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Emotion Regulation

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How do athletes feel when they perform at their best? How can they reach and maintain optimal feeling states? How do athletes feel when they perform poorly? How can they stay away or regulate their dysfunctional feelings? How can they optimize their performance? These are critical questions for athletes, coaches, and practitioners that have also attracted the attention of researchers. Indeed, athletes' ability to regulate their emotional states is crucial for a successful performance. For decades, researchers have examined the relationships between emotions and performance (Hanin, 2000; Jones, Lane, Bray, Uphill, & Catlin, 2005; Lane et al., 2016; Ruiz, Raglin, & Hanin, 2017; Turner & Jones, 2018). Anxiety, as the most common emotion that athletes experience prior to competition, was the focus of initial research, which aimed at understanding how such emotion could influence performance (Hanton, Mellalieu, & Williams, 2015; Marchant, Maher, & Wang, 2014; Turner & Jones, 2018). Beyond anxiety, however, athletes experience an array of emotions, which can be functional or dysfunctional for their performance. There is, therefore, a need of a more holistic approach to the study of a variety of unpleasant and pleasant emotions and other non-emotion components of athletes' experiences, which form the so-called psychobiosocial states. Because of the acknowledged impact of emotions on performance, emotion regulation strategies have attracted research attention in recent years (Friesen et al., 2013; Lane, Beedie, Jones, Uphill, & Devonport, 2012). Although emotion-centred strategies are useful to improve performance, a combination of strategies focused on emotional states as well as in action or task-execution patterns are deemed as most effective (Bortoli, Bertollo, Hanin, & Robazza, 2012; Robazza, Bertollo, Filho, Hanin, & Bortoli, 2016).

In the following section we include a brief review of the emotion-performance relationship literature. We then describe psychobiosocial states and their defining characteristics as conceptualized within the individual zones of optimal functioning (IZOF;

Hanin, 2007) model as applied to emotion regulation. Finally, we introduce the multi-action plan (MAP; Bortoli et al., 2012) model, which has been developed for emotion and action regulation in the optimization of athletes' performance. Some directions for future research are also proposed.

The Emotion-Performance Relationship

Conceptual ambiguity has characterized the emotion literature. Constructs such as affect, emotion, and mood have been used interchangeably, although theorists acknowledge that they are different (Beedie, Terry, & Lane, 2005; Ekkekakis, 2012; Keltner, Oatley, & Jenkins, 2014). Affect, defined as the subjective sense of positivity or negativity arising from an experience (Carver, 2003), is viewed as the superordinate category of individuals' experiences, which includes emotion and mood. Affect has been categorized using global dimensions such as valence (pleasant vs. unpleasant), and activation (high vs. low; Russell, 2003). Emotions, on the other hand, can be considered as discrete categories (e.g., anger, anxiety, happiness) with different antecedents and consequences. For instance, Lazarus (2000) stated that appraisals of the person-environment interaction result in specific core relational themes or meanings, which facilitate adaptation. Eight negatively-toned emotions (e.g., anxiety, shame, guilt) and seven positively-toned emotions (e.g., pride, hope) with specific core relational themes are distinguished, although, there is no consensus regarding the total number of emotions (Scarantino, 2015). For instance, Ekman, Friesen, and Ellsworth (1972) postulated 6-7 emotions (i.e., happiness, surprise, fear, sadness, anger, and disgust combined with contempt) whereas Lazarus distinguished 15 emotions (i.e., anger, anxiety, fright, guilt, shame, sadness, envy, jealousy, happiness, pride, relief, hope, love, gratitude, and compassion). Emotion and mood have been differentiated based on the cause, duration, intensity, and action tendencies that are associated with both phenomena (Beedie et al., 2005; Shuman & Scherer, 2015). Emotions are considered to be relatively brief and intense, related to a specific object (e.g., an athlete may be angry at a referee), and underlying specific tendencies for action (e.g., tendency to correct the wrongdoing), whereas moods are less intense, last longer in time, do not have an identifiable cause, and are associated with broader approach-avoidance tendencies.

An extensive body of research has focused on understanding the influence of emotional phenomena on athletic performance, with several theoretical frameworks offering accounts of this relationship (for a summary of selected approaches, see Table 1). Some of these theoretical approaches have been developed within sport settings, while other models have been adapted or borrowed from mainstream psychology. Early approaches focused on a unidimensional construct (i.e., arousal) or the detrimental effects on performance of anxiety as a single, though most commonly experienced, emotion. However, as Hackfort and Schwenkmezger (1993) pointed out, anxiety can be better differentiated into worry and emotionality components. Worry is conceived as a cognitive process that involves, for example, doubts about one’s own performance in comparison with others and preoccupation on the consequences of failure for oneself and the others, while emotionality consists of affective-physiological symptoms determined by increased arousal, such as increased heart rate, stomach butterflies, and sweaty hands. Some of the mechanisms by which anxiety influences performance have been explained using different theoretical perspectives, such as conscious processing (Masters & Maxwell, 2008), attentional control (Eysenck & Wilson, 2016; Payne, Wilson, & Vine, 2018; Vine, Moore, & Wilson, 2016), and ironic processes of mental control, namely the tendency to commit errors one is trying to avoid (Wegner, 2009). One theoretical assumption is that anxiety impairs performance by exerting changes in attention and visuomotor control. For example, Eysenck and Wilson (2016) postulated that anxiety influences cognitive processing by producing an attentional bias that makes individuals focus their attention disproportionally to threat-related stimuli. Other explanations consider the negative impact of anxiety on thought processing by leading individuals to reinvest their attention focus on automated processes, thereby disrupting movement execution (Masters & Maxwell, 2008), or to commit counter-intentional errors (Wegner, 2009).

Athletes, however, not only experience anxiety. Many researchers have indicated that athletes experience a variety of pleasant and unpleasant emotions (Jones et al., 2005; Lane et al., 2016; McCarthy, 2011) that can enhance or impair performance (Robazza et al., 2018; Ruiz, Hanin, & Robazza, 2016). Some theoretical approaches have focused on the relationship between several moods, as measured on the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971), and performance, postulating that positive mood (i.e., vigour) facilitates performance, while negative mood (e.g., depression) impairs performance (Morgan, 1985). Lane and collaborators have extended this notion suggesting that high intensity of negative mood in combination with depressive mood may be harmful for performance, whereas the same mood in absence of depression may be beneficial (Lane & Terry, 2000; Lane, Terry, Devonport, Friesen, & Totterdell, 2017). This notion has been tested using the POMS and derivative instruments such as the Brunel Mood Scale (BRUMS; Terry, Lane, Lane, & Keohane, 1999; Terry, Lane, & Fogarty, 2003). The authors have extended the model to examine the effect of high vs. low activation of pleasant and unpleasant emotions with a large sample of participants assessed on the Sport Emotion Questionnaire (SEQ; Jones et al., 2005), which includes five emotional constructs (i.e., anger, anxiety, dejection, excitement, and happiness).

To fully understand the athletes' pleasant and unpleasant states associated with their performances, it is important to explore the idiosyncratic nature of these experiences (Hanin, 2000). The individual zones of optimal functioning (IZOF) model (Hanin, 2007, 2010) is a theoretical approach focused on individual states and specifically designed for the sport context. Drawing on the cognitive-motivational-relational theory (Lazarus, 2000), the IZOF model recognizes individual differences in the perception and interpretation of one's own experiences associated with sports performance.

Psychobiosocial States Related to Performance Defined

The concept of a psychobiosocial state (to be distinguished from biopsychosocial approaches; Appaneal & Perna, 2014; Blascovich, 2008; Blascovich & Tomaka, 1996) draws from the theoretical framework of the IZOF (Hanin, 2007, 2010), which underscores the subjective experience of emotion. Psychobiosocial states are conceptualized as the constellation of subjective experiences in which an individual's functioning is displayed. In contrast to previous research, which mainly focuses on emotional intensity, the structure of psychobiosocial states is described using the dimensions of form (display), content (type), and intensity (quantity).

Psychobiosocial states have a multimodal display including affective, cognitive, motivational, volitional, bodily, motor-behavioural, operational, and communicative state modalities (Hanin, 2010; Ruiz et al., 2016). A central component of psychobiosocial states is emotion or the subjective experience (feeling) conceptualized considering the interaction between valence (pleasant vs. unpleasant) and performance functionality (functional vs. dysfunctional). This interplay yields four types of states: pleasant-functional, unpleasant-functional, pleasant-dysfunctional, and unpleasant-dysfunctional. The functionality of psychobiosocial states is contingent on the individual interpretation of the own interaction with the environment, perceived resources, and ability to cope. For instance, pleasant-functional (e.g., feeling energetic before a competition) or unpleasant-functional (e.g., anxious) states can be helpful in mobilizing resources, while unpleasant-dysfunctional (e.g., sluggish) or pleasant-dysfunctional (e.g., complacent) states may reflect a lack of energy or inability to mobilize resources. Emotions are triggered and modulated by one's actions, but at the same time they also influence action regulation (Nitsch & Hackfort, 2016).

The performance functionality distinction is also applied to categorize the remaining modalities of psychobiosocial states. The cognitive aspect relates to the ability (on the functional side) or inability (dysfunctional) to attend to relevant stimuli and maintain the concentration according to task demands. The motivational state modality manifests pre-decisional processes related to choosing (or avoiding) a specific goal or course of action, while the volitional modality involves post-decisional processes related to the mobilization of (or lack of) resources or energy needed to complete the task. The biological component of psychobiosocial states includes a bodily modality, or the psychophysiological aspects of emotions related to activation (or deactivation), and a motor-behavioural modality that involves the perception of movement and motor coordination efficiency (or inefficiency). Finally, psychobiosocial states are also manifested in a social component, which involves operational aspects or the perception of the effectiveness (or ineffectiveness) of task execution and action, as well as a communicative modality that includes features related to the effective (or ineffective) facets of the interaction with the members directly or indirectly involved in the activity. All modalities of psychobiosocial states are interrelated. For instance, an athlete may feel angry with herself (emotion modality) after a poor performance in the previous rounds of a competition, as she thinks she has underperformed. Leading to the next round, she may feel alert (cognitive), motivated to do better (motivational), and determined to reach her goal (volitional). Additionally, she may feel energetic (bodily), powerful (motor-behavioural), and skilful (operational). She may also feel supported by her coach and teammates (communicative). An extensive body of work supports this conceptualization (for reviews, see Hanin, 2000; Ruiz et al., 2017).

Psychobiosocial states are an integral component of the performance process implying a bi-directional relationship. This idea concurs with the action-theory perspective (Nitsch & Hackfort, 2016). Particularly, psychobiosocial states influence performance, while ongoing performance influences psychobiosocial states. The first effect entails a ‘signal’ function to the individual regarding the own state and consequences, while the second effect involves a ‘regulatory’ function on the own states. The functionality of pleasant and unpleasant psychobiosocial states depends on their content and intensity, which result from one’s appraisals of the interaction with the environment, own resources, and capability to deal with situational demands (Robazza & Ruiz, in press). Athletes’ preperformance states provide information about the meaning of the situation, resources available, and options of self-regulation. Drawing on the cognitive-motivational-relational theory (Lazarus, 2000), the IZOF model assumes that before performance the athlete’s appraisals of the anticipated gains or losses trigger challenge or threat states, respectively. For instance, when a situation is appraised as an anticipated gain or challenge, the athlete’s states (e.g., feeling confident) can signal that there are enough resources, and the situation ahead can be handled effectively. Ongoing evaluations of performance provide information regarding the generation and optimal use of resources (e.g., effort, concentration) for the task at hand or for future accomplishments. In the IZOF model, performance is predicted based on the interaction of functional and dysfunctional states, which can have a beneficial and/or detrimental influence. A high probability of optimal performance is expected when the athlete experiences intense functional psychobiosocial states and low levels of dysfunctional states. This combination is predicted to promote high energy mobilization and optimal use of energies. Conversely, high probability of poor performance is expected when the athlete experiences high intensity of dysfunctional psychobiosocial states and low levels of functional states.

Assessment of Psychobiosocial States

The interaction between athletes’ functional and dysfunctional psychobiosocial states is the foundation in the prediction of performance and in the regulation of such states. The first step in the prediction and regulation of athletes’ experiences is based on an accurate assessment. The literature on the emotion measurement is dominated by the use of self-reports of subjective experiences, which typically neglect individual differences in the experience and interpretation of these experiences. An assessment procedure that allows for the examination of athletes' idiosyncratic experiences is the individualized profiling of psychobiosocial states (IPPS; Ruiz et al., 2016). Grounded in the IZOF model, IPPS extends individualized emotion profiling (IEP; Hanin, 2000) to assess all psychobiosocial states modalities (i.e., affective, cognitive, motivational, volitional, bodily, motor-behavioural, operational, and communicative) so far conceptualized as associated with sports performance. Regarding the psychobiosocial states affective modality, valence and performance functionality are considered descriptive features of the athletes' individual experiences associated with their performance. Thus, and in line with previous IZOF-based research, IPPS measures four types of emotions (i.e., pleasant-functional, unpleasant-functional, unpleasant-dysfunctional, and pleasant-dysfunctional states). Performance functionality is applied to the remaining state modalities. In total, IPPS contains 20 rows of items each formed of a list of synonym descriptors (3-4 per row). The affective modality includes six types of items measuring (functional and dysfunctional) pleasant, anxiety-related, and anger-related states. The other modalities are measured using two rows of items (one for functional and one for dysfunctional items).

Two standardized versions of the instrument exist for inter-individual comparisons. One measures athletes' state experiences, called the psychobiosocial states scale (PBS-S; Ruiz, Robazza, Tolvanen, & Hanin, 2018), and the other measures athletes' trait-like, more stable patterns of experiences (PBS-ST; Robazza, Bertollo, Ruiz, & Bortoli, 2016). These assessment procedures have been used to measure the content, intensity, and perceptions of the functional impact of athletes' states accompanying recalled most and least successful performances (Middleton, Ruiz, & Robazza, 2017; Mueller, Ruiz, & Chroni, 2018; Ruiz et al., 2016), as well as actual experiences in practice settings (Ruiz, Haapanen, Tolvanen, Robazza, & Duda, 2017) and in competition settings (Robazza et al., 2018). Currently, versions of the measure exist in English, Finnish, and Italian language. Additionally, a scale has been developed to assess psychobiosocial states in physical education (Bortoli, Vitali, Di Battista, Ruiz, & Robazza, 2018).

Regulation of Psychobiosocial States and Optimization of Performance

Being able to attain an optimal emotional state and maintain it is important to achieve and sustain consistent performance in training and competition. For instance, athletes may engage in self-regulation strategies aiming at dealing with adverse situations and the states associated with such situations. In this section, we conceptualize self-regulation and emotional regulation. We then describe a model aimed to optimize performance based on self-regulatory strategies targeting psychobiosocial states and action. Finally, we provide some guidelines for future research.

Self-regulation. Self-regulation consists of the individuals' efforts to manage internal states, involving thoughts, feelings, and actions, or the interpersonal processes planned and adapted to the achievement of personal goals (Baumeister, Vohs, & Tice, 2007; Zimmerman, 2006). It is through self-regulation that individuals may become active managers of their emotions and actions in emotion-inducing situations. The self-regulation of action is often referred to as self-regulation, while the self-regulation of emotion is referred to as emotion regulation (Koole, Van Dillen, & Sheppes, 2011). Self-control, often used interchangeably with self-regulation, is the conscious and effortful form of self-regulation, which involves the deliberate efforts aimed at inhibiting, overriding, and altering dominant responses with the purpose of achieving a goal (Baumeister et al., 2007). For example, an athlete that continues competing after feeling intense pain caused by a hard encounter with an opponent is engaged in self-control.

Research using the strength model of self-control indicates that self-regulation draws on a limited but renewable resource, referred to as self-control strength, which is depleted when an individual engages in prior voluntary acts of self-control (for a review, see Englert, 2016; Muraven & Baumeister, 2000). One explanation of this limitation is the reduction of glucose levels as the primary energy source of the brain (Ampel, Muraven, & McNay, 2018; Gailliot & Baumeister, 2007). Beedie and Lane (2012), however, have questioned this explanation, suggesting a resource-allocation model in which glucose is a mediator of motivational and behavioural processes involved in self-control. Different hypothetical relationships between glucose levels, appraisals of a task, and motivation have been proposed. For instance, an individual with enough glucose levels, who appraises a need to exert self-control will be sufficiently motivated to attempt self-control. In contrast, when a performer does not have enough glucose levels (perhaps due to prior self-control), but appraises the need to exert self-control, a motivational or emotional response (e.g., anxiety) can arise leading to the release of liver glucose and involvement of brain areas responsible for self-control. In extreme situations, when an intense emotional experience (e.g., rage) requires repeated self-control attempts, other processes (e.g., concentration) taking place to respond to the situation can compete with self-control for glucose and therefore result in depletion of resources and ineffective adaptation.

Emotion-regulation. Emotion regulation refers to the process by which an individual modifies the type of emotions experienced, their intensity, and duration (Peña-Sarrionandia, Mikolajczak, & Gross, 2015). Individuals may engage in emotion regulation for three purposes. Down-regulation processes aim at an exit of an emotional state or decreasing its intensity. In contrast, maintenance processes aim to keep emotional intensity stable over time. Up-regulation processes may increase the intensity of emotional experiences. Hackfort (1999) distinguished emotion regulation from emotion control and emotion modulation. According to this view, emotion regulation is based on feedback processes targeting a specific emotion or emotion component (e.g., physiological arousal) and resulting in a reduction or intensification of physiological arousal or activation. Emotion control, on the other hand, refers to a purposeful induction or reduction of a certain emotion through organized procedures (e.g., anxiety control strategies) having a monoemotional and quantitative (intensity) orientation. Finally, emotion modulation is contended to have a multiemotional (i.e., several emotions) and multicomponential (i.e., physiological, cognitive, and feeling) orientation.

Lazarus and Folkman (1984) defined coping as the “constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (p.141). Coping is concerned with exiting or decreasing unpleasant or stress-related experiences, and thus, is considered a form of emotion self-regulation (down-regulation). It has received a substantial amount of research attention (Devonport, 2011; Nicholls, 2010; Thatcher, Jones, & Lavallee, 2012). Lazarus and Folkman (1984) distinguished two forms of coping—problem-focused coping is directed at managing or changing the stress-eliciting situation, whereas emotion-focused coping, which is likely to occur when the individual appraises that the stress-causing situation cannot be changed, involves the reduction of the emotional distress associated with the situation. For example, not looking at the draws until finishing with the warm-up can be a form of problem-focused coping for an athlete, whereas trying to relax to reduce the anxiety after knowing the opponent is a form of emotion-focused coping. So, while coping is always an attempt to reduce unpleasant emotions, emotion regulation can be directed to increase or decrease pleasant and unpleasant emotions that are functional for performance.

Emotion regulation is assumed to serve hedonic or instrumental goals (Tamir, 2009). The former refers to the need to promote pleasure and prevent pain through the down-regulation of unpleasant emotions and up-regulation of pleasant emotions, while the latter refers to the regulation of emotional experiences with the purpose of achieving a goal. An athlete practicing deep breathing to decrease feelings of unpleasant anxiety and calm down prior to competition is engaged in hedonic emotion regulation. However, in the sporting context there are situations in which an athlete can deliberately seek to increase the intensity of unpleasant emotions (e.g., anger) to generate an additional source of energy needed to accomplish a task (e.g., score a point). This is an example of instrumental emotion regulation. Research indicates that individuals engage in emotion regulation to evoke and maintain specific emotions they believe helpful to achieve a goal (Hanin, 2010; Lane, Beedie, Devonport, & Stanley, 2011).

There are several emotion regulation strategies. The process model of emotion regulation (Gross, 2014), which draws on the work of Lazarus (2000) and Frijda (1986), organizes emotion regulation strategies according to when they take place in the emotion process. The model assumes that when individuals enter a particular situation and pay attention to certain aspects of such situation, their appraisal triggers specific emotional responses that involve physiological changes, subjective feelings, and specific tendencies to act. Two types of emotion regulation strategies are distinguished. Antecedent-focused strategies are employed before the emotion response is activated and are directed at changing the emotional input before the emotion is experienced. Response-focused strategies take place once the emotional response is generated and are intended to modify the emotional experience or expression once they have been elicited.

There are four types of antecedent-focused strategies, which include situation selection, situation modification, attention deployment, and cognitive change (Gross, 2014). Situation selection strategy involves deciding not to enter an emotion-eliciting situation. An example of such strategy would be an athlete who avoids performing the warm-up in front of an audience or direct rivals. However, individuals may not always have control over the situations they enter. In situation modification, the individual enters the situation, but takes steps to change certain aspects to decrease its negative emotional impact or to facilitate a desired emotional state. This strategy involves direct situation modification, which is similar to problem-focused coping (Lazarus & Folkman, 1984), support seeking or conflict resolution. Attentional deployment refers to individuals directing their attention towards (concentration) or away (distraction) from specific aspects of the situation. For instance, prior to shooting a penalty, a player may focus on his breathing and mentally recall a successful shot, thereby ignoring the sounds of a hostile crowd. Lastly, cognitive change involves a re-interpretation of the meaning that the individual has about the specific situation. A very common cognitive change strategy is cognitive reappraisal that involves modifying the thoughts about the emotion-eliciting situation or about the capacity to manage it, in a way that changes its emotional impact. For instance, an athlete feeling too anxious after learning that he will face the highest ranked opponent may interpret his anxiety as excitement. He can therefore consider the situation an opportunity to test his skill level and learn from the opponent, instead of thinking that he will lose and disappoint his coach and the team.

Response modulation strategies take place when an individual wants to change the experience, physiology, and/or expressive aspects of an emotion that is already elicited. In sport settings, the most common form of response modulation is arousal regulation using techniques such as imagery or relaxation (Turner & Jones, 2018). Expressive suppression is also a common strategy, which consists in inhibiting the outward expression of an emotional experience. For example, a tennis player may suppress the urge to throw his or her racket after making double fault. However, suppressing emotional expression is a resource demanding activity possibly leading to negative consequences. For instance, a study by Wagstaff (2014) indicated that participants who engaged in emotion suppression while watching a disgusteliciting video performed worse in a 10-km cycling time trial compared to participants who did not engage in emotion suppression.

A meta-analysis of 306 studies indicated cognitive reappraisal as the most effective strategy compared to response modulation or attentional deployment (Webb, Miles, & Sheeran, 2012). Within attentional deployment strategies, distraction was found a more effective way to regulate emotions than concentration. In addition, suppressing the emotional expression was shown to be more effective than suppressing the experience or the thoughts associated with the emotion-eliciting situation. This finding concurs with the notion of ironic processes of mental control positing that attempts to influence mental states (e.g., experience or thoughts) require monitoring processes that (ironically) act in the opposite direction of the intended control (Wegner, 2009). In summary, the review shows that the effectiveness of emotion regulation strategies is moderated by factors such as the type of emotion to be regulated or the frequency with which the strategy is employed. Short lasting emotions (e.g., anger compared to sadness) are easier to regulate, and strategies the more are practiced, the more effective they are. Despite substantial research evidence supports the process model in general psychology, research examining the effects of interventions informed by this model in sport is still scarce (McCormick, Meijen, Anstiss, & Jones, 2018).

The emotion regulation literature also distinguishes other two types of emotion regulation. Intrinsic or intrapersonal emotion regulation is directed at the modification of one’s own emotions. The study of emotion regulation strategies that athletes engage in to enhance their performance has received most research attention (Lane et al., 2016; McCormick et al., 2018). In the sport setting, however, coaches, teammates, and other people influence the emotional states and performance of athletes. Emotion regulation of others’ emotions, referred to as extrinsic or interpersonal emotion regulation (Rimé, 2007), is gaining research attention (Campos, Walle, Dahl, & Main, 2011; Friesen et al., 2013). For instance, a study by Friesen et al. (2018) indicated that the congruency of coach and athlete perceptions between their desired emotions (emotions they wanted to feel prior to performance) and emotions actually experienced were associated with better perceived performance. Research also shows that athletes engage in emotion regulation strategies to influence their own emotions and those of their teammates (Tamminen & Crocker, 2013).

Following the assumptions of the IZOF model (Hanin, 2000, 2007, 2010), the first step in reaching an optimal state is being aware of the content and intensity of one's emotional experiences and their influence on performance. Athletes and relevant people involved (e.g., coaches) should be aware of functional and dysfunctional experiences, and the impact of these experiences on their performance. Awareness can be increased by developing profiles of individual functional and dysfunctional psychobiosocial states and patterns (Hanin, 2007), using the assessment procedures previously discussed. Competitive sport provides repeated opportunities for athletes and coaches to reflect on psychobiosocial states and their relationship with performance. The role of coaches in interpersonal regulation has received scarce research attention. In an attempt to fill this gap in the literature, Mueller, Ruiz, and Chroni (2018) examined the perception of coaches about functional and dysfunctional psychobiosocial states of their players, and how they used such information in interpersonal emotion regulation. Results indicated that coaches managed the expression or suppression of their own emotional states to regulate those of the players. For instance, coaches used emotion expression to amplify the pleasant states of players and to reassure them, and emotion suppression to diminish the intensity or avoid their player's frustration and disappointment. In addition, the players were aware of the coaches' strategies, which they perceived as helping them and their performance. Coaches' ability to perceive their players' feeling states and an effective use of emotion regulation strategies can also serve to enhance the coach-athlete relationship (Davis & Davis, 2016).

A key concept for emotion regulation is meta-experience. In the IZOF model, the concept of meta-experience goes beyond categorizing oneself in a particular state, such as afraid, angry, or happy. Meta-experiences refer to the individual's knowledge, attitudes, and preferences towards one's own specific experiences (Hanin, 2000). Meta-experiences are typically developed from a constant evaluation of past performances and the functional impact of subjective experiences, and play an important role in self-regulation. For example, an athlete who is aware that in most previous successful performances she has felt anxious, may develop a positive attitude towards pre-competitive anxiety, and thus may not engage in its down-regulation. Coaches can play an important role in helping athletes develop realistic meta-experiences. Coaches, however, need to know their athletes, how they are feeling and reacting, and how these feelings influence their performance. Sport psychology practitioners can also be very instrumental in this process.

Regulation also involves the acceptance of the emotional experiences and their functional or dysfunctional impact. Acceptance is considered a key component of mindfulness, resulting in a reduction of avoidance tendencies (Moore, 2016). A mindful and acceptance attitude is expected to be more effective in improving the own relationship with internal experiences (i.e., cognitions, emotions, and physiological reactions) in comparison with attempts to modify them (Gardner, 2016). Athletes who have accepted their experiences and the impact that these have on their performance are a step closer to change or to engage in some sort of regulation strategy. The opposite, athletes resisting their feelings or associated thoughts, may reflect lack of motivation for change or even lead to ironic processes (Wegner, 2009) and expenditure or depletion of resources.

The final step involves the implementation of emotion regulation strategies. Individualized emotion regulation strategies may target the content, intensity, frequency, and duration of psychobiosocial states. Interventions aiming to regulate a range of psychobiosocial state modalities are expected to be more effective than intervention programs including only one modality. For example, Robazza, Pellizzari, and Hanin (2004) developed an individualized psychological skills training program that targeted the content and intensity of precompetition emotional and bodily state modalities in roller-skating hockey players and gymnasts. Such intervention included, and developed when needed, successful strategies that already existed in the athletes' repertoire. More recently, self-regulation strategies of the whole range of psychobiosocial states were effectively implemented in swimmers' preperformance routines together with the use of music (Middleton et al., 2017).

A more comprehensive approach, however, involves the regulation of psychobiosocial states (including emotion and non-emotion modalities) as well as performance or action patterns. Thus, a combination of regulation strategies targeting emotion and action patterns is expected to be more effective in improving performance consistency (Bortoli et al., 2012; Hanin & Hanina, 2009; Hanin, Hanina, Šašek, & Kobilšek, 2016).

Optimization of Performance: The Multi-Action Plan (MAP) model . The multi-action plan (MAP; Bortoli et al., 2012; Robazza et al., 2016) theoretical framework was developed as an action-oriented intervention that extends the IZOF model and its focus on subjective emotional experiences. The MAP model uses a 2 × 2 interaction of action control (high vs. low) and emotional valence (pleasant vs. unpleasant) to categorize four types of performance. A so called Type 1 optimal–automatic performance state is characterized by functional pleasant states experienced prior to or during task execution. These functional pleasant states result from athletes' appraisals of an anticipated gain (challenge). Feeling confident, in control, energized, and having enough resources to accomplish the task are typical of Type 1 performance, which is alike to an ideal state (Unesthål, 1986) or flow experience (Jackson & Csikszentmihalyi, 1999). Athletes have an appropriate focus of attention, task execution seems automatic and it requires minimal conscious control.

According to the MAP model, optimal performance can also occur under controlled attention to consciously monitor (supervise) the correct movement execution and prevent a dysfunctional step-by-step control of the action (van Ginneken, Poolton, Masters, Capio, Kal, & van der Kamp, 2017). A Type 2 optimal–controlled performance state may involve the experience of functional unpleasant states, and can occur under novel or stressful situations. Athletes' functional unpleasant or "emergency" states (e.g., anxiety, anger) are associated with high action tendencies, and signal a need to use compensatory resources to execute the task, including a higher focus of conscious monitoring. In such cases, reinvesting attention to skill components is likely (Masters & Maxwell, 2008). Reinvestment, however, can facilitate movement execution as along as the athlete is able to focus on one or a few core components of the action. This type of reinvestment is expected to facilitate voluntary action monitoring, keep the flow of the movement, and prevent disruption of automated processes. This action-centred self-regulation requires a previous identification of core movement components, namely, those parts of the action that are not completely automated and are therefore subjected to variations, particularly when performing under pressure. Athletes can also move from Type 2 (controlled) performance to Type 1 (automatic) performance with the help of emotion regulation strategies (Robazza et al., 2016).

The MAP model also considers two types of suboptimal performance. A Type 3 suboptimal over-controlled performance state usually involves athletes' experiencing dysfunctional unpleasant states. Athletes' appraisals of occurred harm result in a tendency to suppress undesired thoughts and unpleasant emotions (e.g., dejection), and an excessive attention focus on task execution ("trying too hard") or a focus on irrelevant cues. This state leads to an over controlled task execution and movement disruption. Both emotion- and action-centred regulation strategies can help the performer regain and optimal performance state. A Type 4 suboptimal under-controlled performance state may involve the experience of dysfunctional pleasant states resulting from athletes' appraisals of benefit before the task is finished. These appraisals result in feeling too good (e.g., complacency) too early, which lead to a lack of task-involvement or minimal conscious focus of attention and inability to recruit necessary resources to accomplish the task. Again, both emotion- and action-centred regulation with a focus on core action components can be helpful (Bortoli et al., 2012; Robazza et al., 2016). Thus, emotion- and action-centred self-regulation strategies, used separately or in combination, are recommended for optimal performance. To deal with dysfunctional states (unpleasant and pleasant), athletes should be aware of and accept their states and the situation, focus on the present moment, and engage in emotion- and/or action-centred strategies (Bortoli et al., 2012; Middleton et al., 2017; Robazza et al., 2016; for a review, see Robazza & Ruiz, 2018).

Conclusions

This chapter outlines the importance of considering individual differences in the assessment and regulation of athletes' subjective emotional experiences. Athletes' awareness and acceptance of the own functional and dysfunctional psychobiosocial states, which comprise emotion and non-emotion components, are crucial for the regulation of such states behaviour, and performance. The use of self-report instruments sensitive to the individual nature of experiences can serve as catalyst for discussion with athletes and enhance their self-awareness. Several emotion regulation strategies exist, and have been categorized based on when they take place in the emotion process. Individualized intervention programs including strategies aimed at the regulation of several components of athletes' psychobiosocial states are suggested rather than targeting a single modality. Together with emotion-centred strategies, action-centred strategies are also recommended, thus taking a more comprehensive approach for performance optimization.

Future Research Directions

Future research and applications should address three main themes. The first main direction involves the use of technology in the assessment of athletes' states including, for example, video recordings of specific situations to access athletes' emotion related information in real performance settings (Friesen et al., 2018; Hackfort & Schlattmann, 1991; Martinent, Ledos, Ferrand, Campo, & Nicolas, 2015). For instance, Martinent et al. (2015) used continuous video recordings of table tennis players' actions and contextual information as stimulus to help players identify emotions experienced during competition. Similarly, Friesen et al. (2018) used video recordings of karate matches to assist athletes and their coach identify the emotions the athletes had experienced and those they desired they had experienced. This methodology has proven to be an effective tool to examine intra-personal and interpersonal emotion regulation strategies. Thus, further research utilizing technology to assess athletes' emotional experiences and self-regulation strategies is warranted.

Athletes experiences involve several modalities, thus, the second main research direction includes the combination of physiological, psychological, and behavioural measures. In a recent study, Robazza et al. (2018) examined psychobiosocial states, cognitive functions, endocrine responses (i.e., cortisol and chromogranin A), and performance in a team of orienteers. An interesting approach includes the assessment of brain activity and neural efficiency during performance in actual settings (Bertollo et al., 2016). Given that athletes' feeling states associated with performance are multimodal, it seems sensible to include psychophysiological and behavioural data.

Finally, integrating several types of data also calls for the combination of theoretical frameworks. As in the Robazza et al. (2018) study, which incorporated the IZOF (Hanin, 2007) and biopsychosocial (Blascovich, 2008; Blascovich & Tomaka, 1996) models, it is our contention that an integration of different perspectives can improve our understanding of athletes’ experiences and better inform research and applied interventions aimed at self-regulation of emotional, cognitive, and behavioural processes.

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Table 1. Selected theories on the relationship between emotion-related constructs and athletic performance.

Focus	Theory/Model/Hypothesis	Setting	Proposal	Assessment Methods
Arousal	Drive theory (Hull, 1943; Spence & Spence, 1966)	Mainstream	Positive linear relationship between arousal and performance for well-learned tasks	Not tested
	Inverted-U hypothesis (based on Yerkes & Dodson’s Law, 1908)	Mainstream	Peak performance at a moderate level of arousal	Not tested
	Reversal theory (Hudson, Males, & Kerr, 2016; Kerr, 1985)	Mainstream	Individuals in telic state prefer to experience low arousal, while individuals in paratelic state prefer high arousal. Optimal performance when motivational dominance, physiology, and sport type are aligned	Telic State Measure (TSM; Svebak & Murgatroyd, 1985)
	Biopsychosocial model of arousal regulation, later referred to as challenge and threat model (Blascovich, Seery, Mugridge, Norris, & Weisbuch, 2004; Blascovich & Tomaka, 1996)	Mainstream	Challenge and threat states result in increased sympathetic–adrenomedullary (SAM) activity, with threat states also linked to increased pituitary–adrenocortical (PAC) activity inhibiting vasodilation	Cardiovascular measures (e.g., heart rate, ventricular contractility, cardiac output)
Anxiety	Cusp catastrophe model (Fazey & Hardy, 1988)	Sport-specific	When cognitive anxiety is low there is an inverted-U relationship between physiological arousal and performance, whereas when cognitive anxiety is high performance improves to a critical point after which a sudden decline occurs	Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990)
	Multidimensional anxiety theory (Martens et al., 1990)	Sport-specific	Inverted-U relationship in performance-somatic anxiety relationship, while cognitive anxiety is negatively related to performance	CSAI-2 (Martens et al., 1990)

	Directionality approach (Jones, Hanton, & Swain, 1994)	Sport-specific	Athletes with positive expectancies in coping ability and goal attainment interpret anxiety symptoms as facilitative for performance, whereas those with negative expectancies interpret their symptoms as debilitative	CSAI-2 (Martens et al., 1990), State-Trait Anxiety Inventory (STAI; Spielberger, Gorsush, & Lushene, 1970)
	Attentional control theory (Eysenck & Wilson, 2016)	Mainstream	Anxiety impairs processing efficiency by consuming attentional resources, increasing distractibility, and attention to threat-related stimuli	State–Trait Anxiety Inventory (STAI; Spielberger et al., 1970)
	Reinvestment theory (Masters & Maxwell, 2008)	Sport-specific	Poor performance results from athletes trying to consciously control the execution of a motor skill with declarative knowledge	Movement specific reinvestment scale (Masters & Maxwell, 2008)
Mood	Mental health model (Morgan, 1985)	Mainstream	Superior performance associated with intense vigor and low tension, depression, anger, fatigue, and confusion (iceberg profile)	Profile of Mood States (POMS; McNair et al., 1971)
	Conceptual model of mood-performance relationships (Lane et al., 2017)	Mainstream, adapted to sport	Vigor facilitates performance; confusion and fatigue debilitate performance; anger and tension are helpful in absence of depression, and harmful in presence of depression	Brunel Mood Scale (BRUMS; Terry, Lane, Lane, & Keohane, 1999; Terry, Lane, & Fogarty, 2003)
Multiple emotions	Individual zones of optimal functioning model (Hanin, 2000)	Sport-specific	Optimal performance associated with intense functional states including emotions (pleasant and unpleasant) and low levels of dysfunctional states and emotions via energy mobilization and organization. Poor performance associated with the opposite	Individualized emotion profiling (IEP; Hanin, 2000), Individualized Profiling of Psychobiosocial States (Ruiz et al., 2016)

Cognitive motivational-relational theory (Lazarus, 2000)	Mainstream	Each emotion influences performance differently, usually via appraisals of anticipated gains (i.e., challenge) or losses (i.e., threat) that lead to changes in motivation and coping attempts. These changes have specific action tendencies, and physiological and behavioral consequences (e.g., skilled performance)	Not tested
Theory of ironic processes of mental control (Wegner, 2009)	Mainstream	Unwanted emotions (e.g., worry, fear, anxiety) associated with harmful thoughts that individuals aim to suppress recur after suppression producing counter-intentional (ironic) effects	Not specific
Theory of challenge and threat states (Jones, Meijen, McCarthy, & Sheffield, 2009)	Sport-specific	Challenge states associated with increased SAM activity, emotions perceived as helpful, and superior performance compared to threat states	Psychophysiological measures (cardiovascular markers) and emotion measures (SEQ; Jones et al., 2005)
Multi-action plan model (Bortoli et al., 2012; Robazza et al., 2016)	Sport-specific	Interaction between emotion valence and control results in four types of performance: *optimal-automatic performance* (functional pleasant emotions and low control); *optimal-controlled performance* (functional unpleasant emotions and high control); *suboptimal-effortful performance* (dysfunctional unpleasant emotions and high control); *suboptimal-automatic performance* (dysfunctional pleasant emotions and low control)	Core action elements, perceived accuracy, and perceived control ratings on modified Borg (2001) scale