

Psychology in the realm of sport injury: What it is all about*

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PSYCHOLOGY IN THE REALM OF SPORT INJURY: WHAT IT IS ALL ABOUT

KEY WORDS: Sport injury, Psychological models, Injury prevention, Injury rehabilitation, Sport injury research.

ABSTRACT: Sport injuries are a constant in physical activity and sport and represent, to a greater or lesser degree, an obstacle that most athletes have to face and which could have an impact on economical, occupational and educational aspects, as well as on physical and psychological health. Traditionally, sport injury was deemed the result of biomechanical forces exerted on the body and sustained during participation in sport activity, under which perspective the athlete is considered merely as the container of a set of parts that break down and must be repaired. In contrast, Sport Psychology has brought the individual into a central active role, both when sustaining and recovering from an injury. This paper promotes a psychological perspective on sport injury and reviews the main psychological models posed for both the pre-injury and the post-injury phases. Finally, the paper addresses some of the main problems encountered by research on sport injury and sets out several guidelines for future research in the field.

Sport injuries are a constant in physical activity and sport and represent, to a greater or lesser degree, an obstacle that most athletes have to face. However, the number of sports injuries is dramatically increasing regardless of categories and modalities, due to the increase in professionalization, competitiveness and practice extension (see, for instance, Yang et al., 2012).

Sport injury is an event that not only imperils the sport career but may also have an impact on economical, occupational and educational aspects, as well as on physical and psychological health. Sport injury implies an organism dysfunction which usually produces pain and limitations or interruption of sport activity (Buceta, 1996). Moreover, it may also lead to changes in the sport setting, competitive sport losses, interferences in non-sport activities, and impact on personal and familiar facets of life. Many injuries could even result in the athlete's premature retirement (González and Bedoya, 2008), sometimes traumatically perceived by the athlete (Rotella and Heyman, 1991) with severe long-term effects. This is the case, for instance, of concussions. Recent years have witnessed an increase in the number of studies regarding cognitive, motor, neuromuscular and co-ordination consequences of concussions (Lovell, 2009). In such injuries, it seems difficult to sort out psychological consequences, emotional impact and the athlete's cognitive appraisal (Abenza, Olmedilla, Ortega, Ato and García-Mas, 2010; Putukian and Echemendía, 2003), as well as the relationship between the derived chronic condition and the affective responses to such condition.

The traditional outlook on sport injury and the role of Psychology

Traditionally, sport injury is understood as bodily damage sustained during participation in sport activity. From this point of view, the research object is the sport injury itself (the muscle, the tendon, the bone, the organ...) and the condition is seen as the result of biomechanical forces exerted on the body. However, this perspective leads to an idea of the athlete as a mere container of a set of parts that break down and must be repaired.

Furthermore, most epidemiological studies only consider the biomechanical and medical aspects of the injury (Hägglund, Waldén, Til and Pruna, 2010). However, such a perspective usually fails to take into account the athlete who suffers the sport injury and his/her role in it. Athletes are active subjects in the injury process, both in the pre-injury phase committing (or omitting) actions that can lead to an (own or opponent's) injury, and in the post-injury phase contributing to (or hampering) the rehabilitation progression.

However, in spite of the demand for an open-minded approach (Paredes, Gallardo, Porcel, De la Vega, Olmedilla and Lalín, 2012), there is still a long way to reaching true integration of the different disciplines involved in the field. To illustrate our contention we shall look at the case of collisions, one of the most frequent antecedents of sport injuries. There is a fairly considerable amount of epidemiological information about the relative risk of injury as the result of a collision with an opponent (Banerjee, Palumbo and Fadale, 2004). Nevertheless, there is a lack of information about sequences of play involved in

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collisions, the behavior of both opponents who clash, what makes an athlete more prone to bumping into a rival, whether or not such a collision leads to an injury, and what makes the athlete vulnerable to suffering an injury as a result of a particular collision despite suffering (or provoking) many others during the match. Likewise, the analysis of aspects involved in sport injuries such as overtraining, nutrition, pain, etc. cannot be complete without taking into account pain tolerance, motivation, social pressure, eating disorders, etc. Ultimately, full understanding of this complex and multidimensional phenomenon named sport injury demands a multidisciplinary biopsychosocial approach for an appropriate prevention and rehabilitation in which psychological variables play a crucial role. This approach should contribute to a comprehensive identification of the etiological risk factors and the injury mechanisms as well as athletes' responses to injury conditions (Bahr and Krosshaug, 2005).

The outbreak of psychological research on sport injury over the last 30 years has brought two main developments (see, for instance, Brewer, 2001; Williams, 2001). On the one hand, it has contributed to a better comprehension of variables that play a role in making the athlete more prone to suffering a sport injury. On the other hand, psychology has boosted the analysis of athletes' emotional and other responses to injury and how such responses influence the healing process and their ability to resume training and competing.

Regarding the pre-injury phase, research has highlighted stress as one of the most important variables involved in the injury process (Williams and Andersen, 1998). Stress has been shown to promote vulnerability to injury, either as a result of major life events and/or negative situations that athletes are unable to cope with due to their lack of coping strategies and social support (Petrie, Deiters and Harmison, 2014), or as a result of daily hassles, still barely studied but whose influence has been shown (Wiese-Bjornstal, 2010). Other variables that seem to play a role are mood states (Rozen and Horne, 2007), personality dimensions such as neuroticism and self-esteem (Deroche, Stephan, Brewer and Scanff, 2007) and risk-taking behavior (Brovard, 2008; Rubio, Pujals, de la Vega, Aguado and Hernandez, 2014, in this special issue). Furthermore, several researchers point out the need to explore the relationships between the variables mentioned above and the associated physiological states (Galambos, Terry, Moyle and Locke, 2005).

These pieces of research have given rise to several conceptual models providing reference frameworks for identifying and explaining the role of psychological variables in sport injuries. Such is the case of Andersen and Williams' Stress-Injury model (Andersen and Williams, 1988), which emphasizes the role of stress and suggests two mechanisms for explaining such relationships: attentional deficits and an increase in muscle tension. In their latest review of the model (Williams and Andersen, 1998) two-way directions are proposed among their components. Stress responses may be the result of bidirectional relationships between cognitive appraisals of potentially stressful situations and physiological and attentional facets that are in a constant feedback. Likewise, these relationships may be moderated by other variables such as personality, history of stressors and coping resources.

The Wiese-Bjornstal' (2009) Biopsychosocial Sport Injury Risk Profile points out that the risk, causality and etiology of sport injury takes into account the combined interaction of intrinsic (biological and psychological characteristics) factors and actions of the athlete with the extrinsic (physical and socio-cultural

characteristics) factors and events of sport environments, all of which are associated with the implications for the athlete's behavior and risk vulnerability based on the resultant exposure, choices and hazards (see Wiese-Bjornstal, 2014, in this special issue).

Meeuwisse, Tyreman, Hagel and Emery's (2007) Dynamic Recursive Model of Sport Injury includes intrinsic (e.g., bone strength, age, previous injury history, etc.) as well as extrinsic risk factors (e.g., reaction to other athletes, game conditions, officiating decisions or the spectator environment). These factors might interact with each other. Furthermore, the model emphasizes the fact that adaptations occur within the context of sport (both in the presence and absence of injury), which alter risk and affect etiology in a dynamic, recursive fashion. That is to say, an athlete can recursively enter a cycle with a different set of risk factors even though most of the other elements relating both to the athlete and the environment may remain constant. Actual injury occurs as a result of some "inciting event" based on controllable behaviors and uncontrollable risks inherent to sport activity and an athlete's specific risk vulnerabilities. The model not only considers risk factors and injury mechanisms, but also emphasizes the role of protective factors that athletes might deploy proactively in order to cope with their life and sport demands (Meeuwisse, 2009).

These conceptual frameworks have also promoted the development of interventions aimed to reduce injury vulnerability using techniques such as attentional focus shift, imagery, self-talk, relaxation, stress management control, etc. (Williams and Andersen, 2007; see also Johnson, Tranaeues and Ivarsson, 2014, in this volume).

Regarding the phase in which the athlete is currently injured, psychology studies have shown that the injury itself becomes a stressful condition (Wiese-Bjornstal, 2010), affecting emotional, cognitive and behavioral responses. Such a condition interacts with other personal and psychosocial factors (personality dimensions, previous injury history, age, gender, athlete-rehab team partnership; see Brewer et al., 2007). Research concerning this post-injury phase has looked into how variables such as pain tolerance (McGuire et al., 2006), catastrophizing perceptions (Campbell and Edwards, 2009), mood (Appaneal, Levine, Perna and Roh, 2009; Olmedilla, Ortega and Gómez, 2014), or social support (Robbins and Rossenfeld, 2001) can mediate the athlete's adherence to the rehabilitation program (Brewer et al., 2000) and other athlete's behaviors related to resuming sport activity (Podlog, Dimmock and Millar, 2011).

Accordingly, several conceptual models centered on the post-injury phase and focused on emotional responses to sport injury have been proposed. These are either stage-based or process-based models. Regarding the former, Heils's (1993) Affective Cycle of Injury suggests that the sportsperson presents three different grief states: distress, denial and determined coping. Usually, in the early stages of injury, distress and denial are at their peak. As rehabilitation progresses, a trend toward determined coping appears. The transition to a coping stage might be promoted or interfered with by personal and situational variables. An example of a process-based model is the Brewers' (1994) Cognitive Appraisal Theory which posits that athletes' behavior in the face of sport injury is determined by their emotional reaction to this event. In turn, emotional response is the result of the interaction between personality (e.g., self-esteem, locus of control, anxiety, etc.) and situational factors (injury severity, sport status, etc.). We find an attempt to synthesize

existing approaches to the dynamic process of psychological response to sport injury in Wiese-Bjornstal, Smith, Shaffer and Morrey's (1998) Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process. This model includes personal and situational moderating factors as well as cognitive, emotional and behavioral responses which interact with each other. Psychological consequences are related to the whole injury experience, around the three components of the response to sport injury: cognitive appraisal, emotional response and behavioral response. In this way, the notion of the so-called "psychological impact" of sport injury (Liberal, Ponseti, Cantalops and Escudero, 2014, in this special issue) provides a more holistic view of the athlete suffering an injury.

General and specific problems affecting sport injury research

There are several obstacles to consolidating a more in-depth knowledge of sport injury for more effective prevention and treatment. Some of these affect all the disciplines involved, whereas others are specific to Psychology.

The first main problem researchers have to cope with is the lack of a unique, unanimously accepted definition of what constitutes a sport injury (Fuller, 2010). Theoretical definitions have tried to establish a clear differentiation between sport injury and disease (Langley and Brenner, 2004). Thus, sport injury definitions usually relate to bodily damage and energy transfer (Fuller, 2010). That is, sport injury results from a transfer of energy to the tissue. The nature of the load and its velocity, the magnitude of the energy transfer and the properties of the tissue, such as stress-strain relations, determine whether the tissue will be able to make the corresponding adaptations instead of being damaged. If transfer of energy is the key point for establishing a sport injury, however, conditions such as hypothermia or hypoxia as a result of physical activity cannot be considered. Moreover, common definitions have restricted sport injury to limited periods of time and to those incurred during training and/or competition events, compared to other medical conditions that, in turn, are usually related to pathologies developed over longer periods of time, and are not directly related to sport activity. Such restrictions, however, do not leave room for chronic conditions as a result of previous bodily damage (e.g., osteoarthritis).

Authors have tried to avoid such obstacles by defining sport injuries in terms of the functional affectation to sport activity: bodily damage sustained during participation in sport activity which causes, at least, the loss of one day's training (Dick, Agel and Marshall, 2007). Nevertheless, such a rule is not exempt from misunderstandings. Particularly, those cases in which the athlete trains and/or competes despite suffering bodily damage. This increasingly common situation is due to different causes, such as the particular sport normative culture, the athlete playing the injury down, the fear of being pushed into the background in the team or in the regard of the coach or the manager, the injury not being intrusive enough to prevent participation though still having undesirable consequences for health and further injury vulnerability, etc. (Wiese-Bjornstal, 2010). Currently, there is a tendency to consider sport injury irrespectively of the time loss and the need for medical attention.

Obviously, if there is no consensus about what a sport injury is, there can be no generally accepted classification. Defining whether each case is a sport injury and to what type it pertains lies at the basis of any injury surveillance and etiology research. Classifications, beyond location criteria, have established different levels according to severity, using criteria such as tissue

damage, the need for hospitalization or catastrophic affectation and fatal casualty. Several authors have highlighted the need to use objective measures based on classifications of injury severity recorded by certified professionals (e.g., Petrie and Falkstein, 1998) instead of simply recording the time loss from athletic activity, which has been used in many studies (Fuller, 2010), although some works have shown how robust this last criterion is (Rubio, Pujals, Márquez and Sánchez-Iglesias, 2013).

A particular problem encountered in psychological research on sport injury is the lack of consensus regarding the variables that should be considered as well as the lack of homogeneity in the assessment instruments used, which might compromise the results obtained (Olmedilla, Ortega and Abenza, 2013). Moreover, the use of self-reports, though widely extended, limits accurate ecological moment-by-moment assessment of dimensions such as perceived stress or coping. (Shiffman and Stone, 1998).

Where to walk through sport injury research

As mentioned, psychological aspects of sport injuries have been studied over the last 30 years. Nevertheless, besides the body of knowledge accumulated and the fruitful research programs conducted for different research groups, the field remains as a set of disperse data, theories and concepts (Olmedilla and García-Mas, 2009). In order to integrate the different approaches, Olmedilla and García-Mas (2009) proposed a comprehensive, multi-conceptual, perspective: The Global Psychological Model of the Sportive Injuries (MGPsLD). This perspective considers three axes: causal, temporal, and conceptual, and comprises the psychological and situational variables that have shown to be involved in the phenomenon. Moreover, the Global Model analyses the methodological consequences of this comprehensive approach and suggests a global empirical research strategy. In their conclusions, the authors put forward several contentions, which we adapt to the present:

1. There is a need to integrate the different collections of empirical data as well as to agree on what a sport injury is, to what extent it is measured through the outcomes usually used and how the relationships between psychological factors and sport injury should be methodologically studied (see, Johnson et al., 2014, in this special issue).
2. A misunderstanding between psychological variables and situational (sport related) factors is detected in several pieces of research. In many cases, situational factors are taken as representations of psychological variables (e.g., the match period, instead of athletes' perception of their chances of winning or losing, etc.; see Ortin, 2009).
3. There is a lack of accurate data on the incidence and prevalence of sport injuries as well as about the social, occupational and health impact of sport injuries. There is also a lack of information about rehabilitation and sport activity recovery. Despite the efforts of several research groups in specific sports (e.g., Dick et al., 2007), information is essentially focused on descriptive medically-based epidemiology. Nevertheless, there is still a lack of accurate information regarding sequences of play involved in sport injuries, the nature of athletes' behavior or when such behaviors lead (or not) to a sport injury, etc.
4. The clinical outlook takes precedence over a more positive perspective based on the athlete as a whole person instead of the athlete as a machine some of whose gears are affected. Furthermore, there is a lack of consistent action in preventing injuries.
5. The field demands a theoretical clarification and a specific methodological approach according to each axis (Causal,

Temporal, Conceptual) both in research objectives and practical applications.

6. There is a lack of homogeneity in the assessment instruments used, and several concerns about the near to exclusive use of self-reports should be taken into account. Moreover, information gathering based on self-reports should be complemented by other methods, such as task-based assessment, observational techniques, physiological and biochemical outcomes, as well as the promotion of new IT-based technologies.

– Finally, linking to the conclusions of the III International Seminar on Physical Activity and Sport devoted to psychological variables influencing sport injuries, held at Palma de Mallorca (Spain) on 20 – 21 June 2013, the following recommendations for both research and applied practice are suggested:

– The notion of sport injury should be open to a broader understanding, including fatigue, pain, etc. regardless of the time-loss they provoke.

– Personal growth as a result of a sport injury should be considered (see, Almeida, Luciano, Lameiras and Buceta, 2014, in this special issue).

– Behavioral analysis of athletes and sport situations must be conducted.

– The temporal axis and the continuum prevention-readaptation ought to be emphasized.

– Promoting a global perspective walking hand-in-hand with biomechanical, orthopedic and psychological professionals, as well as including physiological and IT assessment methods, should be given maximum priority.

– Encouraging the use of big data analysis, particularly probabilistic Bayesian analysis for improving prediction, would provide a very useful methodological approach.

– Broadening dissemination objectives as well as the scope of scientific journals in which to publish papers on psychological variables that influence or are influenced by sport injuries (public health, sport medicine, education, etc.) might give more visibility to the work and attract the involvement of other professionals and researchers.

LA PSICOLOGÍA EN EL REINO DE LAS LESIONES DEPORTIVAS: DE QUÉ SE ESTÁ HABLANDO

PALABRAS CLAVE: Lesión deportiva, Modelos psicológicos, Prevención de la lesión, Rehabilitación de la lesión, Investigación sobre lesiones.

RESUMEN: Las lesiones deportivas son una constante en la actividad física y el deporte y representan, en mayor o menor grado, un obstáculo al que la mayor parte de los deportistas se tienen que enfrentar, pudiendo aquéllas tener consecuencias a nivel económico, laboral, educativo, además de a nivel físico y psicológico. Tradicionalmente, la lesión deportiva ha sido considerada como el resultado de la acción de fuerzas biomecánicas que ejercen sobre el cuerpo mientras se participa en una actividad deportiva. Esa perspectiva viene a considerar al deportista como un mero contenedor de unas piezas que se han roto y deben ser reparadas. Al contrario, la Psicología del Deporte le concede al individuo un papel activo central tanto en el padecimiento de una lesión como en el proceso de recuperación de la misma. El presente artículo viene a promover una perspectiva psicológica de la lesión deportiva, revisando los principales modelos psicológicos que se han propuesto tanto para la fase de pre-lesión como para la fase de post-lesión. Finalmente, el artículo plantea los principales problemas de la investigación sobre lesiones deportivas y brinda una serie de líneas de actuación para llevar a cabo la investigación en este campo.

A PSICOLOGIA NA ESFERA DA LESÃO DESPORTIVA: DO QUE SE TRATA

PALAVRAS-CHAVE: Lesão desportiva, Modelos psicológicos, Prevenção da lesão, Reabilitação da lesão, Investigação sobre lesões.

RESUMO: As lesões desportivas são uma constante na actividade física e no desporto e representam, em maior ou menor grau, um obstáculo que a maioria dos atletas tem que enfrentar, podendo aquelas ter consequências a nível económico, laboral e educativo, bem como a nível físico e psicológico. Tradicionalmente, a lesão desportiva tem sido considerada como o resultado da acção de forças biomecánicas exercida sobre o corpo enquanto se participa numa actividade desportiva. Essa perspectiva tem vindo a considerar o atleta como um mero recipiente de peças que foram quebradas e devem ser reparadas. Pelo contrário, a Psicologia do Desporto reconhece ao sujeito um papel activo central tanto no padecimento da lesão como no processo de recuperação da mesma. O presente artigo procura promover uma perspectiva psicológica de lesão desportiva, revendo os principais modelos psicológicos que têm sido propostos tanto para a fase de pré-lesão como para a fase de pós-lesão. Por último, o artigo discute os principais problemas da investigação sobre lesões desportivas e oferece uma série de linhas de acção para a realização de investigação neste âmbito.

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