



Biopsychosocial considerations of Sports Injury and Rehabilitation

Dave Collins^{1,2,3*}, David Porter¹ and Ian Gilham¹

¹Opus Biological Ltd. London, England

²Moray House School of Education and Sport, University of Edinburgh, Scotland

³Gray Matters Performance Ltd. Stratford upon Avon, England

*Corresponding author: Moray House School of Education and Sport, University of Edinburgh, Holyrood Road, EH8 8AQ, Scotland, United Kingdom.

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Abstract

Dealing with injury and rehabilitation is a core role for medical and paramedical practitioners. Importantly, however, there is an increasing recognition of the need for effective use of a wider team to address the biopsychosocial aspects of this process more fully. Optimising the work of the consequently interdisciplinary team is therefore a key concern. Accordingly, this perspective paper offers an overview of the origins, principles and application of a biopsychosocial model to the work of interdisciplinary teams with injured athletes. Case studies are used to exemplify effective practice across the different elements of rehabilitation.

Keywords: Sport Medicine; Sport Science; Support; Interdisciplinarity

The Problem and a Solution

Dealing with injury and optimising rehabilitation are key issues for practitioners in performance sport. Importantly, the increased multidisciplinary of support teams has led to a parallel increase in the disciplines involved; extending from the traditional medical-physiotherapy line to acknowledge potential contributions from a wider diversity of specialists, including psychology, nutrition, conditioning and even the sports coaches themselves! Unfortunately, however, even these welcome expansions have failed to grasp the crucial characteristic of injury and recovery as a biopsychosocial phenomenon. In simple terms, and as with so much else in human behaviour an interdisciplinary and multifaceted process in which optimum progress is best addressed by catering for both the discipline-specific aspects and overlapping interactions. Accordingly, in this perspective paper we introduce/reintroduce the biopsychosocial (BPS) construct, tracing it from its medical roots to applications across a broad spectrum of human behaviour. We then offer an overview of the genuinely integrated approach

which is the bedrock of the approach to dealing with sports injury, rehabilitation and return to play (RTP). After some practical examples from our own work, we finish with recommendations for introducing and evolving biopsychosocial practice in your own environment.

Biopsychosocial structures - A New Perspective

As a first consideration, it is important to stress the interdisciplinary nature of the BPS. Interdisciplinary support from science and medicine has long been proposed as important [1] and yet, as more modern work has shown [2] it is still somewhat rare. As such, genuinely interdisciplinary systems are dependent on a combination of strong leadership, role clarity and quality professional preparation [3] all applied with a strong focus on confidentiality and service to the client. The key difference in using an Interdisciplinary Team (IDT) is that all will be in communication throughout. The other element of the BPS approach is how well it

can cater for the multifactor impacts of injury. The combination of biology (e.g., pain and restriction) psychology (e.g., loss of identity) and social considerations (e.g., loss of status in the team or support group) has also been well documented [4] but often with one or more elements neglected. In summary of this very brief overview, there seems to be a common knowledge and even approval of BSP. Unfortunately, however, genuine usage seems less frequent [5].

Origins and Exemplar Applications of the Biopsychosocial Approach

This comparative rarity is even more surprising given the medical genesis of the BPS approach [6]. In contrast, consideration of BPS is more common in the social sciences [7]. demonstrated how the impact of anabolic steroids seemed to relate to a combination of BPS factors, with androgenic and mood effects seemingly mediated by expectancy and social setting. A similar interaction is apparent in many, very different environments; for example, the operation of talent development (TD) for sport. Progress is under the influence of biological (e.g., somatotype and relative maturation [8] psychological characteristics (e.g., mental skills) [9] and the development environment (e.g., an effective and supportive milieu) [10]. Once again, our summary would be that, whilst the BPS approach is well known and often used, its application in rehabilitation settings and systems is less common than it could, or indeed should be. Based on our ongoing research and experience, we would see this as down to a lack of methodological guidance: in short, good, applied exemplars of how this approach can work and be deployed effectively. So, in the rest of this paper, we will endeavour to fill this gap.

How Might it Work? Principles and Practice

A Procedural Exemplar

A 33-year-old female competitive equestrian jump rider suffers a significant pelvic injury during a fall from her horse in competition. The athlete is based in the US, but injury takes place at an international event in Holland. Due to links with a sports medicine department in the U.K, the athlete travels there the day after the injury. There are several complex issues at play in this case. The athlete is away from their home environment, is travelling as an individual without a support team, is carrying a significant injury and it is their first ever trauma incident resulting in withdrawal from an event. To make the athlete as comfortable as possible, it was arranged that she stay at an UK hotel with which she was familiar and had good relationships with the staff. It was also arranged that her trainer from the US was flown over to London to ensure a familiar face was there in the initial stages of the rehabilitation process: this especially whilst relationships with the sports medicine team were formed. This all assisted in providing a positive rehabilitation environment; a consideration shown to decrease negative affect responses and maximise rehabilitation adherence [11]. In the early stage of the rehabilitation process, the sports medicine physician led the patient's care ensuring correct blood, imaging and diagnostic tests were carried out.

Once diagnosis was made, input from a specialist hip and pelvis orthopaedic surgeon was sought. To support the athlete further, a family member joined these appointments remotely. Support of family and friends can be vital to a successful process and is even described as the 'secondary rehabilitation team' by [12]. It was agreed by all parties at this stage that conservative management through physiotherapy with medication and supplementation, was the correct approach. Regular repeat imaging to determine bone healing progress and athlete pain levels was used to guide refinement of the physical rehabilitation programme. Finally, involvement of a sports psychologist was implemented alongside the physiotherapy treatment to reduce apprehension around a return to competitive riding and to reduce the anxiety that this injury could prevent them from competing again at the top level. Against this case exemplar, it is worth considering the steps and stages taken through the injury-rehabilitation-RTP cycle.

Stages of Rehabilitation

a) Immediate Action

Positive reinforcement and reassurance will be key in setting the tone for a successful rehabilitation process for the injured party and surrounding team. An example would be a rugby player experiencing a game ending knee injury in the 70th minute of a midweek, evening match. The player walks off the pitch with support of the medical staff to the dressing room. In this situation the medical staff inform the player to not worry and to manage the knee with elevation and use of the 'Ice Compression Machine' until the following morning when the club will arrange a car to bring them to the training ground. This prevents any hypothetical diagnosis unnerving the player, causing them to worry overnight. The next day, when they arrive at the training ground, they are in a familiar environment with the medical team all round them. At this point a more accurate plan can be made after reassessment of the knee. They can then be sent for diagnostic imaging immediately if indicated and from there, a plan can be made as to the next stages of treatment. Setting up a comprehensive team so that the player perceives coherent support from all angles will be imperative to keeping them focused and ready to hit the ground to recovery with a determined mindset. Knowing that medical staff, teammates, family and friends are there for them will aid this and build trust. Trust between the athlete and IDT should promote a positive emotional response which correlates to a positive level of physical and psychological functioning through the rehabilitation process [13]. Regular IDT meet ups and discussions, increasingly inclusive of the player, can amplify the time and effort being put in to support the player during their recovery. At a more accessible and less formal level, the use of a WhatsApp group or chat can give the player the feeling that they have close support at any given time. A good example of this in practice is a 23-year-old tennis player, who has just come to the end of their studies and is about to make the jump into attempting to make it on to the professional circuit. They then suffer an acute ankle injury. The injury takes place in the Dominican Republic, 1 week into their planned pre-tournament

season training camp. The player decides to return home to the UK where he feels he can have the injury fully assessed after difficulties in gaining medical assistance whilst at the training camp. It is quickly determined through physiotherapy assessment and MRI that the tennis player has a grade 2 ATFL and CFL injury. A plan to rehabilitate the player back to full fitness is put into place. On detailed subjective assessment at the first consultation, it becomes clear that the player is lacking support in several areas, which could both aid his rehabilitation but also; improve his chances to succeed on the professional tour and for injury prevention going forwards. Through introduction to a nutritionist, sports psychologist and strength and conditioning coach, a comprehensive IDT is built with these professions to work alongside the sports medicine physician and physiotherapist. The team liaise regularly, inclusive of the player, through group calls, face to face meetings and WhatsApp conversations. This ensures the player is optimising their physical and mental recovery from injury whilst building towards improved performance.

b) Going forwards

Goal setting is significant from this early phase and is a method which both athletes and sports medicine professionals agree can play a key role in rehabilitation [14]. Setting the player short term, achievable targets, will enable them to feel they are making timely progress from the earliest part of the process. Simple goals such as reducing swelling or setting a date for starting a form of training, which does not involve the injured area directly, are examples of this. Alongside this, there should be numerous, progressive goals set, all the way through to RTP. This should enable the athlete to see the value in each step of the process.

c) Exploiting the social milieu

One of the many positives of team or squad training in sport, is building close bonds with your fellow players/competitors through the challenges you share, both on and off the field. When recovering from injury and being absent from the full training sessions or match day squads, a player can feel a loss of worth to the team. Such frustrations are exacerbated in committed athletes with a strong sense of athlete identity; in short, most if not all elites and a good number of lesser performers [15]. Reflecting this, measurement of athlete identity can yield useful insights into how well an athlete will handle the challenge of injury [16]. Whatever the level, however, all this can lead to a reduction in motivation and increased frustration levels. Neither of these are going to improve rehabilitation outcomes. Therefore, utilising team members to help aid a player's rehabilitation, is a prime tip for improving the injured individual's feeling of worth and for keeping them as part of the squad. Athletes have reported [17] being able to maintain a positive outlook and having enhanced motivation due to their peer support during their rehabilitation.

This utilisation can be done in a practical manner through pairing the injured player with a match fit teammate in training drills where the injured player is able to partake to a high level.

For example, an upper body strength and conditioning session when the player is mid stage through a high ankle sprain recovery. Or putting them up against a match fit player in team competitive drills. A player recovering from a shoulder dislocation taking part in maximal bike sprints in pre-season training for example. Fellow team members could also be key if someone has gone through a similar rehabilitation previously and made a successful, full return to match play. For the injured player, having someone to ask questions and relate to who has completed their own recovery process, could hold value in reassuring them that they will eventually get back to full fitness and competition. This keeps them focused and motivated to achieve their long-term recovery goal. Remaining a figure in the dressing room environment whilst progressing through rehabilitation can be of use to both the injured player and the team. Dressing rooms will often have their big characters who are vital in pre match, half time and post-match motivation and briefing. It is these characters who can help to bring focus, ideas and extra determination to the team when things are not going to plan. If this player is absent due to injury, however, the team loses their influence and opinions at a crucial time. Keeping them present will give both the team a boost whilst also offering the recovering player personal value and a sense of importance. This extends to attendance at team meetings, travelling with squad to match days, taking part in media and press duties where applicable. Tasking the player to critically analyse opponents, then presenting back to coaching staff, is another effective way to retain status and purpose.

Some Methodological Suggestions

Role Clarity in the Rehab Process

With an increasing number of specialists involved, this can become a curse rather than a blessing! Without careful planning and leadership, generating a tight and shared mental model of practice, the athlete client can become confused or even downhearted at the volume of contradictory advice. In short, the key issues for the IDT are:

- a) Who does what?
- b) Who talks (or doesn't talk) to who?
- c) How and when are communications coordinated.

The original ideas presented here were developed by Bruce Hamilton and Neil Black for application to UK Athletics [18]. Problems were arising with a growing and enthusiastic support team through a lack of consideration for these very issues. So, as an athlete was injured then rehabilitating, Doctors would suggest exercises and Physios would offer diagnoses. Even worse, what was offered went straight to the athlete and was often contradictory. To solve this, role clarity was codified to cover who 'was in charge' at each stage, what this involved but also, how all members of the team could contribute. As an overview, this led to the following Shared Mental Model (SMM):

1. Immediately after the injury, and until a handover is agreed, the Doctor is in charge and will be the sole point of contact for the athlete.
2. At a time set by context and circumstances, usually around 48 hours post injury, the lead role is handed over to the Physio, who then takes sole responsibility for injury related communication.
3. At a suitable stage in the RTP process, the lead is passed to a conditioner or coach, then eventually, back to the technical coach.
4. ANY member of the support team can express an opinion or raise questions, but these are always done through the IDT and decided on/communicated by the designated lead.

This code worked well, ensuring consistent messages to the athlete, a SMM plan for support staff and clarity on roles and responsibilities for all concerned.

Planning and Progress Tools

Another important feature of IDT working against a BPS Model is how things are planned and progress measured. One tool that we use extensively is a staged approach to recovery, which we call the 'Challenge Ladder'. Figure 1 below presents the final stages of rehabilitation for an international alpine Downhill Skier who was recovering from an ACL reconstruction. We should stress that this is the 'final' top 5. The full programme extended to over 30 rungs, developed between the athlete, physiotherapist and psychologist. At first, step challenges are based on what the most challenging

things are at the moment; something as simple as straight leg raises. The stepped process helps the athlete to feel greater control over the process and, as things progress, play a more active part in their own RTP. The Challenge Ladder has three major features of usage.

1. The athlete will be mentally practising (ideally internal imagery) two steps up from what they can physically do. Taking the next steps up is determined when this mental rehearsal is vivid, controllable and pain free.
2. Notice that, in the final stages, the athlete is taken beyond what is needed to ski effectively. In the example above, level 3 was the 'determined equivalent' of the hardest move this athlete would face; a full power turn at 80mph with the recovering knee on the inside. Levels 4 and 5 were additional loading and were there to convince the athlete of a successful rehabilitation process and mitigate against any concern or apprehension.
3. At regular intervals through the RTP process, the athlete watched video of their own performance pre-injury, imagining doing these movements to offer positivity for the future and maintain memory traces for the eventual return.

Our aim is for the athlete to always come back from injury stronger, with extra tools in their armoury. To this end, we encourage athletes to spend some time working with their fellows on aspects of the sport. Examples include working on scouting notes for opposition, mental rehearsal of new moves or techniques, competition planning; all ensuring the best 'cunning plans' for doing them when they get back!

Other Biopsychosocial issues in RTP

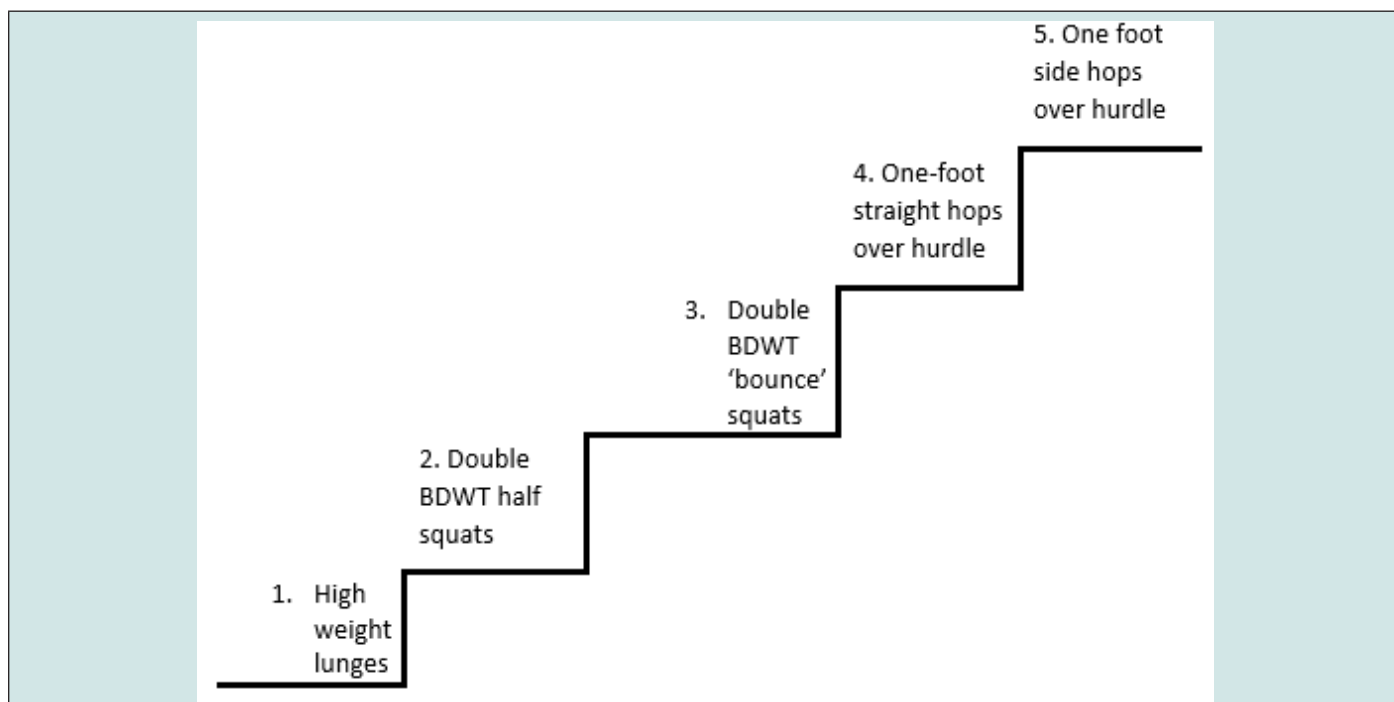


Figure 1: Final steps on the Challenge Ladder for ACL reconstruction in an alpine skier.

Even after the athlete has completed rehab and returned to play, there are 'dangers' which can persist. Accordingly, the effective rehab process must anticipate and cater for these. In this section, we address two of many; firstly, the prevalence, measurement and countering fear of movement. Termed Kinesiophobia, such an apprehension is very understandable, albeit that the extremes may be less tolerated. A handy reference for measuring and anticipating the degree and impact of this is provided by [17]. Usefully, their paper provides both specific and more general measures which may predict or precede this condition. Unsurprisingly, high trait anxiety (an inbuilt tendency to worry) is a major precursor for these concerns. Accordingly, detection and more careful consideration of a BPS agenda is indicated in these athletes. Ideally, this trait has been identified and addressed, at least in part, from early in the TD process. Another common and related concern is countering psychomotoric losses which may accrue during the injury and rehab process. Once again, careful consideration and application of the BPS approach. Accordingly, care with the skill levels of injured and rehabilitating athletes is key. As you will see, the final stages of the Challenge Ladder (Figure 1) address the confidence elements of this specifically, ensuring that this element at least is reinforced. From a skill perspective, the rehabilitated body is often slightly different. Accordingly, mental rehearsal of previous skills (often usefully stimulated by video of earlier, pre-injury performances) is an important additional element which we build into our rehab systems.

Conclusion and Recommendations for Practice

We hope that the need for this paper, and the logic underpinning the ideas presented, has emerged clearly from it. Recent reviews [20] make it clear that such a focus is important and appropriate. Furthermore, research increasingly stresses the importance of practitioner decision making in designing and applying optimum tools and techniques [21-23]. As such, there is an increasing emphasis and focus on the need for effective rehabilitation and RTP. The goal for both the individual athlete and the team/organisation is a fit player actively participating in the sport. To achieve this, we have found through our own experience, that a BPS model is superior to other structured or non-structured approaches. The model relies heavily on the interpersonal skill levels of the practitioners involved. Notably, it requires and seeks but seeks the approval and agreement of the injured athlete. The focus for effective rehabilitation is not only an athlete who can return to play but one that remains fit and injury free. The 'patient-centred care' aspect of the BPS model fully addresses the need for practitioners to advocate and care for the injured athlete but also, to share any decision making with them therefore tailoring the rehabilitation to the individual rather than the injury. The interdisciplinary approach is grounded in the respect and value held for each team member's knowledge and expertise ranging from the complexities of the injured athlete's psychological response to not training or competing through to and beyond the exact return to high level competition. We commend it to practitioner teams across sports

settings and beyond.

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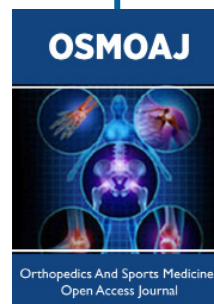
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