

Psychological intervention programs in sports injury rehabilitation processes

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Summary

Introduction: This paper aims to review the publications regarding the psychological interventions applied in the rehabilitation processes of injured athletes until 2020.

Material and method: A datasearch were conducted in Web of Science (WoS) databases according to the recommendations and criteria established in the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement guidelines. To do this, the search terms sport injur*, psycho* and rehabilitation were used. The inclusion criteria used were: 1) to have as an object of study the measurement of psychological variables during the rehabilitation phase of a sports injury; 2) be empirical in nature and; 3) the application of a psychological training program as part of the treatment in the rehabilitation of the sports injury.

Results: After applying the search strategies, a total of 394 articles were obtained, of which after eliminating those that did not meet the exclusion criteria were reduced to 15 articles.

Conclusions: The results show that the most used psychological intervention programs in the rehabilitation of injured athletes have been relaxation, guided imagery, goal-setting and mindfulness. On the other hand, the most studied psychological variables were pain, adherence to rehabilitation and self-efficacy. Finally, the application of psychological intervention in the rehabilitation process of the injured athlete was effective, for the objective pursued, in 13 of the 15 works under study.

Key words:

Sport injur. Rehabilitation.
Psychology. Psychological training.
Sport.

Programas de intervención psicológica en procesos de rehabilitación de lesiones deportivas

Resumen

Introducción: El presente trabajo tiene como objetivo revisar las publicaciones respecto de las intervenciones psicológicas aplicadas en los procesos de rehabilitación de deportistas lesionados hasta el año 2020.

Material y método: Se realizó una búsqueda bibliográfica en la base de datos electrónica Web of Science (WoS) de acuerdo con las líneas de recomendación para revisiones sistemáticas y meta-análisis de la guía PRISMA. Para ello, se utilizaron los términos de búsqueda *sport injur**, *psycho** y *rehabilitation*. Los criterios de inclusión utilizados fueron: 1) tener como objeto de estudio la medición de variables psicológicas durante la fase de rehabilitación de una lesión deportiva; 2) ser de carácter empírico y; 3) la aplicación de un programa de entrenamiento psicológico como parte del tratamiento en la rehabilitación de la lesión deportiva.

Resultados: Tras aplicar las estrategias de búsqueda, se obtuvieron un total de 394 artículos, de los cuales tras eliminar los que no cumplían los criterios de exclusión se redujeron a 15 artículos.

Conclusiones: Los resultados muestran que los programas de intervención psicológica más utilizados en la rehabilitación de deportistas lesionados han sido la relajación, la visualización, el establecimiento de objetivos y el Mindfulness. Por su parte, las variables psicológicas más estudiadas fueron el dolor, la adherencia a la rehabilitación y la autoeficacia. Finalmente, la aplicación de intervención psicológica en el proceso de rehabilitación del deportista lesionado se mostró eficaz, para el objetivo que perseguía, en 13 de los 15 trabajos objeto de estudio.

Palabras clave:

Lesión deportiva. Rehabilitación.
Psicología. Entrenamiento psicológico.
Deporte.

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Introduction

An injury can constitute a catastrophic break that calls for major reflection and reconsideration, which athletes, at times, do not have sufficient resources to do in the best possible way¹⁻³. In addition, such occasions can sometimes entail negative consequences on athletes' physical, neurological⁴⁻⁸, and psychological health⁹⁻¹¹.

The Wiese-Bjornstal *et al.*¹² Model allows us to understand the relationships between sports injuries and psychological factors. Like the models of Andersen and Williams¹³ and Williams and Andersen¹⁴, this model dynamically integrates personal and situational factors into the response components to the injury¹⁵. The authors explain that an overarching emotional and behavioural response appears in the injured athlete that is caused by the situation and the cognitive assessments that they subsequently arrive at. Thanks to this model, it is understood that stress is not only a risk factor in sports injury, but also an obstacle to recovery.

As Olmedilla and García-Mas² explain, five fundamental lines of research are observed on the relationship between psychological factors and sports injuries. One of them focuses on the study of athletes' emotional and psychological reactions to injuries, associating them to behaviours vis-à-vis adherence to rehabilitation. In this line of research, notable works are Brewer *et al.*¹⁶, Abenza *et al.*¹⁷, and Chan and Hagger¹⁸, which explain that factors such as stress, fear of pain, level of motivation, confidence, and others, are key in the rehabilitation process. In light of such works, it is important to take psychological techniques into account, both to improve adherence to treatment and to control anxiety levels, and to increase injured athletes' self-confidence¹⁹⁻²¹. To know which techniques are the most appropriate when carrying out psychological work with athletes in a rehabilitation process, one must know which psychological variables are the most affected or the most important to improve.

Based on the excellent systematic review of Cavanna and Chang²², the objective of which was to identify the psychological problems considered most relevant by sports doctors for the rehabilitation process, the following can be highlighted: anxiety, stress, depression, level of adherence, and social support. In this sense, there is research that also highlights anxiety control, self-confidence, motivation and concentration^{10,23-25}. Junichi and Hajime²⁶ emphasise aspects such as stress control or anxiety reduction. Yang *et al.*²⁷, emphasise social support, understanding it as athletes' assessment of the help that could be available from their social network, and their satisfaction with such support. Other studies have focused on analysing the relationship between personality traits and sports performance^{28,29}, where aspects such as competitiveness, team spirit, self-confidence and analytical disposition appear as significant predictors of sports performance.

In this sense, there are several studies that focus their psychological intervention on the use of techniques such as relaxation, goal setting or visualisation³⁰⁻³⁴. Specifically, different studies associate visualisation and

relaxation with an improvement in psychological coping^{33,34} and reduced anxiety over fear of re-injury^{30,33,34}. Also, although to a lesser extent, these techniques have additionally proven to be effective in reducing negative psychological consequences, improving psychological coping and reducing anxiety over fear of re-injury, psychological counselling, written sharing, and acceptance and commitment therapy³³.

In line with the proven importance of psychological intervention in the rehabilitation process of injured athletes, several research projects have begun to use them. Framed within a psychological training program, as part of an injured athlete's rehabilitation³⁵⁻³⁷, they increasingly integrate psychological work into athletes' training.

Smith *et al.*³⁸ conducted a systematic review of the various coping strategies used by athletes recovering from sports injuries. In this review, it is noted that depression can be partially mitigated by setting short-term goals. Several studies^{39,40} using psychological techniques as part of the rehabilitation of a sports injury demonstrated the treatment's efficacy.

In this sense, the following affirmations can be made: a) the reviews carried out are either very old, or were not focused exclusively on psychological intervention programs²²; and b) there is a corpus of literature on psychological interventions in the rehabilitation processes of sports injuries, and it has been increasing in recent years.

In the light of the above, the objective of this paper is to review the existing publications until 2020 which aim to apply psychological intervention programs in the rehabilitation processes of injured athletes.

Materials and method

Search strategy

To search for the information studied herein, the Clarivate Analytics Web of Science (WoS) electronic database (<https://webofknowledge.com>) was used.

WoS is a powerful platform of the ISI (*Institute for Scientific Information*) that integrates different bibliographic databases and other resources covering all fields of scientific knowledge. The fields of analysis contained in the database are: topic, title, author, author identifiers, publisher, joint authorship, publication name, DOI, year of publication and address.

Procedure

A systematic review of the literature was carried out following the pre-defined protocol for the stages of identification, screening, selection, and inclusion, as described in the PRISMA⁴¹ guide.

The *Social Science Citation Index* (SSCI) and *Science Citation Index* (SCI) databases were selected in the WoS database to perform data queries.

A detailed search of original articles was carried out using a series of keywords in order to filter the articles dealing with this subject. To do this, we used the advanced search using a topic with the descriptors (topic= *sport injur**) and (topic=*psycho**) and (topic=*rehabilitation*). All articles published up to and including 2020 were analysed.

The initial search yielded a total of 394 articles that matched the defined keywords. This total was reduced after applying the exclusion criteria to properly analyse the information.

Exclusion criteria

Of the works identified (n=394) the following exclusion criteria were applied:

- The research subject was the validation of an instrument.
- The research subject was a bibliographic review.
- The research was not of an empirical nature.
- The research did not address at least one psychological variable.
- The research did not apply a psychological training program.

Following these criteria, a total of 15 articles were included in the review. Figure 1 details the excluded works according to the aforementioned criteria.

Data analysis

After selecting the articles that made up the analytical corpus of the study, they were analysed according to a series of variables such as: complete citation; research objectives; applied psychological intervention program; psychological variables studied in the research; assessment tools used and; research results.

Results

In the aforementioned way, and in keeping with the exclusion criteria, 15 articles were selected in the end.

Table 1 below lists the studies that incorporated a psychological intervention program in the rehabilitation process of sports injuries in athletes.

Figure 1. Selection process of the articles included in the review.

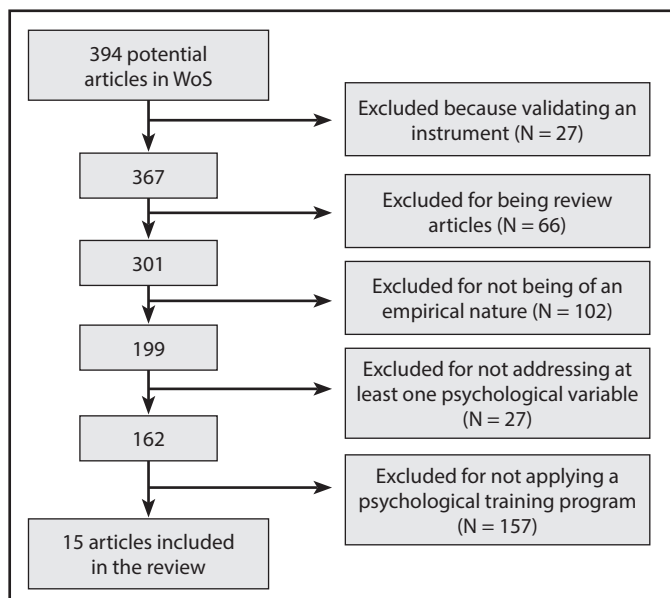


Table 2 shows the most relevant aspects of each of the publications, specifically: the complete citation of the article, the research objectives, the psychological intervention program used in the study, the psychological variables studied in the research, the psychological assessment instruments and, finally, the research results.

The most commonly used psychological technique in the intervention programs was visualisation, followed by goal setting and relaxation, psychological counselling and mindfulness. The psychological variables that attracted the most interest in the studies were pain, adherence to rehabilitation and self-efficacy. Self-reports predominated as an assessment instrument and the results showed the effectiveness of the psychological intervention program that was adopted in 13 of the 15 studies under investigation.

Discussion

The objective of this work was to review, in the current state of the literature, the existing publications in which psychological training programs were applied in the rehabilitation processes of injured athletes.

Taking into account the search source, the keywords and the exclusion criteria used in obtaining the articles of interest to this research, it was observed that few studies (N=15) focused on the application of a psychological training program as part of the rehabilitation process in injured athletes.

Table 1. Studies that incorporate a psychological intervention program in the rehabilitation process.

Authors	Psychological intervention program
Brinkman <i>et al.</i> 2020	Goal setting
Arvinen-Barrow <i>et al.</i> 2020	Active video games (AVG)
Podlog <i>et al.</i> 2020	Cognitive Behavioural Therapy (CBT)
Mohammed <i>et al.</i> 2018	Mindfulness
Palmi <i>et al.</i> 2018	Mindfulness
Pazit <i>et al.</i> 2017	Communication and information
Carson <i>et al.</i> 2014	Visualisation
Mankad and Gordon, 2010	Pennebaker's writing paradigm
Vergeer, 2006	Visualisation
Christakou y Zervas, 2007	Relaxation and visualisation
Thatcher <i>et al.</i> 2007	Reversal theory
Rock and Jones, 2002	Psychological counselling
Evans and Hardy, 2002	Goal setting
Cupal and Brewer, 2001	Relaxation and visualisation
Brewer <i>et al.</i> 1994	Goal setting, visualisation and psychological counselling

Table 2. Analysis of the selected articles as a sample of the systematic review.

Use of goal setting to enhance self-efficacy after sports-related injury: a critically appraised topic (Brinkman <i>et al.</i> 2020)		
Objectives To know if goal setting is effective in improving self-efficacy after a sports injury	Psychological Intervention Program Goal setting	Psychological variables Efficacy
Psychological Assessment Instruments <i>Sports Injury Rehabilitation Beliefs Survey</i>		
Results The results support improved self-efficacy for athletes undergoing rehabilitation for sports injuries when using goal setting		
Functional outcomes and psychological benefits of active video games in the rehabilitation of lateral ankle sprains: a case report (Arvinen-Barrow <i>et al.</i> 2020)		
Objectives Examine the functional outcomes and psychological benefits of the active video game (AVG) rehabilitation program in injured athletes	Psychological Intervention Program Active Video Games (AVG)	Psychological variables Adherence to rehabilitation, perception of pain, perception of readiness for RTP and mood
Psychological assessment instruments Measure of adherence to training rehabilitation in athletes Pain Visual Analog Scale (VAS) Injury-Psychological Readiness to Return to Sport Scale Brunel Mood Scale		
Results The results are favourable at the functional level of the injury, but the application of AVG does not produce improvement in the psychological variables of the study		
A cognitive behavioural intervention for college athletes with injuries (Podlog <i>et al.</i> 2020)		
Objectives Examine the efficacy of a CBT intervention in improving psychological well-being, rehabilitation adherence and outcomes	Psychological Intervention Program Cognitive Behavioural Therapy (CBT)	Psychological variables Positive and negative affect, vitality and self-esteem
Psychological assessment instruments Self-reports		
Results The results show improvements in the emotional well-being of the study subjects compared to the control group.		
Effect of Mindfulness Bases Stress Reduction (MBSR) in increasing pain tolerance and improving the mental health of injured athletes (Mohammed <i>et al.</i> 2018)		
Objectives Evaluate the role of MBSR in reducing perceived pain and decreasing anxiety and stress, and increasing tolerance to stress and mindfulness	Psychological Intervention Program Mindfulness Based Stress Reduction (MBSR) Program	Psychological variables Pain, anxiety, and stress
Psychological Assessment Instruments Cold Pressor Test (CPT) Visual Analogue Scale (VAS) Mindful Attention Awareness Scale (MAAS) (Brown and Ryan, 2003) Depression Anxiety and Stress Scale (DASS) (Lovibond and Lovibond, 1995) Profile of Mood States (POMS) (Terry <i>et al.</i> 2003)		
Results The results show increased tolerance to pain and increased awareness Anxiety and stress decreased as the sessions went on		
Mindfulness rehabilitation intervention of an injured athlete: professional football case (Palmi <i>et al.</i> 2018)		
Objectives Evaluate the effectiveness of a mindfulness intervention in the rehabilitation of an injured athlete	Psychological Intervention Program Mindfulness	Psychological variables States of mood, full self-awareness, and emotions
Assessment Instruments Profile of Mood States (POMS) Mindful Attention Awareness Scale (MAAS) Positive and Negative Affect Schedule (PANAS)		
Results The results demonstrate the efficacy of this intervention in improving subjective perception of mood during rehabilitation		

(continuation)

Table 2. Analysis of the selected articles as a sample of the systematic review. (continuation).

A novel web-support intervention to promote recovery following Anterior Cruciate Ligament Reconstruction: a pilot randomised controlled trial (Pazit <i>et al.</i> 2017)		
Objectives Evaluate the efficacy of an internet-based intervention regarding perceptions of knee pain, function, self-efficacy and fear of pain	Psychological Intervention Program Communication and Information	Psychological variables Perception of pain, self-efficacy and fear of pain
Assessment tools Semi-structured telephone interviews Fear-Avoidance Beliefs questionnaires Tampa Scale for Kinesiophobia Knee Self Efficacy Scale (K-SES)		
Results The results show the effectiveness of the internet-based intervention as an information tool		
A case study of technical change and rehabilitation: intervention design and interdisciplinary team interaction (Carson <i>et al.</i> 2014)		
Objectives Research an interdisciplinary team's approach to technical change and rehabilitation of an injured athlete	Psychological Intervention Program Visualisation and Self-Efficacy	Psychological variables Visualisation and self-efficacy
Assessment tools Instruments created <i>ad hoc</i>		
Results The results show that self-reporting measures of self-efficacy and visualisation were considered essential to facilitate change, highlighting the multifactorial nature of the intervention		
Psycholinguistic changes in athletes grief response to injury after written emotional disclosure (Mankad y Gordon, 2010)		
Objectives Examine the effectiveness of Pennebaker's standard writing paradigm in improving psychological response	Psychological Intervention Program Pennebaker Standard Writing Paradigm	Psychological variables Psychological responses, self-efficacy and writing
Assessment tools Psychological Responses to Sport Injury Inventory ³¹ (PRSI) The 19-item Sport Injury Rehabilitation Beliefs Survey ¹² Linguistic Inquiry Word Count ³² (LIWC2007)		
Results The results demonstrated that the writing paradigm was effective in improving psychological rehabilitation by contributing to a better personal understanding of the injury event and attenuating the grief-related response		
Exploring the mental representation of athletic injury: a longitudinal case study (Vergeer, 2006)		
Objectives Improve the knowledge and use of visualisation, thoughts, and sensations related to the injury during the rehabilitation process	Psychological Intervention Program Visualisation	Psychological variables Visualisation, thoughts and sensations
Assessment tools Unspecified		
Results The results indicate the importance of consciousness, mental images, the mental model of the injury, the mental "itinerary" of the future and the self-concept desired by the athlete as interdependent dimensions in the visualisation of injuries		
The effectiveness of imagery on pain, edema, and range of motion in athletes with a grade II ankle sprain (Christakou y Zervas, 2007)		
Objectives Examine the effectiveness of visualisation and relaxation training	Psychological Intervention Programa Relaxation and Visualisation	Psychological variables Visualisation and pain
Assessment tools Visual Analog Scale (EAV)		
Results No significant differences in pain were found between the two groups after performing visualisation		

(continuation)

Table 2. Analysis of the selected articles as a sample of the systematic review. (continuation).

A reversal theory analysis of psychological responses during sports injury rehabilitation (Thatcher <i>et al.</i> 2007)		
Objectives Evaluate the effectiveness of reversal theory in the emotional and psychological process of rehabilitation from injury	Psychological Intervention Program Reversal Theory	Psychological variables Motivational states, injury beliefs, emotional and psychological responses
Assessment tools Motivational Style Profile (MSP) Sports Injury Rehabilitation Beliefs Survey (SIRBS) Structured interviews <i>ad hoc</i> to assess emotional and psychological responses to injury		
Results The results demonstrate the efficacy of Reversal Theory in this context		
A preliminary investigation into the use of counselling skills in support of rehabilitation from sport injury (Rock y Jones, 2002)		
Objectives Analyse the usefulness of psychological counselling in the rehabilitation of injured athletes	Psychological Intervention Program Psychological Counselling	Psychological variables Social support, adherence, mood and pain
Assessment tools Semi-structured interviews created <i>ad hoc</i> Social Support Behaviours Survey (SSBS) Sport Injury Rehabilitation Adherence Scale (SIRAS) Emotional Responses of Athletes to Injury Questionnaire (ERAIQ) Patient Information Questionnaire (PIQ)		
Results The results show the beneficial impact of psychological counselling on outcomes of rehabilitation from injury, especially during setbacks		
Injury rehabilitation: a goal-setting intervention study (Evans y Hardy, 2002)		
Objectives Examine the effects of an intervention based on goal-setting	Psychological Intervention Program Goal-setting	Psychological variables Adherence, self-efficacy, hopelessness, time management
Assessment tools <i>Ad hoc</i> self-reporting to assess adherence to rehabilitation Sports Injury Rehabilitation Beliefs Survey (SIRBS) Psychological Responses to Injury (20item PRSII)		
Results In the study group that received goal-setting treatment, increased levels were observed of adherence to rehabilitation, self-efficacy, improved time management and decreased hopelessness, compared to the control group.		
Effects of relaxation and guided imagery on knee strength, reinjury anxiety, and pain following anterior cruciate ligament reconstruction (Cupal y Brewer, 2001)		
Objectives Examine the effects of relaxation and visualisation on knee strength, anxiety toward a new injury, and pain from surgery	Psychological Intervention Program Relaxation and Visualisation	Psychological variables Anxiety toward a new injury and pain
Assessment tools <i>Ad hoc</i> self-report instrument to assess anxiety toward a new injury <i>Ad hoc</i> self-report instrument to assess perceived pain		
Results A decrease was appreciated in anxiety toward a new injury and perceived pain in the treatment group versus the control group		

(continuation)

Table 2. Analysis of the selected articles as a sample of the systematic review. (continuation).

Perceptions of psychological interventions in the context of sport injury rehabilitation (Brewer <i>et al.</i> 1994)		
Objectives Evaluate the perception of three different psychological interventions in the context of rehabilitation from a sports injury	Psychological Intervention Program Goal-setting, visualisation, psychological counselling	Psychological variables Perceived satisfaction, adherence, beliefs, motivation
Assessment tools Intervention Perceptions Questionnaire (IPQ) Treatment Acceptability Questionnaire (TAQ)		
Results The results show that goal setting, visualisation and psychological counselling are effective to be used in the treatment of injured athletes		

The interest in studying the relationship between sports injuries and psychological factors has led to rehabilitations more frequently combining physical and psychological aspects, which has given rise to interesting works³². In this study, the research studies identified were carried out in the last 20 years. Specifically, 9 articles were published between 2010 and 2020 and 6 articles between 2001 and 2006.

The main objective of the 15 analysed studies was to assess the effectiveness of the psychological training program applied in the injured athlete's rehabilitation. The most applied psychological intervention program was visualisation (used in 5 of the 15 publications), followed by goal setting and psychological techniques such as relaxation, psychological counselling and mindfulness.

Although the different treatments applied were effective in the rehabilitation processes, visualisation proved to be the most used and the most effective technique. It obtained favourable results in 4 of the 5 studies where it was used as the main psychological intervention program. It is also worth mentioning the effectiveness of mindfulness, which achieved positive results after application in the two studies where it was used. These techniques were effective in improving different states of anxiety and concentration⁴², increasing self-esteem and promoting coping and stress management strategies⁴³ and, therefore, in improving sports performance⁴⁴.

On the other hand, the most studied psychological variables were pain, adherence to rehabilitation, and self-efficacy, followed by others such as anxiety, mood, perceived satisfaction, motivation or stress. In keeping with the scientific evidence, with decreased anxiety comes better performance⁴⁵ and, by extension, better coping strategies⁴³.

Different assessment instruments were used in the different studies, proving to be very specific for each study. The most used method was self-reports. The fact that most of the instruments used were self-reported demonstrated the importance and consistency of this instrument in the analysis of psychological variables.

In sum, in accordance with the results, the interventions that were carried out helped the injured athletes in their rehabilitation processes.

Although not in all cases—but in most—it was possible to improve the indicators of the psychological variables under analysis (decreased anxiety, pain control, improved mood, or improved self-efficacy with respect to recovery). The results obtained, as well as the intervention proposals, could be useful tools for sports psychologists both to develop working hypotheses and more appropriate interventions.

Conclusions

The following conclusions were drawn in relation to this review's objective of grasping the current state of the literature as relates to the application of psychological training programs as intervention tools in the rehabilitation of sports injuries:

- The most commonly used technique was visualisation, which was used in 5 of the 15 publications that were analysed.
- Goal setting was used in 3 studies, followed by psychological counselling, mindfulness and relaxation, which were used in two publications (each).
- The most studied psychological variables were pain, adherence to rehabilitation and self-efficacy.
- The assessment instruments used were very different, the most used being self-reports.
- The results showed the efficacy of the psychological intervention in 13 of the 15 articles analysed.

Limitations and future lines of research

The WoS electronic database is the most important database and includes almost all prestigious journals. Despite this, it would perhaps be interesting to expand the search to other databases, thus recovering articles that were not identified in this search.

According to the results, in future lines of research, it would be important to publish the application of professional interventions, either focused on psychological aspects or as interdisciplinary interventions that improve the proper understanding of injured athletes' rehabilitation

processes. This is specifically so in the case of applying psychological techniques such as visualisation or psychological establishment in pain treatment or adherence to rehabilitation treatment.

Conflict of interest

The authors do not declare any conflict of interest.

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