Psychological Injury Rehabilitation: The Link Between Body and Mind

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Introduction

Psychological factors, including stress, can increase the likelihood of sustaining an injury as well as inhibit proper recovery, making mental health intervention within athletics crucial to injury prevention and successful recovery. There is extensive research that confirms that mental rehabilitation is equally as important as physical rehabilitation when recovering from an athletic injury. Psychological training during injury rehabilitation greatly improves the likelihood an athlete successfully returns to their sport, as well as increases the given timeline for this recovery process. This paper intends to expand on this data by also exploring the specific mental training strategies that may be most effective.

The link between psychological factors and bodily function involves a multitude of specific aspects, none being more important than mind-muscle connection. In the simplest explanation, mind muscle connection is bringing attention to one's body or specific body part as they move it. Drawing this attention has major implications regarding injury rehabilitation, However mind muscle connection stems farther than just regarding injuries. Studies have shown that having a solid mind muscle connection can improve results in the realm of body building to maximize muscular development (Schoenfeld 2016, Calatayud 2016). Calatayud found that when athletes specifically focus on one muscle during a workout, muscle activity increased by 20% - 60%. If that specific workout incorporated multiple muscle groups, this focus on one muscle did not take away from muscle activity in the other. His results show the importance of mind-muscle connection regarding athletic success.

The body goes hand in hand with the mind. In order to have peak performance from the body, the mind must assist along the process. This connection goes for both training and injury

rehabilitation. Mind-muscle connection cannot provide the results alone however, the same vigorous training is required for the best results, it is more of an enhancement.

Case Studies

Margot Putukian, the director of athletic medicine and head team physician at Princeton University, states that injury is often an unavoidable part of being an athlete that may trigger or unmask serious mental health issues such as depression, anxiety, disordered eating, and substance use or abuse. She goes on to say that depression tends to magnify other responses and can also impact recovery. This inevitable interaction between physical injury and psychological struggle needs to be understood and acted upon so athletes can prepare and cope for successful recovery (NCAA Sports Science Institute, 2023). Thankfully, there have been professional athletes that have shared their stories with mental health and injury that speak to the need for the implementation of psychological recovery.

Val Constien, an Olympic level track and field athlete in the Steeplechase, discusses her mental struggle with physical setbacks in RunnersWorld magazine. Constein had her third metatarsal snap in half due to underfueling which led her to struggle even more with body image. Due to the lack of mental healing provided to her during recovery she didn't perform as well and felt isolated after attempting to return to training. As fall turned into winter, Constein experienced seasonal depression which led to another stress reaction in her patella. After yet another obstacle, one of her teammates noticed signs of depression and suicidal thoughts. This highly successful athlete found themselves in a feedback loop of mental and disruption because

there was never any psychological intervention to prevent further reinjury. She now has been able to return to pursuit of a gold medal after finding the resources she needed for proper recovery and advocating for mental health resources for young athletes (Kuzma, 2021).

Emotional Support Throughout Recovery

Emotional support can go a long way in determining the difficulty of rehabilitation after a severe injury. It's an extremely difficult process, and often going through that alone can be nearly impossible. Wayment and Huffman recorded a study assessing emotional support within concussed collegiate football players. Amongst the findings, sadly the players recorded that they received the least amount of support from their coaches and teammates. More importantly however, it was found that when players receive proper emotional support following a concussion, the athletes had less psychosocial reactions, more sport-injury related growth, and greater intentions to report future concussion symptoms (Wayment & Huffman 2020). Not only did this emotional support help the athletes during the recovery process of the injury, but the implication that they were more likely to report a possible concussion in the future is vital in protecting the athletes from long term brain damage. It is believed that this intention to report future injuries is not strictly confined to concussions. Nearly 46% of all athletic injuries stem from overuse injuries (Renström 1985), or injuries that occur as a result of wear-and-tear on the athlete's body when they are not given the necessary rest and recovery time. If athletes feel supported enough to be able to report any nagging pain, the frequency of these overuse injuries should decrease as a whole.

This support should come from those closest to the athlete, but it could come from a variety of sources. Wayment and Huffman also discussed how without substantial emotional support, the athlete could also be prevented from recovery. Often there is a mental block regarding fear of reinjury that prevents the athlete from progressing throughout the recovery. If the recovery is not done properly out of this fear, the athlete is actually more likely to suffer a reinjury.

When an individual focuses their entire life on a sport and it is then taken away from the sport temporarily due to injury, everything they did throughout their day to day is changed. A podcast called Sidelined Stories discusses real journeys that athletes have gone through after severe injuries. There is a recurring theme throughout the different episodes that injuries tend to increase depression in the athletes and often have a plethora of other side effects including identity loss, self-blame, and changed relationships. Injuries damage far more than just the affected body part, the psychological damage can be just as, if not more damaging to the athlete. They often feel alone throughout the process, away from teammates and coaches that they were used to seeing daily. These case studies demonstrate the importance of a multidisciplinary approach to injury rehabilitation, including working closely with sports psychologists, athletic trainers, and coaches to develop a comprehensive and individualized recovery plan. They also highlight the importance of using mental techniques, such as mental imagery and mindfulness to maintain motivation and manage psychological challenges during the recovery process.

Literature Review

When research regarding the psychological factors of rehabilitation are assessed, it is evident that negative effects can stunt progress and increase the likelihood of reinjury. For example, fear of reinjury in athletes is often a common response that proves to be detrimental to proper recovery. A systematic review conducted by a group of doctorate level researchers as well as physical therapists revealed that fear of reinjury can lead to physical impairment, malfunction, and decreased likelihood of successful re-entry to sport (Hsu et al., 2017). This fear response can lead to altered muscle recruitment strategies, lack of muscle endurance, and decreased stability after various injuries mainly involving the knee and achilles. With attention focused on emotions and thoughts related to potential reinjury, athletes returning to sport may inhibit performance and increase reduction in sport participation.

According to an article on psychological predictors of sport recovery in the sport, exercise, and performance psychology journal (Carly et al, 2020), pain catastrophizing, if not addressed, can also pose a risk for athletes attempting to recover from injury. Pain catastrophizing is the inability to control thoughts and worry about pain that lead to magnification and feelings of helplessness. These research found that, “that individuals with higher scores in pain catastrophizing at 48 hours postexercise were significantly more likely to experience continued pain at 96 hours post exercise (Parr et al., 2014). Remedying common distorted psychological reactions to pain can be extremely beneficial to improving the recovery process and increasing resilience for future injury. Additionally, these researchers make note that addressing an athletes mental state more generally is crucial during the recovery process. If injury leads to chronic stress with unresolved mental trauma or rehabilitation issues, the body

may be unable to properly recover when faced with strenuous tasks. Chronic stress impedes the recovery of muscle function and negatively influences affective and psychophysiological responses to exercise making athletes more susceptible to reinjury and underperformance.

More generally, studies show that common psychological responses to injury can have a significant impact on recovery from more severe injuries that require surgery. According to the American Academy of Orthopedic Surgeons, "studies have shown that psychological stress can extend healing time of wounds by 25 percent or more" (Kirschner, 2019). It has also been found that psychological disruptions related to stress like anxiety and depression can increase perceptions of pain, creating more stress. Due to the increased cortisol levels that inhibit the healing process, Psychological stress leads to physiological tension which interferes with rehabilitation and can even lead to chronic pain. Kirschner (2019) goes on to state that developing stress that lingers long after surgery is extremely common and up to half of those with serious injuries would be diagnosed with PTSD. This knowledge is particularly critical for athletes and their support system to understand because the "more deeply an individual's sense of identity is connected to his or her physical form, ability, and performance, the greater the emotional reaction to a traumatic physical injury". Athletes rely on their body to be able to perform their sport so injury poses a risk to their passion and often livelihood which disrupts their identity. These surgeons go on to conclude that "rehabilitation for athletes who rely on their body to perform should always include mental recovery" given the extensive research on the strong connection between mental and physical pain.

Mental Intervention Strategies

It is clear that psychological rehabilitation is crucial to physical recovery from various sports injuries, which leads us into exploring which strategies may be most effective. While this knowledge is important for athletes to have, it is more important for coaches, athletic trainers, and sports psychologists who will guide athletes through their recovery process and help implement these tools strategically. When an athlete is in extreme distress after an injury, their support system becomes crucial to giving them the tools to sustain mental wellness as well as prevent isolation so they can recover effectively. Positive self talk, imagery, goal setting, and preventing isolation have presented themselves as the most effective and research tested ways to recover psychologically.

Mind muscle connection serves a great purpose in the rehabilitation and performance of athletes. During exercise and performance athletes could face issues while trying to activate certain muscle groups. The activation of specific muscles is significant during the efforts of muscle targeting. In order to address a solution to increasing targeted muscle activity a study was conducted by Fujita et al, in which verbal instructions were given during the contraction of back muscles. The researchers concluded that their verbal instructions were able to increase muscle Electromyographic (EMG) activity in the first three repetitions of their exercises (Fujita et al 2020). The researchers also established that the muscle targeting was effective and not at the expense of other muscle groups.

In another study by Snyder, BJ and Leech, JR, a similar approach was taken in which the goal was to increase muscle EMG activity in the latissimus dorsi muscle during the lat pull-down

following expert instruction. When athletes want to target a specific muscle one concern is doing so at the expense of other body parts (ie. using different muscles instead). In their study, Snyder and Leech solved the problem (athletes were using more of their elbow flexors during the multijoint lat pull-down exercise) through verbal instruction. As they expected, the post instructional group saw an increase in muscle activity (Snyder, BJ, Leech, JR 2009).

Mind muscle connection is a primary driver of increased muscle activity. While it does increase muscle activity it does so without affecting the non targeted muscles. In a study conducted by Shoenfield, External vs Internal focus were applied to various exercises in order to assess mind-muscle connection, muscle activation, and overall exercise performance. This study examined the effects of different attentional focus strategies (external focus, internal focus, and no focus) on muscle strength and size in resistance-trained men. Exercises such as isometric knee extension and elbow flexion paired with internal and external focus. The participants performed leg extensions, leg presses, and bicep curls for eight weeks. The researchers found that the internal focus group showed greater improvements in muscle strength and size compared to the other groups. This suggests that focusing on internal cues (e.g. specific muscle contractions) can enhance mind-muscle connection and improve performance in resistance training (Shoenfield et al 2017). This study furthermore confirms that a well known claim in bodybuilding called "mind-muscle connection" is valid and could be enforced when an individual's goal is to maximize muscle development (Shoenfield et al 2017).

Mind muscle connection can be used clinically in order to aid with muscle rehabilitation and for the maintenance and enhancement of neural signals that result in increased muscle strength (Ranganathen et al 2004). In a study done to measure increased muscle contractions, researchers instructed volunteers to perform “mental contractions'' that involved elbow flexors and little finger abductions. They were able to see that mental training (mind muscle connection) increased little finger abduction strength by 35% and elbow flexion strength by 13.5%. Ranganathan and other researchers concluded that the increased cortical output due to mental training (mind muscle connection) helped directly increase muscle activation and strength (Ranganathan et al 2004). These findings help create possible clinical applications for patients in various age groups that require exercise programs and solutions for muscle retention/rehabilitation (Ranganathan et al 2004).

Positive self talk is commonly known to improve performance but now proves beneficial for injury rehabilitation as well. Positive self talk can be defined as encouraging statements or phrases told or thought to oneself to promote feelings of capability and general performance. A study done within the Tulane School of Medicine revealed this strategy had a significant positive correlation with successful and continued completion of rehab exercises post injury (Gennarelli et al, 2020). Self talk has been separated into two categories known as instructional and motivational self talk as described by Hatzigeorgiadis and his fellow researchers. It is important to note that studies have shown that both serve a unique purpose; instructional talk is effective in improving precision while motivation is effective in improving use of strength and endurance. A varying and inclusive meta-analysis concluded that self talk strategies can, in fact,

have a significant positive effect on learning, performance, skill attainment within sports (Hatzigeorgiadis, 2011). Given that recovery from injuries requires the use of fine motor skills as well as building strength both instructional and motivational self-talk would be useful.

Researchers Levaleva and Orlick (1991, 1993) studied how different self-talk statements impacted the recovery rate of two groups of participants. They found that positive phrases like “I can do anything”, “I can beat this thing” , and “it's getting better all the time” correlated with fast healing while negative phrases like “what a useless body,” “ it will never be as strong again”, “I’ll never make up for the lost time” correlated with much slower recovery. These harsh statements are common among athletes who rely on their body for success and have been subject to such high expectations to persevere through pain. Injury can feel like a type of failure for many athletes and takes away their source of pride making it a slippery slope for negative thoughts which will perpetuate feelings of hopelessness. Countering this type of talk early on by replacing it with more positive, forward thinking would be extremely effective in increasing feelings of achievements and actions towards more rapid improvement.

Mental imagery is a vital part in the recovery process that is often overlooked. Mental imagery, also known as visualization or mental rehearsal, is a cognitive process that involves creating or recreating sensory experiences in the mind. It involves using the imagination to create mental images of specific scenarios, situations, or actions. For athletes recovering from injury, mental imagery can be a helpful tool in facilitating physical rehabilitation and promoting psychological well-being. Here are a few ways mental imagery can be beneficial: Enhancing motor skills: Mental imagery has been shown to activate the same neural networks involved in

actual physical movement, leading to improved motor performance. By mentally rehearsing specific movements or exercises, athletes can maintain and improve their motor skills even while they are unable to physically perform the activity. Reducing anxiety: Injured athletes may experience anxiety or stress related to their injury and the rehabilitation process. Mental imagery can help reduce anxiety by allowing athletes to visualize themselves successfully completing the rehab process and returning to competition. Building confidence: Mental imagery can help injured athletes build confidence by creating positive mental images of themselves performing at a high level. This can improve their self-efficacy, motivation, and overall mindset during the recovery process. Speeding up recovery: Mental imagery has also been shown to have a positive effect on physical healing. Studies have found that using mental imagery in conjunction with physical therapy can lead to faster recovery times and better outcomes.

Preventing isolation

Isolation is a common challenge for injured athletes, as they may be forced to limit or discontinue their participation in training and competition, which can result in reduced social support and a lack of motivation. However, there are several strategies that can be used to prevent isolation and promote psychological well-being in injured athletes: *Communication*: Encouraging injured athletes to maintain regular communication with their coaches, teammates, and support staff can help them feel connected to their sport community. This can

involve regular check-ins, team meetings, or virtual connections through social media or video conferencing.

Involvement in team activities: Injured athletes can be encouraged to participate in team activities in non-playing roles, such as assisting with coaching or team administration, attending team meetings, or traveling to competitions. This can help them stay connected to the team and maintain a sense of involvement in their sport.

Goal-setting: Setting realistic goals for the rehabilitation process can help injured athletes maintain motivation and focus. This can involve setting short-term goals for each phase of the recovery process, as well as longer-term goals for returning to competition.

Mental imagery: As mentioned earlier, mental imagery can be a powerful tool for maintaining and improving physical and psychological well-being during the recovery process. Injured athletes can be encouraged to use mental imagery to visualize successful rehabilitation and return to sport.

Reframing the injury: Helping injured athletes reframe their injury as an opportunity for growth and development can help them maintain a positive mindset and maintain motivation. This can involve focusing on areas of their game that they can improve upon while recovering, such as strength training or mental preparation.

Overall, preventing isolation in injured athletes involves providing them with opportunities for social support, involvement in team activities, and maintaining a positive mindset. By implementing these strategies, injured athletes can stay connected to their sport community and maintain a sense of purpose and motivation during the recovery process.

Goal Setting

Goal setting is a powerful tool for injured athletes as it can help them maintain motivation, focus, and track their progress during the rehabilitation process. Setting both short-term and long-term goals: Injured athletes should set both short-term goals that can be achieved during each phase of the recovery process and long-term goals that focus on returning to competition. Short-term goals can help keep athletes motivated and focused on the rehabilitation process, while long-term goals provide a clear target for returning to sport. Use the SMART framework: Goals should be Specific, Measurable, Attainable, Relevant, and Time-bound (SMART). This means that goals should be specific and well-defined, measurable, realistic and achievable, relevant to the athlete's needs and aspirations, and have a clear deadline. Involve the athlete in goal setting: Injured athletes should be actively involved in setting their goals, as this can help them feel more invested and committed to the rehabilitation process. Coaches and support staff can guide the goal-setting process, but the athlete should have input and be able to make adjustments based on their progress and changing circumstances. Track progress and adjust goals as needed: Injured athletes should regularly assess their progress towards their goals and adjust them as needed. This can help them stay motivated and adjust their expectations based on their recovery progress. Celebrate progress and accomplishments: Celebrating progress and accomplishments can help injured athletes maintain motivation and focus during the rehabilitation process. Coaches and support staff can acknowledge and celebrate progress towards goals, as well as other milestones and accomplishments along the way.

Overall, effective goal setting for injured athletes involves setting both short-term and long-term goals, using the SMART framework, involving the athlete in the goal-setting process, tracking progress and adjusting goals as needed, and celebrating progress and accomplishments along the way. By setting clear goals and tracking progress, injured athletes can maintain motivation and focus on their rehabilitation and return to sport.

Discussion

The mind and body are often viewed as two separate entities but research is causing that line to be blurred. Physical health and mental health are correlated to one another, being healthy often leads to increased mental health, and vice versa (Ohrnberger 2017). This application can be used as a crucial way to assist in injury rehabilitation as well as prevention. Mind muscle connection is just one of the methods, but it is arguably the most important regarding rehabilitation. As previously mentioned, mind muscle connection can increase overall muscular activity during exercise. This is particularly beneficial during that recovery process, to incorporate muscle groups that may have been idle for a period of time initially post injury. The physical body responds best when the mind is directly linked to the muscles while work is being done.

Athletes are trained from the beginning of their time in sports to follow the guidance of their coaches regarding issues they may be having in all aspects of life. This trend however ends

when the athlete becomes injured, they are often left to deal with the recovery process almost individually. Due to the plethora of reasons listed previously discussing the importance of proper psychological tactics during rehabilitation, it would be beneficial for athletes to have the counseling of their coaches, trainers, or sports psychologists during this period to reinforce these ideas. In a period where the athlete needs the most support, why is this when they are left to fend for themselves? Having this support would not only help prevent the issue of isolation (Wayment & Huffman 2020) the research implies that the rehabilitation would go better physically. These resources should be available in all high level athletics, however if there is not enough funding for them at lower levels of sports, the coaches should be trained to at least know the basics of sports psychology. For Division 1, olympic, and professional athletics there is no reason why these resources should not be available.

While injuries are inevitable, there should be an attempt to prevent these injuries as much as possible. Approximately 46-54% of all athletic injuries are overuse injuries (Renström 1985), meaning they stem from certain body parts being used more frequently than the rest as a result of what their specific sport requires. Overuse injuries affect body parts differently, causes compartment syndromes in muscles, tendons to become inflamed, and causes stress fractures in bones. These injuries could easily be prevented, if the athlete simply let their body heal when a body part started to feel off. Athletes typically don't rest these injuries until they are severe however, typically out of fear of seeming weak or letting their team down (Hoang 2012). Allowing athletes to have this rest period would go a long way in decreasing the frequency of injuries. This would even make the ability to have sport psychology resources to the athletes more feasible because there would be less injuries total for them to assist. Sports

at the end of the day are meant for fun and entertainment, and often it is easy to forget that. Spreading awareness for proper ways to treat these injuries, while emphasizing the athlete's mental wellbeing throughout is the priority. As research and medicine progress, these new findings should be intertwined with athletics. The more we know, the more we can and should use to help athletes during the most difficult times of their career.

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