# VALIDATION OF THE FOOT AND ANKLE OUTCOME SCORE FOR USE IN INFRACALCANEAL HEEL PAIN

## Christopher Collazo, DPM, AACFAS; Alisha Joshi, BA; Lowell Weil, Jr., DPM, MBA, FACFAS; Matthew Sorensen DPM, FACFAS; Zachary Laidley, DPM; Erin Klein, DPM, MS, FACFAS; Adam Fleischer, DPM, MPH, FACFAS

#### **STATEMENT OF PURPOSE**

To attempt to validate the Foot and Ankle Outcome Score (FAOS) for use in patients with infracalcaneal heel pain (i.e., plantar fascilitis). FAOS is a commonly used patient-reported outcome measure (PROM) that has already been validated for use in several foot/ankle disorders, but not plantar fasciitis. This was accomplished by assessing the survey's construct validity, content validity, reliability and responsiveness in patients who had presented to our practice for treatment over the past 3 vears.

#### LITERATURE REVIEW

Heel pain is one of the most common complaints seen by the foot and ankle specialist and may be present in upwards of 11-15% of adults<sup>1</sup>. Plantar fasciitis is first treated with conservative, non-operative measures, and it is not uncommon to see most patients improve within 6 weeks of formal treatment. In fact, non-operative therapeutic regimens may see as many as 90% to 95% of patients experience resolution of symptoms within 1 year<sup>2,3</sup>. For those that do not improve with conservative measures, there are a variety of surgical and more invasive procedures available such as the plantar fasciotomy, ESWT, radiofrequency coblation, or the use of a gastrocnemius recession in combination with or without a plantar fasciotomy. Most of these procedures have been well described in the literature with good to excellent long-term outcomes, but most studies investigating the outcomes of surgical intervention for infracalcaneal heel pain have lacked the use of a validated patient-centered outcome measure



- > The use of validated outcome scores have become the standard to evaluate patient function before and after surgery<sup>4</sup>.
- > There is, furthermore, an increasing demand for validated patient-centered outcome measures in the use of foot and ankle pathologies<sup>5</sup>.
- > Despite being the most heavily used outcome score for heel patients, the AOFAS Hindfoot scoring scale is no longer recommended for use<sup>6,7</sup>.
- In addition to its failure to capture patient-reported outcomes, the AOFAS surgery has been shown to have poor construct validity<sup>8</sup>.
- > The American Orthopedic Foot and Ankle Society has even advised against the continued use of the AOFAS rating systems<sup>9</sup>.
- > The FAOS, in contrast, has been validated for multiple foot and ankle pathologies including hallux valgus, adult flatfoot, lateral ankle instability, ankle osteoarthritis, and most recently for hallux rigidus<sup>10</sup>.
- > FAOS is a 42-item questionnaire consisting of 5 different subcategories including: symptoms, pain, and functions of daily life, functions of sporting and recreational activities and quality of life, all pertaining to the foot and ankle.
- > The survey is entirely self-administered and can be completed in less than 10 minutes.

Rel

CO

RESP

## **METHODOLOGY**

		<ul> <li>A total c</li> </ul>
	Measures the importance of content in the FAOS	compone
	<ul> <li>Patients were contacted with the diagnosis of heel pain/ plantar fasciitis (ICD</li> </ul>	responsiv
	10 Code= M72.2) and inviting them to participate in a Qualtrics Survey (Week	•
		men and
	• The Qualtrics Survey consisted of the FAOS Survey with each item and a following supervision and the values of each item.	<ul> <li>Spearma</li> </ul>
	follow up question regarding the relevance of each item	correlatio
	• Each item of the FAOS was rated by participants based on relevance to	when cor
NTENT	current symptoms on a Likert Scale of 1-3	of 5 subs
	• 1> Of No Importance	compone
LIDITY	• 2> Of Somewhat Importance	SF-12
	• 3> Very Important	subdomain
	• Within each subscale, patient responses were summed then a mean score of 2	Physical
	or greater was considered to demonstrate an acceptable content validity.	health
		component
	• Construct Validity measures how well the FAOS correlates with a known,	Mental health
	validated measure of patient reported outcomes.	component
	• The SF-12 was used as the reference as it already has been validated for use in	
	foot and ankle pain.	Table 1. Co
	<ul> <li>Spearman's Correlation coefficients were calculated to compare the FAOS</li> </ul>	<ul> <li>A mean</li> </ul>
	against SF-12	acceptab
ISTRUCT	<ul> <li>A correlation coefficient: between 0.3 and 0.7 was considered a moderate</li> </ul>	<ul> <li>Three out</li> </ul>
	correlation, while below 0.3 suggested that the two instruments are poorly	content v
LIDITY	related to one another	<ul> <li>ICC representation</li> </ul>
		The tir
		administr
		all 18 sub
		• These s
	• The measure of consistency of the instrument when a single participant takes	
	the survey on 2 separate occasions (Week 0 and Week 4)	All five-
	<ul> <li>Patients who completed the Content Validity Portion at Week 0 and had</li> </ul>	reliability
	plateaued in the opinion of the PI in terms of treatment response were re-	FAOS Subscal
	surveyed at Week 4	
	• Intraclass correlation coefficients (ICC) were calculated, with a value of 0.7	Pain
ABILITY	indicating acceptable reliability	Symptoms
		Daily Activitie
		Sports/Recrea
		Quality of Life
		Table 3. Reli
		Four of
		effective
	<ul> <li>Responsiveness refers to the ability of an instrument to detect a change in national status following intervention</li> </ul>	• The effe
	patients' status following intervention	responsi
	<ul> <li>FAOS Data had been collected, both pre-operatively and post-operatively, since 2013, for bool pain patients</li> </ul>	FAOS Subscale
	since 2013, for heel pain patients • Analysis of EAOS scores was carried out using the Student's naired t test	
ONSIVE-	<ul> <li>Analysis of FAOS scores was carried out using the Student's paired t test (significance set at P&lt;0.05)</li> </ul>	Pain
ONSIVE	<ul> <li>Responsiveness is calculated via the effect size (ES) and Standard Response</li> </ul>	Symptoms
NESS	Mean (SRM) for each FAOS subscale	Daily Activities
		Sports/Recreat
		Quality of Life
		Table 4. Res

### www.WEIL4FEET.com

## RESULTS

of 58 patients were included in one or more of the four major 45 women).

an Correlation Statistics between 0.3 and 0.7 indicate moderate on. All FAOS subscales demonstrated adequate construct validity mpared with the physical health component of the SF-12, and 2 out scales demonstrated moderate correlation with the mental health ent of the SF-12. (Table 1)

<b>\</b>					
Stat	FAOS Pain	FAOS	FAOS ADLs	FAOS	FAOS QoL
		Symptoms		Sport/rec	
Correlation coefficient	0.3187	0.3701	0.3908	0.5079	0.4483
P value	0.0392	0.0118	0.0075	0.0003	0.0018
Correlation coefficient	0.3495	0.2676	0.3676	0.2353	0.2709
P value	0.0180	0.0754	0.0124	0.1202	0.0717

onstruct validity between SF-12 and FAOS (N=45).

score of 2 or greater was considered ble content validity

out of 5 subscales demonstrated satisfactory validity. (Table 2)

esents the intraclass correlation coefficient me between the first and second ration of the FAOS survey was 4 weeks for ojects.

subjects all related no change in their caneal symptoms between administrations.

with ICCs of 0.8 and higher. (Table 3)

Mean +/- SD
2.10 +/- 0.56
2.06 +/- 0.45
1.82 +/- 0.57
1.87 +/- 0.63
2.29 +/- 0.62

-subscale demonstrated good test-retest Table 2. Mean relevance scores for each FAOS subscale (N=34).

	Mean +/- SD first FAOS	Mean +/- SD second	ICC
		FAOS	
	60.6 +/- 22.8	58.2 +/- 19.2	0.926 (0.802, 0.972)
	61.1 +/- 20.4	57.6 +/- 20.7	0.929 (0.810, 0.973)
	71.9 +/- 22.8	68.7 +/- 23.3	0.892 (0.712, 0.960)
tion	62.8 +/- 29.7	69.4 +/- 27.3	0.896 (0.723, 0.961)
	46.1 +/- 23.0	40.4 +/- 20.5	0.827 (0.536, 0.935)

#### iability of FAOS subscales (N=18).

the 5 FAOS Subscales (all but Symptoms) were responsive to change after e treatment.

fect size (ES) indicates that sports/ rec and Quality of Life were the most sive subscales

	Pre-treatment score +/-	Post-treatment score +/-	p Value	ES
	SD	SD		
	58.1 +/- 20.2	78.3 +/- 13.4	0.0003	12.9
	66.9 +/- 14.5	70.8 +/- 16.6	0.2979	10.5
	68.0 +/- 18.7	85.9 +/- 9.0	0.0004	11.7
on	60.9 +/- 29.5	82.2 +/- 17.8	0.0245	25.4
	33.2 +/- 26.8	57.8 +/- 25.4	0.0176	27.6

ponsiveness of FAOS subscales (N=17).

## DISCUSSION

There remains a continued need for validated and reliable patient outcome measures ents of this study: construct validity, content validity, reliability, and in foot and ankle surgery. The FAOS has proven to be a reliable and validated patient iveness. The mean age of the population was 49.7 +/- 12.1 yrs (13 outcome measure for other foot and ankle pathologies. Our study demonstrates acceptable construct and content validity, reliability and responsiveness of the FAOS for Infracalcaneal Heel Pain. Construct validity shows the ability of an instrument to measure what it was intended to measure. In comparing the FAOS to the SF-12, all o the FAOS subscales demonstrated good overall correlation with the physical health component. There was poor correlation with the mental health component with 2 out or the 5 subscales demonstrating moderate correlation which is consistent with previous studies<sup>10</sup>. Content validity (relevance) of the FAOS from the patients perspective, was deemed relevant in 3 out of 5 subscales of the FAOS. The ADLs subscale trended towards relevance as in previous studies<sup>10</sup> and once again questions the ability of the ADLs subscale to adequately play a role in a patient's assessment of their outcome There was acceptable test-retest reliability across all 5 subscales of the FAOS, though the short time frame between assessments could bring in to question the ability of the FAOS to accurately assess the immediate and long term. Our findings of an ICC o 0.827 or greater, were as good if not better than previous literature<sup>10</sup>.The responsiveness of the FAOS when evaluating infracalcaneal heel pain was found to be significant in 4 out of 5 subscales with symptoms being not statistically significant. This could be due to the relatively small difference in the pre-treatment and post-treatment scores.

## CONCLUSION

Our study demonstrates that the FAOS is a responsive, reliable and valid patientreported outcome measure for infracalcaneal heel pain. The FAOS has been validated previously for hallux rigidus, lateral ankle ligament reconstruction, hallux valgus and adult acquired flatfoot deformity<sup>10</sup>. The continued applicability and validity of the FAOS as a patient-reported outcome measure for foot and ankle pathology demonstrates that the FAOS can reliably be used for infracalcaneal heel pain.

#### **R**EFERENCES

 Rompe JD. Plantar Fasciopathy. Sports Med Arthrosc Rev. 2009 Jun; 17 (2): 100-4. 2.Quaschnick MS. The diagnosis and management of plantar fasciitis. Nurse Pract. 1996 Apr; 21 (4): 50-4, 60-3, quiz 64-5. 3. Kinley S, Frascone S, et al. Endoscopic plantar fasciotomy versus traditional heel spur surgery: A Prospective Study. J Foot Ankle Surg. 1993 Nov-Dec; 32 (6): 595-603. 4. Patel AA, Donegan D, Albert. The 36-item Short Form. J Am Acad Orthop Surg. 2007 Feb; 15 (2):126-34. 5. Hunt KJ, Hurwitt D. Use of Patient-Reported Outcome Measures in Foot and Ankle Research. J Bone Joint Surg Am. 2013 Aug 21; 95 (16):e118(1-9).

6.Baumhauer JF, Nawoczenski DA, et al. Reliability and Validity of the American Orthopaedic Foot and Ankle Society Clinical Rating Scale: A Pilot Study for the Hallux and Lesser Toes. Foot Ankle Int. 2006 Dec; 27 (12): 1014-9. 7.Madeley NJ, et al. Responsiveness and Validity of the SF-36, Ankle Osteoarthritis Scale, AOFAS Ankle Hindfoot Score, and Foot Function Index in End Stage Ankle Arthritis. Foot Ankle Int. 2012 Jan; 33(1):57-63. 8.SooHoo NF, et al. Evaluation of the Validity of the AOFAS Clinical Rating Systems by Correlation to the SF-36. Foot Ankle Int. 2003 Jan; 24(1):50-5.

9. Pinsker E, Daniels TR. AOFAS Position Statement Regarding the Future of the AOFAS Clinical Rating Systems. Foot Ankle Int. 2011 Sep; 32(9):841-2.

10.Hogan MV, et al. Validation of the Foot and Ankle Outcome Score for Hallux Rigidus. HSS J. 2016 Feb; 12(1):44-50.



