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ORIGINAL ARTICLE

Pain Catastrophizing Related to Psychological Inflexibility, Self-Reported Injuries and Perfectionism in Soccer Referees

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Abstract

Purpose This study aimed to analyze how psychological flexibility, perfectionism, and reported injuries are related to pain catastrophizing in soccer referees.

Methods Design: This was a descriptive cross-sectional study. Setting: Data were collected online from 199 soccer referees. Pain catastrophizing was assessed with the Pain Catastrophizing Scale, psychological inflexibility with the Acceptance and Action Questionnaire, and perfectionism with the Frost Multidimensional Perfectionism Scale. Data were also gathered on other injury-related variables.

Results Referees with medium–high scores on psychological inflexibility showed greater pain catastrophizing ($t = 5.322$, $P < 0.001$), rumination ($t = 4.004$, $P < 0.001$), helplessness ($t = 5.023$, $P < 0.001$) and magnification ($t = 5.590$, $P < 0.001$) than those with low scores. Psychological inflexibility emerged as a significant predictor of catastrophizing ($\beta = 0.313$, $P = 0.006$). A slight relationship was found between perfectionism and catastrophizing. For all subscales, the referees who reported mild–moderate injuries in the last three seasons showed greater pain catastrophizing, while those with severe injuries obtained higher scores on all dimensions of catastrophizing except magnification. Finally, those who reported severe injuries only obtained higher scores on rumination and helplessness.

Conclusion These results provide a better understanding of the variables that influence pain perception. Possible interventions are suggested based on the observation that greater psychological flexibility was associated with lower pain catastrophizing, with the specific features of the latter depending on the presence and severity of the injury.

Keywords Football · Referee · Perfectionism · Pain catastrophizing · Injuries · Psychological flexibility

Introduction

The activity of referees, both professional and amateur, is associated with a number of problems that, if not properly managed, can hinder the development of professional and sports careers. Among other risk behaviors and problem situations are injuries and associated pain.

There are few and relatively recent studies on sports injuries in referees. Data on injuries in football referees show an incidence of 20.8 injuries per 1000 match hours [5]. The relative risk of injury during the match is 4.3 times higher than that during training [25, 64]. The observed prevalence varies from 22.5% in referees of all categories [6] to 52% in professional referees [33].

Pain frequently occurs in association with injuries [25]. Almost 90% of referees had pain or painful discomfort related to musculoskeletal system [5]; in the past 12 months, 92% of main referees and 83% of assistant referees reported some type of pain complaints related to their refereeing activities. Hae-Young and Young-In [21] stated that 87.5% of main referees and 89.3% of assistant referees reported musculoskeletal pain. The same research showed that, in main referees, 43.8% had hamstring pain, 31.3% with calf muscle pain and 25% with lower back pain. In the case of assistant referees, 39.3% felt pain in their knees, 32.1% in their adductors, 28.5% in their calf muscles.

This list of problems, which is by no means exhaustive, draws attention to the need for referees to develop effective skills, competencies and coping strategies in the face of

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such situations. The ultimate goal should be to have effective measures that enable referees to adaptively cope with the challenges they face in their professional lives, considering the multiple sources of stressful stimuli they are exposed to [60].

The International Association for the Study of Pain's definition of pain [43] has succeeded in incorporating the subjectivity of pain, clinical development, and intervention [10]. Thus, pain is understood as a personal experience influenced by biological, psychological and social factors, and people learn the concept of pain through life experiences [43]. In this context, pain catastrophizing becomes a relevant factor. Pain catastrophizing is a psychological construct characterized by a set of excessively negative emotional and cognitive processes in response to pain, whether real or anticipated [42, 48]. The person focuses inordinately on the painful sensation (rumination), exaggerates the damage (magnification) and perceives an inability to control the pain (helplessness) [55, 62]. The response to pain may be mediated by catastrophizing [15], which could depend on the type of pain experienced [48]. There is also evidence of an association between pain catastrophism and increased sensitivity, intensity, and disability derived from emotional states associated with anxiety and depression [40].

Pain catastrophizing is one of the most significant treatable psychological factors involved in pain perception [55]. It is associated with poorer pain-related coping and an avoidance of those activities that an individual believes may exacerbate their pain, leading to more frequent rumination, increased pain sensitivity, and increased disability [42]. Reports in the literature suggest that catastrophizing is related to longer periods of rehabilitation after surgical interventions [36]. It is also regarded as a risk factor for increased opioid prescription after surgery [39], lower adherence to treatments [32], the use of maladaptive coping strategies [55], and the development of chronic pain and poor treatment outcomes [16].

From a functional contextual approach, such as that adopted by Acceptance and Commitment Therapy (ACT), it has been suggested that pain intensity is a key contextual variable to consider in existing models of pain and associated interventions [56]. Within this approach, the psychological flexibility model has been proposed to understand avoidance and persistence patterns, which can be effective in reducing pain in the short term [28]. Psychological flexibility refers to the possibility of fully embracing unpleasant private events in the present, without attempting to modify them. Rather, the individual is encouraged to let go of the struggle against discomfort and fully feel, engage with, and view these events for what they are as a method of serving one's own values [22, 23]. The psychological flexibility model promotes adaptive coping through the six components of acceptance, cognitive defusion, being present, self-as-context, being in contact with one's values, and committed action [8, 22, 63].

Observational studies have demonstrated how psychological flexibility components specifically help to predict patient improvement during ACT-based chronic pain treatment [54, 56, 57]. While some studies have reported a modest negative relationship between pain acceptance and pain catastrophizing [24], others have found that individuals who show greater pain acceptance appear to catastrophize less about their pain [61, 63]. Acceptance of pain may also reflect a greater level of psychological flexibility that allows for broader and more adaptive responses in times of increased pain [57, 62].

The opposite of psychological flexibility is psychological inflexibility. The latter refers to the rigid dominance of certain unhelpful private events over effective actions, long-term goals, useful thoughts, and emotions [7]. In the sporting arena, athletes who exhibit poor psychological flexibility may show fewer effective behaviors and are less likely to achieve optimal performance [31]. Furthermore, psychological rigidity is associated with more symptoms of distress, including anxiety and depression [46], which has also been observed in various athletes [9, 65]. Therefore, it is feasible to suppose that psychological inflexibility is associated with increased distress, poor performance, and pain catastrophizing in athletes.

In this context, perfectionism has been analyzed as a highly stressful cognitive-personal vulnerability factor [51] that is frequently observed in pain patients [19]. Perfectionism is characterized by cognitive rigidity and behavioral inflexibility [12], with the affected individual presenting a lack of strategies related to the specific situation while using the same strategies regardless of the context [11]. In addition, perfectionism has been linked to stress, poor mental health, and the frequency/intensity of pain and fatigue [30]. More specifically, studies have shown how perfectionism is associated with reduced optimal functioning and health [30] mediated by processes of behavioral disengagement, denial, and self-blame [42] or experiential avoidance [4].

The presence of a relationship between psychological flexibility, perfectionism, and pain catastrophism would have important implications for injury and rehabilitation processes. However, there are few studies in sports context. Therefore, a thorough analysis of this relationship in sports context is necessary. In this context, it has been found that different sports are associated with specific characteristics related to pain perception, modulation, and thought processes [2]. For example, athletes with catastrophic thoughts are more likely to experience higher pain levels and a greater cardiovascular response to a painful stimulus [26]. However, it is also worth noting that other studies with athletes have found no significant correlations between pain catastrophizing scores and pain [50].

Concerning perfectionism, while in athletes this can act as a motivational force that enhances performance and achievement, it can also have maladaptive consequences concerning injury and pain. Factors affecting pain, such as pain catastrophizing and fear of pain, may be enhanced by perfectionism, and perfectionism may contribute to the somatization of psychological problems or chronic stress [38]. It has been suggested that an athletic identity characterized by high perfectionism and negative affective is associated with higher levels of fear, avoidance, and catastrophizing of pain, which may contribute to pain-related disability [38].

Many of the studies conducted on pain catastrophizing and associated issues in sport have primarily focused on athletes. However, despite the demands and responsibilities placed on sports referees, it is a largely understudied group. This is particularly surprising if we consider the sporting injuries and psychological factors that affect them [1, 41] or their physiological characteristics [53]. Thus, the present study sought to expand the available knowledge on pain catastrophizing and related constructs in a population of soccer referees. The specific aim was to analyze how psychological flexibility and perfectionism interact with pain catastrophizing and the self-reported injuries suffered by this group. It was hypothesized that psychological flexibility will be associated with lower pain catastrophizing, while high perfectionism scores will be related to higher pain catastrophizing. Similarly, it was expected that pain catastrophizing scores will be positively related to the number of self-reported injuries. In contrast, referees with high psychological flexibility will report fewer injuries, while those with high perfectionism scores will report a greater number of injuries.

Method

Sample

This was a descriptive cross-sectional study. The inclusion criteria were to be at least 18 years old, to hold membership of the Royal Spanish Football Federation for at least three years, be currently active (although they may have been temporarily unable to referee due to injury), and to give written informed consent. A total of 206 referees responded to the request for participation. Two participants were excluded because they did not meet the age criterion, four because they had been qualified for less than three years, and one due to current inactivity. The final sample consisted of 199 referees (91.96%, male, $M_{age} = 28.24$, $SD = 8.467$; Min = 18 and Max = 58). Of the total sample, 146 (73.4%) were amateurs, and 53 (26.6%) were classified as semi-professional or professional.

Instruments

Data were collected on sociodemographic variables, including year of birth, gender and education level (no education, basic education, high school education, and university studies). In addition, information was gathered on pain intensity experienced in the last three–four months as a result of refereeing activity, along with the presence and severity of injuries in the last three seasons. Following the procedure used by Olmedilla-Zafra et al. [34], a question was asked, *how many injuries have you had in the last three seasons according to severity*? The response options were: Mild Injuries (required treatment and resulted in at least one day of restricted sporting activity); Moderate Injuries (required treatment and resulted in six days of restricted participation in training, sporting activity, or competition); Serious Injuries (required one to four months of sick leave); and Very Serious Injuries (involved four months of sick leave and required hospitalization, surgery, or continued rehabilitation to avoid deterioration).

Pain catastrophizing was assessed using the Pain Catastrophizing Scale (PCS) [14, 54], in its Spanish version validated in athletes by Olmedilla-Zafra et al. [35]. The PCS is a 13-item scale in which participants take their past painful experiences as a reference to indicate the degree to which they have experienced about the thoughts or feelings described in a series of statements (e.g., *The pain is very bad, and I don't think it will ever get better*). The participants respond on a Likert scale ranging from 0 (never) to 4 (always). The PCS yields a total score and three sub-scale scores assessing (a) Rumination: the constant worry and inability to inhibit pain-related thoughts; (b) Helplessness: the inability to cope with painful situations; and (c) Magnification: exaggeration of the unpleasantness of pain situations and expectations of negative consequences. The total score ranges between 13 and 62 points, with low scores indicating low catastrophism and high scores indicating high catastrophism. In this study, the internal consistency (assessed by Cronbach's alpha) was good for the total score ($\alpha = 0.932$) and for the dimensions of Rumination ($\alpha = 0.858$), Helplessness ($\alpha = 0.882$), and Magnification ($\alpha = 0.774$).

The Spanish adaptation of Acceptance and Action Questionnaire (AAQ-II) [7] by Ruiz et al. [47] was used to measure psychological flexibility–inflexibility. This is a 7-item questionnaire concerned with how the individual relates to their internal events (e.g., thoughts, feelings, emotions and memories) and to what extent they perceive these events as barriers to leading the life they wish. Participants respond on a Likert-type scale (1: never true, to 7: always true) to indicate the extent of their belief in the statements (e.g., *Worries get in the way of my success*). Low scores on the questionnaire indicate greater psychological flexibility, while high scores indicate greater inflexibility. The test used

in this study has shown high internal consistency (Cronbach's $\alpha = 0.903$). To determine the relationship between the level of flexibility and the rest of the variables, participants were categorized according to tercile distributions of the total AAQ-II score [44]. Thus, three levels were established: *High Inflexibility* (≥ 34 points), *Medium Inflexibility* (21–33 points), and *Low Inflexibility* (≤ 20 points).

Perfectionism was assessed using the Frost Multidimensional Perfectionism Scale (FMPS) [18], in its Spanish version developed by Gelabert et al. [20]. The FMPS is a 35-item self-report instrument where participants respond on a Likert-type scale (1—strongly disagree, to 5—strongly agree) to a set of statements (e.g., *If I fail partly, it is as bad as being a complete failure)*. Good internal consistency was found for the total score ($\alpha = 0.922$) and the following dimensions of perfectionism: Concern over Mistakes (CM, $\alpha = 0.903$), reflecting negative reactions to errors; Doubts about Actions (DA, $\alpha = 0.776$), reflecting the tendency to doubt one's ability; Personal Standards (PS, $\alpha = 0.752$), setting high standards for evaluation; Parental Expectations (PE, $\alpha = 0.813$), the belief that one's parents set very high standards; Parental Criticism (PC, $\alpha = 0.810$), the belief that one's parents were overly critical; and Organization (O, $\alpha = 0.919$), the importance attached to orderliness.

Procedure

All procedures were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Declaration of Helsinki 1975, revised in 2013. The study was approved by the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Internal Code: 2159-N-21. Date of approval: 14/12/2021; Act: 11/21). All participants completed the informed consent form.

Data collection was conducted online from December 15, 2021, to February 06, 2022. The Referees Committee of the Royal Spanish Football Federation and all its Territorial Committees were contacted, informing them of the study and requesting their collaboration by disseminating the link to the online questionnaires among the active referees in the federation.

Data Analysis

Descriptive analyses (frequencies, percentages, means, and standard deviation) were conducted on the main study variables. Quantitative variables were then compared using the Student's *t*-test for independent groups. Snedecor's F or ANOVAs were used to analyze more than two groups. For the Student's *t*-test, effect sizes were estimated using Cohen's *d* (where < 0.2 denotes a small effect size; around 0.5 a medium effect size, and > 0.8 a large effect size). In the case of qualitative variables, comparisons were made using the Chi-square test (χ^2). Associations between the variables were analyzed by Pearson correlations, and stepwise linear regression analysis was employed to determine the predictors of pain catastrophizing. All analyses were conducted using the SPSS statistical package (IBM version 20.0, SPSS Inc., Armonk, NY, USA), adopting a significance level of $P < 0.05$.

Results

The sample consisted of 199 referees, of whom 91.96% ($n = 183$) were men ($M_{age} = 28.41$, $SD = 8.674$) and 8.04% ($n = 16$) were women ($M_{age} = 26.25$, $SD = 5.373$). There were no differences between the two groups according to age ($t = 0.978$, gl = 197, $P = 0.329$). Concerning education level, 2.5% ($n = 5$) reported having a basic level, 44.2% ($n = 88$) a secondary education level, and 53.3% ($n = 106$) had completed university education.

In terms of refereeing activity, 23.6% ($n = 53$) reported refereeing in professional/semi-professional leagues and 73.4% ($n = 146$) in Amateur leagues. The participants had been qualified for a mean of 8.24 years ($SD = 5.228$; Min = 3, Max = 28). The Professional/Semi-professionals ($M = 10.32$, $SD = 4.961$) had been qualified for more years than the Amateurs ($M = 7.48$, $SD = 5.132$), a difference that was statistically significant ($t = 3.483$, $P = 0.001$). There were no age differences ($t = 0.368$, $P = 0.713$) between Professional/Semi-professional ($M_{age} = 28.60$, $SD = 5.963$) and Amateur ($M_{age} = 28.10$, $SD = 9.224$) referees.

Of the whole sample, 7.5% reported that they were currently injured (see Table 1), of which 73.3% stated that the injury was refereeing-related (refereeing, performing physical tests or training). When asked about the injured body area, 80% ($n = 12$) stated that the injury was in the feet/legs/knees; 3.31% ($n = 2$) in the waist/hips; and 6.7% ($n = 1$) in the head region. In addition, 52.8% of the participants stated that they had felt pain resulting from their refereeing activity in the last 3–4 months. Of these, 46% had felt pain in the feet/legs/knees; 3.5% in certain trunk areas; 2% in the waist/hips; 0.5% in the hands/elbows/arms; and 0.5% in the shoulders/neck.

Regarding pain intensity, when comparing the Professional/Semi-professionals ($M = 6.38$, $SD = 2.080$) and Amateurs ($M = 6.04$, $SD = 1.898$), no statistically significant group differences were observed ($t_{(df = 103)} = 0.789$, $P = 0.432$).

Table 2 shows the scores obtained from the referees on the various tests according to category. No differences were observed between the two groups in any of the tests or the corresponding subscales. However, there was a non-significant trend in which amateur referees assigned greater

Table 1 Pain and injury-related characteristics of the sample according to referee category (Professional/Semi-professional and Amateur), along with Chi-square values

Pain and injury characteristics	Referee category			$\chi^2_{(1,199)}$	P
	Professional Semi-professional 53 (26.6)	Amateur 146 (73.4)	Total 199		
I am currently injured				1.483	0.223
Yes	6 (11.3)	9 (6.2)	15 (7.5)		
No	47 (88.7)	137 (93.8)	184 (92.5)		
The injury relates to refereeing activity				0.511	0.475
Yes	5 (83.3)	6 (66.7)	11 (73.3)		
No	1 (16.7)	3 (33.3)	4 (26.7)		
Injury prevents me from refereeing				1.111	0.292
Yes	4 (66.7)	8 (88.9)	12 (80.0)		
No	2 (33.3)	1 (11.1)	3 (20.0)		
Injuries (last 3 seasons)				0.009	0.924
Yes	41 (77.4)	112 (76.7)	153 (76.9)		
No	12 (22.6)	34 (23.3)	46 (23.1)		
Minor injuries (last 3 seasons)				0.195	0.659
Yes	29 (54.7)	85 (58.2)	114 (57.3)		
No	24 (45.3)	61 (41.8)	85 (42.7)		
Moderate injuries (last 3 seasons)				0.014	0.907
Yes	23 (43.4)	62 (42.5)	85 (42.7)		
No	30 (56.5)	84 (57.5)	114 (57.3)		
Serious injuries (last 3 seasons)				0.033	0.855
Yes	13 (24.5)	34 (23.3)	47 (23.6)		
No	40 (75.5)	112 (76.7)	152 (76.4)		
Very serious injuries (last 3 seasons)				0.373	0.542
Yes	5 (9.4)	10 (6.8)	15 (7.5)		
No	48 (90.6)	136 (93.2)	184 (92.5)		
Pain related to refereeing (last 3–4 months)				0.398	0.528
Yes	26 (49.1)	79 (54.1)	105 (52.8)		
No	27 (50.9)	67 (45.9)	94 (47.2)		
Pain has prevented me from refereeing (last 3–4 months)				0.022	0.883
Yes	19 (35.8)	54 (37.0)	73 (36.7)		
No	34 (64.2)	92 (63.0)	126 (63.3)		

Number and percentage of cases [N (%)] for categorical variables

importance to the order and organization of what occurs during the course of a game or activity, as indicated in the subscale (O) of the perfectionism test.

Regarding the Psychological Flexibility test scores, 2.0% ($n=4$) of the referees obtained scores that indicate High Inflexibility, 19.6% ($n=39$) with Medium Inflexibility, and 78.4% ($n=156$) with Low Inflexibility (see Table 3). Thus, referees with scores denoting high Psychological Flexibility (Low Psychological Inflexibility) showed lower pain catastrophizing, as indicated in both their total score and the three subscales of the test (all with a large effect size, except in the case of rumination, which was medium).

Concerning the intensity of perceived pain related to refereeing activity during the last 3–4 months, no differences were observed between participants with High–Medium Inflexibility and those with Low Inflexibility. However, those who reported feeling pain showed higher scores on Psychological Inflexibility ($M=15.94$, $SD=6.975$) than those who did not ($M=13.19$, $SD=7.328$). This difference was significant ($t_{(df=197)}=2.712$, $P=0.007$) with a medium effect size ($d=0.4$). Similarly, the group that reported feeling pain obtained a higher total score in catastrophizing ($M=20.33$, $SD=9.415$) than those who did not ($M=12.96$, $SD=9.588$), a difference that reached significance ($t_{(df=197)}=5.469$, $P<0.001$) with a large effect size ($d=0.8$). These groups also differed on rumination ($t_{(df=197)}=5.555$, $P<0.001$), helplessness ($t_{(df=197)}=5.291$, $P<0.001$) and magnification ($t_{(df=197)}=3.557$, $P<0.001$) scores.

Table 2 Means and standard deviations of the dependent variable (Pain Catastrophizing, Psychological Inflexibility, Perfectionism) of the sample according to the referee category, and Student's *t* values

Variable	Referee category			$t_{(df=197)}$	*P*
	Professional Semi-professional 53 (26.6)	Amateur 146 (73.4)	Total 199		
Total pain Catastrophizing	16.79 (9.367)	16.87 (10.473	16.85 (10.167)	0.047	0.962
Rumination	6.43 (3.560)	6.28 (3.954)	6.32 (3.845)	0.248	0.805
Helplessness	6.45 (4.135)	6.55 (4.670)	6.52 (4.524)	0.131	0.896
Magnification	3.91 (2.677)	4.04 (2.813)	4.01 (2.772)	0.304	0.761
Total perfectionism	90.42 (20.217)	96.22 (21.463)	94.67 (21.244)	1.712	0.088
Personal standards (PS)	21.70 (5.086)	21.80 (5.290)	21.77 (5.224)	0.123	0.902
Parental expectations (PE)	10.91 (3.948)	12.22 (4.673)	11.87 (4.520)	1.823	0.070
Parental criticism (PCR)	7.21 (3.177)	8.25 (4.008)	7.97 (3.824)	1.702	0.090
Concern over mistakes (CM)	19.28 (7.492)	20.20 (8.041)	19.95 (7.890)	0.723	0.471
Organization (O)	22.04 (5.259)	23.69 (5.330)	23.25 (5.348)	1.942	0.054
Doubts about actions (DA)	9.28 (3.284)	10.06 (3.759)	9.85 (3.646)	1.334	0.184
Total psychological inflexibility	14.81 (6.685)	14.58 (7.476)	14.64 (7.258)	0.196	0.229
Categorized Psychological Inflexibility				$\chi^2_{(1,199)}=0.913$	0.339
High–medium (≥21 points)	9 (17.0)	34 (23.3)	43 (21.6)		
Low (≤20 points)	44 (83.0)	112 (76.7)	156 (78.4)		

Mean and standard deviation [M(SD)] for continuous variables. Number and percentage of cases [*N*(%)] for categorical variables

Table 3 Means and standard deviations for the Pain Catastrophizing Scale (PCS), according to the categorization of Psychological Inflexibility (Acceptance and Action Questionnaire; AAQ-II) and Student's *t* values

Variable	Psychological Inflexibility		$t_{(df=197)}$	*P*	Cohen's d
	High–medium 43 (21.6)	Low 156 (78.4)			
Pain intensity (*N=105*)	5.73 (1.564)	6.25 (2.041)	1.193	0.235	
Total pain catastrophizing	23.70 (8.526)	14.96 (9.785)	5.322	<0.001	0.95
Rumination	8.33 (3.584)	5.77 (3.740)	4.004	<0.001	0.69
Helplessness	9.42 (3.666)	5.72 (4.419)	5.023	<0.001	0.91
Magnification	5.95 (2.526)	3.47 (2.596)	5.590	<0.001	0.97

Mean and standard deviation [M(SD)] for continuous variables. Number and percentage of cases [*N*(%)] for categorical variables. *Low Inflexibility* (≤20 points in AAQ-II); *High–Medium Inflexibility* (≥21 points in AAQ-II)

Table 4 displays the responses given to the various measurement scales according to the reported injuries and severity during the last three seasons. It is clear that, compared with the non-injured referees, those who reported suffering from injuries obtained higher scores on pain catastrophizing, with a large effect size ($d=0.9$). These groups also showed differences in rumination ($d=0.9$) and helplessness ($d=0.9$) with large effect sizes, and a difference in magnification with a medium effect size ($d=0.7$).

Concerning the severity of the injuries, it was found that in the case of mild injuries, the effect size was medium for the total score on pain catastrophizing ($d=0.5$), rumination ($d=0.6$), helplessness ($d=0.5$) and magnification ($d=0.5$). For moderate injuries, the effect size remained moderate for the total score on pain catastrophizing ($d=0.6$), rumination ($d=0.5$), helplessness ($d=0.7$) and magnification ($d=0.5$).

For those who reported severe injuries, compared to those who did not, the effect size was reduced, showing a medium effect size for pain catastrophizing ($d=0.4$), rumination ($d=0.4$) and helplessness ($d=0.4$), with no differences in magnification. Finally, for those with very severe injuries, no differences were found in pain catastrophizing or the magnification subscale, while a medium effect size was found in rumination ($d=0.6$) and helplessness ($d=0.5$).

In addition, differences were only observed in the scores on psychological inflexibility for those who reported minor injuries (accounting for 57.3% of the sample), with a medium effect size ($d=0.4$).

Table 4 Means and standard deviations of the dependent variable (Pain Catastrophizing, Psychological Inflexibility, Perfectionism) of the sample according to the existence and severity of injuries in the last three seasons, and Student's *t* values

Variable	Injuries in the last 3 seasons				Severity of injuries in the last 3 seasons															
					Minor injuries				Moderate injuries				Serious injuries				Very serious injuries			
	Yes	No	*t*	*P*	Yes	No	*t*	*P*	Yes	No	*t*	*P*	Yes	No	*t*	*P*	Yes	No	*t*	*P*
PC	18.80 (9.66)	10.35 (9.13)	5.270	<0.001	19.05 (9.73)	13.89 (10.05)	3.649	<0.001	20.22 (9.00)	14.33 (10.29)	4.210	<0.001	19.98 (9.75)	15.88 (10.13)	2.445	0.015	21.20 (7.92)	16.49 (10.27)	1.732	0.085
R	7.04 (3.63)	3.93 (3.61)	5.095	<0.001	7.10 (3.65)	5.28 (3.88)	3.378	0.001	7.32 (3.29)	5.58 (4.07)	3.329	0.001	7.49 (3.41)	5.96 (3.91)	2.411	0.017	8.00 (2.56)	6.18 (3.90)	2.515	0.021
H	7.33 (4.43)	3.85 (3.78)	4.824	<0.001	7.41 (4.41)	5.33 (4.42)	3.292	0.001	8.13 (4.47)	5.32 (4.20)	4.536	<0.001	7.87 (4.64)	6.11 (4.42)	2.368	0.019	8.73 (4.28)	6.34 (4.51)	1.983	0.049
M	4.44 (2.74)	2.57 (2.38)	4.182	<0.001	4.54 (2.75)	3.28 (2.65)	3.252	0.001	4.78 (2.57)	3.43 (2.79)	3.485	0.001	4.62 (2.82)	3.82 (2.74)	1.741	0.083	4.47 (2.72)	3.97 (2.78)	0.670	0.504
P	94.43 (20.77)	95.48 (22.97)	0.292	0.770	96.62 (21.64)	92.06 (20.54)	1.504	0.134	93.89 (21.08)	95.25 (21.44)	0.446	0.656	93.15 (24.34)	95.14 (20.26)	0.510	0.612	94.87 (15.14)	94.66 (21.69)	0.037	0.971
PS	21.92 (5.17)	21.28 (5.44)	0.727	0.468	22.01 (5.25)	21.46 (5.20)	0.734	0.464	21.58 (5.13)	21.92 (5.31)	0.459	0.646	21.47 (5.34)	21.87 (5.20)	0.458	0.647	23.40 (4.50)	21.64 (5.27)	1.256	0.211
PE	12.05 (4.48)	11.26 (4.66)	1.042	0.299	12.76 (4.57)	10.67 (4.19)	3.311	0.001	12.19 (4.72)	11.63 (4.37)	0.859	0.391	12.00 (4.79)	11.83 (4.45)	0.226	0.821	11.33 (3.90)	11.91 (4.57)	0.477	0.634
PCR	7.85 (3.71)	8.37 (4.21)	0.808	0.420	8.39 (3.88)	7.41 (3.69)	1.787	0.075	8.09 (3.98)	7.88 (3.72)	0.395	0.693	7.66 (4.22)	8.07 (3.70)	0.635	0.526	6.93 (2.66)	8.05 (3.89)	1.092	0.276
CM	19.49 (7.47)	21.50 (9.07)	1.520	0.130	19.92 (7.79)	20.00 (8.07)	0.070	0.945	19.53 (7.19)	20.27 (8.39)	0.656	0.513	18.81 (7.78)	20.31 (7.92)	1.140	0.255	19.20 (6.13)	20.02 (8.03)	0.384	0.701
O	23.28 (5.34)	23.15 (5.42)	0.143	0.886	23.34 (5.16)	23.13 (5.62)	0.277	0.782	22.93 (5.13)	23.49 (5.51)	0.732	0.465	23.62 (5.59)	23.14 (5.28)	0.536	0.593	24.13 (5.49)	23.18 (5.35)	0.663	0.508
DA	9.84 (3.50)	9.91 (4.14)	0.124	0.901	10.20 (3.61)	9.39 (3.67)	1.562	0.120	9.58 (3.52)	10.06 (3.74)	0.928	0.355	9.60 (3.99)	9.93 (3.54)	0.555	0.579	9.87 (3.64)	9.85 (3.66)	0.014	0.989
PI	15.08 (7.28)	13.17 (7.06)	1.572	0.118	15.77 (7.86)	13.13 (6.09)	2.672	0.008	14.92 (6.39)	14.44 (7.87)	0.460	0.646	14.38 (6.99)	14.72 (7.36)	0.281	0.779	12.93 (3.52)	14.78 (7.47)	0.949	0.344

Mean and standard deviation [M(SD)]; *PC* Pain Catastrophizing, *R* Rumination, *H* Helplessness, *M* Magnification, *P* Perfectionism, *PS* Personal Standards, *PE* Parental Expectations, *PCR* Parental Criticism, *CM* Concern over Mistakes, *O* Organization, *DA* Doubts about Actions, *PI* Psychological Inflexibility

A stepwise linear regression analysis was conducted to explore the possible relationships between pain catastrophizing and psychological inflexibility, perfectionism, pain intensity, age, and the number of injuries (see Table 5). These variables were included as predictors of the total pain catastrophizing score (see Table 6).

Although perfectionism showed a positive and significant correlation with pain catastrophizing ($r=0.157$, $P=0.027$), this significance was lost when the other variables were added to the model. Consequently, psychological inflexibility emerged as the main explanatory variable, explaining 11.6% of the variance ($P=0.002$), with a predictive power of $\beta=0.333$ ($P=0.005$). Similarly, when successively introducing the other variables, these explained 92% of the variance in catastrophizing, with psychological inflexibility maintaining a predictive power of $\beta=0.313$ ($P=0.006$) and pain intensity a predictive power of $\beta=0.298$ ($P=0.001$). The number of injuries was not a significant variable.

Discussion

The present study expected to find a relationship between high psychological flexibility and lower pain catastrophizing (Hypothesis 1), and a positive relationship between perfectionism scores and pain catastrophizing (Hypothesis 2). Similarly, it was anticipated that pain catastrophizing scores would show a positive relationship with the number of injuries reported by referees (Hypothesis 3). In contrast, psychological flexibility will be related to fewer injuries (Hypothesis 4), while high perfectionism will be associated with a higher number of injuries reported by referees (Hypothesis 5).

Hypothesis 1 is supported by the data, since it was observed that low scores on psychological inflexibility were correlated with lower pain catastrophizing on all dimensions of the test. This finding is in line with the

Table 5 Bivariate Pearson correlations

Variable	1	2	3	4	5	6	7	8	9
1.- PC	1								
2.- RU	0.913***	1							
3.- HE	0.932***	0.752***	1						
4.- MA	0.881***	0.735***	0.742***	1					
5.- PE	0.157*	0.123*	0.136*	0.182**	1				
6.- IP	0.456***	0.370***	0.438***	0.444***	0.411***	1			
7.- IP	0.279**	0.194*	0.355***	0.145	−0.118	−0.046	1		
8.- NI	0.208**	0.154*	0.201**	0.223**	0.075	0.141*	0.021	1	
9.- AG	−0.203**	−0.231***	−0.153*	−0.175*	−0.151*	−0.190**	−0.009	−0.015	1

*$P<0.05$; **$P<0.01$; ***$P<0.001$

PC Pain Catastrophizing, *RU* Rumination, *HE* Helplessness, *MA* Magnification, *PE* Total Perfectionism, *PI* Psychological Inflexibility, *IP* intensity of pain, *NI* number of injuries, *AG* age

Table 6 Stepwise regression analysis, taking pain catastrophizing as the predicted variable and perfectionism, psychological inflexibility, number of injuries and pain intensity as predictor variables

Variable	β	t	P	R^2	ΔR^2	P	F	P
Model 1				0.044	0.044	0.031	$F(1, 104)=4.447$	0.031
PE	0.210	2.774	0.031					
Model 2				0.116	0.072	0.005	$F(2, 104)=6.699$	0.002
PE	0.013	0.116	0.908					
PI	0.333	2.879	0.005					
Model 3				0.205	0.089	0.001	$F(3, 104)=8.688$	<0.001
PE	0.056	0.501	0.617					
PI	0.321	2.97	0.004					
IP	0.301	3.363	0.001					
Model 4				0.209	0.004	0.475	$F(4, 104)=6.613$	<0.001
PE	0.052	0.470	0.639					
PI	0.313	2.823	0.006					
IP	0.298	3.329	0.001					
NI	0.065	0.717	0.475					

PE Perfectionism Total, *PI* Psychological Inflexibility, *NI* number of injuries, *IP* intensity of pain

notion that psychological flexibility promotes adaptive coping [8, 22], which has also been observed in the field of sport [9, 65].

It is striking that the estimated pain intensity during the last three–four seasons did not differ between referees with low and medium–high scores in psychological inflexibility. These results support data reporting a weak relationship between psychological flexibility scores and pain intensity [24, 45]. Similarly, a study analyzing pain-related psychological inflexibility over time in women found a positive correlation between psychological inflexibility and pain severity at baseline. However, pain severity at baseline was not associated with psychological inflexibility at follow-up period [27].

This lack of a relationship between psychological inflexibility and pain intensity could be due to the fact that psychological inflexibility is characterized by behaviors that provide short- but not long-term, pain relief [23, 63]. Such behaviors include physical inactivity, avoidance of pain-associated activities, rumination, and attempts to distract from or suppress pain. In contrast, people with high psychological flexibility are characterized by acceptance of internal experiences, awareness of the present moment and the opportunities it offers, and engagement in actions consistent with personal goals and values [23]. Psychological flexibility is also associated with improvements in pain perception [23]. Given these two profiles, the assessment of short-term pain intensity is unlikely to reveal differences among referees across a range of scores (high/medium/low) in psychological flexibility [23, 24, 27, 45].

Pain catastrophizing was shown to significantly correlate with psychological inflexibility and pain intensity, in line with previous studies [24, 27, 45, 62]. However, the significant correlation between pain catastrophizing and pain intensity runs counter to other studies with athletes that found no correlation between pain catastrophizing scores and estimated pain intensity [50]. Given these contradictory findings, the debate still appears to be open as to whether catastrophizing is an antecedent or a consequence of pain intensity [59]. In this sense, catastrophizing and pain intensity are the perception of stimulation. Thus, depending on how they have evolved in the history of referees' interactions, they will exhibit one or another of these characteristics. Their interactions must be analyzed on the basis of dispositional variables and contextually. This breaks with the antecedent–consequent dichotomy.

The findings of the present study are congruent with data indicating that athletes with catastrophic thoughts are more likely to experience higher pain levels and a greater cardiovascular response to a painful stimulus [26]. Thus, it has been suggested that individuals who adopt a more pain-accepting stance appear to catastrophize their pain to a lesser extent [61]. Moreover, some studies in the literature have reported a negative association between psychological flexibility and pain catastrophizing [31, 45]. For example, the work of Paparizos et al. [37] explored the relationship between catastrophism and induced pain in a group of dancers (expert, intermediate, and beginners) compared with a control group. In the group of dancers, catastrophism was significantly related to pain (as a predictor), that is, the more experienced dancers showed more pain tolerance than the beginners, and the dancers, in general, tolerated pain better than the control group.

Similar to the work of Paparizos et al. [37], older athletes have been shown to adopt more effective pain management skills than their younger counterparts [29]. These results are consistent with those found in our sample of referees, where a significant negative association was observed between age and pain catastrophizing, but not between age and pain intensity.

Hypothesis 2 is partially supported by the finding that perfectionism scores were positively correlated with pain catastrophizing, since the correlation was only significant for magnification (but not rumination or helplessness). This result is compatible with findings from other studies suggesting that perfectionism can exacerbate factors that affect pain, such as catastrophizing [38], and is considered a vulnerability factor in pain patients [19]. Moreover, and as previously stated, perfectionism is positively related to psychological inflexibility and cognitive rigidity [12]. However, when the perfectionism variable was introduced into a predictive model of catastrophism along with psychological inflexibility and pain intensity variables, it lost its power as a predictor of pain catastrophism compared to these other variables.

This lack of predictive capacity of perfectionism for pain catastrophizing is in line with current evidence supporting the multidimensional nature of perfectionism, drawing a distinction between functional and dysfunctional perfectionism [17, 52]. Thus, depending on contextual variables, functional perfectionism refers to cognitions and behaviors aimed at obtaining positive outcomes, with a tendency to be optimistic about future success. In contrast, dysfunctional perfectionism is characterized by an excessive focus on mistakes and implies an inability to experience satisfaction with the situation [52].

Our analyses revealed that the number of reported injuries correlated significantly with pain catastrophizing scores. In this regard, there is evidence that pain coping styles differ between currently injured and non-injured athletes, with injured athletes showing significantly higher scores on catastrophizing [49]. However, the number of injuries does not significantly predict catastrophism, when associated with psychological inflexibility and pain intensity.

This could be because, considering the injuries reported during the last 3–4 seasons, it was found that characteristics of pain catastrophism differ according to the severity of the

injury. Those referees who reported mild or moderate injuries obtained higher total scores on pain catastrophism and all its subscales (rumination, helplessness, and magnification). In the case of severe injuries, there were no differences in magnification between those who reported injuries and those who did not, although the differences in the total score and the other two dimensions (rumination and helplessness) were maintained. Finally, for very serious injuries, pain catastrophizing and magnification scores did not differ between those who reported injuries and those who did not, although differences were observed in rumination and helplessness. These findings suggest that the objective severity of the injury may be somewhat less important than pain perception, modulation, and pain-related thoughts for predicting pain catastrophizing [2].

No differences were found in psychological inflexibility scores between participants who reported suffering injuries in the last three–four seasons and those who did not, contrary to the findings of other studies [58]. However, an association was found between psychological inflexibility and the severity of the injury, that is, those who reported minor injuries (57.3%), showed greater psychological inflexibility, as predicted by Hypothesis 4.

Finally, perfectionism was not found to correlate significantly with the number of injuries (Hypothesis 5) or pain intensity. The latter finding runs counter to reports in literature showing that perfectionism is positively associated with the frequency and intensity of pain [30]. This lack of agreement with the findings of previous research could stem from the multidimensional nature of perfectionism. The "dual process model of perfectionism" is now increasingly used to explain the various effects of perfectionism [52]. This model accounts for the existence of mixed perfectionist tendencies. The combination of high scores for dysfunctional perfectionism and low scores for functional perfectionism is more maladaptive than the combination of high scores for both perfectionisms [52]. Similar to the findings observed in swimmers [13], it has been suggested that individuals with mixed perfectionistic tendencies (depending on the coping strategies used) may cope directly with stressors and experience the benefits of creating an action plan to manage the stressful situation [3].

The present study has several limitations. First, its correlational nature prevents us from establishing causal relationships between the study variables (although the literature has provided support for such relationships). Although information has been collected through referees' self-reports regarding the presence and severity of injuries, it would be of interest to analyze more specific dimensions of sporting-related injuries and associated constructs (e.g., the type and duration of the injury, the intensity of current pain, or the rehabilitation process) and examine how these variables could relate to pain catastrophizing. Likewise, it would be useful to conduct longitudinal and long-term studies that evaluate psychological flexibility and pain catastrophizing. Such studies could also examine the evolution of pain perception, pain intensity, and changes in the injury during rehabilitation across a variety of sports and injuries.

Conclusion

The results of this study provide a better understanding of the variables that influence pain catastrophizing. Furthermore, these findings have practical implications. Pain catastrophizing is one of the most important treatable psychological factors involved in pain perception, and its strong association with increased psychological inflexibility opens up promising new avenues of research. The current literature suggests that psychological flexibility is a notable coping strategy that contributes towards resilience, improving the perception of pain and reducing the extent to which it is negatively evaluated. Given the frequency and prevalence of injury and pain in the referee population, intervention strategies for referees should include measures to assess and improve psychological flexibility. This would help referees improve their pain management strategies and shorten the recovery process for sports injuries (which are often very costly and consequential).

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Data Availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of Interest The author declares no conflict of interest. The author is solely responsible for the content and wording of the article.

Ethical Approved By the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Internal Code: 2159-N-21. Date of approval: 14/12/2021; Act: 11/21).

Helsinki Declaration All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Declaration of Helsinki of 1975, revised in 2013.

Informed Consent The participants filled Informed consent.

References

1. Arbinaga F, Fernández-Ozcorta EJ, Herrera-Macías PP, Vela-Calderón D. Burnout syndrome and resilience in soccer and basketball referees. J Sport Psychol. 2019;28(2):23–32.
2. Assa T, Geva N, Zarkh Y, Defrin R. The type of sport matters: pain perception of endurance athletes versus strength athletes. Eur J Pain. 2019;23(4):686–96. https://doi.org/10.1002/ejp.1335.
3. Barrell G, Terry P. Trait anxiety and coping strategies among ballet dancers. Med Proble Perform Art. 2003;18(2):59–64. https://doi.org/10.21091/mppa.2003.2012.
4. Bisgaier S. Acceptance and Commitment Therapy for the treatment of perfectionism. Widener University ProQuest Dissertations Publishing, 2019.
5. Bizzini M, Junge A, Bahr R, Helsen W, Dvorak J. Injuries and musculoskeletal complaints in referees and assistant referees selected for the 2006 FIFA World Cup: retrospective and prospective survey. Br J Sports Med. 2009;43(7):490–7. https://doi.org/10.1136/bjsm.2008.048314.
6. Bizzini M, Junge A, Bahr R, Dvorak J. Injuries of football referees: a representative survey of Swiss referees officiating at all levels of play. Scand J Med Sci Sports. 2011;21(1):42–7. https://doi.org/10.1111/j.1600-0838.2009.01003.
7. Bond FW, Hayes SC, Baer RA, Carpenter KM, Guenole N, Orcutt HK, Waltz T, Zettle RD. Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: a revised measure of psychological inflexibility and experiential avoidance. Behav Ther. 2011;42(4):676–88. https://doi.org/10.1016/j.beth.2011.03.007.
8. Cassar GE, Knowles S, Youssef GJ, Moulding R, Uiterwijk D, Waters L, Austin DW. Examining the mediational role of psychological flexibility, pain catastrophizing, and visceral sensitivity in the relationship between psychological distress, irritable bowel symptom frequency, and quality of life. Psychol Health Med. 2018;23(10):1168–81. https://doi.org/10.1080/13548506.2018.1476722.
9. Chen LH, Wu CH, Chang JH. Gratitude and athletes' life satisfaction: the moderating role of mindfulness. J Happiness Stud. 2017;18(4):1147–59. https://doi.org/10.1007/s10902-016-9764-7.
10. Cohen M, Quintner J, van Rysewyk S. Reconsidering the international association for the study of pain definition of pain. Pain Rep. 2018;3(2): e634. https://doi.org/10.1097/PR9.0000000000000634.
11. Crosby JM, Bates SC, Twohig MP. Examination of the relationship between perfectionism and religiosity as mediated by psychological inflexibility. Curr Psychol. 2011;30(2):117–29. https://doi.org/10.1007/s12144-011-9104-3.
12. Delor B, Douilliez C, Philippot P. Une approche transdiagnostique et basée sur les processus du perfectionnisme inadapté=A transdiagnostic and process-based approach of maladaptive perfectionism. Rev Francoph Clin Comport Cogn. 2019;24(1):20–38.
13. Didymus F, Fletcher D. Swimmers´experiences of organizational stress: exploring the role of cognitive appraisal and coping strategies. J Clin Sport Psychol. 2014;8(2):159–83. https://doi.org/10.1123/jcsp.2014-0020.
14. Edwards RR, Smith MT, Kudel I, Haythornthwaite J. Pain-related catastrophizing as a risk factor for suicidal ideation in chronic pain. Pain. 2006;126(1–3):272–9. https://doi.org/10.1016/j.pain.2006.07.004.
15. Edwards RR, Mensing G, Cahalan C, Greenbaum S, Narang S, Belfer I, Schreiber K, Campbell C, Wasan A, Jamison R. Alteration in pain modulation in women with persistent pain after lumpectomy: influence of catastrophizing. J Pain Symptom Manage. 2013;46(1):30–42. https://doi.org/10.1016/j.jpainsymman.2012.06.016.
16. Farin E. The reciprocal effect of pain catastrophizing and satisfaction with participation in the multidisciplinary treatment of patients with chronic back pain. Health Qual Life Outcomes. 2015;13(1):163. https://doi.org/10.1186/s12955-015-0359-5.
17. Flett GL, Hewitt PL. Reflections on three decades of research on multidimensional perfectionism: an introduction to the special issue on further advances in the assessment of perfectionism. J Psychoeduc Assess. 2020;38(1):3–14. https://doi.org/10.1177/0734282919881928.
18. Frost RO, Marten P, Lahart C, Rosemblate R. The dimensions of perfectionism. Cogn Ther Res. 1990;14(5):449–68. https://doi.org/10.1007/BF01172967.
19. Galvez-Sánchez CM, Duschek S, Reyes del Paso GA. Psychological impact of fibromyalgia: current perspectives. Psychol Res Behav Manag. 2019;12:117–27. https://doi.org/10.2147/PRBM.S178240.
20. Gelabert E, Ll G-E, Martín-Santos R, Gutiérrez F, Torres A, Subià S. Psychometric properties of the Spanish version of the frost multidimensional perfectionism scale in women. Psicothema. 2011;23(1):133–9.
21. Hae-Yong P, Young-In Ch. A preliminary study on musculoskeletal pain in K-league referees - a complete survey. Korean J Sports Med. 2014;32(1):37–43. https://doi.org/10.5763/kjsm.2014.32.1.37.
22. Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J. Acceptance and commitment therapy: model, processes and outcomes. Behav Res Ther. 2006;44(1):1–25. https://doi.org/10.1016/j.brat.2005.06.006.
23. Hayes SC, Strosahl KD, Wilson KG. Acceptance and Commitment Therapy. Process and practice of mindful change. New York: Guilford Press; 2016.
24. Kratz AL, Davis MC, Zautra AJ. Pain acceptance moderates the relation between pain and negative affect in osteoarthritis and fibromyalgia patients. Ann Behav Med. 2007;33(3):291–301. https://doi.org/10.1007/BF02879911.
25. Lambert Ch, Reinert N, Stahl L, Pfeiffer T, Wolfarth B, Lachmann D, Shafizadeh S, Ritzmann R. Epidemiology of injuries in track and field athletes: a cross-sectional study of specific injuries based on time loss and reduction in sporting level. Phys Sportsmed. 2022;50(1):20–9. https://doi.org/10.1080/00913847.2020.1858701.
26. Lentini M, Scalia J, Berger-Lebel F, Touma F, Jhajj A, Darlington P, Dover G. Association between pain catastrophizing and pain and cardiovascular changes during a cold-pressor test in athletes. J Athl Train. 2021;56(5):473–83. https://doi.org/10.4085/16-20.
27. Maathz P, Flink IK, Engman L, Ekdahl J. Psychological inflexibility as a predictor of sexual functioning among women with vulvovaginal pain: a prospective investigation. Pain Med. 2020;21(12):3596–602. https://doi.org/10.1093/pm/pnaa042.
28. McCracken LM. Committed action: an application of the psychological flexibility model to activity patterns in chronic pain.

J Pain. 2013;14(8):828–35. https://doi.org/10.1016/j.jpain.2013.02.009.
29. Meyers MC, Stewart CC, Laurent CM, LeUnes AD, Bourgeois AE. Coping skills of olympic developmental soccer athletes. Int J Sports Med. 2008;29(12):987–93. https://doi.org/10.1055/s-2008-1038679.
30. Molnar DS, Flett GL, Sadava SW, Colautti J. Perfectionism and health functioning in women with fibromyalgia. J Psychosom Res. 2012;73(4):295–300. https://doi.org/10.1016/j.jpsychores.2012.08.001.
31. Moore ZE. Theoretical and empirical developments of the mindfulness-acceptance-commitment (MAC) approach to performance enhancement. J Clin Sport Psychol. 2009;3(4):291–302. https://doi.org/10.1123/jcsp.3.4.291.
32. Neame R, Hammond A. Beliefs about medications: a questionnaire survey of people with rheumatoid arthritis. Rheumatology. 2005;44(6):762–7.
33. Oliveira MC, Naujorks-Reis L, da Silva AI. Injury incidence in Brazilian football referees. Arch Med Deporte. 2016;33(2):108–12.
34. Olmedilla-Zafra A, Ortega-Toro E, Abenza-Cano L. Perception of youth football players and the influence of psychological work on the relationship between psychological variables and injuries. Cuad de Psicol del Deporte. 2007;7(2):75–87.
35. Olmedilla-Zafra A, Ortega-Toro E, Abenza-Cano L. Validation of the pain catastrophizing scale in Spanish athletes. Cuad de Psicol del Deporte. 2013;13(1):83–94. https://doi.org/10.4321/S1578-84232013000100009.
36. Olmedilla-Zafra A, Ortega-Toro E, Gómez JM. Influence of sports injury changes in mood and precompetitive anxiety in soccer players. Cuad de Psicol del Deporte. 2014;14(1):55–62. https://doi.org/10.4321/S1578-84232014000100007.
37. Paparizos AL, Tripp DE, Sullivan MJL, Rubenstein ML, Maya L. Catastrophizing and pain perception in recreational Ballet Dancers. J Sport Behav. 2005;28(1):35–50.
38. Park A, Hsu C, Randall E, Simons L. Perfection, performance, and pain: athletic identity and perfectionism as risk factors for pain-related distress in adolescents with chronic pain. J Pain. 2018;19(3):S58. https://doi.org/10.1016/j.jpain.2017.12.148.
39. Patel MS, Updegrove GF, Singh AM, Jamgochian GC, LoBiondo D, Abboud JA, Ramsey ML, Lazarus MD. Characterizing opioid consumption in the 30-day postoperative period following shoulder surgery: are we over prescribing? Phys Sportsmed. 2021;49(2):158–64. https://doi.org/10.1080/00913847.2020.1789439.
40. Peñarroya-Baulíes A, Ballús-Creus C, Pérez-Martínez J. Coping strategies, catastrophism and mood differences depending on chronic pain duration. Rev Soc Esp Dolor. 2011;18(2):77–83.
41. Pizzera A, Laborde S, Lahey J, Wahl A. Influence of physical and psychological stress on decision-making performance of soccer referees. J Sports Sci. 2022;40(18):2037–46. https://doi.org/10.1080/02640414.2022.2127516.
42. Quartana PJ, Campbell CM, Edwards RR. Pain catastrophizing: a critical review. Expert Rev Neurother. 2009;9(5):745–58. https://doi.org/10.1586/ern.09.34.
43. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, Keefe FJ, Mogil JS, Ringkamp M, Sluka KA, Song XJ, Stevens B, Sullivan MD, Tutelman PR, Ushida T, Vader K. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020;161(9):1976–82. https://doi.org/10.1097/j.pain.0000000000001939.
44. Roales-Nieto JG, Moreno-San Pedro E, Córdoba-García R, Marín-Romero B, Jiménez-López FR, Gil-Luciano A, Silvano-Arranz A, Fernández-Lao IR, Granados-Gámez G, Hernández-López M. Smoking self-quitting and psychological flexibility. Int J Psychol Psychol Ther. 2016;16(2):111–30.
45. Rodero B, Pereira JP, Pérez-Yus MC, Casanueva B, Serrano-Blanco A, da Cunha R, Ribeiro MJ, Luciano JV, García-Campayo J. Validation of a Spanish version of the psychological inflexibility in pain scale (PIPS) and an evaluation of its relation with acceptance of pain and mindfulness in sample of persons with fibromyalgia. Health Qual Life Outcomes. 2013;11:62. https://doi.org/10.1186/1477-7525-11-62.
46. Ruiz FJ. A review of acceptance and commitment therapy (ACT) empirical evidence: correlational, experimental psychopathology, component and outcome studies. Int J Psychol Psychol Ther. 2010;10(1):125–62.
47. Ruiz FJ, Langer A, Luciano C, Cangas AJ, Beltrán I. Measuring experiential avoidance and psychological inflexibility: the Spanish version of the acceptance and action questionnaire-II. Psicothema. 2013;25(1):123–9.
48. Ruscheweyh R, Nees F, Marzinak M, Evers S, Flor H, Knecht S. Pain catastrophizing and pain-related emotions, influence of age and type of pain. Clin J Pain. 2011;27(7):578–86. https://doi.org/10.1097/ajp.0b013e31820fde1b.
49. Salma ChL, Meyers MC. Athletic and pain coping skills of competitive female equestrian athletes. J Sport Behav. 2019;42(1):91–108.
50. Sciascia A, Waldecker J, Jacobs C. Pain catastrophizing in college athletes. J Sport Rehabil. 2020;29(2):168–73. https://doi.org/10.1123/jsr.2018-0137.
51. Sirois FM, Molnar DS. Perfectionism and maladaptive coping styles in patients with chronic fatigue syndrome, irritable bowel syndrome and fibromyalgia/arthritis and in healthy controls. Psychother Psychosom. 2014;83(6):384–5. https://doi.org/10.1159/000365174.
52. Stoeber J, Otto K. Positive conceptions of perfectionism: approaches, evidence, challenges. Pers Soc Psychol Rev. 2006;10(4):295–319. https://doi.org/10.1207/s15327957pspr1004-2.
53. Stølen T, Chamari K, Castagna C, Wisløff U. Physiology of soccer: an update. Sports Med. 2005;35(6):501–36. https://doi.org/10.2165/00007256-200535060-00004.
54. Sullivan MJ, Stanish W, Waite H, Sullivan M, Tripp DA. Catastrophizing, pain and disability in patients with soft tissue injuries. Pain. 1998;77(3):253–60. https://doi.org/10.1016/S0304-3959(98)00097-9.
55. Sullivan MJ, Thorn B, Haythornthwaite JA, Keefe F, Martin M, Bradley LA, Lefebvre JC. Theoretical perspectives on the relation between catastrophizing and pain. Clin J Pain. 2001;17(1):52–64. https://doi.org/10.1097/00002508-200103000-00008.
56. Suso-Ribera C, García-Palacios A, Botella C, Ribera-Canudas MV. Pain catastrophizing and its relationship with health outcomes: does pain intensity matter? Pain Res Manag. 2017. https://doi.org/10.1155/2017/9762864.
57. Thompson M, McCracken LM. Acceptance and related processes in adjustment to chronic pain. Curr Pain Headache Rep. 2011;15(2):144–51. https://doi.org/10.1007/s11916-010-0170-2.
58. Trompetter HR, Bohlmeijer ET, Fox JP, Schreurs KMG. Psychological flexibility and catastrophizing as associated change mechanisms during online Acceptance & Commitment Therapy for chronic pain. Behav Res Ther. 2015;74:50–9. https://doi.org/10.1016/j.brat.2015.09.001.
59. Turner JA, Aaron LA. Pain related catastrophizing: what is it? Clin J Pain. 2001;17(1):65–71. https://doi.org/10.1097/00002508-200103000-00009.

60. Vela D, Arbinaga F. Application of the list of stressful situations for arbitration (LISEA) in football referees. Rev Iberoam Psicol Ejerc Deporte. 2018;13(2):281–7.
61. Vowles KE, McCracken LM. Acceptance and values-based action in chronic pain: a study of treatment effectiveness and process. J Consult Clin Psychol. 2008;76(3):397–407. https://doi.org/10.1037/0022-006X.76.3.397.
62. Wade JB, Riddle DL, Price DD, Dumenci L. Role of pain catastrophizing during pain processing in a cohort of patients with chronic and severe arthritic knee pain. Pain. 2011;152(2):314–9. https://doi.org/10.1016/j.pain.2010.10.034.
63. Wicksell RK, Olsson GL, Hayes SC. Psychological flexibility as a mediator of improvement in Acceptance and Commitment Therapy for patients with chronic pain following whiplash. Eur J Pain. 2010;14(10):1059.e1-1059.e11. https://doi.org/10.1016/j.ejpain.2010.05.001.
64. Wilson F, Byrne A, Gissane C. A prospective study of injury and activity profile in elite soccer referees and assistant referees. Ir Med J. 2011;104(10):295–7. http://hdl.handle.net/10147/213513
65. Zhang CQ, Chung PK, Si G, Liu JD. Psychometric properties of the acceptance and action questionnaire-II for Chinese college students and elite Chinese athletes. Meas Eval Couns Dev. 2014;47(4):256–70. https://doi.org/10.1177/0748175614538064.