold, loneliness, pain) during training, inspire them before important matches, or cause them to give their all for the win at the final stage of a close race. However, for the maintenance of sport enjoyment, self-confidence, and long-term, sustainable development, it may be better to rely on the building blocks of outcome goals, namely, performance goals and process goals, which are discussed next.

A zero sum *situation* does not imply exclusive zero sum *motivation* (*cf.*, Hays, 2012). In a competitive context, effective self-regulators pursue *performance goals* (or self-based goals) simultaneously, or subsequently. This type of goal represents *what* athletes are aiming to achieve. The standard is grounded in an *intra*-personal standard: that is, referring to a former version of oneself. Such a reliance on temporal comparison (Albert, 1977), which is largely under the athlete’s own control, may refer

to time *("Running the 100m within 10 seconds"*), distance or height (*"To break the 8 meter (distance) or 2 meter (height) barrier"*), technique *("Hitting draws and fades with a golf driver"*), or effort *("Never give up in this match"*). In the example discussed above, Ranomi's performance goal at the World Aquatics Championships 2017 was to post a personal best. Because swimming is a self-paced skill, no opponent could stop her from attaining her performance goal.

She additionally set *process goals* (or task-based goals) in service of her performance goal. Process goals refer to *how* athletes can achieve their performance and outcome goals. Process goals are set by breaking the performance goal down into manageable chunks and creating a plan to achieve it. Because process goals rely on standards that are inherent in the task itself, athletes receive direct, immediate, and ongoing feedback during their sport performances. This process facilitates learning and skill acquisition, enhances concentration and commitment, and makes flow states more likely to occur. In contrast, outcome and performance goals require the ability to cognitively represent two outcomes simultaneously (*i.e.*, others' performances and one's own previous performances, respectively; Elliot, Murayama, & Pekrun, 2011), which may interfere with total absorption in the task.

The multiple goals athletes typically hold can be structured into a hierarchical goal system or framework (Williams, 2013). Goal systems are defined as the mental representations of motivational networks composed of interconnected goals and means (Kruglanski et al., 2002). Specifically, superordinate outcome goals (*Why?*) should be used to flexibly organize performance goals (*What?*) and their means of attainment, or process goals (*How?*). These latter lower-order goals, or tactics (Scholer & Higgins, 2008), are typically more numerous, context-specific, short-term (proximal), and substitutable (Duckworth & Gross, 2014). For example, at the World

Aquatics Championships 2017, Ranomi had a series of process goals with regard to start speed (15m from signal), turn speed, finishing speed (last 5m), swimming speed per lap, and stroke frequency and stroke length. Because she achieved all of her process goals as well as her performance goal (a personal best), she was eventually pleased with her performance, despite her unexpected and disappointing final rank. As an effective self-regulator, she acknowledged that she had achieved her performance and process goals over which she had personal control.

Although research on the effectiveness of goal hierarchies in sports is virtually nonexistent (Burton & Weiss, 2008; Williams, 2013), making goal systems visible and explicit likely helps athletes to effectively self-regulate and monitor their goal pursuit: it may increase athletes' awareness of what actions, means, and subgoals facilitate and inhibit their focal objective (Zimmerman et al., 2017). As illustrated by Ranomi's case, her process goals regarding speed (start, swimming, turn, and finish) and stroke (frequency and length) were the building blocks of her performance goal (a personal best), which should have led to achievement of her top-ranked, but largely uncontrollable outcome goal (a spot on the podium).

When resources are limited, goal hierarchies may also help athletes to de-activate or inhibit rival goals which are deemed less important. Successful goal pursuit entails maintaining commitment to one's focal goals (*e.g.*, Van Yperen, 2009), which is most likely to occur for individuals high in self-control and grit. *Self-control* refers to the capacity to regulate attention, emotion, and behavior in the presence of temptation (Baumeister, Schmeister, & Vohs, 2007); *grit* is the tenacious pursuit of a dominant superordinate goal despite setbacks (Duckworth, Peterson, Matthews, & Kelly, 2007). Thus, self-control is typically associated with attaining short-term process goals, whereas grit is more tightly coupled with achieving exceptional long-

term outcome goals (Duckworth & Gross, 2014). Self-control and grit are particularly important in situations in which pursuing a negative subordinate proximal goal (*e.g.,* training in wet and cold weather, accepting a nasty and selfish star player in your team) is required as a stepping stone for attaining a positive superordinate distal goal (*e.g.,* becoming world champion).

Principle 3. Differentiate achievement goals on the basis of evaluative standard and valence.

The influential achievement goal approach to achievement motivation (Elliot & Hulleman, 2017) developed more or less independently of the goal-setting literature (Locke & Latham, 2013). Most noticeable (and confusing) about this development is that different labels are used for similar goals, and the same labels for different goals. Specifically, in the achievement goal approach, other-based outcome goals are referred to as *performance goals*. Self-based performance goals in the goal-setting literature are called *mastery goals* in the achievement goal approach. Even more confusing, achievement goal researchers in sport psychology tend to rely on a dichotomy of other-based *ego goals* versus self-based or task-based *task goals* (*e.g.,* Duda, 2005). In the extant (achievement) goal literature, these different goals are operationalized either as goal state, dispositional goal orientation, or perceived motivational climate (Biddle, Wang, Kavussanu, & Spray, 2003; Duda, 2005; Elliot, Jury, & Murayama, 2018).

Although self-based and task-based goal pursuit are closely related, these goals can be pursued independently. Hence, Elliot et al. (2011) identified three basic evaluative standards: (1) *Other-based standards* refer to others who are concrete and present in the achievement situation (as in face-to-face competition) or to aggregated

normative information; (2) *Self-based standards* refer to one's personal performance trajectory; (3) *Task-based standards* refer to the absolute demands of the task (*e.g.*, sinking a putt, lifting one's knees when running). Following Elliot et al. (2011), in the current chapter, the terms *other-based goal, self-based goal, and task-based goal* are used as labels throughout.

Achievement goals differ not only with respect to the evaluative standards individuals use. Another basic dimension is how competence is valenced: that is, as the individual's desired level of competence or undesired level of incompetence (for a recent review, see Elliot & Hulleman, 2017). Crossing the three standards used to define competence with how competence can be valenced yields a 3 × 2 achievement goal model (Elliot et al., 2011). Individuals may be focused on (1a) doing better than others or (1b) not doing worse than others, (2a) doing better than before or (2b) not doing worse than before, and (3a) doing the task correctly or (3b) not doing the task incorrectly. Mascret, Elliot, and Curry (2015) extended this 3 × 2 achievement goal model to the sport domain.

Principle 4. Set approach goals rather than avoidance goals.

Few studies have examined differences between self-based and task-based goals (undifferentiated known as "mastery goals"; Elliot & Hulleman, 2017), and particularly studies on negatively valenced self-based and task-based goals are underrepresented. Nevertheless, the quite consistent results of several meta-analyses suggest that particularly the valence dimension of achievement goals is important for performance attainment. Across achievement domains (*i.e.*, sport, education, and work), approach goals (other, self, or task) are positively related to performance attainment whereas avoidance goals (other, self, or task) are negatively related to

performance attainment (Baranik, Stanley, Bynum, & Lance, 2010; Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Payne, Youngcourt, & Beaubien, 2007; Van Yperen, Blaga, & Postmes, 2014).

Particularly for sport psychologists and other applied scientists and practitioners, an important question is whether performance can be improved by achievement goal interventions. The observed positive links between approach goals and performance attainment in survey research are valuable and useful for providing ecologically valid information. However, in order to enhance performance, we need to know what the *causal effects* are of *assigned* achievement goals on performance and other outcomes of interest. That is, only findings from experimental achievement goal research provide a solid basis for the development of effective achievement goal interventions in applied settings. Note that in an experimental setting or practical intervention, typically one particular achievement goal is assigned to the individual; this is assumed to be the individual's *dominant* achievement goal in that particular setting (Van Yperen, 2006).

A meta-analysis of experimental achievement goal research showed that the observed patterns in the rather small number of experimental studies are generally in line with the overall pattern found in correlational research. That is, relative to avoidance goals, approach goals enhance performance attainment (Van Yperen, Blaga, & Postmes, 2015). Self-regulation processes related to the positive, appetitive possibility of competence, including mental focus and feedback seeking, may explain the positive effect of approach goals, and self-based and task-based goals in particular, on performance (*e.g.,* Anseel, Beatty, Shen, Lievens, & Sackett, 2015; Janssen & Van Yperen, 2004; Lee, Sheldon, & Turban, 2003). For example, in a meta-analysis of the antecedents and outcomes of feedback-seeking behavior, Anseel

et al. (2015) showed that approach goals were positively associated with overall feedback seeking. These results suggest that approach-oriented individuals tend to view feedback seeking as a viable strategy for reaching their goal, either to improve on the task or to do better than others. However, individuals endorsing self-based or task-based goals may be particularly interested in information that helps them to improve, whereas individuals with other-based goals may find social comparison information most valuable (Janssen & Prins, 2007).

In contrast, avoidance forms of regulation tend to evoke negative outcomes, including lower levels of self-efficacy and performance (Payne et al., 2007), through increased levels of worry and intruding negative thoughts (*e.g.,* Elliot & McGregor, 1999; Lee et al., 2003). For example, in two prospective studies, Pekrun, Elliot, and Maier (2006) showed that in contrast to approach goals, *other*-based avoidance goals were positive predictors of anxiety. In a longitudinal study, Lee et al. (2003) found a negative link between other-based avoidance goals and mental focus, which in turn was positively related to performance. These findings suggest that other-based avoidance goals may have undermined individuals' mental focus on the task and, accordingly, their performance on the task, due to worries or intruding thoughts about potential failure or other cognitive interferences.

Across studies in the sport domain, however, Van Yperen et al. (2014) did not observe a negative link between *other*-based avoidance goals and performance. Given that competition and social comparison are defining features of sport, an outcome-oriented sport climate may better fit with athletes' other-based goals. That is, athletes with other-based avoidance goals may not necessarily ''feel bad'' in a sport context, which may mitigate the decrease in task focus, effort, and persistence, and ultimately, performance deterioration which is more often observed in other achievement

domains. Furthermore, in sport contexts, an other-based avoidance goal may not have such a negative connotation because not performing worse than others, or not losing (*i.e.*, a draw), may be perceived as a great achievement or a desired outcome; for example, because the opponent is considered to be much stronger, or because not losing may be sufficient to qualify for the next round in a tournament or to become league champion.

Similarly, in achievement domains other than sport, *self*-based avoidance goals tend to have a negative impact on performance (Van Yperen et al., 2015). This may be particularly true in a multiple-trial context, i.e., a context that matches the intrapersonal evaluative focus of self-based avoidance goals (Van Yperen, Elliot, & Anseel, 2009). In such a context, an intrapersonal standard is highly diagnostic. That is, both the dimensions of comparison (the task itself, the conditions, etc.) and the comparison other (the self) are specific, clear, and unambiguous. Accordingly, doing worse than one did before on the same task under identical conditions can yield unequivocal negative feedback which makes it hard to distort the undesired outcome in a self-enhancing manner and to find appropriate excuses for one's poor performance. Therefore, negative, interfering thoughts during task performance may even be stronger when pursuing a self-based avoidance goal relative to an other-based avoidance goal. Indeed, Sideridis (2008) showed that relative to other-based avoidance goals (and approach goals), self-based avoidance goals were associated with enhanced negative affect and increases in cognitive and somatic anxiety, as indicated using both self-report and physiological measures (cf., Preenen, Van Vianen, & De Pater, 2014; Tanaka, Okuno, & Yamauchi, 2013).

In contrast, in sport contexts, athletes may be more likely to perceive a performance at their typical level (i.e., not performing worse than before) to be

sufficient for a win or to finish at a particular rank. Especially among older athletes (30+), self-avoidance goals may not have such a negative effect on sport performance and related variables since maintenance, loss-prevention, and self-based avoidance goals may be more prevalent in the final stage of one's sport career. In the work domain, there is some evidence that among employees in the final stage of their career (60+), self-based avoidance goals are positively associated with positively valenced variables, including well-being, task enjoyment, and work engagement (De Lange, Van Yperen, Van der Heijden, & Bal, 2010; Ebner, Freund, & Baltes, 2006; Senko & Freund, 2015). These findings are in line with the idea of regulatory fit: What works best for an individual depends on factors such as age, needs, and type of motivation (e.g., Unkelbach, Plessner, & Memmert, 2009).

Principle 5. Develop interventions that focus on self-based and task-based approach goals.

A general conclusion based on experimental achievement goal research is that relative to avoidance goals, approach goals enhance task performance (Van Yperen et al., 2015). For the sport domain, the good news is that field research suggests that the negative link between avoidance goals and sport performance tends to be absent (Van Yperen et al., 2014). In the extant achievement goal research, the typical practical recommendation is to focus on *self*-based and *task*-based approach goals. The pursuit of these goals is generally considered to be the ideal type of competence-based regulation (Pintrich, 2000). Individuals pursuing these goals have been found to be high in achievement motivation (Elliot & Church, 1997), intrinsic motivation (Rawsthorne & Elliot, 1999), task interest (Harackiewicz & Knogler, 2017), and agreeableness and conscientiousness (Day, Radosevich, & Chasteen, 2003; McCabe

et al., 2013). Furthermore, a focus on self-based and task-based goals tends to promote prosocial behavior, such as tolerance for opposing views (Darnon, Muller, Schrager, Pannuzzo, & Butera, 2006; Nederveen-Pieterse, Van Knippenberg, & Van Dierendonck, 2013) and sharing resources with others (Levy, Kaplan, & Patrick, 2004; Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007).

However, it is unrealistic to ignore other-based approach goals. Competition and social comparison are defining features of sport, so athletes will rely primarily on social comparisons in their performance self-evaluations. This tendency exists in other performance contexts as well, even among individuals with dominant self-based approach goals (Van Yperen & Leander, 2014). The problem is that thoughts about (largely uncontrollable) other-based outcomes (either win or lose) tend to undermine athletes' mental focus on the task at hand, and, accordingly, their performance on the task, due to worries and other cognitive interferences. Other potential costs associated with other-based goals are a loss of interest (Harackiewicz & Knogler, 2017), anxiety, worry, negative affect (Elliot & McGregor, 2001; Pintrich, 2000), dissatisfaction (Van Yperen & Janssen, 2002), and neuroticism (Hendricks & Payne, 2007; McCabe et al., 2013). Other-based goals also tend to elicit unethical behaviors such as thwarting behavior and less accurate information-giving (Poortvliet, Anseel, Janssen, Van Yperen, & Van de Vliert, 2012), and cheating (Van Yperen, Hamstra, & Van der Klauw, 2011), which should caution practitioners against their promotion (for reviews, see Ordóñez & Welsh, 2015; Van Yperen, 2017).

To optimize self-regulation, athletes should be aware of what actions, means, and subgoals facilitate and inhibit their other-based goal. This may be enhanced by (1) organizing athletes' goals into a hierarchical achievement goal system, (2) directing athletes' focus to the means rather than the outcomes, (3) emphasizing evaluation

more in terms of progress and effort, (4) defining success more in terms of improvement, and (5) creating and maintaining a strong developmental climate in which athletes are stimulated to develop their technical, tactical, physical, and mental skills (*cf.*, Ames, 1992). Directing athletes towards positively valenced self-based goals is likely to increase their perceived feasibility, whereas task-based goals may enhance their concentration and focus during task performance. To test the effectiveness of such goal-based interventions, repeated measures designs may be applied to athletes' self-based growth curves, i.e., patterns across time that are independent of others' performances. Remarkably, so far, this has rarely been done in achievement goal research (Da Motta Veiga & Turban, 2014; Yeo, Loft, Xiao, & Kiewitz, 2009).

Principle 6. Delineate athletes' idiosyncratic developmental trajectories to better understand the process of goal attainment and self-regulation.

Theoretical and practical progress in goal research can be made by examining, among other things, process-oriented explanations for goal attainment, and more generally, for developmental processes such as becoming an elite athlete. Goals and performances likely develop out of structures of dynamically interacting (personal and environmental) factors or components, in the form of direct and indirect loops of reinforcement or diminishment (Den Hartigh, Van Dijk, Steenbeek, & Van Geert, 2016). For example, the components of a competitive sport culture interact with athletes' goal-setting strategies and their ways of coping with the pressure to perform, losses, and disappointments (Den Hartigh, Van Yperen, & Van Geert, 2017). In such a dynamic network perspective, drops and rises in performance are not determined by a single component or event, but by their interactions with time and other components

in the athlete's network structure. Positive or negative events may trigger a boost or breakdown in the development of existing components and/or a reconfiguration of connections between components, and then be repeatedly refueled or redirected by the same or other network components (*cf.*, Cohen, Garcia, & Goyer, 2017). For example, Ranomi's unexpected loss discussed above may have resulted in even more focus, goal commitment, and motivation to succeed. A couple of months later, in December 2017, at the European Short Course Swimming Championships, she won four gold medals. In contrast, earlier in her career, she experienced a decline in performance because her coach left for another job in Australia. This latter event illustrates the occurrence of a negative developmental pattern due to the disappearance of a critical network component. To capture the dynamic and complex process of goal attainment, resilience, and athletes' development, different data sources may be used, including biographical data, (experimental) time-series data (e.g., by using wearables), and computer simulation data (Den Hartigh et al., 2016, 2017; Hill, Den Hartigh, Meijer, De Jonge, & Van Yperen, in press). For example, to better understand the dynamics of psychological momentum, Den Hartigh, Gernigon, Van Yperen, Marin, and Van Geert (2014) asked rowing pairs to compete against a virtual opponent on rowing ergometers, while a screen in front of the team broadcast the ongoing race. The race was manipulated so that the team's rowing avatar gradually progressed (positive momentum) or regressed (negative momentum) in relation to victory. The participants responded verbally to collective efficacy and task cohesion items appearing on the screen each minute. In addition, effort exertion and interpersonal coordination were continuously measured. This study revealed that relative to positive team momentum, negative momentum elicits stronger (opposite) psychological changes and accompanies different (less adaptive) behavioral regulation. In a follow-up study, Den

Hartigh, Van Geert, Van Yperen, Cox, and Gernigon (2016) demonstrated that rowers who had developed long-term positive psychological momentum after two successful races were less sensitive to a negative momentum scenario in the third race compared with athletes who had developed long-term negative momentum after two unsuccessful races. The asymmetry between positive and negative psychological team momentum dynamics, and the impact of both short- and long-term history of progress and regress, underlines the relevance of a dynamic system perspective.

Principle 7. Work on strengths and weaknesses simultaneously.

Another interesting goal-related issue is whether athletes' goals and effort should be directed toward enhancing their strengths or improving their weaknesses? How are these assessed in the first place? To start with the latter question, individuals' self-evaluations are typically based on social comparison information (*e.g.,* Van Yperen & Leander, 2014). However, when explicitly asked to indicate their relative weaknesses and strengths, individuals tend to use dimensional within-person comparisons as well (Möller & Marsh, 2013). For example, a soccer player may consider herself a better passer than header; that is, she considers passing a relative strength, and heading a relative weakness. As demonstrated in a meta-analytic investigation of within-person self-efficacy, self-efficacy is primarily a product of past performance (Sitzman & Yeo, 2013). Therefore, relative to heading, the soccer player's self-efficacy with regard to passing is likely to be higher, which may positively affect subsequent performance. Indeed, a meta-analysis on the link between self-efficacy and performance in sport revealed an average correlation of .38 (Moritz, Feltz, Fahrbach, & Mack, 2000). Furthermore, research has shown that indices of self-efficacy are positively related to personal goal levels (Kane, Marks, Zaccaro, & Blair,

1996), and to intrinsic motivation and willingness to exert effort (e.g., Bandura & Locke, 2003; Latham & Pinder, 2005; Hiemstra & Van Yperen, 2015), all of which may explain better subsequent performance. Thus, in an autonomous environment without constraints and extrinsic reinforcers such as money, credits, fame, and recognition, individuals may be most likely to work on their strengths because this reinforces their self-confidence.

In contrast, a focus on one's weaknesses may hamper one's self-confidence, but may be deemed necessary to increase one's general effectiveness. For example, a tennis player with a technically vulnerable backhand is likely to be constantly bombarded on his backhand side by his opponents. He should improve his backhand technique to no longer feel shackled on his backhand wing, particularly under pressure. Research has shown that testing conditions (such as exams and competitions) may motivate individuals to invest more effort to meet the external standards, but they mostly enjoy working on their strengths (Hiemstra, Van Yperen, & Timmermans, 2018). To serve their distal, long-term other-based goals (*e.g.*, winning tournaments, becoming a champion), athletes' proximal process goals should be directed toward improving their relative weaknesses (*e.g.*, their backhand), but this may be more enjoyable when combined with drills and exercises that rely on their relative strengths. Such an approach serves both athletes' self-improvement and self-enhancement needs (Wood, 1989). A helpful tool in this regard may be performance profiling, a procedure that encourages athletes to identify, and reflect on, the qualities needed to be successful in their sport. Athletes are typically requested to indicate on a dartboard-like diagram *"Where I am now?"* and *"Where I would like to be?"* in those attributes, and next, to engage in deliberate practice to fill the gap (Butler & Hardy, 1992; Weston, Greenlees, & Thelwell, 2013). Although research has highlighted the

range of beneficial impacts of profiling, rigorous, empirical research on its efficacy is still lacking (Weston et al., 2013).

Principle 8. Distinguish between high-pressure situations and athletes' psychological reactions to pressure.

When engaging in a zero sum game (i.e., the outcome is either win or lose), athletes have the prospect of unequivocal normative evaluation. Particularly when the stakes are high, goal-committed athletes are likely to perceive performing in front of an audience as a high-pressure situation. Athletes cannot change this situation, but they can control and change their reaction to it. In other words, it is important to distinguish between a high-pressure situation and athletes' psychological reactions to pressure (Lazarus, 1991; Lazarus & Folkman, 1984), which have clear physiological underpinnings (Blascovich, 2008; Dienstbier, 1989).

High-pressure situations activate the Sympathetic-Adrenal-Medullary (SAM) system, eliciting arousal (e.g., increased heart rate, dilated blood vessels, and higher levels of glucose) as an undifferentiated somatic state which mobilizes resources for vigorous action (i.e., "fight-or-flight" response; Blascovich, 2008; Jamieson, 2017; Whelan, Epkins, & Meyers, 1990). Performers' ("secundary") appraisal of their increased arousal level will be determined, among other things, by their perceived abilities to cope effectively with the pressure situation (Lazarus & Folkman, 1984). When they feel they have the requisite physical, technical, tactical, and mental resources, they are likely to interpret their increased arousal level as a functional coping resource that aids rather than harms performance (Jamieson, 2017). Hence, they tend to perceive arousal as anticipatory excitement which has been demonstrated

to enhance subsequence performance (Jamieson 2017; Moore, Vine, Wilson, & Freeman, 2015; Thomas, Mellalieu, & Hanton, 2009).

In contrast, performers who feel that they lack the skills to deal effectively with the high-pressure situation tend to perceive their increased levels of arousal as a hindrance rather than a help, and accordingly, are more likely to experience pressure, threat, and concomitant performance anxiety. Such an appraisal activates, in addition to the SAM system, the Hypothalamic-Pituitary-Adrenal-cortical (HPA) system, resulting in the release of cortisol (Blascovich, 2008; Dienstbier, 1989). Furthermore, perceived threat increases vascular resistance, which limits blood flow to the periphery and produces high Total Periphal Resistance (TPR) scores. In contrast, low TPR scores reflect delivery of oxygenated blood to the brain and periphery, and are associated with perceived challenge (Jamieson, 2017; Seery, 2011).

The other related, yet distinct, component of performance anxiety has been referred to as anxious apprehension, worry, or cognitive concern about one's performance level and its implications for the self (Liebert & Morris, 1967; Nitschke, Heller, Imig, McDonald, & Miller, 2001). Performers high in anxious apprehension have difficulties in keeping their performance efforts channeled toward task execution. Self-focus theories postulate that anxiety increases performers' self-consciousness, which hampers performance through their attempts to consciously monitor or control their previously automatic skills (Beilock, Schaeffer, & Rozek, 2017). Also distraction theories such as Attention Control Theory (ACT) state that anxious apprehension undermines performance through attentional control (Derakshan & Eysenck, 2009; Eysenck, Derakshan, Santos, & Calvo, 2007). Especially threat-related, interfering thoughts (e.g., thoughts about failure, negative evaluation, or losing) are assumed to reduce the cognitive resources available for

processing and performing the task (Deffenbacher, 1980; Sarason et al., 1986). For example, Jordet and Hartman (2008) demonstrated that relative to an approach situation, in which a team win could be ensured immediately, in an avoidance situation, in which missing a penalty kick instantly produced a team loss, soccer players tended to respond more anxiously (e.g., by taking less time for their preparation).

Apparently, the outcome of a penalty shootout is a function of the immediate importance of the outcome, but the behavior of the goalkeeper may also have an effect. As demonstrated by Wood and Wilson (2010), under high-threat conditions, penalty takers found it more difficult to focus on their target (just inside the goal post) when the goalkeeper was arm-waving rather than stationary. *Choking under pressure* occurs when, in a high-stakes situation, the negative cognitive appraisal of arousal due to a lack of perceived control and self-presentational concerns leads to a dramatic and acute (rather than gradual) performance impairment: that is, a lower level of performance than one is capable of (Beilock et al., 2017; Hill, Hanton, Matthews, & Fleming, 2010).

Principle 9. Accept fluctuating internal states and focus on goal-relevant cues and contingencies.

As discussed in the previous section, performers may interpret increasing levels of arousal differently, which is likely a function of individual differences, time, and context. This also suggests that individuals can be educated and trained to restructure and reappraise increasing levels of arousal as an opportunity for growth, mastery, or gain, which likely leads to better performance (Lazarus & Folkman, 1984; Jamieson, 2017; Moore et al., 2015; Thomas et al., 2009). Whereas arousal reappraisal training

is aimed at changing athletes' responses to increasing levels of arousal (Brooks, 2014; Crum, Salovey, & Achor, 2013), more traditional *Psychological Skills Training* (PST), including techniques such as imagery/mental rehearsal and self-talk, is typically targeted at controlling (e.g., eliminating or dampening) emotions, cognitions, and bodily states, which is assumed to create a psychological state for optimal performance (e.g., Hardy, Jones, & Gould, 1996). The ability to effectively regulate one's arousal level by using, for example, specific breathing and relaxation techniques may be helpful because beyond a particular point even positively framed arousal levels may impair performance (e.g., Hanin, 2000; Hardy, Beattie, & Woodman, 2007; Yerkes & Dodson, 1908). Brown and Fletcher (2017) recently meta-analysized randomized controlled trials on psychological, social, and psychosocial interventions with sport performers focusing on variables relating to their athletic performance. Their conclusion was that these interventions have a moderate positive effect on sport performance, and this effect may last at least a month following the end of the intervention.

In contrast to PST, other types of psychological interventions are based on the assumption that changing, controlling, or reducing internal processes such as emotions (e.g., anxiety, uncertainty, fear of failure) and thoughts (e.g., thoughts about losing and quitting) is not the optimal strategy. For example, Mindfulness-Acceptance-Commitment (MAC; Gardner & Moore, 2012) focuses primarily on athletes' ability to contact the present moment fully. Rather than reappraising, controlling, or self-regulating their internal processes (*e.g.,* in high-pressure situations), athletes should engage in a nonjudging (*i.e.*, not good, not bad, not right, not wrong) moment-to-moment awareness and acceptance of their internal states. In other words, MAC reinforces the idea that the natural ebb and flow of positive and

negative thoughts, emotions, and bodily sensations should be experienced without judgment or avoidance. Deliberate attempts to self-control or suppress such internal experiences, so-called *experiential avoidance* (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), are assumed to result in negative outcomes. For example, Wegner's (1994) ironic process theory proposes that efforts at self-regulation of thoughts lead to a rebound effect. Particularly under conditions of pressure, anxiety, fatigue, and mental load, attempts to block out unwanted thoughts (*e.g., "Do not double-fault", "Do not overshoot the hole"*) paradoxically make them more likely to surface. Their prominence in our consciousness may subsequently produce counter-intentional outcomes. Presumably, this is due to an unconscious meta-cognitive scanning process that is automatically activated to monitor the effectiveness of the cognitive activity aimed at suppressing the unwanted emotions and thoughts, which are brought to awareness when detected (Moran & Toner, 2017). This cognitive activity interferes with consistent and effortful personal-values-driven commitment to behavioral actions and choices that support the person's athletic endeavors (Gardner & Moore, 2012). MAC training is geared toward athletes who want to learn to experience their internal states without judgment or avoidance, and to defuse or disconnect these states from their behavioral choices and actions. This behavioral flexibility is enhanced by teaching athletes how to align their behavior with their personal values and proximal and distal goals. They learn to accept fluctuating competitive demands and internal experiences and to (re)focus their attention to performance-relevant cues and contingencies that support their athletic endeavors (Gardner & Moore, 2012). After clinching his third grand slam title, the Swiss tennis player Stan Wawrinka (2016) unusually disclosed the following at the U.S. Open 2016 press conference: *"Today, before the final, I was really nervous like never before. I was shaking in the locker.*

When we start five minutes before the match talking, last few things with Magnus, I start to cry. I was completely shaking. But the only thing I was convinced with myself that my game was there. Physically I was there. My game was there. Put the fight on the court and you will have a chance to win." The MAC approach, which emphasizes that so-called negative psychological processes do not necessarily hinder athletes' performance and well-being, has received promising empirical support across a variety of sports (e.g., Bernier, Thienot, Codron, & Fournier, 2009; Bühlmayer, Birrer, Röthlin, Faude, & Donath, 2017; Gardner & Moore, 2012; Sappington & Longshore, 2015). A specific technique aimed at directly optimizing the performance process (rather than affecting the performer's internal state), is called *Quiet Eye;* this is discussed next.

Principle 10. Control the controllables.

Attentional mechanisms are critical in understanding the relationship between performance anxiety and performance attainment (Wilson, 2012). Self-generated concerns arising from one's own thoughts and feelings, but also external distractors such as weather conditions, the click of a camera, or actions by opponents or parents, tend to impair attentional control, and accordingly, to negatively affect performance attainment. As discussed in the previous section, attempts to suppress such internal and external distractors, paradoxically make them more likely to emerge. A more effective strategy is to *control the controllables*, that is, to focus on the task at hand and controllable actions.

An illustrative technique that directs performers' attention to the controllables is *Quiet Eye (QE)*, which has been defined as the final fixation or tracking gaze that is located on a specific target or object prior to the onset of a critical movement

(Vickers, 2007). Research has shown that experts have longer QE durations than nonexperts, and successful attempts have longer QE durations than unsuccessful attempts (Lebeau et al., 2016). Longer QE durations are associated with, for example, goaltender success in deflected ice hockey shots (Panchuk, Vickers, & Hopkins, 2017), golfers' improved putting performance on the course (Vine, Moore, & Wilson, 2011), and more perceived control and superior performance in a penalty shootout (Noël & Van der Kamp, 2012; Wood & Wilson, 2012). The extant QE literature suggests that actively maintaining effective gaze behavior (QE) alleviates the negative effects of anxiety on visual attentional control and subsequent performance (Vine et al., 2011; Wilson, 2012). Furthermore, timely information about targets from the gaze system (*i.e.*, long QE duration) is proposed to increase the motor preparation period that involves the fine-tuning and accuracy of movement parameters responsible for motor programming. QE also provides the external focus of attention on process-related or task-relevant cues which is believed to promote automatic behavior in skilled performers, and accordingly, helps in coping with distractors, including feelings of anxiety, negative thoughts, or the mechanics of skill execution (*cf.*, Wulf, 2013). Finally, similar to a pre-performance routine, QE helps the performer to create a more relaxed pre-performance state, which becomes more and more profound with deliberate practice. Deliberate practice refers to engagement in practice activities assigned by a coach with a clear, specific goal of improvement and where the practice activities provide immediate feedback and opportunities for repetition to attain gradual improvement (Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson, 2014). In general, engaging in deliberate practice to improve relevant technical, tactical, physical, and mental skills can be considered the key to success, also because

adaptive, challenge-type responses to arousal are a function of athletes' perceived skills in dealing effectively with pressure situations.

Concluding Remarks

The main conclusion is that the last principle, control the controllables, can be considered an overarching principle of effective self-regulation. Athletes actually increase their control over actions, means, and subgoals when they (1) organize their goals into a hierarchical achievement goal system; (2) focus on self-based and task-based approach goals rather than other-based approach goals or avoidance goals; (3) work on both their strengths and weakness by engaging in deliberate practice; (4) accept fluctuating internal states; and (5) focus on goal-relevant cues and contingencies, particularly in high-pressure situations. Enhancing and developing personal control over goal attainment, but also accepting the uncontrollables, are indispensable mental skills to ultimately achieve the outcome that is happily welcomed by any sport performer: *Coming out victorious*.

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