

# College Athletes With Ankle Sprain History Exhibit Greater Fear-Avoidance Beliefs

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**Context:** Postinjury, college athletes have reported elevated levels of fear. However, it is unclear how a history of ankle sprain impacts injury-related fear. **Objective:** The aim of this study was to determine if Fear-Avoidance Beliefs Questionnaire (FABQ) scores differ between college athletes with a history of a single ankle sprain, those with recurrent ankle sprains, and healthy controls. **Design:** Cross-sectional design. **Setting:** National Collegiate Athletic Association institutions. **Patients:** From a large database of college athletes, 75 participants with a history of a single ankle sprain, 44 with a history of recurrent ankle sprains ( $\geq 2$ ), and 28 controls with no injury history were included. **Main Outcome Measures:** Participants completed an injury history questionnaire and the FABQ. On the injury history form, the participants were asked to indicate if they had ever sustained an ankle sprain and, if yes, to describe how many. FABQ scores ranged from 0 to 66 with higher scores representing greater fear. **Results:** Athletes with a history of recurrent ankle sprains (median, 28.00; interquartile range, 18.25–38.00) reported higher levels of fear than those with a history of a single ankle sprain (21.00; 8.00–31.00;  $P = .03$ ; effect size = 0.199) and healthy controls (5.50; 0.00–25.00;  $P < .001$ ; effect size = 0.431). Athletes with a history of a single sprain reported greater fear than healthy controls ( $P = .01$ , effect size = 0.267). Athletes with a history of a single sprain reported greater fear than healthy controls ( $P = .02$ , effect size = 0.23). **Conclusions:** College athletes with a history of ankle sprain exhibited greater levels of fear on the FABQ than healthy controls. These findings suggest that ankle sprains in general may increase injury-related fear and that those with a history of recurrent sprains are more vulnerable.

**Keywords:** fear of reinjury, ankle injury, psychosocial

Almost half of all ankle sprains in the United States occur during athletic activity.<sup>1</sup> Each year ankle sprains account for roughly 15% of all injuries to National Collegiate Athletic Association student-athletes, with the majority sustained by the lateral ligamentous complex.<sup>2</sup> Although basketball, football, and soccer are commonly associated with the highest percentage of ankle sprains, athletes engaging in other tasks are also vulnerable; approximately 10% of gymnastic<sup>3</sup> and strength and conditioning injuries<sup>4</sup> are ankle sprains. As ankle sprain is a relatively common injury, clinicians have become comfortable treating the physical impairments (ie, range of motion deficits and strength deficits). However, little is known about the psychosocial factors, such as injury-related fear, that contribute to an individual's disablement following an ankle sprain.

Physical and psychological readiness to return to athletic activity is not always synonymous.<sup>5</sup> Consequently, psychological perceptions, such as injury-related fear, are being increasingly recognized as important to recovery and rehabilitation. Injury-related fear is an umbrella term that encompasses pain-related fear, kinesiophobia, and fear-avoidance beliefs. Currently, the only way to measure such fears is through patient-reported outcomes. For more than 3 decades, the Tampa Scale of Kinesiophobia (TSK) and Fear-Avoidance Beliefs Questionnaire (FABQ) have been the predominant instruments used to measure injury-related fear. The TSK measures kinesiophobia, a condition in which a patient

has an excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury.<sup>6</sup> The FABQ quantifies fear-avoidance beliefs<sup>7</sup> as they pertain to physical activity and work. Elevated levels of fear have contributed to disablement in patients with low back pain<sup>8</sup> and patellofemoral pain<sup>9</sup> and following anterior cruciate ligament reconstruction.<sup>10</sup> Furthermore, acutely injured high-school and college athletes have exhibited increased fear.<sup>11</sup> It is clear that injury-related fear can affect a range of athletes with various orthopedic conditions.

Despite increased fears in other populations, the literature pertaining to injury-related fear in patients with a history of ankle sprain is limited. In a case report,<sup>12</sup> a patient recovering from a medial ankle sprain reported increased fear on the TSK at 3 and 5 months postinjury when compared with the preinjury level and a healthy control. The increased fears also corresponded to an overall decrease in physical activity over the 5-month period.<sup>12</sup> In addition, individuals with chronic ankle instability (CAI), a condition characterized by recurring ankle sprains and repetitive bouts of the ankle giving way,<sup>13</sup> have reported greater fear on the TSK and FABQ than individuals with no history of ankle sprain.<sup>14</sup> However, another investigation<sup>15</sup> did not detect differences in TSK scores between copers (ie, an individual with a history of ankle sprain who does not experience residual symptoms) and individuals with CAI, despite both groups having a history of ankle sprain. Thus, additional research is needed to determine how a history of ankle sprain impacts injury-related fear.

Expanding understanding of injury-related fear may provide new perspective into the long-term sequelae and diminished physical activity experienced years after the initial ankle sprain injury. Thus, the purpose of this study was to determine if FABQ scores differ between college athletes with a history of a single ankle

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sprain, those with a history of recurrent sprains, and healthy controls. We hypothesized that athletes with a history of ankle sprain would exhibit greater fear-avoidance beliefs than those with no history and that those with recurrent sprains would report the greatest fear-avoidance beliefs.

## Methods

### Design

A cross-sectional design was used to examine the influence of an ankle sprain history on fear-avoidance beliefs. For the independent variable, participants were divided into 3 groups: those with a history of a single ankle sprain, those with a history of recurrent ankle sprains, and those with no injury history. FABQ scores served as the dependent variable.

### Participants

From a large cohort of college athletes, 75 (37 males and 38 females) participants with a history of a single ankle sprain, 44 (11 males and 33 females) with a history of recurrent sprains ( $\geq 2$ ), and 28 (16 males and 12 females) controls with no injury history were included. Athletes with a current injury or any history of surgery were excluded. Table 1 depicts demographic variables as well as class and sport frequency distributions by group. The source population included 469 athletes from 3 National Collegiate Athletic Association institutions.<sup>16</sup> The study was approved and conducted in compliance with each university's institutional review board. All participants were asked to review a cover letter and, upon agreeing to participate, proceed to the study questionnaires.

### Procedures

Participants completed a self-reported injury history questionnaire and a modified FABQ during organized team meetings. The injury history questionnaire contained 15 categories of sports-related injuries. Those categories ranged from specific injuries, such as concussion and ankle sprain, to broad categories like shoulder and knee injuries. For this analysis, the participant was asked to indicate if they had ever sustained an ankle sprain and, if yes, to describe how many, and to list any history of orthopedic surgery. It should be noted that no time restrictions were instituted for the injury history, and participants were instructed to report any ankle sprain that they could recall over the course of their lifetime. The original FABQ was developed to assess fear-avoidance behavior related to physical activity and work in patients with low back pain.<sup>7</sup> To apply the instrument to athletes, we used previously described modifications<sup>9,11</sup> and replaced the word "back" with "injury" and "work" with "sports." Scores on the 16-item FABQ ranged from 0 to 66, with higher scores representing greater fear. Participants scored each item on a 7-point Likert scale ranging from 0 (completely disagree) to 6 (completely agree). The original and modified versions of the FABQ have demonstrated good test-retest reliability (intraclass correlation coefficient = .52–.96) and internal consistency ( $\alpha = .52$ –.92) values in patients with low back pain,<sup>7,17</sup> patellofemoral pain,<sup>9</sup> and anterior cruciate ligament reconstructions.<sup>18</sup>

### Statistical Analyses

A Kruskal-Wallis test was used to compare FABQ scores across groups. Mann-Whitney *U* tests were performed to determine where group differences occurred. Descriptive statistics for FABQ scores were reported as median and interquartile range. Alpha was set at

**Table 1 Demographics, Class, and Sport Frequency Distributions by Group**

	Single ankle sprain (n = 75; 37 males and 38 females)	Recurrent ankle sprains (n = 44; 11 males and 33 females)	Controls (n = 28; 16 males and 12 females)
Age, y	19.5 (1.4)	19.3 (1.0)	19.4 (1.3)
Height, cm	174.8 (10.8)	170.9 (8.7)	173.1 (11.1)
Weight, kg	71.5 (12.8)	68.3 (11.4)	72.7 (14.9)
Freshman	28 (37.3%)	12 (27.3%)	10 (35.7%)
Sophomore	19 (25.3%)	18 (40.9%)	9 (32.1%)
Junior	13 (17.3%)	9 (20.5%)	5 (17.8%)
Senior	14 (18.7%)	5 (11.4%)	4 (14.3%)
5th Year	1 (1.3%)		
Baseball/softball	11	7	5
Basketball	5	3	4
Cross country/track and field	15	3	4
Field hockey	4	1	
Football	5	1	1
Golf			3
Lacrosse	8	8	
Sailing		1	3
Soccer	13	13	
Swimming and diving	4		8
Tennis	4	3	
Volleyball	2	4	
Wrestling	4		

$P \leq .05$  for all analyses. Nonparametric effect sizes (ESs) were estimated using  $z$  values and interpreted as small (0.10–0.29), medium (0.30–0.49), and large ( $\geq 0.50$ ). SPSS software (version 22; IBM Corporation, Armonk, NY) was used to conduct all statistical analyses.

## Results

The FABQ scores demonstrated group differences ( $P \leq .001$ ). Athletes with a history of recurrent ankle sprains (median, 28.00; interquartile range, 18.25–38.00) reported higher levels of fear than those with a history of a single ankle sprain (21.00; interquartile range, 8.00–31.00;  $P = .03$ ; ES = 0.199) and healthy controls (5.50; interquartile range, 0.00–25.00;  $P < .001$ ; ES = 0.431) (Figure 1). Athletes with a history of a single sprain reported greater fear than healthy controls ( $P < .01$ , ES = 0.267).

## Discussion

The purpose of this cross-sectional investigation was to determine if injury-related fear differed between college athletes with a history of a single ankle sprain, those with a history of recurrent sprains, and controls with no history of injury. As anticipated, athletes with a history of recurrent ankle sprains reported the highest levels of fear on the FABQ. Athletes with a history of a single ankle sprain reported higher levels of fear than the control group; however, their scores were still significantly lower than those of the recurrent sprain group. The average difference between groups was approximately 8 points on the FABQ. Although the literature pertaining to score differences is scarce, small to medium ES were found between groups. These findings suggest that having a history of ankle sprain increases fear-avoidance beliefs, and a recurrent sprain history appears to make college athletes most vulnerable to fear.

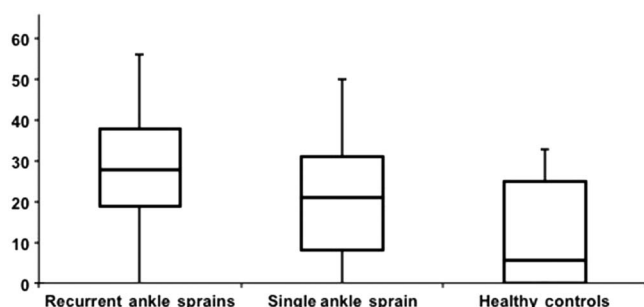
This is not the first study to observe heightened injury-related fear in individuals with a history of ankle sprain. Individuals with CAI have reported greater levels of fear than healthy controls on the TSK-17, TSK-11, and FABQ.<sup>19,20</sup> Although we do not know when such fears begin to affect everyday function or impact physical activity, greater fear has been associated with diminished self-reported function. A moderate correlation ( $r = .503$ ) was observed between the FABQ and the Disablement in the Physically Active Scale—Physical Summary Component in college athletes with a history of injury.<sup>16</sup> This suggests that as fear increases, the patient's

perception of function decreases. Furthermore, kinesiophobia scores contributed to self-reported disability on the Lower-Extremity Functional Scale in patients with foot and ankle pathologies, with 40% of those pathologies representing ankle sprains.<sup>21</sup> As heightened fears contribute to self-reported disability in those with foot and ankle pathologies<sup>21</sup> and college athletes with a history of injury<sup>16</sup> and also to disability and low levels of physical activity in individuals with patellofemoral pain<sup>22</sup> and patients post-ACL reconstruction,<sup>23</sup> these fears should be considered when selecting treatments and developing rehabilitation plans. However, given that only 6.8% of individuals who sustain a lateral ankle sprain receive formal therapy,<sup>24</sup> it is imperative that clinicians prescribe the standard of care (external support and rehabilitation) and adequately educate patients on the long-term consequences of ankle sprains left untreated. In addition, until specific rehabilitation strategies are proven effective at combating fear, the clinician should monitor fear and functional outcomes (ie, with the Foot and Ankle Ability Measure and Lower-Extremity Functional Scale), identify deficits (ie, difficulty walking up stairs, pivoting, and cutting), and ensure that those self-perceived impairments are targeted via therapeutic exercise.

It should be noted that all athletes included in the current investigation, even healthy controls, reported higher FABQ scores than a previous cohort of nonathletes with CAI (19.00 [11.40]),<sup>14</sup> suggesting that the unpredictable movements associated with many sports may contribute to greater fear. For example, a soccer player cannot predict what motions (ie, cutting, sprinting, or pivoting) will be required for him to successfully execute a pass on the field; however, a nonathlete can go to a fitness center and control the types of activity (ie, swimming or biking) performed. Furthermore, those with recurrent sprains (28.00; interquartile range, 18.25–38.00) reported scores similar to acutely injured athletes surveyed 3 weeks postinjury (28.00; interquartile range, 22.00–33.9).<sup>11</sup> As none of the athletes in the present study had a current injury, this raises concern. Future research should seek to determine if greater levels of fear make an individual more susceptible to injury.

An emotionally disruptive injury experience may take a greater toll on an athlete for whom a return to sports is central to lifestyle and personal identity.<sup>25</sup> Although the exact cause of greater fear is not yet known, monitoring and addressing it is imperative, as athletes returning to sports may experience hesitancy, avoidance, poor performance, or muscular guarding, all of which may increase the likelihood of injury.<sup>25</sup> There is limited evidence from a cross-sectional study<sup>26</sup> that ankle mechanics and sensorimotor control contributed to greater fear-avoidance beliefs in individuals with CAI. More specifically, poor postural control, increased anterior ankle laxity, and inversion rotation contributed to increased FABQ scores in those with CAI.<sup>26</sup> Thus, rehabilitation programs that emphasize balance in combination with bracing or taping may help to decrease fear in these athletes. Furthermore, continued rehabilitation for those with a history of ankle sprain and monitoring of fear or reinjury may be warranted, even after the impairments of a recurrent episode of giving way have resolved.

Clinician and patient perceptions of function following musculoskeletal injury, specifically ankle sprains, often differ.<sup>27</sup> Larmer et al<sup>27</sup> explored self-perception of function in patients with ankle sprains and found that, despite reassurance from their clinicians, patients still exhibited fear and apprehension that the ankle had not returned to normal when discharged. Furthermore, participant interviews confirmed that patients had a fear of reinjury until they actually performed tasks that were perceived as difficult.<sup>27</sup> Accordingly, clinicians should be cognizant of the patient's



**Figure 1** — Box and whisker plots of Fear-Avoidance Beliefs Questionnaire scores by group. The box plots display the upper quartile (75th), median, and lower quartile (25th). The upper and lower margins of the whiskers reflect the maximum and minimum observations.

perception and encourage patients to perform physical tasks under their supervision to cultivate confidence and mitigate fear. In addition to targeting the patient's functional and mechanical insufficiencies to combat injury-related fear, clinicians should ensure a psychologically minded rehabilitation program that utilizes an open line of communication with the patient.

The current investigation was not without limitations. Although athletes with a history of surgery or current injury were excluded, it is unclear how other musculoskeletal injuries in the athletes' histories or how seeking treatment may have influenced FABQ scores. At this time, it is also unclear how sports participation may contribute to injury-related fear. However, in the current study we compared FABQ scores in athletes engaged in limited contact ( $n = 29$ ), contact/collision ( $n = 70$ ), and noncontact sports ( $n = 48$ ) and did not observe a significant difference ( $P = .14$ ). Thus, although a soccer player may be more restricted by a lower-extremity injury than a swimmer, these differences appear unlikely to influence FABQ values. Lastly, the ankle sprain history was self-reported, and the time since last injury was not taken into account. Future research should prospectively examine the impact of fear-avoidance beliefs on performance and risk of reinjury, as well as determine how severity and type (ie, medial or lateral) of ankle sprain affect injury-related fear. Moreover, efforts should be dedicated to identifying rehabilitation strategies that effectively diminish injury-related fear.

## Conclusions

College athletes with any history of ankle sprain exhibited greater injury-related fear on the FABQ than healthy controls. These findings suggest that ankle sprains, in general, may increase injury-related fear, and individuals with a history of recurrent sprains appear to be more vulnerable. Accordingly, injury-related fear should be addressed during rehabilitation.

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