

## Predicting Injuries of Athletes by Considering Psychological Factors

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**Abstract:** The aim of this research was to make a comparison between the psychological factors of injured and uninjured athletes and to predict the future injuries of those exposed to risks with regard to psychological factors. Among male athlete students with an average age of  $22.7 \pm 3.7$ , 169 subjects were chosen as available samples and were divided into two groups of injured (75 people) and uninjured (94 people) according to an injury questionnaire. A Personal information form, the Competitive State Anxiety Inventory-2 (CSAI-2) questionnaire by Rainer Martens, Eysenck 34 -question questionnaire and a researcher-designed questionnaire was used to collect athletic injuries, were filled by the participants in both groups. Also, the statistical method of one-way variance analysis was used in order to analyze the difference between the two groups in three scales of cognitive, somatic and well-confidence variables and the discriminant analysis method was used to predict the possible chance of injury. Generally, the results of this research showed a difference ( $P < 0.01$ ) between the two groups. The analysis of the differences showed that athletes who scored higher than 83 in the questionnaire, were potentially at risk and were more likely to be injured in the future. Finally, this study indicates that by analyzing personal characteristics and psychological factors, it is likely to identify those athletes who are exposed to risk and take appropriate measures in order to prevent the injury.

**Key words:** Injury % Psychological factors % Injured athlete

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### INTRODUCTION

Even with making the best efforts to prevent injuries and increasing the quality of sports, injuries cannot be prevented. But it seems there are some ways to reduce the risk of injury, among them, diagnosing the athletes with regard to psychological factors related to the injury [1-5].

There are many studies which have focused on factors which predict the increase in the risk of taking an injury by athletes, which include physical/physiological factors (for example the form of the body, physical fitness, etc.), anatomical (including biomechanical factors), environmental (such as the surface of the floor, etc.) and psychological factors. This research is limited to psychological factors which may probably increase the risk of injury of the athletes.

The research on psychological background of athletic injuries goes back to the work of Holmes and Rahe (1967), which was based on the relationship between the anxiety caused by life events and illnesses, which revolutionized medical conduct [2]. They found out that people who experienced more life events such as death of

a friend or a relative, divorce, moving to a new place, etc. are more in the danger of becoming ill in the future. Supporting the findings of Holmes and Rahe, the evidences show that anxiety has a negative effect on the body's immune system [3]. In 1970, Holmes used measurement scale of social balance for predicting injuries in soccer matches. Holmes found that soccer players, who have been through major life events, are more likely to be injured. In the same way, some investigators corrected the measurement scale of social balance to suit the athletes of American universities and found that the group which had experienced more life events, was injured more frequently [1-4].

One of the earliest studies which focused on preventing injuries from the psychological perspective has been directed by Davis in 1991. Using intervention based on stabilizing, he reported a decrease in the number of injuries ranging between 33 percent for football and 52 percent for swimming [5]. In another study, Kerr and Goss (1996) provided a 16 session program for swimmers which covered an eight-month period. The program included Meichenbaum's Stress Inoculation Training (SIT) (1985).

Although decrease in injuries was a factor for the control group and the experiment group were also given some exercises which basically did not have a meaningful difference, however, there was a significant decrease in injuries [6]. Kolt *et al.* (2004) conducted a research similar to that of Kerr and Goss, for gymnasts based on interventions preventing injury. In this research, no meaningful difference was found between the injuries in the control group and gymnasts who had received interventions. Williams and Anderson (1988) believe that there are evidences which prove that interventions are influenced by the size of the sample [7].

In Perna *et al.* (2003) study, the athletes in the experimental group had a meaningful decrease in the days which were missed due to injury or illness. Also, the results indicated that intervention effects were, in a special way, an intermediary for negative behavior [8]. Young (2005) reported an average relationship between psychological factors and the intensity and length of injury. Self confidence and freedom from anxiety were discovered to be meaningful predictors of the intensity of injury. Likewise, freedom from anxiety and negative stress were discovered to be predictors of the length of injury [9].

The work of Johnson *et al.* (2005) demonstrated the usefulness of marking those athletes who ran a high risk of becoming injured and who needed interventions. Those in the experimental group had received minor treatments, which included 6 mental skills (such as stress management, goal setting and stabilizing), which were taught during a 19-week competition season. Samples in the experiment group had, in a meaningful way, less injuries compared with the control group [10]. The work of Johnson *et al.* was approved by Maddison and Parapavessis (2005). They demonstrated that by using the intervention of stress management for a group of athletes who had been diagnosed with being at risk of injury based on previous injuries, defense and levels of social support, athletes in the experiment group missed less time for injury than those in the control group. These two studies suggested marking of those athletes who are more at risk of being injured, to researchers. They also suggested that from the psychological perspective, the subjects be rescued according to interventions which are more effective [11]. In this regard, spotting those psychological factors which help to identify the athletes who are at risk is important. So in this study, the researcher had been looking for psychological factors which are likely to be related with injuries of the athletes and which can help us to identify those athletes who are likely to become injured in the future.

## MATERIALS AND METHODS

In this study, the psychological characteristics of injured and uninjured athletes was analyzed and compared in order to determine the relationship between psychological factors and injury of the athletes and to predict the injury of those athletes who are at risk. In order to do so, among the male athlete student who took part in the Nationwide University Competitions in 2005, 169 students with an average age of  $22.7 \pm 3.7$  were chosen as accessible samples. The events took place at Shiraz University for 4 days. According to the information gathered by injury questionnaires, samples were divided into two groups of injured (75 people) and uninjured (94 people). The questionnaire included some brief questions about the 'injury', thus defined for the purpose of this study: any physical injury inflicted during a sport activity on any parts of the body which prevented the subject from practicing or competing, or hindered his normal activity, for at least 24 hours. If the answer to this question was positive, then the subject was asked to fill the main injury questionnaire, which included questions regarding each part of the body. To make sure about the kind and the intensity of the injury, those who were given injury questionnaires were again interviewed. It's worth mentioning that only injuries of the past 2 years were of interest to this study. Also, the 34-question Eysenck questionnaire [12] was used to assess personal features of the athletes. Since there were too many questions about personal features and in order to reduce the size of the questionnaire, with the background of the study considered, 3 features of risk-taking, excitement seeking and quarrelsomeness were chosen. After piloting and correcting the questionnaire, ultimately the Cronbach's alpha coefficient was as follows: 0.86 for risk taking, 0.74 for excitement seeking and 0.66 for quarrelsomeness. The Competitive State Anxiety Inventory-2 of Rainer Martens was used to assess competitive state anxiety of the athletes before the competition. In this study, the modified form of this questionnaire was used. The special feature of this questionnaire is that it divides the pre-match competitive state anxiety into three subscales: cognitive anxiety, somatic anxiety and self-confidence. Reliability of each of the threefold factors of this questionnaire according to Cronbach's alpha is as follows [13] (Table 1).

It is worth reiterating that the above feature has been chosen and analyzed after preliminary studies on researches related to psychological factors and athletic

Table 1: Cronbach's alpha coefficient for competitive state anxiety elements

Factor	Reliability
Cognitive	" = 0.79-0.81
Somatic	" = 0.82-0.83
Self-confidence	" = 0.88-0.90

Table 2: Personal information of the athletes

Statistical indicator	Age	Height (cm)	Weight (kg)
Average	22.7	177.4	71.9
SD	3.7	7.6	11.0

Table 3: The variance analysis of the comparison of cognitive anxiety, somatic anxiety and self-confidence in injured and uninjured athletes

	Variable source	Variance	F.coefficient	Meaningfulness (s)	Differenc (e)
Group membership of	Cognitive	206.171	7.313	0.008	0.42
Injured and uninjured	Somatic	372.857	12.075	0.001	0.067
Athletes	Self-confidence	243.190	7.522	0.007	0.043

Table 4: The variance analysis of the comparison of risk-taking, excitement seeking and quarrelsomeness in injured and uninjured athletes

	Variable source	Variance	F.coefficient	Meaningfulness (s)	Difference
Group membership of	Risk-taking	392.606	27.299	0.0001	0.141
Injured and uninjured	Excitement seeking	288.685	26.324	0.0001	0.136
Athletes	Quarrelsomeness	91.989	5.643	0.019	0.033

injuries were conducted by a number of physical education and psychology experts. The statistical method of variance analysis was used to determine the difference between the injured and uninjured athletes and discriminant analysis to predict injury of the athletes [14].

## RESULTS AND DISCUSSION

The Table 2 Shows Anthropometric Characteristics of the Athletes.

As it is shown in Table 3, there is a meaningful difference between injured and uninjured athletes in the average cognitive anxiety, somatic anxiety and self-confidence ( $P < 0.001$ ).

Table 4 shows that there is a meaningful difference between injured and uninjured athletes in risk-taking, excitement seeking and quarrelsomeness variables

As a whole, the results of this study show that there is a meaningful difference among the psychological features of the injured and uninjured athletes. In fact, these results show that these psychological factors may indeed be related to the injuries of the athletes.

The data were analyzed with discriminant analysis and after determining the cut point and carrying out necessary calculations, the following formula was produced and the distinction score between injured and uninjured athletes was found.  $Z'y = 0.075$  Total score = 5.877 Total score = 83.29.

The discriminant analysis shows that the athletes who scored more than 83.29 were more likely to become injured in the future.

## CONCLUSION

Although earlier studies on stress and injury concluded that there is a direct relationship between stress and injury, however, latest studies have illuminated the fact that such a relationship is complex with numerable variables which can affect the outcome. In the last decade, identifying athletes who are at risk of being injured has been based on psychological factors (for example those athletes with lower social security and higher stress). Researchers believe that it is possible to identify those athletes who are at risk of being injured, using personal features and psychological factors and take appropriate measures in order to prevent injuries. But the scientific knowledge in this regard is still limited and studies have not yet been successful in uncovering hidden mechanisms behind the relationship between psychological factors and injury.

Personal features and sensational seeking (excitement seeking) variables are known to be predictors of athletic

injuries in regard to personality and positive mental states. Positive mental states, the ability to experience positive states such as focusing, conversation with other and feeling comfortable, are related to injury. Williams *et al.* (1993) demonstrated that those athletes who are able to experience more positive mental states are less exposed to the risk of being injured [1].

As a whole, the results of this study show a difference between psychological features of injured and uninjured athletes, in the sense that psychological

features chosen for this study can be related to the injury of the athletes. When the total score of athletes was calculated, there was a significant difference between the injured and uninjured athletes. Next, by using discriminant analysis method, the formula for predicting those athletes who are more at risk of being injured, was produced. Andersen and Williams (1988 and 1993) hypothesized that a trenchant personality can predict some aspects of athletic situation such as being less threatened or combativeness which leads to lower stress and fewer injuries [8]. Other behaviors like competitive anxiety can be used to predict the athlete's proneness to higher stresses in competitive situations which may increase the risk of injury. The results of this study indicated a meaningful difference between the injured and uninjured athletes in the personal variables of risk-taking, excitement seeking and quarrelsomeness ( $P < 0.01$ ). From these results, it can be deduced that injured athletes have a risk-taking and excitement seeking morale and do not fear to risk. That may be the reason why they put themselves more in risky situations which may lead to injury as a consequence. In fact, these people like to lead a risky life and are after victory regardless of possible dangers which may have dire consequences for them. Therefore, ways to prevent injury and stress must be identified and necessary actions must be taken. It is worth noting that closer studies must be done on this issue. By taking into account that the risk of injury always exists, regardless of facilities and situations and that injury may have dire psychological consequences for the athlete, it is suggested that by using stress-management methods and by controlling psychological factors of the athlete, injuries to some extent be predicted and reduced. This will also increase the performance.

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