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Review

Self-talk: Review and sport-specific model

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ABSTRACT

Self-talk is a key component of the sport psychology canon. Although self-talk has been widely endorsed by athletes and coaches as a performance enhancement strategy, a comprehensive model of self-talk in sport that might be used to guide systematic research has yet to be developed. This purpose of this paper is to: (a) review theory and research related to self-talk in sport; and (b) present a sport-specific model that builds upon existing theory and research, and addresses key questions related to self-talk. The paper begins with a definition of self-talk, developed with consideration of the discursive nature of inner speech and dual process theories. Extant self-talk models related to self-talk in sport are reviewed and serve as a foundation for a sport-specific model of self-talk. Components of the model (i.e., self-talk, System 1, System 2, behaviour, contextual factors, personal factors) are presented, the reciprocal relationships among model components are explored, and implications of the sport-specific model of self-talk are discussed.

Contents

Self-talk (also referred to as inner dialogue, internal monologue, intrapersonal communication, inner voice or speech, covert speech, private or silent speech, self-statements, self-communication, self-directed verbalizations, verbal thinking, verbal mediation, auditory imagery, articulatory imagery, stream of consciousness) has been endorsed by coaches and athletes as one of the most widely used and effective strategies for enhancing sport performance (Shannon, Gentner, Patel, & Muccio, 2012; Thelwell, Weston, Greenlees, & Hutchings, 2008; Vargas-Tonsing, Myers, & Feltz, 2004). Extensive research has documented associations among self-talk, performance, and related variables (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011; Tod, Hardy, & Oliver, 2011), but a

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comprehensive theoretical model of self-talk in sport that might be used to guide systematic research has yet to be developed (Hardy, Oliver, & Tod, 2009).

To fully understand how various factors related to self-talk interact as part of a theoretical model, it is important to define self-talk as a construct. Hardy (2006) reviewed published definitions of self-talk and highlighted their strengths and shortcomings. For example, he noted the deficiencies of definitions of self-talk that include body language, imagery, and thoughts, all of which are related to but are not self-talk. He concurred that self-talk includes that which people say to themselves out loud or inside their heads, but suggested that simple definitions do not fully define self-talk. Hardy then presented a working definition of self-talk that includes several components: "(a) verbalizations or statements addressed to the self; (b) multidimensional in nature; (c) having interpretive elements associated with the content of statements employed; (d) is somewhat dynamic; and (e) serving at least two functions; instructional and motivational, for the athlete." (p. 84). This multidimensional definition highlights key aspects of self-talk. Limitations of the definition include imprecise language (i.e., "somewhat dynamic") and a definitional focus on two particular functions of self-talk, instructional and motivational, that may limit consideration and understanding of other functions or effects of self-talk as well as the effects of coaches and relevant others (Theodorakis, Hatzigeorgiadis, & Zourbanos, 2012) on self-talk. Hardy noted that this definition of self-talk would likely benefit from future modification.

Approaching the definition of self-talk in sport psychology from another perspective might be one way to expand upon and clarify the definition of self-talk. It might also help provide answers to questions such as: What is self-talk? What happens when we engage in self-talk? If we already know everything we know, then why do we talk to ourselves? To create such a definition and provide answers to these questions, it is useful to consider the discursive nature of self-talk (Haye & Larrain, 2013; Larrain & Haye, 2012) and dual-process theories (Kahneman, 2011; Stanovich & West, 2000). The purpose of this paper is to review the literature on self-talk in sport, present a sport-specific model of self-talk, highlight key components of the model as they relate to existing data, and suggest directions for future research.

Discursive nature of inner speech and dual process theories

Proponents of the discursive nature of inner speech have suggested that consciousness is characterised by many internalised positions that are constantly interacting (Larrain & Haye, 2012). That is, experiences, thoughts, and beliefs are internalised as voices within the greater discourse of consciousness, as bodily reactions to the outside world are evaluated and articulated in terms of language. In this view, self-talk is similar to other types of inner speech because it is a representation of an internal position. Self-talk is set apart from other inner speech and non-language based cognition, however, in that it has recognisable syntax and can occur either internally or out loud. When considered this way, self-talk can be defined as an act of syntactically recognisable communication in which the sender of the message is also the intended receiver.

Dual process theories provide additional perspective on self-talk. Dual-process theories have been long been considered as explanations for human behaviour, having been espoused by Plato, Descartes, James, Freud, and other notables (Frankish & Evans, 2009). Typically, dual process theories posit a processing mechanism that is intuitive, fast, effortless, contextualized, and undemanding of working memory, and another processing mechanism that involves reasoning, is decontextualized, slower, requires more conscious effort, and is demanding of working memory. In sport psychology, researchers have looked at self-talk through a dual process theory lens and have explored and compared self-talk that is spontaneous, automatic, and undirected to self-talk that is goal directed and intentional (e.g., Latinjak, Zourbanos, Lopez-Ross, & Hatzigeorgiadis, 2014). The specifics of dual process theories differ in form, but share an underlying approach that highlights two distinct processing mechanisms that can lead to different and sometimes conflicting outcomes. Because there is considerable agreement (Kahneman, 2003) about the dual process theory characteristics described by Stanovich and West (2000), we use their System 1 (intuition) and System 2 (reasoning) terminology for our discussion (see also Evans & Stanovich, 2013).

In his Nobel Prize lecture, Kahneman (2003) noted that two discrete but interacting systems transform information from the outside world into cognitive content: (a) System 1, which is fast, effortless, and emotionally charged; and (b) System 2, which is slower, effortful, and consciously monitored. Content that originates in System 1 is often described as intuition, and comes to mind spontaneously as gut feelings or impressions. For example, being surprised by something but not really knowing what caused the feeling of surprise, or recognising someone without quite knowing what caused you to recognise that person (Kahneman, 2011). Content that originates in System 2 includes explicit and intentional ideas, logic, conscious calculations, attributions, and interpretations (Berkowitz, 1993; Kahneman, 2011). Studies of the brain using event-related fMRI to explore logical reasoning and belief bias have provided support for dual process theories (Goel & Dolan, 2003). Additional research has indicated that System 2 attributions and interpretations (e.g., self-criticism) have been associated with activity in the lateral prefrontal cortex and dorsal anterior cingulate brain regions (Longe et al., 2010).

Once System 1 and System 2 have translated stimuli from the outside world into information in the brain, experiences can be articulated as new positions within the inner-discourse of consciousness. According to proponents of discursive theories, this type of internal self-talk plays an important role in regulating psychological functions (Larrain & Haye, 2012). Regulation occurs when a current experience is articulated in consciousness as a new position that can then be understood in terms of past experiences, thus allowing for self-regulation toward the completion of future goals. Within this regulation, System 1 and System 2 self-talk serve different functions. System 1 self-talk brings current experiences into awareness in a way that represents the immediate, emotionally-charged reaction to a situation. System 2 self-talk results from consideration and planning, and may lead to logical, instructional, task-focused, and motivational self-talk, as well as self-talk used for distraction purposes. System 2 also monitors the information generated by System 1 (e.g., swearing in frustration), which may lead to System 2 self-talk (e.g., calming self-talk to manage frustration).

A sport example highlighting the compatibility of discursive and dual process theories as they relate to self-talk might focus on a golfer who strikes the ball poorly and has an immediate reaction of frustration, exclaiming, "I am the worst!" This System 1 self-talk expresses the golfer's experiences, beliefs, and bodily reactions to the outside world as they are evaluated and articulated in terms of language. System 2 self-talk can occur as a direct response to System 1 self-talk as experiences from System 1 are reconstructed and articulated through the more rational and deliberate processing of System 2. Continuing with the golfer example, the System 1 exclamation, "I am the worst!" could activate System 2 self-regulatory processes, such as the use of instructional self-talk to manage the swing on the next stroke (e.g., "swing loose"), calming self-talk to reduce frustration (e.g., "golf is just a game"), or

motivational self-talk to sustain effort (e.g., "I will play well on the next hole").

Understanding self-talk in light of discursive and dual-process theories provides answers to the questions posed at the beginning of this section. What is self-talk? Self-talk is the syntactically recognisable articulation of an internal position that can be expressed either internally or out loud, where the sender of the message is also the intended receiver. What are we doing when we engage in self-talk? We are recreating lived experiences as syntactically organised internal positions, as reactions to the outside world are experienced, evaluated, and articulated in consciousness. Why do we talk to ourselves? Self-talk expresses emotions, impressions, biases, and associations. Self-talk also allows for self-regulation as new experiences are articulated and redefined in terms of past experience. This process of redefinition can result in an entirely new position being articulated via self-talk that may reflect emotional states and/or serve a proactive, goal-directed regulatory function in consciousness.

Self-talk models in sport

In addition to providing answers to important self-talk related questions, viewing self-talk through the lens of dual-process theory and inner-discourse can build on existing models of self-talk and performance. Hardy et al. (2009) proposed a framework for the study and application of self-talk within sport that includes the antecedents of self-talk, defined as personal factors (i.e., cognitive processing preferences, belief in self-talk, personality traits) and situational factors (i.e., task difficulty, match circumstances, coaching behaviours, competitive setting), self-talk itself, and the consequences of self-talk, including cognitive mechanisms (i.e., concentration, attention), motivational mechanisms (i.e., self-confidence, motivation), behavioural mechanisms (i.e., technique), and affectual mechanisms (i.e., affect, anxiety). A meta-analysis of the instructional and motivational self-talk and performance in sport literature provided support for the framework, demonstrating the effects of self-talk on performance and highlighting the importance of situational factors (Hatzigeorgiadis et al., 2011). Theodorakis et al. (2012) discussed support for the framework, but identified potentially distinct effects of situational factors and social-environmental factors such as coach behaviours and the broader social context as being important for consideration in the development of future models.

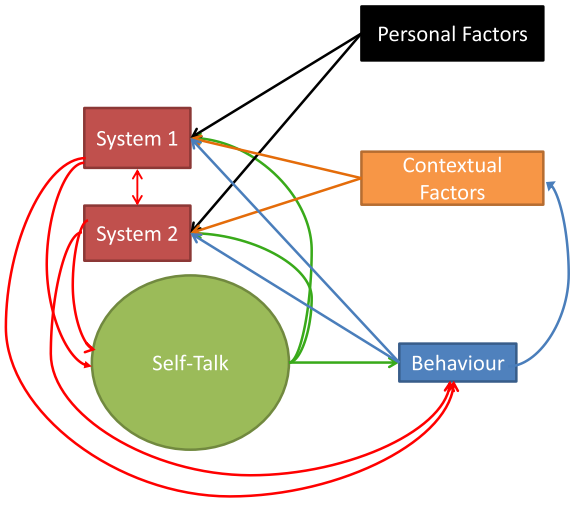

Fig. 1. Sport-specific model of self-talk. The antecedents of self-talk, personal and contextual factors, are shown by the black and orange arrows connecting to System 1 and 2. The red arrows represent the connections between System 1, System 2, self-talk, and behaviour; and the reciprocal nature of the links are shown by green and blue arrows. The effect of behaviour on self-talk is mediated through System 1, System 2, and contextual factors. Examples of these connections are described in the text.

Although Hardy et al. (2009) provided a strong theoretical foundation for self-talk research in sport, they noted that their proposed framework was sequential in form and that more complex, possibly circular and reciprocal, relationships among self-talk and related variables are likely to exist. This contention was supported by research with competitive tennis players, indicating that during tournament matches, self-talk statements were associated with the outcome of subsequent points and particular point outcomes tended to be followed by self-talk (Van Raalte, Cornelius, Hatten, & Brewer, 2000). The purpose of the following section is to build upon the Hardy et al. (2009) self-talk in sport framework, integrating discursive and dual process theories, to create a sport-specific model of self-talk.

Sport-specific model of self-talk

The sport-specific model of self-talk shown in Fig. 1 highlights the dynamic interrelationships among: (a) personal factors; (b) situational factors (referred to as contextual factors in this model); (c) cognitive mechanisms (represented by System 2); (d) affect, motivation, and anxiety related to both Systems 1 and 2; (e) behaviour; and (f) self-talk. The model is designed to address shortcomings in existing models of self-talk in sport and to highlight areas where research is lacking.

Self-talk

As previously stated, self-talk can be defined as the syntactically recognisable articulation of an internal position that is expressed either internally or out loud where the message-sender is also the intended receiver. Hardy (2006) suggested categorisation of self-talk in terms of several factors, including function, valence, and overtness. With regard to function, self-talk has been described as having instructional and motivational functions (Hatzigeorgiadis et al., 2011; Van Raalte, Brewer, Rivera, & Petitpas, 1994), as affecting focus, confidence, effort regulation, cognitive and emotional control, and automatic execution (Hardy, Gammage, & Hall, 2001; Theodorakis, Hatzigeorgiadis, & Chroni, 2008), and as directing goal achievement (Latinjak et al., 2014). Researchers in other fields have noted that self-talk includes both inner speaking and inner hearing and may serve functions related to problem solving, planning, memory (including autobiography), task switching, and self-control/regulation (Hurlburt, Heavey, & Kelsey, 2013; Morin, 2011).

With regard to valence, self-talk is typically categorised as positive and negative. Positive self-talk consists of statements that people say to themselves that are encouraging or positive in tone. In a sport setting, positive self-talk might include statements such as "I can do it," or "Yes!" Negative self-talk involves statements that are negative and/or reflect anger, frustration, or discouragement, such as "you are slow!" or "that's horrible." Motivational self-talk, which refers to self-talk that encourages and motivates performers with such statements as "let's go!" or "I feel good," is often understood as having positive valence. However, negative statements such as "bad play, stupid," can be considered to be positive/facilitative if their use results in enhanced performance. Similarly, positive statements such as "you can do it" might be considered negative/debilitating if they are distracting and lead to poorer performance. We concur with Theodorakis et al. (2012), however, that self-talk is best defined by the meaning of self-talk statements rather than confounded with outcome.

Other types of self-talk that do not easily fit into positive, negative, instructional, and motivational categories have been less widely studied by sport psychologists. For example, little attention has been paid to self-compassionate (e.g., "All humans fail sometimes") self-talk (Mosewich, Crocker, Kowalski, & DeLongis, 2013), calming (e.g., "Be cool and keep playing") self-talk (Schüler & Langens, 2007), self-protective (e.g., "I coach myself in a friendly way) self-talk (Conroy & Coatsworth, 2007), task-irrelevant (e.g., "I want a strawberry milkshake!") self-talk (Berk, 1986), humorous self-talk, self-talk related to enjoyment/appreciation of the moment (e.g., "it is exciting to be in the championship match"), and self-talk related to others, such as "this referee is terrible," "my teammates are playing well," and "my coach will be angry if this continues." Associative self-talk that focuses on bodily sensations experienced during endurance performance (e.g., "my shoulders are tight" and "this is what I am supposed to be feeling right now") tends to be more prevalent during high intensity sport performances (Aitchison et al., 2013; Kress & Statler, 2007; St. Clair Gibson & Foster, 2007). Dissociative self-talk, which includes situation-irrelevant self-talk (Hatzigeorgiadis & Biddle, 2000), repeating mantras (Van Raalte, Brennan Morrey, Cornelius, & Brewer, 2015, in press), counting, making "to do" lists, and singing to oneself, may be more widely used by exercisers and endurance athletes, such as long distance runners, swimmers, and cyclists. Self-talk pertaining to escape (e.g., "I want to quit," "I do not want to take part in this competition any more") has been found to co-occur with high ego- and low task-orientation (Hatzigeorgiadis & Biddle, 2000). Spontaneous and goal directed self-talk related to particular emotions have been categorized according to time perspective, activation, and time-orientation (Latinjak et al., 2014). Additional research is needed to determine if these activation and time-related categories of self-talk are related sport-specific variables such as performance. Although valence is an important aspect of self-talk, some types of self-talk tend to be overlooked when valence is a primary focus.

Hardy (2006) noted that self-talk can be categorized according to overtness. That is, self-talk may be overtly spoken aloud, mouthed but not spoken, or completely internal (Hardy, 2006; Oppenheim & Dell, 2010). Although only overt self-talk involves the production of sound, Larrain and Haye (2012) asserted that internal and overt self-talk are similar with regard to key features. Physiological research also indicates similarities between internal and overt self-talk. That is, specific brain structures, such as the left inferior frontal gyrus, also known as Broca's area, have been found to be related to both internal and overt self-talk (Morin, 2011; Unterrainer & Owen, 2006). Research directly comparing self-talk that is overtly spoken aloud, covert but mouthed, and completely covert in sport settings has not been conducted.

Self-talk can also be categorised in terms of grammatical form, although this has been studied primarily in areas outside sport and exercise psychology (Kross et al., 2014). Senay, Albarracin, and Noguchi (2010) compared the effects of interrogative self-talk (i.e., "Will I?") to that of the simple future tense (i.e., "I will") and found that use of the interrogative form, led to superior task performance. This effect was replicated by Puchalska-Wasyl (2014), but only for participants who both expressed a belief that self-talk affects performance and answered the question, "Will I?" in the affirmative. Patrick and Hagtvedt (2012) compared the effects of refusal strategies involving "I don't" and "I can't" and found that the use of "I don't" resulted in relatively more positive behaviour change than "I can't." Zell, Warriner, and Albarracín (2012) and Dolcos and Albarracin (2015) noted that when individuals are performing tasks, they sometimes refer to themselves as "I" and other times as "you" and as "we." They found that participants who referred to themselves as if they were another person using "you" or "we" in circumstances that required behavioural regulation and conscious self-guidance performed better than participants who referred to themselves in the first person. Son, Jackson, Grove, and Feltz (2011) randomly assigned undergraduates to self-talk that focused on their own capabilities ("I") or on the groups' capabilities ("we") and found that self-talk using "I" negatively affected performance, self-efficacy, and collective efficacy relative to other approaches. Similarly, Kross et al. (2014) found that first-person language use (when compared to non-first person language use) led people to appraise stressors in threatening terms. Further attention to the grammatical form of self-talk and its effects on performance and related variables may be warranted.

In sum, self-talk varies in terms of a number of characteristics. Categories of self-talk such as function, valence, overtness, and grammatical form are particularly useful for self-talk research because they can be objectively documented (Diaz, 1999). One of the benefits of the sport-specific model of self-talk is that it provides a theoretical basis for self-talk categorisation, as self-talk can be further understood in terms of how it relates to System 1 and System 2. The following section presents System 2 in advance of discussing System 1 because the focus of research on self-talk in sport has involved System 2.

System 2

We begin this section by defining System 2 and its major characteristics. Proactive and reactive System 2 self-talk are then described. Suggestions for future research related to System 2 self-talk are provided.

System 2 refers to the processing of information that occurs in a slow, effortful, and consciously monitored fashion (Kahneman, 2003). Several key features of System 2 are related to self-talk in sport. First, System 2 processing requires mental effort (Stanovich & West, 2000). Second, System 2 is a rational system that is emotionally neutral. Rather than being influenced by biases and habits, System 2 processing is primarily governed by rules and logic, and is amenable to change via the introduction of new information or perspectives (Kahneman, 2003). Finally, System 2 functions as a monitor of thoughts and actions (Stanovich & West, 2000).

Self-talk that is the result of System 2 has the same key features of System 2 processing. Such self-talk requires mental effort, is influenced by different perspectives and new information, and plays a role in monitoring self-talk from System 1. Consideration of System 2 self-talk is useful in illuminating some of the findings related to self-talk in sport. For instance, System 2 self-talk is often helpful in directing attention and enhancing performance. Because mental effort is a limited resource, however, exclusive or extensive use of System 2 self-talk can deplete System 2 capacity, leading to processing disruptions and performance decrements (Kahneman, 2003; Schmeichel & Baumeister, 2010; Wegner, 1989). Such performance decrements may appear surprising because they follow from the intentional use of self-talk (System 2). Overuse of System 2 self-talk, however, can exhaust mental resources and lead to a reliance on System 1 gut feelings and emotions, negating the intended effects of the System 2 self-talk (see Frankish & Evans, 2009). Self-talk that is well-practised and does not exhaust System 2 is effective in enhancing performance relative to newly learnt self-talk or self-talk that is not practised (Hatzigeorgiadis et al., 2011). Further insights into self-talk in sport can be made when System 2 self-talk is categorised as either proactive or reactive.

Proactive self-talk is used with a specific intention or outcome in mind and requires mental effort from the performer or athlete. Proactive self-talk has been widely studied in the self-talk in sport literature, typically as self-talk assigned to performers by

researchers (Theodorakis et al., 2012; Tod et al., 2011). For example, an athlete using instructional self-talk to master a skill or choosing to use motivational statements such as "I am strong. I will do this!" during a competition are examples of proactive self-talk.

With regard to the sport-specific model of self-talk, proactive System 2 self-talk and dual process theories can be synthesized as part of a self-talk dissonance hypothesis. Proactive System 2 self-talk that is consistent with System 1 impressions is considered to be consonant self-talk and proactive System 2 self-talk that is inconsistent with System 1 impressions is dissonant self-talk. Athletes who uses proactive System 2 self-talk (e.g., "I can do this") that is consistent with their System 1 impressions of ability, experience self-talk consonance. That is, athletes who say to themselves, "I can do it" when they feel that they can perform well are likely to encourage themselves and to continue to work hard to perform. In contrast, athletes who use proactive System 2 self-talk (e.g., "I can do this") when they feel that they cannot do it, perhaps because their opponents are too good (a System 1 impression), are likely to experience self-talk dissonance. As with cognitive dissonance, this discomfort is likely to require the use of cognitive resources and to motivate people to reduce the discrepancy by changing their perceptions or their behaviour (Festinger, 1962). Predictions derived from the self-talk dissonance hypothesis follow directly from the sport-specific model of self-talk but research is needed to test these predictions.

In contrast to proactive self-talk, reactive System 2 self-talk occurs as a response to the emotionally charged and bias-driven System 1. For example, a soccer player who is responsible for an own-goal exclaims "I'm the worst, I should just quit!" in an immediate, emotionally charged reaction. When the emotional response is brought into awareness and represented in this verbal manner, it becomes available for processing by System 2. Self-talk that occurs as a result of this processing would be considered reactive System 2 self-talk. For instance, the player might say to herself, "I need to make it up to my team and make sure nothing gets past me," thus increasing her focus and performance. Although reactive self-talk predictions are consistent with the sport-specific model of self-talk, further research is needed to confirm the hypothesized effects of reactive System 2 self-talk on performance.

System 1

The interaction between System 2 and the effortless, unconscious processing that takes place through System 1 has important implications that provide additional insight into self-talk. In this section, System 1 and its features are described. Next, self-talk research is interpreted in light of System 1 concepts, although it should be noted that research specifically designed to test hypotheses related to System 1 (and System 2) has not been conducted. The section concludes with a discussion of the relationships between System 1 and System 2 self-talk and suggestions for future research.

Whereas System 2 processing is characterised by deliberate mental effort and conscious monitoring, System 1 processing generates associations and impressions, is automatic, fast, parallel, effortless, difficult to modify, and occurs below the level of awareness via biases and heuristics (Kahneman, 2003; Stanovich & West, 2000). Like System 2, however, System 1 deals with concepts and can be evoked by language.

The role of System 1 in affecting self-talk may appear minor when compared to that of System 2, but System 2 involves the use of limited resources. When System 2 resources are exhausted, System 1 becomes the main self-regulatory system (Evans & Frankish, 2009; Morf & Mischel, 2012). Even when System 2 is used, the monitoring function of System 2 can be attenuated by cognitively demanding tasks. In such cases, the emotionally charged impressions of System 1 are likely to affect self-talk and to be blurted out before real thinking occurs (Kahneman, 2003).

Considering emotionally charged self-talk in terms of System 1 can provide a basis for understanding valence as it relates to self-talk. When self-talk is discouraging in tone and reflects negative emotions, such as frustration or anger, it is negative in valence. Negative self-talk in sport may often involve System 1, as such self-talk has been found to be emotionally charged and to occur spontaneously (Van Raalte et al., 1994, 2000). System 1 negative self-talk does not respond quickly to logic or new information (Kahneman, 2003) and, therefore, System 1 negative self-talk may be difficult for athletes to moderate or control. Self-talk that is encouraging in tone or reflects feelings of happiness or excitement is considered positive. Some positive self-talk, such as that following the scoring of a key goal, may also be related to System 1 and may explain why positive self-talk used during "excessive celebrations" can be similarly difficult to modify even if cognitive and behavioural interventions are used.

Future research exploring and developing strategies to modify System 1 and System 2 self-talk may be warranted. For example, practicing self-talk leads to stronger performance-related self-talk effects (Hatzigeorgiadis et al., 2011). Such practice may be the mechanism by which self-talk shifts from System 2, requiring cognitive resources, to System 1. Little research has been conducted to explore exactly how such self-talk becomes automatic but it seems likely that certain aspects of the self-talk itself may facilitate such a transition. Comfort or familiarity with self-selected self-talk, such as the self-talk statements measured by the Automatic Self-Talk Questionnaire for Sports (Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis, & Papaiannou, 2009), may be one factor that facilitates such a transition, as self-selected self-talk has been associated with enhanced performance (Harvey, Van Raalte, & Brewer, 2002; Theodorakis et al., 2012). System 1 and System 2 can be assessed via methods such as experience sampling (Wood, Labrecque, Lin, & Rünger, 2014), fMRI (Goel & Dolan, 2003), and cognitive tasks (Toplak, West, & Stanovich, 2014). The grammatical form of self-talk may enhance or hinder the shift of self-talk from System 2 to System 1. Overall, research focused on understanding the interaction among System 2 self-talk, System 1 self-talk, and the availability of cognitive resources could provide important insight into the relationship between performance and these types of self-talk.

Behaviour

The effect that self-talk has on behaviour, and more specifically performance, has been the primary focus of self-talk literature in sport psychology. This section reviews the major findings related to self-talk and behaviour, and includes suggestions for future research.

Self-talk has been shown to be related to behaviour on tasks as diverse as anagram solving, clinical case formulation, interview success, school performance, and sport performance (Senay et al., 2010; Theodorakis et al., 2012). With regard to sport performance, self-talk has been shown to enhance performance of badminton, basketball, cycling, dart throwing, dressage, golf, running, sit-ups, skiing, soccer shooting, swimming, tennis, vertical jump, volleyball, and water polo goal shooting (Blanchfield, Hardy, de Morree, Staiano, & Marcora, 2014; Díaz-Ocejo, Kuitunnen, & Mora-Mérida, 2013; Hatzigeorgiadis et al., 2011; Masciana, Van Raalte, Brewer, Branton, & Coughlin, 2001; Theodorakis et al., 2012; Van Raalte et al., 1995; Wolframm & Micklewright, 2011; Zetou, Vernadakis, Bebetsos, & Makraki, 2012). The demonstrated relationship between self-talk and performance in sport

psychology research may help explain the position of self-talk as an integral component of the sport psychology canon (Andersen, 2009).

Hatzigeorgiadis et al. (2011) published a meta-analysis of sport self-talk studies that involved instructional and motivational self-talk. Their results indicated that instructional self-talk was more effective than motivational self-talk in enhancing performance of fine motor tasks. Instructional self-talk was also found to be more effective for fine motor tasks than for gross motor tasks. Self-talk was identified as most effective in enhancing the performance of novel, as compared to familiar, tasks. Finally, the effects of self-talk were enhanced by practice.

Complementing the meta-analysis of Hatzigeorgiadis et al. (2011), Tod et al. (2011) published a systematic review of the literature on self-talk in sport and concluded that positive, instructional, and motivational self-talk were associated with enhanced sport performance. Instructional and motivational self-talk appeared to positively affect the performance of precision and gross motor skill tasks. Counter to conventional wisdom, negative self-talk was not found to hinder performance on sport tasks, although other sport psychology researchers have concluded that negative self-talk is detrimental to sport performance (e.g., Van Raalte et al., 1994, 2000).

Although the focus of the scientific literature on self-talk has been on how self-talk affects behaviour, the sport-specific model of self-talk shown in Fig. 1 predicts that behaviour also affects self-talk via System 1 and System 2. In support of this prediction, Van Raalte et al. (2000) found that tennis players who exhibited losing behaviour (lost tennis points) tended to use negative self-talk following the lost points. According to the model, behaviour may lead to System 1 (gut feelings, intuition, impressions) and/or System 2 (explicit intentional ideas), which may result in self-talk. That is, a poor tennis shot may lead to an immediate, emotionally charged reaction (System 1), a negative exclamation (e.g., "bad shot!"), which in turn can lead to a System 2-generated, instructional self-talk response (e.g., "hustle fast to short balls") or to a less adaptive approach that results in losing subsequent games (Zourbanos et al., 2015). Additional research that examines self-talk that occurs as a consequence of behaviour can provide further insight into the role of self-talk in self-regulation. In addition, post-behaviour self-talk seems to be importantly related to self-talk as a dialogical process. An approach to research that captures self-talk as part of an ongoing dialogue with behaviour could extend current understanding.

The results of the research described above, suggests that self-talk is related to meaningful behaviours in the sport domain. It should be noted, however, that this research primarily included experimental intervention studies that were conducted in laboratory, not competitive sport, settings. Indeed, much of the research on self-talk in sport has been conducted with college-aged participants who are WEIRD. That is, participants who are **W**estern, **E**ducated, **I**ndustrialised, **R**ich, and **D**emocratic (Henrich, Heine, & Norenzayan, 2010). A minority of participants in these studies have been elite or highly skilled athletes participating in real competitive events such as swim meets (Hatzigeorgiadis, Galanis, Zourbanos, & Theodorakis, 2014). In contrast to laboratory studies, correlational research conducted in field settings with competitive youth and masters athletes have shown significant relationships among negative self-talk, affect, and sport behaviour (Hardy, Hall, & Alexander, 2001; Van Raalte et al., 1994, 2000). Additional research, both experimental and correlational, conducted in diverse contexts with athletes of various ages and levels is needed before conclusions about the relationship between self-talk and athlete behaviour can be fully drawn.

Contextual factors

According to the sport-specific model of self-talk, contextual factors are directly related to System 1 and/or System 2 such that contexts may evoke formal, rational analysis (System 2) or prime emotional responses (System 1) that may then be related to self-talk and/or behaviour, which in turn may affect certain aspects of the context (Morf & Mischel, 2012). In this section, a definition of context is provided. Next, literature pertaining to context and self-talk is reviewed, starting with a discussion of self-talk in laboratory contexts and moving to a discussion of research in sporting contexts. This discussion is followed by a review of relevant literature on social context, including the impact of national and team cultures on self-talk. Research implications related to context and the sport-specific model of self-talk are also presented.

Context can be defined as the group of conditions that exist where and when something happens, which may include physical and social components (Merriam-Webster, 2015). Aspects of the physical context in sport include weather, the site (e.g., competition venue, training ground), and physical components of the sport being played (e.g., type and quality of equipment). Social context includes such factors as the individuals present, their behaviour and culture, the motivational climate, the importance and level of competition, and the game, training, or experimental circumstances.

With regard to physical context, research conducted in laboratory settings has shown the effects of self-talk to be relatively stable over time (Lidstone, Meins, & Fernyhough, 2011). In laboratory studies involving sport tasks, positive self-talk, as compared to negative self-talk, has been associated with better performances (Hardy, 2006). Sports medicine contexts share components of laboratory settings in that they are relatively controlled environments. Not surprisingly, research in a sports medicine setting has indicated that both motivational and instructional self-talk enhance the performance of people recovering from knee injuries (Beneka et al., 2013).

Only a small number of self-talk studies have been conducted with athletes in competitive sport contexts (Hatzigeorgiadis et al., 2014; Tod et al., 2011) and these studies have not been conducted in elite sport training environments or academies. Studies of self-talk in sport training and competition contexts suggest that athletes use self-talk differently in training as compared to competition (van de Pol & Kavussanu, 2011; Van Raalte et al., 1994, 2000), and at home more than at away competition venues (Thelwell, Greenlees, & Weston, 2009). Self-talk tends to increase in frequency over the course of the competitive season and in a quadratic relationship with task difficulty such that the greatest use of self-talk occurs at moderate levels of task difficulty (Hardy et al., 2009).

Research exploring contextual factors across sports has not yet been conducted. There is great variability in the demands of particular sports. For example, there are sports with breaks in the action, during which athletes might use self-talk (e.g., tennis, golf), endurance sports such as marathon running that occur over long periods of time and might involve self-talk use during performance (Van Raalte et al., 2015, in press), and sports of short duration that might involve very brief or even no self-talk use during task execution (e.g., sprinting, weight lifting). Research focuses on self-talk that is matched to the constraints of particular sport contexts is likely to lead to the development of effective sport-specific self-talk interventions.

The relationship between context and self-talk is described as bi-directional in the sport-specific model of self-talk. That is, context can affect self-talk, but it is also possible that athletes' self-talk may affect sport contexts. Former world #1 tennis player John McEnroe ("you cannot be serious") and former boxer Muhammad

Ali ("I am the greatest"), who seemed to thrive in worry/anxiety-inducing conditions, have been accused of purposefully using self-talk to alter sport contexts for their own benefit (Murray, 1997). Researchers may want to explore how individual sport contexts can be shaped and affected by athletes' self-talk (Van Raalte, Brewer, Cornelius, & Petitpas, 2006).

With regard to social context, culture has been examined in the general and sport-specific self-talk literatures. In Western cultures, self-talk use increases when performing tasks that benefit from verbal mediation (Berk, 1999). In accord with the sport-specific model of self-talk, which highlights the relationships among context, System 1 (perceptions and priming), and self-talk, the effects of negative self-talk have been found to differ based on culture (context). That is, East Asian students reported the use of self-talk that was proportionally more negative than that of European American students when performing a dart throwing task. Such negative self-talk was associated with better performance for East Asians than for European Americans (Peters & Williams, 2006).

Attention has also been paid to the effects of team culture on self-talk. Hardy and Hall (2006) studied team sport athletes who indicated that self-talk use was part of the team context. That is, coaches promoted the use of self-talk. Hardy et al. (2009) hypothesised that teammates and relevant others such as opponents, parents, and media portrayals of athletes serve as self-talk role models. Based on the sport-specific model of self-talk, it is expected that a supportive social context that highlights the value of self-talk could lead to System 1 emotional effects (e.g., athlete feeling supported and confident) and/or the decision choice to start or continue to use self-talk (System 2). The emotional effects and/or self-talk use may affect behaviour (e.g., sport performance), which may, in turn, affect the context (e.g., responses from teammates, coaches, and fans). Research using a variety of methodological approaches indicates that coach esteem, support, and behaviours are related to athletes' use of self-talk such that supportive coaching behaviours are associated with more positive and less negative self-talk in athletes and negative coaching behaviours such as high levels of perceived control and blame are related to athlete use of negative self-talk (Conroy & Coatsworth, 2007; Conroy & Pincus, 2006: Theodorakis et al., 2012; Zourbanos et al., 2011). Much of the research that has been conducted in sport contexts is correlational. To determine cause and effect, experimental research is needed to determine how context is related to the adoption of particular types of self-talk and to performance. For example, researchers might explore the effects of critical, emotionally charged environments on self-talk use and performance in both practice and competition settings. Experimental research designed to understand how context influences self-talk could also provide further insight into which self-talk types are related to enhanced and impaired performance in particular environments.

Personal factors

In addition to understanding the way the characteristics of an individual's surroundings are related to self-talk, it is also important to understand how characteristics of the individual influence self-talk. Starting with a definition of personal factors, this section includes a review of research related to the stable characteristics of individuals and how these characteristics interact with self-talk behaviours. Research from mainstream psychology is reviewed before moving to sport-specific findings related to personal factors and self-talk. Suggestions for future research are also provided.

Relatively stable over time, personal factors include biological and genetic factors, personality, and demographic characteristics (Hardy et al., 2009; Morf & Mischel, 2012). According to the sport-specific model of self-talk, personal factors directly affect System 1 and System 2, which are related to self-talk and behaviour. Wood, Perunovic, and Lee (2009) explored the relationship between a personal factor, self-esteem, and self-talk, and found that high self-esteem participants, who may feel comfortable (System 1) with positive self-statements, benefited from the use of positive self-talk. In contrast, low self-esteem participants, who may feel uncomfortable or doubtful (System 1) when using positive self-talk, reported that using positive self-talk made them feel worse. Thus, consideration of personal factors such as self-esteem may be essential in determining if a particular type of self-talk will be beneficial for an individual. For individuals with low self-esteem, use of positive self-talk can be detrimental. Other researchers have demonstrated relationships between self-talk and personal factors such as defencive pessimism (Norem, 2008), neuroticism (Hyphantis, Goulia, & Carvalho; 2013), achievement goals and perceived competence (Zourbanos, Papaioannou, Argyropoulou, & Hatzigeorgiadis, 2014), and self-consciousness (Schneider, Pospeschill, & Ranger, 2005), but these relationships have not been tested in sport settings.

Sport-specific self-talk research involving personal factors has included assessment of skill level, emotional intelligence, trait anxiety, goals and goal orientation, and belief in the effectiveness of self-talk (Burton, Gillham, & Glenn, 2011; Hardy et al., 2009; Theodorakis et al., 2012). Skilled and emotionally intelligent performers tend to use self-talk more than less skilled and less emotionally intelligent performers (Lane, Thelwell, Lowther, & Devonport, 2009; Thelwell et al., 2009), and benefit more than less skilled athletes from instructional self-talk in terms of performance accuracy (Takahashi & Van Raalte, 2010). When in pressure situations, skilled performers required to use explicit monitoring and detailed instructional/procedural self-talk experience performance decrements (Beilock, Carr, MacMahon, & Starkes, 2002). Athletes who focus primarily on winning (ego orientation) and not on the process of performance (task orientation) report more disengagement self-talk than other athletes (Hatzigeorgiadis & Biddle, 2000). Athletes with moderate focus on winning (ego orientation) and strong focus on performance (high task orientation) tend to use positive self-talk (Harwood, Cumming, & Fletcher, 2004). Indeed, task orientation has been shown to predict self-talk use (van de Pol & Kavussanu, 2011) as has the belief in the effectiveness of self-talk (Hardy et al., 2009). Little sport research has been conducted on personal factors such as race/ethnicity, disability status, and personality as they relate to self-talk.

Consideration of personality may be useful in explaining individual differences in self-talk use and effectiveness. Personality differences may help explain why there are large individual differences in terms of how self-talk is used (Alderson-Day & Fernyhough, 2015, in press), why some people engage in self-talk almost constantly and others engage in self-talk extremely rarely (Hurlburt et al., 2013), and why some people perform better but others perform worse after using positive self-talk (Van Raalte et al., 2000). Additional exploration of personal factors such as self-regulation and attention control skills (Morf & Mischel, 2012) may also help to identify for whom and under what circumstances self-talk occurs, as well as the effects of such self-talk.

Implications

Much self-talk research has been focused on motivational and instructional self-talk. When self-talk is defined as the syntactically recognisable articulation of an internal position that can be expressed either internally or out loud, where the sender of the message is also the intended receiver, then attention is directed to both Systems 1 and 2 and suggests exploration of a wider range of self-talk including but not limited to its function, valence,

overtness, and grammatical form. Hardy et al. (2009) highlighted the need for development of a model of self-talk that includes the complex, interconnected, reciprocal, relationships among self-talk and related variables. The sport-specific model of self-talk specifies such interconnected, reciprocal relationships among contextual factors (e.g., task difficulty, match circumstances, coaching behaviours), personal factors (e.g., personality traits), self-talk, performance, cognitive mechanisms (i.e., System 2), and gut feelings and attributions (System 1). The model can be used to answer questions raised by existing data and directs attention to areas where little research has been conducted.

Questions raised by the body of self-talk literature include the following: Why does self-talk that is practiced have a stronger performance enhancing effect than self-talk that is not practiced? Consideration of the sport-specific model of self-talk suggests that practice of self-talk may be the mechanism by which self-talk shifts from System 2 to System 1. According to the model, facilitating the shift of self-talk from System 2 to System 1 via other mechanisms such as the use of familiar, athlete self-selected self-talk, would also be expected to occur and may result in enhanced performance. Another self-talk related question that has been raised is, "why is self-talk that is effective in practice not always helpful in competition?" The answer to this question may be provided by considering context in conjunction with the reciprocal relationships between System 1 and System 2. In a practice context with relatively low cognitive demands, System 2 self-talk can direct attention to key skills and strategies and result in enhanced performance. If the demands of competition deplete System 2 resources, however, System 1 processes and interpretations are likely to rebound and produce performance decrements without System 2 control. Self-talk may also fail in competition due to self-talk dissonance. That is, when System 2 self-talk that is effective in practice (e.g., "I can do this") is then used during difficult competitions where the athlete feels it cannot be done (System 1), the resulting self-talk dissonance can deplete System 2 resources and result in performance disruptions. The sport-specific model of self-talk suggests that an athlete would be likely to benefit from altering either System 2 self-talk to reduce self-talk dissonance or relying less on System 2 during competition may reduce such performance decrements.

There are some questions that have been minimally considered in the sport psychology literature but are addressed by the sport-specific model of self-talk. For example, the question, "Why do people talk to themselves?" may be answered by considering how self-talk can bring System 1 gut feelings, perceptions, and attributions into awareness so that System 2 logical processes can be employed. An athlete who bursts out with the System 1 perception (e.g., "I stink") may hear herself and better understand her own frustration. Once recognized, she may then use reactive System 2 self-talk to redirect herself and enhance her performance (e.g., "If I move my feet and hustle, nothing will get past me"). Why is it so difficult for people to stop using negative self-talk? System 1 does not respond quickly to logic or new information (Kahneman, 2003) and, therefore, System 1 negative self-talk may be difficult for athletes to moderate or control. Although much spontaneous self-talk is negative, System 1 positive self-talk, such as that following the scoring of goals, may be similarly difficult to modify, although this hypothesis remains to be tested. If players need their errors pointed out to them to learn, why are some successful athletes so negatively affected by critical coaches? Research exploring the effects of context on self-talk and the effects of self-talk across sports and contexts would extend knowledge related to the self-talk most prominent in certain environments, as well as to the self-talk types related to performances in various environments. Inclusion of personal factors in such research might help clarify for whom and under what circumstances are particular types of self-talk effective.

Summary

This review highlights ways in which the self-talk in sport literature is consistent with the sport-specific model of self-talk, a framework that incorporates the multiple and reciprocal relationships among self-talk, behaviour, personal factors, contextual factors, and System 1 and System 2 processing. Findings from disparate areas in the self-talk literature are reviewed and a definition of self-talk that takes into account complex factors is provided. The model directs attention to possible self-talk research questions not yet explored. In addition, the model provides a link between self-talk theory which may allow athletes, coaches, sport psychology practitioners, and researchers to collectively reference and evaluate research and practice from a shared perspective. Consideration of the model can be used for the development of research questions and the tailoring interventions to the needs of individual athletes, teams, coaches, and sports organisations in varied contexts. Ideally, theoretically guided research will continue to enhance the development of self-talk research and practice in sport.

Disclosure statement

A potential or actual conflict of interest exists when commitments and obligations are likely to be compromised by authors' other material interests, or relationships (especially economic), particularly if those interests or commitments are not disclosed. With regard to this manuscript, the authors have no conflicts of interest to report.

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