



ORIGINAL ARTICLE

Psychological analysis of injuries in a first category softball national championship in Cuba

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Abstract

Introduction: the systematic analysis of the relationships between relevant psychological variables for sports performance and injuries is essential to contribute to their prevention in specific sports.

Material and methods: a descriptive-correlational and cross-sectional study was carried out in the first category women's national softball championship in Cuba. 88 athletes participated with an average chronological age of 22.91 ($SD=6.13$) and a sports experience of 10.83 years ($SD=4.92$). A specific questionnaire, the Competitive Sport Anxiety Inventory and the Psychological Inventory of Sport Execution was applied. Descriptive statistics and Kendall's Tau_b nonparametric correlation coefficient was used for data analysis.

Results: A high injury load was verified with a low perception of the role of psychological factors in its etiology, as well as a notable occurrence of new injuries with negative emotional repercussions. Negative correlations of self-confidence, negative coping control, visual-imaginative control, positive coping control, and attitude control with history of injuries were obtained. The high anxiety showed significant relationships with previous injuries and new injuries during the analyzed competition.

Conclusions: the findings are especially congruent with previous results in elite softball players, although new and greater relationships between variables were determined. All this means that stimulating psychological skills to control anxiety in competition could contribute to the prevention of injuries. However, longitudinal analyzes are required to confirm the predictive role of these variables before proposing psychological interventions in this regard.

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Introduction

Scientific findings have led to a consensus that athletes who experience a lot of stress in life and have poor coping skills may be at increased risk of injury. Although up to now it has not been possible to predict injuries reliably by analyzing only psychological factors, the relationship between these and the risk of injury in certain subpopulations has been conclusively confirmed. Variables such as anxiety, perfectionism, coping resources, stress due to life events, risk behaviors, moods and self-esteem constitute some of the most important psychological factors.¹

According to Herring et al.,¹ in many cases the practice of sport serves as a primary coping mechanism and an outlet to deal with psychological problems, it can also be an important component of the subjects' own identity. In these athletes, an injury can trigger more intense emotional responses, constituting a major life event that affects cognition, emotions, and behavior. Emotional responses can be adaptive or maladaptive, and among the most common and relevant are anger, denial, sadness, fear, grief, feelings of isolation, irritability, lack of motivation, and frustration.

The analysis of psychological factors related to injuries has a notable significance for their prevention, and it is essential that the medical team recognize that these can play a role as a history of sports injuries. In addition, it must be considered that even when emotional responses are often resolved, they can also become problematic, affecting treatment and rehabilitation.¹

Although the role of psychological processes in sports injuries is recognized in the scientific field,¹⁻³ this knowledge has not been fully introduced into the professional practice of doctors, psychologists, rehabilitators, coaches, and athletes.⁴ The inconsistency between theory and practice may be conditioned by insufficient scientific research in this field of study, because although it reached high levels of productivity in the eighties of the last twentieth century, after a plateau in the nineties there was a significant decline,^{5,6} not allowing to solve the theoretical–methodological insufficiencies in the psychological study of injuries. All this maintains the need for new findings that allow systematizing the knowledge accumulated since the update of the Stress and Injury model.⁷

Even though sports psychologists in Cuba have tried to solve the psychological problems derived from injuries,⁸ the application of this knowledge in psychological preparation plans and in the prevention, treatment and rehabilitation of injuries is still insufficient.⁹ However, in recent years research has been carried out in team sports with high-performance athletes who compete at the highest national and international level.^{10,11} These studies have contemplated the analysis of anxiety and psychological variables of sports performance, the latter's understood as fundamental mental abilities to achieve a high level of performance in competitions.¹²⁻¹⁵

The findings obtained in previous studies denote a low perception of the influence of psychological factors on the

occurrence of injuries in the athletes analyzed, and indicate that the relationships between these psychological variables and injuries have specific features in each sport, although it can be affirmed that, in a general sense, not all psychological skills are related to the occurrence, number of injuries suffered, severity and context where they occur.^{11,16} These investigations have verified that high levels of anxiety and low coping resources configure the greatest risk of injury, allowing the identification of a dialectical relationship between both groups of variables.⁹

The present research was carried out as a continuation of the study of the relationships between psychological variables and injuries in elite female softball players,¹⁷ in order to obtain generalizable findings to this population of high-performance Cuban athletes. The first national women's softball championship after the COVID-19 pandemic was selected as the context of the study, with the aim of determining the relationship between psychological variables with injury history and new injuries occurred in the competition.

Material and methods

A correlational and cross-sectional study was carried out in the first category women's national softball competition in Cuba, held at the beginning of 2022 in the province of Villa Clara. The six teams from the provinces with the greatest development of softball participated in the competition, with 15 athletes each. 100% of the athletes from the teams were studied, except for the one from the Villa Clara province, where 87% were studied because two had been diagnosed positive for COVID-19 at the time of the study. A total of 88 female softball players participated with a chronological age between 12 and 40 years ($M=22.91$; $SD=6.13$) and a sports experience between 2 and 26 years ($M=10.83$; $SD=4.92$). 18.2% of the participants were part of the national preselection for the X Women's Pan American Softball Championship in Guatemala 2022.

An ad-hoc questionnaire was applied to obtain sociodemographic and sports data, injury history, perception of the causes of past injuries, injuries sustained up to the time of evaluation, and the emotional state before them. The instrument combines the use of closed and open questions.

The Competitive Sport Anxiety Inventory,¹⁸ in its Spanish version,¹⁹ was used to assess anxiety in competition. The instrument is made up of 27 items distributed into three subscales that measure cognitive and somatic anxiety and self-confidence with four Likert-type response options (1= Not at all; 2= A little; 3= Moderately; 4= A lot). A Cronbach's Alpha coefficient of 0.73 was obtained for the cognitive anxiety factor, 0.81 for somatic anxiety and 0.87 for self-confidence. The total score achieved by each athlete was considered, and according to the determination of quartiles, the state of anxiety of the athletes was classified as high (>94), medium (94–86) and low (<86).

To evaluate the psychological variables related to sports performance, the Psychological Inventory of Sport Execution

was used.¹² The instrument is made up of 42 items grouped into seven Likert-type scales (from 1 = Almost Never to 5 = Almost Always). A Cronbach's Alpha of 0.70 was obtained for self-confidence, 0.73 for negative coping control, 0.71 for attention control, 0.65 for visual-imaginative control, 0.69 for motivational level, 0.70 control of positive coping and 0.73 for attitudinal control. By obtaining quartiles, the variables were discretized into high, medium and low so that self-confidence (<25= low; 25-27= medium; >27= high); negative coping control (<19= low; 19-22= medium; >22= high); attention control (<20= low; 20-23= medium; >23= high); visuo-imaginative control (<23= low; 23-26= medium; >26= high); motivational level (<24= low; 24-26= medium; >26= high); positive coping control (<25= low; 25-27= medium; >27= high) and attitude control (<25= low; 25-28= medium; >28= high).

The application of the instruments was carried out during the first week of the competition, in the field and with optimal conditions. They were administered to the members of the two teams that would play to second hour in the same sports facility before starting the preparation prior to the game and with enough time.

Approval of the research was obtained through the technical conference prior to the start of the competition, which was made up of the national commissioner, the methodologists, technical directors of the participating teams and the referees. The informed consent of all the athletes was obtained and the ethical standards of the scientific research contained in the Declaration of Helsinki were followed. The study design was previously endorsed by the Scientific Councils of the Faculty of Physical Culture of the Central University "Marta Abreu" of Las Villas and of the Provincial Center for Sports Medicine of Villa Clara, as well as for the Research Ethics Committee of this last institution.

Empirical distribution of frequencies was used to describe the history of injuries of the athletes, the perception of their causes, the occurrence of new injuries in the competitive context analyzed and the psychological state triggered by them. The distribution of anxiety and psychological skills in the population was also described. Descriptive statistics such as the mean, deviation, skewness, and kurtosis were applied, also using Shapiro-Wilk to determine the

Variables		N	%
History of injury	Has been injured	63	71.6
	Has not been injured	25	28.4
Number of injuries	More than two injuries	15	23.8
	Two injuries	19	30.2
	One injury	29	46.0
Increased severity of injury	Very serious	2	3.2
	Serious	1	1.6
	Moderate	29	46.0
	Minor injury	31	49.2
Context of the injury	Training	29	46.0
	Competing	34	54.0

compliance or not of normality of the variables. The Kendall Tau b non-parametric correlation coefficient was used to determine the relationship between the psychological variables with the history of injuries and new injuries in competition. Jamovi Software (version 1.8 for Windows) was used for statistical analysis.^{20,21}

Results

Table 1 and Fig. 1 show that most of the softball players have suffered injuries in their sports career, although with a low frequency of repetition and less severity, which have occurred more during competitions. Insufficient training, technical problems and poor warm-up are the perceived factors with the greatest influence on the occurrence of past injuries.

Table 2 and Fig. 2 show that at the time of the psychological evaluation the greatest number of injuries had occurred, with frustration, worry and anxiety predominating. In addition, close to 40% of the athletes were injured, although there is a low tendency to reiteration.

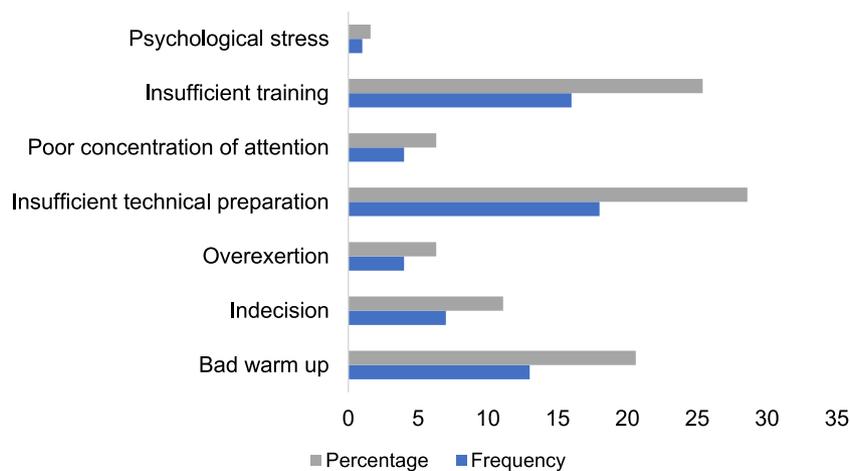


Fig. 1 Perception of the cause of previous injuries.

Table 2 New injuries occurred in the competition.

		Injured at the time of psychological evaluation	Injured after psychological evaluation	Injured in competition	Number of injuries		
					1	2	>2
N	21		9	30	27	2	1
%	23.9		10.2	34.1	90	6.7	3.3

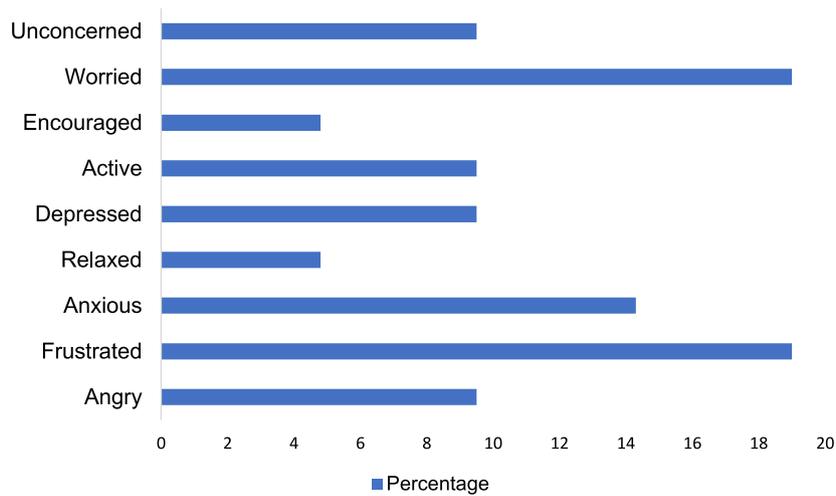


Fig. 2 Emotional reaction of athletes injured in competition.

Table 3 shows a marked tendency to present high levels of anxiety in the competition, while the control of negative coping and attention obtain lower average scores than the rest of the psychological skills. High levels of self-confidence, visual-imaginative control, motivation, positive coping control, and attitude predominate. The data does not have a normal distribution.

Table 4 shows that the athletes with less negative coping control have suffered previous injuries, in greater quantity, severity and during competitions. Less visuo-imaginative control is related to having suffered more injuries and during competitions. The number of injuries is also related to lower self-confidence, positive coping, and attitude control, while low attitude control is also related to more serious injuries. On the other hand, high anxiety in competition is related to the occurrence of injuries in that context. It was determined that higher anxiety and lower negative coping control are related to the early occurrence of injuries in competition. However, a higher level of anxiety in the competition is related to the injury regardless of the moment of the competition in which they occur.

Discussion

Among the results found, the low perception of the role of psychological processes in the occurrence of injuries stands out, coinciding with several studies.²²⁻²⁵ In addition, the negative emotional repercussion of the injury was verified^{26,27} and a tendency of the athletes to present high levels of anxiety in the competition, average levels of negative coping control and attention control. It was also found

that the presence of injuries at the time the psychological evaluation was carried out was related to high anxiety and low control of negative coping.

The results obtained follow the direction of the approaches of the Stress and Injury model of Williams and Andersen,⁷ which maintains that injuries occur due to a combination of psychosocial factors and the cognitive appraisal of a stressful situation. Athletes with high anxiety in competition, a history of stressful experiences, and low coping resources experience increased physiological arousal and impaired attention when in a stressful situation. Consequently, these athletes are at greater risk of injury compared to others.²⁸

Anxiety shows a significant role in this study. The association between trait anxiety and state anxiety in competition with the injuries has been confirmed in numerous research's, being verified as an important predictor of injuries.²⁹⁻³⁴ The positive relationship with the number of injuries suffered, and their greater severity, has also been confirmed.^{30,34-41} Anxiety leads to perceive competition situations as threatening, and to respond to them with states of anxiety of disproportionate intensity and magnitude with respect to the demand,⁴² for this reason it is debilitating on sports performance, because depending on the nature of the task involved it hampers most forms of athletic performance, and is especially disruptive to fine motor skills.⁴³

Closely related to anxiety, another fundamental variable in sports performance is negative coping control. In the present study, the athletes with less coping control suffered more previous injuries, in a greater quantity, severity, and during the competition. These results also follow the line of previous research. A much higher average number of injuries

Table 3 Distribution of psychological variables in the population and normality test.

Variables		N	%	M	SD	Asymmetry	Kurtosis	Shapiro-Wilk W	p.
Anxiety state in competition	Low level	2	2.3	2.81	.451	-2.317	4.890	.471	<.001
	Middle Level	13	14.8						
	High level	73	83.0						
Self-confidence	Low level	4	4.5	2.66	.565	-1.442	1.159	.617	<.001
	Middle Level	22	25.0						
	High level	62	70.5						
Negative coping control	Low level	22	25.0	2.01	.719	-.017	-1.034	.808	<.001
	Middle Level	43	48.9						
	High level	23	26.1						
Attention control	Low level	21	23.9	2.10	.759	-.174	-1.230	.804	<.001
	Middle Level	37	42.0						
	High level	30	34.1						
Visuo-imaginative control	Low level	5	5.7	2.52	.606	-.881	-.193	.703	<.001
	Middle Level	32	36.4						
	High level	51	58.0						
Motivational level	Low level	4	4.5	2.56	.584	-.933	-.096	.687	<.001
	Middle Level	31	35.2						
	High level	53	60.2						
Positive coping control	Low level	3	3.4	2.67	.541	-1.390	1.032	.614	<.001
	Middle Level	23	26.1						
	High level	62	70.5						
Attitude control	Low level	3	3.4	2.70	.529	-1.606	1.740	.583	<.001
	Middle Level	20	22.7						
	High level	65	73.9						

Note. $p \leq 0.05$ (two-tailed); N= number; M= Mean; SD= Standard Deviation.

has been confirmed among those who score low in negative coping control, and higher scores on the scale of athletes without injury compared to injured athletes.³⁶ This inverse relationship has also been confirmed in different studies, in that less negative coping control implies a higher incidence of injuries.^{10,22,30}

Negative coping control means both cognitive and behavioral control of the activities that the individual initiates, or his ability to face the continuous adverse situations that arise.^{12,44} It is linked to the ability to perceive difficult situations as a challenge instead of a threat or problem. High scores mean a greater ability to control negative emotions

Table 4 Relationship between psychological variables, history of injuries and injuries in the current competition.

Variables		Injury history				New injuries			
		HSI	NI	ISI	CI	ITPE	IAPE	IC	NI
Anxiety state in competition	Kendall's Tau_b	.141	.063	-.069	.224*	.297**	.304**	.304**	.194
Self-confidence	Kendall's Tau_b	.192	-.214*	-.168	-.142	.079	-.112	.129	.230
Negative coping control	Kendall's Tau_b	-.290**	-.234**	-.251**	-.239*	-.240*	.124	-.086	.159
Attention control	Kendall's Tau_b	.107	-.151	.017	-.130	-.166	.015	.031	.038
Visuo-imaginative control	Kendall's Tau_b	-.238*	-.264**	-.191	-.223*	-.123	.042	-.021	.021
Motivational level	Kendall's Tau_b	.020	-.025	-.060	.040	-.026	.012	.034	.014
Positive coping control	Kendall's Tau_b	.191	-.270**	-.179	-.139	-.007	.121	.156	.168
Attitude control	Kendall's Tau_b	.204	-.293**	-.256**	-.140	-.141	.068	.125	-.022

Note. * $p \leq 0.05$; ** $p \leq 0.01$ (two-tailed); HSI= History of injury; NI= Number of injuries; ISI= Increased severity of injury; CI= Context of the injury; ITPE= Injured at the time of psychological evaluation; IAPE= Injured after psychological evaluation; IC= Injured in competition; NI= Number of injuries.

such as anxiety, fear or frustration, and their control is essential for sporting success, as it is convenient to remain calm, relaxed and focused to keep negative energy to a minimum.¹³ The presence and use of coping strategies, more than adaptive and functional aspects, have been related to a decrease in the frequency of injuries.⁴⁵ In addition, coping resources contribute positively to the decision-making process,⁴⁶ a capacity that is related to the decrease in the occurrence of injuries.⁴⁷

Regarding the attention control scale, it implies better control of concentration and ability to attend to the great variety of stimuli and situations that arise, maintaining a state of alertness, focused on outstanding events and ignoring irrelevant ones.⁴⁴ Previous studies confirm that less attentional control is related to more previous injuries and greater severity of injuries.⁴⁸ As already mentioned, the Stress and Injury model suggest that injuries may be caused by attention deficit, caused by increased distraction and peripheral narrowing.⁷ The main studies that have analyzed the relationship between attention and injuries have confirmed the important role of stress, specifically, high life stress together with low social support leads to greater peripheral narrowing,⁴⁹ and this narrowing mediated 8.1% of the relationship between negative life events and injuries.⁴⁵

Another interesting result in the study is the negative relationship between self-confidence and number of injuries. Self-confidence has been shown to be a significant predictor of injuries,^{30,31,34,50,51} and lower levels of self-confidence have been associated with a greater number of injuries.^{52,53} Greater self-confidence can be considered a positive variable against the risk of injury, since the athlete's positive evaluation of his own abilities can lead to adequate technical and tactical achievements adapted to the sporting situation.⁵³ It has even been suggested that self-confidence can be considered a resilience factor that can protect against the debilitating effects of anxiety.⁵⁴

With the realization of the study, the findings obtained in a similar investigation carried out in the national pre-selection of women's softball in Cuba are confirmed.¹⁷ The results of both studies coincide when determining that less self-confidence, negative and positive coping control are related to a greater number of injuries suffered, as well as less attitude control is related to more severe injuries. In addition, they agree that less negative coping control is related to the occurrence of injuries in competitive situations.

In the present research, a broader correlation matrix was obtained between psychological variables and injuries, highlighting the role of anxiety, negative coping control, and visuo-imaginative control. Although the new findings may be due to the expansion of the study participants, without a doubt they show the consistency of the knowledge acquired about the relationships between psychological variables associated with sports performance and injuries in high-performance Cuban softball players.

Identifying the psychological factors that contribute to an athlete's increased vulnerability to injury should help all sports science professionals. This information will contribute both to the detection of athletes with a higher risk of injury, and to the design of strategies and programs for the control and potentiation of the variables.^{37,55} Certain studies have shown that psychological interventions for the prevention and reduction of injuries are effective.⁵⁶ Techniques such as

goal setting, positive self-talk, imagery, relaxation, mindfulness, and cognitive-behavioral biofeedback contribute positively to injury prevention, physical recovery from injury, and improved levels of self-confidence, and decreased cognitive and physical anxiety.⁵⁷

The replication of this study in several national championships is considered necessary with the aim of determining psychological predictors of sports injuries in this sport, which have not been found in the scientific literature to date. This would allow the systematization of the knowledge obtained to guide the primary and secondary psychological prevention of injuries in these athletes, integrating into current preventive strategies to form a true comprehensive care, moving towards the biopsychosocial model in the professional practice of medical doctors, psychologists, and physiotherapists.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Ethical disclosures

Protection of human and animal subjects

The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data

The authors declare that no patient data appear in this article.

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