Development and Validation of a Questionnaire Designed to Measure Foot-Health Status

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The aim of this study was to apply the principles of content, criterion, and construct validation to a new questionnaire specifically designed to measure foot-health status. One hundred eleven subjects completed two different questionnaires designed to measure foot health (the new Foot Health Status Questionnaire and the previously validated Foot Function Index) and underwent a clinical examination in order to provide data for a second-order confirmatory factor analysis. Presented herein is a psychometrically evaluated questionnaire that contains 13 items covering foot pain, foot function, footwear, and general foot health. The tool demonstrates a high degree of content, criterion, and construct validity and test-retest reliability. (J Am Podiatr Med Assoc 88(9): 419-428, 1998)

Questionnaires can be designed to assess either broad or specific dimensions of health. Researchers acknowledge the role of general health measures while identifying their limitations in measuring the impact of specific diseases.[1] It is a widely held view that disease- or region-specific measures of health may identify different yet complementary aspects of an individual's health status.[2] Examples of specific health measures include the Arthritis Impact Measurement,[3, 4] Sickness Impact Profile,[5] Foot Function Index,[6] Western Ontario and McMaster University Osteoarthritis Index (WOMAC),[7] McGill Pain Questionnaire,[8] and forefoot score.[9] Well-established general health measures include the Short Form 36[10, 11] and Modified Health Assessment Questionnaire.

In 1996, researchers embarked on the development of a self-administered questionnaire that could accurately and reliably measure foot health. This questionnaire was intended for the assessment of subjects undergoing surgical treatment for common foot conditions; however, the tool is not limited to this use. The authors are aware of only one other self-administered foot-health questionnaire that has undergone a validation process.[6] That tool (the Foot Function Index) is specifically designed to assess the effects of foot orthoses in people with rheumatoid arthritis and does not evaluate specific aspects of foot health relevant to assessment of surgical treatment. Kitaoka et al[9] have developed a method that allows surgeons to evaluate the foot-health status of subjects from both subjective and objective perspectives. This method does not utilize a self-administered questionnaire. Interestingly, both methods identify similar patient needs in terms of foot pain, function, footwear, and disability.

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In terms of defining a theoretical framework for developing a foot-health–status questionnaire, it is important to distinguish between the process of evaluating patient outcomes and developing a patient-satisfaction questionnaire. Patient outcome studies differ significantly from patient-satisfaction surveys, which tend to capture dimensions of care rather than the specifics of the patient or provider. Patient satisfaction may be defined as a complex, multidimensional phenomenon comprising the individual's own beliefs and elements of the health-service experience such as accessibility or convenience, art of care, efficacy or outcome of care, and previous experience.[11-15] Williams[12] states that patients may have a complex set of important and relevant beliefs that cannot be embodied in terms of expressions of satisfaction. Thus concepts that appear to be straightforward may actually be a conglomeration of dimensions.

Accordingly, the authors decided to develop not a "patient satisfaction" questionnaire but rather a tool that was capable of independently measuring foot-health status, thereby allowing a range of surgical interventions to be studied. This approach has several distinct advantages over the more subjective evaluation of patient satisfaction with therapeutic and, in particular, surgical treatments.[16]

It is important to apply well-established principles of psychometric analysis as part of the development of any new questionnaire. It is preferable to develop a questionnaire that has both good clinical utility and sound psychometric characteristics. In psychometric analysis, the ultimate goal of construct validation is for the questionnaire to truly reflect the construct it was designed to measure. This means that the relationships entered into by the different scores achieved in a questionnaire are consistent with theory; however, this cannot be directly tested, only inferred from demonstrating factors such as content and criterion validity and questionnaire reliability (ie, internal consistency and temporal stability). Usually, a validation process is conditional in nature and relies heavily on defining the specific intent of the questionnaire.[17] Consequently, validity assessment involves evaluating the inferences made from scores on a test, not the test itself.[18] Therefore, the validity of test scores can be assessed from several different perspectives.[19-21]

Background to Questionnaire Development and Current Study

Five focus groups were conducted throughout Australia with podiatric surgeons to identify the reasons patients consulted them for surgical treatment of foot problems. The surgeons were consistent in identifying several of the key needs voiced by patients: the desire to resolve pain in various parts of the foot, the need to improve foot function and appearance, and the desire to reduce problems associated with footwear. These concerns are well understood by surgeons and patients alike and are well documented in most surgical textbooks. Balanced with these needs is the surgeon's responsibility to evaluate additional patient characteristics (eg, age, comorbidity) that may influence surgical success. Only after careful consideration of all elements in the equation can a decision to proceed with a surgical treatment be reached.

Based on this information, it was hypothesized that there were five different domains of foot health that were of surgical significance and had the potential to be measured. These included the four domains mentioned above, plus a fifth domain, self-perception of general foot health—ie, what an individual thought about the condition of his or her feet, as opposed to the actual condition of the feet.

To explore this theory, 46 questions (Likert scale format) were written to assess foot health in terms of pain, function, cosmetic appearance, footwear, and general foot health. Items were developed to ensure that they provided an adequate spectrum of the particular construct. For example, in the assessment of foot pain, a question specifically asked subjects about the intensity of pain, which they rated as follows: none, very mild, mild, moderate, or severe. Another question in the foot-pain subscale addressed the frequency of pain; possible responses were never, occasionally, fairly often, very often, or always. Thus both intensity and frequency of the construct could be evaluated. An expert panel composed of podiatric physicians, measurement experts, and potential respondents was used to rate questions on content coverage and relevance as well as technical factors, and a mean rating was assigned. On the basis of these ratings, 19 questions were eliminated. The remaining questions were administered to 225 subjects who presented to the Queensland University of Technology podiatric clinic for treatment.[22]

The responses were evaluated with respect to data quality, scaling assumptions, scale homogeneity, internal reliability, item nonresponse, and response bias. A principal component analysis with scree test was performed and indicated that only four factors (pain, function, footwear, and general foot health) could be extracted. The four factors were rotated to simple structure using the direct oblimin technique and 12 additional items were omitted based on item factor loadings of less than 0.7, to leave a final list of 13 questions for use in the Foot Health Status Questionnaire (FHSQ).[22] Respondents' scores were recoded,

tabulated, and finally transformed to a scale ranging from 0 (indicating poorest foot health) to 100. Table 1 summarizes the four basic domains of foot health and the meanings of the highest and lowest scores.

Further assessment of the preliminary version of the FHSQ is reported here and deals with the following issues: exploration of FHSQ subscales and their composite items in terms of the variables' distribution characteristics, evaluation of test-retest reliability (temporal stability), and replication of the factor structure using the maximum likelihood method.

Methods

One hundred eleven volunteers were recruited from the Queensland University of Technology podiatric clinic to participate in this component of the study. It has been suggested that a minimum of 10 subjects per variable is necessary for a confirmatory factor analysis.[23] One of the principal objectives of the present study was to conduct a second-order factor analysis on the four FHSQ subscales, two Foot Function Index (FFI) scales, and three clinical measures. The only exclusion criteria that were applied were that subjects be older than 18 years of age and fluent enough in English to complete a questionnaire. All assessments were conducted by a licensed podiatrist. Subjects were asked to complete two self-administered questionnaires, the new FHSQ and the FFI. During the first visit, the subjects were assessed in terms of foot pain, biomechanical foot function, and foot morphology. Foot pain was evaluated in three ways, using two different self-administered questionnaires (the FHSQ and FFI) and a single-item seven-point visual analog scale. The single-item instrument is made from plastic and has a movable marker that slides along the scale to indicate the subject's level of perceived pain. The FHSQ uses a Likert-type scale of response to a series of four questions, and the FFI uses a visual analog scale of seven similar items. The effects of foot function were assessed using two measures, FHSQ function and the FFI disability subscales. A full clinical examination of both feet was also conducted.

Footwear problems were assessed in two ways: first, by identifying the absence or presence and extent of hallux valgus deformity using the criteria established by Root et al,[24] and second, by using a Branick foot-measuring device. This device permits an estimate of which percentile of the population frequency an individual's foot morphology may belong to; for example, subjects with a double-E fitting represent only about 8% of the population and hence are likely to have difficulty in finding suitable footwear (Clarks Footwear Company, personal communication, 1997).

Seventy-two subjects who received no treatment were given a second copy of the FHSQ to take home to complete 1 week after the initial consultation and return in a preaddressed, stamped envelope. Test-retest reliability of the FHSQ was assessed to evaluate the tool's temporal stability using the interclass correlation coefficient.[23]

All main demographic variables were recorded to enable the study population to be assessed in terms of sex, age, general physical health, and pensioner/unemployed health-care card status. To provide a measure of comorbidity in the study population, sub-

Table 1. The Four Basic Domains of Foot Health as Evaluated by the FHSQ

Domain	No. of Items	Theoretical Construct	Meaning of Lowest Score (0)	Meaning of Highest Score (100)
Foot pain	4	Evaluation of foot pain in terms of type of pain, severity, and duration	Extreme and significant foot pain that is acute in nature	No pain or discomfort in any part of the foot
Foot function	4	Evaluation of feet in terms of impact on physical function	Severely limited in performing a broad range of physical activities because of feet; limited in walking, working, and moving about	Can perform all desired physical activities: walking, working, climbing stairs
Footwear	3	Life-style issues related to footwear and feet	Extremely limited in access to suitable footwear	No problems with obtaining suitable footwear
General foot health	2	Self-perception of feet (individual's subjective assessment of body image, related to feet)	Generally perceives feet to be in a poor state of health and identifies poor condition of feet	Perceives feet to be in an excellent state of health and condition

jects were asked to record the total number of illnesses for which they were being treated.

Finally, the use of confirmatory factor analysis permits the researcher to evaluate hypothesized models that explain the various relationships within a given data set. The advantage of this over conventional methods of validation—ie, convergent and discriminant validation—is that it is possible to statistically test the structure of a questionnaire and account for variability in both the respondents and the measurement tool.[25] In essence, confirmatory factor analysis allows the researcher to manipulate a data set according to an *a priori* hypothesis and statistically test this hypothesis in terms of goodness of fit indices.

Three theoretical models were then hypothesized to explain the potential relationships of the nine variables within the data set. This approach, using confirmatory factor analysis to establish a health questionnaire's criterion validity, is not frequently reported in the medical literature and has not previously been applied to a specific measure of foot health.

Data Analysis

All data were transferred to a spreadsheet in the SPSS®[1] software program, version 6.1, and descriptive analysis was performed. For the more advanced statistical modeling, the data were then transferred to Lisrel®[2] version 8.12.[26]

Results

Descriptive Statistics of the Study Population

Table 2 provides details of the study population. The study population comprised mainly middle-aged or elderly females (ratio, approximately 3.4:1), which is consistent with published data on the prevalence of superficial foot problems and bunions.[27-29] Approximately 30% of subjects were not taking medication on a regular basis at the time of assessment.

As one might predict, older people were more frequently affected by osteoarthritis (treated with oral anti-inflammatory medication) and were also more likely to present with hallux valgus deformity (Table 2).

Diagnosis of the Principal Foot Complaint

Table 3 shows the number of subjects presenting with various foot complaints, as diagnosed by a licensed podiatrist and grouped into three broad categories for ease of clinical interpretation: minimal pathology usually confined to superficial skin conditions, acute inflammatory conditions, and footwear problems. It should be stressed that these are arbitrary divisions and that some overlap between diagnosis of foot complaint and class of condition is likely to exist.

Item and Subscale Analysis

The results of the first-order factor analysis conducted on the initial study group of 225 subjects are reported in Table 4. A first-order factor analysis was undertaken using principal components analysis, and factors were identified using scree plot. The results of the test-retest reliability analysis (n = 72) conducted in the second study are included in this table.

Each item demonstrated only minor skewedness (departure from normal distribution); that is, the skewedness statistic should be approximately <1.0 to infer normality of distribution. In a large sample (ie, >100), a variable with statistically significant skewedness often does not deviate enough from normality to make a substantive difference in the analysis.[30] Using this criterion, normal scaling assumptions are not seriously violated. Oblimin rotation converged in eight iterations and yielded a solution with factors that are not totally unrelated; that is, factors are likely to be related/correlated in the real world. Eighty-four percent of the variance was explained by this four-factor solution.

Test-Retest Reliability

Table 4 also shows two other important features of the FHSQ. First, the subscales have a high degree of internal consistency, as illustrated by the high Cronbach α (internal consistency column), ranging from 0.85 to 0.88. The second feature is the high test-retest reliability, ranging from 0.74 to 0.92. This reinforces the notion that the scales have temporal stability and that subsequent administration (1 week apart) will yield comparable information.

Table 5 describes the total scores of each of the four subscales in a factor correlation matrix that acts as a guide for hypothesis formulation in the second-order confirmatory factor analysis phase. As one might predict, foot pain and function were most highly correlated, representing different but complementary aspects of foot health. To a lesser but still significant extent, subjective self-perception of foot health (the individual's overall self-assessment of body image related to his or her feet) correlated with pain and function. The footwear domain did not correlate

[1] SPSS, Inc, Chicago, IL.
[2] Scientific Software International, Inc, Chicago, IL.

Table 2. Demographic Characteristics of the Study Population

	Cases	Age (years)		*P* Value
		Mean	SD	
Study group	111	54	20	
Sex				
Male	25	45	17.7	.013[a]
Female	85	57	19.8	
Illnesses treated				
None	33	41	16.2	.000[b]
1-3	49	57	18.9	
>3	18	72	11.3	
Pension-card holder				
Yes	58	64	16.7	.000[a]
No	47	42	16.9	
Hallux valgus				
Present	36	63.3	16.4	.000[a]
Absent	72	49.3	19.7	
Osteoarthritis				
Present	28	70.8	12.4	.000[a]
Absent	79	48.8	19.0	

Note: Numbers in each category in the "Cases" column do not total 111 because of missing data.

[a] Student's *t*-test; Levine's test of normality, equal variance.

[b] One-way analysis of variance.

Table 3. Frequency of Diagnosis of Principal Foot Complaint Using Australian Podiatry Association Diagnostic Criteria Guidelines

Diagnosis	Class of Condition	n	%
Plantar hyperkeratosis and heloma durum	Minimal	46	41.4
Plantar fasciitis	Acute	13	11.7
Nail pathology	Minimal	9	8.1
Leg/hip/knee pain	Minimal	8	7.2
First metatarsophalangeal joint bunion formation	Footwear	6	5.4
Heloma molle	Footwear	5	4.5
Tarsalgia	Acute	4	3.6
Foot posture checkup	Minimal	4	3.6
Miscellaneous		4	3.6
Capsulitis	Acute	4	3.6
Interdigital neuroma	Acute	3	2.7
Trauma	Acute	2	1.8
Scar tissue	Minimal	2	1.8
Unclassified		1	0.9
Total		111	100

Table 4. Item Internal Consistency, Factor Loadings, and Item-Scale Correlation from Results of First-Order Factor Analysis (N = 225)

Item	Internal Consistency[a]	Factor Loading	Item-Scale Correlation[b]	Test-Retest Reliability (ICC)[c]
Foot pain domain				
What level of foot pain have you had during the past week?	0.881	0.723	0.167–0.517	
How often have you had foot pain?	0.814	0.849	0.171–0.504	
How often did your feet ache?	0.830	0.868	0.252–0.514	
How often did you get sharp pains in your feet?	0.873	0.743	0.090–0.439	
Scale summary	0.884	0.796	0.342	0.862
Foot function domain				
Have your feet caused you to have difficulties in your work or activities?	0.803	0.707	0.257–0.053	
Were you limited in the kind of work you could do because of your feet?	0.787	0.774	0.256–0.048	
How much does your foot health limit you in walking?	0.831	0.725	0.247–0.538	
How much does your foot health limit you from climbing stairs?	0.839	0.812	0.174–0.318	
Scale summary	0.855	0.755	0.358	0.915
Footwear domain				
It is hard to find shoes that do not hurt my feet.	0.795	0.812	0.247–0.318	
I have difficulty finding shoes that fit my feet.	0.793	0.853	0.102–0.194	
I am limited in the number of shoes I can wear.	0.787	0.815	0.192–0.293	
Scale summary	0.851	0.827	0.173	0.740
General foot health domain				
How would you rate your overall foot health?	0.877	0.891	0.286–0.417	
In general, what condition would you say your feet are in?	0.877	0.878	0.294–0.423	
Scale summary	0.877	0.884	0.185	0.784

[a] Cronbach α.

[b] Range of correlations between items and other scales.

[c] Test-retest analysis performed in second study (n = 72). ICC, interclass correlation coefficient.

Table 5. Factor Correlation Matrix for Subscale Total Scores

	Pain	Function	Footwear	General Foot Health
Pain	1.0			
Function	0.746	1.0		
Footwear	0.120	0.099	1.0	
General Foot Health	0.645	0.628	0.241	1.0

with any of the other domains and represents an independent foot-health parameter.

FHSQ Subscale Scores

Table 6 shows the mean FHSQ scores across the four foot-health domains. All four scales showed a minor degree of skewedness. More subjects recorded positive foot-health states than negative foot-health states for the pain and function scales (as indicated by the negative sign of the skew statistic). The footwear and, to a lesser extent, the general foot health scales have positive skew statistics, indicating that more respondents' scores were close to or less than 50.

Criterion Validation

Table 7 summarizes the three hypothetical models as assessed under confirmatory factor analysis.

Discriminant Validity of the FHSQ Subscale Scores

Additional construct validation is provided in Table 8 by classifying foot diseases (minor pathology, acute disease, and morphological problems) and assessing the ability of the FHSQ to discriminate between different types of foot pathology.

Discussion

Presented here is a methodical approach to development and validation of a new foot-health–status questionnaire. The FHSQ is designed to have a high degree of clinical utility for practitioners interested in assessing the foot health of groups of individuals. By accurately quantifying self-reported foot-health status, it will be possible to evaluate some of the effects of various therapeutic and surgical interventions.

The foot pain, function, and general foot health scales measure the presence and magnitude of physical and psychologically perceived disability and impairment. It is important to note that the footwear scale is "bipolar" in nature and measures a range of both positive and negative foot-health states. For this scale, a score in the middle range (ie, 50) is achieved when respondents report no problems or difficulties. For the purpose of practical interpretation of all subscales, scores of 0 indicate poor foot health and scores of 100 indicate optimum foot health.

To investigate the FHSQ's construct validity, a multitrait, multimethod analysis using a second-order factor analysis was conducted. This analysis al-

Table 6. Description of Central Tendency for the Four FHSQ Subscales and Scores for Each Scale

Domain	n	Mean Score	SD	Skew	Range[a]
Foot pain	93	71.5	24.4	–0.871	0 –100
Males	24	78.1	22.2		
Females	69	69.6	24.8		
Foot function	100	77.8	25.6	–1.172	0 –100
Males	25	87.5	21.4		
Females	75	75.5	25.5		
Footwear	98	37.4	27.7	0.476	0 –100
Males	24	50.0	32.3		
Females	74	34.0	24.9		
General foot health	102	52.9	28.1	0.137	0 –100
Males	25	61.8	27.8		
Females	77	50.5	27.9		

[a] Minimum to maximum.

Table 7. Model Fitting Second-Order Confirmatory Factor Analysis

Model	χ^2	*df*	*P*	χ^2 *df*	RMSEA	GFI	CFI
1. Four independent factors	162.4	30	.000	5.4	0.251	0.70	0.61
2. Pain/function	85.4	29	.000	2.9	0.164	0.83	0.83
3. Pain/function/general foot health	39.9	27	.052	1.4	0.081	0.90	0.96

Abbreviations: RMSEA, root mean square error of approximation; GFI, goodness of fit index; CFI, comparative fit index.

Table 8. Discriminant Validity of FHSQ Based on Assessing Subscale Scores of Three Groups of Foot Pathology

Foot Disease	Pain	Function	Footwear	General Foot Health
Minor pathology	83.6	88.8	40.3	62.8
	(16.1)	(16.3)	(28.4)	(24.1)
	55	59	58	61
Morphological problems	67.1	77.9	17.3	46.3
	(22.4)	(29.1)	(21.0)	(32.8)
	11	13	13	13
Acute disease	48.1	53.9	40.3	35.0
	(22.5)	(25.3)	(26.0)	(25.0)
	27	27	26	27

Note: The three values given for each column are, top to bottom, mean score, SD (in parentheses), and number of subjects.

lowed investigation of three models in which four domains of foot health were hypothesized to exist.

In the confirmatory factor analysis models, general foot health was deemed to be a fixed parameter because of the purely subjective and individual assessment of one's own body image.

From the matrix of factor correlations (Table 5), relationships among the scales were noted to be significant and in the expected direction. The footwear domain did not correlate with any other factor. Pain, function, and general foot health are correlated. This is important when attempting to fit a model to the data.

The first model proposed in Table 7 hypothesized that the four subscales were all independent, standalone scales that measured free-standing constructs. When this model was fitted to the data, it failed to produce a nonsignificant *P* value, and the statistical indicators of the model's fit (χ^2, *df*, root mean square error of approximation [RMSEA]), goodness of fit index (GFI), and comparative fit index (CFI) are poor. As a guide for optimum model fitting, the RMSEA statistic should ideally be less than 0.1, and both the goodness of fit index and comparative fit index should be greater than 0.9. The goal of this analysis is to achieve a statistically nonsignificant difference between the hypothesized model and actual study subjects' data set. When the correlation between the pain and function constructs is estimated in model 2, χ^2 is reduced from 162.4 to 85.4 at the cost of 1 *df*. While this is a significant improvement in fit, the model still obtains a *P* value less than .000, suggesting that additional parameters need to be estimated.

In model 3, the pain, function, and general foot health status domains are allowed to correlate, and a suitable goodness of fit is achieved in the data. The model is not statistically different from the actual data set, and all estimates of goodness of fit are acceptable. The footwear domain does not correlate with any other construct. Clearly, this final model can be considered the best explanation of the relationship between the four theoretical domains of foot health as described by the FHSQ. This final model is schematically demonstrated in Figure 1.

Foot pain and function, as one might predict, are strongly correlated and can explain a great deal about how an individual's health is perceived. It is theoretically possible to have a limitation of foot function and activity without experiencing pain and *vice versa;* however, as demonstrated by the confirmatory factor analysis, these two aspects of foot health are likely to be highly correlated. General foot health, which captures a dimension of body image (ie, the subjects' general perception of their feet but not necessarily actual pathology), is likely to correlate with both pain and function in a predictable manner. In the final model, the footwear domain demonstrates a clear independence from the other three constructs.

When evaluating and interpreting scores on the four FHSQ subscales, due consideration should be given to the interrelatedness and independence of these constructs.

Following the confirmation of the FHSQ's structure, four one-way hierarchical analyses of covari-

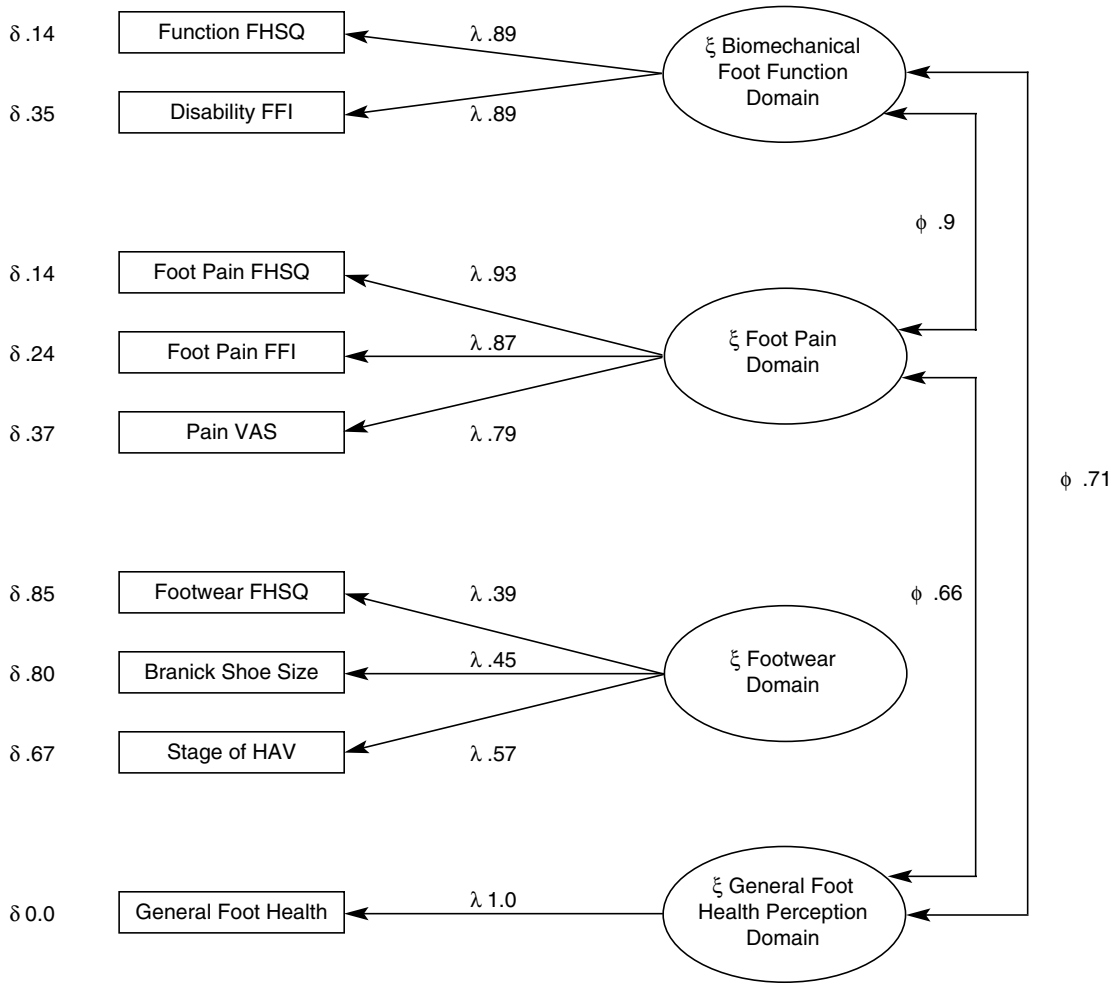

Figure 1. Confirmatory factor analysis model. ϕ (phi), covariance among the latent factors; λ (lambda), "factor loadings" for each second-order measure; δ (delta), effect measure error term on each observed indicator; ξ (xi), latent construct (also known as "domain" or "factor"). HAV, hallux abducto valgus; VAS, visual analog scale.

ance (one for each of the subscales) were conducted to test whether differences existed between the scores for males and females after controlling for age. There were no differences between males and females in reports of foot pain or general foot health perception scores ($F[1,91] = 2.87$, $P = .103$; and $F[1,99] = 0.71$, $P = .4$, respectively). In terms of the foot function subscale, sex alone explained the difference in recorded scores (ie, males reported less physical impairment due to their feet than did females, irrespective of age; $F[1,97] = 4.69$, $P = .03$). In terms of the footwear domain, both age and sex were significant explanations for differences in scores (older females reported poorer scores; $F[2,95] = 5.41$, $P = .03$).

The clinical utility and potential usefulness of the FHSQ is highlighted by its ability to discriminate between different groups of people who present with different types of foot problems. From a clinical perspective, Table 8 shows several interesting features of the FHSQ scores. First, minor foot complaints tend to produce higher scores (indicating better health status) in the pain, function, and general foot health scales. By contrast, more severe foot problems (such as neuromas, plantar fasciitis, and tarsal inflammation) seemingly produce more impairment and disability in terms of pain and function ($F[2,92] = 32.07$, $P = .00$; and $F[2,96] = 25.03$, $P = .00$, respectively). People with these problems also tend to perceive that their foot health is poorer than do people with minor foot problems.

Second, after adjusting for the effects of age and sex, subjects with foot-morphology problems (cavus foot types, hammer toes, interdigital corns, and bunion development) scored significantly worse than any other group in the footwear domain ($F[2,95] = 4.962$, $P = .009$). This group of subjects has significant difficulty in obtaining access to suitable and comfortable footwear.

With a knowledge of various pretreatment foot pathology scores, it may be possible to quantitatively assess the effectiveness of various treatments as reported by the patient. The goal of treatment would be to shift self-reported foot-health status in a positive direction, perhaps toward yet-to-be-established population norms.

One of the limitations of this study is that the general foot health domain had to be fixed in the confirmatory factor analysis. This means that the general foot health scores reported by subjects must be assumed to incur no measurement error, as the error term for this parameter is fixed at zero. In a practical sense, this is unlikely to be the case; however, one could argue that subjective body image is exactly that, a purely subjective measure.

Summary

The authors have presented the theoretical underpinnings of a new questionnaire that can provide researchers with information about self-reported foot-health status. This tool demonstrates a degree of construct validity and clinical utility that should help researchers identify changes in foot-health status as a consequence of therapeutic and surgical intervention. The questionnaire takes approximately 3 to 5 minutes to complete and can be used as a region-specific measure of health to complement global measures of health. The tool's brevity has the advantage of reducing respondent burden, thereby enhancing response rates. It is hoped that researchers of foot pathology will begin to use the FHSQ in various settings so that further construct validity can be established.

Acknowledgment. This research was supported in part by a Queensland University of Technology Meritorious Researcher Grant.

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