





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

Julian Fritsch<sup>a</sup> , Darko Jekauc<sup>a</sup>, Peter Elsborg<sup>b\*</sup> , Alexander Tibor Latinjak<sup>c</sup> , Markus Reichert<sup>a</sup>, and Antonis Hatzigeorgiadis<sup>d</sup> 

<sup>a</sup>Karlsruhe Institute of Technology, Institute of Sports and Sports Science, Karlsruhe, Germany; <sup>b</sup>Steno Diabetes Center Copenhagen, Gentofte, Denmark; <sup>c</sup>University of Suffolk, Ipswich, United Kingdom of Great Britain and Northern Ireland; <sup>d</sup>Department of Physical Education & Sport Sciences, University of Thessaly, Trikala, Greece

## ABSTRACT

A theory driven classification recently introduced to sport psychology distinguishes between goal directed self talk as a controlled type of self talk, and spontaneous self talk as an uncontrolled type of self talk. Based on this classification, the aim of this study was to explore the relationship between self talk and emotions. To this end, twenty competitive tennis matches were video recorded. Shortly after the match, the players were confronted with situations from the match and asked to rate the intensity of their emotions experienced, the intensity of their outward emotional reactions, and to report on their self talk. Multilevel fixed and random effect models showed that the intensity of emotions experienced (fixed model:  $\beta = -1.40$ ;  $p < .01$ ; random model:  $\beta = -1.40$ ;  $p < .01$ ) and outward emotional reactions (fixed model:  $\beta = -0.79$ ;  $p < .01$ ; random model:  $\beta = -0.76$ ;  $p < .05$ ) were lower in instances where players reported solely goal directed self talk than in instances where players reported solely spontaneous self talk. Moreover, in the fixed model, the intensity of emotions experienced was also lower in instances where players reported goal directed self talk in conjunction with spontaneous self talk, compared to instances where players reported solely spontaneous self talk ( $\beta = -0.46$ ;  $p < .01$ ). Finally, exploratory analyses suggest that these effects are mostly true for negative emotions rather than positive ones. Overall, the findings support the relevance of dual process self talk approaches. These findings encourage players to gain awareness about their emotions through spontaneous self talk, while they can use goal directed self talk for emotion regulation.

*Lay summary:* During a match, most tennis players talk a lot to themselves. This study shows that their self talk is related to (a) the emotions they experience and (b) the emotions they show to the outside. Specifically, a goal oriented type of self talk is related to less intense emotions.

## IMPLICATIONS FOR PRACTICE

- Players can gain awareness about their emotional states through spontaneous self talk.
- Players can use goal directed self talk to proactively and reactively regulate emotions.

- Video assisted recall can be helpful to assess and learn to deal with challenging psychological states during sport competitions.

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, 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, 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, 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, Hardy 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 toward the participating player. The lens of the

camera was repositioned toward 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 (e.g. 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:

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

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

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.

**Table 1.** 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
All situations <sup>a</sup>				
Spontaneous self-talk	279	4.39 ( $SD=1.77$ )	279	2.58 ( $SD=2.34$ )
Goal-directed/spontaneous self-talk	193	3.92 ( $SD=1.79$ )	193	2.52 ( $SD=2.18$ )
Goal-directed self-talk	168	3.33 ( $SD=2.16$ )	168	2.04 ( $SD=2.34$ )
Situations with negative emotions <sup>b</sup>				
Spontaneous self-talk	151	4.58 ( $SD=1.61$ )	114	4.04 ( $SD=1.72$ )
Goal-directed/spontaneous self-talk	76	3.70 ( $SD=1.42$ )	56	3.59 ( $SD=1.41$ )
Goal-directed self-talk	88	4.02 ( $SD=1.70$ )	65	3.54 ( $SD=1.82$ )
Situations with positive emotions <sup>b</sup>				
Spontaneous self-talk	118	4.53 ( $SD=1.56$ )	67	3.85 ( $SD=1.65$ )
Goal-directed/spontaneous self-talk	108	4.40 ( $SD=1.65$ )	75	3.80 ( $SD=1.72$ )
Goal-directed self-talk	50	4.12 ( $SD=1.55$ )	28	4.29 ( $SD=1.98$ )

<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.



## **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 1. 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).

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**

Using a fixed effect model, Model 1 in Table 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**

Using a random effect model, which took the extent to which the associations differ between subjects into account, Model 2 in Table 3 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 ( $\beta = 0.38, t(32.04) = 1.61, p = .12$ ).

### **Exploratory analyses for positive and negative emotions**

Further exploratory analyses included a differentiation between positive and negative emotions. In the case of negative emotions (Model 1a in Table 2), 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 2), the model only approached significance ( $\beta = 0.49, t(269.88) = 1.93, p = .06$ ) by showing that the intensity of emotions

**Table 2.** Multilevel model analyses with fixed effects to predict the intensity of emotions experienced.

Mode	Fixed					Random			
	Beta coefficient	Standard error	t	df	p	Variance estimate	Standard error	Wa d-Z	p
Mode 1, DV: intensity of emotions experienced									
intercept	4.45	0.23	19.61	25.00	<.01	0.81	0.29	2.79	<.01
Goa -directed se f-ta k <sup>a</sup>	-1.40	0.17	-8.03	633.32	<.01				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.46	0.17	-2.71	634.55	<.01				
Mode 1a, DV: intensity of negative emotions experienced									
intercept	4.69	0.22	21.35	27.15	<.01	0.68	0.26	2.62	<.01
Goa -directed se f-ta k <sup>a</sup>	-1.00	0.21	-4.69	311.98	<.01				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.87	0.21	-4.10	308.84	<.01				
Mode 1 b, DV: intensity of positive emotions experienced									
intercept	4.49	0.22	20.50	32.02	<.01	0.57	0.23	2.45	<.05
Goa -directed se f-ta k <sup>a</sup>	-0.49	0.26	-1.93	269.88	0.06				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.12	0.21	-0.57	272.87	0.57				

<sup>a</sup>The reference category was spontaneous se f-ta k.

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***

Using a fixed effect model, Model 3 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 ( $\beta = 0.79$ ,  $t(632.63) = 3.47$ ,  $p < .01$ ). 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***

Using a random effect model, which took the extent to which the associations differed between subjects into account, Model 4 in Table 3 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 emotions***

Further exploratory analyses included a differentiation between positive and negative emotions. In the case of negative emotions (Model 3a in Table 4), 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 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 ( $\beta = 0.16$ ,  $t(166.97) = 0.43$ ,  $p = .67$ ).

**Table 3.** Multilevel model analyses with random effects to predict the intensity of emotions experienced and outward emotional reactions.

Mode	Fixed					Random				
	Beta coefficient	Standard error	t	df	p	Variance estimate	Standard error	Wa d-Z	p	
Mode 2, DV: intensity of emotions experienced										
intercept	4.39	0.24	17.99	31.82	<.01	0.69	0.29	2.41	<.05	
Goa -directed se f-ta k <sup>a</sup>	-1.40	0.24	-5.83	34.40	<.01	0.27	0.13	2.01	<.05	
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.38	0.24	-1.61	32.04	.12					
Mode 4, DV: intensity of outward emotiona reactions										
intercept	2.65	0.23	11.55	44.95	<.01	0.18	0.20	0.90	0.37	
Goa -directed se f-ta k <sup>a</sup>	-0.76	0.32	-2.40	40.12	<.05	0.49	0.22	2.24	<.05	
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.25	0.32	-0.79	37.49	.44					

<sup>a</sup>The reference category was spontaneous se f-ta k.

**Table 4.** Multilevel model analyses with fixed effects to predict the intensity of outward emotional reactions.

Mode	Fixed					Random			
	Beta coefficient	Standard error	t	df	p	Variance estimate	Standard error	Wa d-Z	p
Mode 3, DV: intensity of outward emotional reactions									
intercept	2.72	0.20	13.54	34.24	<.01	0.43	0.19	2.25	<.05
Goa -directed se f-ta k <sup>a</sup>	-0.79	0.23	-3.47	632.63	<.01				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.27	0.22	-1.22	627.48	.22				
Mode 3a, DV: intensity of negative outward emotional reactions									
intercept	4.21	0.25	17.08	27.99	<.01	0.79	0.32	2.47	<.05
Goa -directed se f-ta k <sup>a</sup>	-0.95	0.27	-3.58	229.50	<.01				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.40	0.26	-1.53	226.73	.13				
Mode 3 b, DV: intensity of positive outward emotional reactions									
intercept	3.94	0.29	13.51	29.96	<.01	0.79	0.38	2.06	<.05
Goa -directed se f-ta k <sup>a</sup>	0.16	0.38	0.43	166.97	.67				
Goa -directed/spontaneous se f-ta k <sup>a</sup>	-0.61	0.30	-0.20	166.08	.84				

<sup>a</sup>The reference category was spontaneous se f-ta k.

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

## 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 is 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, 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, 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, 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, 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, Hardy 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).

## Conclusion

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, 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.

## ORCID

Julian Fritsch  <http://orcid.org/0000-0002-3741-8035>

Peter Elsborg  <http://orcid.org/0000-0002-1770-2274>

Alexander Tibor Latinjak  <http://orcid.org/0000-0003-4412-872X>

Antonis Hatzigeorgiadis  <http://orcid.org/0000-0001-7062-479X>

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