

**COGNITIVE AND BEHAVIORAL TECHNIQUES USED BY OLYMPIC AND
PARALYMPIC SWIMMERS TO MANAGE PERFORMANCE RELATED
THOUGHTS AND EMOTIONS**

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ABSTRACT

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The present study investigated the thoughts and emotions of swimmers and what techniques they used to manage them before and during their best and worst performances. Twelve male Brazilian swimmers (5 Olympic and 7 Paralympic) took part of the study. They were 22 to 37 years old ($M = 26.16$, $SD = 4.32$). Three athletes (25%) were middle distance swimmers in freestyle, and the other nine (75%) were sprinters in all four swimming styles. An in-depth semi-structured interview was designed to explore the internal processes of participants and the techniques they used to manage them in the competitive events. The interview consisted of three sections: the first section examined the thoughts and emotions related to the best performance and the techniques used to manage them. The second section focused on thoughts and emotions in the worst performance and the techniques used. The third section investigated athletes' awareness about internal processes and the influence on performance. Interview data were inductively and deductively analyzed, based on emerging themes and concepts of cognitive behavior therapy (Beck, 1995). Imagery, breathing, self-talk, music, cognitive restructuring and motivational audios were the techniques used by swimmers to manage their thoughts and emotions. The techniques were mostly used before best performances than before worst performances. There was a great variability in how the techniques were utilized, regarding the purpose and timing before and on the day of the races. Although some of the athletes were already familiar with some of the techniques, they reported improvement in how and why to use them after started a psychological preparation with a sport psychologist. Athletes also mentioned that some techniques were not efficient, because the dysfunctional thoughts were constants in the worst performances. Functional thoughts and pleasant emotions were more common in the best performances, whereas dysfunctional thoughts and unpleasant emotions were more common in the worst ones. The swimmers believed that thoughts generate emotions and they can influence performance. However, only a few of them mentioned to be aware of how to manage this relationship to be more functional. Thus, it seems important to educate athletes to distinguish thoughts from emotions, how to identify and evaluate them, to have a functional behavior.

Keywords: Cognitive techniques, behavioral techniques, thoughts, emotions, athletic performance, Cognitive Behavior Therapy.

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♪ “*Você não sabe o quanto eu caminhei, pra chegar até aqui!*” ♪

1 INTRODUCTION

Sport psychologists and mental coaches have been working with athletes and teams for many decades, helping them to enhance performance and well-being (Vealey, 2007; Weinberg & Gould, 2007). Throughout the years, different techniques for mental skills training have been developed and improved to assist athletes and coaches in different sports (Vealey, 2007). The most common techniques are: imagery, self-talk, physical relaxation/arousal, goal setting, (Andersen, 2009; Vealey, 2007), and thought management (Vealey, 2007). These techniques have been effective in mental training, which has been effective in enhancing athletic performance in competitive sports (Vealey, 2007; Weinberg & Comar, 1994). However, mental training is a comprehensive process that has to consider the individuality of the athlete and specificity of the sport when an intervention is guided (Vealey, 2007; Weinberg & Comar, 1994). The effectiveness of mental training programs that incorporate various mental trainings techniques respecting the individual characteristics and needs of athletes should be investigated (Vealey, 2007).

Although the efficacy of techniques for mental skills training in sport is recognized, an individualized approach can offer a deeper understanding about the variables that influence performance. It can assist sport psychologists and mental coaches to conduct better interventions, increasing the efficacy of the psychological work. The individual zones of optimal functioning (IZOF) model (Hanin, 2003) for example, helps athletes to understand what emotions (i.e. pleasant and unpleasant) and their intensities help or disturb (i.e. functional or dysfunctional) athletic performances (Hanin, 2003). This approach increases the chances of assessing performance related emotions to subjective experiences and emotional patterns for the development of an individualized self-regulation intervention (Hanin, 2003; Ruiz, Raglin, & Hanin, 2017). Also, it has been shown that the content and the intensity of the emotions are associated to successful and poor performances (Ruiz et al., 2017). Internal and external events trigger the emotions and the perception of managing them (Friesen, Devenport, & Lane, 2016). Internal events, such as thoughts generate emotions which influence behavior (Beck, 1995).

Considering the influence of thoughts on emotions, cognitive behavior therapy (CBT; Beck, 1995), for instance, has been applied in sports context (Didymus & Fletcher, 2017). This theory uses the concept of cognitive model, which proposes that people's perception of events influences emotions and behaviors (Beck, 2011). Thus, it is not the situation itself that determines what people feel or how they react, but the way they interpret it will generate emotions and influence behavior (Beck, 1995). This is because events, thoughts and emotions can be experienced and perceived in different ways, due to previous experiences and expectations of each person (Beck, 2011; Mahoney & Avenier, 1977). Cognitive behavior therapy has been used to teach athletes how to identify thoughts, evaluate them to improve emotions, to try to achieve the desired behavior (Didymus & Fletcher, 2017; Gustafsson, Lundqvist, & Tod, 2017; Whelan, Mahoney & Meyers, 1991).

The evaluation of the event, the ability to identify and evaluate thoughts and emotions, the repertoire of behavior and techniques can influence the sense of control and performances success (Gould & Maynard, 2009). The patterns of thoughts are strongly correlated with successful and unsuccessful athletic performances (Mahoney & Avenier, 1977). Anxiety and fatigue for instance, which are both very common in sport, can maintain or worsen dysfunctional thoughts and unpleasant emotions, if the athlete does not know how to evaluate their validity (Moran, 2012). Thus, they should be encouraged to reflect on the factors that contribute to those performances and the thoughts surrounding emotions (Turner & Barker, 2012). Athletes should have a broad repertoire of behavior and techniques, as well as time to practice them, to evaluate thoughts and have a more functional way of thinking and acting (Vealey, 2007; Whelan et al., 1991). Therefore, it is relevant to investigate whether the athletes are aware of their thoughts and emotions, their influence on performance, and how athletes manage their internal processes.

2 LITERATURE REVIEW

2.1 Sport Psychology in Practice

The studies in sport psychology covers two main objectives: to understand how psychological factors affect the athletic performance of a participant while practicing or competing in sport events (Weinberg & Gould, 2015). Also, to understand how participation in sport and exercise events affect the psychological development and well-being of participants (Weinberg & Gould, 2015). One of the roles of sport and exercise psychologists is consulting with athletes and teams to develop psychological skills, for instance through a mental training program, for enhancing athletic performance in trainings and competitions (Weinberg & Gould, 2015). However, athletes and coaches often use mental training techniques without a sport psychologist or mental training consultant (Vealey, 2007). When mental training is guided by a specialist is more effective in helping athletes to learn, practice and master the techniques, giving them more chances to achieve their goals (Arnold & Sarkar, 2015; Haberl & McCann, 2012). In their review, Gould and Maynard (2009) have provided a starting point for planning a broad psychological preparation to athletes for their sports career. This is important, because Olympic athletes had shown unrealistic expectations regarding the efficacy of psychological techniques for enhancing performance (Weinberg & Comar, 1994).

Furthermore, the effectiveness of applied sport psychology has been evaluated by athletes and teams (Sharp & Hodge, 2014). Sharp and Hodge have assessed the athletes' perception of their sport psychologists work and how it assisted their athletic performance. They interviewed nine elite athletes from five different sports, all representing their country at an international level. Some of the points mentioned by the athletes as important components for sport psychologists were: "demonstrate knowledge and experience of the sport", "developed practical psychological support that meet the athlete's needs" and "the relationship between athletes and psychologists". Due to the small sample size and culture, the results do not permit external validity. However, as well as in this research, it has been shown that a strong therapeutic alliance is important to adherence to the treatment and promote improvements (Beck, 2011).

There has been a growth in the number of sport psychologists helping athletes and teams to prepare for the Olympic and Paralympic Games (Arnold & Sarkar, 2015). Also, the quality of their work has been improving (Haberl & McCann, 2012; Mahoney, Anderson, Miles, & Robinson, 2002; Sharp & Hodge, 2011). Additionally, the effectiveness of applied sport psychology has been evaluated by the consultants (Mahoney et al., 2002; Sharp & Hodge, 2011). Sharp and Hodge have investigated the perception of the effectiveness of sport psychology consultants about their work. According to the consultants, the main components for an effective work were: “establishing an effective alliance between psychologist and athlete”, “consulting meets athlete’s needs”, “active participation of the athlete”, and “boundaries of confidentiality”. These findings are in agreement with the perception of the athletes about the effectiveness of sport psychology consultants.

Arnold and Sarkar (2015) interviewed 15 of the world’s best sport psychologists, who have worked with athletes and teams for the Olympic Games. The important themes that emerged from the interviews were: “to know the sport”, “to know the athletes” and “do not feel to prove their expertise”. According to Arnold and Sakar, it is important to integrate the psychological work and be part of a multidisciplinary team to increase the effectiveness of the work, as well as building relationships with the staff members. Their data also suggested the importance of educating coaches to develop mental skills through mental training techniques for their own benefit.

2.2 Cognitive and Behavioral Techniques

Psychologists and mental coaches have been working with athletes and coaches for many decades, helping them to enhance sport performance and well-being (Vealey, 2007; Weinberg & Gould, 2007). Throughout the years, different techniques for mental skills training have been developed and improved to assist athletes to achieve their purposes in different sports (Vealey, 2007; Weinberg & Gould, 2007). The most common techniques are: imagery, self-talk, physical relaxation/arousal, goal setting, (Andersen, 2009; Vealey, 2007), and thought management (Vealey, 2007). These techniques have been extensively

used in most of the intervention research in sport psychology (Vealey, 2007), as clinical psychology has used imagery and physical relaxation (Beck, 2011).

Imagery is the mental creation or re-creation of sensory experiences, and it is the most popular mental training technique among athletes, as well as the most widely studied in the literature (Andersen, 2009; Vealey, 2007; Williams, Cooley, Newell, Weibull, & Cumming, 2013). Athletes use imagery for several reasons, such as skill learning, practice and refinement, strategy development, familiarization with competition venue and mental arousal (Williams et al., 2013). Additionally, imagery can be used to cope with various stressors or obstacles, reducing the stress by reimagining a situation under control (Beck, 2011), to enhance self-confidence, attentional control and motivation (Vealey, 2007). Imagery can be used in different sports at different time points: during the pre-season, competitive season, and off-season, which will influence on how it is used (Williams et al., 2013). Also, athletes from different ages and performance levels can benefit using it (Williams et al., 2013). Imagery can be induced when guided by someone else, which is common when the person is not familiar with the technique, or it can be spontaneous when created by the person who already has experience with it (Beck, 2011).

Self-talk, also considered inner dialogue, is also referred to as a technique involving the internal verbal dialogue that athletes can use to give instructions, to calm down or to motivate themselves (Vealey, 2007). Research has indicated that different types of self-talk, such as instructional and motivational can be effective in enhancing sport performance (Van Raalte, Vincent & Brewer, 2016; Weinberg & Gould, 2007). Van Raalte et al., have separated this technique in two types: (a) system one is considered the spontaneous or automatic self-talk, which in some theories of Psychology includes automatic thoughts (Beck, 1995); and (b) system two that athletes use intentionally, with a purpose. Although planned self-talk can be effective and help athletes to direct attention and enhance skill acquisition in sport (Vealey, 2007), it may lead to overthinking, disturbing the focus and bringing unpleasant emotions depending on the athlete and the situation (Van Raalte, et al., 2016). Although it has been researched mostly singly (Van Raalte, et al., 2016) intentional self-talk can be used along with other techniques, such as imagery (Andersen, 2009; Whelan et al., 1991).

Physical relaxation and arousal can be useful to help athletes manage their physical and mental vigor levels to allow them to perform their best (Vealey, 2007). Relaxation techniques, such as meditation, progressive muscle relaxation, and rhythmic breathing are often used to decrease stress symptoms (Beck, 2011; Williams & Andersen, 2007). Deep breathing exercises can lower physiological activation level (i.e. heart beating), decrease distractibility and help keep an appropriate attentional focus, whereas short breathing exercises can increase the activation level (Williams & Andersen, 2007). Deep and short breathings can be beneficial to help athletes to maintain focus, but they can also disturb them to reach their desired state of arousal to perform (Williams & Andersen, 2007). Relaxation or arousal require a match between the type of intervention and the different emotions experienced, such as anger, anxiety and fear to achieve a personal optimal state to perform (Vealey, 2007). Especially because it is known that, anxiety for instance, is an unpleasant emotion, but it can be functional (Beck, 2011) to some athletes, helping them to achieve the ideal arousal to perform (Hanin, 2007; Ntoumanis & Jones, 1998). Thus, it is difficult to ascertain the specific effectiveness of physical relaxation and arousal as a mental training technique (Vealey, 2007; Williams & Andersen, 2007).

Goal setting is an established target, or a specific standard or accomplishment that the athlete or the team strive to achieve (Vealey, 2007). It works when used systematically because it focuses attention on specific tasks, increases effort and persistence when adversity is encountered, and promotes the development of strategies and problem solving to achieve the goal (Vealey, 2007; Wikman, Stelzer, Melzer, Hauge, & Elbe, 2014). Gould (2006) has suggested a three-phase goal setting system with planning, meeting, and follow-up/evaluation phases, which increases the awareness of the process, not focusing only on the results. The goals can be defined individually by the athlete, for the team by teammates and the staff depending on the sport. Setting goals can guide athletes and coaches to act and think in purposeful ways to achieve specific accomplishments and personal fulfillment (Vealey, 2007). They must be incorporated into a systematic mental training program that enables athletes to plan, execute and evaluate, to manage their behaviors towards achieve them (Gould, 2006; Vealey, 2007; Wikman et al., 2014).

Thought management is the process of assisting a person to manage their thinking (Moran, 2012). It includes strategies such as evaluation of thoughts, positive thinking,

blocking distractions (Vealey, 2007) and cognitive restructuring (Beck, 1995). To evaluate the thought is to seek evidence that confirms or denies it, helping to improve the mood (Beck, 2011). Positive thinking and blocking distractions can be done using positive words or sentences to self-talk (Vealey, 2007). However, they help momentarily to deviate from what is disturbing and can worsen the emotional state (Moran, 2012). Cognitive restructuring is a psychotherapeutic process that helps the person to identify and modify the maladaptive thoughts, attitudes and beliefs. It has been widely used in clinical psychological contexts (Beck, 2011; Weaver, Himle, Steketee, & Muroff, 2014) and in sports context through cognitive behavior therapy (Didymus & Fletcher, 2017; Whelan, Mahoney & Meyers, 1991) and rational emotive behavior therapy (Turner, 2016).

The aforementioned techniques have been effective in mental training, which has been effective in enhancing athletic performance in competitive sports (Vealey, 2007; Weinberg & Comar, 1994). The effectiveness of various psychological interventions enhancing athletic performance were measured objectively and subjectively, both indicating the importance of mental preparation for athletic excellence (Gould & Maynard, 2009; Weinberg & Comar, 1994). However, it involves a comprehensive process to apply mental training techniques considering the specificity of the athlete and sport when an intervention is guided (Vealey, 2007; Weinberg & Comar, 1994). Researchers should examine the effectiveness of mental training programs that incorporate various mental trainings techniques respecting the individual characteristics and needs of the athletes (Vealey, 2007). A mental training program that covers a variety of techniques together can be effective to help athletes to manage their internal processes, such as thoughts and emotions and consequently, perform better (Andersen, 2009; Vealey, 2007).

2.3 Investigating Individualized Approaches in Sport

Although the efficacy of techniques for mental skills training in sport is recognized, individualized approaches have offered a deeper understanding about the variables that influence athletes' performance. It can assist sport psychologists and mental coaches to conduct better interventions, increasing the efficacy of the psychological work. The individual zones of optimal functioning (IZOF) model (Hanin, 2003) is a sport specific,

idiographic approach, which studies the subjective emotional experiences associated to the athlete's successful and poor performances (Ruiz et al., 2017). The model has five dimensions: form, content, intensity, time, and context (Hanin, 2003). According to the author, emotional experience is always manifested in some form (i.e. subjectively perceived or observable); it has specific content (i.e. quality) and intensity (i.e. quantity) in a time and context. This individualized approach is an instrument to assess performance related emotional patterns, and personal experiences for the development of an individualized self-regulation intervention (Hanin, 2003). It helps to understand which emotions (i.e. pleasant or unpleasant) associated with their intensities help or disturb the optimal psychobiosocial state of the athlete (Hanin, 2007). The IZOF model has been widely studied in sport context and it is a valuable self-assessment tool, useful for intervention programs (for a review, see Ruiz et al., 2017).

Middleton, Ruiz and Robazza (2017) have investigated the effects of music on pre-performance psychobiosocial states of swimmers. Seventeen competitive swimmers participated in a 5-week intervention focusing on finding the IZOF model through an intervention using music. Findings showed that pre-performance psychobiosocial states were different between best and worst performances. Swimmers improved their ability to regulate pre-performance states using music, which promoted a positive impact on their perceived effectiveness of pre-performance routines. Furthermore, in the qualitative reports, swimmers stated that they became more aware of how to use music with specific purposes. Although music could be used as a technique to regulate the psychobiosocial states of athletes, more studies should be done to support these findings, since it was a small sample size and there was not a control group. Furthermore, a competitive environment was simulated to this study, which decreases the ecological validity of it.

Internal and external events trigger the emotions and the perception of managing them (Friesen et al., 2016). Some theories from Psychology have pointed that emotions are generated and influenced by thoughts (Beck, 1995; Turner, 2016). Miles, Neil and Barker (2016) have explored the cognitions, emotions, behaviors and coping strategies that elite cricketers experienced along a 7 days period practicing and on the day of their first competitive selection of the season. In this study, the athletes identified cognitions associated with a variety of competitive stressors (e.g. selection of players to the game) that

resulted in pleasant (e.g. happiness) and unpleasant (e.g. anxiety) emotions. Different coping strategies, such as pre-competition routines, social support, self-talk, and humor were reported by athletes to cope with stressors and emotions. Although they were elite athletes, it was not mentioned if they had support from a sport psychologist or mental coach to help them to create more efficient strategies.

Thoughts and emotions can also influence performance of referees during competitions (Friesen et al., 2016). Friesen et al. evaluated the emotion regulation experiences of 19 lacrosse referees while they officiated an Under-19 World Championship tournament. The referees were interviewed about the events that trigger emotions and what they did to manage them during round-robin, playoffs and finals. The authors found that the emotional states of referees with pleasant and unpleasant emotions fluctuated throughout the tournament. Moreover, internal and external events triggered the emotions and the perceptions of confidence in managing them decreased throughout the game. It can be considered that during competitive sport events, fluctuations are likely to occur also among athletes. For instance, Sofia and Cruz (2016) explored the individual differences in the way that 269 athletes experienced anger in a sport competition. Their results revealed significant differences in fight or flight, anger rumination, thought suppression, antisocial behavior toward teammates and opponents, and self-control among athletes with different levels of anger. These findings support the cognitive model, which implies that thoughts generate emotions and can increase their levels, whereas cognitive strategies can help individuals reappraise their emotions.

2.4 Theories of Psychology in Sport

Considering the influence of thoughts on people's emotions, some theories from mainstream psychology were applied to the sport context to improve the psychological preparation highlighting issues that influence performance. Self-efficacy in sport (Moritz, Feltz, Fahrback, & Mack, 2000) from social cognitive theory (Bandura, 1986), Rational emotive behavior therapy (REBT; Ellis, 1995) and its application with different sports (Turner, 2016) and cognitive behavior therapy (CBT; Beck, 2005), also used with athletes

and teams (Didymus & Fletcher, 2017; Gustafsson et al., 2017) are some examples of successful psychological intervention in sport.

The concept of self-efficacy, which was developed within the framework of social cognitive theory, has been defined as the belief that one has in being able to execute a specific task successfully (Bandura, 1986). According to Bandura, there are four sources of efficacy including: past performance, vicarious experience or social comparisons, verbal persuasion, and physiological/emotional states. Conforming to Feltz and Lirgg (2001), a person's experiences affect self-efficacy beliefs through the cognitive processing of such information. In past performance, if the view of those events was experienced successfully, self-efficacy beliefs will increase. On the other hand, if the experiences were faced as failures, self-efficacy beliefs will decrease. Vicarious experience is obtained through observing others performing a task and the consequences of their performances, and then using that information to form judgments about the execution and behavior in terms of performance or personal characteristics (Feltz & Lirgg, 2001). Persuasive information includes self-persuasion, such as self-talk and positive imagery, and persuasion from others for instance, encouragement and feedback (Feltz & Lirgg, 2001). And finally, physiological/emotional source of information includes the autonomic arousal that the person associates with the emotions when ready to perform, as well as one's level of physical conditioning, fatigue, and pain (Feltz & Lirgg, 2001). Since the introduction of the concept of self-efficacy, the number of studies on self-efficacy related specifically to sport performance has increased considerably (Feltz & Lirgg, 2001; Moritz et al., 2000).

Rational emotive behavior therapy (REBT; Ellis, 1995), is useful to increase awareness of irrational beliefs and how they influence emotions. Irrational and rational beliefs represent specific types of thoughts that lead to emotional and behavioral reactivity (Turner, 2016). The REBT framework indicates that irrational beliefs lead to unhealthy negative emotions, and a host of maladaptive behavior (Turner, 2016). Thus, the goal of REBT is to replace irrational with rational beliefs to promote pleasant emotions and rational responses to life events (Turner, 2016). In sports, a thought such as "I want to perform my best" can easily become "I have to perform my best" due to the pressure of perform well and obtain good results (Turner & Barker, 2012). The REBT is used to help

athletes to practice better thought control teaching them to evaluate irrational beliefs to have realistic ones which will influence emotions and performance (Turner, 2016).

Cognitive behavior therapy (CBT) is an important school of Psychology which produces fast and lasting results (Beck, 1995). The theory that underlies CBT, uses the concept of cognitive model, which proposes that emotions and behaviors are influenced by the perception of events (Beck, 2011). Thus, it is not the situation itself that determines what people feel or how they react, but the way they interpret it will generate emotions and influence behavior (Beck, 1995). The cognitive model considers the link between thought, emotion and behavior (Beck, 1995). Thoughts can be functional or dysfunctional, which means that they can help or disturb the person to achieve goals (Beck, 2011). Thoughts will generate pleasant or unpleasant emotions and consequently influence positively or negatively the behavior, depending on the evaluation made of the situation (Beck, 2011). The pattern of thoughts leads to core beliefs, which is a deepest idea about the self (Beck, 1995). According to Beck, the experiences and life history add a meaning to perceived situational state, which is interpreted or reinterpreted as facilitating or dangerous, and thus cognitive behavior therapy teaches to identify, evaluate and respond to dysfunctional thoughts and beliefs. After identifying the thoughts, the person must analyze the validity of them searching for evidences to validate or refute them, and finally plan a course of action (Beck, 1995; Weaver et al., 2014). A realistic evaluation of the situation can modify the thought, improving the emotions leading to a functional behavior (Beck, 1995; Weaver et al., 2014).

In sports, CBT has been used to teach athletes how to identify thoughts, evaluate them to improve emotions, to try to have the desired behavior (Didymus & Fletcher, 2017; Gustafsson et al., 2017; Whelan et al., 1991). The theory also provides a variety of cognitive and behavioral techniques to athletes and teams to manage their internal processes, such as thoughts and emotions (Beck, 2011; Weaver et al., 2014) during practices and competitions (Didymus & Fletcher, 2017; Gustafsson et al., 2017). This is because events, thoughts and emotions can be experienced and interpreted in different ways, due to previous experiences and expectations (Beck, 2011; Mahoney & Avenier, 1977). Psychological stressors can be different for each athlete, depending on the gender, the sport and the level of performance (Arnold, Fletcher, & Daniels, 2016). According to

these authors, internal responses of men and women, such as cognitive appraisals and coping strategies were different when facing organizational stressors. As well as male and female swimmers reported in a diary for 28 days a variety of cognitive appraisals and coping strategies in response to organizational stressors (Didymus & Fletcher, 2014). Keeping a diary served as a strategy to educate athletes to be aware and to differentiate thoughts from emotions. However, in this study due to the long-term data gathering it is difficult to know the criteria used by the swimmers to judge the effectiveness of their coping.

Athletes have also been found to cope differently in different moments of the competition. For instance, Gaudreau and Blondin (2004) found that athletes from different sports used different combinations of coping strategies to deal with stressful situations during the competitive events. However, first of all, the competition did not have to be seen as a stressful event. Therefore, those thoughts should be identified and worked through psychological interventions, not allowing them to be enhanced, hindering athletic performance (Moran, 2012).

2.5 Influence of Thoughts and Emotions on Performance

Sports have become a dynamic natural scenario to investigate the relationship between thinking and skilled actions (Moran, 2012). According to Moran, competitive sports offer to cognitive researchers a useful setting to investigate a combination of practice and pattern-recognition knowledge that can, for instance, help skilled performers to anticipate a type of movement. Additionally, cognitions are assumed to affect emotions and behaviors. Furthermore, and in line with CBT, people are capable of learning to monitor and modify much of their cognitive activity and would benefit from learning to consider thoughts as hypotheses rather than facts. By testing the validity of these hypotheses, athletes can modify their cognitive appraisals from unhealthy and maladaptive to more evidence-based and adaptive thoughts (Moran, 2012). A logbook, for instance, can be a useful tool to increase awareness of thoughts among athletes in applied sport settings (Didymus & Fletcher, 2017; Moran, 2012).

Salkovskis (2012), has investigated cognitive vulnerability in which anxiety, depression or fatigue, can maintain or worsen negative thoughts and emotions. Anxiety and fatigue for instance, are very common in sport context and they can maintain or worsen dysfunctional thoughts and unpleasant emotions, if the athlete does not know how to evaluate their validity (Moran, 2012). In sports context, cognitive vulnerability can be influenced by the dynamic between the environment, psychological and physiological factors, and the magnitude of the error (Fryer, Tenenbaum, & Chow, 2017). Since previous experiences add a meaning to perceived situational state, psychological stressors should be identified and worked through an individualized intervention (Beck, 2011; Weaver et al., 2014). The evaluation of the event, the ability to identify and evaluate thoughts and emotions, and the repertoire of strategies can influence the sense of control and performance success (Gould & Maynard, 2009). Athletes should have a broad repertoire of behavior and techniques, as well as time to practice them to increase confidence, the sense of control and have a more functional way of thinking and acting (Vealey, 2007; Whelan et al., 1991).

An individualized preparation can help athletes enhance awareness of their optimal states to practice and compete using different tools with specific purposes (Hays, 2012). Mahoney and Avenier (1977) have suggested a strong correlation between athletes' patterns of thoughts in successful and poor performances. The functional impact of emotions on performance is determined by the content (quality) and intensity of the emotions associated to successful and poor performances (Hanin, 2003; Ruiz et al., 2017 for a review).

Turner and Barker (2012) also have mentioned that athletes should be encouraged to reflect on the factors that contribute to performances or the thoughts surrounding emotions. Therefore, it is relevant to investigate whether the athletes are aware of thoughts and emotions and their influence on athletic performance. Additionally, there is a need to examine which techniques are used by the athletes themselves to change or maintain the thoughts and emotions influencing their optimal performance states.

3 PURPOSE OF THE STUDY

Considering the influence of internal processes on performance, the purpose of the study was to investigate the thoughts and emotions of athletes before and during their best and worst performances. Additionally, what techniques the athletes used to manage their internal processes, such as to change dysfunctional thoughts and unpleasant emotions, or to remain in a functional state in those competitive events.

Research questions

- What thoughts and emotions did the athletes have in their best and worst performances?
- What did athletes do to manage thoughts and emotions associated with their best and worst performances?
- Were the athletes aware of the relationship between thoughts and emotions?
- Were the athletes aware of the influence of thoughts and emotions on performance?

4 METHODS

4.1 Researcher Role

The researcher who conducted the interview has worked as a sport psychologist of professional Brazilian athletes, such as swimmers and soccer players. The psychological work lasted two years with weekly meetings, and the approach used was cognitive behavior therapy. Considering the qualitative aspect of this study, some measures such as general questions before specific ones, and a second coder, were taken to avoid researcher's bias. However, this previous experience can also be seen as a positive aspect, because the interviews were deeply explored. Also, the results were carefully analyzed according to the theory that underlies cognitive behavior therapy.

4.2 Participants

A purposeful sample of 12 male Brazilian swimmers were recruited to take part of the study, in which 5 were Olympic and 7 were Paralympic athletes. According to Swann, Moran and Piggott (2015), participants therefore represented competitive-elite and successful elite athlete populations. The athletes were aged from 22 to 37 years old ($M = 26.16$, $SD = 4.32$). They started swimming when they were from 3 to 29 years old ($M = 10.66$, $SD = 7.03$) and they became professional athletes in the age of 14 to 30 ($M = 17.75$, $SD = 4.09$) when they signed their first contract. All the 12 athletes participated in 1-3 Olympic or Paralympic Games ($M = 1.5$, $SD = 0.67$). Three of the athletes (25%) were middle distance swimmers in freestyle, and the other nine (75%) were sprinters in all four swimming styles.

4.3 Instrument

A semi-structured interview was designed with open-ended questions, which permitted an in-depth exploration of how the swimmers interpreted and experienced specific competitive events and what they did to manage internal processes. The interview

was separated in three sections: the first section focused on their best performances. In the beginning of it, participants were asked to recall what they considered to be the best performance in their careers. They were given time to remember the competition and the specific race, and to speak freely about it, to help improve the accuracy of the recalled information. Then, they answered 11 questions such as “What did you do in the day of this race?”, in which they could decide from which moment they wanted to talk about: in the hotel going to the competition venue or when they arrived at that place. Then, using the mentioned situation, the questions focused on internal processes, for instance: “What did you feel while you were (warming up)?”, and “What was going on through your mind when you felt that way?”. Also, what was done to handle the thoughts and / or emotion: “What did you do to manage it?”. The questions about internal processes were repeated to investigate them during the race. The swimmers could speak freely in the end of this section in case they had remembered of something or wanted to add some information that they considered relevant.

The second section of the interview focused on their worst performances. They were given time to recall the competition and the race that they considered to be the worst performance in their careers and to speak freely about it, to help improve the accuracy of the recalled information. There were also 11 questions, which started with: “What did you do in the day of this race?”, in which they could decide from which moment they wanted to talk about too. Then, the questions were focused on internal processes, for instance: “What did you feel when you (arrived at the competition venue)?”, and “What was going on through your mind when you felt that way?”. Also, whether the participants tried to manage thoughts and / or emotions and what they tried to do: “Did you try to manage it? How?”. The questions about internal processes were repeated to investigate them during the race. In the end of this section, swimmers could speak freely in case they had remembered of something or wanted to add some information that they considered relevant.

The third and last section of the interview contained 3 questions to investigate the athletes’ awareness about internal processes and the influence on performance: “Do you think that there is a relationship between the way you think and the way you feel? Can you tell me more about it?”. Also, “Do you think that this relationship influences your performance? Can you tell me more about it?”, and finally “What do you usually do to

manage it?”. The swimmers also could speak freely by the end of the interview to add some information that they considered relevant.

4.4 Procedures

The research was approved by the Ethics Committee of the University of Jyväskylä, Finland. A pilot study was conducted with a professional swimmer to check clarity and purpose of questions of the interview guide, also to practice interviewer skills. The semi-structured interview was done by Skype, and after that, the only change in the interview was the order of the questions to facilitate the recollection of the competitive events and the aspects related to them.

The first contact was made with the coaches from both teams due to previous professional contact. They received information about the study and after that, they provided a list of participants and their contacts. Athletes were invited via cellphone to participate in the research. They received brief information about it, also were informed that the interview could happen at the training site, to avoid displacement. Before the interviews, they were given an information sheet about the study along with the consent form. After the participants signed the consent form, the interviews were conducted individually, face-to-face and took place in a separated room in the site where the athletes trained. The interviews happened during autumn of 2017 in Brazil. They were audio recorded and lasted an average of 33 minutes (25 to 40 minutes).

4.5 Data Analyses

Thematic analysis was used in this qualitative research, due to the exploratory nature of the research questions. It emphasizes to pinpoint, to examine and to create themes within data (Braun & Clarke, 2006). Six phases were followed to create established and meaningful patterns, which were: familiarization with the data, generating initial codes, searching for themes among codes, reviewing codes and themes, defining themes and giving names, and the final report (Braun & Clarke, 2006).

Firstly, the interviews were transcribed verbatim. Initially they were read and reread until the author felt familiar with the data. Pseudonyms were assigned to each of the athletes to ensure the participant's anonymity. Secondly, codes were developed from the raw data using Atlas.Ti software. Then, themes and sub-themes were developed from the list of codes and patterns, aiming to answer the research questions. The process of data analysis occurred with inductive and deductive approaches. The inductive approach means that both themes and sub-themes identified were linked to the data without trying to fit them into a pre-existing frame (data-driven) (Braun & Clarke, 2006). On the other hand, for the deductive approach, the analysis tended to use a theory in advance to determine the data analysis (theory-driven) (Braun & Clarke, 2006). Cognitive behavior therapy (Beck, 1995) was the one used to establish themes, also to contribute to the analysis for the final report.

Member checking was not used in this research (i.e. validation of data), because it has been questioned and therefore unlikely to generate new insights that can be used for further analysis (Tracy, 2010). A second coder checked the codes and themes ensuring inter-rater reliability. It means that the second coder, or researcher, accepted another researcher's assumptions, projections, and biases (Saldaña, 2016). The second coder ensures that all definitions are clear and inclusive of all the possible types of responses to be collected (Saldaña, 2016). Also, transferability and trustworthiness may contribute to the reliability and validity of the researcher's findings and interpretations (Saldaña, 2016).

5 RESULTS

The main themes and subthemes found are presented in Table 1. The following three main themes were identified: Cognitive and behavioral techniques, Cognitive model, and Swimmers' perceptions about the relationship between thoughts and emotions and their influence on performance. The results about before and during best performances were initially narrated followed by the results of the before and during worst performances.

Main Themes	Subthemes
Cognitive and Behavioral Techniques	Types of techniques; When the techniques were used; How the techniques were executed; Purpose of using the techniques.
Cognitive Model	Functional / Dysfunctional thoughts before race; Pleasant / Unpleasant emotions before race; Functional / Dysfunctional thoughts during race; Pleasant / Unpleasant emotions during race; Positive consequences in performance (For best performance); Negative consequences in performance (For worst performance).
Swimmers' perceptions about the relationship between thoughts and emotions and their influence on performance	Relationship between thoughts and emotions; Influence of thoughts and emotions on performance; Responding to dysfunctional cognitions and unpleasant emotions.

Table 1: Main themes and sub-themes for swimmers' best and worst performances.

Since swimmers could say freely what the best and worst performances were for them, they defined those performances as best (or worst) results in a race, body sensation in

water, qualified for a championship, and achieving (or not) expectations. For best and worst performances, the athletes mentioned the same swimming styles, however, in different competitions. For one swimmer, the best performance was the semi-final and the worst one was the final in the same championship.

5.1 Cognitive and Behavioral Techniques

This theme covered the different types of techniques mentioned by the swimmers. For each of the techniques the sub-themes were: how the techniques were executed, when the techniques were used, purpose of using the techniques and how the athletes learned it.

The 12 swimmers interviewed practiced different behavioral and cognitive techniques. For the best performance, the 12 athletes practiced imagery, nine did breathing techniques (75%), seven used music (58%), seven did self-talk (58%), five used cognitive restructuring (42%), and one used motivational audios (8%). For the worst performance, six swimmers did imagery (50%), six used breathing techniques (50%), five used music (42%), five used self-talk (42%), one did cognitive restructuring (8%), and motivational audios (8%).

Regarding the use of imagery in best performance, the swimmers did the technique in different moments and ways for different purposes. Four athletes (33%) started practicing imagery throughout the season, such as *“three months before the competition”* (swimmer#1), whereas eight of them (67%) started doing it closer to the competitive event, such as *“in the week of the competition”* (swimmer#7). All swimmers did imagery throughout the race day in different moments: *“in the hotel”* (swimmer#4), *“during the warm up”* (swimmer#9) and *“in the waiting room”* (swimmer#6). The place and moment influenced the way that athletes did imagery. Athletes imaged what they called “ideal race and time”, adding different features to the technique, as exemplified by one of them: *“In the hotel days before the competition I sat down, picked up the stopwatch and I did imagery 2 or 3 times”* (swimmer#4). Participants also did the technique to remember their race strategies at the competition venue, as illustrated:

“Before I started to warm up, I sat down, and I did imagery to count how many strokes I had to do, the rhythm of them, and the force that I had to do in

each of the 50 meters, otherwise I would not finish it the way that I wanted” (swimmer#5).

Swimmers also imaged what they called “the main parts of the race”, such as *“the start, the turn and the end of the race during the warm up, also in the waiting room” (swimmer#2)*. The swimmers had different goals using imagery, which were achieved in their best performances. The athletes did it to *“feel more secure” (swimmer#11)*, to *“feel confident” (swimmer#1)*, to *“concentrate” (swimmer#6)*, to *“feel calmer” (swimmer#8)*, to *“increase the arousal” (swimmer#9)*, and to avoid unpleasant feelings planning what to do in difficult situations, as illustrated: *“I knew that the race would be painful, so I did imagery precisely to be prepared for it” (swimmers#2)*. The swimmers did not mention having used the technique during the race.

For the worst performance, six swimmers did imagery (50%). As it happened in the best performance, participants also did the technique in different ways and moments throughout the season, the week and the race day, as cited: *“I imaged the whole race weeks before the competition. In the day of the 50m, I just did the main parts like the start and the end” (swimmer#1)*. Moreover, one of the athletes used imagery to see himself winning his race, for believing that he had chances to be on the podium, as stated: *“In that moment I was sure that the medal was on my chest, and I kept visualizing that. I only had to repeat what I did in the morning” (swimmer#11)*. Although swimmers had many goals using imagery, only one mentioned have achieved his goal, which was to manage anxiety before his race: *“That moment when I did imagery, I forgot what was going on around me and I felt calm” (swimmer#4)*. Six athletes did not do imagery for their worst performances for different reasons: four of them were unfamiliar with it, as exemplified: *“For my worst performance I did not know how to do imagery yet” (swimmer#2)*; one was uncertain about using it: *“I was afraid that if I had done that, it could worsen my current emotional state” (swimmer#8)*. And lastly, one swimmer mentioned that he did not do imagery before his worst performance, believing that he had chances to be on the podium: *“I was thinking: I’m going to win, this medal is mine. So, for this race I did not do imagery, I was thinking about the medal and I forgot that firstly I had to swim!” (swimmer#9)*. According to him, if he had done the technique, it could have helped him to focus on the moment and what to do.

About the use of breathing techniques for the best performance, nine swimmers (75%) mentioned have used them in different moments, which influenced the way they used them. Deep and slow breathing as well as deep and fast breathing were used in different moments at the competition venue, as stated: *“During the warm up I did that one that you breath slowly. But right before the announcement, I started doing that faster breathing”* (swimmer#5). Breathing techniques were used along with other techniques, such as *“body relaxation”* (swimmer#2) and *“meditation focusing on deep and long breathings in the hotel before I go to the competition venue”* (swimmer#4). The purposes of using breathing techniques influenced the moments and the ways they were executed. Breathing with body relaxation and meditation were used to *“relax”* (swimmer#4). Slow breathing was used to *“calm down”* (swimmer#2) and to *“concentrate”* (swimmer#12), whereas deep and fast breathing was used to increase arousal, as illustrated: *“Right before the announcement when I was in the waiting room, I breathed faster a few times. It was good to wake me up”* (swimmer#9). Two swimmers (17%) did not mention have used breathing technique and another (8%) stated that he did not use it. During the race, some athletes used rhythmic breathing (33%) or did not breath (17%), as part of their race strategies, as indicated by one participant: *“I used rhythmic breathing to hold on the rhythm of the race, especially during the final meters”* (swimmer#4).

For the worst performance, six athletes (50%) mentioned have used breathing techniques. As happened in the best performance, the moments and ways for using the technique varied, such as *“in the hotel, I did breathing technique along with meditation”* (swimmers#4), and *“I did hyperventilation in the waiting room”* (swimmer#9). Deep and slow breathing were mostly used, as illustrated: *“I have noticed that when I am nervous, I breath shortly, so that day I breathed slowly during the warm up, just to try to feel calm”* (swimmer#8). Three participants (25%) stated to have achieved momentarily their goals using the technique, as cited: *“I felt calm when I focused on my breath. It helped me when I was waiting for my race”* (swimmer#3). Three swimmers (25%) did not know how to use breathing as a technique in their worst performances, as cited: *“I was very inexperienced. I did not know how to use even breathing to change my situation”* (swimmer#2). The other three swimmers (25%) did not mention having used breathing techniques.

Music was used in the week of the competition by seven swimmers (58%) in their best performances. Four athletes (33%) used music with specific purposes and three (25%) used it as a distraction. Athletes used different musical genres in different moments throughout the race day, such as *“calm songs while I was going to the competition venue”* (swimmer#12), and *“I listened to upbeat songs right before the announcement in the waiting room”* (swimmer#9). The purposes of listening to different musical genres varied, depending on the moment at the competition venue. Calm songs were used *“to feel happy during the warm up”* (swimmer#9), *“to feel calmer in the waiting room”* (swimmer#12), and *“concentrate when I was in the waiting room”* (swimmer#3). On the other hand, upbeat songs were used to *“increase confidence during the warm up”* (swimmer#2) and *“to feel happy during the warm up, and to increase arousal in the waiting room”* (swimmer#9). Two athletes who had the same routines for practices and competitions also used music to feel more energetic, as cited: *“Music is part of my routine during practices. When I put some music in the competition, my brain knows that it is time to go hard”* (swimmer#2). Swimmers also interrupted the use of music while waiting for their races, when they believed that they had achieved their goals using it, as cited: *“At that moment when I realized I was fine, I stopped listening to music”* (swimmer#3). The athletes also used music along with other techniques, such as *“with imagery when I was warming up”* (swimmer#12). The participants who used music as a distraction reported to use it with current top hit songs *“to feel happy”* (swimmer#10). Three athletes (25%) stated that they did not like to use music in any moment, and two (17%) did not mention having used it.

Five swimmers (42%) used music throughout the day of their worst performances. The athletes used it to try managing their emotional states, in which three of them achieved their goals, as mentioned: *“After the warm up, I listened to some music to relax a little bit more”* (swimmer#11). Three swimmers (25%) reported that for their worst performances they did not use music and they did not know how to use it with specific purposes yet. Three participants (25%) did not want to use music believing that it could worsen their emotional state and one (8%) did not mention having used it.

Self-talk was used in the best performance of seven swimmers (58%). Different types of self-talk were used in different moments at the competition venue before their races. Motivational self-talk was used by four swimmers (33%) in different moments.

Athletes used words or sentences along with their own names, as mentioned: *“When my race was announced I said: Ok, (said his own name) it’s time now, let’s go, let’s go”* (swimmer#6). Instructional self-talk was used by three participants (25%) to recall their race strategies at the same time as they did imagery, as illustrated: *“I told myself how I would swim and the rhythm of the strokes. I said it while I saw myself doing it when I was in the waiting room”* (swimmer#5). Calm self-talk was used by three participants (25%) with words or sentences along with other techniques, as mentioned by an athlete: *“Before the race I took a deep breath, thought about a calm place, calm words and thought about my race”* (swimmer#12). There were different purposes for the use of self-talk. Calm self-talk was used to help them to *“feel calmer”* (swimmer#7), and to *“concentrate”* (swimmer#10). Instructional and motivational self-talk were used to *“feel confident”* (swimmer#10), to *“concentrate”* (swimmer#12) and to *“motivate”* (swimmer#6). Instructional and motivational self-talk were used during the races by six swimmers (50%) to instruct and to motivate, as stated: *“Hold your breath!”* (swimmer#10), and *“I trained too much for this, this is my dream, I can do it!”* (swimmer#5). Five athletes (42%) reported that they did not use self-talk for their best performances, because they had never practiced before, also to believe that it did not sound truthful, as illustrated: *“I don’t like to do self-talk. I don’t know, it is weird, it sounds fake to me”* (swimmer#2).

Five swimmers (42%) used self-talk before their worst performances, in which three (25%) used the motivational and two (17%) the positive self-talk. The technique was used to try changing dysfunctional thoughts and unpleasant emotions, which according to athletes was inefficient, as cited: *“I said: hold on, there is a chance, but I do not know, it did not work”* (swimmer#1). During the race, the athletes also mentioned having used self-talk (41.66%). Three swimmers (60%) mentioned having used negative self-talk, because they believed that they did not have any chance to succeed, as exemplified: *“It is not working, just finish it, you are not doing it right”* (swimmer#10). Two athletes (17%) used instructional self-talk, but according to them, they did not achieve their purposes, as mentioned: *“I was screaming to myself, but my body was not responding”* (swimmer#1). Four swimmers (33%) mentioned that they did not use self-talk and the other three (25%) did not mention the technique.

Cognitive restructuring was used in the best performance of five swimmers (42%). The athletes reported to use this technique in their daily lives, but it was mainly used throughout the race day, which varying since they were in the hotel until the competition venue, as following statement: *“This is something that I try to do daily, but I remember that some things went wrong during the warm up inside the swimming pool, and I kept thinking about it. But then, I decided that it was nothing”* (swimmer#5). The participants used the technique to try to understand what they were thinking or feeling and according to one of them *“to try to find the source of that thought”* (swimmer#2). According to the athletes, it helped to have a more realistic thought, improving their emotional states, which was also evaluated and reconsidered, as illustrated: *“I was anxious, but then I thought about it and, in fact it was not anxiety, it was desire to swim, I knew my potential”* (swimmer#5). The technique was also used during the race by four swimmers (80%) to manage internal factors, such as *“to endure muscle pain”* (swimmer#2) and external factors, as illustrated: *“I thought: I am pushing hard as I always do, and I am losing him. Am I right or he is risking? No, I think that he is risking, I will do it my own way”* (swimmer#12). The athletes who used this technique achieved their goals before and during their best performances.

One athlete (8%) did cognitive restructuring before his worst performance at the competition venue. According to the participant, the technique helped him to feel calm and focused, whereas the other techniques did not relieve his unpleasant emotions and dysfunctional thoughts, as mentioned: *“Analyzing the thoughts and understanding where they come from is the most valid technique to me. More than to think positively, or breath, or positive self-talk”* (swimmer#2). The five swimmers who did cognitive restructuring in their best performances did not know yet how to do it in their worst performances. The athletes who did not know this technique were unable to manage their thoughts, as shown: *“I noticed that there was something wrong in the swimming technique, and instead of focusing on improving it, I kept thinking about what was wrong, and I focused on the feeling of something being wrong”* (swimmer#8).

Motivational audios were mentioned by one athlete (8%) for his best and worst performances. According to him, he listened to a playlist with motivational audios daily during trainings. Since he had the same routine for trainings and competitions, he also listened to the audios before his races. According to the athlete, he listened to playlist

because *“I felt empowered and confident when I listened to it”*. This goal was achieved for the best performance, however, not in the worst performance. According to him, it did not sound truthful, because it did not match to what he was thinking, as stated: *“Although I kept listening to the audios, talking to myself and doing imagery, this time I do not know, the negative thoughts invaded my head”* (swimmer#1).

Eleven swimmers (92%) mentioned that they learned most of these techniques, or a more specific way to perform them with a professional, as stated: *“Most of the techniques that I know, especially how to evaluate my thoughts, I learned with my psychologist”* (swimmer#2). The athletes mentioned that they learned or improved the way of practice imagery, breathing, self-talk, music with specific purposes and cognitive restructuring with a sport psychologist, as following statement: *“I learned how to do imagery by myself, all athletes do it, right?! But it has improved when I started a psychological work. Now I am able to put more stimuli, it became more real”* (swimmer#3). Breathing techniques were also learned from other sources, such as *“I learned them at Yoga classes”* (swimmer#1). Vicarious experiences were also an effective way for some athletes to learn breathing and the use of music *“by seeing other athletes using it”* (swimmer#6). Eight swimmers (67%) had their worst performances before the best performances, and seven of them started their psychological preparation after that negative result.

5.2 Cognitive Model

This theme, theory-driven from CBT, explored the relationship between thoughts and emotions and the consequences on performance in the given situation mentioned by each of the swimmers.

For the best performance, the way that swimmers evaluated the competition, mainly their races, influenced them to have a positive attitude towards it. Three athletes (25%) reported that for the best performance, they faced the competition as something common, in which they were used to do daily, as mentioned: *“I did not face it as a big challenge, I faced it as something that I did every day during practices”* (swimmer#12). Two swimmers (17%) who participated in the 2016 Olympic/Paralympic Games, evaluated the event as a very exciting moment, which contributed for this to be their best performances. One

important point that contributed to athletes' evaluation of the events was their beliefs about the preparation throughout the season. The 12 athletes mentioned that they did a good preparation in the physical, psychological and technical aspects, which led them to feel prepared for the competition, as exemplified: *"The whole preparation was good. I was confident about the process"* (swimmer#3). Although some events in the race day brought thoughts of doubt, swimmers reported that they preferred to believe in the preparation that they had during the season, instead of in this specific moment, as stated: *"I did not warm up very well, but I knew that I was ready to swim well"* (swimmer#7). The events in the day of the race also contributed to positive beliefs. Two athletes (17%) had good results in previous races, which gave them confidence to perform even better for the finals, when they had their best performances, as illustrated: *"I swam very close to my best, and usually I do not swim very well in the morning. So, I knew that something good would happen"* (swimmer#4).

All swimmers had functional automatic thoughts before their best performances, such as *"this is where I supposed to be"* (swimmer#5) and *"I am ready"* (swimmer#1). Thoughts about the race strategy were very common among all participants. The thoughts led to pleasant emotions such as *"happiness"* (swimmer#4), *"confidence"* (swimmer#9), *"security"* (swimmer#1) and *"readiness"* (swimmer#2). Three participants (25%) had dysfunctional thoughts before the best performance, such as *"the importance of performing well"* (swimmer#11). Anxiety was the only unpleasant emotion mentioned by six swimmers (50%) at some point before their races. However, they felt secure about what they were able to perform and described anxiety as *"nice adrenaline"* (swimmer#5) and *"positive anxiety"* (swimmer#7). Swimmers could manage the negative thoughts and unpleasant emotion, which did not influence negatively the performance. The use of cognitive and behavioral techniques mentioned in previous main theme also contributed to the readiness before the best performance.

During their races, swimmers also had functional automatic thoughts about aspects related their race strategies, as mentioned: *"During the race I thought about the technique, to be as best as possible technically, to pull water as much as possible"* (swimmer#1). Athletes had pleasant feelings such as *"confidence"* (swimmer#1), *weightlessness* (swimmer#8), and *"calm"* (swimmer#12). Moreover, two swimmers (17%) had

dysfunctional thoughts due to comparisons of themselves with the opponents, such as *“I started comparing myself with who was by my side and thought about the end of the race”* (swimmer#2). However, these thoughts did not disturb the good result. The unpleasant feeling mentioned during the best performance by four swimmers (33%) was muscle pain. One swimmer stated that external factors were important to boost him during the final meters and helped him to overcome the pain: *“By the end of the race I was feeling too much pain, and the crowd was a motivational factor in that moment, it was absurdly good, and I knew that it was for me”* (swimmer#5). The use of cognitive and behavioral techniques mentioned in previous main theme also contributed during best performances.

The influence of the previously cited thoughts and emotions on performance was successful. The swimmers could accomplish what they had planned, to execute their strategies, also to overcome small incidents. Thus, swimmers achieved their goals and had what they considered their best performances, as illustrated: *“The result was positive, I improved my time, did the best of my life and I could do the strategy that I wanted”* (swimmer#2).

For the worst performance, the subthemes for the cognitive model had different contents. The way the swimmers evaluated the competitive events, influenced them to have a negative attitude towards it. Two swimmers (17%) who participated in the 2016 Olympic/Paralympic Games for the first time, evaluated the event as a difficult moment, which contributed for being their worst performances, as stated: *“Indescribable to be there, oh God, nothing compares to that. It is a huge competition, I was shaking!”* (swimmer#6). For the worst performance, the beliefs about the lack of preparation also influenced the way that athletes faced the competitive events. Nine swimmers (75%) believed that they did not have a good preparation during the season, geared to their needs, as following statement: *“I am sure that the trainings were not what they should have been”* (swimmer#4).

Thoughts and emotions were also perceived differently comparing to the best performance. Eight athletes (67%) faced anxiety as something negative in their worst performances, as stated: *“This time, it was not good anxiety”* (swimmer#7). Participants also mentioned that they did not have a good sensation in the water during the warm up. Differently from the best performance, they did not know how to manage it, as cited: *“The*

water was heavy, I was not pulling enough water. Maybe everything was right, but in my head it was not.” (swimmer#8).

Dysfunctional automatic thoughts were very common before the worst performance for ten swimmers (83%). For six participants, the dysfunctional automatic thoughts started weeks or days before the competition, due to personal reasons such as *“broke up my relationship”* (swimmer#12) or professional reasons, such as *“my team ceased the activities”* (swimmer#4). Thoughts about *“the greatness of the event”* (swimmer#3) and *“the importance of performing well”* (swimmer#7) led them to feel unpleasant emotions such as *“sadness”* (swimmer#1), *“insecurity”* (swimmer#6), and *“inferior to the opponents”* (swimmer#4). Two swimmers (17%) were discouraged for believing that they did not have chances to perform successfully, which made them just want to finish the race, as exemplified: *“I thought: whatever happens, I want it to finish as quickly as possible”* (swimmer#10). On the other hand, two swimmers (17%) were overexcited, thinking about their chances to win a medal, which influenced them to feel *“euphoria”* (swimmer#11) and *“confidence”* (swimmer#9). Functional automatic thoughts about the possibility to perform well were mentioned by two swimmers before the worst performance (17%), which brought hope. However, dysfunctional thoughts were recurrent, and the athletes said that they did not know what to do to change them, as shown: *“It was bad, I was thinking that it was bad, and I did not know how to change the process. I saw everything happening and I did not do anything”* (swimmer#2).

During the worst performance, the dysfunctional automatic thoughts were also very common. The thoughts were triggered by internal and external events, when athletes compared themselves with the opponents, such as *“I am falling behind, I cannot make it”* (swimmer#1); and uncertain about the race strategy: *“It is not working, should I change my strategy?”* (swimmer#). Unpleasant feelings such as *“tiredness”* (swimmer#10), *“hopelessness”* (swimmer#2) and *“desperation”* (swimmer#1) were the most cited ones. Two swimmers (17%) mentioned have had positive thoughts, to try to do the best they could, but it was not enough to overcome and change dysfunctional thoughts. They felt tired as soon as they started swimming, bringing the negative thoughts back, as illustrated: *“I thought that maybe there was a chance, until I started swimming. But four hours of positive thinking could not overcome weeks of negative thoughts”* (swimmer#1). The two

athletes who had thoughts related to their chances of winning a medal, mentioned to have had negative thoughts as soon as the race started, as shown: *“I was thinking that I had real chances to be on the podium. But as soon I as started swimming, I messed up the start and for the 50m there is no time to recover”* (swimmer#9).

There were different negative consequences regarding the influence of those thoughts and emotions on performance. The swimmers were not able to achieve their goals, such as executing their race strategies, or swimming as well as they thought they could, so they rather simply finished the race, as illustrated: *“I was overactivated for the race. I did a higher frequency of stroke than I usually do, so I basically finished it”* (swimmer#9). The swimmers had what they considered the worst performance in their careers: *“I was not qualified for the championship that I wanted”* (swimmer#4), *“I did not perform good enough to be in the final”* (swimmer#6), and *“I swam 20 seconds more than my best time”* (swimmer#12), were some examples of the negative results.

5.3 Swimmers’ Perceptions About the Relationship Between Thoughts and Emotions and their Influence on Performance

This theme approached how athletes understood the relationship between thoughts and emotions, the relationship with their performances, and how they managed this relationship. The subthemes were: relationship between thoughts and emotions, influence of thoughts and emotions on performance, and responding to dysfunctional cognitions and unpleasant emotions.

Ten swimmers (83%) stated that there was an interaction between thoughts and emotions, while two athletes (17%) said that this relation existed occasionally. According to participants, positive or negative thoughts trigger emotions, as one athlete indicated: *“If you have negative thoughts, your emotions cannot be different”* (swimmer#1). Overthinking was also mentioned to influence thoughts and emotions, by worsening the way that events and situations were seen. Eight swimmers (67%) believed that the thoughts are antecedents and generate emotions, although they also thought that they influence each other, as mentioned: *“Everything that you think will generate emotions. And if you are not aware of it, the negative emotions will worsen your thoughts”* (swimmer#5).

About the influence of thoughts and emotions on performance, the 12 swimmers said that it can happen, however the explanations were different. Athletes said that functional thoughts let them perform what they can do, whereas dysfunctional thoughts prevent this to happen, as following statement:

“If I think that I am going to swim badly, I am going to do that, but if I think that I am going to swim well, it does not mean that it is going to happen, but I will be focused in a condition to perform what I know” (swimmer#3).

Three athletes (25%) said that it is important to use the power of mind and to think positively to deal with potential negative thoughts, which may disturb the performance. However, the same athletes said that sometimes this strategy does not sound truthful, as cited: *“It does not matter how much you think positively if you have never trained to perform well” (swimmer#9).* One swimmer (8%) stated the importance of a good preparation during the season, which helped him to perform well and not focus on internal processes: *“If you did a good preparation, technical and mental, if you are in shape, you will be confident that you will perform well” (swimmer#7).*

Ten swimmers (83%) mentioned techniques and strategies to respond to dysfunctional cognitions and unpleasant emotions when they were aware of them. Six athletes said that if their emotions changed, they tried to evaluate their thoughts, searching for evidence to confirm or deny them. According to the participants, this realistic thinking made the process more rational, and helped them regulate their emotions. They mentioned that since they learned how to use this technique, they could successfully manage their thoughts. One athlete reported that this realistic evaluation of thoughts is important to make him aware of the situation and to put him in position to think about what he needs to do, as illustrated:

“The bus was going to the competition venue and did the wrong way and got lost. The competition would start in one hour, nobody spoke our language, nobody spoke English, everybody was desperate, and I thought: Wait, let’s make things happen. What can I do? (...) And then, when everything was ok, and we arrived at the competition venue, while some people were shaking I took a deep breath and thought: Ok, now everything is solved, let’s go back to

the competition routine". So, it is about to rationalize during these tough moments. I think that this helped my performance a lot" (swimmer#2).

Three swimmers (25%) said that they tried to think positively, or to use the "power of the mind" to respond to dysfunctional thoughts and unpleasant emotions. However, sometimes the strategy did not sound truthful, consequently it was not effective, as exemplified: *"If I am not feeling good, like in my worst performance, I try to think positively, but it is not easy, it does not work all the time" (swimmer#10).* One athlete (8%) said that what helped him to respond to dysfunctional automatic thoughts was to have a routine, as mentioned:

"That is why I always follow the same routine during competitions and trainings, because even if I am feeling strange or having negative thoughts, I know that if I follow my routine I will do everything that I need in the right way, and then, I forget about what I was thinking" (swimmer#9).

Two swimmers (17%) did not know how to react to internal processes. According to participants, they had different strategies in each competition and they were not aware about what to do to manage their internal processes, as shown: *"The difference was my state of mind. I do not know exactly what led me to have a good performance, to be calm like that" (swimmer#8).*

6 DISCUSSION

The present study investigated the thoughts and emotions of swimmers before and during their best and worst performances. Also, what techniques the athletes used to manage thoughts and emotions that influenced their personal optimal state. The 12 swimmers interviewed practiced a variety of behavioral and cognitive techniques mostly before and during their best performances. The techniques were used in different moments throughout the season, the week and mainly the day of the races of the swimmers. The moments when the techniques were used influenced the ways in which the techniques were executed, also the purposes of the swimmers of using them. Previous studies have suggested that multiple types of techniques are important for athletes' success, to increase their repertoire of behavior, giving them more options to cope with emotions as anxiety (Gustafsson et al., 2017) and different situations (Feltz & Lirgg, 2001; Vealey, 2007; Weinberg & Gould, 2015).

For imagery, some swimmers started practicing it weeks before the competition, and all of them did it in the race day. The athletes also practiced imagery in different ways, adding some stimuli to try to make it more real and closer to an ideal race. Moreover, the moment influenced that the way the technique was executed. The results corroborate with the findings of Vealey (2007), who stated that athletes tend to use mental techniques more in competitions than in practices. According to Williams et al., (2013) athletes should be encouraged to practice imagery daily, increasing their chances to perform better, rehearsing what they would like to do in a competition. Additionally, the more vivid the imagery is, the better for the athletes (Williams et al., 2013). Greater number of sensory modalities and details is considered a good imagery ability (Williams et al., 2013). The findings also support Williams et al., who have stated that the timing will influence on how the technique is used. The internal or external perspective adopted by athletes (Williams et al., 2013) when using imagery was not investigated in this present study. Besides, research has shown that performance may be enhanced using both perspectives (Vealey, 2007).

Breathing techniques were also mentioned before and during the best and worst performances. Some breathing techniques were part of the race strategies. Sprinters for

instance, do hyperventilation before their races to try not to breathe during them (Jacob et al., 2015). Although it was part of the race strategies of the swimmers, they also used breathing to regulate their emotional states. Athletes also used breathing along with meditation and body relaxation. Beck (2011) has suggested that many people can benefit from learning relaxation techniques including progressive muscle relaxation and controlled breathing to manage their stress symptoms. Vealey (2007) has also stated that physical relaxation and breathing techniques may be useful to help athletes manage their physical and mental states to perform their best.

Music was used before the best and worst performances. Most athletes used different musical genres with specific purposes, whereas some of them used it only as a distraction. Music can be a distraction for many people (Juslin & Västfjäll, 2008) including athletes. Study has suggested that the most common goal of musical experiences is to influence emotions (Juslin & Västfjäll, 2008). People use music to change emotions, to enjoy or comfort themselves, and to relieve stress (Juslin & Västfjäll, 2008). However, in sport context music can be more than a distraction, it can be used with specific purposes by athletes to regulate psychobiosocial states (Middleton et al., 2017), and facilitate flow states (Norsworthy, Gorczynski & Jackson, 2017), which can influence athletic performance.

Different types of intentional self-talk were used before and during best and worst performances. Self-talk was used along with other techniques such as imagery, to rehearse the race strategy. As stated by Van Raalte et al., (2016) self-talk that helps athletes to direct attention or provide motivation and leaves sufficient attentional resources available for the task is ideal. It also supports the findings of Vealey (2007), who stated that other mental training techniques are associated with self-talk, including breathing, imagery, and thought management, and allow athletes to better cope with different situations. Negative self-talk was mentioned during the worst performance and although positive self-talk was used, it did not help athletes to change their thoughts or emotions. It corroborates with the findings of Van Raalte et al., that self-talk may lead to overthinking, disturbing the focus and bringing unpleasant emotions depending on the athlete and the situation. Additionally, positive self-talk helps momentarily to deviate from what is disturbing and can worsen the emotional state (Moran, 2012).

Cognitive restructuring was also used before best and worst performances and during best ones. The athletes who used this technique reported that the results were lasting in managing internal processes than the other techniques. For the worst performance, only one athlete knew how to do cognitive restructuring, which helped him to feel calmer and focused. Cognitive restructuring has been used to help people in a variety of psychiatric conditions and diagnosis (Beck, 2011; Weaver et al, 2014), as well as athletes in different sports (Didymus & Fletcher, 2017; Gustafsson et al., 2017). Didymus and Fletcher have shown similar findings with the intervention with female field hockey players when they were educated about the cognitive restructuring technique. Right after teaching them the technique, the hockey players reduced threat and loss appraisals, whereas challenge appraisals increased, even three months post intervention. Therefore, athletes can benefit from learning this technique.

The athletes learned or improved the way they practiced the techniques from different sources, most of them with a sport psychologist. The participants also learned the techniques from past performances, observing other athletes, and at yoga classes. When mental training is guided by a specialist is more effective in helping athletes to learn, practice and master the techniques, giving them more chances to achieve their goals (Arnold & Sarkar, 2015; Haberl & McCann, 2012). The findings also support Hays (2012), who has stated that an individualized preparation can help athletes understand themselves, creating awareness of their best psychological and physiological state to practice and compete using different tools with specific purposes. Additionally, Chase, Feltz and Lirgg (2003) have mentioned that past performances and vicarious experiences are important sources of information for personal efficacy, which was found in the results of the present study.

For the cognitive model, an important aspect mentioned by the swimmers that influenced their evaluation of the competitive events was the preparation during the season. For the best performance, athletes considered the preparation a positive aspect that helped them to achieve those results. On the other hand, for the worst performance, athletes believed that there was a lack in the preparation, which influenced negatively their performances. Those beliefs influenced the way that participants faced the competitions comparing both performances. The athletes' beliefs whether they were prepared to perform

well, generated thoughts, influenced their emotions and the way they faced the competitions: to fight for a good position even feeling muscle pain, or just to finish the race. These findings enlighten the concept of the cognitive model, which considers that it is not the event itself, but how people perceive it that influences emotions and behaviors (Beck, 2011). It also supports the findings of Didymus and Fletcher (2017), in which the reappraisal of organizational stressors led to pleasant emotions and more adaptive behaviors. Beck, as well as Mahoney and Avenier (1977) have suggested that events, thoughts and emotions can be experienced and interpreted in different ways, which happened with the swimmers who participated in the same Olympic/Paralympic event.

Functional thoughts were much more common before best performances leading to pleasant emotions, and the dysfunctional thoughts and unpleasant emotions were handled by the swimmers in these performances. On the other hand, dysfunctional thoughts and unpleasant emotions were more common in the worst performances, and difficult to be managed by the athletes. Some participants mentioned that most of the techniques were not efficient in help them to manage internal processes. Moreover, most of the athletes did not know many of the techniques before their worst performances. It corroborates with the findings of Mahoney and Avenier (1977), who have suggested that patterns of thoughts were correlated with successful and poor performances. Middleton et al., (2017) have suggested that pre-performance psychobiosocial states were different between best and worst performances. Additionally, Hanin (2007) has been shown that the content and the intensity of the emotions are associated to successful and poor performances, although the intensity of them were not assessed in the present study.

Regarding the opinion of the swimmers about the interaction between thoughts and emotions, it can be stated that the athletes were aware of this relationship. All 12 swimmers believed that the internal processes can influence performance, but it was explained differently. Participants also mentioned different ways to manage dysfunctional thoughts and unpleasant emotions. Miles et al., (2016) have also reported that the athletes identified cognitions associated with a variety of competitive stressors that resulted in pleasant and unpleasant emotions. The athletes also used different coping strategies to cope with stressors and emotions, but the strategies differed from the techniques used by the swimmers in the present study. Beck (2001), as well as Gould and Maynard (2009) have

also mentioned that expanding the repertoire of techniques helps to increase the sense of control, because the person has more options to cope with different situations.

The results of this study should be interpreted considering its methodological strengths and limitations. In the beginning of the interviews, when participants were asked to recall their best and worst performances, it was not determined what best or worst performances should be, neither a limited time was specified. Athletes could say freely what those performances were for them and when that happened. The competitive events mentioned by the swimmers happened one or two months before the interview, but also happened one year before it. It may have influenced the way the memories were recalled. This is one of the difficulties in qualitative research when assessing emotions and related cognitions and the time they occurred (Ntoumanis & Jones, 1998). However, two swimmers stated that more months after the competition allowed them to have a more realistic evaluation of their results in worst performances. The small sample size of participants and their nationality, do not permit external validity. However, the elite level in which the athletes competed should be considered a strength. Additionally, the indepth nature of the findings allowed to state the importance of individualized psychological preparation, and time for the athletes to practice it. Weinberg and Gould (2015) have differentiated clinical sport psychologists from educational sport psychologists, also known as “mental coaches”. According to the Federal Council of Psychology, in Brazil only clinical sport psychologists are allowed to work with sport psychology (Resolution CFP N° 02/01), which could have influenced the type of work developed and provided for the athletes, consequently the results found in this present study.

Future researches should investigate if athletes can change their internal processes before and during competitions to have a better performance, since this one investigated specifically the best and the worst ones. Since this present study used a qualitative approach, future researches should also investigate the thoughts and emotions of athletes using questionnaires, in a bigger sample and different cultures.

7 CONCLUSION

All swimmers used a variety of techniques to manage their thoughts and emotions, mostly before their best performances. There was a great variability in how the techniques were utilized, regarding the purposes and timing throughout the week and the race day. The swimmers achieved their goals using the techniques mainly in the best than the worst performances. Some athletes mentioned that some techniques were not efficient, because the dysfunctional thoughts were constants in the worst performances. Although some of the athletes were already familiar with some of the techniques, they reported improvement in how and why using them after started a psychological preparation with a sport psychologist.

The beliefs about the process of preparation during the season influenced how swimmers faced the competitions. Those beliefs influenced positively and negatively the way they faced the competitive events, their thoughts, emotions, and consequently their performances. Functional thoughts and pleasant emotions were more common in the best performances, whereas dysfunctional thoughts and unpleasant emotions were more common in the worst performances.

The swimmers were able to remember their thoughts and emotions before and during their best and worst performances. However, some athletes mixed both concepts during the interview. Thus, it is important to educate athletes to distinguish thoughts from emotions, how to identify and evaluate them, to achieve the desired behavior. Additionally, the swimmers believed that thoughts generate emotions and they can influence performance. However, only a few participants mentioned to be aware of how to manage this relationship to be more functional. Therefore, cognitive restructuring can be a type of technique used in sport context.

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