Models of injury and practical tips for using imagery in rehabilitation

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Summary

Athletes' reactions to injuries are varied and involve not only physical, but also mental responses. The perception of injury and individual differences can influence the results of rehabilitation. This article presents four models that show these relationships. Special attention is paid to the difficulties faced by athletes when returning to sport. Imagery is a mental training technique recommended in the rehabilitation process. Correct application of this method is thought to be important in recovery. There are several main factors that are considered to affect the effectiveness of imagery training. Real examples of the use of the technique by injured athletes are useful for understanding what to pay attention to. Our purpose is to show that imagery training can help in an injury situation or after injury.

Key words: injury, imagery, rehabilitation, mental training, injury perception

Injury in sport as a challenging situation

Injury is one of the greatest challenges an athlete faces during their career (O’Connor et al., 2005). The experience not only affects the athlete’s athletic activities, but determines how they function in all areas of their lives. While minor injuries result in a short-term exclusion from the full training process or competition, others have a longer-term impact and, in the worst case, force the athlete to end their career. Professional athletes have a higher risk of injury than amateurs due to the significantly greater number of hours they devote to sport (Brewer, 2009). For example, 75% of professional football and soccer players face a minor or significant injury each playing season (Vitale, 2011). Injuries in sport are therefore a common occurrence, one might say inherent in an athlete’s career. However, each case requires an individual approach, as an injury involves not only physical pain, but more importantly psychological discomfort and the possibility of trauma arising in its aftermath (Blecharz, 2008).

Many different factors can be the cause of injury. These include loads experienced during training and competitions, inappropriate ways of regeneration, aspects related to nutrition and supplementation, but also the level of stress experienced in various, also non-sporting, situations (Luszczynska, 2011). Blecharz (2008) emphasizes the key importance of the athlete’s psyche, which shapes his perception of injury and whose structure is to some extent disturbed by abnormalities of body functioning and general deviation from the previously accepted norm. Lack of concentration, fatigue and outcome pressure are also identified as risk factors that can result in injury (Andersen & Williams, 1993; Blecharz, 2008; Heil, 1993).

There is neither a universal method for coping with an injury situation nor the only correct response to this upsetting event. It is recommended that during rehabilitation, the injured athlete should benefit from the support that should be offered by their social environment and the professional intervention of a psychologist, however it is rarely used (Rees, Mitchell, Evans, & Hardy, 2010). Between 5 and 24% of athletes exhibit changes in emotional functioning after an injury so severe that the assistance of a psychotherapist is recommended (Luszczynska, 2011). The support of family and friends is especially important in the first weeks after an injury (Bianco, 2001). The stress experienced by an athlete in an injury situation can affect functioning in the physical, emotional, and social spheres as well as the structure of one’s self (Heil, 1993). It is worth adding that often the necessity of withdrawal from sporting activity is associated with consequences affecting, not only the sporting level, but also the financial status of the athlete (Przybylski, Budnik-Przybylska, & Rosiak, 2018).

Recovery is undoubtedly a long-term process, involving the entire spectrum of an athlete’s daily activi-
ty. It also depends on his or her temperamental and personality traits, susceptibility to distractors, and the important role training and related achievements play in the athlete’s life, as well as the ability to cope with crisis situations (Blecharz, 2008; Morris & Summers, 1998).

Thus, the rehabilitation itself and the treatment associated with it are often a source of a strong stress reaction, as they require adjustment to a new reality and, consequently, a reorganization of the previous lifestyle. The role of the treating physician and medical staff is important, and the athlete should have complete trust in them (Blecharz, 2008). There is evidence that mental imagery, as a fundamental cognitive capability, can be a beneficial support in rehabilitation and can have the effect of increasing performance (Di Nuovo, De La Cruz, Conti, Buono, & Di Nuovo, 2014; Multhaupt & Beuth, 2018). Motor imagery can be successfully used in therapy for people with for example spinal cord injuries, which can improve the function of imagined body parts (Grangeon, Revol, Guillot, Rode, & Collet, 2012; Pfurtscheller, Linortner, Winkler, Korisek, & Müller-Putz, 2009).

The purpose of our article is to introduce the topic of injury and mental training and mainly imagery training. In the first part we discuss the basic models describing an injury in sport. They show different perspectives on the injury situation. The first Williams and Andersen (1998) deals with predisposing factors of injury, the second Wiese-Bjornstal (1998) deals with the response to injury in sport and the third Brewer (2007, 2009): the biopsychosocial model integrates the influence of different factors on the healing process and the effectiveness of rehabilitation. A key element is the athlete’s perception of the injury, which influences the consequences of returning to sport (Blecharz, 2008).

In the next step, the authors focus on the principles of applying imagery training and emphasize the practices of a properly conducted process. It is often widely believed that imagery training is effective in any form, however, there are some elements that could facilitate this process to produce the desired results.

Models describing injuries in sport

In psychological literature we can find theoretical models concerning possible causes of injuries and the athlete’s reaction to this situation and the related process of returning to competitive sports.

Williams and Andersen (1988): a model of injuries in sport

The most widely cited model of injury in sport is that of Williams and Andersen (1988). It assumes that the specific physical and psychological changes that occur in an injury situation are the factors directly and most closely related to it. The physical effect of a stressful experience is an increase in muscle tension and muscle spasm, which translates into an increased risk of injury. In turn, the psychological response to stress – decreased concentration and reduced processing of incoming information – promotes an underestimation of the threat posed by the environment. The authors call these processes proximal to trauma. They, in turn, are explained by other factors indirectly correlated with the injury. These include cognitive appraisal, relating to resources, consequences, and situational demands; personality variables ( locus of control, anxiety as a trait, achievement motivation, mental toughness); stressful events experienced (previous injuries, daily stressors); and coping resources such as coping styles, ability to manage stress, and social support (Williams & Andersen, 1998).

When referring to the experience of stress, the researchers relied on Lazarus and Folkman’s (1984) coping model and the classical approach to stress as an important life situation, evaluated positively or negatively (Holmes & Rahe, 1967). Analyzing the results of numerous studies, they identified the stressors most important to athletes that are related to the occurrence of injuries in sport (Williams & Andersen, 1999). The first group consists of important life events unrelated to sport, also positive (e.g., death of a loved one, getting married). However, the important factor is not the sheer number of events, but the subjectively perceived level of stress as a result. Other stressors, called minor daily hassles, also contribute to an increased risk of injury as a result of perceived increased stress (Fawkner, McMurray, & Summers, 1999). Injuries sustained earlier in one’s career are also significant. The authors of the model described above emphasize that fear of injury recurrence also alters cognitive appraisal and increases perceived stress in the athlete.


The response to the injury suffered, the processes surrounding rehabilitation and the return to sport are described by the integrated model of injury response in sport (Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998). The concept is comprehensive, so research has only focused on its selected areas and therefore lacks a full validation taking into account all elements and the interactions between them.

In the initial phase, the most important seems to be the cognitive evaluation of the injury, representing the set of first psychological reactions to this difficult experience. It concerns the need to redefine previously set sporting goals, and to estimate the time needed to return to full fitness. It is also important to assess oneself in terms of athletic identity, as the injury may necessitate a change in self-image in this area (Heil, 1993). The greatest decline in athletic identity is observed between 6-12 months after long-term injury (Brewer, Cornelius, Stepham, & van Raalte, 2010). An athlete’s cognitive appraisal is influenced by individual variables (motivational, cognitive, emotional, personal injury history) and situational variables (type of sport played, performance history, social support, access to rehabilitation). In turn,
cognitive assessment implies an emotional-cognitive response to injury. Wiese-Bjornstal et al. (1998) highlighted its important components: anxiety, depression, regret, focus on a positive future, and emotional coping with stress. The response to injury also includes a behavioural component, referring to the use of social support, adherence to rehabilitation, risk-taking behaviours, and problem-focused coping (Wiese-Bjornstal et al., 1998). Proper cognitive assessment implies the behavioural aspect is also extremely important in readiness to use mental training, including imagery training.

Brewer (2007, 2009): the biopsychosocial model

The conceptualization of the rehabilitation process after injury is explained in detail by Brewer’s (2007; 2009) biopsychosocial model. It consists of seven dimensions that are relevant at different stages of the rehabilitation process, influencing the intermediate and final outcome and each other. First of all, it is emphasized that the mentioned rehabilitation process begins with the occurrence of the injury. The location, cause, type of injury sustained, and previous experiences influence biological, psychological, and socio-contextual dimensions. Sociodemographic characteristics of the athlete (age, gender, ethnicity, economic status) also influence the dimensions listed above. These, in turn, determine the intermediate outcomes of rehabilitation, understood as pain perception, range of motion, muscle strength and endurance, joint laxity, and overall recovery duration. Finally, indirect outcomes influence the final outcomes of rehabilitation, as assessed by overall performance, quality of life after injury, satisfaction with treatment, and desire to return to sport. Brewer (2007, 2010) highlights the central role of psychological factors and the influences between the dimensions described.

Blecharz (2008): injury perception model

In addition to the physical aspect of the recovery process, the athlete’s psyche is equally important both during and after the injury situation. The psychological functioning of an athlete suffering an injury is disrupted to some extent, also due to other roles he or she undertakes in his or her life that cannot be performed satisfactorily at that time. Therefore, it is worth analyzing not only the area of sport, but also other spheres of the athlete’s functioning. It is important how he or she divides his or her time during the day between different activities and whether he or she does not become too involved in some area. This may translate into an inadequate focus during sport and underutilization of one’s resources, including mental resources needed in the rehabilitation process.

The Sport Injury Perception Scale (SPUwS) developed in Poland may be helpful in assessing the mental state of an athlete experiencing an injury.

Blecharz (2008) in his model focuses on three perspectives (emotional, cognitive and behavioural) from which the athlete’s reactions to injury and the physical strain experienced should be considered. At the same time, it emphasizes the multitude of ways of perceiving and experiencing the situation of injury and, consequently, exclusion from sport for some time. Since every organism is different, differences in psychosomatic reactions can be observed. A factor that significantly influences the perception of oneself in an injury situation is personality. It is necessary for an athlete who has experienced an injury to accept and understand the current state, treating it as a transitional period, but one that offers a chance for development. A negative perception of the situation intensifies helplessness, decreases confidence, and may result in depression (Brewer, Linder, & Phelps, 1995).

Adequate perception of the injury facilitates the recovery process, as protection against making similar mistakes as before the injury and adequate mental preparation increase readiness to face similar difficult situations during an athletic career. Also, proper motivation could speed up recovery from an injury. However, beware of its excess, which may cause lapses of attention, which in turn may translate into errors such as technical errors (Blecharz, 2008). The support of not only specialists, but also family, friends, coach or team may be beneficial in the return to full fitness. The return to competitive sport may be a challenge for the athlete due to the possible change of goals and expectations. Therefore, support during this period of the career may be the important part of the treatment of the injury.

Imagery training in sport

Imagery training is the most commonly used method in mental training, leading to optimization of athletic performance (Morris, Spittle, & Watt, 2005) is also used in rehabilitation. It is defined as a process in which sensory experiences (e.g., auditory, visual, kinesthetic) already stored in memory are reproduced in a controlled manner (Karageorghis & Terry, 2014). Athletes vary in their preference for sensory use, although the most commonly used technique is a combination of kinesthetic and visual imagery (Callow & Ross, 2010).

The main areas of application of imagery training in sport are: teaching and improving technique, tactics and strategy, practicing and improving traits, mental skills, problem solving, controlling arousal levels, and to accelerate rehabilitation and return to athletic form after an athlete’s injury (Nowicki, 2004).

The basis of imagery training is the assumption that our mind does not distinguish between real and actual situations and perceived or imagined situations, and that a person, when imagining a movement or observing this movement in another person, reacts as if he or she were actually performing it. It appears that the information sent in the form of nerve impulses to and from the brain during imagery is similar to that produced during motor actions), and similar traces of movement are stored in memory (Guillot, Hoyek, Louis, & Collet, 2012; Hétu, Gregoire, Saimpont, & Coll, 2013; Hardwick, Caspers,
Eickhoff, & Swinnen, 2018; Jeannerod, 1994; Münzert & Zentgraf, 2009). However, it is emphasized that if an athlete lacks a given motor skill (or has it poorly mastered), the imagery technique does not benefit, and therefore does not promote the learning of completely new psychomotor skills (Olsson & Nyberg, 2010). Additionally, individuals who have the ability to use imagery use it more frequently (Gregg, Hall, & Nederhof, 2005), including rehabilitative imagery (Budnik-Przybylska, Karasiewicz, & Kukielpko, 2020).

Why do athletes use imagery training?

Most current research on the function of athletes’ use of imagery training is based on Pavio’s (1985) concept of imagination. According to this model, the use of imagery has cognitive and motivational functions, and it relates to a specific situation or operates on a general level. Accordingly, four types (types) and related functions of imaginations are distinguished:

- cognitive general (CG) – concern the player’s routine, action plans, strategies
- cognitive specific (CS) – refer to perceptions related to specific sports skills, typical of a given sport
- motivational general (MG) – relate to emotions and physiological arousal
- motivational specific (MS) – relate to the athlete’s ideas of individual goals, specific performance and outcome

Similar functions of imagery training are used in trauma situations (Sordoni et al., 2000), where it is advisable to use both cognitive and motivational imagery. The use of cognitive imagery during the treatment process facilitates the proper reproduction of the rehabilitation exercise pattern. Thus, it allows the maintenance of routine, but it is also associated with motivational imagery, which focuses on generating a positive image of the various stages of the healing process. This translates into the ability to cope with a variety of potentially uncomfortable or painful situations during rehabilitation, and helps control stress and anxiety (Driediger, Hall, & Callow, 2006; Miller, 2017). Thus, perceiving trauma in a reflective manner and looking for the positive side of the rehabilitation process reinforce the relationship between general imagery skills and the use of motivational imagery in rehabilitation (Budnik-Przybylska, Karasiewicz & Kukielpko, 2020).

Main principles of using imagery training

There are many models for applying imagery training in sport, including the PETTLEP model (Holmes & Collins, 2001) or the Revised applied model of deliberate imagery use for sport, dance, exercise and rehabilitation (Cumming & Williams, 2012).

The main idea of the PETTLEP model (Holmes & Collins, 2001) is to bring imagery training exercises closer to physical training. It is an acronym derived from the first letters of the elements included in optimal and complete imagery training. This model includes a component: physical, environment, task, timing, learning, emotion, and perspective.

In the Revised applied model of deliberate imagery use (Cumming & Williams, 2012), importance is placed on “where and when” imagery is used, “who” uses imagery, “why” - what function the imagery serves, “what” (type of imagery) is being imagined “and how” it “matters” to him/her. In addition, the ability to use imagery is emphasized.

Both briefly described models are mainly applied to imagery adapted to healthy athletes, but we believe they should be taken into account when working in an injury situation.

Research indicates that imagery training has a positive effect when the session includes short repetitions of the imagined activity for 1-3 minutes, similar effect is when the session lasts 15 to 25 minutes (Feltz & Landers, 1983; Hinshaw, 1991). Each session may be preceded by a relaxation training, which makes it possible to achieve inner calmness, self-confidence, and to increase the level of concentration and susceptibility to suggestion (Nowicki, 1991), although in the PETTLEP model (Holmes & Collins, 2001) attention is rather paid to bringing the emotional state closer to the one in which the imagined task takes place. It is important for the athlete to control the imagery that the images are real and related to the athletic goals.

Depending on the athlete’s needs and preferences, the athlete may perceive himself from different perspectives - internal (author’s perspective) and external (observer’s perspective). The external will be more effective in correcting movement, while the internal will be more effective in the athlete’s imagining of a particular technique and the feelings associated with it. Authors agree that the representations created in the mind, should be characterized by polysensory, or multisensory (Morris et al., 2005). Motor imagery should take into account the sensations of the body during a given movement, and incorporate features of the environment in which the movement takes place e.g. water, treadmill, pitch (Blecharz & Siekanska, 2012). The effectiveness of imagery training is also influenced by the inclusion of positive emotions in imagery, as this fosters connections between thoughts and emotions (Stępiński & Budnik-Przybylska, 2017).

Research shows that the best results are seen when scripts are individualized (Williams, Cooley, Newell, Weinboll, & Cumming, 2013), and prepared by the athletes themselves because they result in greater psychophysiological activity (Wilson, Smith, Burden & Holmes, 2010).

Imagery in rehabilitation

The circumstance of injury and the need for rehabilitation are a source of stress and anxiety for the athlete. In such a situation, an effective return to sports competition consists of medical, physiotherapeutic and psychological interactions. During the rehabilitation period after the injury, imagery, which is usually the result of cooperation with a sports psychologist, may accelerate the healing process of damaged tissues, thus improving the
return to training (Morris et al., 2005; Perry & Morris, 1998). They should be used concurrently with the rehabilitation stages or slightly ahead of the rehabilitation process (Hare, Evans & Callow, 2008). In addition, imagery training helps to manage the pain associated with an injury and reduces fear of reinjury (Hamson-Utley, 2008; Rodriguez, Marroquin, & Cosby, 2019). Blecharz (2008) emphasizes the importance of the injured athlete's assessment and interpretation (perception) of the injury. Perceptions of the injury as a loss, challenge, or threat determine the individual's subsequent behaviour and take certain actions in the context of rehabilitation.

It appears that during rehabilitation, athletes use imagery training, but to a lesser extent than during sports training and competition. Injured athletes undergoing treatment are more likely to use motivational imagery (coping with injury-related stress, performing effectively in difficult situations, achieving treatment goals) than cognitive imagery (Sordoni et al., 2000).

Perry and Morris (1998) describe a mechanism demonstrating the positive impact of imagery on the rehabilitation process. They explain that during imagery, more blood flows to the injured body part and the injured tissue increases in temperature, which in turn may result in a faster healing process. Athletes in rehabilitation may create imagery that relates directly to the healing process and the skills that were learned prior to the injury, as well as controlling negative emotions, improving self-confidence, having a positive attitude in the context of recovery, or performing physical exercise (Crossman, 2001).

### Stages of imagery training in the treatment of sports injury

Morris, Spittle & Watt (2005) outlined the application of imagery training for sports injury rehabilitation, dividing the process into four stages:

1. Healing imagery
2. Pain-management imagery
3. Rehabilitation-process imagery
4. Performance imagery.

The effectiveness of the model was attested to by the words of Polish footballer – with the initials LP, who in an interview (Przegląd Sportowy, 18.01.2018) referred to the stages of his treatment of collateral ligament damage in the knee:

> “LP: It’s not just the many hours of rehab with physical therapists, in the gym, and then on the field. During an injury you have to take care of your head. The sessions to strengthen my mental awareness helped me a lot. From the beginning I set myself goals, over time I set more goals. I visualized them one by one and pursued them. It mobilized me and had a good influence on the quality of my work.

**Journalist: What did you visualize?**

**LP:** I had audio materials prepared that put me in the right state and with that I thought about what was going on inside my knee, how it was functioning, how the ligaments were coming together, etc. Then my first run, activities with the team and back on the field. It was reassuring and helped me get in the right mindset. Me and my loved ones know how much effort I had to put in to get back to health.”

### Correct and incorrect application of imagery training in rehabilitation

In the following part, the different stages are characterized along with examples of possible imagery, including what the athlete should pay special attention to so that imagery training does not result in negative consequences. Positive and negative examples are presented based on the imagery diary of a mountain biking athlete and the sailor - both after arm injury.

#### Healing imagery

At this stage it is crucial for the athlete to understand the nature of the injury. If necessary, it is useful to use anatomical models, x-rays, or films to show the location of the injured body part and the network of related structures (Cupal & Brewer, 2001). Moreover it is suggested to use personalized, vivid images that include the anatomical structure and appearance of the injured body part (Heil, 1993; Taylor & Taylor, 1997; Williams, Rotella & Scherzer, 2001).

The imagery should be as detailed as possible, positive and related to the athlete’s resources, showing the athlete as a strong and fit person.

#### Positive examples:

“Ligaments (individual fibers) touch each other, connect, intertwine, tighten, more fibers come in, everything comes together, tightens up, a given fiber and piles of fibers find the right places to attach, the right distance from the bone - this is the ideal place: after complete regeneration it will be the right distance, the right tension, good strength and durability. The whole thing comes together like a jigsaw puzzle, then strengthens, weaves, tightens, tightens, and forms an inseparable whole. A ligament firmly attached to a bone is perfect and strong, joined and complete – it is a whole. Electrical energy (and light) permeates through the ligaments and stimulates them to function, regenerate, repair. Structures have the energy and strength to reconstruct themselves. This energy comes from the brain, there are strong impulses. Each ligament fiber has a place, an attachment, where it fits perfectly. The fibers hit their spot and attach, and with this energy they strengthen, tighten, become a strong and powerful whole.”

“I focused on the x-ray. I saw an empty riverbed that fills with water and merges with a tributary, as if the broken part of the bone fuses with the remaining part becoming one again.”

#### Negative example:

“I’m very sad, I can’t bring up anything positive in my mind. I try to chase away thoughts of how inside my hand everything is rotting and decaying, but I can’t.”

In both positive examples athletes used metaphors to imagine the healing process but the first one was very detailed. In the negative example the athlete seems to be in a bad mental state and is not ready to use imagery training at that moment. In this case she is unnecces-
sarily trying to fight the negative thoughts, which only expends energy fighting them. A better solution seems to be to stop imagery training. The trauma situation involves experiencing difficult emotions and taking time to accept them, the swings of emotions. At this point, she should allow herself to feel the difficult emotional state, come to terms with it, and even wait for her mood to improve in order to effectively use imagery, as demonstrated in the positive example. The athlete may not be aware of it yet at this stage, therefore her actions are not effective.

Pain-management imagery

This type of imagery is designed to help minimize pain and create coping skills. There are two options for imagery: the pleasant imagery technique and attributing physical properties to pain (Morris et al., 2005). The athlete may replay pleasant and relaxing images, places, or situations in their mind. Their sympathetic nervous system then decreases its activity, muscle tension also decreases, and the body goes into a calm and relaxed state. The way in which the imagination of pain is created by giving it physical properties (size, shape, movement, colour) allows the athlete to take control of the discomfort. He or she can manage them effectively by changing the intensity of the pain, determining its characteristics, thereby reducing the sense of discomfort.

Positive example:

“I carefully looked at the familiar interior to better recall images from 3 weeks ago. I remembered how I survived the tremendous pain and dealt with it. I saw myself there again in 2 weeks when they took off my cast. I felt joy to see my arm. It was skinny, but it didn’t hurt.”

In the example presented, the athlete, as part of her pain management, was shifting perspective to the situation of being in the outpatient clinic where she was experiencing escalating pain. This was in order to compare the pain with the current pain, which is already less. Furthermore, she imagined the same place being already healthy, without experiencing physical discomfort. Here present another example of pain management:

“Pain is a black mass (liquid that diminishes and disappears). Swelling is red but also yellow and purple (fluid that starts to absorb, spread and slowly disappears), the arm looks neat and normal.”

Here the athlete uses metaphor to cope with pain. Similarly she imagined the near future with a healthy hand. Moreover we would like to add thoughts which could appear during pain management processes.

“I feel like I could pee from the pain. Maybe I shouldn’t push so hard? But without pain, there will be no progression. We’re going with it.”

The quote presented above accentuates the athlete’s internal dialogue at this point. While it is not imagined it comes from the diary and allows pain to be managed appropriately.

If the athlete was not able to transition imaginatively into a pain management situation, and was only focused on feeling extreme pain, then imagery training would not be helpful or even advisable. The emphasis here is on readiness to move on to the next stage.

Rehabilitation-process imagery

During this stage, the athlete can imagine aspects related to similar stages of rehabilitation. It is particularly important to follow the treatment program and to properly perform rehabilitation exercises, which are often tedious and lengthy. Sticking to a specific regimen helps to overcome the difficulties that an athlete may encounter while in this phase of the recovery process. At this point, the main emphasis could be on the cognitive imagery of performing a particular technique. Comparisons can be used here, such as a well-oiled mechanism in an engine, etc. In situations dealing with repetition in exercise performance, athletes can use motivational imagery, e.g. a state of relaxation, or a feeling of satisfaction after achieving the next goal in rehabilitation (Cupal & Brewer, 2001; Heil, 1993; Lebon, Guillot & Collet, 2012; Wilczyńska et al., 2015).

Example

“It’s so normal somehow. I am inside my hand with my thoughts. In my wrist I see a rubber band which I stretch. It resists, but carefully and with enough force I manage to stretch it.”

In the example above, the athlete was increasing the range of motion by comparing it to stretching the rubber band which is just cognitive imagery. Her focus is on executing the correct technique. However, there were also situations where thoughts hindered the rehabilitation process “It’s hard to do the same thing over and over again. I’ve had enough, and there are still so many days to go...” However, the athlete continued to exercise despite the monotony.

Here we present another positive example of rehabilitation imagery

“Muscles relax, pain disappears, ligaments prepare to take it easy and recover for the tough week ahead. They are strengthening and continuing to fuse, quite quietly but very thoroughly and correctly, just as it should be.”

At this stage, it is necessary to pay attention to whether the athlete, despite the incomplete rehabilitation process, will not want to skip the next stages during imagining as well, which may disrupt the rehabilitation in a way. Each stage of imagination should be adjusted to the rehabilitation stage.

Performance imagery

The last range includes ideas about exercises specific to the sport of the injured athlete. It is then possible to maintain and develop technical and tactical skills that guarantee a smooth and safe return to athletic competition. It is also important to eliminate the fear of re-injury, which can affect performance levels, and to constantly maintain a routine. Also associated with the return to sport stage are Healed Images, which address the condition after recovery.

Based on literature, imagining achievement during rehabilitation results in athletes strengthening their
confident in performing at the desired level, increases motivation, and reduces anxiety associated with returning to sport and pre-injury form (Morris et al., 2005).

Example:
“After a morning workout on the bike. I’d like to speed up the time, to already have a ‘free’ hand so that nothing is restricting my grip on the bike handlebars. To be able to ride technical sections and not just spin on the flat. I ran my thoughts out to that moment.”

“In the morning, after training. The pleasant fatigue enhances the positive thoughts. I wonder how I will run once my arm has fully recovered. I’m hoping to do even better.”

In the example presented, the athlete wants to accelerate the rehabilitation phase, it concerns the combination of imaginations and internal dialogue. Positive thoughts generate positive imaginations. The rehabilitation is at the final stage, but she is not yet fully functional, nevertheless she imagines the technical elements related to the sport and motivates herself to perform the correct technique. Imaginings about the near future.

An element to pay attention to may be imagining the outcome versus forgetting to imagine the process, it means continuing the rehabilitation exercises and imagery.

Here we present another example of performance imagery, similarly concentrating on the technique and positive thoughts:
“(...) I imagined myself getting ready to go down to the water, getting the boat ready, hoisting the sails, bouncing off the slip. Then how we sail, every maneuver, how I make turns, how I stern when there is more wind, for example. And how I repeated the stern several times in a row, step by step, until I got it right. Then I imagined how we were racing with others, preparing for the start, fighting for the place, accelerating the boat and the start. Then tacking, full, but quite accelerated. And I kept telling myself that it will be fine, that we can do it. At the end of the imagination I always wanted to finish with such a sense of confidence, charged”.

When is imagery training not effective?
Despite the many advantages of using imagery training, there are also situations in which the technique proves ineffective or even dangerous for the athlete. Budny and Woolfolk (1990) listed danger conditions related to the athlete’s state, such as anxiety, distraction, lack of imagery control, and overconfidence. The attitude itself towards the application of training and the belief in its effectiveness seems to be the key element. Mental (mental) readiness helps to effectively pursue athletic excellence, which also consists of readiness to apply imaginations (Orlick, 2008). When imagining, one should not create a sense of compulsion or obligation within oneself, as these create adverse associations between athletic activity and anxiety or frustration. It is much more beneficial to base one’s imagination on positive emotions – satisfaction, joy of progress, self-confidence and belief in one’s own abilities (Nowicki, 2004). When athletes are unable to control their imagery, it is sometimes better not to use it at all, rather than to have it have a negative resonance, thus reinforcing negative emotional states. A good alternative may be to focus on the key elements of movement execution with emotional states isolated (Budnik-Przybylska et al., 2021). In addition, note that athletes may wish to remove negative thoughts by using the word “no” (Budnik, 2009) - by doing so they may paradoxically activate a negative association, which is explained by “ironic mental processing theory” (Wegner, 1994).

In addition to proper control over the course of imagery, researchers have also shown specific links between its effectiveness and the personality of the athlete. High neuroticism is associated with a tendency to create imagery in an inappropriate way, while extraversion allows the mind to create more vivid images (McDougall & Pfeifer, 2012). Too many stressors and experiencing anxiety result in an inability to focus on the correct imagery training technique and a lack of imagery control (Budnik-Przybylska et al., 2021). In contrast, persistence, openness to experience, and conscientiousness are positively associated with various areas of imagery training (Budnik-Przybylska, Przybylski & Karasiewicz, 2018). Other personality variables such as extraversion, emotional stability, and openness to experience also interact positively with the rehabilitation process, mainly the use of imagery in injury (Budnik-Przybylska, Karasiewicz & Kukielko, 2020).

The process of recovering from an injury is a global process. It is not just about working with damaged tissues, but the whole athlete. It is extremely important that the athlete is ready to undertake imagery training, because then he will only have the opportunity to have the desired effect. In addition, this training is to be aligned with the rehabilitation process and go along with the athlete. Ideally, the scripts should be as personalized as possible.

Summary
In our article we have presented the most important issues concerning the injury itself, its perception by the athlete, as well as the most important aspects concerning one of the techniques used in sport, namely imagery training. We have presented elements that help in the healing process, as well as emphasized what should be paid attention to in order for the training to bring the expected results. We are aware that our report is not an exhaustion of the topic related to the injury and the use of mental and imagination training – it is a very extensive and complicated subject, because every athlete approaches his or her injury in an individual way. Imagery training can speed up the recovery of an athlete, but this training should be applied in the right way and the athlete should be ready to use it.
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