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**DEPARTMENT OF PHYSICAL EDUCATION AND SPORT SCIENCE**



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**UNIVERSITY OF COPENHAGEN**  
**FACULTY OF SCIENCE**  
**DEPARTMENT OF NUTRITION, EXERCISE, AND SPORTS**



PhD Dissertation

**SELF-TALK AND EMOTIONS IN COMPETITIVE SPORTS**

by

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**Fritsch, J.** (2017). The relationship between self-talk and outward emotional reactions. Part of the Symposium “Self-talk in sport” at the 14<sup>th</sup> World Congress of the International Society in Sport Psychology (ISSP) in Sevilla, Spain.

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## Abstract

The interaction of cognitive and affective processes is at the heart of psychological research. A popular cognitive construct that has received growing attention is self-talk. A recent perspective in self-talk has distinguished between two different self-talk entities relevant within the context of the sport. While the first entity *strategic self-talk* involves the deliberate use of cue words determined before the sport involvement, the second entity *organic self-talk* refers to the innate self-talk athletes have during their sport involvement. Furthermore, organic self-talk is distinguished between *spontaneous self-talk*, a more uncontrolled type of self-talk, and *goal-directed self-talk*, a more controlled type of self-talk. Taking the more theory-based approach of this perspective into account, a main purpose of the present PhD was to investigate the relationship between self-talk and affective processes. With regards to affective processes, emotions are typically defined to involve a subjective experience, physiological processes, and a behavioral component. Although, compared to the subjective experience, the behavioral component of emotions has been relatively less researched in sport psychology, it may offer an investigation of emotions ‘online’ during sport competitions. For this reason, a second focus of this PhD was on outward emotional reactions. The PhD consists of five different articles. The first article includes a review outlining general ideas of how the self-talk perspective, distinguishing between strategic and organic self-talk, including the subcategories spontaneous and goal-directed self-talk, may allow a systematic investigation between self-talk and emotions. In particular, it describes how spontaneous self-talk can reflect emotional processes, while a main function of goal-directed and strategic self-talk is emotion regulation. The main focus of the second article is on how goal-directed self-talk can influence emotions at different stages in the emotion process according to the process model of emotion regulation. In particular, relevant studies in the self-talk literature were classified under the stages of attentional deployment, cognitive change, and response modulation. The scoping review in the third article took a more systematic approach on capturing the available evidence on the

relationship between self-talk and affective processes within the context of sport. Based on the databases PubMed, Scopus, Web of Science, PsycINFO, and Sportdiscuss, 44 articles including 46 studies were identified. The findings of the studies were classified into organic and strategic self-talk. For organic self-talk, the results indicate a relatively consistent relationship between the valence of self-talk and the valence of affective processes. In addition, various functions of self-talk were related to emotion regulation. With regards to strategic self-talk, the review revealed a low number of intervention studies that were limited to anxiety. The fourth article describes a study conducted in competitive tennis matches to assess the relationship between self-talk and emotions. By using a video-assisted methodology, the results show that the intensity of both emotions experienced and outward emotional reactions was lower in situations where players reported goal-directed self-talk, either alone or in conjunction with spontaneous self-talk, compared to situations where players reported spontaneous self-talk alone. These results support the relevance of dual-process self-talk approaches and indicate the potential of goal-directed self-talk to regulate emotions. Finally, the fifth article includes a study that assessed antecedents and consequences of outward emotional reactions in table tennis. Based on the footage of competitive matches, outward emotional reactions were classified as positive, negative, or neutral. Situational factors related to the importance and the controllability of the situations were formed to assess the antecedents of outward emotional reactions. The outcome of the next point was taken to assess the consequences of outward emotional reactions. Results showed that situational factors related to the importance of the situation (e.g., remaining points in the set) could predict positive and negative outward emotional reactions, while the effects of situational factors related to the controllability of the situation (e.g., leadings in points) were less conclusive. In addition, neither positive nor negative outward emotional reactions could predict the outcome of the next point. Overall, the present PhD introduces various new directions in research that may help increase our understanding of the relationship between self-talk and affective processes. These findings may further be interesting from an applied

perspective, highlighting the potential of self-talk for self-regulation. In terms of emotions, the PhD also highlights the importance of considering the different emotion components when examining their role within the context of sport.

## Resumé

Samspelet mellem kognitive og affektive processer er kernen i den psykologiske forskning. En populær kognitiv konstruktion, som har fået stigende opmærksomhed, er den indre dialog, også kaldet self-talk. Et nyere perspektiv inden for self-talk har skelnet mellem to forskellige typer af self-talk, der er relevante i forbindelse med sport. Mens den første type, strategisk self-talk, omfatter den bevidste brug af stikord, der er fastlagt før sportsdeltagelsen, henviser den anden type, organisk self-talk, til den medfødte self-talk, som atleterne har under deres sportsdeltagelse. Desuden skelnes der mellem spontan self-talk, en mere ukontrolleret type self-talk, og målstyret self-talk, en mere kontrolleret type self-talk. I forhold til en mere teoribaseret tilgang i dette perspektiv var et hovedformål med denne ph.d.-afhandling at undersøge forholdet mellem self-talk og affektive processer. Med hensyn til affektive processer defineres følelser typisk til at omfatte en subjektiv oplevelse, fysiologiske processer og en adfærdskomponent. Selv om adfærdskomponenten af følelser sammenlignet med den subjektive oplevelse er blevet undersøgt i relativt mindre grad inden for sportspsykologien, kan den give mulighed for at undersøge følelser "mens de sker" under sportskonkurrencer. Derfor var et andet fokus i denne ph.d. på ydre følelsesmæssige reaktioner. Ph.d.-afhandlingen består af fem forskellige artikler. Den første artikel indeholder en gennemgang, der skitserer generelle idéer om, hvordan self-talk -perspektivet, der skelner mellem strategisk og organisk self-talk, herunder underkategorierne spontan og målrettet self-talk, kan muliggøre en systematisk undersøgelse mellem self-talk og følelser. Navnlig beskrives det, hvordan spontan self-talk kan afspejle følelsesmæssige processer, mens en hovedfunktion af målrettet og strategisk self-talk er følelsesregulering. Hovedfokus i den anden artikel er på, hvordan målstyret self-talk kan påvirke følelser på forskellige stadier i følelsesprocessen i henhold til procesmodellen for følelsesregulering. Især blev relevante undersøgelser i litteraturen om self-talk klassificeret under stadierne opmærksomhedsudfoldelse, kognitiv ændring og responsmodulation. Scoping reviewet i den tredje artikel tog en mere systematisk tilgang til at indfange den tilgængelige

evidens om forholdet mellem self-talk og affektive processer inden for sportskonteksten. På grundlag af databaserne PubMed, Scopus, Web of Science, PsycINFO og Sportdiscuss blev der identificeret 44 artikler, herunder 46 undersøgelser. Resultaterne af undersøgelserne blev inddelt i organisk og strategisk self-talk. For organisk self-talk viser resultaterne et relativt konsistent forhold mellem valensen af self-talk og valensen af affektive processer. Desuden var forskellige funktioner af self-talk relateret til følelsesregulering. Med hensyn til strategisk self-talk afslørede gennemgangen et lavt antal interventionsundersøgelser, der var begrænset til angst. Den fjerde artikel beskriver en undersøgelse, der blev gennemført i konkurrencemæssige tenniskampe for at vurdere forholdet mellem self-talk og følelser. Ved hjælp af en video-assisteret metode viser resultaterne, at intensiteten af både de oplevede følelser og de ydre følelsesmæssige reaktioner var lavere i situationer, hvor spillerne rapporterede målstyret self-talk, enten alene eller i forbindelse med spontan self-talk, sammenlignet med situationer, hvor spillerne rapporterede spontan self-talk alene. Disse resultater understøtter relevansen af dobbeltproces-self-talk-tilgange og viser potentialet i målrettet self-talk til at regulere følelser. Endelig omfatter den femte artikel en undersøgelse, der vurderede forudgående årsager og konsekvenser af udadvendte følelsesmæssige reaktioner i bordtennis. På grundlag af optagelser af konkurrencemæssige kampe blev udadvendte følelsesmæssige reaktioner klassificeret som positive, negative eller neutrale. Situationsrelaterede faktorer i forbindelse med situationernes betydning og kontrolmuligheder blev dannet for at vurdere de forudgående årsager til udadrettede følelsesmæssige reaktioner. Resultatet af det næste point blev brugt til at vurdere konsekvenserne af de ydre følelsesmæssige reaktioner. Resultaterne viste, at situationsrelaterede faktorer i forbindelse med situationens betydning (f.eks. resterende point i sættet) kunne forudsige positive og negative følelsesmæssige reaktioner udadtil, mens virkningerne af situationsrelaterede faktorer i forbindelse med situationens kontrollerbarhed (f.eks. føringer i point) var mindre entydige. Desuden kunne hverken positive eller negative følelsesmæssige reaktioner udadtil forudsige resultatet af det næste point. Samlet set



introducerer den nuværende ph.d. forskellige nye forskningsretninger, som kan bidrage til at øge vores forståelse af forholdet mellem self-talk og affektive processer. Disse resultater kan desuden være interessante ud fra et anvendt perspektiv, idet de fremhæver potentialet i self-talk for selvregulering. Med hensyn til følelser fremhæver ph.d.-afhandlingen også vigtigheden af at overveje de forskellige følelseskomponenter, når man undersøger deres rolle i forbindelse med sport.

## Chapter 1

### General introduction

*Before the match, Johan thinks “It’s going to be a tough match today but I will try my best”. After losing an easy point, he thinks “That was so stupid”. Noting that his head went down, he says to himself “Come on! This is just a point. You can still win it”. When he wins the next point, he demonstratively shows his fist and thinks “Here you go”.*

Examples like the one above indicate that it is very common that athletes talk to themselves during sport competitions. In sport psychology, the term *self-talk* is typically used to study the verbalized thoughts athletes address to themselves (Hardy et al., 2018). The growing literature on self-talk has led to the identification of two self-talk entities, organic and strategic self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). Strategic self-talk refers to the use of self-talk as a mental strategy primarily to enhance sports performance, while organic self-talk refers to athletes’ innate self-talk in relation to their sport involvement. However, it is important to keep in mind that the use of constructs such as self-talk are always simplifications of much more complex interactive processes in the human brain (Lindquist & Barrett, 2012). Thus, when trying to understand the role of psychology within the context of sport, it is important to take into account the interplay of different psychological processes (Tenenbaum et al., 2009). Since emotions appear to represent psychological processes that are related to self-talk in various ways (Latinjak, Hatzigeorgiadis, et al., 2019), a main focus of this PhD is on the relationship between self-talk and emotions.

Emotions are an inherent part of sport competitions. Because athletes often pursue personally relevant goals with an uncertain outcome, athletes can experience extreme states of positive and negative emotions (Lazarus, 2000). In fact, the emotional rollercoasters associated with the highs and lows during sport competitions are one of the main reasons that make sports so fascinating, both for the athletes themselves and for spectators. In the quest to better

understand antecedents and consequences of emotions in sport, most research has focused on the subjective experience of emotions (Hanin, 2007). As demonstrated in the example of Johan showing his fist after having won a point, emotions can also be observable from the outside, indicating they also have a behavioral component (Mauss & Robinson, 2009). The behavioral component of emotions seems worthy of consideration in research, because (a) it emphasizes the interpersonal nature of emotions and (b) research on it appears to be more readily applicable *during* sport competitions. For this reason, a second focus of this PhD is on the behavioral component of emotions.

In the following general introduction, research developments in literature on self-talk are described by distinguishing between organic and strategic self-talk as two different self-talk entities (Latinjak, Hatzigeorgiadis, et al., 2019). Thereafter, the role of emotions within the context of sport is discussed, emphasizing particularly the behavioral component of emotions.

### ***Self-talk in sport***

Self-talk is a popular construct in sport psychology, which has gained increasing attention in recent years (Latinjak, Hatzigeorgiadis, et al., 2019; Latinjak & Hatzigeorgiadis, 2020; Van Raalte et al., 2016). The developments in the literature are reflected in the conceptualization of self-talk as “verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it also either (a) reflects dynamic interplays between organic, spontaneous, and goal-directed cognitive processes or (b) conveys messages to activate responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes.” (Latinjak, Hatzigeorgiadis, et al., 2019, p. 11). Bearing a strong resemblance to previous self-talk definitions (Hardy, 2006; Theodorakis et al., 2000), the first part of this conceptualization emphasizes that self-talk is directed to the self and therefore differs from other forms of verbalizations. The second part of

this conceptualization reflects the aforementioned distinction between organic and strategic self-talk as two different self-talk entities, which will now be outlined in more detail.

### **Strategic self-talk**

Strategic self-talk refers to the use of self-talk plans normally used before or during the execution of a movement in order to influence sport performance or other related outcomes (Latinjak, Hatzigeorgiadis, et al., 2019). The key of this definition is that athletes consciously choose specific self-talk cues they would use during their sport involvement prior to their sport involvement. Given the highly applied value of strategic self-talk, its popularity in applied sport psychology is not surprising (Vargas-Tonsing et al., 2004). Grounded in cognitive behavior therapy approaches (Beck, 1976; Ellis, 2003), the core rationale for strategic self-talk is that the way we talk to ourselves influences feelings and behavior and, therefore, ultimately also performance. The effect of strategic self-talk is often investigated in intervention studies. In these kinds of studies, an experimental group typically receives a self-talk training, while a control group does not (e.g., Hatzigeorgiadis et al., 2009). A meta-analysis of 32 studies showed that a self-talk training has a moderate effect ( $d = 0.48$ ) on sport performance, pointing to the potential of strategic self-talk for performance enhancement (Hatzigeorgiadis et al., 2011).

In light of the potential of strategic self-talk for performance enhancement, another line of research has focused on potential mechanisms that may explain the relationship between self-talk and performance (Galanis et al., 2016). Understanding the self-talk mechanisms is an important endeavor, as it allows to tailor the use of strategic self-talk to the demands of the situation and the needs of the athletes. For this purpose, Hardy et al. (2009) developed a framework distinguishing between cognitive, motivational, behavioral, and affective mechanisms. Regarding cognitive mechanisms, there is ample evidence that self-talk can help increase the attentional focus or counteract debilitating effects of distraction (Hatzigeorgiadis & Galanis, 2017). In terms of motivational mechanisms, several studies have shown how self-

talk can be used to increase one's self-confidence (e.g., Hatzigeorgiadis et al., 2008; Walter et al., 2019). Concerning behavioral mechanisms, studies have focused on specific movement patterns, such as an influence on the elbow-wrist coordination in basketball players (Abdoli et al., 2018). Finally, in relation to affective mechanisms, it has been shown that strategic self-talk can help deal with anxiety (e.g., Hatzigeorgiadis et al., 2009; Walter et al., 2019).

### **Organic self-talk**

The term organic self-talk refers to the innate verbalized self-addressed thoughts athletes have in relation to their sport involvement (Latinjak, Hatzigeorgiadis, et al., 2019). In contrast to strategic self-talk, this kind of self-talk is not based on a plan established before the competition, but emerges naturally during the sport involvement. Traditionally, most research has focused either on the valence (e.g., Zourbanos et al., 2009) or on the functions (e.g., Hardy et al., 2001) of athletes' organic self-talk. Regarding the valence of self-talk (i.e., negative vs. positive self-talk), attempts have been made to uncover antecedents as well as consequences of athletes' self-talk. For instance, it has been shown that personal factors (e.g., goal orientations; Hatzigeorgiadis, 2002), situational factors (e.g., game circumstances; Van Raalte et al., 2000), or social-environmental factors (e.g., coach's behaviour; Zourbanos et al., 2010) can predict the valence of athletes' self-talk. Concerning the consequences of self-talk, studies in tennis using observational self-talk measures have focused on how aloud self-talk can predict the next point, revealing mixed results (Van Raalte et al., 1994; Van Raalte et al., 2000; Zourbanos et al., 2015).

While the classification of the valence of self-talk is primarily content-related, the exploration of the functions of self-talk is concerned with what purpose the self-talk serves (Latinjak, Hatzigeorgiadis, et al., 2019). The most common distinction for self-talk functions is between instructional and motivational self-talk (e.g., Hardy et al., 2001; Zervas et al., 2007). Instructional self-talk (e.g., "Keep the elbow high") refers to directing attention to technical and

tactical aspects of the sport, whereas motivational self-talk (e.g., “You can do it”) aims to increase confidence, emphasize effort, and create positive affective states. Notably, there is sometimes a confusion about separating the functions of self-talk from the content of self-talk (Hardy et al., 2001). For instance, the Automatic Self-Talk Questionnaire for Sport (ASTQ-S), a popular instrument in the literature, identifies self-talk to psych up, to increase confidence, to give instructions, or to control anxiety as positive self-talk (Zourbanos et al., 2009). However, this classification of self-talk appears to be more about the purpose that the self-talk serves, rather than its content. It may well be that negatively toned self-talk (e.g., “you idiot should focus more”) has positive effects. In this regard, recent theoretical frameworks have brought new ideas to the field that may be particularly useful in addressing this potential overlap between the content and functions of previous organic self-talk approaches (Latinjak et al., 2014; Van Raalte et al., 2016).

These new, more theory-based self-talk classifications recently introduced in the literature on self-talk (Latinjak et al., 2014; Van Raalte et al., 2016) are in line with dual-process approaches that distinguish between more controlled, conscious, and reflexive psychological processes and more uncontrolled, unconscious, and automatic psychological processes (Kahneman, 2011; Strack & Deutsch, 2004). In particular, based on the terminology of Christoff (2012), Latinjak et al. (2014) distinguished between goal-directed self-talk, a more controlled psychological process, and undirected self-talk, a more uncontrolled psychological process. In addition, undirected self-talk can further be divided into spontaneous self-talk, stimulus-independent thoughts, and mind-wandering (Latinjak et al., 2014). Spontaneous self-talk is elicited by a stimulus in the current context (e.g., thinking about the last goal). Mind-wandering refers to thoughts that are independent of the current context (e.g., thinking about an exam during the competition). Stimulus-independent thoughts involve thinking about a stimulus that is related to the context, but not associated with current stimuli (e.g., thinking about the last practice while competing). Importantly, using this classification within the

context of sport, research has predominantly focused on spontaneous and goal-directed self-talk (Latinjak, Hatzigeorgiadis, et al., 2019).

On the one hand, spontaneous self-talk consists of unintended statements, which come to mind effortlessly and unbidden, but are linked to relevant stimuli in the current context (Latinjak et al., 2014). According to Latinjak, Hatzigeorgiadis, et al. (2019), spontaneous self-talk cannot exist on its own (i.e., you cannot purposefully create spontaneous self-talk), but is always accompanied by at least one psychological process. These psychological processes may involve, among others, irrational beliefs (“If I lose, my career is over”), motivational orientations (“I have to be better than others”), or affective processes (“I’m afraid to lose”). The association with other psychological processes is particularly interesting for applied sport psychology, considering spontaneous self-talk as a window into the athletes’ mind (Van Raalte et al., 2016). Thus, analysis of athletes’ spontaneous self-talk may allow to identify underlying dysfunctional psychological processes (Latinjak, Hernando-Gimeno, et al., 2019). For instance, if an athlete constantly says to herself/himself that losing is not an option, this may indicate irrational beliefs (Turner, 2016). On the other hand, goal-directed self-talk consists of statements that are intentionally used towards making progress on a task or solving a problem (Latinjak et al., 2014). Thus, similar to strategic self-talk, goal-directed self-talk has a specific purpose, which is typically to increase performance within the context of sport. Nevertheless, the main difference is that strategic self-talk is based on a plan established before the sport involvement, while goal-directed self-talk is used intuitively by athletes in a given moment (Latinjak, Hatzigeorgiadis, et al., 2019). In this sense, goal-directed self-talk can be regarded as an intuitive self-regulation strategy used by athletes (Beckmann & Beckmann & Waldenmayer, 2020).

### *Self-talk and emotions*

The distinction between strategic and organic, and within the latter category between goal-directed and spontaneous self-talk, may be particularly useful when examining the relationship between self-talk and emotions (Latinjak, Hatzigeorgiadis, et al., 2019). Since the literature on this subject is discussed in detail in chapters 2-4, only general considerations are made here. As mentioned above, it is assumed that spontaneous self-talk cannot exist by its own, but is always accompanied by at least one other psychological process (Latinjak, Hatzigeorgiadis, et al., 2019). Theoretical considerations and preliminary evidence suggest that emotions may play a relevant role here (Latinjak et al., 2017; Latinjak et al., 2014). For instance, studies show that the content of spontaneous self-talk often involves evaluating performance or predicting future outcomes, implying an emotional connotation (Latinjak et al., 2014). In addition, the structure of spontaneous self-talk indicates an inherent connection to emotional processes. In particular, it has been shown that spontaneous self-talk ranges in its valence from positive (“I’m playing well”) to negative (“That was a bad mistake”), and in its time-perspective from retrospective (“That was good”) to anticipatory (“I will lose”; Latinjak et al., 2014). The valence dimension bears a similarity to the valence dimension of core affect underlying emotional processes (Russell, 2003). Moreover, the time-perspective was suggested to allow the distinction between specific emotions that are similar in their valence and arousal (Latinjak, 2012). For instance, emotions such as anger and anxiety are both negative in their valence and are both accompanied by high arousal (Russell, 2003). However, while anger is typically elicited by events in the past and is thus considered a retrospective emotion, anxiety refers to future events and is thus considered an anticipatory emotion (Latinjak, 2012). The suggested structural similarity between self-talk and core affect, both ranging in their valence and time-perspective, is underpinned by a study investigating athletes’ spontaneous self-talk in anger- and anxiety-eliciting situations (Latinjak et al., 2017). The results of this study show that in



anger-eliciting situations athletes tend to have retrospective negative self-talk, while in anxiety-eliciting situations athletes tend to have anticipatory negative self-talk.

In contrast to goal-directed self-talk, which is intuitively used by athletes in a given moment, strategic self-talk is based on a plan established before the competition, representing a different self-talk entity (Latinjak, Hatzigeorgiadis, et al., 2019). Nevertheless, both goal-directed and strategic self-talk share the characteristics of aiming to serve a purpose (Galanis & Hatzigeorgiadis, 2020). Given that both positive and negative emotions can hinder as well as support sport performance (Hanin, 2007), it is not surprising that emotion regulation is a primary purpose of both organic goal-directed and strategic self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). With regards to strategic self-talk, this is also in line with the idea that the regulation of affective processes is a mechanism that may explain how strategic self-talk can influence sport performance (Hardy et al., 2009). Looking at the potential of organic goal-directed self-talk for emotion regulation, it was suggested that it can be classified into functions that serve different purposes (Latinjak et al., 2014). In particular, some functions, such as controlling activated states (e.g. “Don’t be angry”) or creating activated states (e.g. “Fight”), appear to directly target the emotion experience (Latinjak et al., 2014). At the same time, other goal-directed self-talk functions, such as reconstructing cognitions (e.g. “It is ok to lose”) or regulating cognitions and behavior (e.g. “Focus on the next point”), can also indirectly influence emotions by changing the meaning of a situation or directing one’s attention.

### ***Emotions in sport***

In emotion research, it is important to distinguish between the terms emotions, mood, and core affect (Ekkekakis, 2013). While core affect refers to the raw feeling at a given moment, derived from the two dimensions valence and arousal, emotions are a psychophysiological response to a relevant stimulus (Russell, 2009). In addition, compared to emotions, moods often have no clear cause, are less intense, but last longer (Beedie et al., 2005). Furthermore, in

contrast to the intuitive understanding that most individuals have of the construct emotion, there is a long-lasting debate in the scientific community about its nature (Lindquist et al., 2013). A central question revolves around the existence of discrete emotions as biological entities (Barrett, 2012). Whereas basic emotion theories assume the existence of a small number of universal emotions with distinct and coherent emotion profiles (e.g., Ekman & Cordaro, 2011), constructionist emotion approaches view emotions as subjective constructions (e.g., Russell, 2009). Despite these theoretical discordances in emotion research, there is general agreement across emotion approaches that an emotion involves changes in subjective experience, physiological processes, and observable behavior (Mauss & Robinson, 2009).

Subjective experience refers to the internal experience of an emotion and is often considered the aspect that distinguishes an emotion from other psychological states (Scherer, 2009). Typically, validated questionnaires that attempt to measure either the subjective experience of specific emotions (e.g., anxiety; Spielberger et al., 1983) or, more generally, the subjective experience of positive and negative affective states are used (e.g., Watson et al., 1988). Physiological processes include changes in the autonomic nervous system and can be measured by an individual's heart rate, blood pressure, or skin conductance (Stemmler, 2004). Finally, the behavioral component of emotions consists of changes in an individual's facial expressions, gestures, postures, or verbalizations (Mauss & Robinson, 2009). The aforementioned debate about the nature of emotions is particularly reflected in the measures of the behavioral component of emotions (Lindquist et al., 2013). While basic emotion theories postulate the use of standardized instruments such as the Facial Action Coding System (Ekman & Friesen, 1978) to objectively measure discrete emotions (Ekman & Cordaro, 2011), constructionist emotion approaches negate the validity of such measures (Barrett, 2012).

### **Behavioral component of emotions – outward emotional reactions**

Looking at the literature concerning emotion in sport psychology, it is apparent that most studies have focused on the subjective experience of emotions or the perception of physiological processes using questionnaires (e.g., Jones et al., 2005), or interview techniques (e.g., Martinent & Ferrand, 2009). However, especially for the use within the context of sport, it is difficult, for practical reasons, to use such measures during a sport competition, i.e., when the emotion actually occurs. Moreover, the behavioral component of emotions emphasizes the interpersonal nature of emotions that can hardly be explained by the subjective experience of an emotion alone. For this reason, in addition to the relationship between self-talk and emotions, another focus of this PhD is on the behavioral component of emotions.

In relation to the behavioral component of emotions, the term *outward emotional reactions* is used to describe an impression about one's emotional state based on the various body channels relevant for emotions (e.g., gestures, verbalizations; Mauss & Robinson, 2009). Outward emotional reactions do not focus on specific emotions, but generally distinguish between positive and negative emotional states. While a positive outward emotional reaction indicates that something pleasant happened to the individual, a negative outward emotional reaction indicates that something unpleasant happened. It is important to note that outward emotional reactions do not necessarily correspond to an individual's subjective experience. Even an intense subjective experience of an emotion is not always accompanied by an outward emotional reaction (Fernández-Dols & Ruiz-Belda, 1995), while individuals may also pretend to have a higher emotional intensity than they actually experience internally (Sève et al., 2007).

### Antecedents of outward emotional reactions

Considering the role of emotions within the context of sport in general, it appears interesting to investigate (a) which conditions and psychological processes lead to emotions (i.e., the antecedents of emotions; Uphill & Jones, 2007) and (b) how emotions, in turn, affect

sport performance (i.e., the consequences of emotions; Martinent & Ferrand, 2009). Regarding the antecedents of emotions, appraisal theories of emotions seem to provide a useful theoretical framework (Lewis et al., 2017; Uphill & Jones, 2007). According to appraisal theories, emotions result from a person-environment transaction (Lazarus, 1991; Scherer, 2013). This implies that it is not a stimulus per se that elicits emotions, but rather the way it is psychologically appraised by the individual.

Regarding relevant psychological appraisal processes, studies within the context of sport have shown that the degree of pressure, the perception of control or the comparison of performance with one's own expectations are crucial psychological processes that influence the occurrence of emotions (Lewis et al., 2017; Thatcher & Day, 2008; Uphill & Jones, 2007). At the same time, research can also focus on objectively measured situations that are associated with a higher likelihood of emotions (Lewis et al., 2017). Such situations may occur during a match (e.g., in tennis, points at the end of the match are more likely to elicit emotions than points at the beginning of a match), or were relevant prior to the match (e.g., a league match is more likely to elicit emotions than a practice match). The identification of such situations associated with emotions seems to be particularly interesting for outward emotional reactions, as they can be assessed without self-report measures. For example, using an observational tool, Moesch et al. (2015) found that in handball outward emotional reactions after scoring in play-off matches were more likely compared to league matches.

### Consequences of outward emotional reactions

Although most athletes would probably agree that emotions can affect sport performance, the current evidence seems rather limited (Uphill et al., 2014). As mentioned above, the focus on athletes' subjective experience is related to a dominant consideration of pre-competitive emotions, particularly anxiety, which ignores the dynamic experience of emotions that occur during sport competitions (Sève et al., 2007). Another related issue is that

research often tends to measure athletes' perceptions of the influence of emotions on sport performance, rather than using objective indicators (e.g., Martinent & Ferrand, 2009). Here, assessing outward emotional reactions in observational studies may allow the use of objective performance indicators, such as the next point in tennis (Van Raalte et al., 1994; Zourbanos et al., 2015).

Outward emotional reactions have further intra- and interpersonal consequences that can hardly be explained by the subjective experience of an emotion alone. With regard to intrapersonal consequences, Darwin (1896) already wrote: "The free expression by outward signs of an emotion intensifies it" and "On the other hand, the repression, as far as this is possible, of all outward signs softens our emotions" (p. 365). The assumed reciprocal relationship between the subjective experience of emotions and the behavioral component is also supported by a lot of research in general psychology (e.g., Adelman & Zajonc, 1989; Duclos et al., 1989; Price et al., 2012). Following this argument, research within the context of sport also suggests that outward emotional reactions are related to psychological processes, such as momentum (Moesch & Apatzsch, 2012) or self-efficacy (Ronglan, 2007).

The fact that outward emotional reactions can be observed from the outside illustrates the importance of considering the interpersonal consequences of emotions (Tamminen & Bennett, 2017). In particular, outward emotional reactions can evoke inferential processes and affective reactions in the onlooker (Van Kleef et al., 2011). Inferential processes may involve seeking explanations for the outward emotional reaction of the other person (e.g., you may wonder why the other person is happy), while affective reactions may involve eliciting one's own emotions (e.g., you are sad because you see your partner is sad). The direction of these psychological processes seems to depend, to a large extent, on the relationship between the onlooker and the individual showing an outward emotional reaction (Furley et al., 2015). Within the context of sport, it has been consistently shown that negative outward emotional reactions of the opponent increase one's own self-efficacy and elicit positive emotions, whereas positive

outward reactions of the opponent decrease one's self-efficacy and elicit negative emotions (e.g., Furley et al., 2015; Furley & Schweizer, 2014; Greenlees et al., 2005). The potential impact of outward emotional reactions on the opponent is further supported by showing a lower probability of scoring a goal in a penalty shootout when the other team's player openly celebrated a goal after the previous penalty shot (Moll et al., 2010). In contrast, when observing a teammate, positive outward emotional reactions have been shown to increase one's self-efficacy and elicit positive emotions (Furley et al., 2015). In the same vein, it was also shown that negative outward emotional reactions of a teammate decrease one's self-efficacy and elicit negative emotions (Furley et al., 2015).

### ***Purpose and summary***

To summarize, the classification of strategic and organic self-talk, and within the latter category between goal-directed and spontaneous self-talk, may allow for a more theory-based investigation of self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). In particular, a main focus of this PhD is on the relationship between self-talk and emotions, as this relationship can offer fascinating insights into the complex interactive psychological processes of human functioning (Hardy et al., 2018). In examining the role of emotions within the context of sport, explicit consideration of the behavioral component seems to contribute to the current literature. For this reason, a second focus of this PhD is on outward emotional reactions. The PhD consists of three review (Chapter 2-4) and two empirical (Chapter 5-6) articles. Moreover, there are two published articles in German in the Appendix. The first article in German is a theoretical paper addressing the recent theoretical developments in the international literature on self-talk. The second article in German is a position paper calling for an increased attention of the behavioral component in emotion research.

Chapter 2 explores in more depth how organic, spontaneous and goal-directed self-talk as well as strategic self-talk are associated with emotions in the current literature. In addition to

outlining how the structure and content of spontaneous self-talk is related to emotions (e.g., Latinjak et al., 2014), research on the rationality of beliefs (e.g., Turner, 2016) is discussed in relation to spontaneous self-talk. Concerning the potential of goal-directed self-talk for emotion regulation, the focus is on how the different self-talk functions may influence emotions directly and indirectly. Moreover, strategic self-talk interventions aimed at reducing anxiety are presented (e.g., Walter et al., 2019). In this context, reflexive self-talk interventions that take athletes' organic self-talk into account are put forward as an alternative to strategic self-talk interventions (Latinjak, Hernando-Gimeno, et al., 2019). The chapter ends with applied recommendations for athletes on how to better manage emotions during sports performance.

Chapter 3 first presents a theoretical framework that tries to explain performance fluctuations in sports performance. In particular, the model considers a cyclic nature of the different emotion components, such as triggers, bodily reactions, feelings, and cognitions. Thereafter, the main focus of chapter 3 is on how goal-directed self-talk may be relevant for emotion regulation. Based on the process model of emotion regulation (Gross, 1998), it is outlined how goal-directed self-talk may influence emotions at different stages of the emotion process. First, the stage "attentional deployment" indicates how goal-directed self-talk may influence emotions by changing attention. Second, the stage "cognitive change" points to the potential of goal-directed self-talk to reappraise a situation. Finally, the stage "response modulation" suggests that goal-directed self-talk can be used to influence the emotional response after it has already occurred.

By taking a more systematic approach, chapter 4 includes a scoping review that aims to capture the available evidence regarding the relationship between self-talk and emotions within context of sport. In this scoping review, 44 retrieved studies were classified into strategic and organic self-talk based on the definitions of Latinjak, Hatzigeorgiadis, et al. (2019). Moreover, the results for organic self-talk were divided into studies that focused on the valence of self-talk, studies that focused on the functions of self-talk, and studies that were based on the

spontaneous/goal-directed self-talk framework. The discussion of the scoping review then tried to integrate the studies conducted without the spontaneous/goal-directed self-talk classification with the studies based on this classification.

In chapter 5, an empirical study is presented in which the relationship between spontaneous/goal-directed self-talk and the intensity of emotions is investigated during competitive tennis matches. Using a video-assisted stimulated recall procedure (Martinet & Ferrand, 2009), a total of 20 tennis players were initially taped. After the match, the players were confronted with the footage. Depending on whether they could remember the point or not, they were asked to rate the intensity of their emotions and to report their self-talk. Notably, for emotions, the players were asked to rate the intensity of their subjective emotion experience as well as of their outward emotional reactions. The reported self-talk was then classified into spontaneous and goal-directed self-talk according to the definitions of Latinjak et al. (2014). It was hypothesized that the intensity of both subjective emotion experience and outward emotional reaction was lower in instances when players reported goal-directed self-talk compared to instances when players reported spontaneous self-talk.

Finally, chapter 6 includes another empirical study in table tennis, focusing on the antecedents and consequences of outward emotional reactions. Using an observational design, a total of 15 matches were filmed from both sides. Two coders classified the outward emotional reactions after each point as positive, negative, or neutral. Situational factors representing the importance of a situation (e.g., remaining points until the end of the set) and the controllability of a situation (e.g., leading vs. trailing) were formed to assess antecedents of outward emotional reactions. It was hypothesized that both positive and negative outward emotional reactions would be more likely the more important a situation is. For the controllability of a situation, it was hypothesized that the more controllable a situation is, the less likely negative outward emotional reactions would be. Furthermore, with regard to the consequences of outward



emotional reactions, it was examined whether outward emotional reactions would influence the likelihood of winning the next point.

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## Chapter 2

### Self-talk and emotion in sport

The links between cognition and emotion have been central within psychological inquiry. In the sport psychology literature, an aspect of cognition that has received particular attention in recent years is self-talk. Studying athletes' self-talk in sport is intriguing for two main reasons. First, exploring thought processes in situations where individuals strive for personally relevant goals provides enlightening insights into how athletes deal with performance-related stressors, and thereby about the functioning of their minds in general. Second, it is of great applied value that athletes can self-regulate and enhance sports performance through practising and using self-talk as a strategy (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011).

In sport psychology, the term *self-talk* can be conceptualised as

verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it also either (a) reflects dynamic interplays between organic, spontaneous and goal-directed cognitive processes or (b) conveys messages to activate responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes (Latinjak, Hatzigeorgiadis, Comoutos, & Hardy, 2019; p. 11).

The first part of the conceptualisation refers to some of the necessary and sufficient characteristics to define self-talk. The second part reflects most of the research in the literature, which has focused on two categorically different self-talk entities. On the one hand, the research focus is on the content, antecedents, and consequences of *organic self-talk*, that is, inherent thoughts and self-statements of athletes before, during, and after sports practice. On the other hand, in the bulk of self-talk studies the effectiveness of *strategic self-talk interventions* was



tested, using predetermined self-talk plans aimed at enhancing performance by triggering appropriate responses (for a meta-analysis see Hatzigeorgiadis et al., 2011).

Of further relevance are theory-based driven classifications of organic self-talk based on dual-process theories (Furley, Schweizer, & Bertrams, 2015). The adaptation of these theories to self-talk research has revealed differences between uncontrolled self-talk, which takes place automatically, and controlled self-talk, which is deliberate and effortful, used for self-regulation (Latinjak, Zourbanos, López-Ros, & Hatzigeorgiadis, 2014; Van Raalte, Vincent, & Brewer, 2016). In this chapter, we refer to the former as spontaneous self-talk, and to the latter as goal-directed self-talk (see Latinjak, Hardy, Comoutos, & Hatzigeorgiadis, 2019). It is noteworthy that spontaneous self-talk is not the only type of uncontrolled self-talk, as there are other types such as mind-wandering. Yet, these types of self-talk have attracted little research attention and not in relation to emotions; thus, in this chapter we will refer only to spontaneous self-talk (see Table 1).

**Table 1.** Overview of self-talk terminology.

<b>Category</b>	<b>Definition</b>	<b>Example</b>
Strategic self-talk	Refers to the use of pre-determined self-talk cues that aim at triggering a specific response, and activating according mechanisms, aiming at enhancing performance or self-regulation goals.	In collaboration with a sport psychologist, to maintain concentration a tennis player uses the cue phrase “Focus on the next point!” after losing a point.
Organic self-talk	Refers to inherent thoughts and self-statements that are addressed to oneself. This comprises uncontrolled and controlled statements.	A football goalkeeper might think after saving a shot “That was a good save. Now go back into your position”.
Spontaneous self-talk	Refers to uncontrolled statements that come to mind effortlessly and unbidden. These statements are linked to the activity at hand in the current context.	After being overtaken by a competitor, a cyclist thinks “Oh no, he’s too strong for me. I won’t win today.”
Goal-directed self-talk	Refers to controlled statements that are instrumentally used in order to make progress on a task.	A basketball player tells himself before a free-throw “Focus on the rhyme.”

### *Spontaneous self-talk and emotions*

Spontaneous self-talk is frequently about evaluating and explaining past performances (e.g. “this was a stupid mistake”) or predicting future outcomes (e.g. “I will win”). This points to the fact that spontaneous self-talk is often emotionally charged (Latinjak et al., 2014) and, thus, expresses emotions (Van Raalte et al., 2016). Spontaneous self-talk cannot exist on its own, but rather reflects underlying psychological processes (e.g. emotions; Latinjak, Hatzigeorgiadis et al., 2019). Notably, in relation to sports performance, spontaneous self-talk does not itself serve any function but only reveals these processes. The inherent relationship between spontaneous self-talk and emotions is also reflected in the fact that spontaneous self-talk varies in terms of valence, much like the core affect underlying emotional experiences (Russell, 1980). Hence, spontaneous self-talk can be perceived as ranging from positive (e.g. “I feel good”), to neutral (e.g. “the ball was out”), to negative (e.g. “today I suck”). In addition to valence, spontaneous self-talk can also be classified according to its time-perspective. In particular, it can be distinguished into statements that are retrospective (e.g. “this stroke was bad”), present-related (e.g. “I’m playing well today”), or anticipatory (e.g. “I will lose”; Latinjak et al., 2014). With relevance for the relationship between spontaneous self-talk and emotion, evidence suggests that athletes use more retrospective statements when angry and more anticipatory spontaneous self-talk when anxious (Latinjak, Hatzigeorgiadis, & Zourbanos, 2017). Considering that anxiety is typically triggered by anticipated events that pose a potential threat to one’s goals and well-being, while anger is typically elicited by past events that antagonise one’s goals and well-being (Lazarus, 2000), the evidence above supports the idea that spontaneous self-talk expresses emotions, including their valence and temporal orientation.

Spontaneous self-talk can also reflect existing or evolving irrational beliefs such as “awfulising” (e.g. “if I don’t win today, then I will never have a chance again”), irrational demands (e.g. “I have practised so much for this, so I really can’t miss such a ball”), or self-downing (e.g. “if I lose today, then I’m just a big failure”). Consistent with rational-emotive

behaviour therapy (REBT; Ellis & Dryden, 1997), such irrational beliefs are at the heart of emotional disturbances. REBT postulates that it is *not* external activating events (e.g. a poor sports performance), but rather how these events are cognitively processed (i.e. beliefs) that triggers dysfunctional emotions and behaviours. Although self-talk does not necessarily always reflect one's deeply held beliefs, the inherent connection between one's beliefs and self-talk has gained increasing attention (Turner, Kirkham, & Wood, 2018). For instance, it has been shown that the irrational beliefs of professional football academy coaches are positively associated with threat appraisals that generally adversely affect sports performance (Dixon, Turner, & Gillman, 2017). Circling back to self-talk, this was supported by an experimental study in golf, which showed that the explicit use of irrational self-talk was perceived as less useful and supportive compared with the explicit use of rational self-talk (Turner et al., 2018). In addition, in this study it was found that irrational self-talk led to poorer putting performance. Besides the limited but rapidly growing research on REBT in the sports context, there is vast amount of evidence outside the sports context also suggesting that irrational beliefs can lead to an increase in maladaptive emotions, which, in turn, impair performance (Turner, 2016).

### ***Goal-directed self-talk and emotions***

Researchers have long been concerned with the question of how athletes intentionally use self-talk to deal with their emotions during sports involvement. For example, Hardy, Gammage, and Hall (2001) found that athletes use self-talk, among other things, to cope with difficult situations and to control their level of activation. Later, various studies on self-talk in sport psychology (e.g. Theodorakis, Hatzigeorgiadis, & Chroni, 2008) and general psychology (e.g. Racy, Morin, & Duhnych, 2019) have confirmed emotion regulation as one of the main functions of goal-directed self-talk.

The study of goal-directed self-talk and emotions was taken a step further with the recognition of goal-directed self-talk as an independent form of organic self-talk (Latinjak et

al., 2014). One current focus of research is on the mechanisms by which self-talk can help athletes regulate emotions. Mainly, goal-directed self-talk can focus directly on the regulation of emotions by identifying dysfunctional emotions (e.g. “don’t be so angry”) and promoting more functional emotions (e.g. “calm down”). However, goal-directed self-talk can also change emotional states without directly focusing on emotions, for example, by controlling cognitive reactions (e.g. “mistakes are part of learning”), focusing attention on task execution (e.g. “focus only on what you need to do”) or controlling future-oriented thoughts (e.g. “you can really win this game”). This latter group of goal-directed self-talk mechanisms may be particularly functional given the possible paradoxical effects of self-talk attempting to suppress unwanted emotions (e.g. “don’t be angry”; Gardner & Moore, 2004). Athletes can use goal-directed self-talk to focus on desired thoughts and actions instead of triggering a meta-cognitive scanning process that paradoxically raises awareness of the unwanted emotions.

Current research further explores when athletes use goal-directed self-talk to deal with dysfunctional emotions (Latinjak, Ramis, & Torregrossa, 2017; Latinjak, Torregrossa, Comoutos, Hernando-Gimeno, & Ramis, 2019). First, competitive factors and match status seem to be critical in eliciting emotions and subsequent regulation attempts through self-talk. For instance, a study with basketball players has shown that goal-directed self-talk aims to cope with nervousness before the game begins, with dejection when losing, with relaxation when winning, and the fear of failure in the crucial moments of the game (Latinjak, Torregrossa, et al. 2019). Personal and social factors, on the other hand, have received less research attention. A descriptive study indicated that female athletes use more goal-directed self-talk in competition than male athletes and that individual-sport athletes use more goal-directed self-talk in both training and competition than team-sport athletes (Latinjak, Ramis, et al., 2017). However, to date, research has not yet examined the links between goal-directed self-talk and emotion in relation to individual differences (such as personality, sport identity, cognitive processing preferences), or social-environmental factors (such as motivational climate and team

factors) that have been associated with self-talk in previous research (for a review, see Hardy, Oliver, & Tod, 2009).

Altogether, research on the use of goal-directed self-talk to regulate emotions has yielded promising results, although much remains to be discovered. For instance, it appears fruitful to explicitly explore the interplay between goal-directed and spontaneous self-talk in relation to emotions. In a relevant study, Fritsch, Jekauc, Elsborg, Latinjak, and Hatzigeorgiadis (2019) investigated tennis players' self-talk and their emotions during competitive tennis matches. The results showed that goal-directed self-talk alone as well as the combination of spontaneous and goal-directed self-talk were related to a lower intensity of emotional experiences and outward emotional reactions than spontaneous self-talk alone. This study indicates that athletes have an inner voice that guides them in sports practice, and that understanding the inner voice is essential to effectively teach athletes better self-regulatory strategies (Latinjak, Font-Lladó, Zourbanos, & Hatzigeorgiadis, 2016)

### ***Self-talk interventions and emotions***

In the self-talk literature, much of the research has focused on interventions that involve the use of cue words aiming at enhancing performance by activating appropriate responses (Hatzigeorgiadis et al., 2011). While much evidence confirms the potential of self-talk interventions, a better understanding of how self-talk enhances performance is still crucial to maximising their effectiveness (Galani, Hatzigeorgiadis, Zourbanos, & Theodorakis, 2016). Studies addressing the emotion regulation potential of self-talk are sparse and confined to the effects of self-talk on anxiety. In the study of Hatzigeorgiadis, Zourbanos, and Theodorakis (2007), with a water polo based task, the use of anxiety-control and attention-control self-talk cues, following a three-day self-talk programme, helped reduce competitors' anxiety under evaluative conditions. These effects were strongest for anxiety-control self-talk cues. Similarly, another study with young tennis players showed that under anxiety-inducing evaluative

conditions, motivational self-talk cues helped reduce anxiety and increase self-confidence (Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis, 2009). Importantly, in both studies, the effect of strategic self-talk on cognitive aspects of anxiety was greater in comparison with somatic anxiety. Finally, Walter, Nikoleizig, and Alftermann (2019) reported that self-talk training helped reducing anxiety in junior sub-elite athletes from a variety of sports. In particular, the results showed that both a one-week short-term intervention and an eight-week long-term intervention significantly reduced the level of somatic anxiety and that this decrease remained stable over time. Interestingly, however, no effects on cognitive anxiety were found, which is in contrast to the two earlier studies (Hatzigeorgiadis et al., 2007, 2009).

The studies described above focused on the effects of pre-determined cue-words used in specific situations and, therefore, belong to the previously described strategic self-talk entity (Latinjak, Hatzigeorgiadis et al., 2019). As an alternative to this traditional approach, reflexive self-talk interventions have been recently introduced in the self-talk literature (Latinjak, Hernando-Gimeno, Lorigo-Méndez, & Hardy, 2019). A key feature of reflexive self-talk interventions is that athletes work to gain awareness on the content and consequences of their organic, spontaneous and goal-directed, self-talk, thereby enhancing their metacognitive knowledge. As part of the reflexive phase of the intervention, the athletes are encouraged to come up with alternative self-statements that they could eventually use to self-regulate or enhance their performance. In contrast to traditional strategic self-talk interventions, reflexive self-talk interventions could even lead to less use of goal-directed self-talk to avoid ironic processes of mental control (Wegner, 1994). An example of ironic processes of mental control is when the deliberate attempt to suppress anxiety leads to even higher anxiety. Although initial studies have shown promising results (Latinjak et al., 2016; Latinjak, Hernando-Gimeno et al., 2019), it is important to emphasise that research on reflexive self-talk interventions is still in its infancy. Future studies must assess its effectiveness in comparison to the traditional strategic self-talk interventions.

Indirect support for reflexive self-talk interventions can be found in cognitive-behaviour approaches (Turner & Barker, 2013), where self-talk serves as an important behaviour change mechanism (Michie et al., 2016); for example, REBT, which aims to make athletes aware of how cognitions can lead to dysfunctional emotions and behaviours (Turner, 2016). Beyond self-talk, REBT involves disputing underlying irrational beliefs and replacing them with more rational ones. Given the relationship between self-talk and beliefs, REBT is a good example of how changing another psychological construct (i.e. beliefs) can lead to changes in self-talk. The relevance of REBT in the sports context was supported by a study showing that shifting to more rational thinking leads to a reduction in cognitive anxiety among elite youth cricketers (Turner & Barker, 2013). Furthermore, reducing irrational beliefs was shown to be associated with a reduction in systolic blood pressure as an indicator of an adaptive physiological response and enhanced sports performance in elite Paralympic athletes (Wood, Barker, Turner, & Sheffield, 2018).

### ***Applied recommendations***

Athletes are constantly talking to themselves during sports competitions, especially when they experience intense emotions and try to regulate them. Since the dynamic interplay between organic self-talk and emotions partly determines an athlete's behaviour and performance (Latinjak, Hatzigeorgiadis et al., 2019), it is not surprising that practitioners in applied sports psychology often regard self-talk as a key construct. In addition to organic self-talk, there is solid evidence that strategic use of cue words can enhance regulation of emotions (Hatzigeorgiadis et al., 2009). Regarding the use of strategic self-talk interventions, we recommend that practitioners tailor the cue words and their implementation to the athlete's specific needs and the requirements of the task (for a full discussion, see Hatzigeorgiadis, Zourbanos, Latinjak, & Theodorakis, 2014). For example, encouraging the athlete to practice self-talk cues in an if-then format appears to be a worthwhile approach (Latinjak et al., 2018).



In this approach, athletes are asked to decide under which condition (e.g. “*if* I feel that my anger is harming my performance”) they should use a specific self-talk cue (e.g. “*then* I will say to myself, calm down, focus on your technique”) to regulate their emotions.

Of particular importance in the use of cue word interventions is the selection of cue word types, which are often classified as instructional or motivational. Experimental studies have shown that motivational cue words related to emotions (e.g. “keep calm”) are most effective for emotional regulation. However, the findings from organic self-talk research can serve as inspiration for strategic self-talk interventions. Based on studies that have explored the mechanisms by which goal-directed self-talk can be used to regulate emotions (e.g. Latinjak et al., 2017), we recommend that practitioners consider two different approaches to cue word interventions that can be used to both prevent and react to detrimental psychological processes, including emotions. On the one hand, cue words can focus directly on emotions (e.g. “be happy”), on the other hand, cue words can focus on other psychological processes such as attention (e.g. “focus”), goals (e.g. “one goal at a time”) or confidence (e.g. “you are ready”). Such self-talk strategies aim to regulate emotions indirectly through the impact of other psychological processes on the athlete’s emotional experiences. Moreover, these alternative approaches may prevent ironic effects of mental control, often discussed in the context of self-talk (Wegner, 1994).

As a new alternative to traditional cue word interventions, self-talk researchers have developed reflexive self-talk interventions (Latinjak, Hernando-Gimeno et al., 2019). In reflexive self-talk interventions, athletes are encouraged to reflect on their organic, spontaneous and goal-directed, self-talk and eventually attempt to change it. Findings from this study suggest that talking to athletes about their organic self-talk may lead to metacognitive knowledge about: (a) recurring complex situations in sport; (b) their psychological processes, including spontaneous self-talk, which constitute a psychological challenge; and (c) the reasonable use of goal-directed self-talk that can support the most appropriate self-regulatory strategies.

Therefore, we recommend practitioners have structured discussions with their athletes about emotionally problematic situations and their organic self-talk in these situations (for detailed procedures, see Latinjak, Hernando-Gimeno et al., 2019). Reflexive self-talk interventions can be assisted by various methods supporting the accuracy of athletes' self-talk assessment, such as video-assisted stimulated recall procedures (Martinent & Ferrand, 2009), think-aloud techniques (Samson, Simpson, Kamphoff, & Langlier, 2017), or descriptive experience sampling (Dickens, Van Raalte, & Hurlburt, 2018). In video-assisted stimulated recall procedures, athletes are first taped during a sports competition followed by a self-confrontational interview based on the footage shortly after the competition (Martinent & Ferrand, 2009). In think-aloud techniques athletes are encouraged to verbalise their thought processes throughout a sports competition (their thoughts might be recorded by a microphone attached to the collar of their T-shirt; Samson et al., 2017). Finally, in descriptive experience sampling, signals, elicited randomly or deliberately in certain situations, are used to stimulate the athlete to immediately reveal their thought processes in a given moment (Dickens et al., 2018).

### ***Conclusions***

Self-talk and emotions are entangled in a reciprocal relationship. On the one hand, the way athletes feel at a given moment influences their self-talk. On the other hand, the way athletes talk to themselves affects the emotions they experience. Considering the recently developed conceptualisations of self-talk (Latinjak et al., 2014; Van Raalte et al., 2016), some interesting claims can be made regarding organic and strategic self-talk. With regard to organic self-talk, spontaneous self-talk is expressive of emotions, whereas goal-directed self-talk can serve an emotion regulation function. With regard to strategic self-talk, typical proactive cue-word interventions can be used to induce or reinforce desirable feeling states in sports situations. Moreover, reflexive self-talk interventions are a promising alternative that can help create the

metacognitive knowledge and skills that underlie more successful use of goal-directed self-talk to help regulate emotions (Latinjak, Hernando-Gimeno et al., 2019).

As the regulation of emotions during sports competition is key for successful sports performance, practitioners are encouraged to make use of athletes' inner voice. Importantly, instead of a one-fits-all solution, they have to work on developing customised-to-needs modes of self-talk interventions and implement laborious training to successfully regulate emotions in sports contexts. The work of practitioners can further be optimised by various methods such as video-assisted stimulated recall (Martinent & Ferrand, 2009), think-aloud techniques (Samson et al., 2017), or descriptive experience samplings (Dickens et al., 2018).

Overall, it can be argued that, despite the rather obvious and profound links between cognition and emotion, up to now in the sports literature emotion and self-talk have been rarely examined in relation to each other. The recent self-talk conceptualisation that touches upon aspects and theorisations of emotions can provide a valuable platform for the development of research perspectives exploring the intriguing relationships between self-talk and emotions.

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## Chapter 3

### Self-talk and emotion regulation

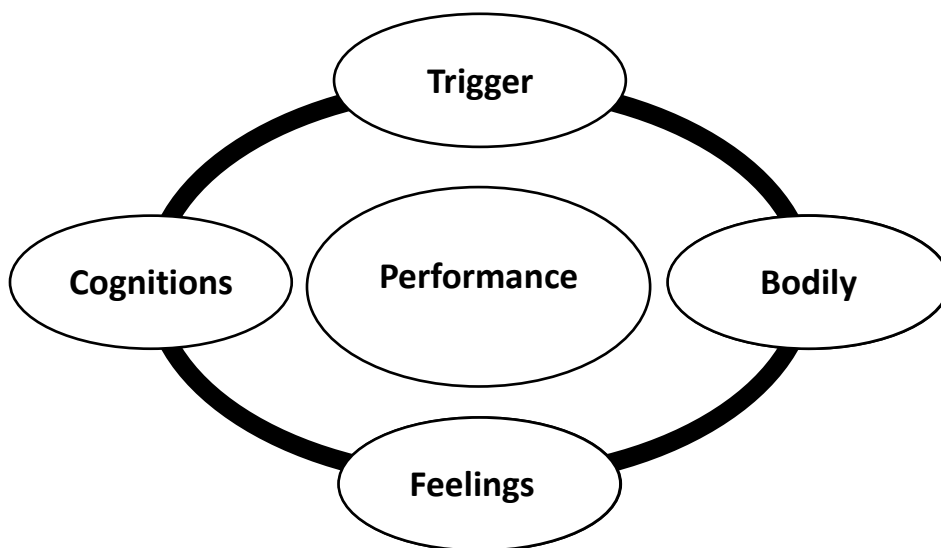
Ronja went through all previous stages and made it to the final of the National Judo Championship. After long and exhausting fights, she is now facing the great favourite who won the last three Championships. Ronja does not normally suffer from a lot of pre-competitive anxiety; however, this time it is different. Just before stepping into the fight arena her muscles are tightening, her heart is pounding, and she is struggling to maintain concentration. Unfamiliar with these reactions, she keeps telling herself “Keep calm, Ronja, it is just a game! Try to enjoy it as much as possible!” and “No one expected that you could make it that far. Put the focus on the fight!”.

#### *What is an emotion?*

Experiences like Ronja's are typically considered to be emotional. Athletes often strive for highly valued goals with uncertain outcome, which explains why emotions are an integral part of sports competitions. Although the term emotion appears intuitively obvious, there is a great deal of debate about its definition in the scientific field. One key controversy centers around the question of whether there are a small number of universal emotions (e.g., anxiety, happiness, sadness) with discrete and specific patterns of response or, on the contrary, an emotion is subjectively constructed (Lindquist, Siegel, Quigley, & Barrett, 2013). Notwithstanding these discrepancies, the various theoretical approaches agree that an emotion is a psychological response to a personally relevant stimulus. This response involves changes in subjective experience (e.g., feeling angry), physiological processes (e.g., changes in heart rate) and observable behaviour (e.g., frowning; Mauss & Robinson, 2009).

### *Cycle of emotions*

In sports psychology, various models, such as the inverted-U hypothesis (Yerkes & Dodson, 1908), the catastrophe model (Hardy, 1990), or the IZOF model (Hanin, 2000), have contributed significantly to our understanding of the relationship between emotions and sports performance. In addition to these models, we outline in the first part of this chapter how a cycle of emotions, operating according to cybernetic principles and mainly referring to high activation emotions, can map emotional processes during a sports competition. This cyclic system is an attempt to explain how an initial event (e.g., the loss of an important point in tennis) can trigger a series of reactions accumulating to an extreme emotional state. As illustrated in Figure 1, the emotional cycle consists of four components: a trigger, bodily reactions, feelings, and cognitions.



*Figure 1.* Cycle of emotions.

### **Trigger**

A trigger represents an automated mechanism that activates the emotional cycle. This mechanism is characterized by the principles of classical and operant conditioning. When a situation is associated with positive or negative consequences, the dominant cues of the



situation will trigger comparable emotional responses in the future. For example, in tennis, experiences of losing a break point, which were associated to negative consequences, may trigger some degree of heightened levels of arousal and hastiness in athletes when faced with the to same situation in the future. Since even the anticipation of a situation can lead to an emotional response, expectations greatly influence whether certain cues trigger emotional responses.

### **Bodily reactions**

The activation of a trigger leads to bodily reactions. According to LeDoux (1996), emotional stimuli are simultaneously processed on a fast and imprecise low road as well as a slow and thorough high road (for the latter see the Cognitions section below). On the low road, information about the stimulus is sent through the thalamus directly to the amygdala. The amygdala induces the release of hormones that lead to an elevated activation (e.g., increased blood pressure, heart rate, muscle tone), preparing the body for action. All of this happens instantly after the confrontation with the stimulus and the individual is not fully aware of what is happening. Notably, in the context of competitive sports, specific nonverbal behaviours, such as dominance and submissiveness, are shown to have a direct effect on onlookers' impression formation (Furley & Schweizer, 2014).

### **Feelings**

Bodily reactions are associated with facial, vocal and postural expressions which influence the emotional experience, highlighting the reciprocal relationship between emotional experience and bodily reactions (e.g., Strack, Martin, & Stepper, 1988). The attempts to make sense of the bodily reactions lead to a subjective impression that, in relation to the situation, is affectively coloured. This subjective impression is reflected in one's affective state representing the raw feeling that something is pleasant or unpleasant, accompanied by a certain level of arousal

(Russell, 2009). Importantly, according to the hedonic asymmetry, negative stimuli have a stronger impact on our affective state and behaviours than positive ones (Frijda, 1988).

### Cognitions

The basic emotional feeling stimulates higher cognitive processes that essentially involves an interplay of organic, spontaneous and goal-directed self-talk. The information processing on the high road involves cortical areas allowing a thorough analysis of the stimulus (LeDoux, 1996). Attention is directed to certain aspects of the situation, memory systems are searched for comparable situations, and scenarios for the course of the ongoing situation are worked out. In line with the mood-state-dependent memory, past situations corresponding to the current affective state are more likely to be recalled (Bower, 1981), amplifying the emotional state. The higher the intensity of the affective state, the more cognitive processes are stimulated. This analysis requires considerable depleting of cognitive resources (Muraven & Baumeister, 2000), which cannot be used to concentrate on the task. As a result, the individual might not have enough cognitive resources to focus on the task at hand. These processes most likely result in performance degradation increasing the chance of further negative events in the competition, thereby, continuing the cycle of emotions.

During a game or match, an athlete can go through multiple accumulating loops in the cycle of emotions. If these automatic and uncontrolled psychological processes are not appropriately regulated, emotions can therefore exert significant influence on performance in sports. When the loops of negative emotions repeat several times, an athlete may enter a downward spiral that results in a temporal state of crisis (see Figure 2). This points to the importance of deliberate strategies that regulate emotions and ultimately avoid performance degradation which athletes should make use of. As we outline in the second part of the chapter, the recently introduced conceptualization of spontaneous and goal-directed self-talk provides a promising platform of assessing the role of self-talk can play in emotion regulation (Latinjak,

Hatzigeorgiadis, Comoutos, & Hardy, 2019; Latinjak, Zourbanos, López-Ros, & Hatzigeorgiadis, 2014).

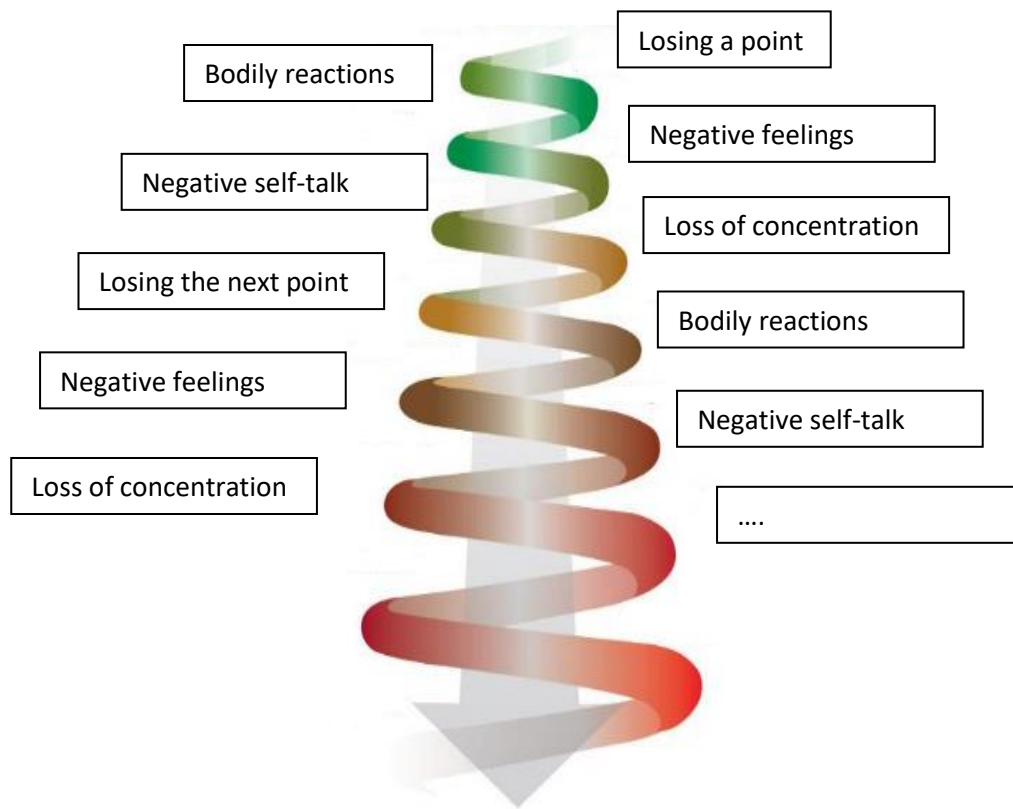


Figure 2. Example of how emotions can impair sports performance when not properly regulated.

### ***Self-talk and emotion regulation***

Significant and emotionally charged moments are naturally an integral part of sports competitions. The cycle of emotions is an example of how emotions affect sports performance, thereby, emphasizing the importance of emotion regulation. Emotion regulation is a key competence and athletes who have developed functional strategies for emotion regulation are less likely to be negatively affected by the cycle of emotions. Similarly, coaches with well-

developed emotion regulation strategies are considered to be more empathic and better valued by their athletes (Strauch, Wäsche, & Jekauc, 2018). In light of the central role of self-talk in emotion regulation and in line with the conceptualization of spontaneous and goal-directed self-talk (Latinjak et al., 2014), we first briefly present the role of spontaneous self-talk as an integral part of the emotion experience. Then, based on the process model of emotion regulation (Gross, 1998), we identify the different emotion regulation functions of goal-directed self-talk.

Spontaneous self-talk, which is automatic and uncontrolled self-talk, is often emotionally charged (Latinjak, Hatzigeorgiadis, & Zourbanos, 2017; Latinjak et al., 2014) or even considered as an expression of emotions (Van Raalte, Vincent, & Brewer, 2016). This implies, that spontaneous self-talk is neither an antecedent nor a consequence, but rather an integral part of the emotion, the same way changes in the peripheral nervous system, in the subjective experience, and in one's observable behaviour are (Russell, 2009). As such, similar to emotions, spontaneous self-talk contains dimensions as (a) valence ranging from positive (e.g., I feel good today), to neutral (e.g., the ball was out), to negative (e.g., I suck), and (b) time-perspective ranging from retrospective (e.g., that was a great shot), to present-related (e.g., the weather is bad today) to anticipatory (e.g., I will win today; Latinjak 2012; Latinjak et al., 2014). As explained in Chapter 2, spontaneous self-talk cannot exist on its own. There is always at least one psychological process which is expressed through spontaneous self-talk. This can explain why spontaneous self-talk can be considered as a window into athletes' mind, reflecting underlying emotional processes (Van Raalte et al., 2016).

Goal-directed self-talk, which is controlled and deliberate, aims at making progress on a task or self-regulation. As emotions are an integral part of sports competitions, it is no surprise that a main function of goal-directed self-talk is emotion regulation (Latinjak et al., 2014; Theodorakis, Hatzigeorgiadis, & Chroni, 2008). For hedonic reasons, athletes usually try to upregulate positive and downregulate negative emotions (Gross, 2015). For instance, shortly before the competition, an athlete might think about past successful competitions in order to

reach a positive state of mind and to avoid negative emotions. Nevertheless, instrumental goals can explain counter-hedonic regulation (Lane, Beedie, Jones, Uphill, & Devonport, 2012). For instance, a study showed that 15% of runners preferred strategies to increase anxiety and/or anger before competition (Lane, Beedie, Devonport, & Stanley, 2011). Similarly, rugby players rated a moderate frequency of anger as beneficial as long as they are able to control their emotions (Robazza & Bortoli, 2007). Notably, when directly comparing the effectiveness of emotion regulation strategies, emotions are reported to be generally easier to regulate when they are experienced as positive rather than negative (Martinent, Ledos, Ferrand, Campo, & Nicolas, 2015).

Goal-directed self-talk can regulate emotions by several means. On the one hand, goal-directed self-talk can focus directly on emotions by enhancing facilitative emotions (e.g., be happy) or dealing with debilitating emotions (e.g., don't be anxious). Here, goal-directed self-talk is often a strategy to deal with spontaneous self-talk and its underlying psychological processes in a reactive manner (Latinjak et al., 2014). On the other hand, goal-directed self-talk can also influence emotions without having a direct focus on emotions by shifting the attention (e.g., focus on the next point) or by altering the meaning of a situation (e.g., mistakes are important for learning). These examples highlight how goal-directed self-talk can also regulate emotions in a proactive manner early in the emotion generation process. A model that aims to classify the different ways of how individuals try to regulate emotions is the process model of emotion regulation postulating five emotion regulation strategies, namely, situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 1998). While situation selection and situation modification refer to attempts aiming at directly modifying the external environment, attentional deployment, cognitive change, and response modulation focus on changing the individual's internal environment and the related bodily reactions (Gross, 2015). In the later three strategies, athletes can use goal-directed self-talk as a technique in itself, a psychological meta-skill that helps to initiate (e.g., imagery) or

be part of other techniques (e.g., pre-performance routines). The potential use of goal-directed self-talk to regulate emotions is supported by neuroscientific findings that indicate how cortical brain regions related with cognitive strategies, such as the prefrontal cortex, can influence subcortical regions related with affective responses, such as the amygdala (Ochsner, Silvers, & Buhle, 2012). For this reason, in the remainder of the chapter we examine the role of goal-directed self-talk in attentional deployment, cognitive change, and response modulation.

### **Attentional Deployment**

According to the process model of emotion regulation, attentional deployment is a strategy that, at an early stage in the emotion generation process, regulates the potential of a stimulus to elicit an emotional response (Gross, 2015). As a stimulus is more likely to trigger an emotional response when one's attention is focused on the stimulus, strategies that move the attention away from or towards the stimulus can either prevent or create an emotional response, respectively (Gross, 1998). Although attentional deployment is considered an antecedent-focused emotion regulation strategy (Gross, 2015), evidence in the sports context shows that goal-directed self-talk can be effective in changing the focus of attention even after the emotion has already emerged (Latinjak et al., 2017). In other words, directing one's attentional focus through goal-directed self-talk can also help athletes decrease the intensity after its occurrence, or prevent it from reoccurring. Interestingly, in the sports context there is evidence that goal-directed self-talk can improve the effectiveness of attentional focus as well as to counter the debilitating effects of internal (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) and external (Galanis, Hatzigeorgiadis, Comoutos, Charachousi, & Sanchez, 2018) distractions.

Anxiety is an emotion that has received a great deal of scrutiny in sports psychology research. According to the attentional control theory changes in athletes' attentional focus can explain the detrimental effects of anxiety on sport performance (Eysenck, Derakshan, Santos, & Calvo, 2007). To elaborate, a high focus on either internal (e.g., concerns about the outcome

of an event) or external (e.g., the opponent goalkeeper in a penalty) stimuli can diminish processing efficiency when attention is taken away from other task-relevant stimuli. For instance, a study showed that football players tend to focus too much on the goalkeeper under anxiety-eliciting condition (Wilson, Wood, & Vine, 2009). As goal-directed self-talk is shown to counteract the detrimental effects of internal and external distractions (Hatzigeorgiadis & Galanis, 2017) as well as anxiety (Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis 2009), it appears to be an effective strategy to reduce these debilitating effects. Importantly, going beyond anxiety and supporting the relevance of instrumental counter-hedonic emotion regulation, Martinent et al. (2015) demonstrated that athletes use attentional deployment including goal-directed self-talk for a wide range of positive and negative emotions. Finally, a point of concern relates to the ironic effects of mental control (Wegner, 1994). It is common to observe that people have difficulties to not think about a certain aspect (e.g., the outcome of the match), especially if they really try. In fact, the deliberate attempt to avoid a specific unwanted thought can even enhance its intensity and the associated emotions (Wegner, 1994). For this reason, it is advisable that goal-directed self-talk does not focus on the stimulus/thought to avoid (e.g., don't think about the past error), but is rather directed to the relevant task (e.g., focus on the next point).

### **Cognitive change**

Cognitive change refers to attempts to alter the meaning of a situation (Gross, 1998) and is often advocated as the most effective emotion regulation strategy (Webb, Miles, & Sheeran, 2012). The basic idea beyond cognitive change is that the way an athlete appraises a situation influences the quality as well as the intensity of the emotional response (Lazarus, 2000). In other words, it is not the situation per se which shapes the emotional response but rather the athlete's interpretation of the situation. A tennis player who is trailing might appraise that the goal of winning is threatened and consequently experiences anxiety. Another player being in

the same situation perceives that situation as a chance to prove her or his abilities and thus experiences hope or excitement. The fact that goal-directed self-talk can be used to change cognitive reactions towards an emotion-eliciting stimulus points to the inherent relationship between goal-directed self-talk and cognitive change (Latinjak et al., 2014).

Sports competitions are often characterized by a stressful nature. Various theoretical approaches distinguish between a challenge and a threat state as possible psychological reactions to such a situation (Blascovich, 2008; Jones, Meijen, McCarthy, & Sheffield, 2009). Through subjective evaluations, athletes weigh their own coping resources against the task demands. Whilst in a challenge state athletes evaluate their coping resources as being equal or greater than the situational demands, in a threat state athletes evaluate the situational demands as being greater than the coping resources (Blascovich, 2008). Since a challenge state is consistently related with superior performance in comparison to a threat state (Hase, O'Brien, Moore, & Freeman, 2019), it is no surprise that athletes are generally advised to consider a competition as a challenge rather than a threat (Jones et al., 2009). Challenge or threat states can enter into an athlete's awareness through spontaneous self-talk. In case a debilitating threat states are identified, athlete could use goal-directed self-talk to reframe this interpretation (e.g., I'm too many points behind to win this match) into an interpretation reflecting a challenge state of the very same situation (e.g., this situation is a chance to show my abilities). Notably, a recent study explicitly examined the effect of a strategic self-talk intervention on athletes' challenge/threat states (Hase, Hood, Moore, & Freeman, 2019). The results revealed a trend showing that athletes being in a threat state might benefit more from instructional self-talk cues whereas athletes being in a challenge state might benefit more from motivational self-talk cues.

The rational-emotive behaviour therapy (REBT; Ellis & Dryden, 1997) is another cognitive-behaviour approach that has recently attracted research in sports psychology in general (Turner, 2016) as well as in relation to self-talk specifically (Turner, Kirkham, & Wood, 2018). Studies consistently show that while rational beliefs (e.g., I really want to win, but it is



okay to lose) are associated with adaptive emotions and behaviours, irrational beliefs (e.g., if I lose today, that will be the end of the world) are associated with maladaptive emotions and behaviours (for a review see Turner, 2016). Although it is important to acknowledge that athletes' self-talk is not always reflective of their deeply held beliefs, self-talk has been proposed as one strategy to apply REBT in the sports context. To elaborate, in a field-based experimental study in golf, rational self-talk has been related with better putting performance and was rated as more usable and facilitative by the participants compared to irrational self-talk (Turner et al., 2018). Although much remains to be discovered concerning the interplay between self-talk, one's deep belief, and emotions, these results indicate that REBT is a promising avenue in the sports context to promote rational beliefs and adaptive emotions.

### **Response modulation**

Although it is often difficult to precisely identify when the emotion generation processes end, and when the emotion regulation processes start (Koole, 2009), according to the process model of emotion regulation, response modulation takes place at a later stage, compared to attentional deployment and cognitive change (Gross, 1998). Once an emotional response has been initiated, changes can be noted in athletes' subjective experience, physiological processes, and observable behaviour (Mauss & Robinson, 2009). For instance, after losing a point, a tennis player might experience anger, his heart beat might increase, and he might visibly shake his head. Here, athletes can use goal-directed self-talk to influence the different components of an emotion by focusing on the subjective experience (e.g., calm down), the physiological processes (e.g., breath slowly), or the observable behaviour (e.g., stand straight).

Research in general psychology indicates that the active suppression of an emotion is typically related to a stronger physiological response (e.g., increased reaction of the sympathetic nervous system) and cognitive costs (e.g., worse memory; Gross, 2015). Of relevance for the sports context, a study, in which a 10-km cycling time trial was used, showed that the effortful

use of emotion suppression leads to a higher perceived exertion and lower performance outcomes (Wagstaff, 2014). Two possible explanations for these detrimental effects are that active emotion suppression (a) exhausts resources that subsequently cannot be used for task performance (Englert, 2016) and (b) can lead to ironic effects of mental control (Wegner, 1994). Nevertheless, it is important to emphasize that other studies support the effectiveness of response modulation in the sports context (Kubiak, Rother, & Egloff, 2019; Wagstaff & Weston, 2014). To elaborate, in a study with military personnel during a 2-month Antarctic mountaineering expedition, expressive suppression, together with acceptance, were rated as the most effective emotion regulation strategies (Wagstaff & Weston, 2014). In addition, Kubiak and colleagues (2019) found that table tennis players with a higher performance status were more likely to use response modulation strategies.

These findings highlight the need for future research exploring whether the evidence from general psychology, suggesting negative implications of response modulation, is applicable in the heat of a sports competition, where it is often difficult to inhibit an emotional response altogether. Specifically, outward emotional reactions, i.e., the behavioural component of emotions, imply various performance-related interpersonal consequences (Fritsch, Elbe, & Hatzigeorgiadis, 2018). For instance, it has been found that negative outward emotional reactions increase, whereas positive outward emotional reactions diminish the opponent's confidence (Furley, Moll, & Memmert, 2015). Similarly, a series of studies looking at the effects of body language provided comparable findings (e.g., Furley & Schweizer, 2014). These studies consistently showed the benefits of a dominant and the downsides of a submissive body language. In addition, regulating one's own outward emotional reactions is important to convey strength to the teammates (Tamminen & Crocker, 2013). Thus, goal-directed self-talk targeting the own body language (e.g., keep your head up) appears suitable, specifically when the other strategies targeting the emotion generation process at an earlier point did not work.

## ***Conclusions***

Emotions are an integral part of competitive sport. They can stimulate athletes to peak performances as well as plunge them into a deep crisis (Jekauc, 2018). The cycle of emotions offers a theoretical explanation of how emotions affect sports performance and emphasizes the importance of emotion regulation as a key competence in sports psychology. Athletes can use goal-directed self-talk that directly but also indirectly influences emotions. In line with the process model of emotion regulation (Gross, 1998), goal-directed self-talk can direct athlete's attention, cognitively change the interpretation of a situation, or modulate the emotional response. Attempting to provide potential research directions on the emotion regulation functions of self-talk, it would be interesting to explore how goal-directed self-talk could most effectively target the cycle of emotions, whether goal-directed self-talk can be more effective with a direct or an indirect focus on emotion regulation, and whether an explicit focus on the underlying psychological processes of spontaneous self-talk could help and thus make the use of goal-directed self-talk more effective.

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## Chapter 4

### **The relationship between self-talk and affective processes in sports: a scoping review**

Self-talk is a construct that has gained in popularity in recent years in sport psychology. The popularity of self-talk is reflected, for example, in the fact that there have been several published reviews of self-talk in recent years (Hardy, 2006; Hatzigeorgiadis et al., 2011; Latinjak, Hatzigeorgiadis, et al., 2019; Tod et al., 2011; Van Raalte et al., 2016). Chronologically, the first review provided a working definition of self-talk that helped distinguish self-talk from other similar constructs (e.g., mental images) and set the stage for the following research (Hardy, 2006). The following two reviews pointed to the potential of self-talk interventions for enhancing sport performance, explaining the popularity of self-talk in the applied field (Hatzigeorgiadis et al., 2011; Tod et al., 2011). Finally, the most recent two reviews introduced new perspectives on self-talk with the goal to promote more theory-based research (Latinjak, Hatzigeorgiadis, et al., 2019; Van Raalte et al., 2016).

In particular, the review of Latinjak, Hatzigeorgiadis, et al. (2019) suggested a distinction between organic and strategic self-talk as two different self-talk entities reflected in the literature. While the origin of strategic self-talk is based on the usage of predetermined cue words with the goal of performance enhancement and/or self-regulation, the origin of organic self-talk refers to athletes' innate thoughts before, during, and after their sport involvement. In line with dual-process approaches (e.g., Christoff, 2012; Kahneman, 2011), organic self-talk is further divided into spontaneous self-talk, a more uncontrolled type of self-talk, and goal-directed self-talk, a more controlled type of self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). This classification bears similarity to the perspective in the review of Van Raalte et al. (2016), distinguishing between System 1 self-talk, a more intuitive type of self-talk, and System 2 self-talk, a more rational type of self-talk.



Examining the relationship between different psychological constructs is important for understanding athletes' performance (Tenenbaum et al., 2009). In particular, the relationship between cognitive processes, like self-talk, and affective processes is considered to be at the heart of psychological inquiry (Ellis, 2003). For this reason, complementary to the existing reviews on self-talk, the focus of the present review is on the relationship between self-talk and affective processes. The umbrella term "affective processes" is used to cover different constructs such as core affect, emotions, and moods (Ekkekakis, 2013). Core affect refers to the raw feeling in a given moment, resulting from the two dimensions valence and arousal (Russell, 2009). Emotions refer to more differentiated states, such as anxiety or happiness viewed as psycho-physiological responses to a relevant stimulus (Russell, 2009). Moods can also be differentiated into various states such as vigor or tension. However, compared to emotions, they are often without a clear cause, less intense, and longer lasting (Beedie et al., 2005). Importantly, the present review is based on the aforementioned distinction between organic and strategic self-talk as an innovative theory-based self-talk perspective (Latinjak, Hatzigeorgiadis, et al., 2019).

### **Organic self-talk**

In organic self-talk, most studies, in particular those conducted before the introduction of more theory-driven self-talk approaches, have focused on the valence and functions of self-talk (Hardy et al., 2018). Regarding valence, studies have typically focused on whether the content of self-talk is positive, negative, or neutral (Van Raalte et al., 1994; Zourbanos et al., 2009). Since affective processes can also be classified by their valence (e.g., Russell & Barrett, 1999), studies about the valence of self-talk indicate how self-talk may be an expression of affective processes (Van Raalte et al., 2016). Studies investigating the functions of self-talk have assessed the purposes self-talk serves, distinguishing, for example, between motivational and instructional self-talk (Hardy, Gammage, et al., 2001). The studies about the functions of self-

talk suggest that self-talk can also be used to regulate affective processes (Theodorakis et al., 2008). Although the studies about the valence and functions of self-talk have indisputably contributed to our understanding of self-talk, a potential ambiguity between the content and functions of self-talk has been recognized (Hardy, Gammage, et al., 2001). For example, some subscales used in the widely used Automatic Self-talk Questionnaire for Sport (ASTQ-S; Zourbanos et al., 2009) that are classified as positive self-talk, thus reflecting the valence of self-talk, could also be viewed as describing functions of self-talk (Karamitrou et al., 2020).

The distinction between spontaneous and goal-directed self-talk may offer a more theory-based approach that could help remedy this potential ambiguity (Latinjak, Hatzigeorgiadis, et al., 2019). Moreover, relevant for this review, this distinction seems particularly useful to investigate the relationship between self-talk and affective processes. Spontaneous self-talk refers to unintended and non-instrumental self-talk statements that come to mind unwillingly in response to stimuli in an ongoing context. The content of spontaneous self-talk has been shown to focus often on evaluating performance (“That was bad”) or predicting outcomes (“I will win”; Latinjak et al., 2014). The emotional connotation of these self-talk statements suggests that spontaneous self-talk often accompany affective processes (Latinjak, Hatzigeorgiadis, et al., 2019). The inherent relationship between spontaneous self-talk and affective processes is further suggested by the structure of spontaneous self-talk (Latinjak et al., 2014). Specifically, the identification of valence as a main dimension of spontaneous self-talk shows an apparent similarity to the structure of core affect underlying affective processes (Russell & Barrett, 1999). This structural similarity is in line with various emotion theories, such as appraisal theories (e.g., Lazarus, 1991; Scherer, 2009) or constructionist theories (e.g., Barrett, 2017; Russell, 2009), emphasizing the role of cognitive processes in emotions.

Goal-directed self-talk is intentionally used to make progress on a task or to solve a problem (Latinjak, Hatzigeorgiadis, et al., 2019). Since affective processes can both positively

as well as negatively influence goal attainment in sports (Hanin, 2007), it is not surprising that emotion regulation is seen as a key function of goal-directed self-talk (Latinjak et al., 2014). In particular, it is assumed that athletes can use goal-directed self-talk to deal with emotions brought into awareness through spontaneous self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). At the same time, goal-directed self-talk may also proactively help to prevent dysfunctional emotions or elicit functional emotions (Van Raalte et al., 2016). The idea that goal-directed self-talk can help regulate emotions at different stages of their development is also consistent with the process model of emotion regulation (Gross, 1998).

### **Strategic self-talk**

The key characteristic of strategic self-talk is that, prior to the sport involvement, cue words are deliberately chosen either by the athletes themselves or by the coach/sport psychologist. These cue words are then used by the athletes during their sport involvement (Latinjak, Hatzigeorgiadis, et al., 2019). Although the content of strategic self-talk can be similar to that of organic goal-directed self-talk, the difference is that organic goal-directed self-talk statements are not based on a predetermined plan, but are elaborated intuitively by an athlete in a given situation. Based on cognitive behaviour approaches (e.g., Beck, 1976; Ellis, 2003), a central idea of strategic self-talk is that through changing one's self-talk, it is possible to change one's feelings and behaviour and, therefore, ultimately also performance. In sport psychology, studies have examined the effectiveness of strategic self-talk through interventions, with the meta-analysis of Hatzigeorgiadis et al. (2011), including 32 studies, showing a moderate positive effect ( $ES = .48$ ) on sport performance. Given this relatively robust evidence for the effectiveness of strategic self-talk, there is a growing research interest in the mechanisms that may explain the effect of strategic self-talk on sport performance. With relevance to this review, the effect of strategic self-talk on affective processes has been put forward as a main mechanism (Hardy, Oliver, et al., 2009).

### **Purpose of the present review**

The link between cognitive and affective processes is considered fundamental within psychological research (Ellis, 2003). For this reason, a review of the available literature on the relationship between self-talk as a cognitive construct and affective processes seems useful for contributing towards a better understanding of mental aspects in athletes' performance. The recent theoretical perspective distinguishing between strategic and organic self-talk provides an innovative perspective for the purpose of such a review (Latinjak, Hatzigeorgiadis, et al., 2019). The results of this review can help identify patterns in the literature and reveal new research questions (Booth et al., 2016). For instance, for organic self-talk, it seems fruitful to assess to which extent the results of studies that are not based on the distinction between spontaneous and goal-directed self-talk correspond with this classification (Latinjak, Hatzigeorgiadis, et al., 2019). This contribution towards more theory-based approaches of self-talk is important for establishing a clearer definition of the different self-talk constructs allowing to define testable hypotheses (Hardy, 2006).

The self-talk approach distinguishing between organic and strategic self-talk implies a variety of interconnected ways in which self-talk and affective processes may be related. Thus, the broad approach taken in scoping reviews was selected for the purposes of this review (Tricco et al., 2018). The specific objectives of the present scoping review were to: (a) provide a comprehensive overview of studies that assessed the relationship between organic self-talk and affective processes; (b) explore the available evidence regarding the potential of strategic self-talk to regulate affective processes.

### ***Methods***

We conducted the scoping review in accordance with the PRISMA Extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018). Furthermore, we registered a protocol prospectively through the website of the Open Science Framework (<registration number

withheld for peer-review>) on 16 July 2020 (updated on 9 March 2021). Following the guidelines of Sandelowski et al. (2006) we opted for an integrated design that allows the synthesis of studies not by method (i.e., quantitative methods and qualitative methods), but by findings addressing the same aspects of a targeted phenomenon.

The review involved a team of five authors who had different responsibilities during the different stages of the review. The first author, who had published on the relationship between self-talk and affective processes, and the second author, who had experience in publishing systematic reviews, were responsible for the identification of the articles, data charting, and data synthesizing. The other three authors had over ten years of experience in publishing empiric research, review articles and book chapters in the field of self-talk and/or affective processes. They contributed with critical comments from their different perspectives to improve the design of the review process, to solve disagreements during the analysis of articles, and to reflect on different interpretations of the review findings.

### **Inclusion and exclusion criteria**

Empirical studies written in English, published in a peer-review journal, and providing insights about the relationship between self-talk and affective processes within the context of sport were included. The term sport referred to motor body movements occurring within the context of a competitive and rule-based activity (Rejeski & Brawley, 1988), thus excluding studies on coaches, referees or spectators. Given the often blurred boundaries between self-talk and other constructs such as mental images or daydreams (Hardy, 2006), studies were only included when self-talk referred to verbalizations addressed to the self (Latinjak, Hatzigeorgiadis, et al., 2019). With regards to affective processes, studies were included when core affect, moods, or emotions were measured (Ekkekakis, 2013). Quantitative studies were included when either both constructs, self-talk and affective processes, were measured or one construct was manipulated and the other one was measured. Studies that combined self-talk with other mental strategies

(e.g., imagery) were excluded, because we were interested in the pure effects of self-talk. Finally, studies that included individuals with mental illnesses were not included, because such illnesses could bias both affective as well as cognitive processes (Ellis, 2003).

### **Search strategy**

The databases PubMed, Scopus, Web of Science (core collection), PsycINFO, and Sportdiscuss were consulted on 16 July 2020 without restrictions for the starting date of the search. The search term (available in the supplementary file 1) for self-talk was based on a previous review on self-talk (Hatzigeorgiadis et al., 2011). For affective processes, the search term covered emotions, affect, and moods (Ekkekakis, 2013), including those emotions (i.e., anxiety, anger, excitement, dejection, happiness) identified as the most relevant to sport performance (Jones et al., 2005). Because search strategies exclusively relying on databases have shown to be non-exhaustive (Hopewell, Clarke, et al., 2007), we checked the reference list of all selected articles for further relevant studies. Finally, we sent an e-mail to all first authors of the identified articles and asked whether they were aware of other relevant articles within this area of research.

### **Identification of articles**

The process of the study selection is shown in Figure 3. All references retrieved from the databases were exported to the software Endnote, where all duplicates were removed. In a first step, the first two authors independently reviewed all titles and abstracts (n = 5799) against inclusion and exclusion criteria. Studies that were excluded by both authors did not pass to the next stage. In light of the large amount of remaining full-texts (n = 310), they were initially reviewed for their potential inclusion by only the first author. Subsequently, the full-texts (n = 107) considered potentially eligible for inclusion were also independently reviewed by the second author. In case the authors could not find an agreement, the fifth co-author of the research team was consulted. The reason for exclusion of studies that were read in full text are listed in the

supplementary file 2. Including the articles identified through other sources ( $n = 3$ ), 44 articles were ultimately selected.

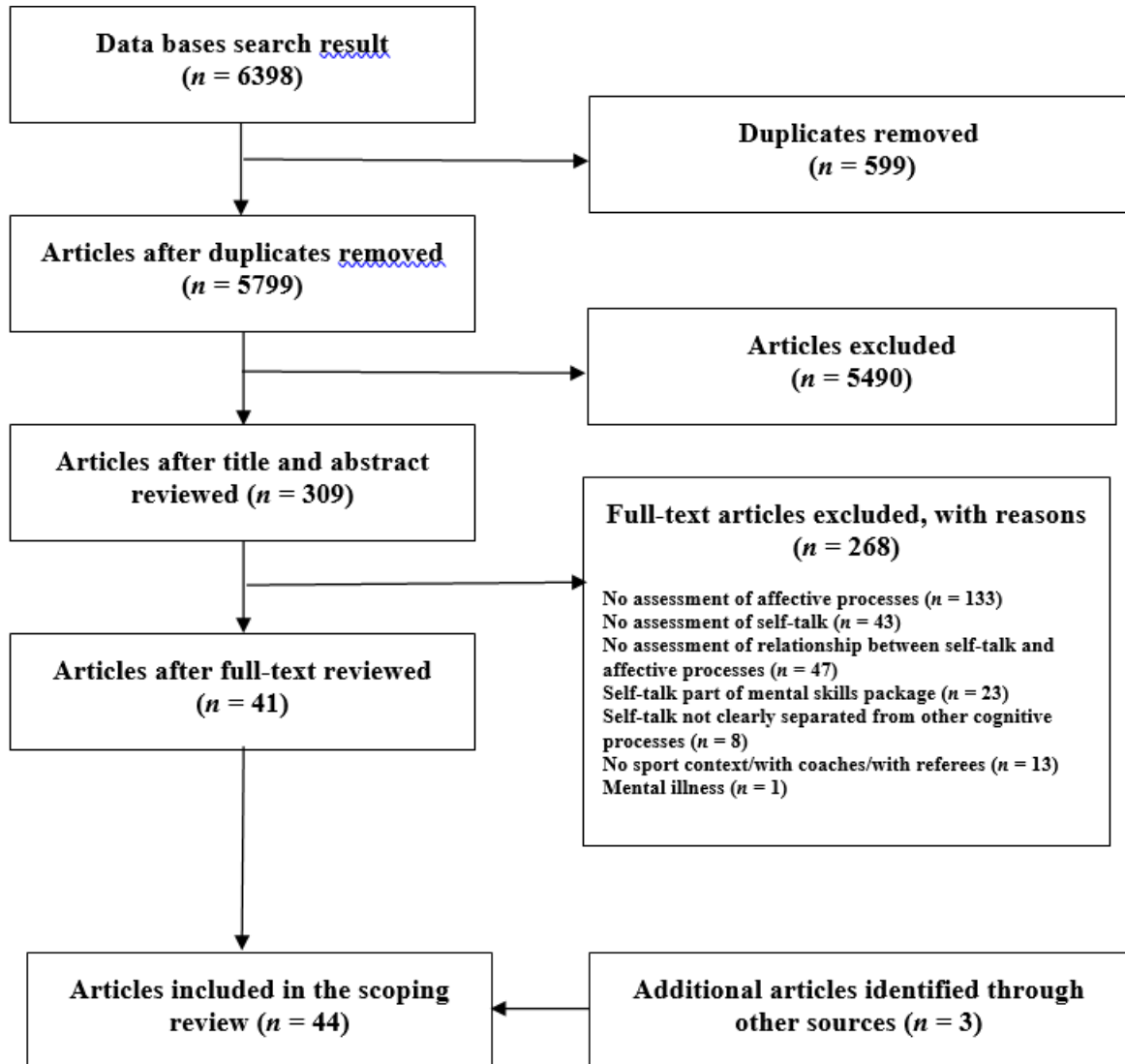


Figure 3. Study selection flow diagram.

### **Data charting**

A table in a Word document was created to determine which study information to extract. This table was used for organic self-talk (Table 3) and strategic self-talk (Table 4). Consequently, the two first authors independently charted the data into the tables. They discussed their results in frequent meetings, while constantly updating the tables in an iterative process. An individualized data extraction table was sent to the first authors of each study to check for accuracy. Twenty-one of the 26 authors responded, with four authors reporting minor inaccuracies referring to the wording in the tables, which were subsequently corrected.

### **Synthesis of results**

Initially, each study was classified as either assessing organic or strategic self-talk. It is important to note that most studies have not been assigned a priori to one of the self-talk entities as they were published before the introduction has been introduced in the literature (Latinjak, Hatzigeorgiadis, et al., 2019). Thus, only those studies in which it was clear that self-talk was a predetermined and deliberate strategy to be used during sport involvement were classified as strategic self-talk. When a study examined different types of self-talk, it could also be classified as both strategic and organic self-talk. For organic self-talk, the results were further classified according to whether or not they used the classification of spontaneous and goal-directed self-talk. Results from studies that did not use this classification were further extracted into the functions and valence of self-talk, where one study could have results for both functions and valence of self-talk. This entire procedure was guided by the first author who was helped by frequent critical discussions with the second author.

### **Results**

The 44 articles were published between 1998 and 2020 and included 46 studies, from which 16 studied strategic self-talk and 31 studied organic self-talk (one study included findings relevant



for both strategic and organic self-talk; Burton et al., 2013). The sample size ranged from 1 to 150 in the qualitative studies and from 7 to 766 in the quantitative studies, with a total sample size of 4010 (1749 females; no information about gender for 43 participants). The study participants came from various sports and competition levels, ranging from recreational to elite. Complete characteristics for each study are provided in Table 3 (organic self-talk) and Table 4 (strategic self-talk).

### **Studies on organic self-talk**

#### **Studies on spontaneous/goal-directed self-talk**

The results of several studies showed that athletes reported both spontaneous and goal-directed self-talk in situations where they experience emotions and/or try to deal with emotions (Boudreault et al., 2018, 2019; Latinjak et al., 2020; Latinjak et al., 2017; Latinjak et al., 2014). When specifically asked about their self-talk in situations where they experience emotions, athletes report more spontaneous than goal-directed self-talk (Latinjak et al., 2017; Latinjak et al., 2014, study 1). Comparing specific emotions, this difference was less pronounced in anger-eliciting situations than anxiety-eliciting situations (Latinjak et al., 2017). In contrast, when specifically asked about their self-talk in situations where they try to regulate emotions, athletes reported more goal-directed than spontaneous self-talk (Latinjak et al., 2014, study 2). Moreover, a study indicated that the intensity of emotions experienced and outward emotional reactions was lower in situations where athletes reported goal-directed self-talk, alone or in conjunction with spontaneous self-talk, than in situations where they reported only spontaneous self-talk (Fritsch et al., 2020). In addition, in two studies with reflexive self-talk interventions, athletes reported that working on their goal-directed self-talk could lead to better management of emotions (Latinjak, Hernando-Gimeno, et al., 2019) and affective states (Latinjak, Font-Lladó, et al., 2016).

Regarding the structure of spontaneous self-talk, studies showed that the valence and the time-perspective of spontaneous self-talk were associated with the valence and time-perspective of emotions (Boudreault et al., 2019; Latinjak et al., 2020; Latinjak et al., 2017). With respect to the specific functions of goal-directed self-talk, Latinjak et al. (2017) compared anxiety-eliciting and anger-eliciting situations. The results showed that in anxiety-eliciting situations the number of goal-directed self-talk statements related to creating activated states, controlling activated states, and creating deactivated states was higher, while in anger-eliciting situations more goal-directed self-talk statements related to controlling cognitive reactions, controlling deactivated states, and regulating behaviour were reported.

#### Studies on valence of self-talk

##### *Studies on negative self-talk*

Several studies showed that measures of negative self-talk positively correlated with measures of negative affective processes, such as anxiety (Burton et al., 2013; Cheng & Hardy, 2016; Conroy & Metzler, 2004; Hatzigeorgiadis & Biddle, 2008; Latinjak, Viladrich, et al., 2016; Zourbanos et al., 2009), fear of failure (Conroy, 2004; Conroy & Coatsworth, 2007; Conroy & Metzler, 2004), fear of success (Conroy & Metzler, 2004), mood states, such as tension and boredom (De Muynck et al., 2020; Zourbanos et al., 2009), and negative affect (Hardy, Hall, et al., 2001). Qualitative studies also indicated that negative self-talk was associated with negative feelings (Woodcock et al., 2012), and negative emotions, such as anxiety, nervousness, disappointment, or anger (Neil et al., 2016; Neil et al., 2011). With regards to the interpretation of anxiety, a cross-sectional study showed that negative self-talk was negatively correlated with the regulatory anxiety dimension (Cheng & Hardy, 2016). Finally, one study showed a negative relationship between measures of negative self-talk and vigour as a positive mood state (Zourbanos et al., 2009).

### Studies on positive self-talk

The majority of findings revealed that measures of positive self-talk negatively correlated with measures of negative affective processes, such as anxiety (Conroy & Metzler, 2004; Zourbanos et al., 2009), fear of failure (Conroy, 2004; Conroy & Metzler, 2004), fear of success (Conroy & Metzler, 2004), negative mood states, such as tension and boredom (Zourbanos et al., 2009), or negative affect (Hardy, Hall, et al., 2001). However, other studies showed no such correlation (Burton et al., 2013; De Muynck et al., 2020), or a positive correlation between some positive self-talk subscales (i.e., Anxiety-control and Instructions) and somatic anxiety (Latinjak, Viladrich, et al., 2016; Zourbanos et al., 2009). With regards to positive affective processes, one study pointed to a positive correlation between measures of positive self-talk and vigour as a positive mood state (Zourbanos et al., 2009). This was supported by the qualitative finding that positive self-talk was associated with the positive emotion relaxation (Neil et al., 2016).

### Studies on temporal sequence of self-talk and affective processes.

Investigating affective processes as an antecedent of self-talk, it was shown that negative emotions before the competition, such as anxiety (Hatzigeorgiadis & Biddle, 2008, study 1 & 2), or fear of failure (De Muynck et al., 2020), were positively associated with negative self-talk during the competition. These findings are consistent with a qualitative study indicating that negative emotions were a trigger of negative self-talk (Hardy, Roberts, et al., 2009). Moreover, it was shown that a facilitative interpretation of anxiety before the competition was associated with less negative self-talk during the competition (Hatzigeorgiadis & Biddle, 2008, study 1 & 2). This finding is consistent with a qualitative study reporting that negative self-talk was a consequence of a debilitating interpretation of anxiety (Neil et al., 2011). Also, positive self-talk during a competition could be predicted by fear of failure before the competition (De Muynck et al., 2020), which is in line with the qualitative finding that positive emotions could result from negative self-talk (Hardy, Roberts, et al., 2009). In the opposite direction, studying

affective processes as a consequence of self-talk, it was shown that changes in negative self-talk predicted changes in fear of failure (Conroy & Coatsworth, 2007). This is consistent with the qualitative finding that negative emotions were a possible consequence of negative self-talk (Hardy, Roberts, et al., 2009).

### Studies on functions of self-talk

Cross-sectional findings revealed negative correlations between cognitive self-talk and performance worries as well as social evaluation worries (Zervas et al., 2007). Other findings indicated positive correlations between the use of motivational as well as instructional self-talk and the regulatory anxiety dimension (Cheng & Hardy, 2016). These findings are in line with qualitative studies reporting that motivational self-talk was positively associated with a facilitative interpretation of anxiety (Neil et al., 2011), or both instructional and motivational self-talk with positive feelings (Woodcock et al., 2012).

Regarding the potential of self-talk for emotion regulation, in a qualitative study the control of one's arousal level was reported as a main function of self-talk (Hardy, Gammage, et al., 2001). Referring to more specific self-talk functions in other qualitative studies, both motivational and instructional self-talk were reported to control one's emotional experience in general (Coulter et al., 2010; Neil et al., 2016), or to deal with specific emotions such as anxiety, sadness, or anger (Miles & Neil, 2013; Miles et al., 2016). In addition, positive self-talk (Martinent et al., 2015; Neil et al., 2016) as well as rational self-talk (Martinent et al., 2015; Miles & Neil, 2013; Miles et al., 2016) were reported to deal with a wide range of positive (e.g., joy, pride) and negative emotions (e.g., anger, anxiety

**Table 2.** Findings on the relationship between organic self-talk and affective processes.

Study	Theoretical framework	Participants	General purpose of study	Research design and methods	Main results with regards to the relationship between self-talk and affective processes
Bernier et al., (2016); France	Nondichotomous framework of attentional foci	Figure skaters <i>n</i> = 8 (4 female) Age: 20.7 ± 1.79 Level = Expert	Exploration of attentional foci and their temporal patterns in expert figure skaters.	Self-confrontation interviews based on footage of competitive performance	In real competition situations, experienced emotions were reported to be expressed through self-talk.
Boudreault et al. (2018); Canada	Spontaneous/goal-directed self-talk	Tennis players <i>n</i> = 6 (3 female) Age: 14-18 Level = Among top 10 in Quebec	Examination of content of tennis players' self-talk in relation to emotions during key events in matches.	Semi-structured interviews within 30 minutes after a competitive match	Five categories of spontaneous self-talk (positive emotion expression, worry rumination, performance pressure, and disengagement) and three categories of goal-directed self-talk (motivational, instructional, and emotional control) were identified in relation to emotions.
Boudreault et al. (2019); Canada	Spontaneous/goal-directed self-talk	Tennis players <i>n</i> = 2 (1 female) Age: 14 and 15 Level = Junior-elite	Examination of content of tennis players' and their parents' self-talk in relation to emotions felt during matches.	Semi-structured interviews in relation to three competitive matches within 30 minutes after the third match	The valence of spontaneous self-talk was related to the valence of emotions (e.g., negative self-talk to anxiety). Goal-directed self-talk was reported to be used to deal with spontaneous self-talk and associated emotions.
Burton et al., (2013); United States	N/A	Football players <i>n</i> = 214 (214 female) Age = 14.6 Level = State to regional	Assessment of relationship between perceived self-talk frequency and effectiveness and other psychological variables.	Cross-sectional design; Sport Anxiety Scale; Soccer Self-Talk Practices Questionnaire	Trait somatic anxiety/trait worry correlated with negative self-talk frequency ( $r = .23^{**}/r = .29^{**}$ ), and self-talk performance impact frequency ( $r = .09/r = .21^{**}$ ), but not with positive self-talk frequency ( $r = .00/r = .02$ ).
Cheng & Hardy (2016, study 2); Taiwan	Three-dimensional model of anxiety	Sport students from various sports <i>n</i> = 370 (142 female) Age = 20.6 ± 1.7 Level = Regional to international	Assessment of the three-dimensional model of performance anxiety by relating it to perfectionism, self-talk, and coping.	Cross-sectional design Chinese Three-Factor Anxiety Inventory; Chinese Self-talk Inventory	Regulatory anxiety dimension was predicted by motivational self-talk ( $\beta = .36^{**}$ ) and instructional self-talk ( $\beta = .24^{**}$ ), but not by negative self-talk ( $\beta = -.03$ ). Cognitive anxiety was predicted by negative self-talk ( $\beta = .441^{**}$ ), but not by motivational self-talk ( $\beta = -.004$ ), and instructional self-talk ( $\beta = .129$ ). Physiological anxiety was predicted by negative self-talk ( $\beta = .350^{**}$ ), motivational self-talk ( $\beta = -.237^{**}$ ), and instructional self-talk ( $\beta = .164^{*}$ ).
Conroy (2004); United States	Multidimensional, hierarchical model of fear of failure	Students engaged in recreational physical activity <i>n</i> = 440 (234 female, 2 did not report their gender) Age = 20.51 ± 1.92 Level = N/A	Assessment of the relationship between fear of failure and self-talk while failing, achievement goals, as well as contextual motivation.	Cross-sectional design Performance Failure Appraisal Inventory; SASB Intrex Introject Questionnaire	Partial correlations showed that (a) fear of experiencing shame and embarrassment correlated with the self-talk dimensions of self-affirm ( $r = -.13^{*}$ ), self-blame ( $r = .20^{*}$ ), and self-attack ( $r = .10^{*}$ ); (b) fear of devaluing one's self-estimate correlated with the self-talk dimension of self-blame ( $r = .17^{**}$ ); (c) fear of having uncertain future correlated with the self-talk dimensions of self-blame ( $r = .15^{**}$ ), self-attack ( $r = .19^{**}$ ), and self-neglect ( $r = .19^{**}$ ); (d) fear of important others losing interest correlated with the self-talk dimensions of active self-love ( $r = -.15^{**}$ ), self-protect ( $r = -.15^{**}$ ), and self-neglect ( $r = .17^{**}$ ); (e) fear of upsetting important others correlated with the self-talk dimension of self-affirm ( $r = -.15^{**}$ ). Non-significant effects are not reported here.

Conroy & Metzler (2004); United States	Structural analysis of social behavior	Students engaged in recreational physical activity $n = 440$ (234 female, 2 did not report their gender) Age = $20.5 \pm 1.9$ Level = N/A	Assessment of the relationship between self-talk and situation-specific performance anxieties.	Cross-sectional design Performance Failure Appraisal Inventory; Fear of Success Scale; Sport Anxiety Scale; SASB Intrex Introject Questionnaire in four conditions: self-talk while failing, self-talk while succeeding, feared self-talk when performing, and wished self-talk when performing	Partial correlations showed that (a) while failing: fear of failure correlated with the self-talk dimensions of self-blame ( $r = .33^{**}$ ), and self-neglect ( $r = .14^*$ ), and sport anxiety with the self-talk dimensions of self-emancipate ( $r = -.14^*$ ) and self-attack ( $r = .19^*$ ); (b) while succeeding: fear of failure correlated with the self-talk dimension of self-control ( $r = .19^{**}$ ), and sport anxiety with the self-talk dimension of self-control ( $r = .16^*$ ); (c) for feared self-talk when performing: fear of failure correlated with the self-talk dimension of self-control ( $r = .18^{**}$ ), and sport anxiety with the self-talk dimension of self-blame ( $r = .37^{**}$ ); for wished self-talk when performing: fear of failure correlated with the self-talk dimension of self-control ( $r = .18^{**}$ ). Non-significant effects are not reported here.
Conroy & Coatsworth (2007); United States	Multidimensional, hierarchical model of fear of failure; Structural analysis of social behavior	Students of summer swim league $n = 165$ (99 female) Age = $11.17 \pm 2.21$ Level = N/A	Assessment of the impact of coaches' behavior on athletes' fear of failure by regarding their self-talk and satisfaction of psychological needs.	Longitudinal design; short form of Performance Failure Appraisal Inventory; Single-items for self-affirmation, self-protection, self-control, and self-blame	In the initial measure, fear of failure was predicted by the self-talk dimensions of self-control ( $\beta = .29^*$ ), and self-blame ( $\beta = .29^{**}$ ), but not of self-affirmation ( $\beta = -.04$ ) and self-protection ( $\beta = -.03$ ). Considering the changes from initial to final measure six weeks afterwards, changes of fear of failure were predicted by changes in the self-talk dimension of self-blame ( $\beta = .74^{**}$ ), but not by changes in the self-talk dimensions of self-affirmation ( $\beta = -.22$ ), self-protection ( $\beta = .19$ ), and self-control ( $\beta = .15$ ).
Coulter et al. (2010); Australia	Process model of mental toughness	Soccer players $n = 6$ (0 female) Age: $29.3 \pm 3.8$ Level = Elite	Exploration of mental toughness in soccer players.	Semi-structured interviews	Instructional and motivational self-talk were used by mentally tough players to control emotional experience.
De Muynck et al. (2020); Belgium	N/A	Tennis players $n = 120$ (39 female) Age = $25.22 \pm 9.82$ Level = Low to high national ranking	Assessment of the relationship between self-reported self-talk and self-talk assessed through thinking-aloud during a tennis performance task. In a subsidiary analysis, fear of failure as antecedent and perceived tensions as outcome of self-talk were assessed.	Longitudinal design; Fear of Failure Scale of shortened Achievement Motives Scale; Pressure subscale of Intrinsic Motivation Inventory; Thinking-aloud; Automatic Self-Talk Questionnaire for Sports	Positive self-talk ( $\beta = .25^*$ ) and negative self-talk ( $\beta = .32^{**}$ ) during tennis matches were predicted by fear of failure before the match. Perceived tension during the match was predicted by negative self-talk ( $\beta = .70^{**}$ ) during the match, but not by positive self-talk during the match ( $\beta = .14$ ).
Fritsch et al. (2020); Germany	Spontaneous/goal-directed self-talk	Tennis players $n = 20$ (7 female) Age = $23.10 \pm 4.88$ Level = Regional to international	Assessment of the relationship between self-talk and emotions experienced as well as outward emotional reactions during competitive tennis matches.	Cross-sectional design; single items for emotion experience and outward emotional reactions; video-assisted self-talk recall	Fixed/random effect model: Intensity of emotions experienced ( $\beta = -1.40^{**}/\beta = -1.40^{**}$ ) and outward emotional reactions ( $\beta = -0.79^{**}/\beta = -0.76^*$ ) were lower in situations with only goal-directed self-talk compared to situations with only spontaneous self-talk. Intensity of emotions experienced ( $\beta = -0.46^{**}/\beta = -0.38$ ), but not of outward emotional reactions ( $\beta = -0.27/\beta = -0.25$ ), was lower in situations with spontaneous self-talk in conjunction with goal-directed self-talk compared to situations with only spontaneous self-talk.
Hardy, Gammage et al. (2001); Canada	N/A	Athletes from various sports $n = 150$ (72 female) Age = $20.68 \pm 1.90$ Level = N/A	Examination of where, when, what, and why athletes use self-talk.	Open-ended questions in questionnaire	Among other functions, self-talk was reported to be used to psych up, to relax, or to control arousal levels.

Hardy, Hall et al. (2001); Canada	N/A	Athletes from various sports <i>n</i> = 90 (31 female) Age = 16 ± 1.4 Level = N/A	Assessment of relationship between self-talk and affect before competitions and practice.	Cross-sectional design; Affect Grid; Self-talk Grid	Partial correlations showed that before practice/competition, valence of self-talk correlated with the valence of affect ( $r = .25^*/r = .35^{**}$ ), but not with the intensity of affect ( $r = .07/r = .06$ ); the intensity of self-talk correlated with intensity of affect ( $r = .31^{**}/r = .50^{**}$ ), but not with the valence of affect ( $r = .03/r = .04$ ).
Hardy et al. (2009); United Kingdom	N/A	Physically active kinesiology students <i>n</i> = 73 (27 female) Age: 19.81 ± 3.05 Level = N/A	Assessment of the effectiveness of a logbook and paperclip technique with the purpose to change negative self-talk. In a subsidiary analysis, antecedents and consequences of negative self-talk were examined qualitatively.	Logbook	Negative emotions ( $n = 4/229$ ) were reported as one of the triggers of negative self-talk. Negative emotions ( $n = 41/211$ ), mixed emotions ( $n = 5/211$ ), and positive affect ( $n = 11/211$ ) were reported as some of the consequences of negative self-talk.
Hatzigeorgiadis & Biddle (2008, study 1); Greece	Control process theory	Cross-country runners <i>n</i> = 38 (11 female) Age = 22.02 ± 2.33 Level = N/A	Assessment of the relationship between anxiety, goal-performance discrepancies, and negative self-talk during running competitions.	Longitudinal design; modified version of Competitive State Anxiety Inventory-2; Performance Worries subscale of Thought Occurrence Questionnaire for Sport	Negative self-talk during competition was correlated with cognitive anxiety intensity ( $r = .34^*$ ), cognitive anxiety direction ( $r = -.34^*$ ), and somatic anxiety direction ( $r = -.32^*$ ), but not with somatic anxiety intensity ( $r = .23$ ), all measured before the competition.
Hatzigeorgiadis & Biddle (2008, study 2); Greece	Control process theory	Cross-country runners <i>n</i> = 36 (12 female) Age = 23.14 ± 6.46 Level = N/A	Assessment of the relationship between anxiety, goal-performance discrepancies, and negative self-talk during running competitions.	Longitudinal design; modified version of Competitive State Anxiety Inventory-2; Performance Worries subscale of Thought Occurrence Questionnaire for Sport	Negative self-talk during competition was correlated with cognitive anxiety intensity ( $r = .34^*$ ), and cognitive anxiety direction ( $r = -.37^*$ ), but not with somatic anxiety intensity ( $r = .29$ ) and somatic anxiety direction ( $r = -.24$ ), all measured before the competition.
Latinjak, Font-Lladó et al. (2016); Spain	Spontaneous/goal-directed self-talk	Orienteer <i>n</i> = 1 (0 female) Age: 36 Level = Elite	Description of a goal-oriented self-talk intervention.	Semi-structured interviews throughout the self-talk intervention	A positive effect on affective states was reported to be one of the outcomes of the intervention.
Latinjak, Hernando-Gimeno et al. (2019); United Kingdom	Spontaneous/goal-directed self-talk	Athletes from various sports <i>n</i> = 4 (4 female) Age: 20-40 Level = Professional	Assessment of a reflexive self-talk intervention.	Semi-structured interviews before and after the intervention	A better control of emotions was reported to be one of the outcomes of the intervention.
Latinjak, Viladrich et al. (2016); Spain	N/A	Athletes from various sports <i>n</i> = 263 (62 female) Age = 20.30 ± 3.08 Level = Regional to international	Validation of the Spanish version of the Automatic Self-talk Questionnaire for Sports	Cross-sectional design; Sport Anxiety Scale-2; Automatic Self-talk Questionnaire in Sports	Cognitive anxiety was correlated with self-talk dimensions of somatic fatigue ( $r = .14^*$ ), worry ( $r = .48^{**}$ ), and disengagement ( $r = .35^{**}$ ), but not of motivation, confidence, instruction, anxiety control, and irrelevant thoughts. Somatic anxiety was correlated with self-talk dimensions of somatic fatigue ( $r = .38^{**}$ ), worry ( $r = .43^{**}$ ), disengagement ( $r = .44^{**}$ ), instruction ( $r = .21^{**}$ ), and anxiety control ( $r = .28^{**}$ ), but not of motivation, confidence, and irrelevant thoughts. No effect sizes were mentioned for non-significant correlations.

Latinjak et al. (2014, study 1); Spain	Spontaneous/goal-directed self-talk	Athletes from various sports <i>n</i> = 32 (14 female) Age = 19.24 ± 1.51 Level = National to international	Assessment of undirected and goal-directed self-talk.	Thought-sampling procedure in relation to situations where sadness, anger, resignation, anxiety, relief, euphoria, confidence, or excitement was experienced	In emotional situations, 466 from 474 self-talk statements were spontaneous, which could then be classified based on valence and time-perspective.
Latinjak et al. (2014, study 2); Spain	Spontaneous/goal-directed self-talk	Athletes from various sports <i>n</i> = 55 (10 female) Age = 19.73 ± 2.10 Level = National to international	Assessment of undirected and goal-directed self-talk.	Thought-sampling procedure in relation to emotional situations where athletes want to improve performance or control emotions	In emotional situations where athletes want to improve performance or control emotions, 1164 from the 1171 self-talk statements were goal-directed, which could then be classified into 7 categories defined by time-orientation and activation: Controlling cognitive reactions, controlling activated states, controlling deactivated states, creating activated states, creating deactivated states, regulating behavior, and focusing on positive predictions.
Latinjak et al., (2017); Spain	Spontaneous/goal-directed self-talk	Athletes from various sports <i>n</i> = 87 (25 female) Age = 19.66 ± 2.07 Level = National	Exploration of self-talk in anger- and anxiety-eliciting sport situations.	Cross-sectional design; thought sampling procedure in relation to anger and anxiety	In anger- and anxiety-eliciting situations, more spontaneous than goal-directed self-talk was reported (no effect size mentioned). Comparing both situations, more goal-directed self-talk was reported in anger-eliciting situations (no effect size mentioned). Spontaneous self-talk was more negative/retrospective in anger- and more positive/anticipatory in anxiety-eliciting situations (partial $\eta^2 = .158^{**}$ /partial $\eta^2 = .264^{**}$ ). In anger-eliciting situations, larger amounts of goal-directed self-talk were reported in relation to controlling cognitive reactions, controlling deactivated states, and regulating behavior, and in anxiety-eliciting situations, larger amounts of goal-directed self-talk were reported in relation to creating activated states, controlling activated states and creating deactivated states (Cramers' $V = .384^{**}$ ).
Latinjak et al. (2020); Spain	Spontaneous/goal-directed self-talk	Basketball and football players <i>n</i> = 30 (0 female) Age = 22.77 ± 4.04 Level = Regional to national	Exploration of spontaneous self-talk in emotion-eliciting sport situations.	Cross-sectional design; thought sampling procedure in relation to anger, anxiety, excitement, and euphoria.	An interaction between self-talk and emotions (Cramer's $V = .760^{**}$ ) was shown. In anxiety, self-talk was mostly anticipatory negative or anticipatory neutral. In anger, self-talk was mostly retrospective negative. In excitement, self-talk was mostly anticipatory positive or anticipatory neutral. In euphoria, self-talk was mostly retrospective positive or anticipatory positive.
Martinet et al. (2015); France	Process model of emotion regulation	Table tennis players <i>n</i> = 11 (0 female) Age = 23.82 ± 5.74 Level = National	Assessment of emotion regulation strategies and their effectiveness in table tennis players.	Self-confrontational interviews based on footage of competitive matches	Positive and rational self-talk were reported to be used to deal with anger ( <i>n</i> = 153 instances and <i>n</i> = 44), joy ( <i>n</i> = 13 and <i>n</i> = 2), anxiety ( <i>n</i> = 39 and <i>n</i> = 22), relief ( <i>n</i> = 0 and <i>n</i> = 2), discouragement ( <i>n</i> = 1 and <i>n</i> = 1), hope ( <i>n</i> = 1 and <i>n</i> = 1), disappointment ( <i>n</i> = 0 and <i>n</i> = 2), pride ( <i>n</i> = 0 and <i>n</i> = 1), and disgust ( <i>n</i> = 0 and <i>n</i> = 3).
Miles et al. (2013); United Kingdom	N/A	Cricketers <i>n</i> = 5 (no information about gender) Age = 28.4 ± 7.3 Level = Professional	Assessment of self-talk during cricket batting performance.	Self-confrontational interview based on footage of competitive match	Motivational self-talk was reported to regulate increasing levels of anxiety during declining performance. In addition, rational self-talk was reported to help prevent becoming anxious during difficult periods of batting.
Miles et al. (2016); New Zealand	Cognitive-motivational-relational theory of emotions	Cricketers <i>n</i> = 4 (0 female) Age = 21.25 ± 1.5 Level = Elite	Exploration of stressors, cognitions, emotions, coping strategies, and behaviors experienced the week before the first competition of the season.	Self-confrontational interviews based on footage of competitive match and stressors identified in reflective diaries	Instructional, motivational and rational self-talk were used to regulate different kinds of emotions (anxiety, sadness, anger) on the days before the competition as well as during the competition.



Neil et al. (2011); United Kingdom	Cognitive- motivational- relational theory of emotions	Athletes from various sports <i>n</i> = 12 (6 female) Level= Elite to non- elite	Exploration of stress and emotion processes by focusing on further appraisals and their perceived impact on subsequent performance.	Semi-structured interviews	Anxiety, nervousness, and anger were reported as a result of negative, primarily self-doubting, self-talk. If anxiety was interpreted as facilitative, motivational self-talk was used to deal with the anxiety symptoms. If anxiety was interpreted as debilitating, the anxiety was followed by more negative self-talk.
Neil et al. (2016); United Kingdom	Cognitive- motivational- relational theory of emotions	Cricketers <i>n</i> = 3 (0 female) Age = 20.5 ± 2.38 Level = Semi- professional	In-depth examination of stress and emotion process during cricket performance.	Semi-structured interviews supported by the use of reflective journals	While negative self-talk was reported to be associated with negative emotions, such as anxiety, disappointment, anger, positive self-talk was reported to be associated with positive emotions such as relaxation. In addition, positive and instructional self-talk was reported to be used for maintaining control over negative emotions.
Woodcock et al. (2012); United Kingdom	Individual zone of optimal functioning	Cross-country runner <i>n</i> = 1 (1 female) Age = 19 Level = University	Exploration of the process of working with an athlete to facilitate skills of emotion regulation.	Semi-structured interviews within an action research approach	The athlete used instructional and motivational self-talk associated with positive/functional feelings when performing well. When performing bad, the athlete had negative self-talk associated with negative/dysfunctional feelings.
Zervas et al (2007, phase 3); Greece	N/A	Athletes from various sports <i>n</i> = 350 (147 female) Age = 20.83 ± 3.07 Level = National to international	Development and validation of a questionnaire that assesses cognitive and motivational functions of self-talk.	Cross-sectional design; Competitive Worries Inventory; Self-Talk Questionnaire for Sports	Cognitive/motivational self-talk correlated with performance worries frequency ( $r = -.18^*/r = -.10$ ), performance worries intensity ( $r = -.16^*/r = -.06$ ), social evaluation worries frequency ( $r = -.18^*/r = -.10$ ), and social evaluation worries intensity ( $r = -.17^*/r = -.10$ ).
Zourbanos et al. (2009, stage 4); Greece	N/A	Athletes from various sports <i>n</i> = 766 (299 female) Age = 17.44 ± 5.18 Level = Regional to international	Development and validation of a questionnaire that assesses athletes' automatic self-talk.	Cross-sectional design; Affect State Inventory; Sport Anxiety Scale; Automatic Self-talk Questionnaire in Sports	Cognitive anxiety/somatic anxiety correlated with the self-talk dimensions of confidence ( $r = -.34^{**}/r = .00$ ), instruction ( $r = -.05/r = .13^*$ ) anxiety control ( $r = .06/r = .24^{**}$ ), somatic fatigue ( $r = .38^{**}/r = .28^{**}$ ), disengagement ( $r = .40^{**}/r = .29^{**}$ ), worry ( $r = .50^{**}/r = .25^{**}$ ), and irrelevant thoughts ( $r = .14^*/r = .16^*$ ), but not with psych up ( $r = -.12/r = .04$ ). Vigor/Tension/Boredom correlated with the self-talk dimensions psych up ( $r = .26^{**}/r = -.16^*/r = -.26^{**}$ ), confidence ( $r = .44^{**}/r = -.36^{**}/r = -.35^{**}$ ), instruction ( $r = .37^{**}/r = -.23^{**}/r = -.24^{**}$ ), anxiety control ( $r = .29^{**}/r = -.12/r = -.22^{**}$ ), somatic fatigue ( $r = -.45^{**}/r = .51^{**}/r = .50^{**}$ ), disengagement ( $r = -.42^{**}/r = .39^{**}/r = .40^{**}$ ), worry ( $r = -.54^{**}/r = .56^{**}/r = .47^{**}$ ), and irrelevant thoughts ( $r = -.40^{**}/r = .48^{**}/r = .49^{**}$ ).

Notes: \* $<.05$ ; \*\* $<.01$

### *Studies on strategic self-talk*

Of five intervention studies all assessing the effects on cognitive and somatic anxiety, three showed a significant effect of self-talk treatment on state cognitive anxiety (Hatzigeorgiadis et al., 2009; Hatzigeorgiadis et al., 2007; Kannian, 2015) and two on state somatic anxiety (Kannian, 2015; Walter et al., 2019). A direct comparison of cue words showed that anxiety-control statements were more effective than attention-related statements, which, however, also had a significant anxiety reducing impact (Hatzigeorgiadis et al., 2007).

The potential of strategic self-talk for emotion regulation was further supported by qualitative findings that showed that athletes deliberately used self-talk as a mental strategy to deal with different types of emotions and feelings in general (Devonport, 2006; Thelwell & Greenlees, 2003), to regulate pre-competitive mood states (Cotterill et al., 2010), to control stress and anxiety (Freitas et al., 2013), and to interpret anxiety symptoms in a facilitative way (Hanton et al., 2004; Wadey & Hanton, 2008). Quantitative cross-sectional findings also showed that athletes who used self-talk as a mental strategy more often tended to interpret somatic anxiety as more facilitative and had lower scores in cognitive and somatic anxiety (Fletcher & Hanton, 2001; Ryska, 1998). In contrast to these findings, it was also found that trait somatic anxiety correlated positively with the use of self-talk as a strategy (Burton et al., 2013), and that in athletes who tended to have a debilitating interpretation of anxiety, the use of strategic self-talk often turned into negative cognitions (Hanton et al., 2005). In addition, a study showed that the use of rational compared to irrational self-talk had no effect on anxiety (Wood et al., 2017).

**Table 3.** Findings on the relationship between strategic self-talk and affective processes.

Study	Theoretical framework	Participants	General purpose of study	Research design & methods	Main results with regards to the relationship between self-talk and affective processes
Cotterill et al. (2010); United Kingdom	N/A	Golfers <i>n</i> = 6 male (0 female) Age = 29 ± 2.5 Level = Amateur	Exploration of participants' views on their use of pre-performance routines.	Self-confrontational interviews based on footage of competitive matches combined with thinking aloud	In pre-performance routines, self-talk was identified as one strategy that could be used to regulate mood states.
Devonport (2006); United Kingdom	N/A	Kickboxers <i>n</i> = 3 (1 female) Age = 37 ± 9.6 Level = Elite	Exploration of the contribution of psychology to the development and maintenance of expert performance in kickboxing.	Semi-structured interviews (one individual; one dual)	Self-talk was reported as a main strategy to control emotions during the competition.
Burton et al., (2013); United States	N/A	Football players <i>n</i> = 214 (214 female) Age = 14.6 Level = State to regional	Assessment of relationship between perceived self-talk frequency and effectiveness and other psychological variables.	Cross-sectional design; Sport Anxiety Scale; Soccer Self-Talk Practices Questionnaire	Trait somatic anxiety/trait worry correlated with self-talk strategy frequency ( $r = .20^{**}/r = .05$ ).
Fletcher & Hanton (2001); United Kingdom	Multidimensional anxiety theory including direction of anxiety	Swimmers <i>n</i> = 114 (49 female) Age = 19.18 ± 2.01 Level = Regional to national	Assessment of the differences in intensity and direction of state anxiety as well as self-confidence depending on psychological skills usage in relation to a swimming competition.	Cross-sectional design; Modified version of Competitive State Anxiety Inventory-2; Self-talk subscale of Test of Performance Strategies	More frequent users of self-talk as a strategy had lower scores in cognitive anxiety intensity ( $p < .05$ ) and higher scores in somatic anxiety direction ( $p > .05$ ), but there were no differences in cognitive anxiety direction and somatic anxiety intensity. Effect sizes were not mentioned.
Freitas et al. (2013); Portugal	N/A	Footballers <i>n</i> = 16 (0 female) Age = 23-34 Level = Elite	Exploration of whether, where, when and why players use different psychological techniques.	Semi-structured interviews	Self-talk was reported as a psychological skill to control stress and anxiety levels.
Hanton et al. (2004); United Kingdom	Multidimensional anxiety theory including direction of anxiety	Various individual and team sport athletes <i>n</i> = 10 (0 female) Age = 26.20 ± 4.95 Level = Elite	Examination of elite athletes' perception and causal beliefs regarding the relationship between competitive anxiety, self-confidence and symptom interpretation.	Semi-structured interviews	Self-talk was reported as a strategy to deal with anxiety symptoms before the competition by (a) directing attention to positive things and maintaining high levels of self-confidence, and (b) alleviating negative thoughts by raising activation levels.
Hanton et al. (2005); United Kingdom	Multidimensional anxiety theory including direction of anxiety	Various individual and team sport athletes <i>n</i> = 6 (0 female) Age = 23.3 ± 2.2 Level = Elite	Examination of elite athletes' precompetitive thoughts, feelings, and mental strategies underlying debilitating symptom interpretations.	Interviews	Positive self-talk was reported as a strategy to deal with anxiety symptoms, however, it often turned into negative cognitions.

Hatzigeorgiadis et al. (2007); Greece	N/A	Swimming class students $n = 21$ (21 female) Age = $20.4 \pm 0.92$ Level = No experience	Assessment of a self-talk intervention using attentional and anxiety-control self-talk statements on different psychological functions in water polo task.	Quasi-experimental design with 3 self-talk training sessions; Competitive State Anxiety Inventory-2	An effect of the self-talk intervention was found for cognitive state anxiety ( $\eta^2 = .19^*$ ), but not for state somatic anxiety ( $\eta^2 = .15$ ). In addition, the effects were stronger for the anxiety-control than the attentional self-talk statement ( $\eta^2 = .23^*$ for cognitive state anxiety; $\eta^2 = .19^*$ for somatic state anxiety).
Hatzigeorgiadis et al. (2009); Greece	N/A	Tennis players $n = 72$ (36 female) Age = $13.47 \pm 1.78$ Level = Regional to National	Assessment of a self-talk intervention using motivational self-talk statements on anxiety and self-confidence in tennis performance task.	Experimental design with 3 motivational self-talk training sessions and one control group; Competitive State Anxiety Inventory-2 revised	An interaction effect of the self-talk intervention was found for cognitive state anxiety ( $\eta^2 = .07^*$ ), but not for somatic state anxiety (no effect size mentioned), with a decrease only in the experimental group.
Kanniyan et al. (2015); Saudi Arabia	N/A	Football players $n = 36$ (no information about gender) Age <sub>IG</sub> = $16.4 \pm 1.8$ Age <sub>CG</sub> = $17.1 \pm 1.4$ Level = School level	Assessment of a positive self-talk intervention on competitive anxiety and self-confidence in junior football players before competition.	Experimental design with 3-5 positive self-talk training sessions per week over 8 weeks and one control group; Competitive State Anxiety Inventory-2	A reduction of cognitive and somatic state anxiety was found in the experimental group, but not in the control group. Effect sizes were not mentioned.
Marshall et al. (2016); Australia	Choking	Golfers $n = 7$ (3 female) Age = $59.14$ (51-81) Level = Amateur	Assessment of a self-talk intervention on anxiety and performance enhancement in the putting of golfers during competitions.	Experimental design with 8 self-talk training sessions including instructional self-talk group, motivational self-talk group and control group; Competitive State Anxiety Inventory-2 revised	No effect of the self-talk intervention on anxiety was found. Effect sizes were not mentioned.
Ryska (1998); United States	N/A	Tennis players $n = 186$ (98 female) Age = $41 \pm 9.47$ Level = Recreational	Assessment of effectiveness and sources of mental strategies as well as their effect on anxiety and self-confidence.	Cross-sectional design; Competitive State Anxiety Inventory; single item for use of positive self-talk	Positive self-talk correlated with cognitive anxiety ( $r = -.32^{**}$ ) and somatic anxiety ( $r = -.27^{**}$ ).
Thelwell et al. (2003); United Kingdom	N/A	Endurance athletes $n = 4$ (0 female) Age = 19-21 Level = Recreational	Examination of the effectiveness of an intervention package and identification of how the different mental skills were used.	Structured interview	Instructional self-talk was reported to help directing the attention on process goals rather than on irrelevant feelings.
Wadey & Hanton (2008); United Kingdom	Multidimensional anxiety theory including direction of anxiety	Various individual and team sport athletes $n = 15$ (9 female) Age = $24.3 \pm 4.2$ Level = Elite	Examination of the relationship between basic psychological skills and directional dimension of anxiety.	Semi-structured interviews supported by a booklet	Positive self-talk was reported to increase the level of effort/motivation and to direct the focus on the task when perceiving anxiety symptoms. This, in turn, increased the perceived control over symptoms leading to a facilitative interpretation of anxiety. Moreover, it was emphasized that positive self-talk does not remove anxiety symptoms but help control them.

Walter et al. (2019); Germany	Self-talk mechanisms	Athletes from various sports $n = 117$ (55 female) Age = $16 \pm 1.8$ Level = Sub-elite to elite	Assessment of a self-talk intervention on anxiety, self- efficacy, volitional skills, and performance in junior athletes.	Experimental design including a group with 1 week of self-talk training with 3 sessions, a group with 8 weeks of self-talk training with 3 sessions per week, and a control group; Competitive Anxiety Inventory with trait and state scales	An interaction effect of the self-talk intervention was found for state anxiety ( $\eta^2 = 0.16^*$ ), with pairwise comparisons showing a reduction in somatic anxiety in the one-week self- talk training group, but not in the two other groups. Pairwise comparisons did not show significant differences for cognitive anxiety. An effect of time was found for trait somatic anxiety ( $\eta^2 = .12^{**}$ ) and trait worry ( $\eta^2 = .09^{**}$ ), with a decrease in all groups.
Wood et al., (2017, study 1); United Kingdom	Rational emotive behavior therapy	Students $n = 35$ (9 female) Age = $20.92 \pm 5.62$ Level = N/A	Assessment of the effects of irrational and rational self- talk statements on cognitions, emotions, and performance.	Experimental counter-balanced design with a lab-based golf putting performance with baseline, irrational self-talk and rational self- talk conditions; State version of the State Trait Anxiety Inventory	No differences in state anxiety were found between the conditions ( $\eta^2 = .01$ ).

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Notes: \* $<.05$ ; \*\* $<.01$ ; Age<sub>IG</sub> = Age in intervention group; Age<sub>CG</sub> = Age in control group

## *Discussion*

The purpose of this scoping review was to provide a comprehensive overview of the existing literature that examined the relationship between self-talk and affective processes in sports. Following the PRISMA-ScR guidelines (Tricco et al., 2018), the review identified a total of 46 studies that were classified as either organic or strategic self-talk.

### *Organic self-talk and affective processes*

#### Spontaneous self-talk and affective processes

It is assumed that affective processes are often accompanied by spontaneous self-talk, referring to unintended and non-instrumental self-talk statements (Latinjak, Hatzigeorgiadis, et al., 2019). This assumed relationship is supported by studies that showed that, in emotional situations, spontaneous self-talk was more prevalent than goal-directed self-talk (Fritsch et al., 2020; Latinjak et al., 2017; Latinjak et al., 2014). The consistent finding that the valence of affective processes was associated with the valence of self-talk further supports the inherent relationship between spontaneous self-talk and affective processes. Because this is true for studies that were based on the distinction between spontaneous and goal-directed self-talk (Boudreault et al., 2019; Latinjak et al., 2020; Latinjak et al., 2017) and those that were not (e.g., Conroy & Metzler, 2004; Hardy, Hall, et al., 2001; Zourbanos et al., 2009), this suggests that studies focusing on the valence of self-talk primarily reflect spontaneous self-talk.

Regarding the nature of the relationship between spontaneous self-talk and affective processes, studies suggest that spontaneous self-talk may be an antecedent (Conroy & Coatsworth, 2007; Hardy, Roberts, et al., 2009), correlate (e.g., Conroy & Metzler, 2004; Hardy, Hall, et al., 2001; Latinjak et al., 2017), and consequence (De Muynck et al., 2020; Hardy, Roberts, et al., 2009; Hatzigeorgiadis & Biddle, 2008) of affective processes. This complex interaction reflects the diverse postulations of emotion theories about the relationship between cognitive and affective processes. For example, constructive emotion theories view

cognitive processes as correlates of affective processes (e.g., Barrett, 2017; Russell, 2009), while appraisal emotion theories emphasize how cognitive processes determine the occurrence of emotions (e.g., Lazarus, 1991; Scherer, 2009). While the distinction between different types of self-talk in the new self-talk classifications (Latinjak, Hatzigeorgiadis, et al., 2019; Van Raalte et al., 2016) provides a solid foundation for understanding how self-talk and affective processes are related, prospective longitudinal studies should take the theoretical postulations of the emotion theories into account to allow for more valid conclusions about the nature of this relationship.

For positive self-talk, two studies found positive correlations between somatic anxiety and the two positive self-talk subscales *Instruction* and *Anxiety-control* of the ASTQ-S (Latinjak, Viladrich, et al., 2016; Zourbanos et al., 2009). This finding indicates a potential ambiguity between the content and functions in previous self-talk classifications (Hardy, Gammage, et al., 2001). It is suggested that some subscales classified as positive self-talk, thus referring to the valence of self-talk, rather describe functions of self-talk (Karamitrou et al., 2020). Specifically, the positive association between the subscales *Instruction* and *Anxiety-control* and anxiety could be interpreted that these subscales represent goal-directed self-talk that athletes use in order to deal with anxiety (Latinjak et al., 2014). However, given the risk of such post-hoc interpretations, the more theory-based self-talk perspectives may now allow such relationships to be examined a priori (Latinjak, Hatzigeorgiadis, et al., 2019; Van Raalte et al., 2016).

#### Goal-directed self-talk and affective processes

Both those studies that distinguished between spontaneous self-talk and goal-directed self-talk (e.g., Boudreault et al., 2019; Fritsch et al., 2020; Latinjak et al., 2017) and those that did not (e.g., Martinent et al., 2015; Miles & Neil, 2013; Neil et al., 2016) showed that athletes use self-talk with the aim of regulating affective processes. These findings suggest that studies

focusing on the functions of self-talk primarily reflect goal-directed self-talk. However, the available evidence does not allow us to draw conclusions about the effectiveness of goal-directed self-talk. Here, it seems particularly promising to compare the effectiveness of different self-talk functions (e.g., motivational, instructional, rational).

One theoretical framework that might allow the examination of how the different self-talk functions influence affective processes at different stages in their emergence is the process model of emotion regulation (Gross, 1998). For instance, motivational self-talk may be used as a response to affective processes. Consistent with studies that showed that athletes use self-talk to interpret anxiety in a facilitative manner (Cheng & Hardy, 2016; Hatzigeorgiadis & Biddle, 2008; Neil et al., 2011), this reactive use of self-talk demonstrates how goal-directed self-talk does not necessarily alter affective processes, but helps to deal with them (Latinjak, Hatzigeorgiadis, et al., 2019). At the same time, other functions like instructional self-talk, appear to rather proactively influence affective processes (Van Raalte et al., 2016). Given the lower cognitive costs of such antecedent-focused emotion regulation strategies (Gross, 1998), such a proactive use of goal-directed self-talk seems particularly promising.

### **Strategic self-talk and affective processes**

In contrast to the vast amount of studies indicating that self-talk interventions have a positive effect on sport performance (Hatzigeorgiadis et al., 2011), this review revealed only five studies involving a self-talk intervention on affective processes. All of these studies exclusively examined whether a self-talk intervention could reduce anxiety symptoms. The results from these studies showed that strategic self-talk could reduce anxiety, but sometimes only the cognitive and sometimes only the somatic component. Thus, no clear conclusions can be drawn. Findings from qualitative studies in this review indicate that athletes also use strategic self-talk for affective processes other than anxiety (Cotterill et al., 2010; Devonport,



2006; Thelwell & Greenlees, 2003), highlighting the general need in sport psychology of moving away from the main focus on anxiety only (Hanin, 2007).

In addition, it seems to be of utmost importance to consider personal and situational factors for the effectiveness of self-talk interventions (Van Raalte et al., 2016). In terms of personal factors, the positive correlation between trait anxiety and self-talk strategy frequency appears interesting (Burton et al., 2013). In particular, this correlation can be interpreted to mean that the athletes' tendency to be anxious before competitions may lead to them having a greater need for strategic self-talk (Brinthaupt, 2019). At the same time, qualitative findings suggest that for athletes prone to a debilitating interpretation of anxiety, the use of strategic self-talk may have counterproductive effects (Hanton et al., 2005). One possible explanation for this finding may be the ironic effects of mental strategies, suggesting that the explicit suppression of undesirable mental states actually reinforces them (Wegner, 1994). In relation to situational factors, the study of Hatzigeorgiadis et al. (2007), which indicates that anxiety-control cue words are more effective than attentional cue words in reducing anxiety, points to the relevance of the content of cue words in strategic self-talk. Other situational factors relevant to assessing the effectiveness of strategic self-talk may be related to the specificity of the sport (e.g., task difficulty), but also to more cultural aspects (e.g., team culture; Van Raalte et al., 2016).

### **Limitations and future directions**

The distinction between organic and strategic self-talk is based on the relatively straightforward definition: compared to organic self-talk, strategic self-talk is deliberately used based on a plan established before the sport involvement (Latinjak, Hatzigeorgiadis, et al., 2019). Nevertheless, the post-hoc classification into these two self-talk entities conducted in this review is a potential limitation. Because this distinction has not been explicitly considered in previous self-talk literature (Hardy et al., 2018), it cannot be ruled out that, for

example, in studies classified as organic self-talk, athletes' self-talk was predetermined and therefore strategic self-talk. Another limitation is the disregard of grey literature, which carries a potential publication bias (Hopewell, McDonald, et al., 2007). However, because the aim of the review was not to address an explicit research question (e.g., can self-talk interventions reduce anxiety?), we chose not to include studies of grey literature, since they often do not contain sufficient information for determining the level of confidence in their findings (Gunnell et al., 2020).

In light of the present findings, three suggestions for further research are made. First, new perspectives introduced into the self-talk literature appear suitable for a more theory-based approach when studying the relationship of self-talk with other psychological constructs (Latinjak, Hatzigeorgiadis, et al., 2019; Van Raalte et al., 2016). A-priori labels of the used self-talk constructs would facilitate the pooling of knowledge and increase the correspondence between different studies. Second, it appears fruitful to integrate theoretical considerations from emotion theories (e.g., Gross, 1998; Russell, 2009; Scherer, 2009) into these theoretical perspectives that may foster our understanding of the relationship between spontaneous self-talk and affective processes as well as for the emotion regulation potential of the different goal-directed self-talk functions. Finally, with regards to the effects of strategic self-talk on affective processes, research could particularly benefit from considering personal and situational moderators and from shifting the current dominant focus on anxiety to other affective processes.

### **Conclusions**

The wide range of theoretical frameworks identified in studies using qualitative and quantitative methods indicates that the relationship of self-talk and affective processes is linked to diverse sport psychological topics. Based on the distinction between organic and strategic self-talk, the present scoping review provides a comprehensive overview of existing

literature on the relationship between self-talk and affective processes in sports. On the one hand, for organic self-talk, research has been relatively consistent in pointing to the inherent relationship between spontaneous self-talk and affective processes. At the same time, the potential of goal-directed self-talk for the regulation of affective process was shown, whereby a more theory-driven approach is needed to assess the effectiveness of the different self-talk functions. On the other hand, the evidence regarding the potential of strategic self-talk to regulate affective processes is rather limited to studies focusing on anxiety. To further advance our understanding about the relationship between self-talk and affective processes, we encourage future research to consider recent developments in the self-talk literature as exemplified in this review.

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## Chapter 5

### Self-talk and emotions in tennis players during competitive matches

Research on self-talk in sport psychology has received increasing attention in recent years, as shown by the publications of a book about self-talk in sport (Latinjak & Hatzigeorgiadis, 2020) and a special issue of a sport psychology journal (Hardy et al., 2018). An important development is the transition from purely data-driven approaches (e.g., Zourbanos et al., 2009) to theory-driven approaches, which have brought innovative ideas into the field and seem useful in exploring the inherent relationship of self-talk with other psychological constructs, including emotions (Latinjak et al., 2014; Van Raalte et al., 2016). These theory-driven approaches, based on dual-process theories (e.g., Furley, Schweizer, et al., 2015), distinguish between uncontrolled self-talk, which reflects underlying psychological processes, and controlled self-talk, which is effortful and intentionally used for self-regulation (Latinjak et al., 2014; Van Raalte et al., 2016). Because the two types of self-talk appear to be related differently to emotions (Latinjak et al., 2014; Latinjak, Hatzigeorgiadis et al., 2017), the aim of the current study was to investigate goal-directed and spontaneous self-talk, comparatively, in relation to emotions in a sport competition.

In sport psychology, the term *self-talk* refers to “verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it also either (a) reflects dynamic interplays between organic, spontaneous, and goal-directed cognitive processes or (b) conveys messages to activate responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes.” (Latinjak, A. Hatzigeorgiadis, et al., 2019; p. 11). The definition identifies two distinct entities of self-talk, which are also reflected in self-talk research: *strategic self-talk*, on the one hand, which involves the implementation of pre-determined self-talk plans mostly to enhance performance (for a meta-analysis see Hatzigeorgiadis et al., 2011) and *organic self-talk*, on the

other hand, referring to players' inherent thoughts before, during, and after sport practice (Latinjak, A. Hatzigeorgiadis, et al., 2019). With regard to organic self-talk, the definition further distinguishes between spontaneous and goal-directed self-talk, which reflects the aforementioned classification of controlled and uncontrolled types of self-talk (Latinjak et al., 2014).

Spontaneous self-talk is a type of uncontrolled self-talk and consists of unintended, non-working, and non-instrumental statements that come to mind unbidden and effortlessly (Christoff et al., 2011). Importantly, spontaneous self-talk is related to the activity at hand in the current context. This distinguishes it from other types of uncontrolled self-talk, such as mind-wandering, which is unrelated to the context (e.g., thinking about work during practice), and stimulus-independent thoughts, which are related to current context, yet unrelated to the ongoing activity (e.g., thinking about training during a match; Latinjak et al., 2014). Research in the sport context has shown that spontaneous self-talk is often about predicting future outcomes (e.g., "I will lose") or evaluating past events (e.g., "that was a great shot"), implying an emotional connotation (Latinjak et al., 2014). Here, it is interesting to note that spontaneous self-talk varies in terms of valence, which ranges from positive to negative, and in terms of time-perspective, which ranges from retrospective to anticipatory (Latinjak et al., 2014; Latinjak, Hatzigeorgiadis et al., 2017). The fact that core affect underlying emotional processes can be similarly classified (Latinjak, 2012; Russell, 1980) points to the inherent relationship between spontaneous self-talk and emotions (Latinjak et al., 2014; Van Raalte et al., 2016). This relationship has also been evidenced in studies conducted before introducing the distinction between spontaneous and goal-directed self-talk to sport psychology, showing a correlation between the valence of self-talk and affect (Hardy et al., 2001), or between negative self-talk and cognitive as well as somatic anxiety (Zourbanos et al., 2009).

Goal-directed self-talk is a controlled type of self-talk that is deliberately used to solve a problem or make progress on a task and thus transform current states into desired states

(Christoff et al., 2011; Unterrainer & Owen, 2006). In light of the impact emotions can have on an individual's goal attainment (Hanin, 2007), it is important to note that emotion regulation is considered a key function of goal-directed self-talk (Latinjak et al., 2014). Studies assessing strategic self-talk interventions have shown that the planned use of self-talk cues can decrease anxiety (Hatzigeorgiadis et al., 2007, 2009; Walter et al., 2019). Looking at the mechanisms of how goal-directed self-talk can regulate emotions, it can directly deal with debilitating emotions (e.g., "no need to be afraid") or promote adaptive emotions (e.g., "stay calm"). However, goal-directed self-talk can also have other functions, such as giving instructions (e.g., "bend your knee"), or directing attention (e.g., "focus on the next point"), which may have an indirect influence on emotions (Latinjak et al., 2014). For instance, by directing the focus on the task at hand, goal-directed self-talk diverts the attention away from a potentially emotional stimulus, which in turn reduces the intensity of an emotion or even prevents its occurrence (Gross, 2015).

In sport psychology, research on emotions has focused primarily on the subjective experience and the associated intrapersonal processes of emotions (Hanin, 2007). However, the fact that table tennis players reported to intentionally either conceal or pretend outward emotional reactions (e.g., facial expressions, gestures, postures, verbalizations) highlights how the behavioral component of emotions can differ from the subjective emotion experience (Sève et al., 2007). The distinction of the behavioral component of emotions from the subjective emotion experience points to the importance of explicitly considering the interpersonal consequences of outward emotional reactions (Tamminen & Bennett, 2017). Noticeably, various experimental studies have shown that positive outward emotional reactions decrease, and negative outward emotional reactions increase, the self-confidence of the opponent (e.g., Furley, Moll, et al., 2015; Furley & Schweizer, 2014). For this reason, in examining the links between self-talk and emotions, we considered both emotions experienced and outward emotional reactions.

Summarizing the above, the introduction of theory-driven conceptualizations of self-talk has significantly advanced the field of self-talk (Latinjak et al., 2014; Van Raalte et al., 2016). One strength of these theory-driven conceptualizations is the ability to make testable assumptions about the relationship between self-talk and other psychological constructs, such as emotions (Latinjak, A. Hatzigeorgiadis, et al., 2019). The purpose of the current study was to assess whether spontaneous self-talk and goal-directed self-talk are differently associated with the intensity of emotions experienced as well as the intensity of outward emotional reactions. Because, on the one hand, goal-directed self-talk is a controlled and rational type of self-talk, with emotion regulation as one of its main functions, and, on the other hand, spontaneous self-talk is a type of uncontrolled and often emotionally charged self-talk (Latinjak et al., 2014; Van Raalte et al., 2016), we hypothesized that the intensity of (a) emotions experienced and (b) outward emotional reactions would be lower in instances where players reported goal-directed self-talk (either solely or in conjunction with spontaneous self-talk) compared to instances they reported solely spontaneous self-talk. Because individuals' positive and negative emotions differ, between them, in subjective experiences, cognitive appraisal processes, and behavioral tendencies (Green, 1992), we explored whether the identified relationships between self-talk and emotions experienced as well as outward emotional reactions were evident for both positive and negative emotions.

## *Methods*

### **Sampling & participants**

Tennis was chosen as the sport of choice because the time between the points offers many opportunities for players to experience and display self-talk and emotions. After the ethical approval by the university's ethics committee, tennis players were contacted through representatives of clubs, tennis coaches, or friends. In total, 20 tennis players (7 female) agreed to participate in the study. Fourteen players were from Germany and six from Denmark. They

were on average 23.10 years old ( $SD = 4.88$ ), had played tennis for an average of 14.70 years ( $SD = 5.58$ ), and had taken part in tennis competitions for an average of 10.85 years ( $SD = 4.91$ ). The current level of the players ranged from regional ( $n = 10$ ) to national ( $n = 6$ ), and international ( $n = 4$ ). Furthermore, the players stated to have played as seniors at the regional ( $n = 8$ ), national ( $n = 2$ ), or international ( $n = 7$ ) level and as juniors at the regional ( $n = 8$ ), or international ( $n = 11$ ) level as the highest level they had ever played. Three players were still at the junior level and one player had only started playing tennis at the senior level. The players trained on average 3.25 ( $SD = 1.67$ ) days or 8.35 ( $SD = 8.78$ ) hours per week.

### **Procedure**

A naturalistic video-assisted approach was chosen, which has been shown to be effective in studying the relationship between self-talk and other psychological processes, such as emotions, in real sport competitions (Latinjak et al., 2019; Miles & Neil, 2013). All matches included in this study were either part of the regular season or an official tournament. Following a naturalistic video-assisted approach (e.g., Miles & Neil, 2013), first, the participating player was recorded with two cameras during a tennis match. A GoPro Action Camera Hero was placed behind the court so the entire court, including the trajectories of the ball and the movement of both players, could be recorded. The purpose of the recordings from this camera was to stimulate the players' memories of specific points after the match. The second camera (a digicam) was positioned next to the court, near to the net and directed towards the participating player. The lens of the camera was repositioned towards the appropriate court side each time the player changed sides during the match. The recording from this camera was not only supposed to support the memory of the players, but also capture their outward emotional reactions. To reduce self-presentational bias, players were told before the match that the study would investigate psychological processes during tennis matches, but the explicit focus on emotions and self-talk was not mentioned. In line with the researcher's observations, after the

match, the players unanimously affirmed that due to the competitive nature of the match the fact that they were recorded did not influence their behavior.

Thereafter, the first author of the study met with the player to conduct an interview, using the footage. The preferred option for the interview was one day after the competition to increase the accuracy of players' memories of their self-talk and emotions (Martinet & Ferrand, 2009). It was decided not to conduct the interviews on the same day of the competition, if this timing was feasible for participants, because (a) the preparation of each interview, including the selection of rallies and the preparation of the footage, took about three hours, and (b) the players were often physically and mentally exhausted after the competition. In total, one interview took place on the same day of competition, 17 interviews the day after the competition, and two interviews two days after competition ( $M_{\text{hours}} = 22.65$ ;  $SD = 9.23$ ). The interviewer made a pre-selection of 20 won and 20 lost rallies from the match. Instead of focusing on specific emotions (e.g., anger, anxiety), as was the case in previous studies (Latinjak, Hatzigeorgiadis, et al., 2017), the study broadly assessed positive and negative emotions, thus considering a wider range of emotional states (Ekkekakis, 2013). Based on his subjective perception, the interviewer tried to select (a) ten rallies in which the players won a point and showed a positive outward emotional reaction, (b) ten rallies in which the players won a point and remained neutral, (c) ten rallies in which the players lost a point and showed a negative outward emotional reaction, and (d) ten rallies in which the players lost a point and remained neutral. However, for some players, the interviewer could not identify ten rallies in which the player showed a negative or a positive outward emotional reaction. Furthermore, it is important to emphasize that the pre-selection of points by the researcher had no direct influence on the statistical analyses because in the interview the players had to assess their emotions themselves.

During the individual interviews, the players were shown the forty rallies one after the other. After the players had seen a rally from both camera angles, they first had to indicate



whether they could recall the rally on a scale of 1 (not at all) to 7 (very clearly). In view of the context dependence of one's own memory (Smith & Vela, 2001), the current score and outcome of the previous points were given as additional information. If the players' response was 1, this rally was skipped and the next rally was shown. If the players' response was 2 or 3, the interviewer asked once more whether the players could actually recall the point and encouraged them to move on to the next point, if they were not confident about their memory. Only when the players confirmed that they recalled the point, further questions about emotions and self-talk were asked. Because the players were shown a large number of situations, single-item scales were used to measure the intensity of emotions experienced and outward emotional reactions (Ekkekakis, 2013). First, the players stated whether they had experienced no emotion, a positive emotion, or a negative emotion after the rally. If they reported experiencing a positive or a negative emotion, they were asked to state its intensity (from 1 = very low to 7 = very high). If they stated they had experienced no emotion, the intensity was regarded as 0. In addition, the players were then also asked to state whether they recognized no outward emotional reaction, a positive outward emotional reaction, or a negative outward emotional reaction after the rally, and, in case of a positive or negative outward emotional reaction, state the intensity of the outward emotional reaction (from 1 = very low to 7 = very high). Again, if they stated they had recognized no outward emotional reaction, the intensity was regarded as 0. Given the inter-individual differences in one's emotionality (Reisenzein & Weber, 2009), we asked the players to take their usual emotion experiences/outward emotional reactions as a reference point. Finally, the players were asked whether they could recall their thoughts and the things they had said to themselves immediately after the rally on a scale of 1 (not at all) to 7 (very clearly). Similar to the recall of the rally, if the players' response was 1, players did not write down any self-talk and the next rally was shown. If the players' response was 2 or 3, the interviewer asked once more whether the players could actually recall their self-talk and encouraged them to move on to the next point if they were not confident about their memory.

Only when the players confirmed that they recalled their self-talk, were they asked to write it down. Here, the players were explicitly asked to quote their thoughts as concretely as possible, avoiding any attempt to evaluate or explain them. The players were also encouraged to write down several self-talk statements if they could recall them.

### **Self-talk categorization**

To prepare the data, the self-talk statements were broken down into individual text units, which were defined as independent statements with significance on their own (Lyons, 1981). Two authors first went through the self-talk statements of five matches to ensure a common understanding of what defines an independent text unit, followed by the first author of the study who completed the procedure. This process resulted in 1242 individual text units with an average of 1.92 individual units ( $SD = 0.87$ ; Range = 1-5) per situation. Then, two authors independently categorized all individual text units into *goal-directed self-talk*, *stimulus-independent thoughts*, *mind-wandering*, and *spontaneous self-talk* based on the definitions of Christoff (2012). Both authors had experience with qualitative research methodology, and academic degrees in sport psychology, and one of the authors was an experienced tennis player. Given the interpretive element of self-talk (Hardy, 2006), the content of some statements can be classified as either goal-directed or spontaneous self-talk (Latinjak et al., 2014). For this reason, the coders had the possibility to classify those individual text units as *either spontaneous self-talk or goal-directed self-talk* to leave them open for discussion later. All individual text units on which the two authors disagreed, and those on which at least one of the coders chose the category either *spontaneous self-talk or goal-directed self-talk*, were discussed in order to agree on a final classification. This procedure was supported by another author of the study. Because the relationship between emotions and self-talk was analyzed at the level of the situation and many situations involved more than one individual text unit, a score was calculated for each situation, taking into account the occurrence of both spontaneous self-talk

and goal-directed self-talk. Due to their low frequency (1.5%), individual text units coded as mind-wandering or stimulus-independent thoughts were not considered in this step. Finally, if a situation involved only spontaneous self-talk, the situation was coded as “spontaneous self-talk,” if a situation involved only goal-directed self-talk, the situation was coded as “goal-directed self-talk,” and if a situation involved both spontaneous and goal-directed self-talk, the situation was coded as “spontaneous/goal-directed self-talk.”

### **Statistical analysis**

To test the relationship between the players’ emotions and their self-talk, we conducted multilevel regression analyses using the statistical software SPSS (IBM), version 25.0. We calculated two-level models, where level 1 represented repeated measurements during a match nested within the players (level 2). We set up two separate models in which self-talk was entered as an independent variable (parameterized as a categorical variable with three different values: goal-directed self-talk; spontaneous/goal-directed self-talk; spontaneous self-talk). In the first model, the intensity of the emotions experienced, and in the second model, the intensity of the outward emotional reactions were the dependent variables. In light of the multilevel structure of the data, for both models we considered fixed and random effects models. In line with established procedures (Hox, 2010), all models included random intercepts, while random slopes were additionally introduced to explore whether the within-subject associations differed between the players. Random slopes were only reported when significant effects emerged (Bolger & Laurenceau, 2013). Because we found variance in the within-subjects effects (significant random effects, see results section), we report four models in total, two with fixed and two with random effects.

For the emotions experienced as a dependent variable, the two models with fixed (a) and random (b) effects are exemplified below:

$$(a) Y(\text{Intensity of the emotion experience})_{ij} = \beta_{0j} + \beta_{1j} * (\text{self} - \text{talk})_{ij} + u_{0j} + r_{ij}$$

$$(b) Y(\text{Intensity of the emotion experience})_{ij} = \beta_{0j} + \beta_{1j} * (\text{self} - \text{talk})_{ij} + u_{0j} + u_{1j} + r_{ij}$$

We estimated within-subjects effects of participants' (subscript  $j$ ) self-talk in distinct situations (subscript  $i$ ) at level 1. Accordingly,  $Y_{ij}$  represents the intensity of the emotion experienced in person  $j$  in situation  $i$ . The intercept is represented by  $\beta_{0j}$  and the beta coefficient of the categorical predictor self-talk by  $\beta_{1j}$  (spontaneous self-talk; spontaneous/goal-directed self-talk; goal-directed self-talk). Furthermore, the term  $r_{ij}$  represents the residual at level 1. Level 2 represents the between-person level, where we included a random intercept ( $u_{0j}$ ) to account for differences in the emotion experienced between participants. In the second equation, the  $u_{1j}$  represents the random effects for the predictor self-talk.

In addition, in the case of a significant relationship, we continued to explore whether this effect applied to both positive and negative emotions. However, due to the reduced data points decreasing the statistical power in these analyses (Arend & Schäfer, 2019), we did not consider random effects for these models.

## **Results**

### **Memory of rallies and self-talk**

The players were shown a total of 782 rallies (392 won and 390 lost). Due to sudden events, one player had to stop the interview after having seen only 22 rallies. Of the 782 rallies, players remembered 692 rallies (88.49%) after seeing them on video ( $M = 34.5$ ;  $SD = 5.91$ ). On a scale of 1 ("I do not remember the point at all") to 7 ("I remember the point very clearly"), the reported mean value of the players' memory of the rallies was 5.04 ( $SD = 2$ ). Of the 692 rallies they remembered, they recalled their self-talk after 645 rallies (93.21%) with an average of 32.3 rallies per player ( $SD = 6.17$ ). On a scale of 1 ("I do not remember my self-talk at all")

to 7 (“I remember my self-talk very clearly”), the reported mean value of the players’ memory of the self-talk was 5.31 ( $SD = 1.71$ ).

### **Coding of self-talk statements**

The initial interrater-agreement between the two coders was 84.70 %. After the three authors convened, 686 individual text units were coded as spontaneous self-talk, 538 individual text units as goal-directed self-talk, 8 individual text units as stimulus-independent thoughts, and 10 individual text units as mind-wandering. Consequently, out of a total of 645 situations, 279 situations were coded *spontaneous* because they contained only spontaneous self-talk text units, 168 situations were coded as *goal-directed* as they contained only goal-directed self-talk text units, and 193 situations were coded as *spontaneous/goal-directed* as they contained both types of text units. Five situations were not included in the analysis because they included only stimulus-independent thoughts and/or mind-wandering.

### **Hypotheses testing**

The descriptive statistics for the intensity of both emotions experienced and outward emotional reactions in relation to players’ self-talk are displayed in Table 2. For the interpretation of the results, it is important to note that situations were also included in which neither emotions experienced nor outward emotional reactions were reported. For this reason, the scale ranged from 0 (no emotion) to 7 (emotion with very high intensity). In case of a positive/negative emotion experienced or outward emotional reaction, the scale ranged from 1 (emotion with very low intensity) to 7 (emotion with very high intensity).

**Table 4.** Descriptive statistics of the intensity of emotions experienced and outward emotional reactions in relation to players' self-talk

Self-talk category	<i>n</i>	Intensity of emotions experienced	<i>n</i>	Intensity of outward emotional reactions
<b>All situations<sup>a</sup></b>				
Spontaneous self-talk	279	4.39 ( <i>SD</i> = 1.77)	279	2.58 ( <i>SD</i> = 2.34)
Goal-directed/spontaneous self-talk	193	3.92 ( <i>SD</i> = 1.79)	193	2.52 ( <i>SD</i> = 2.18)
Goal-directed self-talk	168	3.33 ( <i>SD</i> = 2.16)	168	2.04 ( <i>SD</i> = 2.34)
<b>Situations with negative emotions<sup>b</sup></b>				
Spontaneous self-talk	151	4.58 ( <i>SD</i> = 1.61)	114	4.04 ( <i>SD</i> = 1.72)
Goal-directed/spontaneous self-talk	76	3.70 ( <i>SD</i> = 1.42)	56	3.59 ( <i>SD</i> = 1.41)
Goal-directed self-talk	88	4.02 ( <i>SD</i> = 1.70)	65	3.54 ( <i>SD</i> = 1.82)
<b>Situations with positive emotions<sup>b</sup></b>				
Spontaneous self-talk	118	4.53 ( <i>SD</i> = 1.56)	67	3.85 ( <i>SD</i> = 1.65)
Goal-directed/spontaneous self-talk	108	4.40 ( <i>SD</i> = 1.65)	75	3.80 ( <i>SD</i> = 1.72)
Goal-directed self-talk	50	4.12 ( <i>SD</i> = 1.55)	28	4.29 ( <i>SD</i> = 1.98)

<sup>a</sup>The scale of the intensity for all situations ranged from 0 = no emotion to 7 = emotion with very high intensity.

<sup>b</sup>The scale of the intensity for situations with positive and negative emotions ranged from 1 = emotion with very low intensity to 7 = emotion with very high intensity.

*Hypothesis 1: The intensity of emotions experienced would be lower in instances where players reported goal-directed self-talk (either solely or in conjunction with spontaneous self-talk) compared to instances where they solely reported spontaneous self-talk.*

#### Fixed effect model for emotions experienced

Using a fixed effect model, Model 1 in Table 5.2 shows that the intensity of emotions experienced was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -1.40$ ,  $t(633.32) = -8.03$ ,  $p < .01$ ). The results further showed that the intensity of emotions experienced was significantly lower in instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -0.46$ ,  $t(634.55) = -2.71$ ,  $p < .01$ ).

#### Random effect model for emotions experienced

Using a random effect model, which took the extent to which the associations differ between subjects into account, Model 2 in Table 4 shows that the intensity of emotions experienced was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -1.40$ ,  $t(34.40) = -5.83$ ,  $p < .01$ ). However, there was no significant difference in the intensity of emotions experienced when comparing instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk with instances where they reported solely spontaneous self-talk ( $\beta = -0.38$ ,  $t(32.04) = -1.61$ ,  $p = .12$ ).

**Table 5.** Multilevel model analyses with fixed effects to predict the intensity of emotions experienced

Model	Fixed					Random			
	Beta Coefficient	Standard Error	<i>t</i>	<i>df</i>	<i>p</i>	Variance Estimate	Standard Error	Wald-Z	<i>p</i>
<b>Model 1, DV: Intensity of emotions experienced</b>									
Intercept	4.45	0.23	19.61	25.00	<.01	0.81	0.29	2.79	<.01
Goal-directed self-talk <sup>a</sup>	-1.40	0.17	-8.03	633.32	<.01				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.46	0.17	-2.71	634.55	<.01				
<b>Model 1a, DV: Intensity of negative emotions experienced</b>									
Intercept	4.69	0.22	21.35	27.15	<.01	0.68	0.26	2.62	<.01
Goal-directed self-talk <sup>a</sup>	-1.00	0.21	-4.69	311.98	<.01				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.87	0.21	-4.10	308.84	<.01				
<b>Model 1b, DV: Intensity of positive emotions experienced</b>									
Intercept	4.49	0.22	20.50	32.02	<.01	0.57	0.23	2.45	<.05
Goal-directed self-talk <sup>a</sup>	-0.49	0.26	-1.93	269.88	0.06				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.12	0.21	-0.57	272.87	0.57				

<sup>a</sup>The reference category was spontaneous self-talk.



**Table 6.** Multilevel model analyses with random effects to predict the intensity of emotions experienced and outward emotional reactions

Model	Fixed					Random			
	Beta Coefficient	Standard Error	<i>t</i>	<i>df</i>	<i>p</i>	Variance Estimate	Standard Error	Wald-Z	<i>p</i>
<b>Model 2, DV: Intensity of emotions experienced</b>									
Intercept	4.39	0.24	17.99	31.82	<.01	0.69	0.29	2.41	<.05
Goal-directed self-talk <sup>a</sup>	-1.40	0.24	-5.83	34.40	<.01	0.27	0.13	2.01	<.05
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.38	0.24	-1.61	32.04	.12				
<b>Model 4, DV: Intensity of outward emotional reactions</b>									
Intercept	2.65	0.23	11.55	44.95	<.01	0.18	0.20	0.90	0.37
Goal-directed self-talk <sup>a</sup>	-0.76	0.32	-2.40	40.12	<.05	0.49	0.22	2.24	<.05
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.25	0.32	-0.79	37.49	.44				

<sup>a</sup>The reference category was spontaneous self-talk.

### Exploratory analyses for positive and negative emotions experienced

Further exploratory analyses included a differentiation between positive and negative emotions. In the case of negative emotions (Model 1a in Table 3), the intensity of emotions experienced was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -1.00$ ,  $t(311.98) = -4.69$ ,  $p < .01$ ). Moreover, the intensity of emotions experienced was significantly lower in instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -0.87$ ,  $t(308.84) = -4.10$ ,  $p < .01$ ). In the case of positive emotions (Model 1b in Table 3), the model only approached significance ( $\beta = -0.49$ ,  $t(269.88) = -1.93$ ,  $p = .06$ ) by showing that the intensity of emotions experienced was lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk. However, the model showed no significant difference in the intensity of emotions experienced when comparing instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk with instances where they reported solely spontaneous self-talk ( $\beta = -0.12$ ,  $t(272.87) = -0.57$ ,  $p = .57$ ).

*Hypothesis 2: The intensity of outward emotional reactions would be lower in instances where players reported goal-directed self-talk (either solely or in conjunction with spontaneous self-talk) compared to instances where they reported solely spontaneous self-talk.*

### Fixed effect model for outward emotional reactions

Using a fixed effect model, Model 3 in Table 5 shows that the intensity of outward emotional reactions was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -0.79$ ,  $t(632.63) = -3.47$ ,  $p < .01$ ). However, the model showed no significant difference in the intensity

of outward emotional reactions when comparing instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk with instances where they reported solely spontaneous self-talk ( $\beta = -0.27$ ,  $t(627.48) = -1.22$ ,  $p = .22$ ).

#### Random effect model for outward emotional reactions

Using a random effect model, which took the extent to which the associations differed between subjects into account, Model 4 in Table 4 shows that the intensity of outward emotional reactions was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -0.76$ ,  $t(40.12) = -2.40$ ,  $p < .05$ ). However, the model showed no significant difference in the intensity of outward emotional reactions when comparing instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk with instances where they reported solely spontaneous self-talk ( $\beta = -0.25$ ,  $t(37.49) = -0.79$ ,  $p = .44$ ).

#### Exploratory analyses for positive and negative outward emotional reactions

Further exploratory analyses included a differentiation between positive and negative emotions. In the case of negative emotions (Model 3a in Table 5), the intensity of outward emotional reactions was significantly lower in instances where players reported solely goal-directed self-talk compared to instances where they reported solely spontaneous self-talk ( $\beta = -0.95$ ,  $t(229.50) = -3.58$ ,  $p < .01$ ). However, the model showed no significant difference in the intensity of outward emotional reactions when comparing instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk with instances where they reported solely spontaneous self-talk ( $\beta = -0.40$ ,  $t(226.73) = -1.53$ ,  $p = .13$ ). For positive emotions (Model 3b in Table 5.4), the analyses showed that compared to instances where players reported solely spontaneous self-talk, the intensity of outward emotional reactions was not significantly different in instances where players reported solely goal-directed self-talk ( $\beta = 0.16$ ,  $t(166.97)$

= 0.43,  $p = .67$ ) nor in instances where players reported goal-directed self-talk in conjunction with spontaneous self-talk ( $\beta = -0.61$ ,  $t(166.08) = -0.20$ ,  $p = .84$ ).

**Table 7.** Multilevel model analyses with fixed effects to predict the intensity of outward emotional reactions

Model	Fixed					Random			
	Beta coefficient	Standard Error	<i>t</i>	<i>df</i>	<i>p</i>	Variance Estimate	Standard Error	Wald-Z	<i>p</i>
<b>Model 3, DV: Intensity of outward emotional reactions</b>									
Intercept	2.72	0.20	13.54	34.24	<.01	0.43	0.19	2.25	<.05
Goal-directed self-talk <sup>a</sup>	-0.79	0.23	-3.47	632.63	<.01				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.27	0.22	-1.22	627.48	.22				
<b>Model 3a, DV: Intensity of negative outward emotional reactions</b>									
Intercept	4.21	0.25	17.08	27.99	<.01	0.79	0.32	2.47	<.05
Goal-directed self-talk <sup>a</sup>	-0.95	0.27	-3.58	229.50	<.01				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.40	0.26	-1.53	226.73	.13				
<b>Model 3b, DV: Intensity of positive outward emotional reactions</b>									
Intercept	3.94	0.29	13.51	29.96	<.01	0.79	0.38	2.06	<.05
Goal-directed self-talk <sup>a</sup>	0.16	0.38	0.43	166.97	.67				
Goal-directed/spontaneous self-talk <sup>a</sup>	-0.61	0.30	-0.20	166.08	.84				

<sup>a</sup>The reference category was spontaneous self-talk.

## *Discussion*

The purpose of this study was to test whether goal-directed self-talk, as a controlled type of self-talk, and spontaneous self-talk, as an uncontrolled type of self-talk, are differently related to the intensity of emotions experienced as well as the intensity of outward emotional reactions. Overall, in line with our hypotheses, the results showed that, in situations in which the players reported solely goal-directed self-talk, the intensity of both emotions experienced and outward emotional reactions was significantly lower compared to situations in which players reported solely spontaneous self-talk. Moreover, the results showed that in situations in which players reported goal-directed self-talk in conjunction with spontaneous self-talk, the intensity of emotions experienced, but not of outward emotional reactions, was significantly lower compared to situations in which the players reported solely spontaneous self-talk.

Because spontaneous self-talk is often emotionally charged or an expression of emotions (Latinjak et al., 2014; Van Raalte et al., 2016), the findings are in line with the postulations of the dual-process theories of self-talk. Looking at the direction of the relationship between spontaneous self-talk and emotions, spontaneous self-talk is neither an antecedent nor a consequence of emotions, but can rather be regarded as an integral part of the emotion, just like changes in the subjective experience, observable behavior, or the peripheral nervous system (Russell, 2009). This assumption suggests that spontaneous self-talk cannot exist on its own, but reflects other psychological processes, such as emotions (Latinjak et al., 2014; Van Raalte et al., 2016). The inherent relationship between spontaneous self-talk and emotions is also indicated by Latinjak, Hatzigeorgiadis et al.'s (2017) study, revealing that athletes report more spontaneous than goal-directed self-talk in situations in which they experience anger or anxiety, which are both considered to be high intensity emotions (Russell, 1980).

Although goal-directed self-talk can co-occur with emotions, our results suggest that situations in which players have goal-directed self-talk are associated with a weak emotion intensity compared to situations in which players have only spontaneous self-talk. It is

important to emphasize that our study design did not allow the assessment of the temporal order of self-talk and emotions. Nevertheless, this finding is consistent with the theoretical approaches considering emotion regulation as a main function of goal-directed self-talk (Latinjak et al., 2014; Theodorakis et al., 2008). This relationship is further supported by neuroscientific findings showing how cortical brain regions associated with cognitive strategies influence subcortical regions associated with affective responses (Ochsner et al., 2012). With regard to the specific mechanisms of how goal-directed self-talk regulates emotions, goal-directed self-talk can either directly or indirectly influence emotions (Latinjak et al., 2014). In relation to the former, goal-directed self-talk can deal with debilitating emotions or promote adaptive emotions. Importantly, with relevance for the relationship between self-talk and emotions, the promotion of adaptive emotions can also be associated with an increase of the intensity of the emotion (e.g., “enjoy your game”), which is consistent with the motivational function of goal-directed self-talk (Theodorakis et al., 2008). For the indirect mechanisms of goal-directed self-talk, it can influence emotions by directing the attention (e.g., “focus on your task”), controlling cognitive reactions (e.g., “anyone can make mistakes”), or promoting new goals (e.g., “play better”; Latinjak, Torregrossa et al., 2019). These strategies could be particularly functional when considering the possible ironic effects of mental strategies that focus explicitly on the suppression of emotions (Wegner, 1994). Given the impact of emotion on sport performance (Hanin, 2007), both from a theoretical and applied perspective, future research that focuses on the effectiveness of the different functions of goal-directed self-talk in relation to emotion regulation is warranted. It appears promising to distinguish between goal-directed self-talk that focuses directly on emotions by trying to either increase debilitating emotions or increase adaptive emotions, and goal-directed self-talk that indirectly influences emotions.

Furthermore, the results showed that, regarding emotions experienced, situations in which players reported both spontaneous and goal-directed self-talk were associated with a

lower intensity of emotion compared to situations in which the players reported solely spontaneous self-talk. Although it is important to note that this association was not found in relation to outward emotional reactions, this finding points to the distinction between reactive and proactive emotion regulation functions of goal-directed self-talk. Research indicates that goal-directed self-talk is often the response to emotionally-charged spontaneous self-talk (Latinjak, 2018). In this sense, goal-directed self-talk serves to reactively regulate potentially debilitating effects of emotions brought into a player's awareness by spontaneous self-talk (Latinjak et al., 2014). However, the finding of our study, that the difference in intensity of emotion was bigger when comparing situations in which players reported solely goal-directed self-talk to situations in which players reported solely spontaneous self-talk, illustrates the potential of proactive emotion regulation. Thus, goal-directed self-talk might not only be effective in regulating emotions and the associated spontaneous self-talk after it has occurred, but could also proactively prevent the underlying psychological processes associated with the spontaneous self-talk in the first place (Van Raalte et al., 2016).

The results of the study further indicate that self-talk is related to how the players displayed the emotion to the outside world (i.e., outward emotional reaction). Although this relationship was weaker compared to the one between self-talk and emotions experienced, this result shows how self-talk is also related to observable behavior (Ellis, 2003). That self-talk is at its core intrapersonal (Latinjak, Hatzigeorgiadis et al., 2019), explains why it was more strongly related to the subjective experience of an emotion than to the observable behavior, where additional factors play an important role (e.g., social rules, sport ethics). The social nature of outward emotional reactions are particularly relevant to understanding the interpersonal consequences of emotions, which is an area with many unresolved research questions in sport psychology (Tamminen & Bennett, 2017). Specifically, research shows that outward emotional reactions can influence the opponent's confidence and the experience of their own emotions (e.g., Furley, Moll, et al., 2015; Furley & Schweizer, 2014). Therefore, creating awareness



about the voice inside the head can be especially important for those players who struggle with their outward emotional reactions during competitions.

Exploratory analyses showed that the relationship between self-talk and emotions is more consistent when emotions are positive than negative. In particular, the results show that for negative emotions the intensity of emotions experienced and outward emotional reactions were lower in instances where players reported solely goal-directed self-talk compared to instances where players reported solely spontaneous self-talk. In addition, when comparing instances of spontaneous self-talk in conjunction with goal-directed self-talk, the intensity of negative emotions experienced, but not of negative outward emotional reactions, was significantly lower. For positive emotions, only the intensity of emotions experienced was marginally lower in instances where players reported solely goal-directed self-talk compared to situations where they reported solely spontaneous self-talk. The other comparisons did not reveal significant differences. These results can be explained by the findings from a study in table tennis showing that negative emotions are usually more difficult to regulate than positive ones (Martinent et al, 2015). Thus, in negative situations, such as losing a point, the regulation of negative emotions may need more cognitive control in the form of goal-directed self-talk (e.g., “calm down”). In contrast, in positive situations, such as winning a point, the use of goal-directed self-talk might be less aimed at emotion regulation (e.g., “keep playing that way”), or might even be used to cultivate positive emotions (e.g., “you can do it”; Latinjak et al., 2014). This relationship between goal-directed self-talk and positive emotions is in line with the finding of our study that the intensity of positive outward emotional reactions was highest in instances where players reported solely goal-directed self-talk.

Importantly, the multilevel regression analyses showed some between-subject differences, which generally affect the relationship between emotions and self-talk. While the fixed effect model showed that in instances where players reported goal-directed self-talk in conjunction with self-talk were associated with a lower intensity of emotions experienced

compared to instances where players reported solely spontaneous self-talk, this finding did not show in the random effect model. This finding means that for some players goal-directed self-talk is more strongly related to their emotions than for others. There are likely to be a wide range of personal factors that can explain such individual differences in self-talk (Brinthaupt, 2019). Understanding these individual differences does not only help to refine the theoretical understanding of self-talk (Latinjak et al, 2014), but it also useful when tailoring a self-talk intervention to the individual needs of a player. Of relevance for the relationship between emotions and self-talk, research suggests that the tendency of experiencing anxiety is associated with overall self-talk frequency (Khodayarifard et al., 2014). Another study reported that in competition female basketball players used more goal-directed self-talk than male players (Latinjak, Ramis, et al., 2017). Similarly, Akbari-Zardkhaneh et al. (2018) found that individuals who are more introverted are more likely to report goal-directed self-talk. To conclude, our findings stress the importance of individual differences in self-talk research, which up to now have received relatively little attention, and support the idea that competitive sport is a suitable context for such research (Brinthaupt, 2019).

### **Practical implications**

The results of the study are also interesting from an applied perspective. Although it is important to emphasize that undoubtedly both positive and negative emotions can have facilitative effects on performance (Hanin, 2007), in many situations players would benefit from strategies that can regulate the emotions experienced as well as outward emotional reactions. Importantly, in this study we asked players to report on their self-talk in general and not explicitly what strategies they use to regulate emotions. Because we found a relationship between self-talk and their emotions, we can assume that players often use strategies to regulate emotions, even though at times they may not consciously perceive them as emotion regulation strategies (Lane et al., 2012). In connection with the study of organic self-talk and the recognition of the

psychologist within as an inherent part of every player, reflexive self-talk interventions have been proposed as an alternative to traditional strategic self-talk interventions (Latinjak, C. Hernando-Gimeno, et al., 2019). While in strategic self-talk interventions players normally use predetermined self-talk plans that should trigger appropriate responses (Hatzigeorgiadis et al., 2011), in reflexive self-talk interventions, players are guided to become aware of the content, antecedents, and consequences of their organic self-talk (Latinjak, C. Hernando-Gimeno, et al., 2019). In particular, the analysis of organic spontaneous self-talk can help to identify the situational conditions and the related emotional processes that lead to potentially dysfunctional spontaneous self-talk. Consequently, players can learn how to change the situational conditions and/or learn to apply functional goal-directed self-talk to regulate the related emotional processes (Latinjak, A. Hatzigeorgiadis, et al., 2019). Because our study shows the potential of the strategies inherent in the player, in the long run reflexive self-talk interventions with more self-determined strategies could be useful to lead to more functional organic self-talk and associated emotional processes.

### **Strengths and limitations**

Among the strengths of this study is that it is based on recent theoretical developments in self-talk, distinguishing between spontaneous and goal-directed self-talk (Latinjak et al., 2014). The findings linking the different self-talk types with different emotions experienced and outward emotional reactions provide reasonable support for the new self-talk conceptualization. Another strength of the study is that the data were collected in real sport competitions, thus addressing a major limitation specific to the self-talk literature (Hardy et al., 2018) and also to the sport psychology literature in general (Martin et al., 2005). This methodological approach gives us confidence that the results are relevant to those situations in which players need to perform under pressure as an integral part of sport competitions.

Despite these strengths, there are some limitations in our study that ought to be discussed. First, the design of the correlational study does not allow for causal interpretations regarding the direction of the relationship between self-talk and emotions. Whereas spontaneous self-talk can be regarded as an integral part of emotions, studies with a rigorous experimental design are required, particularly with regard to the assumed emotion regulation functions of goal-oriented self-talk (Latinjak et al., 2014; Van Raalte et al., 2016). Second, although the naturalistic video-assisted procedure of our study has a high ecological validity (Miles & Neil, 2013), the retrospective design cannot guarantee the accuracy of the reported self-talk and emotions. The players' memories could be distorted by various factors, such as the outcome of the match, or the mood of the players during their interview. However, given their subjective nature, it is important to recognize that all self-report measures have limitations (de Guerrero, 2005). In addition, the mean score of the players' recall of their self-talk (5.31 on a scale of 1 to 7) is in line with a recent study showing a strong correlation between retrospective and concurrent self-talk measures (De Muynck et al., 2020), thus supporting the integrity of retrospective methods. The fact that the data are in agreement with the theoretical considerations (Latinjak et al., 2014; Van Raalte et al., 2016) and with previous studies (Latinjak, Hatzigeorgiadis, et al., 2017) further strengthens our confidence in the choice of method. Finally, it is important to note that various studies have shown that the categorization of self-talk statements by researchers differs from that of the participants themselves (Latinjak, Hatzigeorgiadis, et al., 2017; Van Raalte et al., 2014). Although, given the interpretative element of self-talk (Latinjak, A. Hatzigeorgiadis, et al., 2019), the involvement of the participants in the categorization process is important, it can be argued that the categories created by researchers may have greater theoretical value (Latinjak et al., 2019). This point is important to bear in mind because the purpose of the current study was primarily to test concrete hypotheses derived from theory-driven self-talk approaches (Latinjak et al., 2014; Van Raalte et al., 2016).

## **Conclusions**

We are confident that this study is a significant contribution to the rapidly developing self-talk literature. Particularly, the results underline the validity of dual-process self-talk theories that recently have been introduced to the sport psychology literature (Latinjak et al., 2014; Van Raalte et al., 2016). The results support the idea that, on the one hand, spontaneous self-talk is inherently linked with emotions, and, on the other hand, that a main function of goal-directed self-talk is emotion regulation (Latinjak, A. Hatzigeorgiadis, et al., 2019). From an applied perspective, those players who struggle with their emotions in sport competitions could benefit from the use of proactive or reactive goal-oriented self-talk with the aim of emotion regulation.

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## Chapter 6

### **Antecedents and consequences of outward emotional reactions in table tennis**

In sports like table tennis, players can react very differently, depending on whether they won or lost a point. In some situations, after having won a point, players may make a fist and give a shout of joy, whereas after losing a point, players might throw the racket and give a shout of frustration. In other situations, however, you cannot really tell from the players' reaction whether the point was won or lost. This variety of emotional reactions during a match not only makes sport fascinating to watch, it also says a lot about the psychological challenges players face in sports competitions.

Emotions are an integral part of sports. This is highlighted by studies in general psychology that make use of the nature of sports competitions to study emotions (e.g., Fernández-Dols & Ruiz-Belda, 1995; Matsumoto & Willingham, 2006; Aviezer et al., 2012). Although the definition of emotions is highly debated (Lindquist et al., 2013), researchers agree that emotions consist of one's individual subjective experience (e.g., feeling anxious), physiological processes (e.g., change in blood pressure), and behavioral component (e.g., facial expressions; Mauss & Robinson, 2009). Research aimed at understanding the role of emotions in sports has mostly utilized questionnaires (e.g., Jones et al., 2005), or interviews (Martinet & Ferrand, 2009). Due to ethical and practical reasons, these methods cannot be applied to investigate emotions in real time, i.e. during real sports competitions, and thus limit the ecological validity of retrospective or prospective study designs (Uphill et al., 2014). As an alternative to these methods, focusing primarily on the subjective experience of emotions or the perception of physiological processes, this study was based on the premise that emotions are also observable from the outside. The behavioral component of emotion is worth investigating as it is relatively understudied, but also as it addresses the interpersonal nature of emotions

(Tamminen & Bennett, 2017). Specifically, in this study we focused on the investigation of antecedents and consequences of outward emotional reactions in table tennis.

The term outward emotional reaction refers to an impression, which is based on an individual's behavior and provides information about his/her emotional state. This impression includes different body signals that indicate an emotional state. Examples of these are postures, gestures, facial expressions, and verbalizations (Mauss & Robinson, 2009). It is important to note that instead of focusing on discrete emotions such as joy or anger, outward emotional reactions generally distinguish between positive and negative reactions, which makes it possible to study a wide range of emotions (Ekkekakis, 2013). While negative outward emotional reactions indicate that something emotionally unpleasant has happened to the individual (e.g., losing a point), positive outward emotional reactions indicate that something emotionally pleasant has occurred to the individual (e.g., scoring a point). It is further important to note that outward emotional reactions do not always correspond to the subjective emotions experienced. On the one hand, players sometimes fake a higher emotional intensity than is actually experienced through outward emotional reactions (Sève et al., 2007). On the other hand, even intense emotions experienced are not always accompanied by outward emotional reactions (Fernández-Dols & Ruiz-Belda, 1995).

From a sport psychological perspective, two intriguing questions arise: (a) under which conditions are outward emotional reactions more likely to occur and (b) how do these subsequently affect sports performance? In other words, it appears fruitful to focus on the antecedents and consequences of outward emotional reactions in sport competitions (Hanin, 2007). Expanding metacognitive knowledge about these two aspects could help players to regulate their behavior and thoughts more effectively and could thus also improve their emotion regulation skills (MacIntyre et al., 2014). Understanding the conditions under which players tend to react emotionally and identifying how these reactions affect sports performance can help us understand the underlying psychological processes. In addition, such knowledge could

be used to develop strategies that channel emotions in a performance-enhancing way, both proactively and reactively (Uphill & Jones, 2007).

In sports like table tennis or tennis, winning or losing a point are the proximate events that trigger outward emotional reactions. Outward emotional reactions, however, are not randomly distributed throughout a match. In line with theoretical appraisal emotion approaches (Lazarus, 1991; Scherer, 2013), the importance of the situation and the controllability of the situation appear to be two relevant constructs that can either increase or decrease the likelihood of outward emotional reactions. These constructs do not themselves elicit outward emotional reactions, however, they may regulate the occurrence of outward emotional reactions following a potentially emotion-eliciting stimulus (i.e., winning or losing a point in table tennis). Because emotions are the result of a person-environment transaction (Lazarus, 1991), it is important to understand the subjective appraisal processes (e.g., Uphill & Jones, 2007). However, studies in tennis and table tennis have showed that these appraisal processes are often related to situational factors, such as the scoring system (Sève et al., 2007; Lewis et al., 2017). Since such situational factors can be objectively classified in observational studies, they appear to be particularly useful for studying their relationship to outward emotional reactions (for a study in handball see Moesch et al., 2015).

The importance of the situation hugely depends on the potential consequences it can have. Situations with more significant consequences for the individual's goal attainment are associated with stronger emotional responses (Lazarus, 1991; Scherer, 2013). The importance of the situation is appraised very rapidly after the occurrence of an either positive or negative stimulus, and directs more in-depth processing (Scherer, 2013). Moesch et al. (2015) showed, for example, that handball players were more likely to celebrate a goal openly (i.e., positive outward emotional reactions) in elimination matches than in group stage matches. A possible explanation for this is that a defeat in elimination matches is equivalent to an elimination from the competition, which makes the situation more significant. In contrast, a defeat during a group

stage match might be potentially compensated by subsequent matches. Because table tennis matches are divided into sets and sets in turn are divided into points, the importance can also be levelled down to the set level (within the match) as well as the point level (within the set). While points/sets closer to the potential end of a set/match have a stronger impact on the outcome of the set/match, earlier points/sets in the set/match can be compensated more easily by future actions.

The controllability of a situation refers to a basic psychological need, as people generally prefer to have control over the potential outcomes of a situation (Ryan & Deci, 2000). In comparison to the importance of the situation, which must be identified beforehand, the controllability of a situation is appraised at a later stage (Scherer, 2013). In addition, the controllability of a situation seems to be more important for stimuli that are incongruent with the current goal (Scherer, 2013). Since positive emotions are viewed as benefiting one's goals (Lazarus, 1991), situational factors associated with the controllability of a situation could in particular influence the occurrence of negative outward emotional reactions. In table tennis, the current score is one relevant situational factor in relation to emotions (Sève et al., 2007). In situations where the players are leading, the controllability of the situation is higher than in situations where the players are trailing. Hence, the current score can be an indicator of controllability. Table tennis sets generally have 11 points. Leading by 9 to 2 points in a set indicates a higher controllability than leading by 9 to 8 points. At the same time, being behind by 2 to 9 points is associated with a lower controllability of the situation than being behind by 8 to 9 points. Furthermore, the controllability of the situation can be influenced by preceding experiences (Bandura, 1997). Winning consecutive points can lead to a positive momentum that in turn is related to a higher controllability of the situation (Kimić & Jackson, 2002). In contrast, losing consecutive points can lead to a negative momentum and is thus related to a lower controllability of the situation.

Summarizing the above we argue that a higher importance of the situation generally increases the likelihood of both positive and negative outward emotional reactions. Furthermore, a higher controllability of the situation generally decreases the likelihood of negative outward emotional reactions. As these constructs do not function in isolation during a sports competition, it is important to consider the interactive effects of their associated situational factors. For instance, losing a point when the score is 9-7 is related to a higher level of importance of the situation, which thus increases the likelihood of negative outward emotional reactions (Lazarus, 1991; Scherer, 2013). However, at the same time, being in front (9-7) increases the controllability of the situation, and thus decreases the likelihood of negative outward emotional reactions. On the contrary, losing a point at the end of the set when you are behind (7-9) can accumulate effects of a higher importance/lower controllability of the situation, making negative outward emotional reactions very likely.

From a sport psychological perspective, it is not only interesting to understand why players show outward emotional reactions in some situations and not in others, but also how these in turn affect the subsequent sports performance. Enhancing the understanding of the relationship between emotions and sports performance can raise players' awareness of the importance of applying appropriate emotion regulation strategies (Jones, 2003). A number of studies have investigated outward emotional reactions (e.g., over verbalizations and gestures) and have linked these to objective performance indicators (e.g., the subsequent point). Studies in tennis have yielded interesting yet inconsistent results. While two studies showed an association between negative outward emotional reactions and a reduced probability of winning the next point (Van Raalte et al., 1994; Zourbanos et al., 2015), another study could not replicate this finding (Van Raalte et al., 2000). Conversely, it was shown that positive outward emotional reactions either have only a very weak positive association with the outcome of the next point (Van Raalte et al., 2000; Zourbanos et al., 2015) or no association at all (Van Raalte et al., 1994).

In this article, we argue that investigating outward emotional reactions can contribute to our understanding of the role of emotions in sports. The purpose of this study was to study emotions in real time and in their natural context by investigating antecedents and consequences of outward emotional reactions. In particular, we examined situational factors associated with the importance of the situation and the controllability of the situation as two important constructs influencing emotional outcomes (Lazarus, 1991; Scherer, 2013). With regard to antecedents of outward emotional reactions, we hypothesized that situational factors bearing a higher importance of the situation (e.g., point at the end of the set) would increase the likelihood of both positive outward emotional reactions after winning a point as well as negative outward emotional reactions after losing a point. In line with the assumption that the controllability of a situation has a greater effect for goal incongruent stimuli (Scherer, 2013), we also hypothesized that situational factors bearing a higher controllability of the situation (e.g., leading) would reduce the likelihood of negative outward emotional reactions after losing a point. For positive outward emotional reactions after winning a point, we hypothesized that the controllability of the situation would not have an effect. In addition, we hypothesized that the increased probability of negative outward emotional reactions in highly important situations would be reduced when there was a higher controllability of the situation (e.g., leading at the end of the set). For positive outward emotional reactions, we hypothesized that there would be no interaction between the importance and the controllability of the situation. With regards to the consequences of outward emotional reactions, the subsequent point was taken as a performance indicator. Given the inconsistent results of previous studies (Van Raalte et al., 1994; Van Raalte et al., 2000; Zourbanos et al., 2015), we did not have specific hypotheses regarding the impact of positive and negative outward emotional reactions on the likelihood of winning the next point.



## ***Materials and methods***

### **Participants**

Participants were approached before the finals of the Greek national youth championship. A total of 14 male and 7 female Greek junior table tennis players, aged 16 to 18 years ( $M = 16.71$ ;  $SD = .70$ ) and with an average of 7.29 ( $SD = 1.72$ ) years of competition experience agreed to participate in the study. The highest level of competition participation was international for 12 players and national for 9 players. The players trained 3.71 days ( $SD = 1.48$ ) on average per week.

### **Procedure**

The university's ethics committee gave its approval for the study. Players who were 18 signed a consent form, whereas for younger players the consent was granted by their legal guardians. In order to avoid self-presentation biases, the players were told before the match that the recording was intended for motion analysis. After the tournament, they were informed about the actual objective of the study. A total of 15 matches were recorded by two cameras positioned diagonally behind the table, which recorded the movements of the players on the opposite side. Thus, the video footage showed the whole person, including postures, gestures, facial expressions, and verbalizations, as important signals for the emotional state (Mauss & Robinson, 2009). In addition, the video footage also contained the trajectories of the ball, which allowed to keep track of the score. The data collection involved eight group stage matches, one quarter-final, four semi-finals, and two finals. Some of the players took part in more than one match, and a total of 2014 points (per match: 51 to 117;  $M = 67.13$ ;  $SD = 17.6$ ) were observed.

## Measures

### Outward emotional reactions

Outward emotional reactions were used as a dependent variable to investigate their antecedents, and as an independent variable to investigate their consequences. Based on the video footage, two coders independently classified the players' reactions after each point into (1) a positive outward emotional reaction, (2) a negative outward emotional reaction, or a (3) neutral outward emotional reaction. The first coder was a researcher with expertise in emotion literature and the second one a former Greek professional table tennis player and currently a coach. The coding was based on different body signals such as postures, gestures, facial expressions, and verbalizations, indicating the players' emotional state (Mauss & Robinson, 2009). Since research suggests that conclusions about an individual's emotional state cannot be drawn from physical features alone, but rather depend on context (Kayyal et al., 2015), the outcome of the point was taken as relevant context information. The coders were instructed to code outward emotional reactions as positive when the players' behavior indicated that something emotionally positive occurred, and as negative if the players' behavior indicated that something emotionally negative happened. Considering that individuals are always in some kind of emotional state (Russell, 2009), if the coders could not tell from the behavior of the players that something emotionally positive or negative occurred, these outward emotional reactions were coded as neutral.

### Antecedents of outward emotional reactions

#### Importance of the situation

Three situational factors representing the importance of the situation were analyzed, namely the stage of competition, the number of remaining sets, and the number of remaining points.

### *Stage of competition*

This variable was used to distinguish between matches that could be compensated by future matches, and matches that were decisive for remaining in the tournament, i.e., group stage and elimination matches. Thus, points in elimination matches would indicate a higher importance of the situation than points in group stage matches. This situational factor was coded as a binary variable, with elimination matches coded as '1' and group stage matches coded as '0'.

### *Remaining sets*

This variable was used to indicate the lowest number of sets that potentially had to be played until the end of a match. The lower the number of remaining sets, the more important the situation was. Thirteen of the 15 matches were played until one player had won three sets. Two matches (one final and one semi-final) were played until one player had won four sets. This situational factor was coded as a continuous variable, with a higher number indicating that potentially more sets had to be played until the end of the match.

### *Remaining points*

This variable was used to indicate the lowest number of points that potentially had to be played until the end of a set. The lower the number of remaining points, the higher the importance of the situation was. The sets of all matches were played until one player had won 11 points, with at least two points difference between the players. Thus, with a score of 10-10, the set lasted at least up to 12 points (in case of a score of 11-11, up to at least 13 points etc.). This situational factor was coded as a continuous variable, with a higher number indicating that potentially more points had to be played until the end of the set.

### Controllability of the situation

Four situational factors were used to assess the controllability of the situation, namely leading in sets, leading in points, consecutive points won, and consecutive points lost. Furthermore, the two situational factors set difference and point difference were formed. However, it is important to note that these two variables only took into account the absolute set/point difference between the players, and could not distinguish whether the players were leading or not. Because this made an important difference in terms of controllability, two interaction effects (set difference x leading in sets and point difference x leading in points) were additionally analyzed.

#### *Leading in sets*

This variable was used to distinguish between situations where the players were leading in sets within a match and situations where the players were not leading (either trailing or tied). Trailing and tie were combined into one category because a tie implies a set difference of '0'. Treating a tie as a separate category would have therefore resembled the variable set difference (see below), which would have led to collinearity and exclusion of this category. Leading in sets would thus indicate a higher controllability of the situation. This situational factor was coded as a binary variable, with leading coded as '1' and trailing/tie coded as '0'.

#### *Leading in points*

This variable was used to distinguish between situations where the players were leading in points within a set, and situations where the players were not leading (either trailing or tied). The reason for combining trailing and tie was the same as described for the variable leading in sets (i.e., a tie would have resembled a point difference of '0'). Equivalent to the situational factor leading in sets, leading in points would indicate a higher controllability of the situation. This situational factor was coded as a binary variable, with leading coded as '1' and trailing/tie coded as '0'.

### *Set difference*

This variable was used to indicate the difference between sets won by each player. Since this variable had only three gradations, we formed two binary variables. While the first binary variable contrasted situations where an absolute set difference between the players was 1 (e.g., 2-1) to where it was a tie, the second binary variable contrasted situations where the absolute set difference between the players was 2 (e.g., 2-0) to where it was a tie. In both variables, the set difference of 1 set (or 2 sets) was coded as '1' and a tie was coded as '0'.

### *Interaction set difference x leading in sets*

For the variable set difference, only the absolute difference was taken into account, but not in whose favor the set difference was. For this reason, we computed the interaction between the two situational factors set difference and leading in sets. Because the results, upon using two dummy variables for the variable set difference, did not converge, the interaction effect was based on the continuous variable set difference.

### *Point difference*

This variable was used to indicate the absolute difference between points won by each player within a set. The range of this variable was from 0 (in case of a tie) to the maximum of 10 (in case of a score of 10-0 or 0-10). This situational factor was coded as a continuous variable, with a higher number indicating that the point difference between the players was higher.

### *Interaction point difference x leading in points*

Similar to the set difference, the point difference only took the absolute difference into account. For this reason, we formed an interaction term including the two situational factors point difference and leading in points.

### *Consecutive points won*

This variable was used to indicate the number of points won in a row before the assessed point. A higher number of consecutive points won would indicate a higher controllability of the situation. The range of this variable was from 0 (in case it was the start of the set or the last point was lost) to a maximum of 10 (in case the score was 10-0). This situational factor was coded as a continuous variable, with a higher number indicating that more points were consecutively won by the players.

### *Consecutive points lost*

This variable was used to indicate the number of points lost in a row before the assessed point. In contrast to consecutive points won, a higher number of consecutive points lost would indicate a lower controllability of the situation. The range of this variable was from 0 (in case it was the start of the set or the last point was won) to a maximum of 10 (in case the score was 0-10). This situational factor was coded as a continuous variable, with a higher number indicating that more points were consecutively lost by the players.

### *Interaction between importance of the situation and controllability of the situation*

Finally, we investigated the two interactions between remaining sets and leadings in sets as well as remaining points and leading in points in order to assess the interaction between the importance and the controllability of the situation.

### *Interaction remaining sets x leading in sets*

This interaction allowed us to investigate whether the impact of the remaining sets on outward emotional reactions depended on whether the players were leading or not.

### *Interaction remaining points x leading in points*

This interaction made it possible to investigate whether the impact of remaining points on outward emotional reactions depended on whether the players were leading or not.

### Consequences of outward emotional reactions

#### *Outcome of next point*

Here, we investigated whether outward emotional reactions were linked to the performance in the subsequent point. We predicted the outcome of winning, with a won point coded as '1' and a lost point as '0'.

### **Statistical analysis**

#### Statistical analysis for antecedents of outward emotional reactions

The coders identified no positive outward emotional reactions after losing a point and only five negative outward emotional reactions after winning a point. For this reason, we made two different computations. The first computation included only the won points and positive (vs. neutral) outward emotional reactions as binary outcome, and the second computation included only the lost points and negative (vs. neutral) outward emotional reactions as binary outcome. Since some of the players participated in more than one match and up to 117 points per match were observed for each player, outward emotional reactions and match characteristics were not independent of each other, but were nested within persons and within matches. In addition, we considered a temporal autocorrelation since consecutive outward emotional reactions closer in time expected to be more similar.

We used generalized linear models with a logit link (i.e., hierarchical logistic models) within the R package 'lme4' (Bates et al., 2015) to predict outward emotional reactions as binary outcomes. We modelled match and player as two independent random effects. To

account for the possible temporal autocorrelation, we created lag variables for the outward emotional reactions. That is, the outward emotional reactions before the observed point (and thus the corresponding outward emotional reactions as a dependent variable) were coded as the variables 'lag 1', the outward emotional reactions before it as the variables 'lag 2', and so on. This took into account the likely autocorrelations in the outward emotional reactions, since the lme4 package does not have an option to include autocorrelation errors as a specific covariance structure. Specifically, we looked at the outward emotional reactions as well as the outcome of the point of up to five preceding points. For the outcome of the preceding points, the lag variables were coded as '1' when won or as '0' when lost. For the outward emotional reactions, negative ones were coded as '-1', positive ones as '1', and neutral ones as '0'. Due to technical problems with the camera or situations in which the players were outside of the camera view, outward emotional reactions could not be coded in 93 situations. These outward emotional reactions were treated as missing values, however, for the lag variables we coded them as '0' (neutral) to avoid a loss of cases.

To avoid convergence problems of more complex models, continuous predictors were grand mean centered, and the maximum number of iterations was increased. No issues with multicollinearity could be identified when looking at the generalized variance inflation factors of our models. Separately, for both positive and negative outward emotional reactions, we first calculated odds ratios for the bivariate relationships between each individual situational factor and the subsequent outward emotional reaction, adjusted only for the lag variables. In the final model, the significant interaction terms were included and the effects for each situational factor were adjusted by the effects of the other situational factors. The intraclass coefficient (ICC) was calculated for the empty model.



### Statistical analysis for consequences of outward emotional reactions

In order to assess whether outward emotional reactions affect sports performance, we also composed two models. In the first model, we tested the effects of positive (vs. neutral) outward emotional reactions, and in the second model, we tested the effects of negative (vs. neutral) outward emotional reactions. In both cases, this was then linked to the outcome of the next point (won vs. lost). The first point of each set was not included in the analysis because there was no immediate preceding outward emotional reaction. Since outward emotional reactions could also influence performance over more than one point, lag variables were also explored. Again, we looked at the outward emotional reactions as well as the outcome of the point of up to five preceding points.

### ***Results***

#### **Descriptive analysis of codes**

Overall, 1921 outward emotional reactions were recorded. In 93 situations (4.6%), players' outward emotional reactions could not be coded due to technical problems with the camera or situations in which the players were outside of the camera view. Of the remaining 1921 outward emotional reactions, the two coders agreed on 1781 of the ratings (92.71%). With regard to the 140 differently rated situations, only one of the coders identified a negative outward emotional reaction in 119 cases, and a positive outward emotional reaction in 21 cases, whereas the other coder rated all of the 140 outward emotional reactions as neutral. In the following analysis, these 140 outward emotional reactions were treated as neutral, so that only positive and negative outward emotional reactions were considered as such in the analysis if they were identified as such by both coders. In the analysis, 480 negative outward emotional reactions and 481 neutral outward emotional reactions were coded after having lost a point and 356 positive outward emotional reactions, 5 negative outward emotional reactions, and 599 neutral outward emotional reactions were coded after having won a point.

### *Antecedents of positive outward emotional reactions after winning a point*

For the prediction of positive outward emotional reactions, none of the lag variables for preceding outcomes of the point were significant and, therefore, no lagged effects for the outcome of the point were included in the models. Since the three preceding outward emotional reactions were significantly related to the current outward emotional reactions, all following models were adjusted for these lagged effects. A model including only these three lagged effects of outward emotional reactions had a deviance value of 843.34, compared to 882.45 for the intercept only (empty) model ( $\chi^2(3) = 39.11, p < .05$ ). The intraclass correlation (ICC) for person was 0.294, and for match was 0.367. The results for the individual situational factors are presented in Table 6, including odds ratio for the bivariate relationships and odds ratio adjusted by all situational factors and significant interactions.

### Situational factors for importance of the situation for positive outward emotional reactions

For the bivariate relationships, the two situational factors stage of competition ( $OR = 6.314, CI = 1.134-35.133$ ) and remaining sets ( $OR = 0.583, CI = 0.470-0.742$ ) were significant predictors of positive outward emotional reactions. In addition, the situational factor remaining points approached significance ( $OR = 0.946, CI = 0.893-1.002$ ). In the final model, the two situational factors stage of competition ( $OR = 14.695, CI = 1.882-118.988$ ) and remaining points ( $OR = 0.775, CI = 0.713-0.843$ ) were significant predictors of positive outward emotional reactions. Thus, after having controlled for all situational factors, the results showed that after winning a point, the players were fourteen times more likely to show positive outward emotional reactions in elimination matches than in group stage matches. However, there was a large confidence interval. Furthermore, the likelihood of positive outward emotional reactions decreased by about 22.5% for each point further away from the potential end of the set.

### Situational factors for controllability of the situation for positive outward emotional reactions

For the bivariate relationships, the four situational factors, leading in sets ( $OR = 3.009$ ,  $CI = 1.882-4.811$ ), set difference of one set ( $OR = 2.026$ ,  $CI = 1.359-3.019$ ), set difference of two sets ( $OR = 2.434$ ,  $CI = 1.882-4.811$ ), and point difference ( $OR = 0.753$ ,  $CI = 0.641-0.864$ ), were significant predictors of outward emotional reactions. In the final model, only the situational factor point difference ( $OR = 0.503$ ,  $CI = 0.404-0.626$ ) was a significant predictor of positive outward emotional reactions. Thus, after controlling for all situational factors, after winning a point the chance of a positive outward emotional reaction decreased by about 49.7% when the point difference increased by one point. In addition, the interaction between the two situational factors point difference and leading in points was a significant predictor ( $OR = 1.334$ ,  $CI = 1.016-1.752$ ). When the players were leading, the OR of point difference 1 was 0.671, while when the players were trailing or tied, the OR of point difference was reduced to 0.503. This means that the effect of point difference on positive outward emotional reactions was moderated by leading in points. The effect was stronger when the players were trailing or tied. Finally, the effect for the situational factor consecutive points won approached significance ( $OR = 0.810$ ,  $CI = 0.636-1.033$ ). This suggests that the chance of positive outward emotional reactions decreased by about 19% when the number of consecutive points won increased by one point.

### Situational factors for interaction between importance/controllability of the situation for positive outward emotional reactions

The interaction of the two situational factors, remaining sets and leading in sets, was a significant predictor of positive outward emotional reactions ( $OR = 0.295$ ,  $CI = 0.141-0.617$ ). Specifically, when the players were leading, the OR for remaining sets was 0.231 and when the players were trailing or tied, the OR for remaining sets was 0.782. Thus, the results indicate that in situations with more remaining sets the chance of positive outward emotional reactions was more reduced when the players were leading compared to when they were trailing or tied.

**Table 8.** Antecedents of positive outward emotional reactions.

<b>Situational factor</b>	<b>Unadj. OR* (95% CI)</b>	<b>Adj. OR (95% CI)</b>
<b>Importance of the situation</b>		
Stage of competition	6.314* (1.134 – 35.133)	14.965* (1.882 – 118.988)
Remaining sets <sup>a</sup>	0.583* (0.470 – 0.724)	0.782 (0.480 – 1.275)
Remaining points <sup>a</sup>	0.946 <sup>§</sup> (0.893 – 1.002)	0.775* (0.713 – 0.843)
<b>Controllability of the situation</b>		
Leading in sets	3.009* (1.882 – 4.811)	1.439 (0.684 – 3.030)
Leading in points	1.056 (0.705 – 1.582)	1.049 (0.546 – 2.015)
Set difference (1 vs. 0)	2.026* (1.359 – 3.019)	1.045 (0.494 – 2.212)
Set difference (2 vs. 0)	2.434* (1.882 – 4.811)	0.504 (0.157 – 1.621)
Set difference x leading in sets <sup>b</sup>		1.520 (0.419 – 2.771)
Point difference <sup>a</sup>	0.753* (0.641 – 0.864)	0.503* (0.404 – 0.626)
Point difference x leading in points		1.334* (1.016 – 1.752)
Consecutive points won <sup>a</sup>	0.865 (0.715 – 1.046)	0.810 <sup>§</sup> (0.636 – 1.033)
Consecutive points lost <sup>a</sup>	0.872 (0.728 – 1.044)	0.872 (0.688 – 1.105)
<b>Interaction between importance of the situation and controllability of the situation</b>		
Remaining sets x leading in sets		0.295* (0.141 – 0.617)
Remaining points x leading in points <sup>b</sup>		0.960 (0.839 – 1.098)

<sup>§</sup> $p \leq .10$ ; \* $p \leq .05$ ; <sup>a</sup>Grand mean centered; <sup>b</sup>This interaction was not considered in the final model.

### Antecedents of negative outward emotional reactions after losing a point

For the prediction of negative outward emotional reactions, again, none of the lag variables for the preceding outcomes of the point showed a significant effect, but we found significant effects up to the third lag variable for the preceding outward emotional reactions. A model including lagged effects for three preceding outward emotional reactions had a deviance value of 1249.40, compared to 1258.30 for the intercept only (empty) model ( $\chi^2(3) = 8.983, p < .05$ ). We therefore included three lag variables, as in the models for positive outward emotional reactions. The intraclass correlation (ICC) for person was 0.036 and for match 0.021 in the intercept only (empty) model. Due to the low number of five negative outward emotional reactions after winning a point, they were not considered in this analysis. The results for the individual situational factors are presented in Table 7, including odds ratio for the bivariate relationships and odds ratio adjusted by all situational factors and significant interactions.

### Situational factors for importance of the situation for negative outward emotional reactions

For the bivariate relationships, the situational factor remaining sets was a significant predictor ( $OR = 0.737, CI = 0.628-0.865$ ). In the final model, the situational factor remaining points was significant ( $OR = 0.913, CI = 0.862-0.968$ ) and the situational factor remaining sets approached significance ( $OR = 0.720, CI = 0.496-1.045$ ). Thus, after having controlled for all situational factors, the chance of negative outward emotional reactions decreased by about 8.7% for each point further away from the potential end of the set, and by about 28% for each set further away from the potential end of the match.

### Situational factors for controllability of the situation for negative outward emotional reactions

For the bivariate relationships, the two situational factors set difference of one set ( $OR = 1.502, CI = 1.111-2.031$ ), and the set difference of two sets ( $OR = 1.918, CI = 1.286-2.861$ ) had significant effects. Furthermore, the situational factor point difference approached significance

(*OR* = 0.936, *CI* = 0.868-1.009). In the final model, only the situational factor point difference was significant (*OR* = 0.831, *CI* = 0.747-0.925). This result suggests, after having controlled for all situational factors, that the chance of negative outward emotional reactions decreased by about 16.9% when the point difference increased by one point.

Situational factors for interaction between importance/controllability of the situation for negative outward emotional reactions

The interaction of the two situational factors, remaining sets and leading in sets, was a significant predictor for negative outward emotional reactions (*OR* = 1.924, *CI* = 1.117-3.313). Specifically, when the players were leading, the *OR* for remaining sets was 1.385 and when the players were trailing or tied, the *OR* for remaining sets was 0.720. Thus, the results showed that in situations with more remaining sets the chance of negative outward emotional reactions was increased when the players were leading. On the contrary, when the players were trailing or tied the chance of negative outward emotional reactions was decreased with more remaining sets.

**Table 9.** Antecedents of negative outward emotional reactions.

<b>Situational factors</b>	<b>Unadj. OR (95% CI)</b>	<b>Adj. OR (95% CI)</b>
<b>Importance of the situation</b>		
Stage of competition	0.853 (0.545 – 1.335)	0.809 (0.504 – 1.299)
Remaining sets <sup>a</sup>	0.737* (0.628 – 0.865)	0.720 <sup>§</sup> (0.496 – 1.045)
Remaining points <sup>a</sup>	0.965 (0.923 – 1.008)	0.913* (0.862 – 0.968)
<b>Controllability of the situation</b>		
Leading in sets	1.038 (0.742 – 1.452)	0.947 (0.590 – 1.520)
Leading in points	1.053 (0.777 – 1.429)	1.158 (0.819 – 1.637)
Set difference (1 vs. 0)	1.502* (1.111 – 2.031)	1.100 (0.623 – 1.942)
Set difference (2 vs. 0)	1.918* (1.286 – 2.861)	1.319 (0.577 – 3.016)
Set difference x leading in sets <sup>b</sup>		0.658 (0.344 – 1.257)
Point difference <sup>a</sup>	0.936 <sup>§</sup> (0.868 – 1.009)	0.831* (0.747 – 0.925)
Point difference x leading in points <sup>b</sup>		0.938 (0.788-1.116)
Consecutive points won <sup>a</sup>	1.098 (0.963 – 1.251)	1.115 (0.956 – 1.300)
Consecutive points lost <sup>a</sup>	0.981 (0.867 – 1.110)	1.032 (0.893 – 1.193)
<b>Interaction between importance of the situation and controllability of the situation</b>		
Remaining sets x leading in sets		1.924* (1.117 – 3.313)
Remaining points x leading in points <sup>b</sup>		1.020 (0.924 – 1.127)

<sup>§</sup> $p \leq .10$ ; \* $p \leq .05$ ; <sup>a</sup>Grand mean centered; <sup>b</sup>This interaction was not considered in the final model.

### *Consequences of outward emotional reactions*

Finally, we conducted analyses to assess whether positive or negative outward emotional reactions can significantly predict the outcome of the next point. A total of 1813 observed points were included in this analysis. Thus, points where the immediately preceding outward emotional reactions were missing were not considered. This included those points where preceding outward emotional reactions could not be coded due to technical problems ( $n = 93$ ) as well as the first point of each set ( $n = 108$ ). Neither the lag variables for preceding outcomes of the point nor outward emotional reactions were significant and therefore no lagged effects were included in the models. No significant effects were found for both positive outward emotional reactions ( $OR = 0.954$ ,  $CI = 0.734-1.239$ ) and negative outward emotional reactions ( $OR = 1.117$ ,  $CI = 0.892-1.399$ ). Thus, the results suggest that neither positive nor negative outward emotional reactions could predict the outcome of the following point.

### *Discussion*

This study aimed to examine antecedents and consequences of outward emotional reactions during competitive table tennis matches. The results showed positive outward emotional reactions were more likely in elimination matches. Both positive and negative outward emotional reactions were less likely when there were more remaining points until the potential end of the set and also when there was a higher point difference between the players. For positive outward emotional reactions, the effect of point difference was stronger in situations where the players were trailing or tied than in situations where the players were leading. In addition, with more remaining sets until the potential end of the set, the chance of positive outward emotional reactions was more reduced when the players were leading compared to when they were trailing or tied. For negative outward emotional reactions, with more remaining sets until the potential end of the match, they were more likely when the players were leading



in sets, but less likely when they were trailing or tied in sets. Finally, we found that neither positive nor negative outward emotional reactions could predict the outcome of the next point.

### **Antecedents of outward emotional reactions**

Situations that are appraised as relevant for the individual's goal realization have a greater influence on emotional responses (Lazarus, 1991; Scherer, 2013). It is therefore consistent with our hypothesis that situational factors representing the importance of a situation increased the likelihood of both positive and negative outward emotional reactions. The controllability of the situation is particularly relevant in the emotion generation process for stimuli that are not congruent with the current goal (Scherer, 2013). Thus, we hypothesized that the controllability of the situation would reduce the likelihood of negative outward emotional reactions, but would not influence positive outward emotional reactions. However, in contrast to this hypothesis, the results show that, after having controlled for all situational factors, none of the situational factors representing the controllability of the situation could predict the likelihood of negative outward emotional reactions; some of them, however, could predict the likelihood of positive outward emotional reactions. Below, we will first discuss the findings of the individual situational factors concerning the importance of the situation, then the factors related to the controllability of the situation, and finally the interaction of factors related to the importance and controllability of the situation.

#### **Importance of the situation**

In accordance with our hypothesis, the results show that positive outward emotional reactions were more likely in elimination matches than in group stage matches. These findings are in line with a study with handball players (Moesch et al., 2015). Since a defeat in an elimination match cannot be compensated for in future matches, the outcome of a won point is more important.

This makes the situation more likely to elicit emotions (Scherer, 2013). One possible explanation for the finding that the stage of competition does not influence the likelihood of negative outward emotional reactions is the concept of loss aversion, indicating that the fear of losing is associated with stronger emotional reactions than the hope of a possible win (Tversky & Kahneman, 1991). Irrespective of the stage of competition, there is a general tendency to react emotionally after losing a point, which may also explain why overall more negative than positive outward emotional reactions were identified in this study.

A confounding effect was found for the situational factor remaining sets for positive outward emotional reactions. While the effect was significant in the bivariate model, its significant interaction with the situational factor leading in sets may explain why it was not significant in the final model (this interaction effect will be discussed later). The results were less conclusive for negative outward emotional reactions. Although the effect only approached significance, a comparison of the statistical parameters showed a stronger effect in the final model, indicating that negative outward emotional reactions are more likely in sets closer to the end of the match. The outcome of a set closer to the end of a match can be decisive for the final result of the match, thus making the situation more important than the outcome of a set at the beginning of a match. In relation to the situational factor remaining points, its effect was significant in the final model, but not in the model with bivariate relationships, for both positive and negative outward emotional reactions. One can speculate that other situational factors in the regression model suppressed irrelevant parts of the variance in the variable remaining points. In addition, that more conclusive effect were revealed on the point level compared to the set level, is consistent with the observation that players often “reset” their mind after the end of a set (Lewis et al., 2017).

### Controllability of the situation

Similar to the importance of the situation, we found some confounding effects for situational factors with regards to the controllability of the situation. More specifically, the situational factors set differences (for a set difference of both one or two sets) were significant in the model with the bivariate relationships, but not in the final model, for both positive and negative outward emotional reactions. The same was found for the situational factor leading in sets, but only for positive outward emotional reactions. Thus, we assume that the effect of these situational factors overlaps with the effect of other situational factors. In contrast to our hypothesis, after having controlled for all other situational factors, none of the situational factors representing the controllability of the situation showed an effect on negative outward emotional reactions. This is surprising as the controllability is regarded as an important factor in the emotion generation process, especially for stimuli that are opposing the current goals (Scherer, 2013). Since appraisal processes related to the controllability of the situation come into play at a later stage in the emotion generation process (Scherer, 2013), this indicates a stronger impact of emotion regulation strategies. Since negative emotions are more difficult to regulate than positive ones (Martinent et al., 2015), this again could underline the potential role of loss aversion, which suggests that the effects of negative events are less dependent on situational factors (Tversky & Kahneman, 1991).

The point difference was the only situational factor that predicted both positive and negative outward emotional reactions in the final model. The smaller the point difference between the players was, the more likely an outward emotional reaction occurred. This is interesting because the point difference differently represents the controllability of the situation, depending on whether the player is leading or not. It could be that, regardless of who is leading, the predictability of the situation is one important facet in the appraisal process in sports competitions (Thatcher & Day, 2008). Thus, in times of a tight point score it is difficult to predict who will win the set, which generally increases the emotionality of the situation.

Contrary to our hypothesis, it could further be shown that the situational factor leading in points moderated the effect of the point difference on positive outward emotional reactions. In both situations, players were more inclined to show positive outward emotional reactions when there was a small point difference. However, in times of a small time difference, the likelihood was higher when the players were trailing or tied than when the players were leading. In line with the observation that leading in matches is often associated with feelings of confidence and relaxation (Lewis et al., 2017), this can make the situation less emotional and therefore reduces the likelihood of positive outward emotional reactions. This may also explain the trend that positive outward emotional reactions became more and more unlikely when players were winning points consecutively.

#### Interaction of importance of the situation and controllability of the situation

We further assessed the interaction between the importance of the situation and the controllability of the situation. For negative outward emotional reactions, the results suggest that players who were leading in sets were less likely to show negative outward emotional reactions when there were less remaining sets until the potential end of the set. This is in line with our hypothesis that the controllability of the situation can counteract the effects of the importance of the situation. If players were leading in the final phase of the match, this can give them a sense of confidence and control (Lewis et al., 2017), which in turn reduces the likelihood of negative outward emotional reactions. In contrast, if players are trailing or tied in the final phase of the match, the effect of the lower controllability of the situation and the higher importance of the situation can reinforce each other. This may account for the increased probability of negative outward emotional reactions in such situations found in our study. Contrary to our hypothesis, the findings also revealed an interaction effect for positive outward emotional reactions. More specifically, it was shown that positive outward emotional reactions were more likely to occur in the final phase of the match when they were leading.

Disengagement processes may explain why this effect was not as strong in the final phase of the match when the players were trailing or tied (Gaudreau et al., 2005).

### *Consequences of outward emotional reactions*

We further explored whether outward emotional reactions can influence sports performance. Our study design allowed us to use the next point as an objective performance indicator that closely follows the emotion (Uphill et al., 2014). The results indicate that neither positive nor negative outward emotional reactions have an impact on the outcome of the next point. Although other studies that focused on overt verbalizations and gestures in tennis reported debilitating effects of negative and facilitative effects of positive outward emotional reactions (e.g., Zourbanos et al., 2015), our results are in line with studies that did not report an effect on performance (e.g., Van Raalte et al., 2000). The inconsistency of these findings demonstrates that predicting sports performance in general is a difficult task (Nevill et al., 2008), which could be supported by considering additional situational and personal variables (e.g., Moesch et al., 2018). Since emotions can have a stronger effect on observers when they are identifiable from the outside, the study of outward emotional reactions seems particularly suitable for understanding the interpersonal consequences of emotions, an area that has received scant attention in sport psychology (Tamminen & Bennett, 2017). There are several laboratory studies within the context of sport that indicate how outward emotional reactions can influence the opponents' cognitions, emotions, and behaviors (e.g., Furley & Schweizer, 2014; Furley et al., 2015); however, research in the field is lacking. Given the importance of increasing the ecological validity of studies that focus on the relationship between emotions and sports performance (Uphill et al., 2014), we are convinced that with the increased use of innovative research methods (e.g., automatic recognition of body signals; Hetland et al., 2018), the explicit focus on outward emotional reactions can contribute to further insights in this area.

### **Implications for practice**

The present results have various implications for applied work, which are worth examining in future studies. Although our results did not indicate a direct influence of outward emotional reactions on performance, it can be argued that there are situations in which players would benefit from emotion regulation strategies that prevent the occurrence of outward emotional reactions (Lane et al., 2012). Since our study suggests that in certain situations there is an increased likelihood of both positive and negative outward emotional reactions, it seems promising to tailor the use of sport psychological techniques to psychological demands of such situations (Martinent et al., 2015). Here, reflexive self-talk interventions could raise awareness of the players' organic self-talk in such situations, which would possibly help to address potential irrational performance beliefs and subsequent outward emotional reactions (Latinjak et al., 2019). Furthermore, relaxation strategies (e.g., systematic breathing; progressive muscle relaxation) can help to deal with increased arousal in situations that are associated with a higher likelihood of outward emotional reactions (Pineschi & Di Pietro, 2013).

### **Limitations and future directions**

One limitation of the current study is the exclusive use of observational data. Although this methodology made it possible to study emotions 'online' in a real sports competition, an emotion is typically defined as having a subjective experience and physiological processes in addition to the behavioral component (Mauss & Robinson, 2009). In particular, the subjective experience is often considered the most essential component that distinguishes an emotion from other psychological states (Scherer, 2009). Nevertheless, outward emotional reactions imply consequences, especially with regards to the interpersonal side of emotions (e.g., Furley et al., 2015), which can hardly be explained by the subjective experience. For this reason, it seems that especially the combination of the different emotion components can contribute to a better understanding of the role of emotions in sports. In line with emotion theories (Lazarus, 1991;

Scherer, 2013), importance and controllability were considered as potential moderators of outward emotional reactions and contributed to our understanding of the antecedents of emotions in sports competitions. Nevertheless, it is worth noting that these were operationalized based on objective criteria. For a better understanding of their role, future research could potentially explore their relevance for emotions through subjective measures focusing on individuals' appraisal processes (e.g., Sève et al., 2007; Lewis et al., 2017).

Although the statistical analysis took the multi-level structure of the data into account, we did not explicitly deal with inter-individual differences. In sports competitions, however, it can often be seen that players differ in their tendency to show outward emotional reactions. As research points to individual dispositions influencing appraisal processes (Scherer, 2009), inter-individual differences could be another interesting line of future research. Moreover, in the current study we contrasted situations where players were leading with situations where players were not leading (i.e., for statistical reasons described in the methods section, trailing and tie was combined into one category). Because trailing or tied situations are qualitatively different from each other, future studies could consider this distinction. In addition, we only focused on whether or not positive/negative outward emotional reactions occurred, but we did not consider their intensity. It seems plausible that specifically outward emotional reactions with a high intensity (e.g., players make a fist and give a loud shout) have an effect on the opponent. Similar to the emotion experience (Hanin, 2007), a research design that takes their intensity into consideration could thus be specifically relevant with regard to sports performance. Finally, advances in technology appear to offer fascinating perspectives for future lines of research (e.g., Hetland et al., 2018). The automatic coding of physical features signaling outward emotional reactions could allow to draw on huge amounts of data in real sports competitions and thus help us to understand the role of emotions in sports.

## Conclusions

In conclusion, the present study employed a novel methodological perspective to investigate the role of emotions in table tennis. The findings provide valuable preliminary evidence of how various situational factors related to the importance and controllability of the situation influence the likelihood of positive and negative outward emotional reactions. This knowledge is useful both from a theoretical as well as a practical perspective to understand why players can react so differently to similar situations, such as winning or losing a point. Furthermore, our study underlines the importance of considering all emotion components, which, with the progress of new technologies, can help to unveil new insights into the relationship between emotions and sports performance.

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## **Chapter 7**

### **General discussion**

The main focus of this PhD was to investigate the relationship between self-talk and emotions within context of sport. Based on the distinction between strategic and organic self-talk, and, concerning the latter, between spontaneous and goal-directed self-talk, the available evidence on this relationship has been systematically reviewed in the chapters 2-4. This relationship has further been investigated in an empirical study conducted in competitive tennis matches in chapter 5. A second focus of this PhD was on outward emotional reactions. This is reflected in the study in chapter 5, where the relationship between self-talk and outward emotional reactions was examined in addition to the relationship between self-talk and emotions experienced. Moreover, an observational study in chapter 6 investigated antecedents and consequences of outward emotional reactions in competitive table tennis matches. In this final chapter, the main findings of the PhD are discussed, and based on the overall findings, applied implications are suggested. Finally, main strengths and limitations are presented and suggestions of how future research may build on the findings are outlined.

### ***Discussion of the findings***

Together with the narrative reviews in chapter 2 and chapter 3, the scoping review in chapter 4 provides an attempt to systematically summarize the available evidence regarding the relationship between self-talk and emotions within the context of sport. Although the effect of strategic self-talk on emotions is regarded as a potential mechanism for its effect on sport performance (Galanis et al., 2016; Hardy, Oliver, et al., 2009), the available evidence seems rather inconclusive and limited to reduction of anxiety. Besides methodological limitations in the studies, such as small sample sizes (Marshall et al., 2016) or the lack of a control group (Hatzigeorgiadis et al., 2007), it seems important to consider situational as well as personal variables when investigating the effect of strategic self-talk on emotions (Van Raalte et al.,

2016). On the one hand, self-talk does not work the same way for everyone (Brinthaupt, 2019). In fact, when athletes have a lack of self-confidence, the use of strategic self-talk may even have debilitating effects (Hanton et al., 2005). On the other hand, self-talk does not work the same way in every situation (Van Raalte et al., 2016). Throughout a sport competition, there are various situations triggering different emotions and thus requiring different emotion regulation strategies (Lane et al., 2012). As such, athletes may benefit more from instructional self-talk when they experience high-intensity emotions, such as anxiety or anger, and more from motivational self-talk when they experience low-intensity emotions, such as disappointment or relaxation (Fritsch & Jekauc, 2020).

Concerning organic self-talk, the literature reviews in chapter 2-4 indicate that the distinction between spontaneous and goal-directed self-talk may be useful to investigate the relationship between self-talk and emotions (Latinjak et al., 2014). In particular, spontaneous self-talk seems to be inherently related to emotions. This is shown in studies indicating a consistent association between the valence of spontaneous self-talk and the valence of emotions (e.g., Boudreault et al., 2018; Latinjak et al., 2017). Interestingly, the overlap in valence is consistently supported by studies that did not explicitly refer to the distinction between spontaneous and goal-directed self-talk (e.g., Conroy & Metzler, 2004; Zourbanos et al., 2009). In addition to these cross-sectional findings, some studies indicate that self-talk can be an antecedent (e.g., Conroy & Coatsworth, 2007; Hardy, Roberts, et al., 2009) and consequence of emotions (e.g., De Muynck et al., 2020; Hardy, Roberts, et al., 2009). These findings point to a dynamic reciprocal relationship between self-talk and emotions (Latinjak et al., 2020), indicating the complex interaction between cognitive and affective processes in the human brain (Lindquist & Barrett, 2012).

Regarding goal-directed self-talk, the literature reviews suggest that a main function of goal-directed self-talk is emotion regulation. This is mainly supported by qualitative studies in which athletes report the use of goal-directed self-talk to regulate various emotions (e.g.,

Boudreault et al., 2018; Latinjak et al., 2017). Again, this is also true for studies that were not explicitly based on the spontaneous/goal-directed self-talk framework but referred to the functions of self-talk (e.g., motivational, instructional; Martinent et al., 2015; Miles et al., 2016). Nevertheless, it is still relatively unknown which emotion regulation functions work best for which distinct emotions under which circumstances. Here, as exemplified in chapter 3, the process model of emotion regulation (Gross, 1998) appears to be a useful framework for showing how goal-directed self-talk may work at different stages in the emotion process. For instance, when athletes say to themselves, after having lost a point, “Focus on the next point”, this may refer to the emotion regulation category of attention deployment. Such a rather antecedent-focused strategy appears particularly useful, because it can preventatively dampen the emotional response. At the same time, when the emotional response has already evolved, goal-directed self-talk, such as “Calm down”, can work as a response modulation strategy.

The study presented in chapter 5, investigating the relationship between self-talk and emotions during competitive tennis matches, adds to the current self-talk literature in several ways. First, to the best of the author’s knowledge, it is the first study that quantitatively showed that in situations where only goal-directed self-talk was reported the intensity of emotions was lower compared to situations where only spontaneous self-talk was reported. Since the tennis players were asked to report their self-talk during these instances, but not explicitly about their self-talk to regulate emotions, this points to the importance of making use of the intuitive strategies athletes can employ to deal with emotions (Latinjak et al., 2016). Second, the multilevel regression in the study design allowed to reveal some between-subject differences. In particular, it showed that for some players, goal-directed self-talk is more strongly associated with emotions than for others. This finding indicates the importance of taking between-subject differences into consideration, which, until now, has been rarely done in literature on self-talk (Brinthaupt, 2019). Third, the study showed that the relationship between self-talk and emotions applied not only to players’ emotion experiences, but also to their outward emotional reactions.

This finding is consistent with the idea that individual's self-talk is also related to one's observable behaviour (Ellis, 2003).

The role of outward emotional reactions is investigated in the study in chapter 6, with the focus on their antecedents and consequences in competitive table tennis matches. Regarding antecedents of outward emotional reactions, several situational factors representing the importance of a situation (e.g., remaining points until the end of the set) were shown to influence the likelihood of both positive and negative outward emotional reactions. This finding is in line with appraisal theories (e.g., Lazarus, 1991), assuming that the more important a situation is, the more likely an emotional reaction occurs. Moreover, the findings of the study showed that the smaller the point difference between the players was, the more likely an outward emotional reaction occurred. One explanation for this can be that the less predictable a situation is, the more emotionally arousing this is for the players (Thatcher & Day, 2008). However, it is important to keep in mind that it is not the situation per se eliciting an outward emotional reaction, but rather how it is psychologically appraised (Lazarus, 1991). Thus, based on the findings of the purely observational study design, future research may assess the underlying psychological processes that lead to the outward emotional reactions. Regarding the consequences of outward emotional reactions, the findings indicate that neither positive nor negative outward emotional reactions could predict the outcome of the next point. These findings are consistent with previous studies in tennis (e.g., Van Raalte et al., 2000), indicating the difficulty to predict sport performance (Nevill et al., 2008). In this regard, it is important to consider situational (e.g., current score) and personal (e.g., trait self-confidence) variables when assessing the relationship between emotions and performance (Moesch et al., 2018).

### ***Applied implications***

The findings about both the relationship between self-talk and emotions as well as the role of outward emotional reactions appear to be of relevance from an applied perspective.

Understanding the psychological processes leading to emotional responses, how these responses are related with one's self-talk, and how they in turn affect sport performance may allow one to regulate one's emotions more effectively (MacIntyre et al., 2014). For instance, if an athlete is aware about the situational factors (e.g., the final phase of a match) triggering dysfunctional emotional response, the athlete could train to tailor the use of psychological skills to such situations.

One technique that may help to identify antecedents of outward emotional reactions are reflexive self-talk interventions (Latinjak, Hernando-Gimeno, et al., 2019). In reflexive self-talk interventions, athletes are supposed to identify their organic self-talk in psychologically challenging situations. Similar to the study in chapter 5, the recall of one's self-talk could be supported through video-assisted procedures (Martinent & Ferrand, 2009). In line with the idea that spontaneous self-talk is considered a window into athletes' minds (Van Raalte et al., 2016), the analysis of one's spontaneous self-talk may then help to identify situational factors or psychological processes associated with dysfunctional emotional responses. Concerning situational factors, athletes may recognize that their negative self-talk is often triggered by their coach's controlling behaviour (Zourbanos et al., 2016). As a result of this analysis, an athlete could work with their coach using a different communication style (Otte et al., 2020). With regards to relevant psychological processes, athletes may realize that their negative self-talk (e.g., "I cannot forgive myself if I don't win today") points to the existence of dysfunctional performance beliefs (Turner, 2016). Here, athletes may benefit from rational emotive behaviour therapy with the goal to establish more rational performance beliefs (Turner & Barker, 2013).

Another goal of reflexive self-talk interventions is to make use of one's goal-directed self-talk (Latinjak, Hernando-Gimeno, et al., 2019). As indicated by the findings of the study in chapter 5, goal-directed self-talk may be related to a lower emotional intensity. Thus, when athletes struggle with high intensity emotions, it may be advisable to strengthen their goal-directed self-talk, which they would typically use in situations in which they manage to stay



calm. In the same vein, reflexive self-talk interventions may also reveal ineffective or even dysfunctional goal-directed self-talk of athletes (Latinjak, Hernando-Gimeno, et al., 2019). In light of possible ironic effects of strategies trying to suppress certain mental states (Wegner, 1994), goal-directed self-talk to avoid emotions (e.g., “Don’t be afraid”) may not always have the desired effect. This particularly may be the case when the goal-directed self-talk is in contrast with one’s own feelings in a given moment (Van Raalte et al., 2016). In this regard, using goal-directed self-talk in a proactive way (e.g., ‘focus on the next point’) may prevent the emotional response in the first place. The use of such proactive goal-directed self-talk strategies may, furthermore, take up less cognitive resources compared to rather reactive emotion regulation strategies (Gross, 1998).

### ***Strengths and limitations***

The in-depth literature reviews in chapters 2, 3 and 4 allowed for a classification of the existing literature on the relationship between self-talk and emotions within a theory-based perspective of self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). By considering the classification of strategic and organic self-talk, with the subcategories spontaneous and goal-directed self-talk, the reviews highlight various ways in which self-talk and emotions can be related. The relevance of the classification into spontaneous and goal-directed self-talk (Latinjak et al., 2014) is further supported by the study in chapter 5, which shows how this self-talk classification enables a systematic investigation of the relationship between self-talk and emotions. Since the theoretical perspective has only recently been introduced into the literature (Latinjak, Hatzigeorgiadis, et al., 2019), one potential limitation concerns the post-hoc classification of studies into organic and strategic self-talk in the literature reviews of chapter 2, 3 and 4. It may be possible, although studies measured athletes’ innate self-talk during a competition and were thus classified as organic self-talk, athletes’ self-talk was indeed pre-planned and therefore rather strategic. In the same vein, classifying previous literature into the

spontaneous and goal-directed self-talk framework may be somewhat problematic. For instance, some subscales of self-talk measures that focus on the valence of self-talk, and thus typically considered to be spontaneous self-talk (Latinjak et al., 2014), are actually rather goal-directed self-talk (Karamitrou et al., 2020). In this regard, the a priori use of constructs, such as spontaneous and goal-directed self-talk, seems to be a way to move the field forward in a more theory-based manner (Latinjak, Hatzigeorgiadis, et al., 2019).

With regards to emotions, by focusing on its behavioural component, the present PhD offers a new research perspective that has not received much attention in sport psychology. As exemplified in the study in chapter 6, an advantage of this component is that emotions can be assessed online during sports competitions, which addresses a frequently raised limitation in sport psychology research (Martin et al., 2005). At the same time, the purely observational design of this study is also a potential limitation. As the subjective experience is often viewed as the most essential part of an emotion (Scherer, 2009), this study design does not allow the drawing of any conclusions about the extent to what an emotion is actually experienced by the players. Here, advances in technology appear to offer intriguing perspectives to assess the interaction of all emotion components during real sport competitions (e.g., di Fronso et al., 2016; Hetland et al., 2018). Another critical point refers to the distinction between genuinely experienced outward emotional reactions and the purposeful display of emotions in order to gain an advantage in the competition (Sève et al., 2007). Because this clear-cut distinction often seems difficult to make during the heat of a competition, it may be useful to consider the controllability of outward emotional reactions as a continuum (Furley & Schweizer, 2020).

### ***Conclusions***

The way athletes talk to themselves may reflect their current emotional experience. At the same time, athletes may use self-talk to regulate their emotions. The present PhD supports the validity of a recently introduced self-talk perspective (Latinjak, Hatzigeorgiadis, et al.,

2019), which may explain the various ways self-talk and emotions are interconnected. While athletes' spontaneous self-talk is inherently related to their emotional experience, athletes use goal-directed self-talk to regulate their emotions; or strategic self-talk if the cue words they use are based on a pre-planned strategy. Moreover, in particular with regards to emotions, the present PhD indicates that an explicit focus on the behavioural component of emotions may provide a new methodological perspective when assessing the role of emotions within the context of sport. Overall, the findings encourage these new lines of research in understanding mental aspects of sport performance.

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## Appendix

### *Ein theoretischer Beitrag zu Self-talk in der Sportpsychologie [A theoretical contribution on self-talk in sports psychology]*

#### **Abstract**

In this theoretical article on self-talk, various psychological theories relevant to the topic from a historical perspective are first presented. This is followed by the distinction between strategic and organic self-talk reflecting two different research areas in the self-talk literature. In relation to organic self-talk, which focuses on the naturalistic self-talk during sports practice, self-talk classifications based on dual-processes approaches are introduced. In addition, the relationship between emotions and self-talk is taken as an example to show how most research has focused on spontaneous and goal-directed self-talk as two subtypes of organic self-talk. With regards to strategic self-talk, which relates to the pre-planned use of self-talk cues to enhance performance, various potential mechanisms of this effect are presented. Finally, the relevance of self-talk in applied sport psychology is described, including the presentation of reflexive self-talk intervention as an innovative method.

#### **Einleitung**

„Guter Pass von mir, weiter so!“, „Ich sollte nach vorne laufen!“, „Oh je, was spiele ich für einen Mist heute?“ oder „Die Gegnerin sieht stark aus.“ Vermutlich sind jeder Person, die wettbewerbsorientiert Sport treibt, diese oder ähnliche Gedanken bekannt. Basierend auf der Annahme, dass unsere Gedanken im Zusammenhang mit unseren Gefühlen, Verhalten und damit auch der sportlichen Leistung stehen (Ellis, 2003), hat sich in der internationalen



Sportpsychologie der Begriff Self-talk<sup>1</sup> zur Untersuchung dieser psychologischen Prozesse etabliert (für einen historischen Überblick über das Konstrukt Self-talk in der Sportpsychologie, siehe Hardy, Comoutos & Hatzigeorgiadis, 2018). In den letzten Jahren hat dieser Forschungsbereich, vor allem durch die Einführung von neuen theoretischen Annahmen (Latinjak, Zourbanos, López-Ros & Hatzigeorgiadis, 2014; Van Raalte, Vincent & Brewer, 2016), viel Aufmerksamkeit bekommen. Diese Entwicklung spiegelt sich unter anderem in den Veröffentlichungen in einem Sonderheft der Zeitschrift *The Sport Psychologist* (Hardy et al., 2018) und einem Buch (Latinjak & Hatzigeorgiadis, 2020) wieder, welche sich explizit auf das Thema Self-talk im Sport beziehen.

Eng im Zusammenhang mit dem Konstrukt Self-talk steht die Beziehung zwischen Denken und Sprache. Sprache kann Gedanken nicht nur ausdrücken, sondern diese durch ihre Formulierung auch gestalten (Rubinstein, 1958). Für das Konstrukt Self-talk erscheinen dabei insbesondere die Arbeiten des russischen Psychologen Vygotsky (1987) und seiner Unterscheidung von sozialer, privater und innerer Sprache relevant. Während die soziale Sprache sich in der Kommunikation mit anderen Personen äußert, richtet sich die private Sprache, die sich etwa im Alter von zwei Jahren entwickelt und im Vergleich zur inneren Sprache von außen hörbar ist, an die eigene Person (Vygotsky, 1987). Im Unterschied zu Piaget (1926), der die beobachtbaren Selbstgespräche als Ausdruck des egozentrischen Weltbildes der Kinder betrachtete, welche die Kinder in ihrer sozialen Interaktion hindern, geht nach Vygotsky die private Sprache vielmehr aus der sozialen Sprache hervor. Darüber hinaus sah Vygotsky die Selbstregulation als eine Hauptfunktion der privaten Sprache. Dieses zeigt sich zum

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<sup>1</sup>Die deutschen Begriffe innerer Dialog und Selbstgespräch kommen dem organischen Self-talk und der Begriff Selbstinstruktion kommt dem Begriff strategischer Self-talk am nächsten. Da in der internationalen sportpsychologischen Literatur der Begriff Self-talk jedoch auf diese beiden Aspekte eingeht, haben wir uns dafür entschieden, den englischen Begriff Self-talk zu verwenden.

Beispiel daran, dass Kinder bei mittelschweren Aufgaben mehr mit sich sprechen und zudem der Gebrauch der privaten Sprache mit einer schnelleren Lösung von Aufgaben einhergeht (Fernyhough & Fradley, 2005). Gemäß Vygotsky geht die private Sprache mit der Zeit immer mehr in die innere Sprache über, üblicherweise verbunden mit einer Verkürzung der Sprache. Die Annahmen von Vygotsky, dass die innere Sprache aufgrund ihrer Entwicklung aus der sozialen Sprache oft einen dialogischen Charakter aufweist und die Selbstregulation eine Hauptfunktion der inneren Sprache ist, deckt sich mit theoretischen Überlegungen aus der Sportpsychologie (Latinjak et al., 2014; Van Raalte et al., 2016). Obwohl heutige Forschungsergebnisse die Annahmen von Vygotsky zum großen Teil stützen (Fernyhough, 2016), stellt die fehlende direkte Beobachtbarkeit der inneren Sprache eine Schwierigkeit für die Forschung und damit auch für den Bereich Self-talk in der Sportpsychologie dar (Van Raalte, Vincent, Dickens & Brewer, 2019).

Die mit dem Thema Self-talk zusammenhängende Selbstregulation spielt auch in der Theorie der Handlungskontrolle von Kuhl (1983) eine bedeutsame Rolle. Wesentlicher Bestandteil dieser Theorie sind Handlungsstrategien, wie die Aufmerksamkeits-, Motivations- oder Emotionskontrolle. Diese sollen helfen eine gebildete Absicht tatsächlich im Widerstand gegen innere und äußere Hindernisse im Verhalten umzusetzen (Kuhl, 1987). In diesem Zusammenhang unterscheidet Kuhl (1983) zwischen einer Lage- und Handlungsorientierung. Während bei einer Lageorientierung die Gedanken oft auf die Gründe für die fehlende Umsetzung einer Intention oder die möglichen Konsequenzen einer Handlung eingehen, sind bei der Handlungsorientierung die Gedanken auf die für Intentionsrealisierung relevanten Aspekte gerichtet. Auch in der Sportpsychologie hat dieser Forschungsbereich Anklang gefunden, wobei vor allem die dispositionale Tendenz zur Handlungs- oder Lageorientierung untersucht worden ist (z. B. Beckmann & Kellmann, 2004; Gröpel, 2016). Zwar deutet die Studienlage insgesamt daraufhin, dass eine Handlungsorientierung mit einer besseren sportlichen Leistung zusammenhängt, nichtsdestotrotz ist es wichtig zu berücksichtigen, dass

die Vor- und Nachteile einer stärker ausgeprägten Handlungs- oder Lageorientierung von den spezifischen Anforderungen an den Sporttreibenden abhängen (Beckmann & Elbe, 2006).

Ein weiterer relevanter Ansatz ist das Signo-Modell der Handlungskontrolle von Schack (1997). Basierend auf den Überlegungen von Vygotsky (1987) und Luria (2001) wird in diesem Modell der inneren Sprache eine besondere Bedeutung in der Verhaltensregulation zugeschrieben. Konkret kann die Verwendung der inneren Sprache dazu dienen, die Aufmerksamkeit auf die für das Verhalten wichtigen Reize zu lenken (Schack, 1997). Dabei kann die innere Sprache Rückmeldungen zu einer laufenden Handlung geben und entsprechend einen Handlungsplan modifizieren oder gar stoppen, wenn das Handlungsziel nicht erreichbar ist. In diesem Sinne kann die innere Sprache helfen, die Handlungskontrollstrategien zu unterstützen und dabei die Ausführung einer Intention zu gewährleisten. Dies ist eine Erweiterung zu dem Modell von Kuhl (1983), in dem die Frage unbeantwortet bleibt, inwiefern Handlungskontrollstrategien funktional eingesetzt werden können.

Die Idee, dass Gedanken aktiv zur Selbstregulation eingesetzt werden können, findet sich auch in zahlreichen deutschsprachigen Veröffentlichungen. Im Kontext der Stressbewältigung legen verschiedenen Arbeiten die Relevanz von Selbstinstruktionen für die Anwendung von passiven und aktiven Bewältigungsmaßnahmen dar (z. B. Krohne & Hindel, 1992; Schlicht, 1989; Stoll & Wagner-Stoll, 1995; Stoll & Ziemainz, 2003;). Wenn eine Stresssituation als subjektiv wenig kontrollierbar angesehen wird, können bei passiven Bewältigungsstrategien Selbstinstruktionen auf die Neubewertung einer Situation („Ist nicht so schlimm.“) oder auch auf Ablenkung („Die Gegnerin ist heute zu stark.“) abzielen. Hingegen sollten bei einer subjektiv kontrollierbaren Situation aktive Bewältigungsstrategien Selbstinstruktionen beinhalten, die zum Beispiel auf die Erhöhung der Selbstwirksamkeit („Du kannst das!“) oder die Lenkung der Aufmerksamkeit („Konzentriere dich auf deinen Schlag.“) einwirken. Die Bedeutsamkeit von Selbstinstruktionen für die Aufmerksamkeitsregulation zeigt sich auch in einer Untersuchung mit Ultralangstreckenläufern, in der zwischen

dissoziativen Strategien (d. h. die Gedanken beziehen sich vor allem auf die Umgebung) und assoziativen Strategien (d. h. die Gedanken richten sich auf die eigenen Körperempfindungen) unterschieden wird (Ziemainz, Schmidt & Stoll, 2000).

Diese Arbeiten zeigen, dass im deutschsprachigen Raum der Rolle von Gedanken eine große Relevanz in der Sportpsychologie zugewiesen wurde, wenn auch diese meistens nicht einen expliziten Bezug zu dem Konstrukt Self-talk genommen haben. Da es in der internationalen Sportpsychologie jedoch gerade in den letzten Jahren eine Vielzahl von Publikationen mit neuen theoretischen Überlegungen zu dem Thema Self-talk gegeben hat, wurde dieser theoretische Artikel mit dem Ziel geschrieben, diese Entwicklungen darzustellen.

Bei der Betrachtung der in der internationalen sportpsychologischen Literatur verwendeten Definitionen von Self-talk lässt sich eine wachsende Komplexität im Verständnis des Konstruktes erkennen. Während frühere Definitionen betonen, dass Self-talk sich dadurch auszeichnet, dass er sich an die eigene Person richtet (z. B. Theodorakis, Weinberg, Natsis, Douma & Kazakas, 2000), heben spätere Definitionen die subjektive Interpretierbarkeit von Self-talk hervor (z. B. Hardy, 2006). So kann derselbe Gedanke (z. B. „Ich kann eigentlich besser spielen.“) von einer Person als frustrierend, von einer anderen Person jedoch als motivierend wahrgenommen werden. Insbesondere hat sich in den letzten Jahren das Forschungsfeld nochmals stark weiterentwickelt, sodass Latinjak, Hatzigeorgiadis, Comoutos und Hardy (2019) eine neue Konzeptualisierung vorgeschlagen haben, um diesen Entwicklungen Rechnung zu tragen. Diese Konzeptualisierung geht auch auf darauf ein, dass es sich bei Self-talk entweder um von außen hörbare oder nur innerhalb der Person stattfindende Verbalisierungen handelt, die sich an die eigene Person richten und dessen subjektive Bedeutung von der Interpretation der Person abhängt. Dabei basiert Self-talk auf sprachlichen Strukturen und unterscheidet sich von anderen mentalen Prozessen, wie zum Beispiel bildliche Vorstellungen.

Des Weiteren geht die Konzeptualisierung auf die Unterscheidung von organischem und strategischem Self-talk ein. Diese beiden Begriffe von Self-talk werden in zwei verschiedenen Forschungsbereichen in der Literatur thematisiert. Der Forschungsbereich zu organischem Self-talk, den man auch mit dem Begriff „innerer Dialog“ (Beckmann & Beckmann-Waldenmayer, 2020) vergleichen kann, spiegelt sich in den Studien wider, die versuchen, den Self-talk zu untersuchen, den Sporttreibende auf natürliche Art und Weise bei einer sportlichen Aktivität haben. Hingegen wird strategischer Self-talk in dem Teil der Literatur behandelt, der die Wirksamkeit von Self-talk als eine bewusste sportpsychologische Selbstregulationstechnik überprüft hat, die das primäre Ziel hat, durch die Anwendung von Selbstinstruktionen die sportliche Leistung zu verbessern (Latinjak, Hatzigeorgiadis et al., 2019). Im Folgenden werden wir auf diese beiden Forschungsbereiche von Self-talk genauer eingehen, wobei die wichtigsten Begriffe nochmals in der Abbildung 1 aufgezeigt werden.

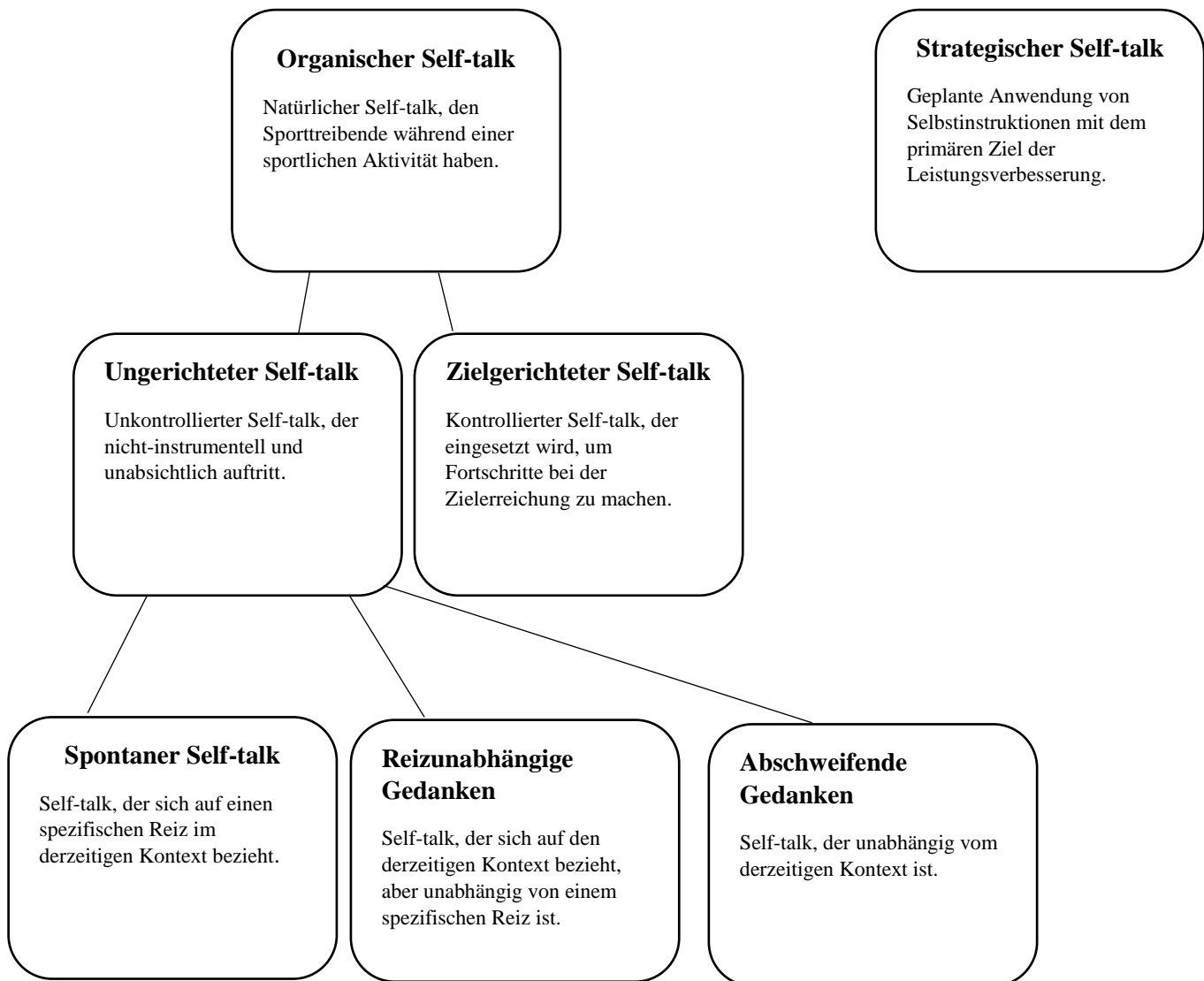


Abbildung 1. Klassifikation der verschiedenen Self-talk Begriffe (basierend auf Latinjak, Hatzigeorgiadis et al., 2019).

### Organischer Self-talk

Die Forschung zu organischem Self-talk hat sich vor allem darauf konzentriert, den Inhalt des Self-talks von Sporttreibenden während ihrer sportlichen Aktivität sowie dessen Ursachen und Konsequenzen zu ergründen (Hatzigeorgiadis, Zourbanos, Latinjak & Theodorakis, 2014).

Dieser Forschungsbereich hat insbesondere durch den Übergang von rein induktiven

Klassifikationen, bei denen vor allem die Valenz von Self-talk beachtet wurde (z. B. Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis & Papaioannou, 2009), zu theoriegeleiteten Klassifikationen (Latinjak et al., 2014; Van Raalte et al., 2016) an Bedeutung gewonnen. Die in die Sportpsychologie eingeführten Klassifikationen beruhen auf sogenannten Zwei-Prozess-Ansätzen (z. B. Evans & Frankish, 2009; Kahnemann, 2011; Strack & Deutsch, 2004), die davon ausgehen, dass menschliches Verhalten durch zwei verschiedene psychologische Prozesse reguliert wird (für eine Anwendung auf den Sportbereich siehe Furley, Schweizer & Bertrams, 2015). So stehen Prozesse, die typischerweise kognitiv beanspruchend, kontrolliert und bewusst sind solchen Prozessen gegenüber, die üblicherweise automatisch und unkontrolliert ablaufen und ein geringeres Maß an Bewusstsein benötigen (siehe Melnikoff & Bargh, 2018, für eine kritische Auseinandersetzung von Zwei-Prozess-Ansätzen).

Eine in dem Forschungsbereich Self-talk von Latinjak et al. (2014) eingeführte Klassifikation basiert auf neuropsychologischen Erkenntnissen, die zwischen zielgerichtetem (goal-directed) und ungerichtetem (undirected) Denken unterscheiden (Christoff, 2012). Im Sinne der Zwei-Prozess-Ansätze kann zielgerichtetes Denken dabei den bewussten und kontrollierten Prozessen zugeordnet werden und bezieht sich dabei auf mentale Prozesse, die eingesetzt werden, um eine Aufgabe zu lösen oder Fortschritte bei der Zielerreichung zu machen (Christoff, Gordon & Smith, 2011). Ein Beispiel dafür ist, dass man sich vor dem Elfmeter überlegt, in welche Ecke man schießen möchte. Gemäß der Zwei-Prozess Ansätze bezieht sich ungerichtetes Denken dagegen auf unbewusste und unkontrollierte Prozesse. Dabei wird ungerichtetes Denken nochmals in abschweifende Gedanken (mind-wandering), reizunabhängige Gedanken (stimulus independent thoughts) und spontane (spontaneous) Gedanken aufgeteilt (siehe Abbildung 1). Abschweifende Gedanken beziehen sich dabei auf Gedanken, die keinen Bezug zur derzeitigen Aktivität haben. Reizunabhängige Gedanken stehen zwar im Zusammenhang mit der derzeitigen Aktivität, sind aber unabhängig von relevanten Reizen. Zuletzt sind spontane Gedanken eine Reaktion auf relevante Reize in der

derzeitigen Aktivität. Zum Beispiel könnte eine tennisspielende Person während eines Spiels an die nächste Klausur (abschweifende Gedanken), das vorherige Training (reizunabhängige Gedanken) oder an den letzten Punkt (spontane Gedanken) denken. Auf der neuronalen Ebene hat sich gezeigt, dass während zielgerichtete Gedanken mit einer verstärkten Aktivität von präfrontalen und frontalen kortikalen Gehirnregionen zusammenhängen, gehen ungerichtete Gedanken mit einer höheren Aktivität des Ruhezustandsnetzwerks (default mode network) einher (Andrews-Hanna, Reidler, Huang & Buckner, 2010). Da bei der Übertragung dieser Klassifikation auf Self-talk im Sportbereich Studien vor allem spontanen mit zielgerichtetem Self-talk verglichen haben (Latinjak, Hatzigeorgiadis et al., 2019), gehen wir im Folgenden ausschließlich auf spontanen Self-talk ein. Dabei ist es wichtig zu betonen, dass inhaltlich derselbe Gedanke („Ich spiele gut“) eine spontane Reaktion auf Ereignisse im Spiel sein kann, aber auch zielgerichtet zur Bestärkung eingesetzt werden kann (Latinjak et al., 2014).

Ein zweiter, ähnlicher theoretischer Ansatz basierend auf dem Zwei-Prozess-Modell von Kahneman (2011), wurde von Van Raalte et al. (2016) in die Sportpsychologie eingeführt. Dieser Ansatz unterscheidet zwischen System 1 (auch intuitiver Self-talk) und System 2 Self-talk (auch rationaler Self-talk). Während es sich bei System 1 Self-talk um spontane, oft emotional gefärbte Reaktionen auf einen Stimulus handelt, basiert System 2 Self-talk auf rationalen Überlegungen und ist emotional neutral (Van Raalte et al., 2016). Eine Gegenüberstellung verdeutlicht, dass man System 1 Self-talk mit spontanem Self-talk und System 2 Self-talk mit zielgerichtetem Self-talk vergleichen kann. Beide Ansätze gehen davon aus, dass die zentrale Funktion von spontanem/System 1 Self-talk ist, psychologische Prozesse ins Bewusstsein zu bringen. Zielgerichteter/System 2 Self-talk ist hingegen wichtig für die Selbstregulierung (Latinjak et al., 2014; Van Raalte et al., 2016). Zudem betonen beide Ansätze, dass für die Erklärung von sportlicher Leistung, sowie auch für das Wohlbefinden von Sporttreibenden, vor allem das Zusammenspiel beider Self-talk Arten wichtig ist. Eine Studie, die sich explizit mit der Interaktion der Self-talk Arten auseinandergesetzt hat, konnte hier



zeigen, dass zielgerichteter Self-talk oft auf spontanen Self-talk folgt (Latinjak, 2018). Dieser Befund entspricht der Annahme, dass spontaner Self-talk häufig die intuitive Reaktion auf Ereignisse in der Umwelt darstellt, woraufhin zielgerichtete kognitive Prozesse versuchen diese zu regulieren (Van Raalte et al., 2016). In diesem Zusammenhang kann zielgerichteter Self-talk auch als eine „naive Selbstregulationstechnik“ verstanden werden, die zwar nicht auf Wirksamkeit überprüft worden ist, aber oft von Sporttreibenden intuitiv eingesetzt wird, um herausfordernde Situationen zu bewältigen (Beckmann & Beckmann-Waldenmayer, 2020). Interessanterweise wurde in der Studie von Latinjak (2018) auch gezeigt, dass, wenn auch geringer als vice versa, spontaner Self-talk zielgerichtetem Self-talk folgt und spontaner Self-talk somit eine intuitive Reaktion auf vernunftbasierte Handlungsvorschläge darstellen kann (Latinjak, 2018). Da der Ansatz von Latinjak et al. (2014) explizit auf die Unterscheidung von organischem Self-talk (mit den beiden Kategorien spontaner und zielgerichteter Self-talk) und strategischem Self-talk eingeht, werden wir uns im Folgenden vor allem darauf beziehen und die entsprechenden Begriffe verwenden.

### Self-talk und Emotionen

Eine Stärke der theoriegeleiteten Klassifikationen ist die Möglichkeit, überprüfbare Hypothesen für die Beziehung von Self-talk zu anderen, für die sportliche Leistung relevanten, psychologischen Konstrukten aufzustellen (Latinjak, Hatzigeorgiadis et al., 2019). In Übereinstimmung mit Zwei-Prozess Ansätzen (z. B. Kahnemann, 2011), gehen die theoretischen Self-talk Ansätze davon aus, dass die für den organischen Self-talk relevante Begriffe spontaner und zielgerichteter Self-talk unterschiedlich mit Emotionen zusammenhängen (Latinjak et al., 2014; Van Raalte et al., 2016). Wie im Folgenden weiter ausgearbeitet, liegen spontanem Self-talk oft emotionale Prozesse zugrunde, während eine zentrale Funktion von zielgerichtetem Self-talk die Emotionsregulation ist (Latinjak et al., 2014).

Im Sportkontext konnte gezeigt werden, dass die dem spontanen Self-talk zugeordneten Statements oft die Bewertung der eigenen Leistung (z. B. „Das war ein guter Schlag.“) oder die Vorhersage von zukünftigen Ereignissen (z. B. „Ich werde verlieren.“) beinhalten (Latinjak et al., 2014). Diese Beispiele legen nahe, dass Self-talk oft emotional gefärbt sein kann. Es wurde zudem gezeigt, dass spontaner Self-talk anhand der Dimensionen (a) Valenz mit den Polen positiv (z. B. „Ich spiele gut.“) und negativ (z. B. „Ich werde verlieren.“) und (b) Zeitperspektive mit den Polen vergangenheitsorientiert (z. B. „Das war ein schlechter Ball.“) und zukunftsorientiert (z. B. „Das wird ein schweres Spiel.“) klassifiziert werden kann (Latinjak et al., 2014). Diese Dimensionen lassen sich auch im Basisaffekt (core affect) als zentraler Bestandteil von Emotionen wiederfinden (Latinjak, 2012; Russell, 1980). In diesem Zusammenhang ist der Befund der Studie von Latinjak, Haztigeorgiadis und Zourbanos (2017) erwähnenswert, dass Sporttreibende in ärgerauslösenden Situationen eher zu vergangenheitsorientiertem und in angstauslösenden Situationen eher zu zukunftsorientiertem Self-talk tendieren. Dieses Ergebnis kann als weiteres Zeichen für die inhärente Beziehung zwischen spontanem Self-talk und Emotionen dienen, da typischerweise Ärger durch vergangene Ereignisse und Angst durch bevorstehende Ereignisse ausgelöst wird (Lazarus, 2000).

Im Unterschied zu spontanem Self-talk wird zielgerichteter Self-talk nicht in positiv und negativ (also in seiner Valenz) eingeteilt, sondern in verschiedene Funktionen. Beispiele dafür wären technische Instruktionen, die Kontrolle der Aufmerksamkeit oder die Erhöhung des Selbstbewusstseins (Latinjak et al., 2014). Einhergehend mit der Annahme, dass die Emotionskontrolle eine wichtige Rolle für die Selbstregulation spielt (Kuhl, 1983), wird auch die Emotionsregulation als eine zentrale Funktion von zielgerichtetem Self-talk angesehen (Latinjak et al., 2014; Van Raalte et al., 2016). Zielgerichteter Self-talk kann direkt auf die Emotionen abzielen, in dem leistungshinderliche Emotionen identifiziert (z. B. „Ärgere dich nicht.“) oder leistungsförderliche Emotionen hervorgerufen werden (z. B. „Hab Spaß beim

Spielen.“). Darüber hinaus kann zielgerichteter Self-talk jedoch auch eine indirekte emotionsregulierende Wirkung haben, ohne direkt auf die Emotion abzielen. Zum Beispiel kann durch die Lenkung des Aufmerksamkeitsfokus (z. B. „Fokussier dich auf den nächsten Punkt.“) oder durch die Neubewertung einer Situation (z. B. „Fehler gehören zu einem Lernprozess.“) die Intensität von Emotionen verringert oder sogar deren Auftreten präventiv vermieden werden (Gross, 2015). Diese Art von zielgerichtetem Self-talk scheint insbesondere in Hinblick auf Emotionsregulation interessant zu sein, wenn man berücksichtigt, dass der bewusste Versuch, leistungshinderliche Emotionen zu unterdrücken (z. B. „Hab keine Angst.“), mit einer Verstärkung der ungewünschten Emotionen einhergehen kann (Gardner & Moore, 2004).

### **Strategischer Self-talk**

Strategischer Self-talk bezieht sich auf die geplante Anwendung von Selbstinstruktionen (self-talk cues), die typischerweise entweder vor oder während der Bewegungskörperausführung eingesetzt werden und das primäre Ziel haben, die sportliche Leistung zu steigern (Latinjak, Hatzigeorgiadis et al., 2019). Strategischer Self-talk ist dem zielgerichteten organischen Self-talk inhaltlich oft ähnlich. Im Unterschied zum zielgerichteten Self-talk, den man auch als eine Form der naiven Selbstregulation betrachten kann (Beckmann & Beckmann-Waldenmayer, 2020), ist strategischer Self-talk in zahlreichen experimentellen Studien untersucht worden. Hier bekommen typischerweise Personen in einer Experimentalgruppe im Unterschied zu Personen in einer Kontrollgruppe eine Self-talk Intervention und im Anschluss wird der Einfluss der Intervention auf die sportliche Leistung überprüft. Eine Metaanalyse mit insgesamt 32 Studien konnte hier eine moderate Effektstärke für den Nutzen von Self-talk Interventionen hinsichtlich der sportlichen Leistung ( $d = 0.48$ ) aufzeigen (Hatzigeorgiadis, Zourbanos, Galanis & Theodorakis, 2011). Wichtig jedoch ist, dass die Definition von strategischem Self-talk vorsieht, dass dieser auch rein auf Reflektionen von Sporttreibenden basieren kann, in denen

diese sich vor einem sportlichen Wettbewerb Selbstinstruktionen überlegen und diese dann im Wettbewerb einsetzen (Latinjak, Hatzigeorgiadis et al., 2019).

Aufgrund der Tatsache, dass die Befundlage die Wirksamkeit von strategischem Self-talk unterstützt (Hatzigeorgiadis et al., 2011), hat sich die Forschung vermehrt darauf konzentriert, die leistungsförderlichen Mechanismen dieses Zusammenhangs zu identifizieren. Die Identifikation der relevanten Mechanismen kann dabei helfen, zum einen den Einsatz von strategischen Selbstinstruktionen noch zielgerichteter auf situative Erfordernisse sowie individuelle Bedürfnisse abzustimmen und zum anderen die theoretischen Ansätze noch weiter zu verfeinern (Galanis, Hatzigeorgiadis, Zourbanos & Theodorakis, 2016; Hardy, Oliver & Tod, 2009). Die Forschungslage deutet daraufhin, dass strategische Selbstinstruktionen dabei helfen können, den Aufmerksamkeitsfokus auf aufgabenrelevante Reize zu lenken sowie auch den negativen Effekten von aufgabenirrelevanten Reizen entgegenzuwirken (Galanis et al., 2016). Darüber hinaus konnten verschiedene Studien einen positiven Effekt von strategischen Selbstinstruktionen auf die Selbstwirksamkeit zeigen (z. B. Chang et al., 2014; Hatzigeorgiadis, Zourbanos, Goltsios & Theodorakis, 2008). Es wird auch davon ausgegangen, dass strategische Selbstinstruktionen hilfreich sein können, Emotionen leistungsförderlich zu regulieren, wobei jedoch zu betonen ist, dass sich die relevanten Studien bisher vor allem auf die Wettkampfangst als Emotion fokussiert haben (z. B. Hatzigeorgiadis, Zourbanos, Mpoupaki & Theodorakis, 2009; Walter, Nikoleizig & Alfermann, 2019). Zuletzt konnte auch in einem Experiment im Basketball gezeigt werden, dass der Einsatz von Self-talk zu einer Verbesserung der Koordination von Ellbogen und Handgelenk geführt hat und somit einen direkten Einfluss auf die Bewegungsausführung nahelegt (Abdoli, Hardy, Riyahi & Farsi, 2018). Man sollte jedoch berücksichtigen, dass die fokussierte Aufmerksamkeit auf die Bewegungsausführung bei einer bereits gelernten Aufgabe oft zu einer Verschlechterung der Leistung führen kann (siehe z. B. Hossner & Ehrlenspiel, 2010).

### *Self-talk in der angewandten Sportpsychologie*

In der angewandten Sportpsychologie hat sich Self-talk als eine beliebte sportpsychologische Strategie erwiesen (Vargas-Tonsing, Myers & Feltz, 2004). In diesem Zusammenhang ist es wichtig zu betonen, dass man dabei nicht den strikten Vorgaben einer im Rahmen von wissenschaftlichen Studien überprüften Intervention folgen sollte, sondern die Verwendung von Selbstinstruktionen vielmehr flexibel auf die Bedürfnisse des Sporttreibenden und den Erfordernissen der Situation abzielen sollte (siehe auch IMPACT approach; Hatzigeorgiadis et al, 2014). Um das Autonomiebedürfnis zu befriedigen, ist es hier insbesondere relevant, den Sporttreibenden in die Auswahl der Selbstinstruktionen miteinzubinden. Außerdem ist es in der angewandten Sportpsychologie anstatt genereller „One-size-fits-all“-Lösungen wichtig, bei der Verwendung von sportpsychologischen Techniken auf die individuellen Bedürfnisse der Sporttreibenden einzugehen (Beckmann & Elbe, 2011). Im Sinne von „Wenn-dann“-Ansätzen (Gollwitzer, 1999), können hier zunächst persönlich psychologisch herausfordernde Situationen identifiziert (z. B. eigene hohe Führung im Tennis) und daraufhin gezielt trainiert werden, Selbstinstruktionen (z. B. „Spiel Punkt für Punkt.“) zur Regulation für diese spezifische Situation anzuwenden (Latinjak et al., 2018). Es wird zudem argumentiert, dass motivationale Selbstinstruktionen (z. B. „Du kannst das.“) vor allem bei Personen mit einem höheren Leistungsniveau, bei grobmotorischen Bewegungsausführungen und im Wettbewerb effektiver sind (z. B. Galanis et al., 2016). Bei technischen Selbstinstruktionen (z. B. „Konzentrier dich auf den Ball.“) wird hingegen davon ausgegangen, dass sie vor allem bei Personen mit einem niedrigeren Leistungsniveau, bei feinmotorischen Bewegungsausführungen und im Training hilfreich sein können.

Die Betrachtung des organischen Self-talks hat zusätzlich zu der Entwicklung einer neuen Art von sogenannten reflexiven Self-talk Interventionen (reflexive self-talk interventions) geführt (Latinjak, Hernando-Gimeno, Lorigo-Méndez & Hardy, 2019). Der Begriff „reflexiv“ legt nahe, dass diese Art von Interventionen explizit den organischen Self-

talk von Sporttreibenden betrachtet. Reflexive Self-talk Interventionen basieren auf kognitiven Ansätzen aus der klinischen Psychologie (z. B. Beck, 1976; Ellis & Dryden, 1997), die in der Sportpsychologie eine immer größere Beliebtheit erfahren (Turner, 2016). Mit Relevanz für das Thema Self-talk wurde von Meichenbaum (1977) betont, dass die Verwendung von Selbstinstruktionen ein geeignetes Mittel zur Beeinflussung von Bewertungs- und Aufmerksamkeitsprozessen ist und somit letztendlich zur Verhaltensregulation im klinischen Kontext eingesetzt werden kann. Ein zentrales Ziel von reflexiven Self-talk Interventionen ist es, das metakognitive Wissen der Sporttreibenden über die Ursachen und Wirkungen ihres organischen Self-talks zu erhöhen und sie darauf aufbauend in ihrem inneren Dialog zu unterstützen, der leistungsförderlich im sportlichen Wettbewerb ist (Latinjak, Hernando-Gimeno, Lorido-Méndez & Hardy, 2019). Dies ist ein bedeutsamer Unterschied zu den traditionellen strategischen Self-talk Interventionen, bei denen typischerweise Selbstinstruktionen ohne Berücksichtigung des organischen Self-talks eingesetzt werden. Bei reflexiven Self-talk Interventionen wird zunächst der organische Self-talk erfasst. Die Analyse des organischen Self-talks kann dabei helfen, psychologische Prozesse oder auch situative Bedingungen, die mit einer bestimmten Art von spontanem Self-talk in Verbindung stehen, zu identifizieren. So könnte ein Ergebnis der Analyse sein, dass negativer spontaner Self-talk mit der eigenen hohen Erwartungshaltung als ein Beispiel für einen psychologischen Prozess oder mit einer misserfolgsbezogenen Kommunikation mit anderen Personen aus dem sportlichen Umfeld als ein Beispiel für eine situative Bedingung im Zusammenhang steht. Folglich kann der Einsatz von zielgerichtetem Self-talk (z. B. „Konzentriere dich auf das, was du kannst“) dabei helfen, besser mit diesen Bedingungen umzugehen. Darüber hinaus könnte das Ergebnis der Analyse auch dazu genutzt werden, an den zugrundeliegenden psychologischen Prozessen (z. B. Verringerung der eigenen Erwartungshaltung) oder den situativen Bedingungen (z. B. Modifizierung der Kommunikation innerhalb des Teams) anzusetzen (Latinjak, Hernando-Gimeno et al., 2019). Hier scheint es hilfreich zu sein, den zielgerichteten Self-talk derart zu

trainieren, dass er, in der Terminologie von Kahnemann (2011), von einem anfangs bewusst eingesetzten Typ 2 Prozess in einen unbewussten und automatischen Typ 1 Prozess übergeht und somit von den Sporttreibenden ohne große kognitive Beanspruchung angewendet werden kann (Van Raalte et al., 2016). Obwohl der Ansatz der reflexiven Self-talk Interventionen den organischen Self-talk eines Sporttreibenden und somit den „psychologist within“ zu berücksichtigen vielversprechend ist, ist hier zukünftige Forschung zur Effektivität dieser Art von Interventionen notwendig (Latinjak, Hernando-Gimeno et al., 2019).

### **Zukünftige Forschungsfragen**

Die Entwicklung des Forschungsgebietes Self-talk hat zu einem besseren Verständnis des generellen Konstruktes, vor allem bezüglich der Unterscheidung zwischen organischem und strategischem Self-talk, aber auch hinsichtlich der Mechanismen, wie Self-talk die sportliche Leistung beeinflussen kann, geführt. Typischerweise führt die Zunahme an Erkenntnissen in einem Forschungsgebiet nicht zu einer Abnahme der offenen Forschungsfragen, sondern vielmehr ergeben sich eine Vielzahl an weiteren spannenden Fragen. Gerade im Hinblick auf die Messung von organischem Self-talk gibt es eine Vielzahl von Messmethoden (für eine Debatte siehe Latinjak, Hardy et al., 2019; Van Raalte et al., 2019). Hier ist es aufgrund des größtenteils intrasubjektiven Charakters des Konstruktes Self-talk wichtig zu betonen, dass keine der Messmethoden ohne Limitationen ist (De Guerrero, 2005). Wir sind vielmehr überzeugt, dass Studien mit der Anwendung verschiedener Messmethoden wie stimulated recall procedures (z. B. Miles & Neil, 2013), thought sampling procedures (z. B. Latinjak et al., 2014), descriptive experience sampling (z. B. Dickens, Van Raalte & Hurlburt, 2018), think-aloud protocols (z. B. Samson, Simpson, Kamphoff & Langlier, 2017) oder auch die Verwendung von Fragebögen (z. B. Hatzigeorgiadis & Biddle, 2000; Zourbanos et al., 2009) zu robusteren Erkenntnissen in dem Forschungsgebiet führen werden. Um sowohl interne als auch externe Validität zu erhöhen, wäre es erstrebenswert, zum einen Studien in einem viel größerem

Ausmaß als bisher im tatsächlichen sportlichen Wettbewerb durchzuführen (Weinberg, 2018) und zum anderen die zeitgleiche Verwendung verschiedener Messinstrumente zu berücksichtigen (De Muynck, Soenens, Delrue, Comoutos & Vansteenkiste, 2020).

Ein besseres Verständnis der Antezedenten, die eine bestimmte Art von Self-talk bedingen, könnten zudem dabei helfen, Self-talk präventiv in einer leistungsförderlichen Weise zu beeinflussen. Studien zeigen hier, dass sowohl personenbezogene Variablen wie die Zielorientierung (Zourbanos, Papaioannou, Argyropoulou & Hatzigeorgiadis, 2014) sowie situative Variablen wie das Verhalten eines Trainer oder einer Trainerin (Zourbanos, Hatzigeorgiadis, Tsiakaras, Chroni & Theodorakis, 2010) einen Einfluss auf den Self-talk von Sporttreibenden haben können. In der Sportpsychologie gibt es vermehrt Bestrebungen, die neuronalen Grundlagen der Selbstregulation von Sporttreibenden zu erforschen (Holmes & Wright, 2017). Hier sollte nochmals wie oben ausgeführt betont werden, dass die Unterscheidung von organischem spontanen und zielgerichteten Self-talk auf neurowissenschaftliche Erkenntnisse zurückgeht (Christoff, 2012). Gerade der sportliche Wettbewerb, in dem Personen üblicherweise persönlich relevante Ziele mit unsicherem Ausgang verfolgen, bietet einen geeigneten Kontext, die Grundlagen des inneren Dialogs von Personen zu erforschen (Brinthead, 2019). Der Einsatz von neurowissenschaftlichen Methoden erscheint auf Grund der sich weiterentwickelnden technischen Möglichkeiten auch in der angewandten Arbeit immer relevanter zu werden (Di Fronso et al., 2016). Zum Beispiel könnte der Einsatz von neurowissenschaftlichen Methoden dabei helfen, Probleme bei der Bewegungsausführung zu identifizieren, wenn Sporttreibende ihre üblichen Gedanken während eines sportlichen Wettbewerbs berichten.

Zuletzt ist zu betonen, dass Self-talk fast ausschließlich im Leistungskontext, jedoch sehr wenig im Gesundheitssetting untersucht worden ist (Weinberg, 2018). Zum Beispiel postulieren verschiedene Theorien, die in den letzten Jahren veröffentlicht worden sind, das Zusammenspiel von automatischen und reflexiven Prozessen als ausschlaggebend dafür, ob



jemand sich dazu überwinden kann, körperlich aktiv zu sein (Brand & Ekkekakis, 2018; Strobach, Englert, Jekauc & Pfeffer, 2020). Hier könnte die Identifizierung von spontanem Self-talk im Zusammenhang mit automatischen Prozessen (z. B. „Ich habe heute keine Lust auf Sport.“) und die von zielgerichtetem Self-talk im Zusammenhang mit reflexiven Bewertungen Prozessen (z. B. „Du solltest dir klarmachen, wie gut es dir beim letzten Mal nach dem Sport ging.“) Erkenntnisse über die dahinterliegenden psychologischen Prozesse liefern.

### **Schlussfolgerungen**

Obwohl es wichtig ist, mögliche Verzerrungseinflüsse (Erinnerung, soziale Erwünschtheit etc.) zu beachten, würden die meisten Personen eine konkrete Antwort auf die Frage „Was hast du gerade zu dir selbst gesagt?“ geben können. Diese Konkretheit von Self-talk ist ein Unterschied zu vielen anderen psychologischen Konstrukten, die man mithilfe von entsprechenden Messinstrumenten (d.h. meistens Fragebögen) nur indirekt messen kann. Wie in diesem Artikel dargelegt, helfen uns die in die Sportpsychologie eingeführten theoriegeleiteten Klassifikationen (Latinjak et al., 2014; Van Raalte et al., 2016), Self-talk systematisch zu untersuchen. In diesem Zusammenhang haben wir anhand von Emotionen den Nutzen dieser Ansätze dargestellt, die Beziehung von Self-talk zu anderen psychologischen Konstrukten besser zu verstehen. Wir sind davon überzeugt, dass Self-talk, wie bereits bei der Selbsterschöpfung (Gregersen, Hatzigeorgiadis, Galanis, Comoutos & Papaioannou, 2017) oder dem Zustand der Bedrohung/Herausforderung (Hase, Hood, Moore & Freeman, 2019) demonstriert, auch mit vielen weiteren Aspekten der Psychologie im Zusammenhang steht und somit ein zentrales Konstrukt darstellt, was dabei helfen kann, Aufschlüsse über die individuellen psychologischen Herausforderungen von Sporttreibenden zu liefern.

In der Sportpsychologie gilt die Selbstregulation als ein entscheidender Faktor für die Erklärung von sportlicher Leistung (Englert, 2016). Angesichts der inhärenten Beziehung von Self-talk und Selbstregulation können Erkenntnisse aus der Self-talk Forschung, vor allem

beruhend auf den theoriegeleiteten Klassifikationen, sportliche Leistungsschwankungen besser erklären. In diesem Zusammenhang ist die Beliebtheit von Self-talk in der angewandten Sportpsychologie auch wenig überraschend. Innovative reflexive Self-talk Interventionen können durch die Identifikation von spontanem und zielgerichtetem Self-talk dazu beitragen, dass Sporttreibende ihre psychologischen Prozesse besser verstehen. Die dabei gewonnenen Erkenntnisse können auch auf Bereiche außerhalb des Sportbereichs übertragen werden, und somit nicht nur die sportliche, sondern vielmehr auch die persönliche Entwicklung positiv beeinflussen.

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***Ein Plädoyer für eine verstärkte Berücksichtigung der Verhaltenskomponente in der sportpsychologischen Emotionsforschung [A call for an increased consideration of the behavioural component of emotion in sport psychology research]***

**Abstract**

In investigating the relationship between emotions and sport performance research has almost exclusively focused on athletes' subjective experience. Prospective or retrospective study designs with the help of questionnaires or interviews have been common practice. Furthermore, in experiments emotions have been evoked and their consequences have been assessed (e.g., on sport performance). Since emotions are also observable through changes in facial expressions, gestures, posture, or voice, this article calls for an increased focus on the behavioural component of emotions in future research. The systematic observation of emotions allows to study them "online" in their natural context. In addition, the article describes how changes in the observable behaviour entail relevant consequences to the individual him- or herself as well as to others (e.g., the opponent) that can hardly be explained by the subjective experience of an emotion. Finally, potential challenges related to the exploration of the behavioural component of emotions are discussed.

**Einleitung**

Der sportliche Wettbewerb ist mit dem Auftreten von vielfältigen Emotionen verbunden. Das Verfolgen von persönlich wichtigen Zielen mit ungewissem Ausgang kann Angst vor dem Versagen, Hoffnung auf einen Erfolg, Ärger über eine unnötige Niederlage oder grenzenlose Freude über einen überraschenden Sieg auslösen. Aus diesem Grund ist es wenig überraschend, dass Emotionen in der Sportpsychologie ein zentraler Untersuchungsgegenstand sind und oftmals ein eigenständiges Kapitel in sportpsychologischen Lehr- und Handbüchern einnehmen (z. B. deutsch: Hackfort & Birkner, 2006; Hänsel, Baumgärtner, Kornmann & Ennigkeit, 2016

und englisch: Hanin, 2007; Hanin & Ekkekakis, 2014). Eine aus theoretischer und praktischer Perspektive bedeutsame Frage ist dabei, inwiefern Emotionen die sportliche Leistung beeinflussen. Aus theoretischer Perspektive wird versucht zu einem besseren Verständnis des Zusammenhangs zwischen der menschlichen Psyche und der individuellen Leistungsfähigkeit zu gelangen. Aus einer praktischen Perspektive geht es darum, wie Athleten und Athletinnen durch die Anwendung von Regulationsstrategien Emotionen in eine leistungsförderliche Richtung kanalisieren können.

Intuitiv würden wahrscheinlich die meisten Sporttreibenden der Aussage zustimmen, dass Emotionen die sportliche Leistung sowohl negativ als auch positiv beeinflussen können. Trotz dieser plausiblen Annahme und des festen Platzes des Themas in der Sportpsychologie haben Uphill, Groom und Jones (2014) festgestellt, dass es zwar die Überzeugung (belief) gibt, dass Emotionen die sportliche Leistung beeinflussen, die aktuelle Forschungslage aber keine eindeutigen Antworten bezüglich der Art des Zusammenhangs zulässt. Ein Grund dafür könnte sein, dass die bisherige Forschung sich nahezu ausschließlich auf die Komponente des subjektiven Erlebens einer Emotion konzentriert hat (Hanin, 2007). In diesem Beitrag wird argumentiert, dass die Einbeziehung der Verhaltenskomponente ein erforderlicher Schritt ist, um in der Erforschung von Emotionen im Sportkontext zu eindeutigeren und aussagekräftigeren Ergebnissen zu kommen. Zunächst erfolgt aber eine Definition von Emotionen.

### **Emotion als Konstrukt mit multiplen Komponenten**

Es gibt eine große Diskussion darüber, wie Emotionen zu definieren sind, wobei sich die verschiedenen Ansätze in zentralen Fragen unterscheiden (für eine Übersicht der verschiedenen Emotionsansätze siehe Gross & Barrett, 2011). Zum Beispiel gibt es eine langanhaltende Debatte darüber, ob es eine bestimmte Anzahl an diskreten, universalen und angeborenen Emotionen gibt oder ob das Erleben bzw. die Beobachtung von einer spezifischen Emotion

vielmehr subjektiv konstruiert wird (Lindquist, Siegel, Quigley & Barrett, 2013). Trotz dieser Unterschiede herrscht über die verschiedenen Ansätze hinweg grundlegender Konsens darüber, dass eine Emotion mit Veränderungen im subjektiven Erleben, in physiologischen Prozessen und im beobachtbaren Verhalten einhergeht (Gross, 2015). Das subjektive Erleben entspricht dabei der Gefühlsebene, die sprachlich wiedergegeben werden kann. Physiologische Prozesse gehen mit Veränderungen im vegetativen Nervensystem einher und lassen sich zum Beispiel anhand der Herzfrequenz, Pupillenweite oder Hauttemperatur messen. In Bezug auf das beobachtbare Verhalten sind Emotionen anhand von Veränderungen im Gesichtsausdruck, der Gestik, der Körperhaltung oder auch der Stimme erkennbar. Da die verschiedenen Komponenten einer Emotion es ermöglichen, Emotionen auf unterschiedliche Art und Weise zu messen (Mauss & Robinson, 2009), wird im Folgenden darauf eingegangen, wie Emotionen typischerweise in der Sportpsychologie erhoben werden und inwiefern die systematische Verhaltensbeobachtung eine substantielle Ergänzung zu diesen Vorgehensweisen darstellt.

### **Messung von Emotionen in der Sportpsychologie**

Ein Blick auf die bisherige sportpsychologische Forschung zeigt, dass Emotionen meistens mithilfe von standardisierten Fragebögen erfasst werden. Beispiele für solche Fragebögen in deutscher Sprache sind das Wettkampf-Angst-Inventar-State (WAI-S; Ehrlenspiel, Brand & Graf, 2009) oder in englischer Sprache der Profile of Mood States (POMS; McNair, Lorr & Droppleman, 1971), der Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump & Smith, 1990) oder der Sport Emotions Questionnaire (SEQ; Jones, Lane, Bray, Uphill & Catlin, 2005). Diese Messinstrumente umfassen hauptsächlich Fragen zum subjektiven Erleben der Person, aber auch zu der eigenen Wahrnehmung von physiologischen Prozessen. Neben verschiedenen mit dem Gebrauch von Fragebögen üblicherweise verbundenen Schwierigkeiten (z. B. Validität des Fragebogens, Motivation der Ausfüllenden, soziale Erwünschtheit), stellt sich in der Sportpsychologie eine weitere Problematik, nämlich,

dass aus ethischen und praktischen Gründen Fragebögen nicht während eines sportlichen Wettbewerbs ausgefüllt werden können. Mit anderen Worten, Emotionen können nicht „online“, d. h. während des Zeitpunkts ihres Entstehens gemessen werden. Aus diesem Grund hat sich ein Großteil der Forschung darauf konzentriert, den emotionalen Zustand möglichst unmittelbar vor einem Wettbewerb zu erheben und dessen Vorhersagekraft für die folgende sportliche Leistung zu überprüfen (für einen Review siehe Terry & Lane, 2011). Angesichts des wechselseitigen Verhältnisses von Emotionen und sportlicher Leistung hat der exklusive Fokus auf Emotionen vor dem Wettbewerb zur Folge, dass viele Emotionen, die durch die Ereignisse während des sportlichen Wettbewerbs ausgelöst werden, nicht berücksichtigt werden können (Sève, Ria, Poizat, Saury & Durand, 2007). Eine andere Vorgehensweise ist, Emotionen, die während eines Wettbewerbs aufgetreten sind, retrospektiv zu erfassen. Dabei werden oft Videoaufzeichnungen als Erinnerungshilfen eingesetzt, um dann mit dem Einsatz von standardisierten Fragebögen oder Interviewverfahren den Einfluss von Emotionen auf subjektive Leistungseinschätzungen (Martinent & Ferrand, 2009) oder auf objektive Leistungsparameter (Uphill et al., 2014) zu messen. Obwohl dieses Vorgehen einen Fortschritt zu der rein prospektiven Erfassung von Emotionen darstellt, bleibt fraglich, wie akkurat sich Athleten und Athletinnen an die zuvor erlebten Emotionen erinnern können. Dabei können vor allem das Wissen über den Wettbewerbsausgang und der emotionale Zustand während der Befragung die Erinnerung verzerren (Levine & Safer, 2002). Neben diesen Methoden, Emotionen in realen Wettbewerben zu messen, bietet die Induktion von Emotionen in einem experimentellen Design die Möglichkeit, konfundierende Variablen (z. B. das Niveau des Gegners) besser zu kontrollieren. Eine solche Vorgehensweise beinhaltet üblicherweise, dass eine gewünschte emotionale Reaktion durch eine experimentelle Manipulation erzeugt wird und im Anschluss daran ihr Einfluss in einer Leistungsaufgabe überprüft wird. Die Manipulation, deren Wirksamkeit durch Fragebögen im Nachhinein überprüft wird, kann durch die Erinnerung an vergangene emotionale Situationen (Rathschlag & Memmert, 2015), den

Gebrauch von emotionalen Geschichten (Woodman, Davis, Hardy, Callow, Glasscock & Yuill-Proctor, 2009) oder auch durch das Anhören von emotionalen Wörtern (z. B. „Disaster“) (Vast, Young & Thomas, 2011) geschehen. Bei solchen experimentellen Studien besteht jedoch die Problematik, dass die psychologischen und physischen Anforderungen sich stark von einem „echten“ sportlichen Wettbewerb unterscheiden (Martin, Vause & Schwartzman, 2005). Es scheint unmöglich, in einem Experiment eine für die Probanden persönliche Relevanz eines sportlichen Wettbewerbs zu replizieren. Dies ist aber für die Entstehung und damit auch für die Erfassung von Emotionen zentral (Lazarus, 2000).

### **Emotionsmessung durch eine systematische Verhaltensbeobachtung**

Die obigen Ausführungen zeigen, dass der prospektiven und retrospektiven sowie der experimentellen Erfassung von Emotionen mit der Hilfe von Fragebögen und Interviews im sportlichen Wettbewerb enge Grenzen gesetzt sind. Die Fokussierung auf das subjektive Erleben einer Emotion könnte eine Erklärung dafür sein, warum der Zusammenhang von Emotionen und sportlicher Leistung noch immer weitgehend unklar ist (Uphill et al., 2014). Ein alternativer Ansatz, der die angeführten Schwächen berücksichtigt, ist die systematische Verhaltensbeobachtung. Die systematische Verhaltensbeobachtung kann beobachtbare Veränderungen im Gesichtsausdruck, der Gestik, der Körperhaltung oder auch Verbalisierungen und deren Effekt auf die folgende Leistung erfassen. Im Unterschied zu den vorher dargestellten Verfahren ermöglicht die systematische Verhaltensbeobachtung, den Zusammenhang von Emotionen und sportlicher Leistung „online“, d. h. zum Zeitpunkt ihrer Entstehung und im natürlichen Kontext zu untersuchen. In dem Zusammenhang ist es interessant, dass der sportliche Wettbewerb gerne als Kontext in der allgemeinen Psychologie in Anspruch genommen wird, um zu untersuchen, wie sich Emotionen in Mimik und Gestik widerspiegeln (z. B. Aviezer, Trope & Todorov, 2012; Fernández-Dols & Ruiz-Belda, 1995; Matsumoto & Willingham, 2006;). Die Idee ist dabei, dass der sportliche Wettbewerb

Emotionen mit einer solch hohen Intensität hervorrufen kann, die unter ethischen Bedingungen nur schwer in einem Labor zu replizieren sind. Darüber hinaus können gerade auch von leistungsstarken Athleten und Athletinnen große Datenmengen erfasst werden, auf die man bei der systematischen Verhaltensbeobachtung zurückgreifen kann. Aus diesen Gründen geht die systematische Verhaltensbeobachtung vor allem mit einer erhöhten ökologischen Validität einher und weist somit Vorteile zu den bisherigen meist entweder durch Fragebögen und Interviews oder im Labor stattfindenden Untersuchungen auf.

Es ist wichtig zu betonen, dass die systematische Verhaltensbeobachtung nicht als Konkurrenz zur bisherigen Praxis, Emotionen durch Fragebögen oder Interviews zu erfassen, verstanden werden soll. Vor allem eine komplementäre Anwendung beider Methoden könnte zu einem besseren Verständnis des Zusammenhangs von Emotionen und sportlicher Leistung beitragen. Beispielsweise könnte verglichen werden, ob erlebte Emotionen, die sich im beobachtbaren Verhalten widerspiegeln, einen anderen Einfluss ausüben, als solche, die nicht von außen beobachtet werden können. Darüber hinaus könnte untersucht werden, auf welche Weise sich der emotionale Zustand vor einem sportlichen Wettbewerb auf die beobachtbaren emotionalen Reaktionen während eines Wettbewerbs auswirkt. Hier scheint es plausibel, dass die mit der Wettkampfangst verbundene erhöhte physiologische Erregung zu einer niedrigeren Hemmschwelle führt, Emotionen während des Wettbewerbs nach außen zu zeigen.

Die mit einer Emotion verbundene beobachtbare Reaktion geht jedoch darüber hinaus, Schlussfolgerungen über das emotionale Erleben einer Emotion zu ermöglichen. Wie im Folgenden beschrieben, haben solche Veränderungen im beobachtbaren Verhalten Konsequenzen für den Sporttreibenden selbst, aber auch für die Personen, die das Verhalten wahrnehmen. Wichtig ist dabei, dass diese Konsequenzen direkt mit den beobachtbaren körperlichen Veränderungen zusammenhängen und daher nur sehr bedingt durch das Erleben einer Emotion erklärt werden können.

### **Intrapersonale Konsequenzen einer beobachtbaren emotionalen Reaktion**

Schon in den Ausführungen von Darwin (1896) und James (1890) wurde postuliert, dass das mit Emotionen verbundene beobachtbare Verhalten nicht nur die Konsequenz einer Emotion ist, sondern auch das emotionale Erleben beeinflussen kann. In dem Zusammenhang schrieb Darwin “The free expression by outward signs of an emotion intensifies it” und “On the other hand, the repression, as far as this is possible, of all outward signs softens our emotions” (p. 365). James ging sogar noch einen Schritt weiter mit seinen oft zitierten Ausführungen, „we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble because we are sorry, angry, or fearful“ (p. 449). Es gibt verschiedene Untersuchungen, die die Aussagen hinter diesen Zitaten unterstützen und aufzeigen, dass beobachtbare Verhaltensweisen nicht nur ein Ergebnis von Emotionen sind, sondern vielmehr auch das emotionale Erleben beeinflussen können. Unter dem Stichwort „facial feedback hypothesis“ haben sich Studien vor allem auf den Gesichtsausdruck konzentriert (Laird, 1974; Strack, Martin & Stepper, 1988; für einen extensiven Review siehe Adelman & Zajonc, 1989). Dabei wurden die Gesichtsausdrücke entweder durch verbale Instruktionen (Laird, 1974) oder mithilfe eines Stiftes im Mund (Strack et al., 1988) manipuliert. Diese Studien zeigen konsistent einen Einfluss des manipulierten Gesichtsausdrucks auf das subjektive Erleben der Probanden. Nach einem positiven Gesichtsausdruck wurden eher positive Gefühle und nach einem negativen Gesichtsausdruck eher negative Gefühle berichtet. Diese Ergebnisse konnten in einer neueren Arbeit, die eine Gesichtsausdrucksmanipulation während einer sportlichen Betätigung auf dem Fahrradergometer beinhaltete, bestätigt werden (Ecke, 2011). Obwohl in der Emotionsforschung die Rolle des Gesichtsausdrucks am häufigsten erforscht worden ist, konnte darüber hinausgehend gezeigt werden, dass auch andere körperliche Veränderungen einen Einfluss auf das emotionale Erleben haben (Price, Peterson & Harmon-Jones, 2012). Zum Beispiel kann die Manipulation der Körperhaltung zu einer Steigerung der assoziierten Emotion führen (Duclos et al, 1989). Damit einhergehend wurde gezeigt, dass, nachdem Personen für

eine kurze Zeit eine dominante Körperhaltung eingenommen hatten (im Vergleich zu einer unterwerfenden Körperhaltung), sie anschließend über ein höheres Machtgefühl berichteten sowie physiologische Veränderungen aufzeigten, nämlich höhere Testosteron- und niedrigere Cortisolwerte (Carney, Cuddy & Yap, 2010). Der Effekt einer dominanten Körperhaltung auf das wahrgenommene Machtgefühl und die damit verbundene Verhaltenstendenz mehr Risiko einzugehen konnte in einer weiteren Studie bestätigt werden (Huang, Galinsky, Gruenfeld & Guillory, 2011). In Bezug auf konkrete emotionale Verhaltensweisen wurden Probanden in einer anderen Studie dazu aufgefordert, mit der Faust in einen Boxsack zu schlagen. Die Ergebnisse zeigen, dass solche Verhaltensweisen zu einem gesteigerten Gefühl von Ärger und aggressiveren Verhalten führen (Bushman, 2002).

Einige Studien im Mannschaftssport stützen die regulative Funktion von beobachtbaren emotionalen Reaktionen auf das subjektive Erleben. Während das Zeigen von positiven Emotionen als eine sinnvolle Strategie zur Auslösung des psychologischen Momentums im Handball angesehen wird, wird eine negative Körpersprache mit einem negativen psychologischen Momentum in Verbindung gebracht (Moesch & Apitzsch, 2012). Im Volleyball hat sich das gemeinsame Feiern eines Punkts als der bedeutsamste Faktor für das Team-Selbstbewusstsein (collective efficacy) herausgestellt. Dagegen haben negative emotionale Reaktionen nach einem verlorenen Punkt (z. B. Schimpfen mit einem Mitspieler; hängende Schultern) den größten negativen Einfluss darauf (Fransen et al., 2012). In ähnlicher Weise wurde von dem Zusammenhang von emotionalen Reaktionen und dem Team-Selbstbewusstsein in einer Studie mit Handballspielerinnen berichtet (Ronglan, 2007). Da diese bisherigen Befunde aus dem Sportbereich ausschließlich aus qualitativen Studien mit Mannschaftssportarten stammen, ist es wichtig, die postulierten Konsequenzen in Individualsportarten zu überprüfen. In dem Zusammenhang erscheint es zudem interessant, die Bedeutsamkeit des beobachtbaren Verhaltens im Hinblick auf die Emotionsregulation von Athletinnen und Athleten zu untersuchen (Jones, 2003). Die Idee, dass die Kontrolle von



beobachtbaren emotionalen Reaktionen dazu genutzt werden kann, auch das emotionale Erleben zu regulieren, verspricht eine hohe Relevanz für die angewandte Arbeit.

### **Interpersonale Konsequenzen einer beobachtbaren emotionalen Reaktion**

Sowohl in der allgemeinen Psychologie (van Kleef, van Doorn, Heerdink & Koning, 2011) als auch in der Sportpsychologie (Tamminen & Bennett, 2017) wird kritisiert, dass Emotionen meist auf ihre intrapersonellen Konsequenzen reduziert werden. Die Tatsache, dass emotionale Reaktionen auch von Außenstehenden (z. B. dem Gegner) beobachtet werden können, deutet jedoch auf die Bedeutsamkeit von interpersonellen Konsequenzen von Emotionen hin. Ein potenzieller Einfluss kann dabei unbewusst wirken, aber genauso kann das bewusste Zeigen von Emotionen als eine Strategie angewendet werden (van Kleef et al., 2011). Gemäß van Kleefs Emotions as social information model (EASI-model) können beobachtbare Emotionen kognitive (z. B. man versucht zu verstehen, warum die Person so reagiert) sowie affektive Reaktionen (z. B. man freut sich mit, wenn man Freude bei anderen Personen erkennt) bei Außenstehenden hervorrufen. Da gezeigt werden konnte, dass gegenteilige Effekte in Abhängigkeit der Beziehung auftreten (Furley, Moll & Memmert, 2015), wird im Folgenden zwischen einem möglichen Einfluss zunächst auf die Eigengruppe und danach auf die Fremdgruppe unterschieden. Dabei bezieht sich die Eigengruppe auf Personen, mit denen man in einem kooperierenden Verhältnis steht und gemeinsame Ziele verfolgt (z. B. Mitglieder der eigenen Mannschaft). Die Fremdgruppe hingegen beinhaltet Personen, mit denen man in einem konkurrierenden Verhältnis steht und gegenteilige Ziele verfolgt (z. B. Mitglieder der gegnerischen Mannschaft).

### **Einfluss einer beobachtbaren emotionalen Reaktion auf die Eigengruppe**

Der Begriff emotionale Ansteckung (emotional contagion) beschreibt den Prozess, wie beobachtbare Emotionen von einer Person auf eine andere übertragen werden können (Hatfield,

Cacioppo & Rapson, 1994). Mit Hilfe von Zitaten aus einer Studie mit kanadischen Athleten kann dieser Prozess beschrieben werden (Tamminen et al., 2016). So wird berichtet, „when you see other people crying it makes you even more depressed and cry more“ (p. 5). Genauso aber auch, „you get a bigger emotional boost of happiness because it is something you share with people and it’s like you have that prosocial emotion of sharing in others’ joy“ (p. 5). Diese Zitate legen nahe, dass eine beobachtbare emotionale Reaktion von Teammitgliedern und auch des Trainers bedeutsam sein können. In dem Zusammenhang konnte eine Studie im Cricket zeigen, dass die Stimmung der verschiedenen Spieler innerhalb einer Mannschaft im Verlaufe des Wettbewerbs positiv miteinander korreliert (Totterdell, 2000). In einer anderen experimentellen Studie sollten sich Probanden in die Rolle eines Fußballtorhüters hineinversetzen und dabei eigene Emotionen und Gedanken nach der Beobachtung einer emotionalen Reaktion eines Elfmeterschützen bewerten (Furley et al., 2015). Falls der Elfmeterschütze als hypothetischer Mitspieler eine positive emotionale Reaktion (ausgestreckte Arme, gehobener Kopf) gezeigt hat, berichteten die Probanden im Anschluss mehr eigene positive Emotionen und eine größere Zuversicht im Hinblick auf den Ausgang des Elfmeterschießens erfahren zu haben. Falls der Mitspieler eine negative emotionale Reaktion (Hände vors Gesicht, gesenkter Kopf) gezeigt hat, antizipierten die Probanden mehr negative Emotionen und eine geringere Zuversicht. Die Bedeutung von Emotionen in der Interaktion zwischen Mitspielern und Mitspielerinnen konnte auch im Tennis gezeigt werden. Dort hat eine inhaltliche Analyse der Kommunikation gezeigt, dass über 50% des Austausches während eines Spiels als „emotional“ klassifiziert werden kann (Lausic, Tennenbaum, Eccles, Jeong & Johnson, 2009). Aus diesem Grund ist es interessant, dass positive emotionale Reaktionen (z. B. verbales Anfeuern nach Punktgewinn) des Kapitäns als eine wichtige Ressource für das Team-Selbstbewusstsein angesehen werden (Fransen et al., 2012). In dem Zusammenhang kann die sichtbare emotionale Reaktion als eine Form von interpersoneller Emotionsregulationsstrategie betrachtet werden (für einen Review siehe Friesen, Lane,

Devonport, Sellars, Stanley & Beedie, 2013). Zum Beispiel wurde von einer Skip (Kapitänin im Curling) in einer Studie betont, wie sie versucht, ihren Ärger während eines Spiels nicht nach außen zu zeigen, um den Mitspielerinnen gegenüber Stärke zu vermitteln und deren Verunsicherung zu vermeiden (Tamminen & Crocker, 2013). Dass ein Kapitän, der durch sein Verhalten Selbstbewusstsein ausstrahlt, einen positiven Effekt auf die individuelle sowie die Mannschaftsleistung haben kann, konnte durch eine experimentelle Studie bestätigt werden (Fransen, Steffens, Haslam, Vanbeselaere, Broek & Boen, 2016). Je nach Intention können Strategien zur Regulation emotionalen Verhaltens dabei entweder die Unterdrückung eines Impulses oder das Zeigen einer „nicht-gespürten“ Emotion bedeuten (Wagstaff, Fletcher & Hanton, 2012). Wichtig ist jedoch, ähnlich wie bei der Betrachtung des subjektiven Erlebens einer Emotion (Hanin, 2007), die Valenz (d. h. wie angenehm oder unangenehm sich eine Emotion anfühlt) von der Funktionalität (d. h. wie sich eine Emotion auf die Leistung auswirkt) einer Emotion zu unterscheiden. So kann eine beobachtbare negative emotionale Reaktion (z. B. Anschreien nach einem Fehler) auch motivierende Effekte auf die Mitspieler und Mitspielerinnen haben (Tamminen et al., 2016).

Zuletzt kann auch das emotionale Verhalten des eigenen Trainers oder der eigenen Trainerin einen Einfluss haben. Trainer und Trainerinnen können vor allem durch Ansprachen vor und während des Wettbewerbs Einfluss auf die Spieler und Spielerinnen nehmen. Dabei werteten Hockeyspielerinnen emotionale Ansprachen des Trainers vor sowie während eines Spiels als effektiv, so lange die ausgedrückten Emotionen authentisch sind (Breakey, Jones, Cunningham & Holt, 2009). Darüber hinaus hat sich gezeigt, dass Ansprachen mit emotionalem Inhalt vor „Championship games“ oder wenn eine Mannschaft als Außenseiter in ein Spiel geht, bevorzugt werden (Vargas-Tonsing & Guan, 2007). Interessanterweise konnte in derselben Studie auch festgestellt werden, dass die Athleten und Athletinnen üblicherweise den Nutzen von Emotionen in solchen Ansprachen höher als die Trainer einschätzen.

### Einfluss einer beobachtbaren emotionalen Reaktion auf die Fremdgruppe

Nicht nur Personen, die der Eigengruppe angehören, können die beobachtbaren emotionalen Reaktionen wahrnehmen. In Übereinstimmung mit dem EASI-Modell übt das sichtbare emotionale Verhalten einen unterschiedlichen Einfluss auf Personen aus der Fremdgruppe aus, mit der man in einem konkurrierenden Verhältnis steht (van Kleef et al., 2011). Das konnte in dem Experiment von Furley et al. (2015) gezeigt werden, bei dem Probanden über mehr negative Emotionen und eine geringere Zuversicht über den Ausgang des Elfmeterschießens berichtet haben, nachdem sie eine beobachtbare positive emotionale Reaktion (ausgestreckte Arme, gehobener Kopf) von einem hypothetischen gegnerischen Spieler gesehen hatten. Gegenteilige Effekte sind festgestellt worden, wenn eine negative emotionale Reaktion (Hände vors Gesicht, gesenkter Kopf) des hypothetischen Gegenspielers beobachtet worden war. Dieser Befund ist in Übereinstimmung mit einer Studie, die sämtliche Elfmeterschießen in Welt- und Europameisterschaften zwischen 1974 und 2006 analysiert hat (Moll, Jordet & Pepping, 2010). Dort wurde gezeigt, dass die Wahrscheinlichkeit eines Fehlschusses mehr als doppelt so groß war, wenn der gegnerische Spieler zuvor eine positive emotionale Reaktion (z. B. ausgestreckte Arme) gezeigt hat. Die Ergebnisse dieser Studie zeigen, dass es möglich ist, emotionale Reaktionen im natürlichen Kontext systematisch zu beobachten und somit die Forderung nach mehr ökologischer Validität zu erfüllen (Uphill et al., 2014).

Qualitative Studien in mehreren Sportarten unterstreichen einen potenziellen Einfluss der beobachtbaren emotionalen Reaktionen auf den Gegner. Zum Beispiel haben Tischtennisspieler das Bestreben betont, negative Emotionen nicht zu zeigen, da sie das Selbstbewusstsein des Gegners stärken würden (Sève et al., 2007). Dagegen werden positive Emotionen in übertriebener Weise mit dem Ziel gezeigt, das Selbstbewusstsein des Gegners zu verringern. Das übertriebene Zeigen von positiven Emotionen wurde auch in einer Studie mit Handballspielerinnen instrumentalisiert, um dem Gegner das Gefühl einer Niederlage zu vermitteln (Ronglan, 2007). Ebenso sollten negative Emotionen nicht gezeigt werden, um

weiter Stärke zu demonstrieren. In dieselbe Richtung geht der Befund, dass Fußballspieler negative emotionale Reaktionen des Gegners als hilfreich ansehen, um ein eigenes psychologisches Momentum auszulösen (Jones & Harwood, 2008).

Zuletzt wurde in mehreren Studien die Körpersprache, die als Teil einer beobachtbaren emotionalen Reaktion angesehen werden kann, untersucht. Dabei haben Probanden Videos von einem hypothetischen Gegner im Tischtennis (Greenlees, Bradley, Holder & Thelwell, 2005), im Tennis (Greenlees, Buscombe, Thelwell, Holder & Rimmer, 2005), im Fußball (Greenlees, Leyland, Thelwell & Filby, 2008), im Baseball (Furley & Dicks, 2012) oder im Basketball (Furley & Schweizer, 2014) gesehen, die entweder eine dominante (aufrechte Haltung, gerader Blick) oder eine submissive Körpersprache gezeigt haben (hängende Haltung, gesenkter Blick). Die Ergebnisse zeigen konsistent, dass Probanden ihre Erfolgchancen signifikant höher einschätzen, wenn der Gegner eine submissive Körperhaltung einnimmt. Dagegen werden die Erfolgchancen als niedriger eingeschätzt, wenn dieser eine dominante Körperhaltung zeigt.

### **Herausforderungen bei der Betrachtung der Verhaltenskomponente von Emotionen**

Die Betrachtung der in der Sportpsychologie weitestgehend vernachlässigten Verhaltenskomponente von Emotionen erscheint erfolgversprechend im Hinblick darauf, ein besseres Verständnis des Zusammenhangs von Emotionen und sportlicher Leistung zu erlangen. Allerdings stellt diese Art der Forschung einige theoretische und praktische Herausforderungen dar, auf die im Folgenden eingegangen wird.

Ein Hauptgrund dafür, dass die Verhaltenskomponente von Emotionen bisher nur sehr wenig Berücksichtigung in der Literatur gefunden hat, ist der Mangel an entsprechenden sportspezifischen Messinstrumenten (Moesch, Kenttä, Bäckström & Mattsson, 2015). Eine nennenswerte Ausnahme bildet das Messinstrument zur Erfassung des non-verbale Verhaltens von Handballspieler und Handballspielerinnen nach erfolgreichem Wurfabschluss (Moesch et al., 2015). Dieses sportspezifische Messinstrument beinhaltet sechs Kodierungen zu möglichen

Gesten (eine Faust nach unten, zwei Fäuste nach unten, eine Faust nach oben, zwei Fäuste nach oben, Daumen hoch und in die eigenen Hände klatschen) und fünf Kodierungen zu möglichen Berührungen zwischen den Mitspielern (Abklatschen nach unten mit einer Hand, Abklatschen nach oben mit einer Hand, Abklatschen mit beiden Händen, mit den Schultern berühren und zwei dieser Berührungen zur selben Zeit). Generell können Messinstrumente zur systematischen Verhaltensbeobachtung Kodierungen beinhalten, die sich entweder auf rein physische Merkmale beziehen oder solche, die eine Interpretation der kodierenden Person benötigen (Bakeman & Quera, 2011). Diese Unterscheidung spiegelt sich in der schon in der Einleitung erwähnten langen und intensiv geführten Debatte über die Definition von Emotionen wider (Mauss & Robinson, 2009). Diskrete Emotionsansätze gehen davon aus, dass es eine geringe Anzahl an Emotionen (z. B. Freude, Angst) gibt, die sich im Laufe der Evolution als adaptiv herausgestellt haben und spezifische biologisch definierte Reaktionsmuster im subjektiven Erleben, in physiologischen Prozessen und im beobachtbaren Verhalten zeigen (Ekman & Cordaro, 2011). Das impliziert, dass es entsprechende Messinstrumente ermöglichen sollten, eine nicht durch höhere kognitive Prozesse überschriebene emotionale Reaktion objektiv messen zu können. Ein bekanntes Beispiel dafür ist das Facial Action Coding System (FACS; Ekman & Friesen, 1978), welches objektiv definierbare Gesichtsausdrücke diskreten Emotionen zuschreibt. Auf der anderen Seite negieren konstruktivistische Emotionsmodelle die Existenz universaler diskreter Emotionen (z. B. Barrett, 2012; Russell, 2009). Vielmehr wird angenommen, dass Personen im Laufe ihrer Sozialisation ein mentales Skript für die verschiedenen Emotionskonzepte entwickeln und eine spezifische Emotion dann als solche erkannt wird, wenn das beobachtete Verhalten mit dem Skript übereinstimmt (Russell, 2009). Obwohl die entwickelten mentalen Skripts zwischen verschiedenen Personen oft sehr ähnlich sind, ist der entscheidende Punkt, dass es gemäß diesem Ansatz wenig Sinn macht, objektive (d. h. basiert auf physischen Merkmalen) Indikatoren für einzelne Emotionen zu bestimmen (Barrett, 2012). Der Logik zur Folge würden konstruktivistische Emotionsmodelle

Messinstrumente postulieren, die eine subjektive Interpretation der kodierenden Person zulassen. Da die derzeitige Forschungslage nicht danach aussieht, dass es zu einer baldigen Lösung dieser Debatte um die Definition von Emotionen kommt, ist für die Entwicklung und Anwendung von entsprechenden Messinstrumenten eine sorgfältige theoretische Einbettung unabdingbar.

Ein weiterer Grund dafür, warum die Verhaltenskomponente von Emotionen wenig Berücksichtigung gefunden hat, könnte sein, dass das beobachtbare Verhalten nicht zwingend dem emotionalen Erleben entspricht. Zum einen können sogar intensiv erlebte Emotionen nicht im Verhalten beobachtet werden (Fernández-Dols & Ruiz-Belda, 1995). Zum anderen kann eine gezeigte emotionale Reaktion ein stärkeres als das tatsächlich erlebte emotionale Erleben vermuten lassen (Schmeichel, Demaree, Robinson & Pu, 2006). Dabei können Athleten und Athletinnen Regulationsstrategien verwenden, um das äußere Erscheinungsbild in die gewünschte Richtung zu modifizieren (Sève et al., 2007). In dem Zusammenhang ist es wichtig zu betonen, dass eine systematische Verhaltensbeobachtung nicht den Anspruch haben kann, das „wahre“ emotionale Erleben zu identifizieren. Vielmehr bezieht es sich mit dem Verhalten auf eine andere Komponente von Emotionen und bietet daher eine vielversprechende Ergänzung zur bisherigen Forschung, die sich fast ausschließlich auf das subjektive Erleben von Emotionen konzentriert hat.

Bei der Betrachtung der Verhaltensebene einer Emotion ist es wichtig – ähnlich wie beim emotionalen Erleben (Hanin, 2007) – die Valenz einer Emotion nicht mit ihrer Funktionalität gleichzusetzen. Bisherige qualitative Studien (z. B. Ronglan, 2007) oder Laborstudien (z.B. Furley et al., 2015) legen nahe, dass positive beobachtbare emotionale Reaktionen förderlich und negative beobachtbare emotionale Reaktionen hinderlich für das Ziel, einen sportlichen Wettbewerb zu gewinnen, sind. Bisher liegen nur wenige Feldstudien vor (Moll et al., 2010; van Raalte, Brewer, Rivera & Petitpas, 1994; van Raalte, Cornelius, Brewer & Hatten, 2000; Zourbanos et al., 2015; Moesch, Kenttä, Bäckström & Mattsson, 2016)

und diese konnten die Annahmen nur eingeschränkt empirisch unterstützen. Zum Beispiel haben Moesch et al. (2016) gezeigt, dass sich nur bestimmte emotionale Reaktionen (Berühren mit Mitspielerinnen; aber nicht Gesten) positiv auf den Spielverlauf ausgewirkt haben. Darüber hinaus haben sich diese Reaktionen nur dann förderlich ausgewirkt, wenn die Berührungen während einer Phase erfolgten, in der es im Spiel gut lief. Erfolgte es in einer Phase, in der es im Spiel nicht gut lief, wurde sogar ein negativer Effekt gefunden. In Studien im Tennis, bei denen der Fokus auf Gesten und Verbalisierungen lag, wurden auch eher inkonsistente Ergebnisse gezeigt. Während in zwei Studien nach negativen emotionalen Reaktionen eine verminderte Wahrscheinlichkeit den nächsten Punkt zu gewinnen aufgedeckt wurde (van Raalte et al., 1994; Zourbanos et al., 2015), konnte dieser Effekt in einer anderen Studie nicht repliziert werden (van Raalte et al., 2000). Darüber hinaus konnte für positive emotionale Reaktionen nur ein sehr schwacher gewinnbringender (van Raalte et al., 1994) oder kein Effekt auf den nächsten Punkt (Zourbanos et al., 2015) gezeigt werden. Diese Ergebnisse zeigen die Komplexität des Zusammenhangs von sportlicher Leistung und Emotionen und betonen die Wichtigkeit, dabei personale und situationelle moderierende Variablen zu berücksichtigen (Moesch et al., 2016).

Es sollte betont werden, dass sich der Fokus auf die Verhaltenskomponente von Emotionen bevorzugt für bestimmte Sportarten anbietet. Insbesondere in Rückschlagsportarten wie Tennis, Tischtennis oder Badminton bekommen die Spieler und Spielerinnen kontinuierlich Feedback über den Verlauf des Spiels. Ferner gibt es in diesen Sportarten viele Pausen (z. B. nach jedem Punkt), die es zeitlich erlauben, Emotionen nach außen zu zeigen. In solchen Sportarten wird zudem permanent das Gegenüber angeschaut, sodass auch die interpersonellen Konsequenzen der beobachtbaren Emotion stärker sein sollten. In anderen Sportarten wie Schwimmen, Radfahren oder Klettern, wo kein unmittelbarer Blickkontakt mit dem Gegner besteht und es keine Pausen während des Wettbewerbs gibt, scheint die Verhaltenskomponente von Emotionen vor allem während des Wettkampfs dagegen weniger bedeutsam zu sein.



Wie anfangs beschrieben beinhaltet eine Emotion mit physiologischen Prozessen eine weitere Komponente (Gross, 2015). Diese Komponente wurde in der Sportpsychologie hauptsächlich dadurch berücksichtigt, dass verwendete Fragebögen Items zu deren Wahrnehmung beinhalten (Beispielitem aus dem WAI-S: „Jetzt, in diesem Moment pocht mein Herz“; Ehrlenspiel et al., 2009). Hier bietet die technische Entwicklung die Möglichkeit, zunehmend objektive Indikatoren von physiologischen Prozessen im Zusammenhang mit der sportlichen Leistung zu untersuchen (z. B. di Fronso, Robazza, Filho, Bortoli, Comani & Bertollo, 2016). Aus diesem Grund ist nicht nur eine verstärkte Berücksichtigung des beobachtbaren Verhaltens, sondern vielmehr aller Emotionskomponenten vielversprechend.

### **Schlussfolgerung**

Trotz der herausragenden Rolle von Emotionen im sportlichen Wettbewerb ist deren Einfluss auf die sportliche Leistung bis heute alles andere als eindeutig erforscht (Uphill et al., 2014). Ein Grund dafür könnte der starke Fokus auf das subjektive Erleben von Emotionen in der sportpsychologischen Forschung sein. Wie dargestellt, hat die Verhaltenskomponente ein großes Potenzial, zu einem besseren Verständnis des Verhältnisses von Emotionen und sportlicher Leistung beizutragen. Der größte Vorteil im Vergleich zur Erfassung von Emotionen mittels Fragebögen und Interviews ist sicherlich, dass es die systematische Verhaltensbeobachtung erlaubt, Emotionen „online“, d. h. während des Zeitpunkts ihres Entstehens und in ihrem natürlichen Kontext zu erfassen. Darüber hinaus führen beobachtbare emotionale Reaktionen zu intra- und interpersonellen Konsequenzen, die nur sehr bedingt durch die Erlebniskomponente von Emotionen erklärt werden können. Es wäre wünschenswert, dass dieser Beitrag dazu führt, dass in zukünftigen Untersuchungen zum Zusammenhang von Emotionen und sportlicher Leistung die Verhaltensbeobachtung als mögliche Ergänzung zu den bisherigen Methoden eingesetzt wird und eine zuverlässigere Erfassung des Zusammenhangs zwischen Emotionen und sportlicher Leistung ermöglicht.

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