

Article

Dispositional Mindfulness and Injury Time Loss in Soccer

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Abstract: Soccer injuries have a low prevalence, albeit prompting detrimental effects for individuals and teams, particularly with prolonged convalescence periods. Age and injury severity appear as the most robust correlates with recovery duration. The role of dispositional mindfulness remains unknown, however, despite considerable evidence that highlights positive effects of mindfulness on injury rehabilitation. This study sought to examine whether dispositional mindfulness explained additional variability in injury time loss in an elite sample of soccer players ($N = 207$). A series of moderated regression analyses examined whether dispositional mindfulness interacted with either age or injury severity in explaining the length of recovery from an injury. The main findings suggest that dispositional mindfulness was unrelated with length of recovery. In contrast, age and injury severity related robustly with the length of lesion recovery, which was even longer for the older players with very severe injuries. The current findings constitute a novelty in the study of injuries in soccer and open new research lines to determine whether mindfulness interventions are likely to contribute to shorten objective rehabilitation length for a more sustainable approach to sports injury



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1. Introduction

The recovery from soccer injuries is highly variable. A study promoted by the Union of European Soccer Associations (UEFA) from five countries and eleven top-level teams ($n = 266$) reports 658 injuries. The incidence of this data is low, with 31 injuries per 1000 match hours and 6 injuries per 1000 training hours. Fifteen per cent of these injuries are severe, averaging about thirty days off from regular playing and training, and affecting individual stress, worry, anxiety, or sadness, and team performance [1]. Pre-injury and post-injury factors determine the likelihood of occurrence and of recovering from an injury [2,3]. Pre-injury factors predispose athletes to suffering a sport injury, comprising individual differences in personality, stressors, and coping. Post-injury factors influence the speed and quality of recovery, comprising situational and personal factors, and age and injury severity being the most influential determinants [4,5].

To our knowledge, this study is the first one that focuses on post-injury factors and dispositional mindfulness with a group of elite soccer players. Dispositional mindfulness reduces stress and improves healthy behaviours and emotional regulation [6]. Nonetheless, it is actually unknown whether dispositional mindfulness associates with the length of recovery from sport injuries. The current study addresses this gap with a group of soccer players. Dispositional mindfulness describes the awareness arising from intentionally paying attention to actual experience, without judging, evaluating, or reacting to it [7]. Mindfulness exerts a robust effect regarding the enhancement of psychological well-being and the regulation of several hormones. There are some reviews and meta-analyses about the benefits of mindfulness in sports, showing that higher levels of dispositional mindfulness improve athletes' attention, self-regulation, and motor skills [6,8,9].

Dispositional mindfulness is a psychological trait that allows us to be mindful, fully aware of the “here and now”. On the other hand, mindfulness is also an ability that can be trained. In this sense, mindfulness-based interventions help to manage stress, train awareness and attention, and improve psychological conditions. Substantial evidence highlights that exercising mindfulness contributes to improving stress-recovery balance, wound healing, and prevents the occurrence of injuries in soccer [10–13]. Potential mechanisms contributing to the rehabilitation of injuries include the reduction of heart rate variability and blood pressure [14] and to enhance the modulation of anxiety and boredom [6,15]. It is unclear, however, whether dispositional mindfulness contributes to reduce the rehabilitation period when considering age and injury severity.

This study addressed one main question: Did individual differences in dispositional mindfulness explain the additional variance in the length of rehabilitation over and above the effects of age and injury severity? Both factors exert a remarkable impact on the length and quality of injury rehabilitation. Older athletes have more previous injuries and a diminished capacity of tissue regeneration, which hamper rehabilitation. In addition, because more severe injuries imply greater tissue damage and the likelihood of surgery, we expected negative age effects and positive injury severity effects regarding recovery length [16,17].

Higher levels of anxiety imply higher inflammation, eventually leading to extended delays in returning to play. Dispositional mindfulness may contribute to reduce anxiety and rumination, and to improve the ability to regulate negative emotions leading to lower inflammation and reduce recovery time from sport injuries [10]. Therefore, we examined whether dispositional mindfulness moderated the association of age and injury severity with length of recovery.

2. Materials and Methods

2.1. Participants and Measures

Participants were 207 Spanish male professional soccer players, with a mean age of 26 years old ($Sd = 4.8$), ranging from 18 to 37 years. Measures included age, injury severity, dispositional mindfulness, and amount of time lost due to a sport injury.

1. **Injury Severity.** Participants were asked about their last injury. Injury severity was quantified according with professional criteria to describe soccer injuries and specific treatment [17]. There were four main categories of injury severity: mild (requiring treatment but training is uninterrupted), moderate (requiring treatment and interrupting training and competition), serious (up to two months off, sometimes hospitalization/surgery), and very serious (meaningful impairment in performance, requiring constant rehabilitation).
2. **Mindfulness.** Dispositional mindfulness was evaluated with the Mindfulness Inventory for Sport [18], a 15-item instrument answered on a six-point Likert-type format from one (not at all), to six (very much). There are three 5-item subscales, awareness, non-judgmental, and refocusing, even though a global score of dispositional mindfulness was used here. Higher scores indicated a higher level in dispositional mindfulness. The Cronbach’s alpha reliability for the current data was 0.66. The dispositional mindfulness was chosen as a way to have an exact idea of the ability of being mindful of the athletes in the moment of the study.
3. **Length of recovery.** The length of recovery from an injury was computed with the days off reported by each participant concerning the last injury.

2.2. Procedure

The sample was recruited among the players in all the football clubs of second league during 2013–2014 season. At that time, the approval of a specific ethics board was unnecessary. In any case, the research was undertaken in accordance with the Declaration of Helsinki. Permission was asked to every club and after that, the researchers moved there to be present in case there were any doubt or question. Participation was voluntary. The

players answered the surveys after signing an informed consent form, which included a detailed explanation about the study aims. The data and code associated to this study are available from the corresponding author on request.

2.3. Statistical Analyses

A negative binomial regression was applied to this data with age, injury severity, and dispositional mindfulness as the independent variables, and the days off as the dependent variable (Figure 1), an appropriate approach with data with an excess of zeros in the response variable [19].

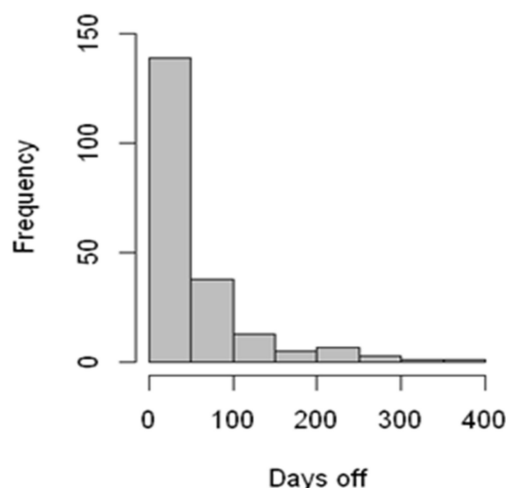


Figure 1. Frequency of days off after a soccer injury.

Five models were compared. Model 1 included the main effects of age, severity, and dispositional mindfulness. Models 2, 3, and 4 evaluated a two-way interaction (age \times severity, age \times dispositional mindfulness, and severity \times dispositional mindfulness). Model 5 evaluated a three-way interaction (age \times severity \times dispositional mindfulness), which was included in addition the interaction terms from Models 2, 3, and 4. A likelihood ratio test (LR) compared whether the inclusion of an interaction term (Models 2, 3, 4, and 5) improved the explanation of days off compared with the main effects model (Model 1). A significant LR test would be indicative of model improvement after entering the interaction term in each respective model. All models were evaluated with the Akaike Information Criterion (AIC), and a pseudo coefficient of determination (R^2). Lower values in the AIC and higher values in the R^2 were deemed as a better model fit.

3. Results

Table 1 shows the descriptive statistics of age, severity of lesion, dispositional mindfulness, and the days off due to an injury. The skewness and kurtosis values indicate that all variables met the normality assumptions reasonably well, but days off displayed higher values in skewness (2.22) and kurtosis (4.94) and a lower mean (51.2) than the standard deviation (67.5).

Table 1. Descriptive statistics of age, severity of lesion, dispositional mindfulness, and days off.

Variable	Range	M	Sd	Skewness	Kurtosis
Age	18–37	25.5	4.9	0.34	−0.92
Severity *	1–4	2.3	0.9	0.38	−0.48
Dispositional mindfulness	44–81	60.6	6.2	0.58	0.50
Days off	0–360	51.2	67.5	2.22	4.94

Note. * 1 (mild), 2 (moderate), 3 (severe), 4 (very severe).

Table 2 shows the outcomes for the main effects model (Model 1) and interaction effects models (Models 2 to 5). In Model 1, there was a negative effect of age (-0.22 , $p < 0.001$), a positive effect of severity (1.00 , $p < 0.001$), and a null effect of dispositional mindfulness. Regarding the models including interaction terms, Model 3 (age \times dispositional mindfulness, LR = 0.00), Model 4 (severity \times dispositional mindfulness, LR = 1.68), and Model 5 (age \times severity \times dispositional mindfulness, LR = 8.54) showed the worst fit to the data. Model 2 (age \times severity, LR = 7.07, $p < 0.01$) showed a significant improvement from the main effects model (Model 1). Model 2 showed the best fit (AIC = 1844, $R^2 = 0.52$) with a statistically significant effect of the interaction term (0.20 , $p < 0.01$). This finding indicates that age was positively associated with days off at higher lesion severity levels.

Table 2. Five negative binomial regression models for age, severity, and dispositional mindfulness (DM) as predictors of days off because of a soccer injury.

	Parameter Estimates				
	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	3.43 ***	3.43 ***	3.43 ***	3.44 ***	3.42 ***
Age	-0.22 ***	-0.22 ***	-0.22 ***	-0.22 ***	-0.23 ***
Severity	1.00 ***	1.03 ***	1.00 ***	1.01 ***	1.04 ***
DM	0.02	0.04	0.02	0.04	0.04
Age \times Severity	—	0.20 **	—	—	0.19 **
Age \times DM	—	—	-0.00	—	0.01
Severity \times DM	—	—	—	0.10	0.06
Age \times Severity \times DM	—	—	—	—	-0.05
AIC	1849	1844	1851	1849	1848
R^2	0.51	0.52	0.51	0.51	0.53
Likelihood ratio test (LR)	—	7.07 **	0.00	1.68	8.54
Degrees of freedom	—	1	1	1	4

Note. ** $p < 0.01$, *** $p < 0.001$.

Figure 2 shows this two-way interaction (age \times severity). The association of age is plotted at four severity levels—mild (1), moderate (2), severe (3), and very severe (4). These findings suggest that dispositional mindfulness is unlikely to contribute to shorten the rehabilitation period with very severe injuries, particularly for older players.

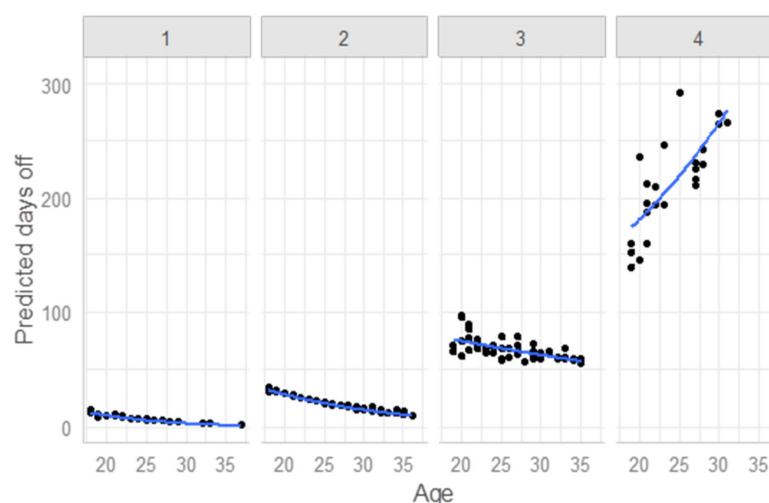


Figure 2. Association of age with predicted days off at four severity levels (1: mild; 2: moderate; 3: severe; 4: very severe).

4. Discussion

This study aimed to investigate the association of dispositional mindfulness with the days off due to an injury with a group of competitive soccer players. It was examined whether dispositional mindfulness contributed to explain additional variance beyond age and injury severity in the length of recovery. As expected, age and injury severity were strongly related to length of recovery, with a two-way interaction model (age \times severity) suggesting that age was positively associated with length of recovery for players with very severe injuries. The findings revealed that older soccer players undergoing very severe injuries took longer rehabilitation processes than younger players.

Age and injury severity were the most important factors associated with recovery length. More severe injuries implied longer recovery periods to return to play, whereas older players experienced longer rehabilitation than younger players because of needing longer healing processes and being at a higher risk of severe injuries [17]. A higher prevalence of degenerative injuries than contact injuries is more likely in older players who have usually endured a higher number of previous injuries leading to eventual chronic impairments [20]. In contrast, individual differences in dispositional mindfulness were unrelated to a longer recovery period.

Because every injured player aims to return to play as soon as possible, returning too early risks the elicitation of a new injury involving other consequences such as losing training days, career interruptions, pain, and regular rehabilitation. Whether a higher level of dispositional mindfulness may trigger the awareness of these consequences when facing an injury because of having experienced them already in the past remains uncertain. In contrast, younger players might be more likely to experience a greater pressure to play, returning to play too early and increase the risk of injury because of excessive workload [21].

Dispositional mindfulness is linked to psychological flexibility or decentering to cope with chronic pain, which might enhance the focus on extending rest until healing. Mindfulness and stress-based interventions have been shown to be effective in preventing the occurrence of injuries and alleviating pain [11–13], as well as improving psychological resources in athletes [6,8,9]. In the light of the current findings, it could be speculated whether mindfulness training could contribute to improving the quality of injury rehabilitation as a result of enhancing the awareness of the benefits derived from longer resting periods and enhancing the coping resources and resilience [20]. In this view, the use of mindfulness interventions as a complement for injury rehabilitation remains inconclusive.

The rather reduced sample size of the study, which is in addition constrained to a limited geographical area, somewhat limits the generalization of the findings. Moreover, it could be argued that the cross-sectional nature of the current analyses hampers the assumption of causation amongst the study variables. Nonetheless, the association of both, age and injury severity with the length of rehabilitation is robust and well established. Injuries are highly stressful events in professional sport with a remarkable impact on wellbeing when needing prolonged recovery. As expected, the current findings revealed that age and injury severity were the most important factors associated with recovery length.

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