

INFLUENCE OF PSYCHOLOGICAL FACTORS ON SPORTS INJURIES

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Sports injuries can be caused by different factors. Scientific literature indicates physical, as well as situational, sports and psychological aspects. This work sets out the main aspects that relate psychological variables to injuries in the sport context. In this regard, it turns to the fundamental theoretic models, falling upon the stress and injury model by Andersen and Williams (1988). On the other hand, it highlights some investigations that have been a reference in the study of vulnerability to injury due to psychological factors, as well as in the psychological consequences from the injury itself. It also discusses research in which the aim is rehabilitation help through specific psychological training. Finally, it shows a new model that integrates previous contributions into the psychology and injuries field.

Key words: Injuries; Vulnerability; Rehabilitation; Psychological variables.

Las lesiones deportivas pueden producirse por diferentes factores. La literatura científica señala tanto aspectos físicos, como situacionales, deportivos y psicológicos. En este trabajo se exponen los aspectos principales que relacionan las variables psicológicas con las lesiones en el contexto del deporte. En este sentido, se acude a los modelos teóricos fundamentales, incidiendo en el modelo de estrés y lesión de Andersen y Williams (1988). Por otro lado se señalan algunos de los estudios que han sido referencia tanto en la vulnerabilidad a la lesión por factores psicológicos, como en las consecuencias psicológicas de la propia lesión. Además se indican investigaciones cuyo objetivo es la ayuda a la rehabilitación a través de entrenamiento psicológico específico. Finalmente se plasma un nuevo modelo que integra las aportaciones anteriores en el campo de la psicología y las lesiones.

Palabras clave: lesiones, vulnerabilidad, rehabilitación, variables psicológicas.

The study of sport injuries within Sport Psychology is one of the areas that has grown most in the last few years. The professionalization of sport practice along with the increase in the number of professional athletes and of participants in nonprofessional physical activities and sports has provoked an increase in the number of injuries with the derived consequences, which are not only health related. In addition, sport injuries are not only present in young or adult populations but also in children and in adolescents in periods of sport initiation.

However, there are still many professionals in the field of sport who question whether there is any relationship between sport injuries and psychology. More and more, there are fewer doubts regarding the influence that certain psychological factors have on the athlete's risk of injury. Within the scientific field of psychology, it is known that psychological factors influence the fact that injuries happen. Which factors and how important these are, are two aspects researchers study in order to better comprehend sports injury and, therefore, make it possible

to implement actions that, in one way or another, will help prevent sports injuries, or at least, minimize those aspects that increase the possibility of injury in the athlete.

Sport injury is relevant not only due to its direct influence on performance but also to the personal and social consequences associated to it, among which we can find the following (Buceta, 2008):

- ✓ Changes in the sports environment (readjustments, changes in positions that affect teammates).
- ✓ Interruption or limitation of the usual extra-sport activities such as attending work or school.
- ✓ In general, changes in personal and family life due to the diminished possibility of performing tasks (cannot get dressed or cannot even be alone).
- ✓ Alteration of other psychological variables related to the injuries that will be discussed later (major irritability, hostility, negative thoughts, sadness).

Multidisciplinary work focused on sports injuries is becoming increasingly frequent. Bahr and Krosshaug (2005), point out that to explain all the internal and external risk factors, as well as the mechanisms involved in the apparition of injury, it is necessary to have a multifactorial point of view, which is congruent with other studies (Hanson, McCullagh and Tonymon, 1992; Heil,

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1993; Palmi, 2001). In general, the authors classify the factors associated to the injury in the following:

- (a) Internal factors: physiological, biomechanical, psychological, age-related, deterioration of the body, history of injuries, lack of physical preparation for a certain task, lack of adherence to a preventative measure, inadequate diet, fatigue or risk behaviors, over-training, etc.
- (b) External factors: deficiency in the environmental conditions, the type and condition of the sport surfaces, sports equipment environmental temperature, intense play, etc.

From a psychological point of view we can posit the following outline as a starting point in the description of the psychological factors related to sports injuries (Figure1).

The first studies regarding psychological factors and sports injuries emerge from clinical experience or directly from training sessions. Historically, attention regarding the relationship between psychological variables and sport injury was focused toward the study of personality. Researchers believed that if certain personality traits increased the athlete's risk of injury, assessing these would permit the establishment of preventative actions based on psychological interventions. The question of the matter was whether there is a type of personality that is related with those athletes who have a greater vulnerability toward sports injuries.

From a psychological perspective, it is extremely important to consider the causes of injury as a result of many different factors, although on occasion the evidence (for example, injury that is caused by a soccer player who tackles a rival player who is running with the ball at high speed from behind) seems to show a unicausal relationship. However, most authors nowadays assume that sports injuries have a multifactorial origin, with some of these factors having a greater or lesser influence on a certain injury, depending on the reality and the context in which it happens. In spite of this multifactorial consideration, psychologists are interested in

determining, as exactly as possible, which psychological variables affect the probability that an athlete may get injured, the relationship among these factors and the injury itself. Thus, we are equally interested in considering which sports situations are those where athletes get injured more frequently.

PSYCHOLOGICAL VARIABLES AND VULNERABILITY TO SPORTS INJURIES

The study of the relationship between psychological variables and sports injuries has significantly increased in the last few years, basically attempting to analyze the influence of psychological factors in the athlete's vulnerability to injury (Udry and Andersen, 2002), or the perception itself of the psychological influence on the injury (Olmedilla, Ortega, Prieto and Blas, 2009), although with great variability of data and concepts which suggests the necessity of proposing new lines of work (Olmedilla and García-Mas, 2009).

The psychological variables more frequently studied have been the following

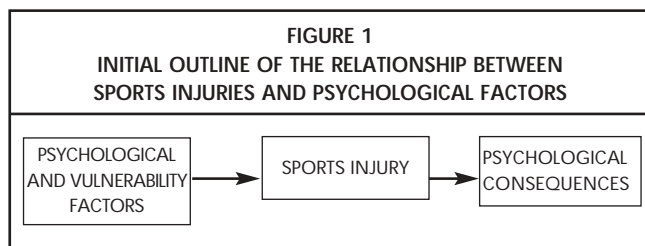
- ✓ Anxiety of competition
- ✓ Psychosocial stress
- ✓ Motivation
- ✓ Self-confidence.

Most studies pinpoint stress as the main factor that along with other variables increases the probability of injury. Therefore, it seems that it is essential to study the situations that are potentially most stressful and the consequences of this stress.

Within the context of high-performance sports, athletes face situations such as team or club discipline, the need of attaining results, continuous demands for improvement, etc. On the other hand, within the context of health-related physical exercise, people are faced with stressful situations in the adherence to the physical activity itself in order to feel good, comply with the planned tasks, reconcile sports activities and family and work, and, in short, many aspects that are related to good planning and an adequate establishment of objectives.

In the study of stress and sports injuries, the so-called life events have become one of the most studied aspects within the sports context, distinguishing, on the one hand, those events of great impact for the subject and that are less frequent, and, on the other hand, those which are considered to be minor but that nevertheless make an impression on the person because they are more habitual.

There are essentially two theoretical models explaining



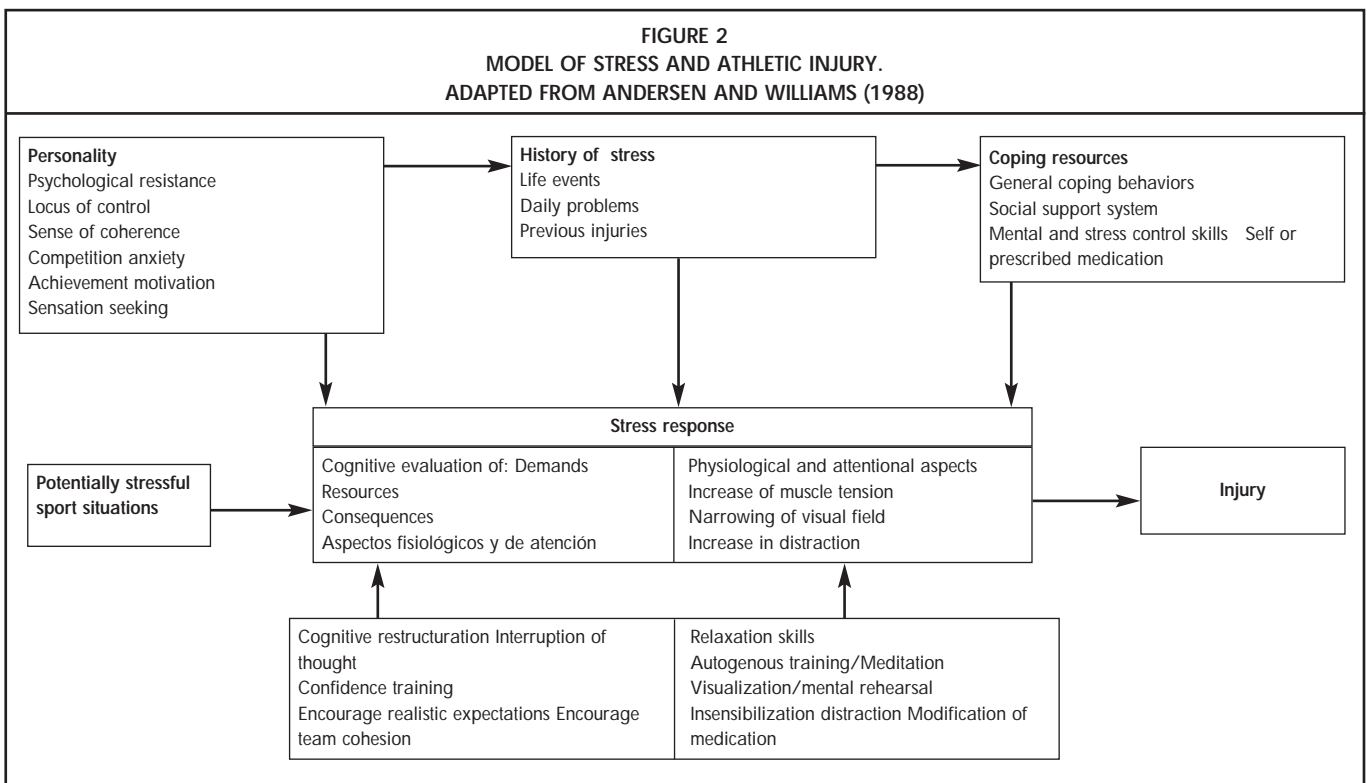
the relationship between stress and sport injury: the attentional deficits theory and the theory of the increase in muscular tension. The first model posits that stress decreases the subject's peripheral attention provoking a reduction of the attention focus. According to the second model, stress provokes a specific muscular over-activation, inducing the execution of less precise movements in sport performance.

The model of stress and athletic injury by Andersen and Williams (1988) has doubtlessly been the model of reference in the study of the relationship between psychological factors and sports injuries. There are three great areas included in this model, namely: personality factors, the history of stress and the athlete's coping resources. Andersen and Williams hold the hypothesis that a person's history of stress contributes directly to his/her response when faced with stress, whereas personality traits and coping skills can either act directly or through that person's history of stress (Figure 2). However, the authors point out that this approach may seem a bit "narrow" in the sense that personality traits and coping resources can moderate the stress response without taking into consideration the daily levels of stress or problems.

During the following decade a great impulse in the study of this relationship took place (Fawkner, 1995; Hanson et al., 1992; Kolt and Kirkby, 1996; Savery and Wooden, 1994; Theorell, 1992; Williams and Roepke, 1993). In 1998, Williams and Andersen developed a modified version of their original 1988 model. The new model included several important modifications regarding the study of stress and sport injury proposing a bidirectional relationship between personality and coping resources, as well as between personality and the history of stressful factors, and between the coping resources and the history of stressful factors. This line of research has continued to grow during the last decade (Abenza, Olmedilla and Ortega, in press; Ortín, Olmedilla, Garcés de los Fayos and Hidalgo, 2008).

SPORT AND SITUATIONAL FACTORS AND ATHLETIC INJURY

As mentioned at the beginning of this article, other relevant external factors have been considered to be related to sports injuries. Among these external factors we find situational and sport-related factors, such as the category of the game, the result itself, the surface, age, history of previous injury or the athlete's participation time.



Buceta (1996) proposes the following categories as the main situational variables:

1. General stressful events (family and economic problems, loss of significant others, minor daily difficulties...).
2. Stressful events related with physical exercise (change of teams, trainer, category, status...).
3. Athlete's life style (frequent traveling, change of residence, strict self-discipline...).
4. Specific demands of training (continuous demands for improvement, constant overreaching, permanent evaluation...).
5. Specific demands of competition (uncertainty about the result, lack of control regarding one's own effort, social evaluation, and frustration when faced with unfavorable results...).
6. Other situations related with sport activity (relationship with the media, negotiations with management...).
7. Specifically, factors associated to previous injuries (movements or actions of special physical risk).

Other investigations point out sport-related factors that are related to injury. Next, some of these studies and related risk factors are mentioned:

- ✓ **Competitive category or level.** Olmedilla, Andréu and Blas (2008), in their study with soccer players, found a significant relationship between sport category and sport injury. Specifically, they indicate that the percentage of injured players in the under-16 category is 54.1%, in the under-12 category is 20% and 15% in the under-14 category.
- ✓ **Result during the competition.** Ortín, Jara and Berengüi (2008), indicate that a greater percentage of injuries occur in situations following defeat in competitions than in victory. In this regard, the situation following defeat can be assessed as stressful for the soccer player, giving rise to behaviors that increase the risk of injury.
- ✓ **History of previous injuries.** Some authors point out that between 20% and 25% of injuries are relapses of previous injuries (Hawkins and Fuller, 1999), which is an aspect that places the athlete's history of previous injuries as an important factor when intervening in prevention. Krucera, Marshall, Kirkendall, Marchak and Garrett (2005), in a study of young soccer players indicate that the history of previous injuries is a relevant factor related to the probability of getting injured again. In this regard, they point out that soccer players who have suffered a previous injury are

2.6 times more prone to injury than players without a history of previous injury.

- ✓ **Playing time.** Most studies count the number of injuries for every 1,000 hours of competition. From an epidemiologic approach we find very diverse data; from the 2.4 injuries cited by Kibler (1995) to the 19.1 indicated by Schmidt-Olsen, Buenemann, Lade and Brasso (1985). Knowles, Marshall and Guskiewicz (2006) highlight the importance of instructing all professionals surrounding the athlete in the different methods for analyzing the epidemiological data as well as in the more frequent causes of injury.
- ✓ **Training versus competition.** In general, studies show that in sports, injuries happen more frequently in competition than in training situations, both in youngsters and in adults (Emery, Meeuwisse and Hartmann, 2005; Faude, Junge, Kindermann and Dvorak, 2005; Smith, Stuart, Wiese-Bjornstal and Gunnon, 1997).

PSYCHOLOGICAL INTERVENTION FOR THE PREVENTION OF SPORT INJURY

The psychological measures for the prevention of sport injuries should be essentially directed toward the reduction of stress, following the 1988 model by Andersen and Williams (Olmedilla and González, 2002).

The programs of psychological intervention for the prevention of sport injury have been fundamentally focused on the psychological training of general skills where the repercussion on the incidence of injury is indirectly assessed (Davis, 1991; Fenker and Lambiotte, 1987; Kerr and Goss, 1996). On the other hand, other specific programs have been developed for the prevention of sports injuries (Johnson, Ekengren and Andersen, 2005; Maddison and Prapavessis, 2005; Noh, Morris and Andersen, 2007), focusing essentially on the control of stress and using different intervention approaches.

One of the stress control approaches on the part of the athlete is to learn coping strategies or the development of general psychological skills that, in many cases, are those utilized by the athlete in sport performance. In this regard, these psychological abilities used by the athlete are real coping resources susceptible to be analyzed in their relationship to the proneness toward athletic injury; thus, most of the proposed programs are also directed at optimizing these skills.

From a more general and integrated perspective, Palmi (2001) proposes the contents for a program of psychological intervention for the prevention of sport injuries:

1. Improving the training of coaches
 - a) Information about risk factors
 - b) Importance of physical preparation
 - c) Importance of sports habits
2. Training in psychological resources
 - a) Activation control
 - b) Attention control
 - c) Control of images and thoughts
 - d) Adjustments of objectives
3. Planning with realistic objectives
 - a) Progressive demands
 - b) Variety of exercises and situations
 - c) Adjustment of training to individuality
4. Improvement of technical resources
 - a) Post-execution information
 - b) Analysis of videos: successful and erroneous actions
 - c) Training by simulating competitive conditions

PSYCHOLOGICAL CONSEQUENCES OF ATHLETIC INJURY

As we have already indicated, in the same way that stress makes a person more prone to sports injury, the injury itself makes the individual more vulnerable to suffer from stress. All the processes that an injured athlete has to go through involve an adaptive effort in which the individual will have to experience specific situations of overcoming without the habitual physical capacity. The stress experienced by the injured individual can be present at any stage from the moment the injury happened, going through the rehabilitation process, until returning to training sessions and competition. In addition to stress, other psychological and emotional processes are associated to sport injury, and have a direct influence on the athlete's rehabilitation process (Abenza, Olmedilla, Ortega, Ato and García-Mas, 2010).

To understand the existing relationships between sports injuries and psychological factors, we can find several investigations that, basically, can be summarized in two theoretical models:

- a) Models focused on the athlete's emotional reactions (Brewer, 1994; Heil, 1993).
- b) The Integrated model of psychological response to sport injury and the rehabilitation process by Wiese-Bjornstal, Smith, Shaffer and Morrey (1998), which integrates theories based on stress processes and others centered on the pain process.

POST-INJURY PSYCHOLOGICAL INTERVENTION

The psychological intervention with an injured athlete begins with the assessment of the available information regarding the injury and the impact it has caused. On numerous occasions, the individual's affective state is damaged not because the consequences are serious, but because of the uncertainty of not knowing the exact estimated time of recovery, of having badly structured objectives on daily tasks, etc. Thus, all professionals surrounding the athlete are responsible (each one in his/her area) for intervening psychologically. In this regard, the multidisciplinary work becomes of principal importance for the correct psychological functioning of the injured athlete. Of course, personal variables play an important role, but the rest of the people involved can adopt strategies that can be very beneficial for the athlete. The possible anxiety states and stress of the injured athlete are mediated by different aspects of the injury itself such as its severity, the deterioration of daily activities or the presence of other parallel vital situations. Palmi (2001) indicates social support as the main factor in the psychological aspect, distinguishing three types of social support:

- ✓ Support from the medical team.
- ✓ Support from the sports team.
- ✓ Support from the family and other close relationships.

Some examples of this actuation can be seen in the work by Abenza, Bravo and Olmedilla (2006), through an individual intervention with a handball goalkeeper, or in the use of specific psychological techniques such as visualization (Hare, Evans and Callow, 2008); or in the work by Olmedilla, Ortín and De la Vega (2006), where there is a detailed description of the psychological intervention conducted with two professional athletes.

Based on what has been previously mentioned, and after several years of research in our country, Olmedilla and García-Mas (2009) consider the necessity of defining a global model of sport injury which is comprehensive, multi-conceptual, and predictable and that can be empirically and/or experimentally demonstrated. Thus, they propose a model with three axes which define it, both from the point of view of research, as well as of application: causal, temporal and conceptual axis (see Figure 3).

In the causal axis, the model is organized as a function of the existence of psychological variables which behave as antecedents, psychological causes that contribute to the prevention of sport injury, and as consequences, psychological effects of a present or past injury. In short, the following questions are trying to be answered:

1. Which changes or modifications in a specific psychological variable have been the cause, and to what extent, of the sport injury?
2. What effects on one or several psychological variables have been caused by the physical and physiological experience of suffering a sport injury?

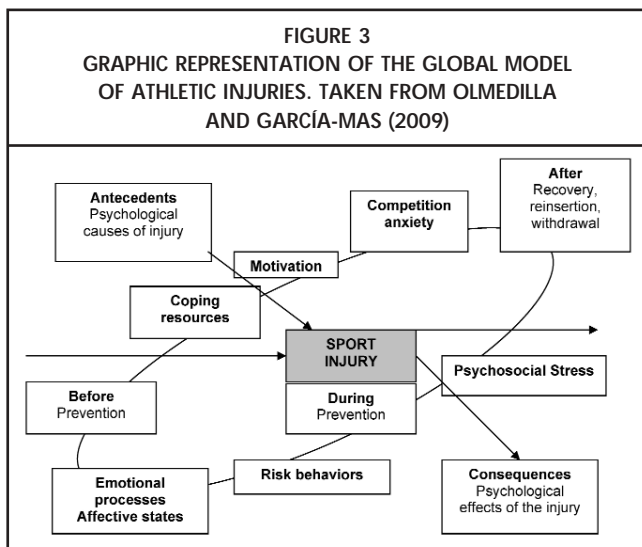
In the temporal axis, which is essentially situational, we find variables, psychological or not, with significantly different importance and relevance, depending on the moment in which they are studied or occur. The following “stages” can be distinguished on this axis: before the sport injury, during the time of the injury and after the medical-morphological-training recovery from the injury.

The conceptual axis, which would be more in the form of a “galaxy” than a line, organizes the psychological concepts and variables related in research studies to sport injury, as a function of their own relationships, that is variable-variable, and the relationships to the injury, variable-sport injury.

Based on the model proposed, Olmedilla and García-Mas (2009) indicate the following conclusions:

1. There is a great theoretical, methodological and applied diversity in the study of the relationships between psychological variables and sport injury, which has not been rectified to date by means of adequate review articles on the subject matter.
2. In some studies, there is another type of confusion between the psychological variables studied and the situational variables (sport-related) with respect to sport injury. These last ones are often taken as the presentation of the psychological variable.

3. There is almost a complete lack of objective data about the incidence, prevalence, health-related, social and labor impact, rehabilitation or recovery from sport injuries. This becomes even more evident in the field of recreational sport activity, or in the practice of physical activity or exercise, where there is almost inexistent data. This fact greatly hinders research attempting to analyze the variables which are considered to be objective epidemiological markers in sport injury.
4. The predominant approach is clinical, without there currently being a significant presence of positive approaches in consideration of the type of analysis or psychological intervention.
5. The field requires a conceptual clarification, and to this end a model of sport injury is proposed which is organized in three axes (causal, temporal and conceptual). This distinction allows us, in part, to reconsider the location of the research studies that have been carried out to date, and provide them with psychological sense at a level different than the purely explicative. The model is open for its subsequent validation.
6. The three proposed axes have an incidence regarding the methodological recommendations in the conduction of studies in each one; in the considerations of application and intervention; and in the detection of research objectives that allows us to advance in the field.
7. Finally, the authors believe that the utilization of comprehensive, global models of this type allow us to have a wider perspective of the field; detect its deficiencies; distinguish between research and implementation; and permit the analysis of the results of research studies to have the greatest theoretical capacity possible.



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