

Development and Validation of the Athlete Fear Avoidance Questionnaire

Geoffrey Dover, PhD, CAT(C), ATC; Vanessa Amar, MSc, CAT(C)

Department of Exercise Science, Concordia University, Montreal, Quebec, Canada

Context: The fear-avoidance model was developed in an attempt to explain the process by which “pain experience” and “pain behavior” become dissociated from the actual pain sensation in individuals who manifest the phenomenon of exaggerated pain perception. High levels of fear avoidance can lead to chronic pain and disability and have successfully predicted rehabilitation time in the work-related–injury population. Existing fear-avoidance questionnaires have all been developed for the general population, but these questionnaires may not be specific enough to fully assess fear avoidance in an athletic population that copes with pain differently than the general population.

Objective: To develop and validate the Athlete Fear Avoidance Questionnaire (AFAQ).

Design: Qualitative research to develop the AFAQ and a cross-sectional study to validate the scale.

Patients or Other Participants: For questionnaire development, a total of 8 experts in the fields of athletic therapy, sport psychology, and fear avoidance were called upon to generate and rate items for the AFAQ. For determining concurrent validity, 99 varsity athletes from various sports participated.

Data Collection and Analysis: A total of 99 varsity athletes completed the AFAQ, the Fear-Avoidance Beliefs Questionnaire, and the Pain Catastrophizing Scale. We used Pearson correlations to establish concurrent validity.

Results: Concurrent validity was established with significant correlations between the AFAQ and the Fear Avoidance Beliefs Questionnaire–Physical Activity ($r = 0.352$, $P > .001$) as well as with the Pain Catastrophizing Scale ($r = 0.587$, $P > .001$). High internal consistency of our questionnaire was established with a Cronbach α coefficient of 0.805. The final version of the questionnaire includes 10 items with good internal validity ($P < .05$).

Conclusions: We developed a questionnaire with good internal and external validity. The AFAQ is a scale that measures sport-injury–related fear avoidance in athletes and could be used to identify potential negative psychological barriers to rehabilitation.

Key Words: fear-avoidance model, scale, sports, athletic injuries, rehabilitation, psychology

Key Points

- We developed and validated the Athlete Fear Avoidance Questionnaire to assess pain-related fear in athletes.
- Pain-related fear or fear avoidance plays a critical role in the rehabilitation of patients with low back pain and work-related injuries. High levels of fear avoidance in athletes may affect rehabilitation times.

Most health professionals who work with injured athletes have encountered situations in which an athlete was struggling psychologically to return to play or the duration of rehabilitation was disproportionate to the athlete’s initial physical dysfunction. To date, a few scales measure athletes’ readiness to return to play, such as the Sports Inventory for Pain and the Injury–Psychological Readiness to Return to Sport Scale.^{1,2} The Sports Inventory for Pain was developed specifically to identify beneficial and detrimental pain-coping strategies among the athletic population, but the authors worked with a student population to generate the items on the questionnaire, rather than a panel of experts in the field, and they did not establish concurrent validity. The Injury–Psychological Readiness to Return to Sport Scale was developed as a tool to assess an athlete’s confidence and psychological readiness to go back to play; however, it was designed to be administered at the end of an athlete’s rehabilitation process and, therefore, cannot be used to address psychological barriers at the beginning of rehabilitation that may lengthen the time to return to play.² Neither

scale has been used extensively, but the fear-avoidance model (FAM), a psychological model well established in the general population, has been used extensively for its predictive value. For example, Sullivan et al³ noted that the Pain Catastrophizing Scale (PCS) has been cited more than 900 times on Web of Science since 1995.

The FAM is based on the emotional reaction of pain perception and high levels of fear avoidance that can lead to dysfunction.⁴ The FAM was created in an attempt to explain the development of chronic pain from acute pain. The model comprises 4 components: fear of pain, kinesiophobia, fear avoidance belief, and catastrophizing. According to the FAM, exaggerated pain perception could lead to the development of chronic pain,⁴ and fear of pain is a main focus. There are 2 possible coping reactions to fear of pain: confrontation and avoidance. Individuals who experience elevated levels of fear of pain with signs of fear avoidance in response to acute pain are more likely to develop chronic pain than those who confront their fear of pain.⁴ The FAM assessment tools were all developed for the general population or patients with chronic low back

pain. The main questionnaires used to assess the 4 components of the FAM are the Fear of Pain Questionnaire–III, the PCS, the Tampa Scale for Kinesophobia, and the Fear-Avoidance Beliefs Questionnaire (FABQ). The FABQ was developed in part for patients with work-related injuries.⁵ Injured varsity athletes may not relate to work-specific items on the FABQ, such as “My pain was caused by my work or by an accident at work.” Although some of the questionnaires, such as the PCS, have been validated on athletes, they were not developed specifically for the athletic population.⁶ In fact, the FAM questionnaires can be used to predict outcomes.^{7,8} Klenerman et al⁷ conducted a study to determine whether chronic pain could be predicted from acute low-back pain in the general population. Results indicated that patients with acute low-back pain either will improve within 2 months or will develop chronic pain and that the FAM appears to be the best predictor of the course of low-back pain within the first 2 months.⁷ In another study, Fritz and George⁸ aimed to identify psychosocial factors that could predict return to work in patients with acute work-related back pain. The results revealed that the FABQ-Work (FAB-W) was the strongest predictor of work status and may be used to predict return to work in patients with acute work-related low-back pain.⁸ The authors of the PCS also established that people who catastrophize have higher levels of pain and disability than people who do not.⁹

Some studies have indicated that parts of the FAM can influence athletes’ rehabilitation.^{6,10,11} Kvist et al¹⁰ also reported on the psychological effect an injury can have on a player. Of the 47% who did not return to their sport, 24% did not return to play because of their fear of reinjury.¹⁰ People who returned to their preinjury levels of activity had the lowest levels of fear of reinjury, whereas people who did not return to their preinjury levels of activity had a higher fear of reinjury.¹⁰ The results of these studies might have been stronger using a scale that was developed specifically for athletes. To date, no questionnaire or scale has been specifically developed to assess fear avoidance or pain-related fear in athletes, who differ from the general population in their mentality and reality (ie, the role of sports or activity in their lives). Furthermore, athletes are exposed to pain and sports injuries relatively often, so knowing whether fear avoidance is a major concern among that population is important. Therefore, taking fear avoidance into account might be useful to establish the most appropriate and effective rehabilitation plan and, consequently, to reduce the time for return to play. A questionnaire specific to athletes might help establish how the FAM or pain-related fear can influence the athletic population, specifically regarding rehabilitation.

Therefore, the aims of our study were to develop and validate the Athlete Fear Avoidance Questionnaire (AFAQ). We used a qualitative study design, a modified Delphi technique, to develop the scale and then a cross-sectional study to establish its validity.

METHODS

Questionnaire Development

Participants. A total of 8 experts in the fields of athletic therapy, sport psychology, and fear avoidance contributed to the development of the scale. We used a modified Delphi

method which is a valid method of scale development starting with contributions from experts.^{2,12} We initially gathered a panel of 5 experts to contribute to the topics and types of questions for the scale (Figure 1). Five experts have been suggested as the appropriate number of panel members for scale development in sport psychology.¹³ This number provides enough experts to give direction for the scale but few enough people that each voice is heard. The experts were chosen so that the various aspects of our questionnaire (athletic therapy, athletes, sport psychology, and fear avoidance) would all be considered.¹² The panel consisted of a university head athletic therapist with more than 30 years’ experience; another head athletic therapist who had worked at a university for the past 7 years; a university men’s basketball head coach who had been named coach of the year 13 times in 24 seasons in his conference; a university professor who developed the PCS, which is one aspect of the FAM; and a mental performance consultant who was also a former athlete and worked with collegiate and national-level athletes. Although each expert had credentials in different areas, they all shared expertise in dealing with return-to-play decisions for athletes who are injured or in pain. All had experience with athletes who were not able to compete or chose not to compete because of injury. We counted on this expertise, regarding athletes competing or not because of pain or injury, in developing the scale. Before the meeting, we provided each panel member with information on the various aspects of the FAM and had them think of possible items to suggest for our scale based on their respective experiences.

On the day of the panel meeting, all experts were present in the same room. We started the meeting with a group discussion on fear avoidance and how each expert had encountered fear avoidance throughout his or her experience and line of work. Then panel members were asked to provide outcome-dependent items they considered relevant for an athletic fear-avoidance questionnaire. Members were also requested to provide terminology they encounter when interacting with athletes. Athlete-specific terminology is critical to generate a scale that resonates with athletes. We asked the experts to supply words or sentences that they heard injured athletes use regularly to reflect their reality in the items of the scale. Using athlete-specific terminology regarding fear avoidance increased the chance of generating a valid scale. Then these words and phrases were formed into items, which were essentially the statements on the questionnaire that the participants would rate or answer. All items generated by the experts throughout the meeting were gathered. After the meeting, we sent all items to all panel members to give them an opportunity to revise and comment outside of the group environment. This is an important process because not all panel members might feel comfortable verbalizing any conflicting thoughts in person. After we received the panel’s comments, we revised and submitted 30 items as a whole to 8 experts. The experts consisted of 4 of the 5 original panel members and 4 new experts. After the initial 5 experts created the items, 1 member discontinued involvement in the study. We had additional experts rate the scale in order to increase the robustness of our analysis. The 4 additional experts included the director of the sport psychology research laboratory at a university and 3 other certified athletic therapists who had experience with professional or varsity



Figure 1. Questionnaire development procedure.

athletes. The experts were invited to offer further suggestions. We asked them to rate each item based on how accurately it would measure fear avoidance in athletes and in terms of relevance on a scale from 1 (*no match*) to 5 (*excellent match*).

After the 2 rounds of comments and ratings from the experts, 24 items remained. Six items were removed were eliminated because of consistently poor ratings or because 1 expert provided a good rationale for exclusion. We analyzed the ratings of the 24 items from the 8 experts to generate a V coefficient.¹⁴ The V coefficient, or content-validity coefficient, is a statistical method developed by Aiken¹⁴ to analyze data from validity judgments or ratings (eg, experts' ratings). The V coefficient can range from 0 to 1, with a high value indicating that an item has high content validity.¹⁴ The V coefficient is generated by the formula provided by Aiken¹⁴ based on the number of items, number of judges, and rating system: $V = S/[n(c - 1)]$, where S is the sum of each score minus 1, n is the number of raters who scored the scale, and c is the total number of values available for each answer on the scale. We determined the statistical significances ($P < .05$) of the V coefficients by comparing our V coefficients with the right-tailed binomial probability table provided by Aiken.¹⁴ The probability table supplies the minimal V-coefficient values needed to reach significance, depending on the number of items and judges. We eliminated the items that did not meet the required V-coefficient value,

which resulted in reducing the original 30 items to 11. One of the 11 items was removed because its wording would have required a different rating system. The item ("I can't wait to go back to play") would have generated a high value for an individual with low fear avoidance, which would be contrary to the rest of the items. The final questionnaire comprises 10 items (Figure 2).

Establishing Concurrent Validity of the AFAQ

Participants. A total of 103 university varsity athletes from various sports (soccer, rugby, football, basketball, and hockey) participated. The sample consisted of 23 injured athletes and 80 athletes who currently uninjured but had a history of previous injury.

Procedure. We asked the participants to fill out the AFAQ, the FABQ, and the PCS (Figures 3 and 4). Each participant signed a consent form, approved by our institution's board of ethics, for their data to be used and was assured that the information acquired would stay confidential. The board also approved the study.

RESULTS

Questionnaire Development

Four athletes either did not complete items or left them blank; these data were eliminated. The data from the

Name:

Sport:

Date:

Athletic Fear Avoidance Questionnaire (AFAQ)

Instructions: We are interested in your feelings or thoughts when in pain as a result of a sport injury. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are in pain due to a sports injury.

Rating	1	2	3	4	5
Meaning	Not at all	To a slight degree	To a moderate degree	To a great degree	Completely agree

Statement	Rating
1. I will never be able to play as I did before my injury	
2. I am worried about my role with the team changing	
3. I am worried about what other people will think of me if I don't perform at the same level	
4. I am not sure what my injury is	
5. I believe that my current injury has jeopardized my future athletic abilities	
6. I am not comfortable going back to play until I am 100%	
7. People don't understand how serious my injury is	
8. I don't know if I am ready to play	
9. I worry if I go back to play too soon I will make my injury worse	
10. When my pain is intense, I worry that my injury is a very serious one	

Figure 2. Athlete Fear Avoidance Questionnaire.

Pain Catastrophizing Scale

Sullivan MJL, Bishop S, Pivik J. (1995)

Name:

Age:

Gender:

Date:

Male Female

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

Instructions:

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

RATING	0	1	2	3	4
MEANING	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time

When I'm in pain ...

Number	Statement	Rating
1	I worry all the time about whether the pain will end.	
2	I feel I can't go on.	
3	It's terrible and I think it's never going to get any better	
4	It's awful and I feel that it overwhelms me.	
5	I feel I can't stand it anymore	
6	I become afraid that the pain will get worse.	
7	I keep thinking of other painful events	
8	I anxiously want the pain to go away	
9	I can't seem to keep it out of my mind	
10	I keep thinking about how much it hurts.	
11	I keep thinking about how badly I want the pain to stop	
12	There's nothing I can do to reduce the intensity of the pain	
13	I wonder whether something serious may happen.	

Copyright 1995 Michael J.L. Sullivan. Reproduced with permission.
Source: Sullivan MJL, Bishop S, Pivik J. The pain catastrophizing scale: development and validation. *Psychol Assess*, 1995, 7: 524-532

Figure 3. Pain Catastrophizing Scale of Sullivan et al.³ Copyright ©1995 by the American Psychological Association. Reproduced with permission from Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale: development and validation. *Psychol Assess*. 1995;7(4):524–532.

Fear-Avoidance Beliefs Questionnaire (FABQ)
Waddell et al (1993) Pain , 52 (1993) 157 - 168

Here are some of the things which other patients have told us about their pain. For each statement please circle any number from 0 to 6 to say how much physical activities such as bending, lifting, walking or driving affect or would affect *your* back pain.

	Completely disagree	1	2	3	4	5	Completely agree
1. My pain was caused by physical activity.....	0	1	2	3	4	5	6
2. Physical activity makes my pain worse.....	0	1	2	3	4	5	6
3. Physical activity might harm my back.....	0	1	2	3	4	5	6
4. I should not do physical activities which (might) make my pain worse	0	1	2	3	4	5	6
5. I cannot do physical activities which (might) make my pain worse.....	0	1	2	3	4	5	6

The following statements are about how your normal work affects or would affect your back pain

	Completely disagree	1	2	3	4	5	Completely agree
6. My pain was caused by my work or by an accident at work.....	0	1	2	3	4	5	6
7. My work aggravated my pain.....	0	1	2	3	4	5	6
8. I have a claim for compensation for my pain.....	0	1	2	3	4	5	6
9. My work is too heavy for me.....	0	1	2	3	4	5	6
10. My work makes or would make my pain worse.....	0	1	2	3	4	5	6
11. My work might harm my back.....	0	1	2	3	4	5	6
12. I should not do my normal work with my present pain.....	0	1	2	3	4	5	6
13. I cannot do my normal work with my present pain.....	0	1	2	3	4	5	6
14. I cannot do my normal work till my pain is treated.....	0	1	2	3	4	5	6
15. I do not think that I will be back to my normal work within 3 months.	0	1	2	3	4	5	6
16. I do not think that I will ever be able to go back to that work.....	0	1	2	3	4	5	6

Scoring

Scale 1: fear-avoidance beliefs about work – items 6, 7, 9, 10, 11, 12, 15.

Scale 2: fear-avoidance beliefs about physical activity – items 2, 3, 4, 5.

Source: Gordon Waddell, Mary Newton, Iain Henderson, Douglas Somerville and Chris J. Main, A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability, *Pain*, 52 (1993) 157 – 168, 166.

Figure 4. Fear-Avoidance Beliefs Questionnaire of Waddell et al.⁵ Reprinted with permission from Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain*. 1993;52(2):157-168.

Table 1. Athlete Fear Avoidance Questionnaire Interitem Correlation Matrix

Item	Item 9	b Value	
		Item 10	All Items
1	0.182	0.180	0.606
2	0.353	0.167	0.749
3	0.206	-0.013	0.516
4	0.257	0.133	0.435
5	0.230	0.185	0.677
6	0.423	0.283	0.487
7	0.376	0.219	0.684
8	0.502	0.208	0.655
9	1.000	0.585	0.698
10	0.585	1.000	0.491
All items	0.698	0.491	1.000

remaining 99 athletes were analyzed. Internal consistency of our questionnaire was established with a Cronbach α coefficient of 0.805 (standardized value = 0.804), and each individual item correlated with the total score ($\alpha > 0.4$; Table 1).

A factor analysis revealed eigenvalues of more than 1 for 4 items on our scale (items 1, 2, 5, and 7; Table 2). Factor analyses are used to identify groups of items that share a common underlying dimension, which varies from the other items and thus could be split into subscales.¹⁵ For example, the PCS has 3 subscales—rumination, magnification, and helplessness—that were identified in this manner. An *eigenvalue* is an estimate of variance explained by a specific factor, and a value of more than 1 indicates an above-average amount of variance.¹⁶ Using the eigenvalues and a factor analysis, we identified no subscales in the AFAQ.

Table 2. Athlete Fear Avoidance Questionnaire: Total Variance Explained

Item	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	3.740	37.401	37.401
2	1.498	14.983	52.384
3	1.080	10.801	63.185
4	1.005	10.053	73.238
5	0.697	6.968	80.206
6	0.603	6.026	86.232
7	0.483	4.828	91.059
8	0.335	3.351	94.410
9	0.300	3.001	97.411
10	0.259	2.589	100.000

Establishing Concurrent Validity of the AFAQ

The same sample of 99 athletes completed the AFAQ, the FABQ, and the PCS (Table 3). Correlating a new scale with an established scale is often done to establish concurrent validity.² We used the FABQ and the PCS because the FABQ had a number of work-related and back-specific questions. Moreover, the FABQ is one of the biggest contributors to the FAM. We included the PCS because it has been used in athletes before and is also one of the strongest contributors to the FAM. Average scores were 23.70 (SD = 6.98) of 50 on the AFAQ, 12.74 (SD = 5.98) of 24 on the FABQ-Physical Activity (FABQ-PA), 9.43 (SD = 8.81) of 42 on the FABQ-W score, and 16.75 (SD = 9.44) of 52 on the PCS.

Pearson correlations revealed the AFAQ was significantly correlated with the PCS ($r = 0.587, P < .001$), FABQ-Total ($r = 0.279, P = .005$), and FABQ-PA ($r = 0.352, P < .001$; Table 3). No significant correlations were identified between the AFAQ and FABQ-W ($r = 0.137, P = .176$).

DISCUSSION

Questionnaire Development

Good validity of the items generated was assured because all aspects of our questionnaire (ie, sport psychology, questionnaire development, athletic injuries, and athletic experiences) were addressed by our panel members' areas of expertise. A careful selection of experts that reflects the nature of the scale is key to establishing validity for a questionnaire.¹⁷ The V coefficient generated for each item assured the quantifiable and statistically significant validity of each item selected for the final version of the scale.

Furthermore, a high Cronbach α (0.805) indicated that internal consistency was good. The Cronbach α describes the extent to which items are related to each other and is a way of establishing reliability in the form of internal

Table 3. Pearson Correlations Between the Athlete Fear Avoidance Questionnaire (AFAQ) and Other Questionnaires

Correlation Between Questionnaires	r Value	P Value
AFAQ-Pain Catastrophizing Scale	0.587	<.001
AFAQ-Fear Avoidance Beliefs-Total	0.279	.005
AFAQ-Fear Avoidance Beliefs-Physical Activity	0.352	<.001
AFAQ-Fear Avoidance Beliefs-Work	0.137	.176

Table 4. Athlete Fear Avoidance Questionnaire Factor Analysis: Rotated Component Matrix

Item	Component			
	1	2	3	4
1	0.908	0.082	0.044	0.012
2	0.580	0.083	0.418	0.421
3	0.248	-0.078	0.112	0.832
4	0.050	0.008	0.843	-0.085
5	0.885	0.093	0.083	0.156
6	-0.030	0.589	-0.054	0.595
7	0.492	0.198	0.448	0.204
8	0.161	0.289	0.711	0.228
9	0.105	0.775	0.366	0.194
10	0.176	0.858	0.060	-0.180

consistency.^{18,19} A value above 0.7 is considered acceptable.¹⁹ However, a value above 0.9 would mean the items were measuring constructs that were too similar.²⁰ Similarly, Cronbach α values for the PCS, FABQ-W, and FABQ-PA were reported as 0.87, 0.88, and 0.77, respectively.^{3,5} The interitem correlation matrix reveals how each item correlates with the total score of the scale. The low coefficient (0.435) of item 4 ("I am not sure what my injury is") can be explained by the setting in which we collected data. All injured participants were assessed and treated by a certified athletic therapist and, therefore, were most likely aware of the nature of their injuries.

The factor analysis revealed no subscales within our questionnaires (Table 1). However, the fact that 4 items had eigenvalues above 1 but their values in the rotated matrix were not all above 0.7 suggests that our scale is complex in nature and measures different aspects of the FAM, such as fear-avoidance beliefs and catastrophizing thoughts (Tables 1 and 4). Therefore, the V coefficient and Cronbach α values show that we developed a complex questionnaire with good internal validity and consistency.

Concurrent Validity of the AFAQ

Concurrent validity was established by the significant correlations between our scale and the PCS and FABQ, which are existing, validated assessment tools of catastrophizing and fear-avoidance beliefs (Table 3).^{3,5} These results indicate that our scale accurately measures fear avoidance in athletes. The weaker correlations between our questionnaire and the FABQ-PA ($r = 0.352, P < .001$) compared with the PCS ($r = 0.587, P < .001$) can be explained by the different natures of the scales. The items of the FABQ are worded to address beliefs rather than actual emotions related to fear and are, as a result, 1 step removed from the actual fear. For example, item 4 of the FABQ-PA states, "I should not do physical activities which (might) make my pain worse." This item addresses a belief rather than the actual feeling evoked by the thought of taking part in physical activities. On the other hand, the items on the PCS address the feelings related to the pain more directly: "It's awful and I feel that it overwhelms me." The majority of our items were worded to describe the emotions an athlete might be feeling regarding an injury rather than what the athlete believes, which may explain the higher correlation with the PCS versus the FABQ-PA. The lack of any significant correlations between the FABQ-W and our questionnaire ($r = 0.137, P = .176$) was expected

because all the items on the FABQ-W are work related and therefore not relevant for athletes.

The very high correlation between our scale and the PCS does not necessarily mean that the scales are redundant, because they could measure 2 different constructs. Psychological characteristics in some constructs overlap. For example, depression and anxiety are overlapping constructs that are highly correlated and yet can be effectively measured as separate and specific constructs.^{21,22} Dobson²² reported an average correlation of 0.61 between depression and anxiety scales, including the Beck Depression Inventory and the State-Trait Anxiety Inventory with a correlation of 0.79 ($P < .0001$). With such high correlations, one might wonder if it is possible to accurately measure depression and anxiety as different constructs. Beck and George's²³ cognitive theory argues that depression and anxiety can be differentiated by their cognitive profiles. In depression, automatic thoughts are dominated by feelings of current loss and failure. In anxiety, thoughts are more future or prediction based and involve feelings of anticipated harm or danger.²⁴ Along the same principle as cognitive theory, Watson and Tellegen's²⁵ 2-dimensional model of affect suggests that 2 main factors describe mood: positive affect and negative affect. According to this model, depression can be described as having high level of negative affect and a low level of positive affect, whereas anxiety has only a high level of negative affect. Therefore, depression can be differentiated from anxiety by its state of anhedonia (low level of positive affect), which involves depressed physiology and behavior resulting in loss of pleasure in activities.²¹ Anxiety can be differentiated by hyperarousal physiology or anxious arousal.²¹ In a 2003 study,²¹ the Beck Depression Inventory accurately measured the anhedonia symptoms of depression and the Beck Anxiety Inventory accurately measured the hyperarousal symptoms of anxiety. The high correlation between the Beck Anxiety Inventory and Beck Depression Inventory scales was attributed to the high level of negative affect common to both anxiety and depression, which did not undermine each scale's capacity to accurately measure each construct.²¹ Hence, 2 scales can be highly correlated without necessarily being redundant.

Similar to depression and anxiety, the high correlation between our scale and the PCS does not necessarily mean that our scale is redundant. All aspects of the FAM (fear of pain, kinesiophobia, fear-avoidance belief, catastrophizing) overlap. However, different scales, such as the PCS and FABQ, measure different aspects of the model.²⁶ For example, although both the affective component of fear and catastrophizing deal with threat perception and hypervigilance, only catastrophizing addresses the ability to cope with pain (helplessness).²⁶ Furthermore, the FABQ was based on the same theoretical background as the Pain and Impairment Relationship Scale and the Survey of Pain Attitudes but added a work element that was not present in the 2 existing scales.⁵ We based our questionnaire on the same theoretical background as the FABQ and PCS but added a sport-specific aspect, which is not present in the PCS or the FABQ. The AFAQ can therefore be correlated with the PCS or FABQ because it measures similar overlapping principles without undermining the AFAQ's

effectiveness in specifically measuring athletic fear avoidance.

Limitations of this scale development were that it did not include a pain measure to track whether an athlete's being in pain or not would affect the results. In addition, as with other pain-related fear scales, sex and age may affect the results. Additional testing will be needed to compare pain-related fear in athletes between males and females and across age ranges. In addition, further validation is needed to correlate results on the AFAQ with return-to-play time in injured athletes.

CONCLUSIONS

The AFAQ is a scale that measures injury-related fear avoidance in athletes. This scale could be used by sports medicine professionals, including athletic therapists and athletic trainers, as an extra rehabilitation tool to identify fear avoidance in athletes as a potential negative psychological barrier to rehabilitation. Fear-avoidance scales for the general population have already been used to predict return to work and the development of chronic pain.^{7,8} Similarly, identifying athletes with high levels of fear avoidance using a sport-specific scale could allow clinicians to address this psychological barrier early in rehabilitation and potentially reduce the time until return to play.

ACKNOWLEDGMENTS

This study was partially funded by a research grant from La Corporation des Thérapeutes du Sport du Québec.

REFERENCES

1. Meyers MC, Bourgeois AE, Stewart S, LeUnes A. Predicting pain response in athletes: development and assessment of the sports inventory for pain. *J Sport Exerc Psychol*. 1992;14(1):249–261.
2. Glazer DD. Development and preliminary validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) scale. *J Athl Train*. 2009;44(2):185–189.
3. Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale: development and validation. *Psychol Assess*. 1995;7(4):524–532.
4. Lethem J, Slade PD, Troup JD, Bentley G. Outline of a fear-avoidance model of exaggerated pain perception—I. *Behav Res Ther*. 1983;21(4):401–408.
5. Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain*. 1993; 52(2):157–168.
6. Sullivan MJL, Tripp DA, Rodgers WM, Stanish W. Catastrophizing and pain perception in sport participants. *J Appl Sport Psychol*. 2000; 12(2):151–167.
7. Klenerman L, Slade PD, Stanley IM, et al. The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. *Spine (Phila Pa 1976)*. 1995;20(4):478–484.
8. Fritz JM, George SZ. Identifying psychosocial variables in patients with acute work-related low back pain: the importance of fear-avoidance beliefs. *Phys Ther*. 2002;82(10):973–983.
9. Sullivan MJ, Stanish W, Waite H, Sullivan M, Tripp DA. Catastrophizing, pain, and disability in patients with soft-tissue injuries. *Pain*. 1998;77(3):253–260.
10. Kvist J, Ek A, Sporrstedt K, Good L. Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2005;13(5):393–397.

11. Paparizos AL, Tripp DA, Sullivan MJL, Rubenstein ML. Catastrophizing and pain perception in recreational ballet dancers. *J Sport Behav.* 2005;28(1):35–50.
12. Gable RK, Wolf MB. *Instrument Development in the Affective Domain: Measuring Attitudes and Values in Corporate and School Settings.* 2nd ed. Boston, MA: Kluwer; 1993.
13. Lynn MR. Determination and quantification of content validity. *Nurs Res.* 1986;35(6):382–385.
14. Aiken LR. Three coefficients for analyzing the reliability and validity of ratings. *Educ Psychol Meas.* 1985;45(1):131–142.
15. Hair JF, Black W, Tatham RL, Anderson RE. *Multivariate Data Analysis.* 5th ed. Upper Saddle River, NJ: Prentice Hall; 1998.
16. Ferguson E, Cox T. Exploratory factor analysis: a users' guide. *Int J Sel Assess.* 1993;1(2):84–94.
17. Dunn JGH, Bouffard M. Assessing item content relevance in sport psychology scale-construction research: issues and recommendations. *Meas Phys Educ Exerc Sci.* 1999;3(1):15–36.
18. Dennick M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ.* 2011;2:53–55.
19. Pettersen KI, Veenstra M, Guldvog B, Kolstad A. The patient experiences questionnaire: development, validity and reliability. *Int J Qual Health Care.* 2004;16(6):453–463.
20. Streiner DL. Starting at the beginning: an introduction to coefficient alpha and internal consistency. *J Pers Assess.* 2003;80(1):99–103.
21. Beck R, Benedict B, Winkler A. Depression and anxiety: integrating the tripartite and cognitive content-specificity assessment models. *J Psychopathol Behav Assess.* 2003;25(4):251–256.
22. Dobson KS. An analysis of anxiety and depression scales. *J Pers Assess.* 1985;49(5):522–527.
23. Beck AT, Clark DA. Anxiety and depression: an information processing perspective. *Anxiety Res.* 1988;1(1):23–36.
24. Clark DA, Beck AT, Stewart B. Cognitive specificity and positive-negative affectivity: complementary or contradictory views on anxiety and depression? *J Abnorm Psychol.* 1990;99(2):148–155.
25. Watson D, Tellegen A. Toward a consensual structure of mood. *Psychol Bull.* 1985;98(2):219–235.
26. Wideman TH, Adams H, Sullivan MJ. A prospective sequential analysis of the fear-avoidance model of pain. *Pain.* 2009;145(1–2):45–51.

Address correspondence to Geoffrey Dover, PhD, CAT(C), ATC, Department of Exercise Science, Concordia University, 7141 Sherbrooke Street West, Montreal, Quebec H4B 1R6, Canada. Address e-mail to gdover@alcor.concordia.ca.

Online First