

# Psychosocial Interventions for Back Pain in Elite Sport: a Review of Selected Research and Current Developments

*Psychosoziale Interventionen bei Rückenschmerz im Leistungssport: Literaturübersicht und aktuelle Entwicklungen*

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## Summary

- › **Psychosocial interventions** for back pain patients are well established elements of treatment regimens and numerous reviews support their effectiveness. Research is sparse regarding the specific case of elite athletes suffering from back pain (BP), and the effects of psychological treatments in this population.
- › **Therefore**, based on a biopsychosocial paradigm, this article describes four intervention approaches with a specific orientation towards athletes' 1) pain perception and pain management, 2) body experience and body concept, 3) motivation and self-regulation, and 4) stress management and recovery.
- › **For each of these four topics**, a short overview of the key research and existing interventions is given. Based on the overviews of these four topics, specific treatments that have been developed by the authors are described. These treatments particularly aim 1) to gradually increase physical and social activity while reducing BP and disability, 2) to concentrate on positive aspects of body experience, 3) to enhance patients' self-efficacy and intrinsic motivation for rehabilitation and 4) to promote and monitor individual recovery activities, and relaxation techniques. Evidence concerning the effects and feasibility of these developments is expected from current intervention studies.
- › **Future studies** are encouraged to examine whether the developed interventions are also effective when offered by trained physiotherapists or physicians in primary care.

## Zusammenfassung

- › **Psychosoziale Interventionen** haben sich im Rahmen der Behandlung von Rückenschmerzen als ein fester Bestandteil etabliert und eine Vielzahl von Literaturübersichten zeigt ihre Effektivität. In Bezug auf die speziellen Aspekte von Leistungssportlern und -sportlerinnen mit Rückenschmerzen und die Effektivität von psychosozialen Maßnahmen im Rahmen ihrer Behandlung ist die Forschungslage jedoch schwach.
- › **Daher beschreibt** der vorliegende Beitrag auf Basis eines biopsychosozialen Paradigmas vier Interventionsansätze mit spezifischer Ausrichtung auf 1) die Schmerzbewältigung und das Schmerzmanagement, 2) die Körpererfahrung und das Körperkonzept, 3) die Motivation und die Selbstregulation und 4) das Stressmanagement und die Erholung von Sportlern und Sportlerinnen.
- › **Für jede der vier Ausrichtungen** wird eine kurze Übersicht über die Forschung und bestehende Interventionsansätze gegeben. Basierend auf diesen Übersichten werden spezifische Interventionsansätze dargestellt, die von den Autorinnen und Autoren entwickelt wurden. Diese Interventionsansätze zielen insbesondere darauf ab 1) die körperliche und soziale Aktivität zu erhöhen während Schmerzen und Einschränkungen verringert werden, 2) die Konzentration auf positive Aspekte der Körpererfahrung zu lenken, 3) die Selbstwirksamkeitserwartung und intrinsische Motivation für die Rehabilitation zu erhöhen und 4) individuelle Erholungsmaßnahmen sowie Entspannungstechniken zu fördern und zu begleiten. Belege hinsichtlich der Effekte und Umsetzbarkeit dieser Interventionsansätze werden von aktuell laufenden Studien erwartet.
- › **Zukünftige Studien** sollen darüber hinaus zeigen, ob die Interventionen auch effektiv sind, wenn sie durch ausgebildete Therapeutinnen und Therapeuten eingesetzt werden.

## KEY WORDS:

Back Pain, Elite Sport, Pain Coping, Body Concept, Motivation, Recovery

## SCHLÜSSELWÖRTER:

Rückenschmerz, Leistungssport, Schmerzbewältigung, Körperkonzept, Motivation, Erholung

## Introduction

Psychosocial interventions in back pain (BP) patients are well established in treatment regimens in the general population. Such interventions are usually embedded in multimodal, multidisciplinary programs as a standard treatment for patients with chronic low back pain (LBP; 39). This current role of psychosocial approaches in BP management is based on a longer history: Already Turner (46) stres-

sed psychological techniques as an essential part of multidisciplinary pain management. Moreover, Turner's early review provided evidence for effects of psychosocial interventions in a variety of pain syndromes while research commenced in patients with headache. Later reviews improved evidence for the effectiveness of psychological interventions for BP in particular (36). Despite this general



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Table 1

Current methods, developments and recommendations for psychosocial interventions in back pain patients.

	<b>PAIN PERCEPTION &amp; PAIN MANAGEMENT</b>	<b>BODY EXPERIENCE &amp; BODY CONCEPT</b>	<b>MOTIVATION &amp; SELF-REGULATION</b>	<b>STRESS MANAGEMENT &amp; RECOVERY</b>
<b>Current methods</b>	Cognitive behavioral interventions "Graded Balance": graded exposure, pacing techniques, tailored individually based on the avoidance-endurance model (AEM)	Psychoeducation, self-monitoring and cognitive restructuring	Multimodal approach (improve physical activity and reduce pain) Cognitive techniques, motivational interviewing, psychoeducation, behavioral change techniques	Educational sessions and psychological relaxation techniques Stress management program
<b>Current developments</b>	Physiotherapists trained in conducting risk factor screening; AEM-based education	Cognitive strategies to disregard body region affected by pain	Intervention tools for enhancing self-efficacy/intrinsic motivation Smartphone application to enhance schedule/coping efficacy	Stress and recovery interventions implemented in multimodal programs
<b>Recommendations</b>	Addressing dysfunctional modes of pain processing in athletes and non-athletes with back pain	Modifying body-related thoughts, feelings and behaviors Considering the concept of positive body image	Testing effects of intervention tools and smartphone applications Developing individually tailored interventions	Individualized and problem-specific interventions

evidence for effects of psychological treatments, different types of psychological interventions do not substantially differ (36); furthermore, besides the evidence that multidisciplinary rehabilitation is more effective than usual care (25), the specific mechanisms responsible for such effects still need to be evaluated.

To explore and explain mechanisms of psychosocial treatments in BP patients, a theoretical concept is necessary; the biopsychosocial paradigm of BP exemplifies the most prominent approach (50). This paradigm distinguishes between the construct of 'disease' as a biomedically oriented term and the construct of 'illness' as a biopsychosocially oriented term. From the biopsychosocial perspective, BP is a matter of interactions between biological, psychic and social determinants. Given this triad, the focus of a multidisciplinary therapy is not only the biomedical treatment but the patient's perception, behavior and social interaction in a given life context. Consequently, today's therapy recommendations and some of the following psychological interventions comprise behavioral therapy, fear-avoidance training, and stress management or relaxation therapy (39). One reason for the conceptual shift away from a restricted biomedical model towards a multi-factorial approach is grounded in the increased risk of chronicity in BP patients with distress and depressive mood (38) as well as dysfunctional pain coping (14, 28).

In the context of sport, the biopsychosocial paradigm has been extensively discussed in relation to the occurrence and rehabilitation of sport injuries. In the course of this discussion, models have been developed to explain how biological, psychic and social determinants work together in injury development (1, 9) or injury rehabilitation (52). In these models, the psychosocial perspective entails stress, emotion, and motivation as important factors of sports injuries. These factors are presumably not only important in terms of sport injuries but also in relation to athletes' BP although the empirical evidence for this assumption is still sparse (17, 44). Taking the biopsychosocial perspective and the existing models of injury rehabilitation in sport into account (52), psychosocial interventions to prevent or decrease sport-related BP should include emotional, cognitive and behavioral aspects of BP in athletes with respect to their specific personal and situational conditions. Given this general framework, the following sections – exemplarily and on the basis of the work of our research

group – describe four different orientations of psychosocial interventions to prevent or decrease athletes' BP: (1) pain perception and pain management, (2) body experience and body concept, (3) motivation and self-regulation, and (4) stress management and recovery (for an overview see table 1).

### Psychosocial Interventions on Pain Perception and Pain Management

#### State of Research

Dysfunctional cognitive, affective and behavioral responses to pain represent modifiable risk factors for the development of chronic BP that are frequently addressed in psychosocial interventions (30). Dysfunctional pain responses comprise emotions such as pain-related fear, anxiety or depression, automatic cognitions of catastrophizing, helplessness, and more general meta-cognitions such as fear-avoidance beliefs. Followed by extensive avoidance behavior, these patterns of pain processing are suggested to lead to physical inactivity and accompany disuse of muscular structures (49). In contrast, due to the avoidance-endurance model of pain (AEM, 13), also cognitions such as pain thought suppression and endurance behavior, where people try to endure ongoing activities despite severe levels of pain, have been shown to predict pain and disability, presumably by physical overuse (10, 11). The AEM implies sub-grouping of patients due to their individual pattern, resulting in the fear-avoidance response (FAR) pattern, the distress-endurance (DER) or eustress-endurance (EER) pattern and an adaptive response way (AR). Among athletes with chronic BP, the EER pattern revealed the highest frequency while FAR and DER pattern were associated with the highest pain intensity and disability (43).

Derived from a cognitive-behavioral approach of therapy (CBT, 45) a number of treatment methods were developed, i.e., graded exposure (48), pacing techniques (34) or cognitive distraction and re-evaluation (45). Although most of these interventions revealed a reduction in pain and disability, these effects are only marginal in size (31). Thus, research is recommending reconsideration of content, delivery, place, and control of therapy (5).

The central principle of an AEM-based approach is to increase physical and social activity gradually, while reducing BP and disability (Graded Balance, GB, 11). Furthermore, >

we argue for a change in delivery of these techniques from a standardized application in patients suffering from chronic pain to an individually tailored delivery, based on screening of psychosocial risk factors, preferably in early phases of the disease (11). In a preliminary randomized trial in patients with subacute BP, this approach, delivered by trained psychotherapists, has been shown as highly statistically and clinically effective in reducing pain and disability (12).

### Current Developments

We are now interested, whether the GB approach is also effective when offered by trained physiotherapists or physicians in primary care, the primary professions frequented by patients with subacute pain. Thus, in a non-randomized intervention trial, we have trained a group of physiotherapists to conduct a risk factor screening and to implement phases of AEM-based education in the regular treatment of their patients. A special challenge is to address dysfunctional modes of pain processing in the group of athletes, as a certain level of pain endurance is afforded to establish high physical performance.

### Psychosocial Interventions on Body Experience and Body Concept

#### State of Research

Body experience and body concept are relatively new approaches in the context of psychosocial interventions for BP. Body experience is defined as a differentiated whole with different levels and functions concerning the body (40). One of these levels is the body concept, which is described as formal knowledge about the body (40), similar to the umbrella term body image, describing the subjective perceptions, feelings, beliefs, and thoughts with respect to the own body (3, 8). A heterogeneous use of these different terms respective to all facets of body experience lead to a difficulty in comparing the state of research in elite sport.

Studies on LBP and body experience or body concept in elite sports are currently not existent. Moreover, the relationship between body image and elite sports seems to be ambivalent. Specifically, some authors assume that athletes are at higher risk for body image disturbances while others report that athletes reveal a more positive body image than non-athletes (for an overview see 15). Psychosocial interventions on body experience and body concept for BP patients have not been examined so far. Hence, our recommendations base on cognitive-behavioral approaches (in the general population) with the aim to modify body-related thoughts, feelings and behaviors (26, 51). Such procedures are already established as treatments for body image disturbances containing psychoeducation, self-monitoring and cognitive restructuring (21).

#### Current Developments

In terms of current developments, two approaches seem promising. First, pain patients (unconsciously) use cognitive strategies to disregard the body region affected by pain (e.g., 32). This might be one reason why competitive athletes with chronic pain are able to continue their training and participation at competitions (42). Performing in spite of pain can intensify pain and result in serious injuries. This distortion of body concept could be a starting point for possible interventions to prevent (further) injuries by training the body perception (e.g., finding a realistic estimation of actual physical competencies during strength training).

Second, pain is perceived as dominant compared to other physical sensations, followed by a higher attention to the pain region (26), potentially leading to a negative evaluation of the (whole) body. Consequently, the body image tends to be negative, which might affect the engagement in physical activity and exercise (8): Some people avoid physical activity, others are stimulated to do more sports. Both facets are known as important risk factors for chronic LBP (13). Therefore, for those patients focusing on negative aspects of their body it could be helpful to concentrate on positive aspects of body experience, e.g., concentrating on the functionality of other parts of the body (47).

### Psychosocial Interventions on Motivation and Self-Regulation

#### State of Research

Physical activity (PA) and exercise are an essential part of therapy in BP patients, with all current therapy strategies containing some kind of physical exercise, supported by empirical evidence of exercise therapy (16). Consequently, there are many different approaches in the literature to enhance PA in patients with LBP. Current evidence indicates that motivational and volitional techniques can improve PA and result in an effective long-term adherence (4, 7, 22, 29). Studies on the enhancement of PA in LBP patients are typically designed as multimodal treatments aiming at both the improvement of PA and the reduction of pain. For instance, Hofmann et al. (20) combined a behavioral medical rehabilitation treatment with a behavioral exercise therapy to reduce barriers to recover and relax and to thereby increase physical functioning. A similar multimodal arrangement was assessed by Ben-Ami et al. (2) who combined different intervention components while considering a stage model (i. e., the transtheoretical model; TTM) as a theoretical basis for behavior change. An additional focus was applied by Pflingsten, Hildebrandt, Franz, Saur, and Seeger (37) who used cognitive techniques aiming at improving the patients' ability to control and strengthen their behavior change, especially for the patients' PA level at home.

Psychological principles and techniques in treatments to enhance PA in LBP patients are manifold. Educational approaches focus on the impartment of knowledge (e.g., about effects of PA regarding LBP; 20) and try to enhance sense, meaning and thus motivation. Action-oriented approaches enhance the patients' competencies to plan PA (2) and to integrate PA in the patients' everyday life (20). These treatment approaches also use behavioral change techniques such as goal-setting or barrier-management (20). Finally, Motivational Interviewing – a complex counseling method for health behavior change including different principles or techniques – has also been applied in behavior change programs (2).

Only a few studies tested effects of interventions to enhance PA with respect to behavior change: Hildebrandt et al. (37) found statistically significant improvements in activity abilities and behavior measurements. Moreover, the study of Ben-Ami et al. (2) showed an increase of PA.

#### Current Developments

To enhance the level of PA of patients with LBP, we developed three intervention tools targeting the patients' motivation and volition. These tools are introduced by the patients' physiotherapist during their prescribed therapy. The first tool ('List of Activities') aims at the enhancement of the patients' task and scheduling efficacy (i.e., choosing feasible activities and

integrating these into the patients' weekly schedule). The second tool ('Grand Canyon') targets the patients' coping efficacy regarding the execution of their chosen activities (e.g., by generating solutions for predicted obstacles). The third tool ('Joy of Movement') aims at improving the patients' intrinsic motivation by focusing on positive experiences/feelings while being physically active.

Furthermore, a smartphone application was developed for competitive athletes prone to suffering from LBP. The aim of this application is to enhance the athletes' scheduling and coping efficacy in light of the execution of core stability exercises to prevent the occurrence and/or manifestation of LBP (i.e., supporting athletes in firstly planning the execution of exercises and secondly developing a barrier management).

## Psychosocial Interventions on Stress Management and Recovery

### State of Research

Stress and recovery have been identified as psychological factors associated with BP development and chronification within the general population (18, 33). Recovery describes "an inter- and intraindividual multilevel (e.g., psychological, physiological, social) process in time for the re-establishment of personal resources and their full functional capacity" (23, p. 42). For stress, a plethora of different stress definitions exist, whereas stress can generally be characterized as a physiological and psychological response to external or internal events exceeding the personal resources (27).

Despite the importance of these psychological concepts, stress and particularly recovery have been acknowledged insufficiently within multimodal programs for BP rehabilitation by means of adequate interventions (39). Commonly used practices to target stress reduction for the treatment of BP encompass educational sessions to discuss coping mechanisms or psychological relaxation techniques such as progressive muscle relaxation (24, 39). Reese and Mittag (39) point out that the existing evidence on the effectiveness of stress specific interventions within multidisciplinary rehabilitation programs is of only low or moderate quality. In line with the recommendations by Kamper et al. (24), Reese and Mittag (39) advocate individualized and problem specific interventions aiming at the topics of stress and recovery as paths for future research.

While inconclusive and isolated research findings delineate the research findings for the general population, interventions for BP entailing components for stress and recovery management are yet to be developed for athletes. Olmedilla-Zafra et al. (35) designed a stress management program with the purpose of diminishing the injury incidence in soccer players. The outcomes of this study showed a lower injury risk for the treatment group compared to the control group. While injuries and BP should be treated as separate concepts (17), the approach proposed by Olmedilla-Zafra et al. (35) could be considered as example applicable to reduce BP incidence in athletes.

### Current Developments

For the athletic population, stress as risk factor has been linked to BP incidence (6) and chronification (19), whereas associations between recovery and BP could not be identified up to the present moment. Within our research group, we followed two paths regarding the examination of stress, recovery and BP:

- a) Due to the extensive knowledge with respect to stress and recovery as risk factors for BP in the general population, we focused on the development of stress and recovery interventions implemented in multimodal programs which are currently tested. These interventions consist of a reflective recovery diary to monitor individual recovery activities, a short breathing relaxation, and strategies to promote detachment (i.e., unwinding from work) (41).
- b) Sound research regarding stress, recovery, and BP barely exists for athletes, requiring the examination of basic associations between these factors as a first step (17, 19).

Our primary findings for the cohort of athletes could serve as a basis to foster and strengthen research considering stress and recovery as relevant psychological factors in the context of BP. Prospectively, the above mentioned stress and recovery based interventions for BP reduction in the general population can be adapted and reframed to the athletic context in case these factors emerge as significant risk factors.

## Conclusions

Psychosocial interventions in BP patients are well established in treatment programs (39) and reviews show their effectiveness in BP patients in general (36). However, in terms of elite athletes, research on the specific personal and situational conditions of athletes suffering from BP (17) and research on effects of psychological treatments in addition to medical treatments barely exist. Based on a biopsychosocial paradigm and existing psychosocial interventions, we developed treatment regimens and techniques that consider psychosocial mechanisms that are not only but particularly of interest in terms of BP in athletes (e.g., pain coping, body concept, motivation, recovery). These regimens are aligned to the BP process in the narrower sense (e.g., pain perception, pain management, body perception, and body image) and to moderators/mediators of the BP process (e.g., stress management, recovery, motivation, and self-regulation). Evidence for effects and feasibility of our approaches in the general population and particularly in the group of athletes is expected from current intervention studies. Finally, it is of interest whether our interventions are also effective if offered by trained physiotherapists or physicians in primary care. In this case, these interventions should be considered as regular parts of the educational programs of physiotherapists, physicians or other kind of therapists. ■

## Förderung

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