

University of Thessaly
Department of Physical Education and Sport Sciences

“Open Sesame Open”: Use of Semantic Memories as a Relief to Anxiety in Sports

Injuries

by

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The present thesis is submitted as Partial Fulfillment of the Requirements for the Degree of European Master of Sport and Exercise Psychology at The University of Thessaly and Leipzig University in 2023.

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Declaration by Author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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Abstract

Aim: The purpose of this study is to test the effect of a self-talk intervention with the particular use of semantic memories against anxiety in a vignette-induced injury scenario.

Method: 56 college athletes ($M = 21.48$, $SD = 2.51$ years) participated in the study.

The study was conducted online, with 3 measurements in the same study. After the baseline assessment, the participants were randomly assigned into two equal groups (organic self-talk and semantic self-talk group). Then, the groups are given a vignette and another measurement of anxiety to determine the effectiveness of the scenario. Then, the groups are provided their respective instructions of the self-talk use. Ultimately, the anxiety levels are measured again.

Results: RM-ANOVA within groups reveal there were significant effects for both groups ($p < .05$). Post-hoc results reveal the vignette has yielded efficiently, and both groups have managed to lower their anxiety levels from the point right after the vignette until the end of the study. Nevertheless, only the semantic self-talk group has shown significantly lower levels of anxiety in their final measurement in comparison to baseline measurement ($p < .05$).

Conclusion: The results of the study reveal the use of semantic self-talk can alleviate anxiety in particular injury scenarios. The study opens up further gaps on how Dual Systems Approach can be questioned, and what kind of semantic memories can turn out to be more efficient.

Keywords: self-talk, anxiety, injury, semantic memory

“Open Sesame Open”: Use of Personal Semantic Memories as a Component of System 2 in Sports Against Anxiety

Psychology has been defined as a science that focuses on mind and behavior (American Psychological Association, n.d.). Nevertheless, cognitions have been widely studied for more than five decades by psychologists and other scholars who are interested in to reveal how our mind functions (Miscel, 1973; Liu & Peng, 2009). In a similar and unsurprising vein, many branches of psychology have been trying to understand the role of emotions in our behaviors, too (Gendron & Feldmann-Barrett, 2009; Lindquist et al., 2012; Ntoumanis & Biddle, 1999). From clinical psychology to health psychology, the salient link between thoughts and emotions have drawn a significant amount of attraction, particularly in the 21st Century (DeSteno et al., 2013; Roberts et al., 2013). Despite being a relatively novel discipline, sports psychology has not been distant to these scientific trends. In fact, a large number of reviews and meta-analyses are available for those who would like to enlighten themselves upon this booming topic in sports psychology (Friesen et al., 2013; Hausenblas & Downs; 2001; Voss et al., 2010).

Literature Review

Self-Talk in Sports

Sport psychology is interested in many different aspects of being an athlete, and one of those areas of interests is the individual psychological factors that influence athletic performance. These characteristics include personality traits, motivation, attentional focus, self-confidence and -as discussed- cognitions (Allen et al., 2013; George & Feltz, 1995; Forrest, 2008; Williams & Krane, 1992). Different models have been put forward or have been adapted from other areas of psychology to understand the role of cognition and emotions in performance (Jones, 2013; Lundgren et al., 2020; McArdle & Moore, 2012). The scientific

literature in sports psychology argue that regulating emotions and behavior are crucial for top performance. There are several strategies that athletes can use to manage their emotion and arousal levels including anxiety and improve sports performance. Firstly, athletes can practice relaxation techniques, such as deep breathing, biofeedback, progressive muscle relaxation, or visualization, to reduce physiological arousal and promote a sense of calmness (Pelka et al., 2016; Kudlackova et al., 2013; Pineschi & Di Pietro, 2013). Secondly, athletes can develop pre-competition routines that help them feel more prepared and confident. These routines can include things like warm-up exercises, visualization, and positive (or even negative) self-talk (Mesagno et al., 2008; Lim et al., 2018; Hamilton et al., 2007). Thirdly, athletes can work with a sports psychologist to learn cognitive-behavioral strategies such as reframing negative thoughts and beliefs, setting realistic goals, and using positive imagery (Gustafson et al., 2017; Hays et al., 2010; Humara, 1999). In addition to all these invaluable methods, self-talk has gathered attention from a wide array of researchers. Self-talk, as a topic that has been popular in academical circles since the second half of 1980s, proposes that how athlete speak to themselves can have decisive outcomes of their performances (Jones, 2003; McArdle & Moore, 2012; Lundgren et al., 2012). In other words, the way athletes talk with their self can have an impact on their performances in various ways.

Instructional and Motivational Self-Talk

The distinction between motivational and instructional self-talk has garnered attention from many scholars who are interested in different sport branches. To demonstrate, Kolovelonis et al. (2011) argue that instructional self-talk is related to technical aspect of performances, while motivational self-talk is closely bound to constructs such as motivation effort and affect. Nevertheless, this important distinction has only been the inception, as it led to a curiosity that spanned further research with more specific hypotheses. One of the factors that have been extensively studied within the theoretical frame of self-talk is its valence. In

other words, the emotional connotation of the self-talk used by the athletes can be debilitating or facilitative for the performance (Fritsch et al., 2022; Hardy et al., 2001). The mentioned valence of self-talk refers to its emotional tone, which can be either positive or negative. Positive self-talk might include words and phrases such as “You can do it!”, “Good shot!” and so on, and negative self-talk has been put forward to consist of words such as “I am tired”, “I am such a failure” (Latinjak et al., 2014). The existing literature argues positive self-talk involves using indeed positive statements to enhance performance through different psychological constructs like self-esteem (Amar & Chéour, 2014; Heydari et al., 2018). Negative self-talk, on the other hand, involves using negative statements that may hinder performance, such as “Damn it” or “I am not good enough” (Zourbanos et al., 2009). Within the earlier literature, provided and argued benefits of the use of positive self-talk include elevated performance through altered motivation, emotions, and confidence (Zourbanos et al., 2009). Despite the fact that earlier studies have argued the use of positive self-talk would be more beneficial for performance, there have been opposing findings where negative self-talk have been found to facilitate performance (Theodorakis et al., 2014). Negative self-talk can also decrease anxiety, ambiguity, and eventually, improve performance (DeWolfe et al., 2021). Therefore, one can say that valence of self-talk and its outcomes depend on the specific situation in which it is used. Still, such findings, do not undermine the idea of positive self-talk being effective in enhancing performance, by having an impact through self-confidence, mental fatigue and mood (Hatzigeorgiadis et al., 2009; Cabral et al., 2023; Van Raalte et al., 2016).

Self-talk that is focused on not only emotions, but also cognitive abilities such as goal-setting, can help an athlete to maintain their motivation during challenging tasks or events (Delrue et al., 2016). That is, self-talk can actually be used to improve performance. Earlier research has suggested that deliberate use of verbal cues can help performers to sharpen their

skills (Landin, 1999). In terms of content, researchers have examined various types of self-talk that athletes use during competition. Some studies have focused on the use of instructional self-talk, which involves the athlete giving oneself specific instructions on how to execute a skill (Hardy, 2006). An impressive number of studies suggest phrases such as "straight" or "elbow" (Theodorakis et al., 2000). Another type of self-talk that has been examined in studies is motivational self-talk. Motivational self-talk mostly involves using statements towards self to increase motivation or self-efficacy, such as "strong" or "I am a winner". Motivational self-talk, regardless of its emotional tone, involves using certain statements to alter self-confidence or anxiety levels, while instructional self-talk involves giving oneself specific directions on how to perform a task or skill (Theodorakis et al., 2000; Hardy et al., 2015). It has also been argued that different skills or tasks can benefit significantly from different types of self-talk. Whereas gross motor task performances that require strength and explosiveness are further improved using motivational self-talk, motor tasks that demand accuracy such as pistol shooting or football penalty shootout can be sharpened with the use of instructional self-talk (Chang et al., 2014; Kolovelonis et al., 2011; Hatzigeorgiadis et al., 2011; Tzormpatzakis et al., 2022). This case, where the content of the self-talk is argued to bring better performance is known as "the matching hypothesis" by the practitioners. Furthermore, instructional self-talk has been argued to turn out particularly useful for performers who need to complete complex patterns of movements or who are learning new skills (Perkos et al., 2002; Anderson, 1997). That is, by helping to analyze the task into its crucial parts and providing oneself with precise instructions, athletes can project their focus to aforementioned integral parts of the movement, which can ultimately lead to better performances (Cutton & Landin, 2007). In other words, instructional self-talk can also serve as a motor-blueprint, of which athletes can review the sequences or components of movements and help athletes to correct errors and to maintain their performance. Quite

parallelly, some other studies have found out that using the right type of self-talk for the right case is crucial for higher performance (Hatzigeorgiadis et al., 2006; Sarig et al., 2023).

Overt and Covert Self-Talk

Yet another topic that has drawn attention from the researchers is the overtness of self-talk. Overtness of self-talk refers to the channel of the content delivered through, and those mediums have been quantitatively divided into two: Overt or covert (Hardy et al., 2005). Overt self-talk refers to statements that are delivered audibly, while covert self-talk refers to discrete, inaudible type of talk that are internal (Hardy, 2006). Recent research has also suggested that both overt and covert forms of self-talk can be effective in given circumstances provided by the context and personality differences (Hong et al., 2020). That is, some athletes may benefit more from overt self-talk, while others may benefit more from covert self-talk. The effectiveness of self-talk may also depend on the athlete's personality, goals, and cognitive style (Burton et al., 2011). Further research is needed to understand the specific mechanisms through which overt and covert forms of self-talk influence performance, as well as the individual differences that may moderate these effects.

Selected and Assigned Self-Talk

Studies have also been trying to determine if there is a significant difference based on the outcomes of assigned and selected self-talk. Some studies have prioritized that a method where participants are allowed to freely choose their own self-talk cues, and some other studies have opted in for participants to use assigned self-talk cues by research designers (Hardy et al., 2005; Hatzigeorgiadis et al., 2014). Recent studies published within the last 10 years found out the determination criteria of self-talk does not deliver significant differences in terms of performance (Hatzigeorgiadis et al., 2011), nevertheless, certain characteristics of athletes can be linked to tendencies in using overt or covert self-talk (Hardy et al., 2004). One

of those characteristics is the sex of the athlete. Whereas male performers are more likely to use covert self-talk, females have a preference towards using overt self-talk. Equivalently, the type of sport seems to have a role in the preference in which medium of self-talk is used.

Hardy (2004) appeal that athletes who partake in team sports use covert self-talk in comparison to those who perform individually in their own respected branch. Despite the fact that earlier meta-analysis studies propose that how self-talk delivered (i.e., overt/covert) does really have a significant effect on the performance, more recent meta-analyses suggest otherwise, and the limited number of studies in the area is something to remember for those who are interested in this question (Hatzigeorgiadis et al., 2011; Kyllö & Landers, 1995).

Individual Characteristics and Self-Talk

One another variable whose effect on the outcome of the self-talk interventions has been thoroughly discussed is the characteristic of the individuals that consist of the sample itself. A brief literature review on self-talk reveals a vast number of studies that are conducted with athletes on different levels of professionalism and experience, and some studies have even composed a sample with non-athlete and students (Horn et al., 2011; Theodorakis et al., 2001; Son et al., 2011). One intriguing study at the intersection of non-athlete participants and non-sportive tasks have been conducted by Galanis (2022). The study benefits from 217 participants at the mean age of 21, and all are student at universities. Furthermore, the measurement in the design of the study itself is somewhat unusual within the self-talk literature, and the participants are expected to go through Vienna Test System, a battery which is mostly used for assessments related to traffic psychology. Initially, the results derive that motor task performance that is operationalized by constructs that originally belong to non-sport environments can be improved by self-talk.

The experience levels and occasionally the ages of athletes have also been the center of the effectiveness of self-talk. Several interventions have been led with adolescents and children (Chroni et al., 2007; Thibodeaux & Winsler, 2018). To demonstrate, one study conducted with female youth footballers, who were competing with their respected U-14 teams. In a single-subject-multiple-baseline design, the sample performed significantly better in a football shooting task (Johnson et al., 2004). Similarly, another study has been conducted with pre-adolescent swimmers who have the mean age of 11 (Zetou et al., 2014). In contrast to the aforementioned study, the swimmers were not competing in events and had received a 6-week intervention program. The effectiveness of the intervention was supported by the significant difference between the experimental and the control group -in favor of the group who received the intervention. These ad-hoc studies have claimed that self-talk can work with different age groups and experience levels.

Training and Effectiveness of Self-Talk

As there is disunity among research designs, meta-analyses have also looked through the glass to understand if providing a training program for the use of self-talk at any point within the procedure would create a significant difference in comparison to the cases where there is no or a shorter span for training (Hatzigeorgiadis et al., 2011). A recent paper, written by Walter et al. (2019), have provided valuable insight for the matter. The group of junior sub-elite level performers, whom the researchers thought being “underrepresented” of, were divided into three: The control group that received no educatory intervention about how to get the best of the self-talk, the group that has received a training for only one week, and the group that received the self-talk training for 8 weeks. The findings of the paper are congruent with the research hypothesis: The groups that received the training have shown lower levels of anxiety, and higher levels of self-confidence, self-efficacy, and performance. Also, the

longer the intervention on how to apply self-talk appropriately, the more effective the intervention was. This paper stands cases against two important questions in self-talk literature. As stated in the paragraph above, self-talk interventions have proven itself to be useful in adolescents and sub-elite level athletes, and even a short intervention on how to use self-talk have been shown to bring impressive levels of improvement in a brief period of time. However, such a proposition does not render the self-talk studies that do not present a training useless.

Recent Advancements on Self-Talk

Since the last ten years, the papers that approached to self-talk with a constructive criticism have called for research that tries to focus more on how minor grammatical changes might impact performance (Van Raalte et al., 2016; Hardy et al., 2019). The call has not drawn attention until late 2010s and early 2020s. Recent papers published by Dezhban Afshord and Dana (2019), and Hardy et al. (2019) propose the difference between “I” and “You” in self-talk in professional athletes can indeed create a difference. The results, however, lack in generalizability as it solely focuses endurance and strength-based tasks. As discussed earlier in the thesis, it has been argued that the type of task plays a major role in the selection of the cue that is expected to assist the athlete in self-talk. The literature still has gaps in how different grammatical structures of self-talk may produce different outcomes, especially on different task requirement conditions.

The “what” of self-talk manifested as the content, the “where” of self-talk manifested as the medium, the “how” of self-talk manifested as the valence and many other wh- questions have been challenged in years. Other than the fine-but-crucial details, there have been novel propositions to the theoretical framework of self-talk, too. Specifically, within the last decade, many academics have alluded how the time was nigh for self-talk to be reviewed

critically in the light of the findings that have been accumulated around the central questions discussed above (Latinjak et al., 2014; Van Raalte et al., 2016). Ultimately, Latinjak et al. (2019) came up with 2 new categorizations of self-talk: Organic and strategic self-talk. Despite the fact that organic self-talk represents the “built-in” side of self-talk regardless of being controlled and uncontrolled, strategic self-talk is framed as the type of self-talk that is used before or during a task, which can be instructional or motivational as discussed above. For example, imagine a basketball player, who is missing a crucial free throw when the game score is close, and one might observe the athlete to scold himself or herself, without showing any effort to activate the self-talk. As argued by Latinjak et al. (2014), this is an example of organic self-talk. Nevertheless, if the athlete utilizes self-talk for reaching towards a certain goal, such as enhancing performance, this can be labeled as strategic self-talk. To demonstrate, when the athlete realizes that he or she needs to regulate their emotions and cognitions to improve free throw shooting performance and therefore decide to use self-talk, one can label such a pattern as the use of “strategic self-talk”. One should note that organic self-talk can be controlled or uncontrolled, and the distinction between organic and strategic self-talk is made on the continuum that is based on having certain goals.

In addition to incorporating models from other branches of psychology in an interdisciplinary manner, researchers who are interested self-talk have been self-reflective, as they have published several papers in different decades (Tod et al., 2011; Hardy et al., 2006; Hardy & Zourbanos, 2016, p. 450). Such papers have examined missing links on an ever-expanding topic, and perhaps one of the most important contributions to self-talk has been the effort to gather different types of self-talk under a broader umbrella. Van Raalte et al. (2015) ingathered The Dual Processing Model to sports psychology. In the paper, System 1 self-talk in sports refers to intuitive self-talk that occurs any given time in the performance environment. This type of self-talk is often brief and focuses on the immediate situation at

hand, and especially includes sudden emotional breaks within the train of thought. System 1 self-talk is thought to be especially effective in situations where there is limited time for conscious thought, as it can help athletes quickly generate a response to the situation without processing new information (Kahneman, 2003). Additionally, System 1 self-talk can be beneficial in preserving cognitive capacity by relying on lower levels of cognitive loads. Once the person is cognitively depleted due to the excessive use of System 2, System 1 takes over (Oyserman et al., 2012, p. 95). System 2, on the other hand, is the self-talk involves the use of deliberate and effortful thinking to modify or regulate thoughts in different contexts (Thompson, 2014, p. 43). That is, unlike System 1 self-talk, System 2 self-talk requires conscious and intentional effort to control the content and direction of self-talk (Latinjak et al., 2019). It is often used when an athlete encounters a challenging situation or problem and needs to consider multiple factors to make a decision or take an action (Furley et al., 2015). The Dual Process Model can also be used for learning and skill development as it revolves around cognitions and outcomes. However, the characteristics of the skill bear great importance on which system to be utilized (Pelaccia et al., 2011). This type of self-talk can be highly effective in enhancing performance, as it allows athletes to remain focused, composed, and motivated in stressful situations (Boudreault et al., 2018). One major detail might help researchers, practitioners and athletes to distinguish self-talk from different types is its valence. As System 1 self-talk has already been segregated as having emotional content, System 2 self-talk is characterized as being emotionally neutral.

Emotions in Sports

Emotions are one of the hottest topics of both research and practice in sports psychology, and anxiety is an emotion that has been studied in many different aspects (Englert & Bertrams, 2012; Kleine, 1990; Burton & Naylor, 1997). Sport-related anxiety is a normal emotional response that all athletes experience to some degree before and during

competition (Ford et al., 2017). However, when anxiety becomes excessive, it can interfere with some athletes' ability to perform at their best (Krane, 1992; Burton & Naylor, 1997; Hanin & Syrja, 1995). Particular levels of anxiety can negatively or positively affect an athlete's cognitive, physiological, and motor skills (Robazza, 2006; Prapavessis et al., 1992; Fullagar et al., 2013). For instance, anxiety can lead to a narrower attention, while a broader attention was more appropriate to capture crucial cues, leading to poor performance. A similar case has been argued in Vast et al. (2010) as positive emotions are most likely to enhance attention. Nevertheless, there have been some other cases where anxiety can improve attention (Eysenck & Calvo, 1990).

Arousal, Alertness and Anxiety in Sports

Earlier research that concedes with the scientific and methodologic expansion of sport psychology has been curious about the construct of "arousal" in sports (Kerr, 1985). In the existing general psychology literature, arousal had been studied in many different sub-branches, with many different approaches in research questions (McBain, 1970; Thompson et al., 2001). The older articles in sport psychology can be trailed back to as early as 1970s (Oxendine, 1970). The earlier research has shown a significant amount of interest in how arousal can be operationalized within physiological constructs (Landers, 1981). Back in the day, researchers approached arousal as "generally energizing" and mostly a beneficial factor for performance (Mohavedi et al., 2007). That is, the higher the levels of arousal, the more energetic the athlete was expected to be during performance, and some findings were found parallel to this approach in some studies before 2000s (Raedeke & Stein, 1994). Within a relatively short time span, the broadly accepted definition transformed to a kind of "alertness" and a state of readiness in general (Krane, 1994). During the 1990s a rapid focus shift in how arousal in performance is handled by sport psychology researchers was witnessed. In 1993, a

multidimensional approach was introduced to the concept of arousal, and the distinction between bodily and mental arousal was put forward (Gow et al., 1993). During the early 2000s, researchers have come closer to define arousal as not only an increase in stimulation, but a position in a continuum that has a wide range of emotions and sensations (Janelle, 2002; Prapavessis, 2000; Arent & Landers, 2003). With researchers focusing more on stress and anxiety contemporarily, arousal has been mostly discarded and there is hardly any research on arousal itself and how it affects athletic performance nowadays, with a handful papers that are exceptions, which focus on particular aspects of arousal (Kuan et al., 2018; Uhm et al., 2020; Li et al., 2019)

Measurements of Anxiety

As anxiety started to draw greater levels of attention from scholars, there have been different conceptualizations of anxiety, which have been briefly discussed above. In quite a parallel track to the definition of anxiety, the measurements tools of anxiety in competitive sports environment have flourished over time, too. However, instead of one scale that has two subscales for trait and state anxiety separately, scholars came up with split scales that measure either state anxiety or trait anxiety only. Just like the initial definition of anxiety in sports, the psychometric tool to measure anxiety was created in 1970s (Martens, 1977). Despite the fact that Martens' work -Sport Competition Anxiety Test (SCAT)- work pioneered the psychometrics of anxiety in sports, the scale solely focused on measuring trait anxiety, lacking focus on state anxiety for those who need to measure the construct. Three years later than the publication of SCAT, Martens et al. (1980) recognized the need and published another scale that fills in the lack of psychometric tools for measuring state anxiety. Despite being adapted for sports context from STAI, the fundamental differences between CSAI and STAI are imminent. Whereas CSAI is particularly focuses on sports-related anxiety, STAI

aims to measure anxiety in a broader context. Still, this version of CSAI criticized for being unidimensional (Putra & Guntoro, 2022). The first multidimensional scale came in 1990, one decade later than the publication of CSAI. Developed by Smith, Smoll, and Schutz (1990) the scale consists of subscales that focus on different conceptualizations of anxiety. The scale represents a significant turning point as it flags the first scale that approaches trait anxiety with a sum of operational definitions such as worry, somatic anxiety and concentration disruption. The very same year in 1990, CSAI have been revisited and authors ref have improved the theoretical framework. CSAI-2, similar to SAS, is also multidimensional in its nature as it measures state anxiety with questions related to cognitive anxiety, somatic anxiety and self-confidence (Martens, Burton, Vealey, Bump, & Smith, 1990). To this date, CSAI-2 is still being used frequently in anxiety and sports studies within the literature. One another scale that has received considerable interest and attention was published by Cheng, Hardy and Markland (2009). The scale includes subscales that aim to measure cognitive and physiological aspects of state anxiety, and items related to how the recipient of the scale regulates their anxiety.

Anxiety and Stress

One should tread carefully when stepping on the territory of emotions in sports, as the distinction between anxiety and stress is quite important. By definition, anxiety refers to a negative state that can be traced in all sport branches (O'Brien & Kilrea, 2021). For many long years, anxiety has been recognized by its two different components: Somatic and cognitive anxiety (Krane & Williams, 1987). Somatic anxiety is traced through psychologic signals, such as any changes in heartbeats per minute, sweating palms, a feeling of contraction in stomach, or shaking hands (Kingery et al., 2007; Ginsburg et al., 2006; Mercader-Rubio et al., 2023). Cognitive anxiety, in contrast, manifests itself commonly in the

minds of the athletes. Practitioners and scholars can spot cognitive anxiety from negative self-talk, altered attention levels, or intrusive thoughts (Hatzigeorgiadis & Biddle, 2008; Janelle, 2002; Dias et al., 2012). Regardless of the type, competitive anxiety can also be studied as trait or state anxiety, too. State anxiety is better understood as the nervousness when there is a possible perceived threat, such as a demanding performance environment, therefore, is not permanent over time (Halvari & Gjesme, 1995). Trait anxiety, on the other hand, is more of an overarching anxiety construct. It refers to how an individual is likely to experience anxiety itself, regardless of the situation (Cowden et al., 2014). In sports, there have been many studies that aim to understand how anxiety affects pre-performance, performance, and post-performance in various ways (Brooks, 2014; Kleine, 1990; Papageorgi et al., 2007).

Previous Models of Anxiety in Sports

It should come as no surprise that sport psychology, as a sub-branch of a discipline that extensively tries to understand how behaviour and emotions are linked, have proposed that one's emotions can have a significant impact on athletic performance outcomes on different decades (McCarthy, 2011; Botterill & Brown, 2002; Beatty & Janelle, 2020). Since the discipline of sport psychology have bloomed later than many other sub-branches of psychology, the initial research have borrowed existing and well-known models that are widely known to the researchers in psychology. Within those models, Drive Theory (Spence & Spence, 1966) and Yerkes-Dodson Law (Yerkes & Dodson, 1908) have received noteworthy attention. However, these models have been discarded upon receiving reasonable doubt and applied criticism for several reasons. Particularly, Yerkes-Dodson Law was criticized for being too simplistic by ignoring the cross-sectionality between arousal and emotions (Hanoch & Vitouch, 2004). Drive theory is also partially rejected as it fails to account for the athletes' performance where "choking" occurs (Hill et al., 2010). Researchers

of sport psychology eventually started to come up with their own models that are original to the area. One of those models is still in use with its high applied value is the “Individual Zone of Optimal Functioning” by Yuri Hanin (2000). The model divides emotions into two axes: One related to the objective tone of the emotion on a scale from positive to negative, and one related to the impact of the emotion on the performance outcome on a continuum between debilitating and facilitative. For example, a negatively perceived and unwanted emotion such as anger might have a positive outcome on athletes’ performance. On the other hand, a welcome emotion such as happiness might be even debilitating for athlete’s performance. “Individual” part in the name of the model implies that there is no one-size-fits-all set of emotions for reaching optimal performance levels. In other words, according to the theory, if athletes can alter their emotions to appropriate levels, their performance will also be affected.

Injuries in Sports

As an uprising trend between the 1990s and early 2000s, the relationship between various psychological factors and injuries have been examined (Junge, 2000; Davis, 1991). However, the general research questions were sometimes too narrow as they aim to understand singular constructs can be linked to athletes getting injured; and sometimes too broad where researchers have tried to discover how broad concepts such as personality are linked in injury experiences of athletes (Goddard et al., 2021). For example, one focal point was whether having a life changing event such as a personal loss would predict injury or not (Evans & Hardy, 1995). The athletes who are injured have lower levels of self-esteem, higher levels of depression and lower levels of perceived support (Wiese-Bjornstal et al, 1998). Contemporary studies have also tried to understand if distinct personalities could be related to injury. One particular study examined whether Type A personality could be related to the risk of injury. The question itself is noteworthy since Type A personality exhibits ambitious,

irritable and anxious individuals (Ekenman et al., 2001; Diekhoff, 1984). Indeed, this type of personality is argued to have ties to being injured, as Type A personality behavioral patterns might come with misinterpreting bodily signals and keeping on to train (Nigorikawa et al., 2003).

Injuries are an essential and unfortunate part of sports, as it has detrimental effects in both in the long and short run (Schinke et al., 2008). There is no doubt that injury from the athletes' perspective is an emotionally and cognitively complex construct (Tracey, 2003). Athletes are likely to feel negative emotions until they move to rehabilitation phase from their own injury (Clement et al., 2015). Even during the rehabilitation, athletes do show symptoms of anxiety, depression, and negatively appraise the situation they are in (Johnston & Carroll, 1998). Not only do athletes have negative feelings for themselves when they are injured, but also their perceptions of the team should be a major point to consider (Mankad et al., 2009).

Sports injuries are mostly investigated through the pre- and post-injury phases. Post-injury stage can have significant effects on athlete's stress level, identity, self-esteem (Nippert & Smith, 2008). Nevertheless, post-injury does not necessarily bring negative outcomes for the athlete. For example, Salim et al. (2016) argue that some athletes can grow through stress after sports-related injuries. Furthermore, under the proper conditions, athletes can even return to sports with higher levels of well-being (Wadey et al., 2016). Also, many other studies underline the importance of athletes reappraising their cognitions and managing their emotions (Roy-Davis et al., 2017; Walker et al., 2007). Sport psychologists play a vital role in every step of injury models for athletes, and recent advancements in literature underline the significance of symbolizing athlete emotions (Heany et al., 2015; Tamminen & Watson, 2022). Therefore, it is safe to assume that a sport psychologist can be a key factor during and after the injury, by helping the athletes as they work with emotions and cognitions.

Semantic Memories

Semantic memory is a type of long-term memory that stores information about the meaning of words, concepts, general knowledge about the world and self – all in all, our conceptual knowledge of the world (Abraham & Bubic, 2015; Binder & Desai, 2011). This type of memory enables individuals to retrieve and use knowledge about the world and the meaning of words, without necessarily remembering where or when they acquired that knowledge (Greenberg & Verfaellie, 2010). It is a fundamental part of cognition and plays a crucial role in our ability to learn, reason, and even visualize (Martin & Chao, 2001). Unlike episodic memory, which stores personal experiences and events, semantic memory is more abstract and deals with general knowledge and concepts (Tulving, 1972). Examples of semantic memories include knowing what your tax number is the capital of France, understanding the meaning of words like "justice" and "freedom," and knowing that birds are generally able to fly (Collins & Quillian, 1969; Smith & Estes, 1978).

Structure and Encoding of Semantic Memories

The development and organization of semantic memory is a complex process that involves the integration of new information with existing knowledge structures (Morais et al., 2013). Over time, semantic memory becomes more elaborate and interconnected, enabling individuals to access information more efficiently and effectively (Robertson & Köhler, 2007). In other words, these type memories are also subject to change and modification as individuals encounter new information or reinterpret existing knowledge.

Emotional neutrality is a defining characteristic of semantic memories. As these memories are associated with objective information that is devoid of any emotional context or personal experience, semantic memories have been used as neutral information in earlier

studies (Macoir et al., 2019). One study is particularly interesting as it suggests that the less emotional details are available, the smaller the number of episodic memories arise in older adults. One might argue that semantic memories are less dependent on emotions to be remembered on this case (St Jacques & Levine, 2007). This emotional neutrality is a key factor that distinguishes semantic memories from other forms of memory, and it has significant implications for how these memories are processed and retrieved (Talmi & Moscovitch, 2004). Stress, on the other hand, is known to make it more difficult to remember emotionally charged memories, not emotionally neutral ones (Littel et al., 2017). Moreover, it has been found that acute stress can in fact enhance the recalling of semantic memories (Smith et al., 2019). This can be particularly useful in situations where it is important to recall specific factual information quickly and accurately, such as a performance setting. Cloitre and Liebowitz (1991) argue that the moment of stress and anxiety is not likely to introduce a bias on semantic memories. In contrast, it is these moments when the memories are encoded that might create a bias on the recalling of memories. The emotional neutrality of semantic memories also means that they are less likely to be affected by the biases and distortions that can arise when emotions and personal experiences come into play, which can improve the accuracy and reliability of the information that they contain.

Semantic Memories in Sports

The literature suggests a vast range of findings over different sub-branches of psychology as semantic memories have drawn attention, however, the domain of sport and exercise psychology remains mostly untouched. There have been surely exceptionally studies, but they are more interested in exercise psychology than competitive sports. It should also be noted that these studies either use how sports related words are remembered or how exercise can improve semantic memory retrieval in older adults (Graham et al., 1997; Won et al.,

2019). The semantic memories' availability and their structure as they are organized in an interconnected network, as mentioned in the paragraph above, should allow athletes to alleviate their anxiety levels. In other words, in stressful moments and anxiety responses, semantic memories are still a reliable source of information. Those particular bits of memories can also activate other connected memories and can help athletes to control their train of thoughts.

Purpose and Hypotheses

Within the literature of sports psychology, the factors mentioned and discussed above have been reviewed and researched by many scholars, particularly in self-talk to alter emotions. Nevertheless, to the current known extent, there is no such study that explores the intentional use of basic semantic memories to regulate their anxiety levels during the early moments of injury in sports. Therefore, this study aims to test whether the recalling of semantic memories would decrease anxiety as they are used right after an anxiety-provoking vignette. It was hypothesized that the use of semantic memories would create a significant difference between anxiety levels measured before the intervention that utilizes deliberate semantic memories and the level of measurement right after the intervention. Furthermore, since the recalling of the information would require - despite being on a minimal level- cognitive effort, it would create an effect similar to activation of System 2. Thus, we expect that use of semantic memories would create a parallel effect to System 2, as it would decrease anxiety.

Since semantic memories are also require cognitive effort to be recalled, the expected results should give significantly lower levels of anxiety in the intervention of semantic memories, as it would also be a part of stimulated scenarios. In other words, recalling basic information should decrease anxiety in a similar manner to System 2.

Methods

Participants

After screening out participants who have been diagnosed with mental disorders and who do not participate in team sports, 56 participants remained in the study. All athletes were competing in the university leagues in Türkiye in team branches (15 in American football, 14 in volleyball, 10 in basketball, 7 in rugby, 5 in football, 2 in flag football, 1 in frisbee, 1 in handball, 1 in Quidditch). The mean age of athletes was 21.48 years, and they ranged between 16 and 32; 46.4% of athletes were females (N= 26) and 53.6% athletes were males (N= 30). On average, the athletes had 6,11 years of experience in their branch. The athletes trained eight and a half hours per week with their team, and days spent with training per week were four.

Measures

The Turkish adaptation of Discrete Emotions Questionnaire (DEQ) (Harmon-Jones et al., 2016; adapted into Turkish by Bekaroğlu & Yılmaz, 2020) was used. The anxiety subscale has 4 discrete words that define different aspects of anxiety, and has shown good internal consistency in Turkish, Cronbach's $\alpha = .829$ (Bekaroğlu & Yılmaz, 2020).

Procedure

The aim of this study was to investigate the role of semantic memories in relieving anxiety during the very first moments of injury in sports. Upon giving their informed consent to the participation to this study, participants first completed a set of basic questions on their demographic information (i.e age, sex, type of sport). Afterwards, the participants filled out the first measurement of anxiety via the anxiety subscale of DEQ. The participants then were provided with a vignette in which they are asked to imagine themselves experiencing an injury during a match. The vignette was created with the help of an expert sport psychologist,

and then was provided to professional athletes to confirm it evoked anxiety. Participants were then randomly assigned to one of two groups. The first group engaged in self-talk in a less-controlled way for 1 minute, as they were asked to be aware of their own thoughts for one minute. It should be noted that the group who use this self-talk is referred as the control group. The second group engaged in an intervention that involved recalling basic semantic memories such as their phone number, Turkish citizenship number, the capital of France, and the largest lake in Türkiye. In contrast to the first group, the second group served as the experimental group in this study.

After their interventions, all participants filled out DEQ for the third and last time. In addition to DEQ, the participants filled out a social validation scale, which measured other emotions that might have arisen during the study. The emotions in the social validation scale were gathered from the professional athletes who voluntarily expressed their emotions after reading the vignette. The measured emotions were fear, curiosity, excitement, sadness, disappointment, and ambition. The strength of the emotions was assessed on a 5-point likert scale from 0 (“I do not feel it at all”) to 4 (“I feel it very strongly”). It should be noted that the participants indeed reported anxiety, nevertheless, since there is a dedicated psychometric tool that measures anxiety, the related items were omitted from the social validation scale.

The vignette which was presented in the study is below:

“The game is in full swing and you're in the zone. The adrenaline is pumping through your veins as you chase the ball down the pitch. You're focused on the game, determined to help your team win. Your heart is pounding in your chest and your muscles ache, but you're pushing through. Suddenly, you feel a sharp pain in your leg, and everything comes crashing down. The minutes leading up to the injury are a blur, but the intensity of the match is still palpable.

You're lying on the ground, staring up at the sky, waiting for the medical staff to evaluate the damage. The pitch feels hard and unforgiving beneath you, and the sounds of the crowd and the game seem to fade into the background. You can feel the heat radiating off the turf, and the smell of the grass is pungent in your nostrils. Your leg throbs with pain, and you can feel your heart rate slowing down. You're no longer in the game, you're on the sidelines now, watching as the medics assess your injury.”

Statistical Analysis

To determine the difference within groups, repeated measure RM-ANOVA was run. Relevant post-hocs and pairwise comparisons were used when necessary. To spot the possible difference between groups at the baseline levels, the calculated RM-ANOVA was used.

Results

Differences in Baseline Measurements

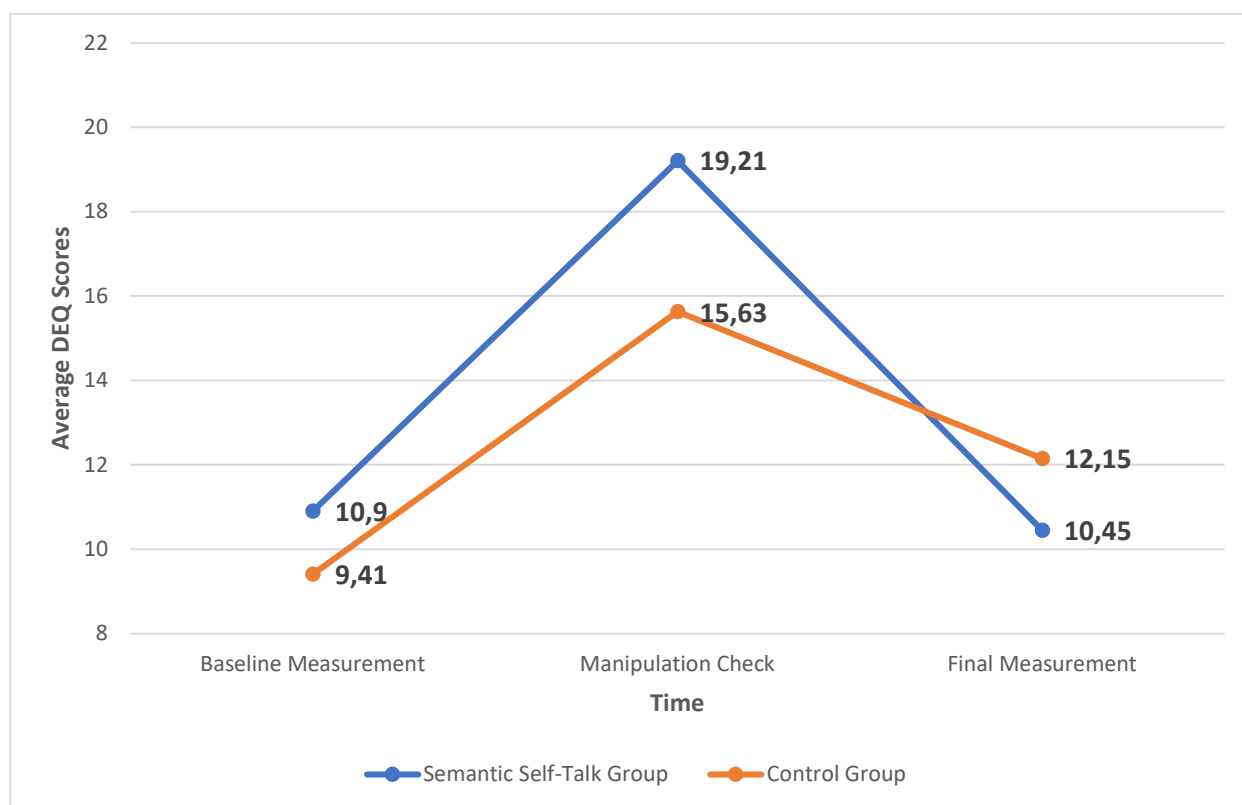
A repeated-measures ANOVA was calculated to determine if two groups differed between their baseline measurements, $F(1, 54) = .945, p = .335$. Despite the fact that the differences are insignificant, a post-hoc pairwise comparison which used LSD correction was used as a safety net, and the baseline measurements did not show any significance in DEQ anxiety scores ($p = .317$). Similarly, the DEQ scores did not reach to any significant differences in the second measurement between the groups ($p = .085$). Thus, one can conclude that the results for the RM-ANOVA indicate an insignificant difference between the groups at the first and the second measurements separately (Table 1).

Table 1.

	Baseline Measure		Manipulation Measure	
	M	SD	M	SD
Control Group	9,41	5,10	15,63	7,61
Experimental Group	10,90	5,87	19,21	7,59

Repeated Measures ANOVA For Semantic Self-Talk Groups

The two-way repeated measures ANOVA showed a significant time by group interaction, $F(2, 53) = 4.99$, $p = .01$, partial $\eta^2 = .16$. Examination of the pairwise comparisons per time showed that (a) for the experimental group, anxiety increased significantly ($p < .001$) from time 1 (baseline) to time 2 (following the vignette, pre-intervention), and dropped significantly ($p < .001$) from time 2 to time 3 (post-intervention), resulting in non-significant differences between time 1 and time 3 ($p = .67$); (b) for the control group, anxiety increased significantly ($p < .001$) from time 1 to time 2, and dropped significantly ($p = .014$) from time 2 to time 3, however, in contrast to the experimental group, anxiety in time 3 was higher than that of time 1 ($p = .013$). The results suggest that the intervention had a considerable effect on anxiety as it was mitigated at baseline levels, whereas for the control group anxiety remained above the baseline levels (Figure 1).

Figure 1. Repeated Measures ANOVA For Semantic Self-Talk Groups

Social Validation Scale

In addition to anxiety, participants recorded that they felt fear with an average score of 1.59, curiosity with an average score of 2.34, excitement with an average score of 2.09, sadness with an average score of 1.73, disappointment with an average score of 1.63 and ambition with an average score of 2.54. Ultimately, it is safe to say that the participants' feelings were akin to what professional athletes experienced when they read the vignette without participating in the study.

Discussion

The study aims to understand how semantic memories as a form of self-talk can affect the feeling anxiety during the early moments of injury, in comparison to uncontrolled self-

talk. The statistical analyses reveal that groups did not differ in their mean anxiety levels at their first measurement before the introduction of the vignette, and the second measurement that took place right after the introduction of the vignette. Both groups (i.e., intervention group with semantic self-talk, and the control group) have lower anxiety levels after utilizing self-talk (from the second measurement to the third measurement). In other words, both groups have managed to decrease their anxiety levels, which is significantly different than the level from the manipulation check. However, unlike the control group, only the participants who used semantic self-talk have achieved even lower levels of anxiety in comparison to their first baseline measurement in the final measurement after the intervention.

As discussed in the introduction in this thesis, dual-systems framework has been adopted by sport psychologists in the recent years. The results of this study can also be interpreted by what the approach suggests. In other branches of psychology, the dual-approach framework has been adopted in emotion regulation studies (Gyurak et al., 2011). The study underlines that two umbrella categories on emotion regulation mechanisms are based on effort: Explicit and implicit regulation. Explicit regulation is characterized by “conscious effort, some level of monitoring emotions, and some level of insight”. In contrast, implicit processes are initiated automatically and completed “without monitoring”. Nevertheless, the acquisition of effortful attempts can also result in habituation. It is noted that the use of certain explicit strategies can bring better and desired outcomes, such as higher levels of positive emotions and well-being.

The use of an approach that is similar to dual-process framework in sports produced meaningful results in regulating emotions, too. The examples of System 1 in sports psychology eco-system draw parallel to what has been defined and discussed above. In their ground-breaking paper, they argued that System 2 self-talk is activated by effort (Fritsch et

al., 2022). Furthermore, organic self-talk is recognized by its “automatic” inception (Latinjak et al., 2019). However, it is widely known in the recent sport psychology literature that the use of organic self-talk can also enhance performance (DeWolfe et al., 2021). Such cases can be argued to have similarities with the habituation of explicit emotion regulation trials, where people are trying to regulate emotions and athletes are trying to achieve desired performance levels. In fact, the body of existing studies point out that explicit emotion regulation strategies do have an impact on emotional responses (Koole & Jostmann, 2004). This study, since it aims to understand a new technique of regulating emotions with explicit techniques provided by the researcher, might have developed results that show lower levels of anxiety after the introduction.

It is clear that the use of semantic memories is fundamentally different than organic self-talk, as it is not automatically engaged by participants in this study. In fact, the participants were given a list to use in self-talk, and even though the information is easy to remember due to its semantic structure, it requires active effort. The piece of insight this study discovers is that the semantic memories as a form of self-talk are not a part of System 1 but perhaps the most distinct System 2 self-talk. In the literature, the System 2 self-talk is differentiated from System 1 self-talk by its structure that is fueled on effortful thinking (Van Raalte et al., 2016). Semantic self-talk requires only a fraction of effort to remember, and this can be used to open the gates of hallway that could carry an athlete from System 1 to System 2 in the moments of sudden anxiety and stress.

Yet another explanation of why semantic self-talk has led to lower anxiety levels might be explained by an existing and uprising concept in clinical practice. Ever since the conceptualization of trauma in clinical circles, remedies have been put forward by practitioners to decrease anxiety levels. One of the most basic and influential techniques have

been grounding- not as a merely physical construct to prevent detachment from reality, but also a mental anchor points to hold on to the present. In the trauma studies of 1990s, scholars suggested that the effort for searching familiar information and objects in the given circumstances might help to cope with unexpected and high levels of distress (Fisher, 1999). Recently, mindfulness studies have created a trend in reporting similar effects on anxiety levels with techniques that also include grounding techniques. In a series of sessions, young adolescent participants who suffer from anxiety have learned various ways of behavioral coping with anxiety. Nevertheless, grounding was one of the most commonly used techniques after the educational sessions were finished. The results suggest that the participants had significantly lower levels of anxiety, and grounding played a key role to do so (McDowell et al., 2020). However, the effectiveness of grounding techniques is not only limited to younger samples. In an interesting study that was completed with a sample that consists of soldiers who were anxious of being deployed, grounding was taught to soldiers in a single psychoeducational session along with many other behavioral and cognitive techniques. The soldiers reported lower levels of anxiety after using techniques in the long run, and grounding was one of the two techniques that was used most frequently (McCaslin et al., 2018). Considering that sport performance psychology and military performance psychology are closely related particularly in North America, one might argue that techniques that also include grounding might alleviate self-reported anxiety in athletes' performance context, too (Goodwin, 2008; Meyer, 2018; Ward et al., 2008). Likewise, in a paper that aimed to inform teachers, there have been a wide number of suggested exercises. One particular grounding technique that is commonly recommended by practitioners is 5-4-3-2-1 technique. In this method, searching for five things the person can see, four things a person can hear, three things the person can feel tactile, two things the person can smell and one thing the person can taste are asked to be aware of in the given moment (Adams & Branscome, 2020). The main

goal of this exercise is to bring the focus on the present to prevent the mind from shifting away in scenarios that might be the reason of anxiety. A very similar semantic self-talk might have created a similar effect by keeping the mind occupied by information that is encoded beyond present or future. Also, semantic self-talk might have been interpreted as a mental way of seeking familiar information, rather than familiar to what our 5 senses perceive. Similarly, the intentional recall of very basic information by the athletes under stimulated anxiety in injury scenarios might have created a “grounding” effect by investing athlete’s cognitive resources into something other than the immediate pain of injury and a piece of information that is easy to remember.

The use of semantic self-talk can be perceived as a grounding technique against anxiety. As discussed above, various grounding techniques are mostly about person’s relationship with present and future, it provides a stabile “ground” the participant can mentally and physically hold on to. By using semantic self-talk, the participants in this study have held on to unshakable facts about themselves and about the world. Also, the wide range of participants in different characteristics who benefit from in their own effort against anxiety provide us a meaningful explanation on why a decrease in anxiety levels is observed. The dual-process theory explains the “theory”/cognitive component of emotion regulation, and behavioral interventions such as semantic self-talk in a structure that is akin to grounding can be used to alter anxiety levels in crisis moments.

There have been a large number of studies that focus on emotions and their effects on attentional factors in sports settings (McCarthy, 2011; Vast et al., 2010). In this study, it is clear that participants tried to select to focus on particular information in two different groups. Whereas the semantic self-talk group is particularly asked to remember certain information, the control group, which was not given any clear instructions, apparently experienced some

forms of organic self-talk. In the results section, a difference between two groups was observed: The semantic self-talk group had significantly lower levels of anxiety in comparison to their own baseline measurements. It should be noted that such a difference was not spotted in the control - organic self-talk - group. Current literature argues that emotions do have a toll on athlete attention, and this division between the groups can be explained through the aforementioned phenomena. Anxiety is argued to direct attention and focus to stimulus which are perceived as threatening, and the organic self-talk group might have gotten lost in stimulus, whereas the semantic self-talk group is asked to attend and focus on a list of given questions (Jones, 2003). Moreover, attention can lead one to turn into internal-narrow thoughts, which are mostly about the personal concerns (Vast et al., 2010). In fact, anxiety is known to deplete working memory capacity in similar cases, and therefore hindering with decision-making processes of athletes (Furley & Wood, 2016; Memmert & Furley, 2007). In this study, since the athletes who are randomly assigned to semantic self-talk group were given a blueprint on how to act and what to decide, and this might have helped them to achieve even lower levels of anxiety in comparison to baseline measurement.

Yet another explanation on why semantic self-talk have presumably led to lower levels of anxiety in comparison to organic self-talk group in the final measurement could be explained by semantic networks (Sternberg & Sternberg, 2012; p. 332). Humans store information in various ways. One particular model is known as The Semantic Network Model. According to the model, semantic information is linked with nodes that are based on other related information. For example, the information that consists of city of Athens being linked to the capital of Greece, and Greece being a part of the European Union are related to one another. In other words, the recalling of Mount Ağrı is the highest mountain in Türkiye and the city of Paris being the capital of France have activated other nodes of information, which contain other semantic information. By recalling semantic memories and information,

athletes might have directed their cognitive resources and working memory to unwillingly activate further related information (i.e., Mount Ağrı being located in the eastern region of Türkiye, eastern regions of Türkiye bordering Iran and Armenia and so on). This possible explanation does not exclude the idea of working memory being a central part of why semantic self-talk might have come along with lower levels, but an additional layer of discussion why this could have been the case.

As one of the most fundamental psychological skills in sports, self-talk is known to be closely related to attention, along with many other cognitive mechanisms (Hatzigeorgiadis & Galanis, 2017). The use of strategic self-talk can have positive effect on attentional capacity, even under demanding circumstances such as physical depletion (Galanis et al., 2022). Selective attention, a particular subset of attention, is balancing the mental capacity to filter out irrelevant stimuli (Calmels et al., 2004). Self-talk, whether be it organic or strategic, might play a key role in helping athletes to remind what they should focus on. Although the previous studies have projected on motor performance and skill execution, this study points out that self-talk, attention and emotion regulation are closely related. Deliberate use of self-talk with semantic information, as a subtle form of strategic self-talk, might help athletes lowering anxiety levels, especially in moments of sudden and unexpected distress (Galanis et al., 2018). In essence, semantic self-talk serves as a bridge between adjusting attention from irrelevant stimulus to easily retrieved, actively used basic information. This connection not only helps athlete to shift away from irrelevant and probably negative thoughts, but also to ground on lower levels of anxiety.

Limitations and Future Directions

Perhaps the biggest limitation of this study is its ecological validity due to its ethical constraints. Since it is highly unethical and practically impossible to physically injure athletes

on will, the study needed to use vignettes to induce anxiety. However, the findings are gathered from college athletes who partake in the study in front of their screens, and it is uncertain that how such findings would have an impact on real-life settings. Further studies might consider working with participants and athletes in concrete sport settings, competitions and trainings.

Furthermore, the existing literature spots three points of emotion literature: The tone of emotion, the intensity of emotion and the duration of emotion. Even though this study considers the tone of the emotion (i.e., anxiety) and the intensity of emotion (i.e., Likert scale used to measure anxiety), the duration of emotion is not directly measured. Scholars who are interested in the topic might also consider adding the measurements about the duration of emotions.

Yet another limitation of the study is that it lacks information in the content of organic self-talk used by participants. Further studies should not forget about adding measurements about what could be used in organic self-talk, and their probable impact on athletes' emotion regulation should be discovered.

Also, this study used different types of semantic information for participants to remember. That is, the participants are asked to use their Turkish citizenship ID number, their personal cell phone number, their student number from past educational institutions, Turkey's highest mountain and the capital city of France. Whereas the first 3 are related to autobiographies of participant and are unique to each participant, the latter 2 are factual and encyclopedic bits of information. Despite the fact that those bits of memories are all labeled as semantic memories in the existing literature, they fall into different categories within the concept. Further studies might test the effectiveness of completely autobiographical semantic memories or encyclopedic information against anxiety.

Despite the fact that semantic self-talk has shown promising results under laboratory settings against simulated anxiety in university athletes, the possible effects of semantic self-talk in comparison to pre-defined strategic self-talk is yet to be discovered. Further studies might be designed around the research questions that test semantic self-talk's effectiveness against other well-known regulation techniques such as cognitive reframing under similar conditions.

Lastly, the measurement at the very end of the study reveals that there are many other emotions that are included in the study. Further research questions can reside on how semantic self-talk can impact these emotions.

Conclusion

This study highlights the use of a new category of self-talk which can be coined as semantic self-talk. It was hypothesized that semantic self-talk would be more efficient than organic self-talk in decreasing anxiety. With a design that has two groups and multiple measurements at different time points, both groups have managed to lower their anxiety levels from the manipulation check to final measurement. The groups did decrease their anxiety levels between the second and final measurement. Nevertheless, it was the experimental group who used semantic self-talk to lower their anxiety to a level that is even below the baseline measurements. Possible and sound explanations behind the occurrences might be related to working memory, attention and information processing that is used to recall and store bits of information. Although the study has its own limitations, it does give way to further domains to discover.

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