

11-2014

Psychosocial factors in sports injury rehabilitation and return to play

Leslie W. Podlog
University of Utah

John Heil
Psychological Health Roanoke

Stefanie Podlog (nee Schulte)
University of St. Augustine for Health Sciences, spodlog@usa.edu

Follow this and additional works at: <https://soar.usa.edu/at>



Part of the [Exercise Science Commons](#), [Psychology Commons](#), [Psychology of Movement Commons](#), and the [Sports Medicine Commons](#)

Recommended Citation

Podlog L, Heil J, Schulte S. Psychosocial factors in sports injury rehabilitation and return to play. *Phys Med Rehabil Clin N Am*. 2014;25(4):915-930. doi:10.1016/j.pmr.2014.06.011

This Article is brought to you for free and open access by the Faculty and Staff Research at SOAR @ USA. It has been accepted for inclusion in Athletic Training Collection by an authorized administrator of SOAR @ USA. For more information, please contact soar@usa.edu, erobinson@usa.edu.

Psychosocial Factors in Sports Injury Rehabilitation and Return to Play



Leslie Podlog, PhD^{a,*}, John Heil, DA^b, Stefanie Schulte, PhD^a

KEYWORDS

- Cognitions • Social support • Intervention plan • Fear of injury • Denial • Distress • Pain

KEY POINTS

- Research on psychological factors has found that cognitive appraisals, emotional reactions, and behavioral responses to injury influence the quality and nature of athletes' rehabilitation.
- The 2 most influential social factors influencing athletes' injury rehabilitation are the nature of patient-practitioner interactions and the effectiveness of social support provisions.
- Taking into account the psychological nature of rehabilitation as well as the plethora of demands confronting returning athletes, the need for evaluation of psychological readiness to return is imperative.
- Injury is an emotionally disruptive experience for anyone, but perhaps more so for athletes, especially those for whom sport is central to lifestyle and personal identity.
- There is an extensive array of psychological factors, positive and negative, that play into the recovery process for better or worse.

PART 1: THE RESEARCH LITERATURE

Impact of Psychological Factors on Rehabilitation

Research on psychological factors has found that cognitive appraisals, emotional reactions, and behavioral responses to injury influence the quality and nature of athletes' rehabilitation. Cognitive, emotional, and behavioral factors influencing athletes' rehabilitation are discussed separately in this article.

Cognitions

A range of cognitions has been identified that influence athletes' emotions and behaviors in rehabilitation settings, including attributions for injury occurrence,

^a Department of Exercise and Sport Science, University of Utah, 250 South 1850 East, Room 200, Salt Lake City, UT 84112, USA; ^b Psychological Health Roanoke, 2840 Electric Road, Suite 200, Roanoke, VA 24018, USA

* Corresponding author.

E-mail address: les.podlog@utah.edu

self-perceptions following injury, cognitively based coping strategies, and perceived injury benefits. Self-perceptions of esteem and worth have also been shown to diminish following injury in some studies (eg, Leddy and colleagues,¹ 1994) but not in others (eg, Smith and colleagues,² 1993). Cognitive appraisals of the potential benefits of injury have been described, including opportunities to develop nonsport interests, viewing injury as a test of character, enhanced appreciation for sport, greater resilience, and enhanced knowledge of the body and technical mastery.^{3,4} Quinn and Fallon⁵ (1999) found differences in sport self-confidence over the course of rehabilitation, with confidence levels high at the onset of injury, declining during rehabilitation, and increasing with recovery. However, there is little other study of change in appraisal over time and how this is related to recovery.

Emotions

Athletes' emotional reactions to injury include feelings of loss, denial, frustration, anger, and depression (eg, Tracey,⁶ 2003). Positive emotions such as happiness, relief, and excitement have been reported as well.⁷ The attainment of rehabilitation goals and the prospect of recovery may engender a host of positive emotional responses throughout the course of rehabilitation. It seems that these responses are influenced by a wide array of personal factors (eg, athletic identity, previous injury experience, injury severity, injury type, current injury status) and situational factors (eg, life stress, social support satisfaction, timing of the injury).^{2,8-16}

Emotions typically fluctuate in response to rehabilitation progress and/or setbacks (see Brewer,¹⁷ 2007, for a review). Emotional states typically move from negative to positive as athletes progress through their rehabilitation and a return to competition draws nearer. Studies have shown an increase in negative affect as the return to sport approaches, possibly because of anxieties over reinjury, the uncertainty of what lies ahead, as well as concerns that postinjury goals may be unrealized.¹⁸ Return to sport may alternatively be viewed as a functional reality check challenging denial that may have falsely bolstered athlete expectation. In summary, individual differences in emotional response over the course of rehabilitation are varied, complex, and fluctuate with rehabilitation progress and setbacks.

Behaviors

The extent to which athletes use various coping skills (eg, goal setting, imagery, seeking out social support) and adhere to rehabilitation have received the greatest amount of research attention. Personal factors linked to adherence including pain tolerance,¹⁹ self-motivation,²⁰ tough-mindedness,²¹ perceived injury severity,²² internal health locus of control,²³ self-efficacy,^{24,25} and self-esteem²⁶ have all been positively associated with rehabilitation adherence, whereas mood disturbance⁹ and fear of reinjury²⁷ are negatively associated. Demographic factors such as age have also been found to influence rehabilitation adherence. For example, Brewer and colleagues²⁸ found that age moderated the relationship between psychological factors and 2 kinds of adherence: home exercise completion and home cryotherapy completion. Older patients were more adherent when they were self-motivated and perceived high levels of social support, whereas younger patients were more adherent when they were highly invested in the athlete role as a source of self-worth.²⁸

Adherence has been positively associated with enhanced clinical outcomes such as proprioception, range of motion, joint/ligament stability, muscular strength and endurance, as well as reductions in the subsequent risk of reinjury.^{9,17,29-31} However, nonsignificant³² and negative relationships^{31,32} have also been found. The negative relationship in particular is likely a function of methodological problems. Although it

is a simple matter to get measures of compliance such as attendance, assessing the more subtle elements such as motivation and psychological coping behaviors is more difficult. Active coping responses such as use of positive self-talk,³³ imagery,²⁴ goal setting,³⁴ and seeking out additional information about injury³⁵ are also associated with adherence. In addition, situational factors, mostly related to perception of treatment, also predict adherence, including a belief in the efficacy of the treatment,²⁸ information about rehabilitation,³⁶ the clinical environment,³⁶ value of rehabilitation to the athlete,²² and hours a week of sport involvement.³⁷

Psychological interventions that have shown efficacy in enhancing the rate or quality of sport injury rehabilitation include goal setting,³⁴ imagery and relaxation,³⁸ and stress inoculation.³⁹ The use of self-directed cognitive coping strategies similarly predict favorable psychosocial outcomes such as accepting injury, focusing on getting better, thinking positively, and using imagery.¹⁰ There is also speculation that psychological factors may expedite the recovery process through neurochemical or physiologic changes such as increased blood flow and enhanced proprioception, muscular endurance and strength, and coordination. However, empirical support for such contentions is lacking.⁴⁰

Social Factors Affecting Injury Rehabilitation

The 2 most influential social factors influencing athletes' injury rehabilitation are the nature of patient-practitioner interactions and the effectiveness of social support provisions.

Patient-practitioner interactions

Patient-practitioner interactions, specifically those between the athlete and athletic trainer/sport physiotherapist, have been found to be crucial factors influencing athletes' psychological state, the quality of their rehabilitation experiences, and eventual treatment outcomes.⁴¹ Given the close proximity and regularity of contact, sport medicine professionals are uniquely positioned to play an influential role in the psychological well-being of injured athletes through behavioral intervention as well as through effective psychological triage and referral.^{42,43} Positive behaviors shown by rehabilitation specialists include building patient alliances based on acceptance, genuineness, and empathy⁴⁴; effective communication⁴⁵; counseling⁴⁶; and the provision of social support (discussed in greater detail later).⁴⁰ The delineation of athletes' roles (eg, motivation, compliance, communication of concerns) and the establishment of clear expectations also seem to be crucial in optimizing athletes' rehabilitation motivation and adherence.⁴⁷ Practitioners may also facilitate rehabilitation by clarifying their own role in the treatment process; specifically, providing clear information about treatment, adequate pain control, and participation in key decisions.⁴⁸

Social support

A wealth of evidence highlights the benefit of social support in coping with difficult life events and facilitating rehabilitation from a variety of ailments (eg, cardiac rehabilitation).⁴⁹ The value of social support in a sport injury context is no exception. Social support and assistance from a variety of sources, including sport medicine practitioners, coaches, teammates, and family, may be vital in enhancing injured athletes' resilience and facilitating adaptive coping (eg, Bianco and Eklund,⁴⁰ 2001). The athlete may benefit from support expressed by listening to the athlete, acknowledging advances in rehabilitation progress (eg, greater range of motion), providing emotional support, encouraging the achievement of physical-rehabilitation goals, encouraging positive coping, and the personal sharing of practitioners' own experiences and opinions.⁵⁰

Initial research suggests that gender differences may exist with regard to perceptions of available social support. Using a sample of 207 injured athletes (male, 111; female, 96), Mitchell and colleagues⁵¹ found that women reported significantly higher scores than men on the availability of emotional and esteem support, whereas no significant differences were reported for the information and tangible forms of support. The investigators suggested that their findings enhance understanding of the moderating role of gender within the social support process and potential coping actions of male and female athletes during rehabilitation. Further research is needed to examine the moderating influence of other variables influencing perceived social support availability and preferences, including type of sport (team vs individual), level of competition, and cultural differences.

Highlighting the value of social support, Canadian national team skiers reported that social support from coaches and rehabilitation practitioners was important in providing reassurance about getting better, keeping things in perspective, focusing on future opportunities, and encouragement to adhere to the rehabilitation program.⁵² US alpine and freestyle skiers in Gould and colleagues'⁵³ (1997) study similarly thought that their injury recovery was facilitated by coach interest and assistance. Johnston and Carroll⁵⁴ (1998) also found that social support from several sources, including coaches and rehabilitation specialists, was beneficial in assisting athletes throughout the injury rehabilitation period. Athletes reported that they needed various forms of social support from the coach and sport medicine practitioner (ie, informational, emotional, and practical) at different points in the recovery period. For example, emotional support was particularly important at the beginning of rehabilitation when athletes were trying to adjust to the severity of their injuries. At the end of rehabilitation, the need for informational support was most salient in ensuring that athletes did not return to sport prematurely. One athlete stated: "At this stage you are raring to go and just want to get back into playing your sport competitively, but you need someone to monitor your re-entry into sport and your training and to make sure you ease back into it and don't re-injure yourself."^{54(p277)} It was at this time that some athletes indicated a lack of sport-specific advice, encouragement, and feedback, especially from physiotherapists and coaches.^{54,55} For example, athletes indicated that they perceived their coaches to be distant and insensitive to injury, did not provide sufficient or appropriate rehabilitation guidance, and did not show a belief in them.⁵⁶ Athletes in a later investigation similarly indicated a lack of (informational) support from coaches and physiotherapists as they were returning to play.⁵⁴ Athletes reported receiving insufficient advice, guidance, and information from their coaches about how to train as they reentered the competitive arena.⁵⁴ These findings are supported by more recent work⁵⁷ that reveals that injured athletes in National Collegiate Athletic Association division II to III were significantly more satisfied with the social support provided by certified athletic trainers (ATCs) than that provided by coaches and teammates. In addition, injured athletes reported that social support provided by ATCs contributed significantly more to their overall well-being.

A lack of social support from relevant individuals such as coaches contradicts the substantial evidence of the benefits discussed earlier.⁴⁰ Social support from coaches, family members, and medical practitioners may be essential in assisting athletes in dealing with the demands of injury recovery and complying with the rigors of their rehabilitation regimens.⁵⁴ Coaches and sport medicine practitioners are encouraged to stay involved and to provide alternative activities (such as developing special practice routines) so athletes can achieve appropriate clinical outcomes and sport-specific skills as they transition back into training and competition. This ongoing involvement diminishes feelings of isolation from the team, allows athletes to continue to develop

in their sports, reduces feelings that athletes are falling behind, and helps maintain confidence in their capabilities when they are returning to their sports.⁵⁸

Performance Concerns Facing Returning Athletes

As the completion of rehabilitation draws near and the prospect of a return to sport approaches, a range of performance concerns may develop. The degree to which athletes experience apprehension regarding the return to sport may be a reflection of the success of the preceding rehabilitation.^{59,60} However, psychological recovery from injury does not inevitably ensue following medical clearance to return to sport.⁶¹ A range of psychosocial issues has been documented during the return-to-sport transition including anxieties associated with reinjury, concerns about achieving preinjury levels of athletic proficiency, perceptions of being disconnected from relevant others (eg, coaches, teammates), a lack of athletic identity, and insufficient social support.^{3,27} External and internal pressures to return to sport may compound the challenges inherent in this transitional period and further test athletes' coping resources.⁶² In addition, athletes may experience self-presentational concerns about the prospect of appearing unfit, incompetent, or lacking in skill.

Methods for Assessing Psychological Readiness to Return

Taking into account the psychological nature of rehabilitation as well as the plethora of demands confronting returning athletes, evaluation of psychological readiness to return is imperative. Several user-friendly assessments exist in the literature that can help guide return-to-sport decisions. These assessments include Creighton and colleagues'⁶³ 3-step return-to-competition decision-making model, the Injury Psychological Readiness to Return to Sport Scale (I-PRRS) 2009,⁶⁴ and the Reinjury Anxiety Inventory.²⁷ Creighton and colleagues'⁶³ 3-step return-to-competition decision-making model is a useful heuristic for conceptualizing the various stages of athletes' return to sport as well as key considerations for each step. In step 1 of the model, the health status of the athlete is assessed through the evaluation of medical factors (eg, medical history of the patient, laboratory tests such as radiographs or magnetic resonance imaging, severity of the injury, functional ability, and psychological state). Step 2 involves consideration of the risks associated with participation by assessing variables such as the type of sport played (eg, collision, noncontact), the position played (eg, goalie, forward), the competitive level (eg, recreational, professional), the ability to protect (eg, bracing, taping, padding), and the limb dominance of the patient. Step 3 in the decision-making process includes consideration of nonmedical factors that can influence return-to-competition decisions. Relevant considerations here include the timing in the season (eg, playoffs), pressure from the athlete or others (eg, coach, athlete's family), ability to mask the injury (eg, pain medications), conflict of interest (eg, potential financial gain or loss to the patient or clinician), and fear of litigation (eg, if participation is restricted or permitted). The model provides a framework outlining the complex interaction of factors ultimately contributing to return-to-competition decisions. Using the 3-step process outlined (and the associated considerations of each step) can help guide practitioner decisions regarding athletes' return to play.

The I-PRRS consists of 6 items that ask athletes to rate dimensions of confidence on a scale from 0 to 100. Initial validation of the instrument suggests that it is a reliable and valid measure. Given its concise nature, the I-PRRS can be easily administered by health practitioners in the rehabilitation setting. The 6 items are (1) "My overall confidence to play is...", (2) "My confidence to play without pain is...", (3) "My confidence to give 100% effort is...", (4) "My confidence to not concentrate on the injury

is..." (5) "My confidence in the injured body part to handle the demands of the situation is ...," and (6) "My confidence in my skill level/ability is..."

The Reinjury Anxiety Inventory is a 28-item measure of 2 factors: anxieties regarding rehabilitation (RIA-R: 15 items; eg, "I am worried about becoming reinjured during rehabilitation," "I feel nervous about becoming reinjured during rehabilitation") and on reentry into competitive sport (RIA-RE: 13 items, eg, "I am worried about becoming reinjured during reentry into competition," "I feel nervous about becoming reinjured during reentry into competition"). Walker and colleagues,²⁷ (2010) differentiated fear (a flight-or-flight response to danger) from anxiety (uncertainty, worry, or concern), suggesting that anxiety more precisely captures the athlete's state of mind. Reliability measures, as well as face, content, and factorial validity, provide strong preliminary evidence for the psychometric utility of this inventory, rendering it a useful tool in the identification of at-risk athletes.

PART 2: CLINICAL PRACTICES

Diagnosis and Triage

"From an emotional or psychological standpoint, serious injury is one of the most traumatic things that can happen to an athlete. It can take away an athlete's career at any time. It threatens the feelings of invincibility and immortality that everybody who is young has to some degree. Because athletes are so dependent upon their physical skills and because their identities are so wrapped up in what they do, injury can be tremendously threatening to their self-identity." Geoff Petrie, National Basketball Association All Star and Vice President, Basketball Operations.⁶⁵

Injury is an emotionally disruptive experience for anyone, but perhaps more so for athletes, especially those for whom sport is central to lifestyle and personal identity. As a result, distress is commonplace, even though a diagnosable psychological disorder is not typically seen. The 2 key psychological dynamics of distress are loss and threat, both of which are psychological drivers of the challenge of rehabilitation. Loss reflects change in lifestyle that is imposed by injury, that which the athlete used to do but cannot while recovering. Threat relates to the uncertainty of the future. Loss can potentially evolve into subclinical or full-blown depression, whereas threat can evolve similarly into an anxiety disorder. With injury, recovery is not complete until the athlete is psychologically ready to return to play. Just as athletes must progress through a physical healing process, they must also address the psychological consequences of injury and the challenges of rehabilitation. Efforts to conceptualize the psychological recovery process for athletes began with adaptation of Kubler-Ross'⁶⁶ (1969) *On Death and Dying*. This approach is groundbreaking in that it identifies distress not as a disorder but as a normal consequence of an unfortunate situation; however, it has not withstood either empirical or clinical scrutiny. Research in sport psychology has focused more on the prediction of rehabilitation outcomes (eg, adherence) than on models for clinical intervention. Thus, Heil⁶⁵ (1993) proposed the affective cycle of injury (Fig. 1) as a clinical model that is sensitive to the medically driven

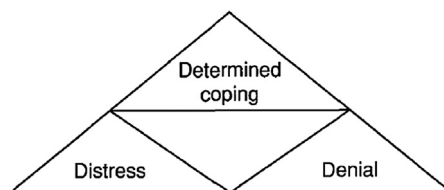


Fig. 1. The affective cycle of injury.

challenges of rehabilitation. It assumes that emotional reactions to injury are cyclical and vary based on daily experiences that create stress or inspiration. The engine of emotion that drives the psychology of rehabilitation has 3 components: (1) distress (eg, loss and threat), (2) denial (unacknowledged distress), and (3) determined coping (vigorous, proactive, goal-driven behavior).

Distress reflects the effects of injury on emotional equilibrium. Denial may be functional when it enables athletes to maintain a positive focus, manage distressing thoughts, or protect themselves from being overwhelmed by negative emotions. Denial is harmful when, for example, failure to recognize the severity of an injury results in poor compliance with a rehabilitation regimen. Determined coping involves moving beyond a resigned sense of acceptance of injury and a passive sense of waiting for the injury to heal. It encompasses exploration, including looking for possibilities, clarifying goals, seeking resources, exploring alternatives, learning new skills, and commitment, such as new focus, vision, teamwork, cooperation, and balance.⁶⁷

The affective cycle of injury assumes that emotional recovery is not a simple linear process, but a cycle that varies over days and weeks, and even within the course of a day. It is useful to envision a macrocycle (which spans the recovery process), minicycles (which are linked to the medical stages of rehabilitation), and microcycles (which reflect the ups and downs of daily life). In the macrocycle of recovery, athletes generally move from distress and denial to determined coping. However, each distinct stage of rehabilitation constitutes a minicycle, which presents new challenges. The microcycle recognizes shifts in emotional response among distress, denial, and determined coping that follow from living with injury. Even as one of the 3 components may predominate in any given stage in rehabilitation, emotional responses typically vary, so that even during periods of determined coping, episodes of denial or distress may appear. Thus, the affective cycle facilitates awareness of and sensitivity to the specific psychological challenges of rehabilitation and how athletes are responding to these challenges.

The Sport Medicine Injury Checklist (Fig. 2) is a guide to triage of the injured athlete. The items are not weighted and vary in clinical significance. The checklist simply represents a comprehensive set of factors that offers insight into the psychological status of the athlete and serves as a starting point for triage, diagnosis, and psychological referral, if needed. There is a variety of formal psychological assessment instruments that the psychologist may use in arriving at a diagnostic impression. Inventories such as the Emotional Responses of Athletes to Injury Questionnaire,²⁷ the aforementioned Reinjury Anxiety Inventory,^{27,65,68} and the Coping Responses Inventory⁶⁹ may be valuable in gauging athletes' emotions and coping responses during rehabilitation. However, the Sport Medicine Injury Checklist may be particularly germane in a clinical setting, given its easy administration; its provision of visual, direct, and immediate feedback to the sport medicine provider; and the broad range of issues it covers influencing the acute and chronic phases of rehabilitation.

Treatment Intervention

"The more I thought about it, the more cancer seemed like a race to me. Only the destination had changed. They shared grueling physical aspects, as well as a dependence on time, and progress reports every interval, with checkpoints and a slavish reliance on numbers... The idea was oddly restorative: winning my life back would be the biggest victory." Lance Armstrong, World Class Tour Cyclist and Founder, Livestrong Foundation.⁷⁰

A psychologically minded approach to the delivery of medical services is the first line of response to injury and rehabilitation. Facilitating optimal recovery includes

Acute phase

- _____ Failure of pain to respond to routine management strategies
- _____ Failure of athlete to comply with recommended rehabilitation program
- _____ Rehabilitation setbacks
- _____ Emotional distress (depression, irritability, confusion, guilt, withdrawal)
- _____ Irrational fear or anxiety in specific situations in the otherwise well-adjusted athlete (may be seen as avoidance of feared situation)
- _____ Overly optimistic attitude toward injury and recovery
- _____ Persistent fatigue
- _____ Sleep problems
- _____ Gross overestimate or underestimate of rehabilitation progress by athlete

Chronic phase

Current factors

- _____ Persistence of pain beyond natural healing
- _____ "Odd" descriptions of pain
- _____ Inconsistency in "painful" behavior or reports of pain
- _____ Failed attempt(s) at return to play
- _____ Performance problems following return to play
- _____ Inability to identify realistic goals for recovery
- _____ Recent stressful changes in sport situation
- _____ Stressful life circumstances (within the last year)
- _____ Depression (including changes in sleep, appetite, energy, and libido)
- _____ Strained relationships with coaches, teammates, or friends
- _____ Personality conflicts between treatment providers and athlete
- _____ Poor compliance with scheduled visits and medication use
- _____ Additional medical treatment sought by athlete without consulting current treatment providers (including emergency room visits)
- _____ Iatrogenic problems
- _____ Repeated requests for pain (especially psychoactive) medication
- _____ Evidence of illicit drug use (recreational or ergogenic)

History

- _____ Multiple surgeries at pain site
- _____ Chronic pain in the same or another physiological system (may be resolved)
- _____ Family members with chronic pain
- _____ Problematic psychosocial history (behavior problems in school; vocational, marital, or legal problems; history of physical or sexual abuse)
- _____ Problematic psychological history (repeated or prolonged psychological adjustment problems; alcohol/drug problems; eating disorders)

Fig. 2. Sports medicine injury checklist. (From Heil J. Psychology of sport injury. Champaign (IL): Human Kinetics; 1993. p. 133; with permission.)

both being attentive to psychological distress and coaching the athlete on the best path to recovery. Athletes possess a physical intelligence that enables them to be more active agents in the rehabilitation process than general medical patients. As a consequence, they are able to benefit from detailed information about the injury and treatments, and form specific goals and milestones for recovery. As shown in the quote earlier, reframing rehabilitation as an athletic challenge focuses athletes on their strengths and gives them the tools to take control of their rehabilitations. Engaging the athlete in this type of dialogue also builds trust and confidence in the medical provider, which can facilitate adjustment to setbacks and to key transitions in the rehabilitation process, including return to play.

A capsule summary of an intervention plan as might be conducted by a sport psychologist is provided later. The skill-based focus that is unique to sport psychology highlights the expectation that psychological attributes can be cultivated just as

physical function can be enhanced. The sport psychologist may be instrumental in addressing the psychological skills listed in the capsule summary, areas in which coaches or teammates may not possess adequate training to address. A detailed discussion of when and where the sport psychologist may be needed during the recovery process is beyond the scope of this article. However, relevant issues may include helping the injured athlete deal with pain and fear (discussed in greater detail later), the reduction of catastrophizing thoughts, reframing negative thoughts and expectations, acting as a source of social support, and liaising between the athlete and various treatment team members. As for the intervention plan, sport psychologists may also provide a range of proactive coping skills that can help injured athletes optimize the likelihood of a safe and successful recovery. A more in-depth review of this plan is available directly from the first and second authors.

Complications

There is an extensive array of psychological factors, positive and negative, that play into the recovery process for better or worse. The psychology of the injured athlete influences both the speed of recovery and the readiness for return to play, or alternatively the transition to a new lifestyle. Because pain and fear are common spoilers in the rehabilitation process, these are discussed in detail. The role of psychological factors in remarkable recovery and as a model for guiding optimal recovery has also been addressed in the literature. Athletes who view the rehabilitation process as a competitive challenge and whose mind-set propels them to new levels of athletic attainment following return to play are said to have achieved a remarkable recovery. For more information see Heil and Podlog⁶⁸ (2012).

Pain

“After being injured, I couldn’t figure out what pain is good and what is bad. I needed a lot more communication and explanation on the possible types of pains that I might experience. I look back and feel as though there were times where I could have kept training but stopped, and times when I needed to stop, but didn’t. Each time it made me feel helpless and lose confidence in my ability in the sport.” Iris Zimmermann, Olympic Fencer and Coach.⁴⁸

Pain may emerge as a barrier to rehabilitation: as a potent distractor, as a trigger of anxiety or fear about recovery, or as a question about the efficacy of treatment. In contrast, failure to recognize and accept the limits that pain is signaling can also complicate recovery. Given the complexities of reporting and assessing pain there is the potential for compliance problems to become intertwined with the provider-patient relationship. Failure to respond to pain as a signal of danger or otherwise set reasonable limits on physical activity may also complicate the recovery process. A failure to set limits can indicate a naive enthusiasm but may also reflect a complex set of underlying dynamics, which may manifest as denial⁴⁸ or a counterphobic response⁷¹ whereby athletes may push needlessly into pain as a signal of effort or proof of courage.

Pain management in both sport and rehabilitation shares a common skill set: (1) to effectively assess the meaning of pain perceptions, (2) to maintain an appropriate focus in the face of distractions (such as pain perception or catastrophizing cognition), (3) to engage in informed decision making regarding a best course of action, and (4) to regulate the autonomic and other physiologic mechanisms of the pain system.

The pain-sport matrix⁶⁵ identifies a four-dimensional strategy that addresses pain assessment, decision making, focusing, and self-regulation. It follows from extensive research with long-distance runners on the psychological strategies of association

and dissociation as methods for managing the collective discomfort of pain, fatigue, and exertion during performance.^{68,72–74} In this literature, association refers to a focus on relevant performance cues, whereas dissociation implies a specific attempt to detach from the experience of pain.⁷⁵

The pain-sport matrix treats pain and performance as independent dimensions identifying 4 broad classes of pain coping methods, defined by whether the athlete focuses on or focuses away from pain and sport.^{68,72} Fig. 3 provides a visual depiction of the pain-sport matrix. The various types of attentional focus are as follows:

- Associating to both pain and sport can be beneficial when pain signals proper technique. If instead the athlete changes movement patterns to avoid pain, compensatory injury could result.
- Dissociating from both pain and sport during performance is problematic because focus is sacrificed for the sake of pain management. This approach alternatively could be beneficially applied during natural breaks from activity as a way of getting psychological rest from pain or the cognitive demands of sport.
- Dissociating from pain while associating to sports performance is appropriate when pain is understood as routine or benign; otherwise pain becomes a distraction and undermines performance.
- Associating to pain and dissociating from sport is of value in the management of overuse and chronic injury. Because sport performance can fully absorb attention, pain signals may be suppressed to the detriment of athletes' physical well-being. This strategy can be used in breaks between activities to assess pain, or, for example, can be used as a check on muscular guarding.

Fear

"Your mind is racing ... you feel your heartbeat pounding in your chest. Your focus is on the heaviness of your breathing and the stream of negative thoughts running through your mind... The image of you falling all the way to the bottom is foremost in your mind." Kathy Kreiner-Phillips, Olympic Alpine Gold Medalist and Sport Psychologist.^{64(p114)}

Fear and the risk of injury are integral in sport. As Kreiner-Phillips' comments indicate, fear can take over the moment. In high-risk sports (eg, motor sports, alpine ski racing, X-Games events), the risk of injury and the fear of injury can increase in tandem. However, fear is not necessarily an unhealthy reaction because it can cause athletes to develop a respect for the potential dangers and ensure sensible action. At the same time, fear that consumes athletes puts them at greater risk of injury by creating muscle tension and bracing, tentativeness in execution, and distraction from essential focusing cues. Fear of injury (or reinjury) can range from a routine concern, to a subclinical syndrome, to a diagnosable disorder. The critical task is determining whether fear is benign and simply a distraction, or an indication of a

	Sport	Pain
Association		
Disassociation		

Fig. 3. Pain-sport matrix.

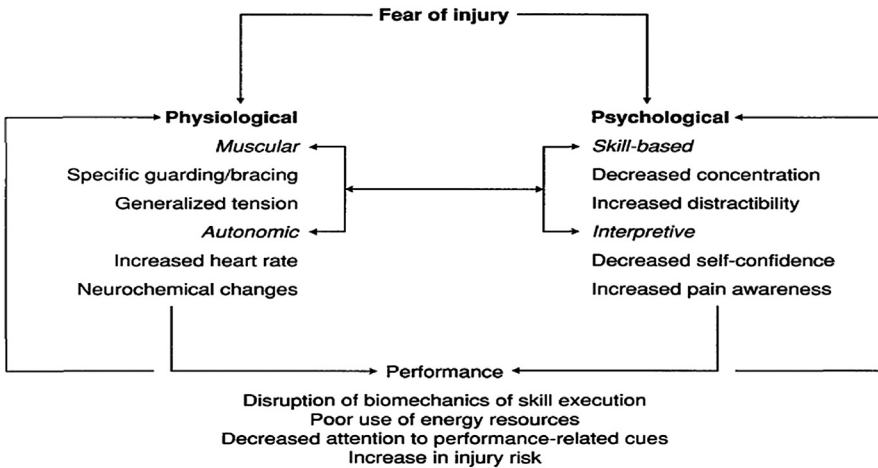


Fig. 4. Fear of injury: a psychophysiological model of risk.

potential threat. Another test is whether the fear is reasonable and grounded in objective reality or irrational and inappropriate.

The physiologic and psychological elements of the fear response create a complex web of interacting influences. Fig. 4 shows the ways in which fear can undermine performance and increase injury risk. Fear may elicit a complex set of interacting psychological and physiologic changes. Awareness of autonomic changes or a decrease in concentration may cause athletes to become distracted from their rehabilitation exercises, triggering a downward spiral that results in poor rehabilitation. If fear of reinjury persists as athletes return to sport, they may experience hesitancy, avoidance, poor performance, or muscular guarding (ie, bracing or splinting that either isolates or decreases the mobility of the injured body part), all of which may increase the risk of reinjury. However, if athletes are engaged in a psychologically minded rehabilitation program that both provides detailed information regarding recovery and cultivates confidence, there is a commensurate decrease in fear as they test the formerly injured area in training.

SUMMARY

This article highlights the impact of injury on athletes' psyches. Examination of the research literature revealed the influence of athlete cognitions, emotions, and behaviors on injury rehabilitation processes, as well the impact of the patient-practitioner relationship and social support provisions. Specific performance concerns among returning athletes and tools/inventories for assessing psychological readiness to return to sport are described. The affective cycle of injury as a model for clinical intervention and the Sports Medicine Injury Checklist as a practical guide for assessment and triage are highlighted. A brief overview of the fundamentals of an injury intervention plan (Box 1) is provided, and the influence of pain and fear in the rehabilitation process is described. A comprehensive perspective of injury should encompass emotional and cognitive factors as well as physical, functional abilities. The sports medicine professional plays a critical role in psychological assessment and intervention, especially when injury is severe or otherwise complicated.

Box 1**Injury intervention plan**

Skill 1: injury education. Providing proactive practical information about injury, healing, and rehabilitation empowers the athlete, cultivates a sense of personal investment in the recovery process, and facilitates compliance with treatment tasks.

Skill 2: rehabilitation and return-to-sport goals. Understanding of rehabilitation goals helps athletes create a sense of personal responsibility and increases their expectations of return to sport by creating a clear path toward recovery.

Skill 3: building the rehabilitation team. Building a team that helps meet the challenges and demands of the new rehabilitation environment helps the athlete overcome feelings of isolation related to separation from the sport/team, and builds confidence in providers, recovery, and return to sport.

Skill 4: managing emotions. Understanding how to identify and cope with the distress inherent in injury helps improve mood and neurovegetative function and modulates the ups and downs of rehabilitation.

Skill 5: visualizing the stages of recovery. Fostering confidence in athletes' ability to cope with injury adversity and endure rehabilitation is driven by depicting a positive future perspective on the recovery process.

Skill 6: focus and distraction control. Facilitating a task focus and providing guidance in distraction control can enable athletes to deal with the uncertainty of rehabilitation and remain appropriately focused on physical, technical, and psychological skills.

Skill 7: working through pain. Managing pain effectively enables the athlete to trust the rehabilitation process, maintain a stable emotional state, and make effective decisions regarding activity and limits.

Skill 8: building confidence in return to play. Accepting fear and treating it as a tool to guide decision making, while cultivating trust in rehabilitation, treatment providers, and self, enables the athlete to transition effectively to sport.

Skill 9: mental toughness and the survival mind-set. Focusing on controlling the controllables (including personal thoughts, feelings, and actions) enable the athlete to gain global skills in coping with adversity and can facilitate remarkable recovery.

Skill 10: becoming a renewed athlete. Assimilating lessons learned from injury and reembracing the aspirations that led to initial participation enable the athlete to return to sport renewed and reinvested.

REFERENCES

1. Leddy MH, Lambert MJ, Ogles BM. Psychological consequences of athletic injury among high-level competitors. *Res Q Exerc Sport* 1994;65(4):347–54.
2. Smith AM, Stuart MJ, Wiese-Bjornstal DM, et al. Competitive athletes: preinjury and postinjury mood state and self-esteem. *Mayo Clin Proc* 1993;68(10):939–47.
3. Podlog L, Eklund RC. A longitudinal investigation of competitive athletes' return to sport following serious injury. *J Appl Sport Psychol* 2006;18(1):44–68.
4. Wadey R, Evans L, Evans K, et al. Perceived benefits following sport injury: a qualitative examination of their antecedents and underlying mechanisms. *J Appl Sport Psychol* 2011;23(2):142–58.
5. Quinn AM, Fallon BJ. The changes in psychological characteristics and reactions of elite athletes from injury onset until full recovery. *J Appl Sport Psychol* 1999;11:210–29.

6. Tracey J. The emotional response to the injury and rehabilitation process. *J Appl Sport Psychol* 2003;15(4):279–93.
7. Podlog L, Eklund RC. Returning to competition after a serious injury: the role of self-determination. *J Sports Sci* 2010;28(8):819–31.
8. Albinson CB, Petrie T. Cognitive appraisals, stress, and coping: preinjury and postinjury factors influencing psychological adjustment to athletic injury. *J Sport Rehabil* 2003;12:306–22.
9. Alzate Saez de Heredia R, Ramirez A, Lazaro I. The effect of psychological response on recovery of sport injury. *Res Sports Med* 2004;12:15–31.
10. Bianco T, Malo S, Orlick T. Sport injury and illness: elite skiers describe their experiences. *Res Q Exerc Sport* 1999;70(2):157–69.
11. Green SL, Weinberg RS. Relationships among athletic identity, coping skills, social support, and the psychological impact of injury in recreational participants. *J Appl Sport Psychol* 2001;13:40–59.
12. Manuel JC, Shilt JS, Curl WW, et al. Coping with sports injuries: an examination of the adolescent athlete. *J Adolesc Health* 2002;31(5):391–3.
13. Smith AM, Scott SG, O'Fallon WM, et al. Emotional responses of athletes to injury. *Mayo Clin Proc* 1990;65(1):38–50.
14. Brewer BW. Self-identity and specific vulnerability to depressed mood. *J Pers* 1993;61(3):343–64.
15. Johnston LH, Carroll D. The context of emotional responses to athletic injury: a qualitative analysis. *J Sport Rehabil* 1998;7:206–20.
16. Sparkes AC. Athletic identity: an Achilles' heel to the survival of self. *Qual Health Res* 1998;8(5):644–64.
17. Brewer BW. Psychology of injury rehabilitation. In: Tenenbaum G, Eklund RC, editors. *Handbook of sport psychology*, vol. 3. Hoboken (NJ): John Wiley; 2007.
18. Morrey MA, Stuart MJ, Smith AM, et al. A longitudinal examination of athletes' emotional and cognitive responses to anterior cruciate ligament injury. *Clin J Sport Med* 1999;9(2):63–9.
19. Fisher AC, Domm MA, Wuest DA. Adherence to sports-injury rehabilitation programs. *Phys Sportsmed* 1988;16:47–52.
20. Brewer BW, Daly JM, Van Raalte JL, et al. A psychometric evaluation of the rehabilitation adherence questionnaire. *J Sport Exerc Psychol* 1999;21:167–73.
21. Wittig AF, Schurr KT. Psychological characteristics of women volleyball players: relationships with injuries, rehabilitation, and team success. *Pers Soc Psychol Bull* 1994;20(3):322–30.
22. Taylor AH, May S. Threat and coping appraisal as determinants of compliance with sports injury rehabilitation: an application of protection motivation theory. *J Sports Sci* 1996;14(6):471–82.
23. Murphy GC, Foreman PE, Simpson CA, et al. The development of a locus of control measure predictive of injured athletes' adherence to treatment. *J Sci Med Sport* 1999;2(2):145–52.
24. Milne M, Hall C, Forwell L. Self-efficacy, imagery use, and adherence to rehabilitation by injured athletes. *J Sport Rehabil* 2005;14:150–67.
25. Daly JM, Brewer BW, Van Raalte JL, et al. Cognitive appraisal, emotional adjustment, and adherence to rehabilitation following knee surgery. *J Sport Rehabil* 1995;4:23–30.
26. Lampton CC, Lambert ME, Yost R. The effects of psychological factors in sports medicine rehabilitation adherence. *J Sports Med Phys Fitness* 1993;33(3):292–9.
27. Walker N, Thatcher J, Lavalley D. A preliminary development of the Re-Injury Anxiety Inventory (RIAI). *Phys Ther Sport* 2010;11(1):23–9.

28. Brewer BW, Cornelius AE, Van Raalte JL, et al. Age-related differences in predictors of adherence to rehabilitation after anterior cruciate ligament reconstruction. *J Athl Train* 2003;38(2):158–62.
29. Brewer BW, Cornelius AE, van Raalte JL, et al. Comparison of concurrent and retrospective pain ratings during rehabilitation following anterior cruciate ligament reconstruction. *J Sport Exerc Psychol* 2004;26:610–5.
30. Brewer BW. The role of psychological factors in sport injury rehabilitation outcomes. *Int Rev Sport Exerc Psychol* 2010;3(1):40–61.
31. Pizzari T, Taylor NF, McBurney H, et al. Adherence to rehabilitation after anterior cruciate ligament reconstructive surgery: implications for outcome. *J Sport Rehabil* 2005;14:201–14.
32. Feller JA, Webster KE, Taylor NF, et al. Effect of physiotherapy attendance on outcome after anterior cruciate ligament reconstruction: a pilot study. *Br J Sports Med* 2004;38(1):74–7.
33. Scherzer CB, Brewer BW, Cornelius AE, et al. Psychological skills and adherence to rehabilitation after reconstruction of the anterior cruciate ligament. *J Sport Rehabil* 2001;10:165–72.
34. Evans L, Hardy L. Injury rehabilitation: a goal-setting intervention study. *Res Q Exerc Sport* 2002;73(3):310–9.
35. Udry E. Coping and social support among injured athletes following surgery. *J Sport Exerc Psychol* 1997;19:71–90.
36. Pizzari T, McBurney H, Taylor NF, et al. Adherence to anterior cruciate ligament reconstruction: a qualitative analysis. *J Sport Rehabil* 2002;11:90–102.
37. Johnston LH, Carroll D. Coping, social support, and injury: changes over time and the effects of level of sports involvement. *J Sport Rehabil* 2000;9:290–303.
38. Evans L, Hare R, Mullen R. Imagery use during rehabilitation from injury. *J Imagery Res Sport Phys Activ* 2006;1(1):1.
39. Ross MJ, Berger RS. Effects of stress inoculation training on athletes' postsurgical pain and rehabilitation after orthopedic injury. *J Consult Clin Psychol* 1996;64(2):406–10.
40. Bianco T, Eklund RC. Conceptual considerations for social support research in sport and exercise settings: the case of sport injury. *J Sport Exerc Psychol* 2001;23(2):85–107.
41. Brewer BW, Van Raalte JL, Petitpas AJ. Patient-practitioner interactions in sport injury rehabilitation. In: Pargman D, editor. *Psychological bases of sport injuries*, vol. 3. Morgantown (WV): Fitness Information Technology; 2007. p. 79–94.
42. Larson GA, Starkey CA, Zaichkowsky LD. Psychological aspects of athletic injuries as perceived by athletic trainers. *Sport Psychol* 1996;10:37–47.
43. Gordon S, Potter M, Ford IW. Toward a psychoeducational curriculum for training sport-injury rehabilitation personnel. *J Appl Sport Psychol* 1998;10:140–56.
44. Petitpas A, Cornelius A. Practitioner-client relationships: building working alliances. In: Kolt GS, Andersen MB, editors. *Psychology in the physical and manual therapies*. Edinburgh (Scotland): Churchill Livingstone; 2004. p. 57–70.
45. Wiese-Bjornstal DM, Gardetto DM, Shaffer SM. Effective interaction skills for sports medicine professionals. In: Ray R, Wiese-Bjornstal DM, editors. *Counseling in sports medicine*. Champaign (IL): Human Kinetics; 1999. p. 55–74.
46. Ray R, Terrell T, Hough D. The role of the sports medicine professional in counseling athletes. In: Ray R, Wiese-Bjornstal D, editors. *Counseling in sports medicine*. Champaign (IL): Human Kinetics; 1999. p. 3–20.

47. Granquist MD, Podlog L, Engel JR, et al. Certified athletic trainers' perspectives on rehabilitation adherence within collegiate athletic training settings. *J Sport Rehabil* 2014;23(2):123–33.
48. O'Connor EA, Heil J, Harmer P, et al. Injury. In: Taylor J, Wilson G, editors. *Applying sport psychology: four perspectives*. Champaign (IL): Human Kinetics; 2005. p. 187–206, 281–283.
49. Lysaght RM, Larmour-Trode S. An exploration of social support as a factor in the return-to-work process. *Work* 2008;30(3):255–66.
50. Hardy CJ, Burke KL, Crace RK. Social support and injury: a framework for support-based interventions with injured athletes. In: Pargman D, editor. *Psychological bases of sport injuries*, vol. 2. Morgantown (WV): Fitness Information Technology; 1999. p. 175–98.
51. Mitchell ID, Neil R, Wadey R, et al. Gender differences in athletes' social support during injury rehabilitation. *J Sport Exerc Psychol* 2009;29(Suppl):S189.
52. Bianco T. Social support and recovery from sport injury: elite skiers share their experiences. *Res Q Exerc Sport* 2001;72(4):376–88.
53. Gould D, Bridges D, Udry E, et al. Stress sources encountered when rehabilitating from season-ending ski injuries. *Sport Psychol* 1997;11(4):361–78.
54. Johnston LH, Carroll D. The provision of social support to injured athletes: a qualitative analysis. *J Sport Rehabil* 1998;7(4):267–84.
55. Robbins JE, Rosenfeld LB. Athletes' perceptions of social support provided by their head coach, assistant coach, and athletic trainer, pre-injury and during rehabilitation. *J Sport Behav* 2001;24:277–97.
56. Udry E, Gould D, Bridges D, et al. Down but not out: athlete responses to season-ending injuries. *J Sport Exerc Psychol* 1997;19:229–48.
57. Clement D, Shannon VR. Injured athletes' perceptions about social support. *J Sport Rehabil* 2011;20(4):457–70.
58. Podlog L, Dionigi R. Coach strategies for addressing psychosocial challenges during the return to sport from injury. *J Sports Sci* 2010;28(11):1197–208.
59. Taylor J, Stone KR, Mullin MJ, et al. *Comprehensive sports injury management: from examination of injury to return to sport*. Austin (TX): Pro-Ed; 2003.
60. Andersen MB. Returning to action and the prevention of future injury. In: Crossman J, editor. *Coping with sports injuries: psychological strategies for rehabilitation*. Melbourne (Australia): Oxford University Press; 2001.
61. Ardern CL, Webster KE, Taylor NF, et al. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. *Br J Sports Med* 2011;45(7):596–606.
62. Podlog L, Eklund RC. The psychosocial aspects of a return to sport following serious injury: a review of the literature from a self-determination perspective. *Psychol Sport Exerc* 2007;8:535–66.
63. Creighton DW, Shrier I, Shultz R, et al. Return-to-play in sport: a decision-based model. *Clin J Sport Med* 2010;20(5):379–85.
64. Glazer DD. Development and preliminary validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) scale. *J Athl Train* 2009;44(2):185–9.
65. Heil J. *Psychology of sport injury*. Champaign (IL): Human Kinetics; 1993.
66. Kubler-Ross E. *On death and dying: what the dying have to teach doctors, nurses, clergy, and their own families*. New York: Macmillan; 1969.
67. Hanin YL. *Emotions in Sport*. Champaign (IL): Human Kinetics; 2000.
68. Heil J, Podlog L. Injury and performance. In: Murphy S, editor. *The Oxford handbook of sport and performance psychology*. New York (NY): Oxford University Press; 2012.

69. Billings AG, Moos RH. The role of coping responses and social resources in attenuating the stress of life events. *J Behav Med* 1981;4(2):139–57.
70. Armstrong L, Jenkins S. *It's not about the bike: my journey back to life*. New York: Putnam; 2000.
71. Ogilvie BC, Tutko TA. *Problem athletes and how to handle them*. London: Palham Books; 1966.
72. Heil J. Association-dissociation: clarifying the concept. Paper presented at: Association for the Advancement of Applied Sport Psychology Annual Conference. San Antonio. October 1990.
73. Crust L. Should distance runners concentrate on their bodily sensations, or try to think of something else? *Sports Injury Bulletin* 2003;30:10–2.
74. Brewer BW, Van Raalte JL, Linder DE. Attentional focus and endurance performance. *Applied Research in Coaching and Athletics Annual* 1996;11:1–14.
75. Masters KS, Ogles BM. Associative and dissociative cognitive strategies in exercise and running: 20 years later, what do we know? *Sport Psychol* 1998; 12:253–70.