

Age- and Gender-Specific Normative Values for the Self-Reported Foot and Ankle Score (SEFAS)

Maria C. Cöster, MD, PhD¹, Björn E. Rosengren, MD, PhD¹, Magnus K. Karlsson, MD, PhD¹, and Åke Carlsson, MD, PhD¹

Foot & Ankle International
1-7

© The Author(s) 2018

Reprints and permissions:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/1071100718788499

journals.sagepub.com/home/fai

Abstract

Background: The Self-Reported Foot and Ankle Score (SEFAS) is a foot- and ankle-specific patient-reported outcome measurement (PROM) score that has been validated with good results for a variety of foot and ankle disorders. SEFAS is sensitive detecting improvement or deterioration after surgery. However, normative values, required to put a specific patient's summary score into perspective, are lacking.

Methods: In this report, we included 396 population-based men and 383 women (43% of the invited individuals), age 20-89 years, who had completed the SEFAS questionnaire and questions regarding anthropometrics and health. We used Mann-Whitney *U* test to test gender differences and Spearman correlation coefficients to determine any association between SEFAS score and age. We present gender-specific median SEFAS scores with range and 5th to 95th percentiles and mean with standard deviation.

Results: The SEFAS normative values were median 48 in men (range 11-48), 5th to 95th percentiles 31 to 48 and mean 45 ± 6 , and in women, median 47 (range 6-48), 5th to 95th percentiles 23 to 48 and mean 43 ± 8 (gender comparison $P < .001$). SEFAS normative values correlated inversely with age ($r = -0.12$, $P < .001$).

Conclusion: In the general population, older age was associated with lower SEFAS value, and men had higher values than women. The population-based normative SEFAS values provided in this study can facilitate quantification of disability related to foot and ankle with and without surgery in the foot and ankle.

Level of Evidence: Level II, prospective comparative study.

Keywords: SEFAS, foot, ankle, normative values, age categories, gender

Patient-reported outcome measures (PROMs) address the perspective of the patient and are valuable for measuring pain, function, and quality of life. SEFAS is a foot- and ankle-specific PROM based on the New Zealand total ankle questionnaire (NZAQ),¹⁸ with the NZAQ originally derived from the validated Oxford-12 hip questionnaire.¹¹ The NZAQ was in 2007 translated into Swedish and culturally adapted according to a standardized cross-cultural adaptation procedure.¹⁴ In 2010 we made a few minor changes in the SEFAS score, making it usable for patients with both foot and ankle disabilities.⁶ Furthermore, the quality of the SEFAS was assessed using the COSMIN guidelines,²⁷ with measurement properties face validity, content validity, construct validity, reliability (including internal consistency, test-retest reliability, and measurement error), and responsiveness, all with good results.^{5,6,8} Studies have also examined floor and ceiling effects and minimal important change

(MIC) for the score.⁵⁻⁷ The SEFAS has recently been compared with the Manchester-Oxford Foot Questionnaire (MOXFQ).¹⁰ The conclusion was that both these PROMs were valid and reliable scores for patients with foot and ankle disabilities.² SEFAS is now available and used in the 2 Swedish National registries for foot and ankle surgery Riksfot and SwedAnkle, recently validated for the German language¹ and is also available in different languages and used in several countries.^{4,9,13,15,21-23,29-31,38}

¹Department of Orthopaedics and Clinical Sciences, Lund University, Skåne University Hospital in Malmö, Sweden

Corresponding Author:

Maria C. Cöster, MD, PhD, Department of Orthopaedics and Clinical Sciences, Lund University, Skåne University Hospital, Malmö 205 02 Malmö, Sweden.

Email: maria.coster@med.lu.se

SEFAS has so far only been used to estimate the disability and the changes from before to after operative procedures in different foot and ankle disorders. However, it would be an advantage to be able to relate a SEFAS summary score for a specific patient or group of patients to normative values for SEFAS in the general population. Population-based normative values are available for the generic PROMs SF-36 and EQ-5D,^{16,17,19,24,25} but not for SEFAS or any other region-specific foot and ankle score. The primary aim was therefore to identify, in a population-based cohort of men and women normative, SEFAS values within the ages of 20-89 years. The secondary aim was to evaluate if the normative SEFAS values differed by age and gender.

Methods

Subjects

We invited, by help of Statistics Sweden, a random sample of 1820 age- and gender-stratified men and women of ages 20-89 years (980 men and 840 women) in the Swedish Population Registry (7 592 822 individuals). Statistics Sweden sent letters to the selected individuals and asked them to complete the enclosed Swedish version of the SEFAS questionnaire^{5,6} and answer some general questions regarding anthropometrics, diabetes, inflammatory joint diseases, impaired circulation in the lower leg, paralysis in the leg, and previous surgery on the forefoot, hindfoot, and/or ankle. All side-specific questions were referred to the right foot and/or ankle. For those individuals who did not respond, Statistics Sweden sent 2 additional letters within an interval of 2 to 3 weeks. After the second reminder, 835 individuals (46 %) had returned letters with completed SEFAS. Fifty-six of the 835 completed SEFAS scores had to be excluded, in 52 cases due to incorrectly completed scores and in 4 cases since the study participants were nonwalkers or amputated in the right leg, thereby unable to answer the SEFAS questions concerning pain and function of the foot and/or ankle. This report therefore includes 779 individuals (42.8%) (396 men and 383 women) (Figure 1). In a nonresponder analysis, we compared the 835 individuals who completed the questionnaires with the ones who did not answer. In the responder group, 51.5% were men, 86.3% were born in Sweden, 60.1% were married or lived with a partner, and 64.5 lived in a larger city. The corresponding values for the nonresponders were 55.9%, 75.1%, 39.8%, and 69.8%, respectively. There was a large difference between the groups regarding the marital status, but we believe that this does not affect our results regarding foot and ankle problems.

Self-Reported Foot and Ankle Score (SEFAS)

The SEFAS is a foot- and ankle-specific patient-reported score that has been described in previous publications.⁵⁻⁸ In

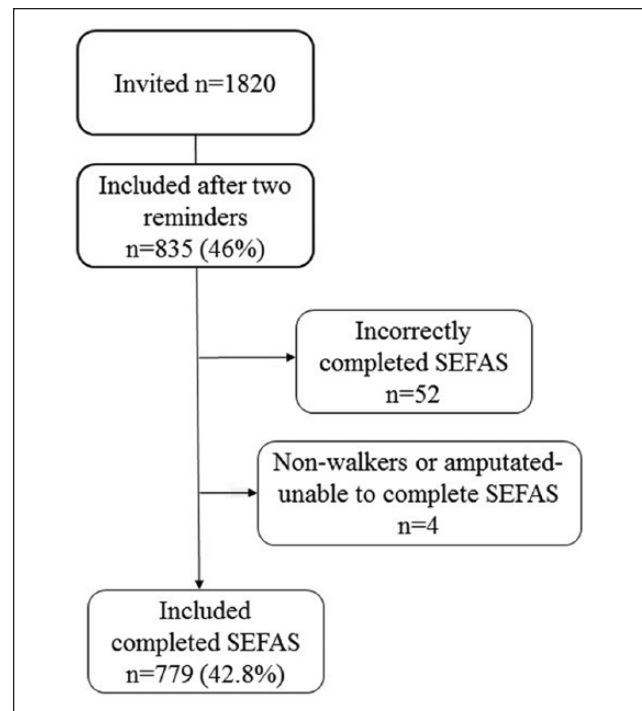


Figure 1. Recruitment procedure of a random sample of 1820 age and gender stratified individuals in ages 20-89 years from the Swedish Population Registry. A total of 528 individuals answered the initial letter, 214 the first remind letter, and 93 the second remind letter. Only individuals who had correctly completed the SEFAS were included in the study population.

summary, the score contains 12 questions with 5 response options, and each question scores from zero to 4 points. A summary score of zero represents the most severe disability, and 48 represents normal function. The score covers different constructs such as pain, function, and quality of life, not separated in subscales. The measurement properties for the SEFAS have been evaluated with good results in patients with osteoarthritis or inflammatory disease in the ankle joint and in patients with a variety of disorders in the forefoot, midfoot, and hindfoot/ankle.^{5,6} SEFAS did not have any floor or ceiling effects in these patient populations.^{5,6,8} Minimal important change (MIC) values have been identified to 5 score points, thereby facilitating the use of the score for evaluation of individual patients.⁷ Furthermore, in a recent review by Schrier et al, the authors concluded that the SEFAS together with the MOXFQ was identified as the most suitable PROM for assessment of hallux valgus treatment.³⁵ The English version of the SEFAS score is presented in Figure 2.

Statistical Analyses

We performed statistical calculations with Statistical Package of Social Science (SPSS) software, version 23.0.

<p>1. How would you describe the pain you usually have from the foot/ankle in question?</p> <p><input type="checkbox"/> None <input type="checkbox"/> Very mild <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe</p>	<p>2. For how long have you been able to walk before severe pain arises from the foot/ankle in question?</p> <p><input type="checkbox"/> More than 30 minutes <input type="checkbox"/> 16-30 minutes <input type="checkbox"/> 5-15 minutes <input type="checkbox"/> Less than 5 minutes <input type="checkbox"/> Unable to walk at all because of the pain</p>
<p>3. Have you been able to walk on uneven ground?</p> <p><input type="checkbox"/> Yes, easily <input type="checkbox"/> With little difficulty <input type="checkbox"/> With moderate difficulty <input type="checkbox"/> With extreme difficulty <input type="checkbox"/> No, impossible to walk on uneven ground</p>	<p>4. Have you had to use an orthotic, shoe insert, heel lift or special shoes?</p> <p><input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Most of the time <input type="checkbox"/> Always</p>
<p>5. How much has the pain from the foot/ankle in question interfered with your usual work including housework and hobbies?</p> <p><input type="checkbox"/> Not at all <input type="checkbox"/> A bit <input type="checkbox"/> Moderately <input type="checkbox"/> Greatly <input type="checkbox"/> Totally</p>	<p>6. Have you been limping when walking because of the foot/ankle in question?</p> <p><input type="checkbox"/> Never <input type="checkbox"/> Only one or two days <input type="checkbox"/> Some days <input type="checkbox"/> Most days <input type="checkbox"/> Every day</p>
<p>7. Have you been able to climb a flight of stairs?</p> <p><input type="checkbox"/> Yes, easily <input type="checkbox"/> With little difficulty <input type="checkbox"/> With moderate difficulty <input type="checkbox"/> With extreme trouble <input type="checkbox"/> No, impossibly</p>	<p>8. Have you been troubled by pain from the foot/ankle in question in bed at night?</p> <p><input type="checkbox"/> Never <input type="checkbox"/> Only one or two nights <input type="checkbox"/> Some nights <input type="checkbox"/> Most nights <input type="checkbox"/> Every night</p>
<p>9. How much has pain from the foot/ankle in question affected your usual recreational activities?</p> <p><input type="checkbox"/> Not at all <input type="checkbox"/> A bit <input type="checkbox"/> Moderately <input type="checkbox"/> Greatly <input type="checkbox"/> Totally</p>	<p>10. Have you had swelling of your foot?</p> <p><input type="checkbox"/> None at all <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Most of the time <input type="checkbox"/> All the time</p>
<p>11. After a meal (sat at table), how painful has it been for you to stand up from a chair because of the foot/ankle in question?</p> <p><input type="checkbox"/> Not at all painful <input type="checkbox"/> Slightly painful <input type="checkbox"/> Moderately painful <input type="checkbox"/> Very painful <input type="checkbox"/> Unbearable</p>	<p>12. Have you had a severe sudden pain shooting, stabbing or spasm from the foot/ankle in question?</p> <p><input type="checkbox"/> Never <input type="checkbox"/> Only one or two days <input type="checkbox"/> Some days <input type="checkbox"/> Most days <input type="checkbox"/> Every day</p>

Figure 2. The English version of the Self-Reported Foot and Ankle Score (SEFAS), a foot- and ankle-specific PROM.

The individuals were stratified in 14 strata according to gender and age within the age categories 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80-89 years. Data for the

different age categories are presented as numbers, range, mean \pm standard deviation (SD), and median together with the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles.

Table 1. Descriptive Self-Reported Data for Women in 10-Year Categories.^a

Characteristic	Age Category (y)						
	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Number of individuals	57	57	51	47	56	64	51
Age (y)	26 ± 2.6	34 ± 2.6	45 ± 3.1	54 ± 3.0	65 ± 3.0	73 ± 2.7	84 ± 2.0
Height (cm)	167.6 ± 6.5	168.1 ± 7.2	169.5 ± 5.5	168.2 ± 5.5	166.2 ± 6.1	164.5 ± 5.6	164.0 ± 7.3
Weight (kg)	66.9 ± 15.8	71.3 ± 17.9	73.5 ± 16.2	75.3 ± 17.8	73.2 ± 12.2	69.0 ± 14.1	65.2 ± 10.4
Body mass index	23.7 ± 5.1	25.2 ± 5.5	25.5 ± 5.2	26.5 ± 5.5	26.6 ± 4.7	25.5 ± 5.0	24.0 ± 3.3
Inflammatory joint disease	0	1	2	4	4	6	6
Diabetes	0	2	1	2	3	7	10
Impaired circulation ^b	1	0	1	0	0	0	7
Paralysis in lower leg ^b	0	0	0	0	1	1	0
Surgery in toes ^b	1	4	3	2	3	4	2
Surgery foot/ankle ^b	1	2	1	4	6	6	3

^aData are presented as mean ± SD or number of individuals.

^bRight leg, foot/ankle or toes.

Table 2. Descriptive Self-Reported Data for Men in 10-Year Categories.^a

Characteristic	Age Category (y)						
	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Number of individuals	51	56	53	49	55	67	65
Age (y)	25 ± 2.7	36 ± 2.8	45 ± 2.9	56 ± 3.0	65 ± 2.9	74 ± 2.7	84 ± 2.6
Height (cm)	181.3 ± 6.6	180.1 ± 7.3	181.6 ± 6.6	180.2 ± 6.3	178.7 ± 5.8	178.2 ± 7.1	175.2 ± 6.5
Weight (kg)	79.6 ± 13.5	83.4 ± 14.9	87.9 ± 13.8	87.7 ± 11.8	82.5 ± 12.5	84.0 ± 14.5	77.7 ± 12.5
Body mass index	24.1 ± 3.3	25.7 ± 4.7	26.6 ± 3.8	27.0 ± 3.0	25.8 ± 3.3	26.5 ± 4.3	25.3 ± 3.6
Inflammatory joint disease	0	1	2	0	4	2	4
Diabetes	0	0	0	2	8	11	7
Impaired circulation ^b	0	1	0	0	1	3	7
Paralysis in lower leg ^b	0	0	0	0	0	0	1
Surgery in toes ^b	3	0	1	2	2	2	2
Surgery foot/ankle ^b	1	4	1	2	5	3	4

^aData are presented as mean ± SD or number of individuals.

^bRight leg, foot/ankle or toes.

We used Spearman correlation coefficient to estimate associations between the summary score and age and Mann-Whitney *U* test for gender difference.

The study was approved by the ethics committee of our university and performed according to the Declaration of Helsinki.

Results

Gender-specific background data are presented in Tables 1 and 2 and gender-specific SEFAS normative values in Tables 3 and 4 and Figure 3. The SEFAS normative summary scores were in men median 48 (range 11-48), 5th to 95th percentiles 31 to 48, mean 45 ± 6; and in women median 47 (range 6-48), 5th to 95th percentiles 23 to 48,

mean 43 ± 8 (gender comparison $P < .001$). None of the individuals had a summary score of zero points whereas 199 men (50%) and 160 women (42%) scored the maximum score of 48 points. The SEFAS normative values correlated inversely with age ($r = -0.12$, $P < .001$ [in men $r = -0.14$, $P = .006$; and in women $r = -0.12$, $P = .02$]).

Discussion

We found that the SEFAS normative values in general were lower in individuals with higher than lower ages and in women compared to men. The gender- and age-specific normative SEFAS values presented in this article thus facilitate the interpretation of the summary score of a specific patient in relation to the general population. This applies

Table 3. SEFAS Summary Scores for Women Reported in 10-Year Categories.^a

Age Category	Number of Individuals	Range	Mean ± SD	SEFAS Score						
				Percentile						
				5th	10th	25th	50th median	75th	90th	95th
20-29	57	21-48	44 ± 7	26	31	43	47	48	48	48
30-39	57	18-48	45 ± 6	34	41	44	47	48	48	48
40-49	51	19-48	45 ± 6	28	39	45	47	48	48	48
50-59	47	13-48	42 ± 9	22	25	40	46	48	48	48
60-69	56	10-48	40 ± 10	18	21	36	46	48	48	48
70-79	64	31-48	45 ± 4	35	40	44	47	48	48	48
80-89	51	6-48	40 ± 11	16	22	38	46	47	48	48

Abbreviation: SEFAS, Self-Reported Foot and Ankle Score.

^aData are reported as number of individuals and range, mean ± SD, and 5th to 95th percentiles.

Table 4. SEFAS Summary Scores for Men Reported in 10-Year Categories.^a

Age Category	Number of Individuals	Range	Mean ± SD	SEFAS Score						
				Percentile						
				5th	10th	25th	50th median	75th	90th	95th
20-29	51	33-48	46 ± 4	37	40	47	48	48	48	48
30-39	56	23-48	45 ± 5	37	38	43	48	48	48	48
40-49	53	20-48	45 ± 7	25	32	45	47	48	48	48
50-59	49	24-48	46 ± 5	32	42	46	48	48	48	48
60-69	55	14-48	44 ± 7	26	37	44	47	48	48	48
70-79	67	11-48	45 ± 6	33	37	44	47	48	48	48
80-89	65	11-48	43 ± 8	26	29	42	47	48	48	48

Abbreviation: SEFAS, Self-Reported Foot and Ankle Score.

^aData are reported as number of individuals and range, mean ± SD, and 5th to 95th percentiles.

both at the time of diagnosis but also at follow-up after treatment of foot and ankle trauma or foot and ankle disorders regardless of the treatment method chosen.

PROMs are nowadays used in almost all national registries to evaluate treatments of patients with different kinds of disorders and disabilities. SEFAS is a foot- and ankle-specific PROM that has been used to evaluate patient-reported outcome of treatments in patients with flatfoot deformity, ankle osteoarthritis,^{9,21} and hallux valgus.³¹ Even if age-, gender-, and country-specific normative values are available for the generic scores SF-36 and EQ-5D,^{16,17,19,24,25} anatomic region-specific normative PROM values improve our ability to evaluate operative procedures in the foot and ankle, because the region-specific PROMs are more sensitive in detecting improvement after surgery than the generic PROMs.²⁰ This is why normative values have been collected for region-specific scores in the spine, shoulder, knee

and hand,^{3,26,28,37} and now in the present study also for a foot and ankle score.

Several foot- and ankle-specific scores are available, such as the Foot and Ankle Outcome Scale (FAOS),³² the Manchester-Oxford Foot Questionnaire (MOXFQ),¹⁰ the Foot Function Index (FFI),³³ the American Orthopaedic Foot & Ankle Society (AOFAS),³⁴ and the Low Extremity Functional Scale (LEFS).¹² However, to our knowledge, no population-based normative values are published for any of these. Normative values are missing for FAOS and MOXFQ, whereas FFI, AOFAS, and LEFS have normative values published, but based on examinations of volunteers such as hospital employees.^{12,33,34} That is, our study provides the first population-based normative foot- and ankle-specific PROM values, reflecting the general population, with data collected in a similar way as for the generic scores SF-36 and EQ-5D.^{16,17,19,24,25,36} By this approach, we found that

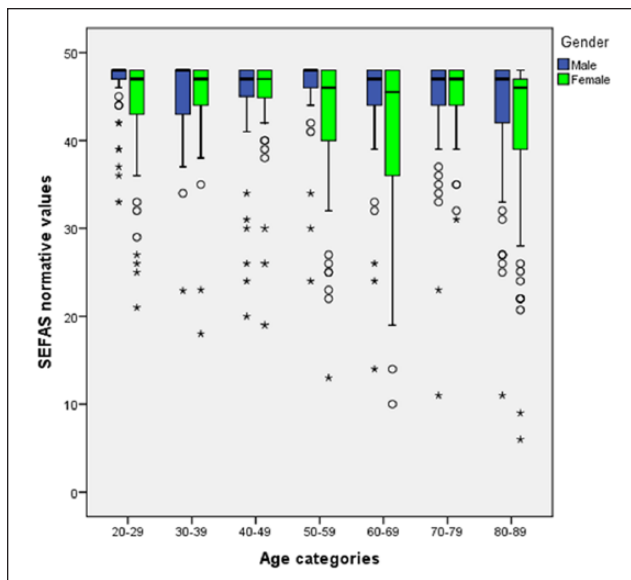


Figure 3. SEFAS normative values for men and women in different age categories presented in a box-plot graph. The box represents the first and third quartiles limits and the line within the box the median value. The small circles and stars are outliers where the stars represent the extreme outliers. The end of the whisker in the lower part of the graph represents one and a half time the interquartile range. The end of the whisker in the upper part of the graph (only visible in women in the age group 80-90) represents the maximum value. SEFAS, Self-Reported Foot and Ankle Score.

SEFAS normative values correlated inversely with age, similar to what has been found for the PROMs FFI, AOFAS, and LEFS,^{12,33,34} and that men have higher SEFAS values than women, similar to the scores SF-36,¹⁹ AOFAS,³⁴ FFI,³³ and LEF.¹²

We found in this normative sample large ceiling effects. This concept is however not of interest when evaluating groups of individuals without foot and ankle problems. The concern would be if there are large ceiling effects in individuals with foot and ankle problems. We have previously shown that there are not any floor or ceiling effects for SEFAS when evaluating patients with different foot and ankle disorders.^{5,6,8} This enables us to conclude that the SEFAS can safely be used to measure changes after foot and ankle surgery even if a great proportion in the general population have the highest possible score.

The strengths of this study include the large sample size and the population-based inclusion of both women and men in different ages. Weaknesses include the fact that only 43% of the invited individuals returned usable information and that the normative values may only be applicable to the Swedish population. We therefore suggest that normative SEFAS values are collected in other countries, in line with what has been done for the generic scores SF-36 and EQ-5D.^{12,25}

Conclusion

In this first population-based examination of normative SEFAS values, we found that the SEFAS summary score in general was lower in individuals with higher than lower ages and in women compared to men. The normative SEFAS values presented in this article facilitate the interpretation of the score of a specific patient in relation to the general population. This would apply both at the time of diagnosis and also at follow-up after treatment regardless of the treatment method chosen.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Maria C. Cöster, MD, PhD, Björn E. Rosengren, MD, PhD, and Åke Carlsson, MD, PhD, report grants from Kock's foundation, grants from Herman Järnhardt's foundation, grants from Skofondens utvecklingsbransch (the Foot-wear branch), grants from the Region Skane Foundations, during the conduct of the study. Maria C. Cöster, MD, PhD, and Åke Carlsson, MD, PhD, report grants from the Swedish Association of Local Authorities, during the conduct of the study. ICMJE forms for all authors are available online.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Herman Järnhardt's foundation, Kock's foundation, The Footwear-branch foundation, The Region Skane Foundations, and The Swedish Association of Local Authorities.

References

1. Arbab D, Kuhlmann K, Schnurr C, Bouillon B, Luring C, König D. Reliability, validity and responsiveness of the German Self-Reported Foot and Ankle Score (SEFAS) in patients with foot or ankle surgery. *BMC Musculoskelet Disord.* 2017;18(1):409.
2. Arbab D, Kuhlmann K, Schnurr C, Luring C, König D, Bouillon B. Comparison of the Manchester-Oxford Foot Questionnaire (MOXFQ) and the Self-reported Foot and Ankle Outcome Score (SEFAS) in patients with foot and ankle surgery [published online ahead of print February 9, 2018]. *Foot Ankle Surg.* doi:10.1016/j.fas.2018.01.003.
3. Baldwin JN, McKay MJ, Simic M, et al. Self-reported knee pain and disability among healthy individuals: reference data and factors associated with the Knee injury and Osteoarthritis Outcome Score (KOOS) and KOOS-Child. *Osteoarthritis Cartilage.* 2017;25(8):1282-1290.
4. Borchgrevink GE, Viset AT, Witso E, Schei B, Foss OA. Does the use of high-heeled shoes lead to fore-foot pathology? A controlled cohort study comprising 197 women. *Foot Ankle Surg.* 2016;22(4):239-243.
5. Coster M, Karlsson MK, Nilsson JA, Carlsson A. Validity, reliability, and responsiveness of a self-reported foot and ankle score (SEFAS). *Acta Orthop.* 2012;83(2):197-203.
6. Coster MC, Bremander A, Rosengren BE, Magnusson H, Carlsson A, Karlsson MK. Validity, reliability, and responsiveness of the

- Self-reported Foot and Ankle Score (SEFAS) in forefoot, hind-foot, and ankle disorders. *Acta Orthop*. 2014;85(2):187-194.
7. Coster MC, Nilsson A, Brudin L, Bremander A. Minimally important change, measurement error, and responsiveness for the Self-Reported Foot and Ankle Score. *Acta Orthop*. 2017;88(3):300-304.
 8. Coster MC, Rosengren BE, Bremander A, Brudin L, Karlsson MK. Comparison of the Self-reported Foot and Ankle Score (SEFAS) and the American Orthopedic Foot and Ankle Society Score (AOFAS). *Foot Ankle Int*. 2014;35(10):1031-1036.
 9. Coster MC, Rosengren BE, Bremander A, Karlsson MK. Surgery for adult acquired flatfoot due to posterior tibial tendon dysfunction reduces pain, improves function and health related quality of life. *Foot Ankle Surg*. 2015;21(4):286-289.
 10. Dawson J, Boller I, Doll H, et al. The MOXFQ patient-reported questionnaire: assessment of data quality, reliability and validity in relation to foot and ankle surgery. *Foot (Edinb)*. 2011;21(2):92-102.
 11. Dawson J, Fitzpatrick R, Carr A, Murray D. Questionnaire on the perceptions of patients about total hip replacement. *J Bone Joint Surg Br*. 1996;78(2):185-190.
 12. Dingemans SA, Kleipool SC, Mulders MAM, et al. Normative data for the Lower Extremity Functional Scale (LEFS). *Acta Orthop*. 2017;88(4):422-426.
 13. Garratt AM, Naumann MG, Sigurdson U, Utvag SE, Stavem K. Evaluation of three patient reported outcome measures following operative fixation of closed ankle fractures. *BMC Musculoskelet Disord*. 2018;19(1):134.
 14. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality-of-life measures—literature-review and proposed guidelines. *J Clin Epidemiol*. 1993;46(12):1417-1432.
 15. Henricson A, Kamrad I, Rosengren B, Carlsson A. Bilateral arthrodesis of the ankle joint: self-reported outcomes in 35 patients from the Swedish ankle registry. *J Foot Ankle Surg*. 2016;55(6):1195-1198.
 16. Hinz A, Kohlmann T, Stobel-Richter Y, Zenger M, Brahler E. The quality of life questionnaire EQ-5D-5L: psychometric properties and normative values for the general German population. *Qual Life Res*. 2014;23(2):443-447.
 17. Hopman WM, Towheed T, Anastassiades T, et al. Canadian normative data for the SF-36 health survey. Canadian Multicentre Osteoporosis Study Research Group. *CMAJ*. 2000;163(3):265-271.
 18. Hosman AH, Mason RB, Hobbs T, Rothwell AG. A New Zealand National Joint Registry review of 202 total ankle replacements followed for up to 6 years. *Acta Orthop*. 2007;78(5):584-591.
 19. Jenkinson C, Coulter A, Wright L. Short Form 36 (SF36) Health Survey Questionnaire: normative data for adults of working age. *BMJ*. 1993;306(6890):1437-1440.
 20. John M, Angst F, Awiszus F, Pap G, Macdermid JC, Simmen BR. The Patient-Rated Wrist Evaluation (PRWE): cross-cultural adaptation into German and evaluation of its psychometric properties. *Clin Exp Rheumatol*. 2008;26(6):1047-1058.
 21. Kamrad I, Carlsson A, Henricson A, Magnusson H, Karlsson MK, Rosengren BE. Good outcome scores and high satisfaction rate after primary total ankle replacement 167 patients followed for 24 months in the Swedish Ankle Registry. *Acta Orthop*. 2017;88(6):675-680.
 22. Kamrad I, Henricson A, Magnusson H, Carlsson A, Rosengren BE. Outcome after salvage arthrodesis for failed total ankle replacement. *Foot Ankle Int*. 2016;37(3):255-261.
 23. Kamrad I, Henricsson A, Karlsson MK, et al. Poor prosthesis survival and function after component exchange of total ankle prostheses. *Acta Orthop*. 2015;86(4):407-411.
 24. Loge JH, Kaasa S. Short Form 36 (SF-36) Health Survey: normative data from the general Norwegian population. *Scand J Soc Med*. 1998;26(4):250-258.
 25. Luo N, Johnson JA, Shaw JW, Feeny D, Coons SJ. Self-reported health status of the general adult U.S. population as assessed by the EQ-5D and Health Utilities Index. *Med Care*. 2005;43(11):1078-1086.
 26. McLean JM, Awwad D, Lisle R, Besanko J, Shivakkumar D, Leith J. An international, multicenter cohort study comparing 6 shoulder clinical scores in an asymptomatic population. *J Shoulder Elbow Surg*. 2018;27(2):306-314.
 27. Mokkink LB, Terwee CB, Knol DL, et al. The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: a clarification of its content. *BMC Med Res Methodol*. 2010;10:22.
 28. Mulders MAM, Kleipool SC, Dingemans SA, et al. Normative data for the Patient-Rated Wrist Evaluation questionnaire [published online ahead of print November 10, 2017]. *J Hand Ther*. doi:10.1016/j.jht.2017.10.007.
 29. Naumann MG, Sigurdson U, Utvag SE, Stavem K. Associations of timing of surgery with postoperative length of stay, complications, and functional outcomes 3-6 years after operative fixation of closed ankle fractures. *Injury*. 2017;48(7):1662-1669.
 30. Naumann MG, Sigurdson U, Utvag SE, Stavem K. Functional outcomes following surgical-site infections after operative fixation of closed ankle fractures. *Foot Ankle Surg*. 2017;23(4):311-316.
 31. Nilsson AK, Coster ME, Bremander A, Coster MC. Patient-reported outcome after hallux valgus surgery—a two year follow-up [published online ahead of print March 6, 2018]. *Foot Ankle Surg*. doi:10.1016/j.fas.2018.02.015.
 32. Roos EM, Brandsson S, Karlsson J. Validation of the foot and ankle outcome score for ankle ligament reconstruction. *Foot Ankle Int*. 2001;22(10):788-794.
 33. Schneider W, Jurenitsch S. Age- and sex-related normative data for the Foot Function Index in a German-speaking cohort. *Foot Ankle Int*. 2016;37(11):1238-1242.
 34. Schneider W, Jurenitsch S. Normative data for the American Orthopedic Foot and Ankle Society ankle-hindfoot, midfoot, hallux and lesser toes clinical rating system. *Int Orthop*. 2016;40(2):301-306.
 35. Schrier JC, Palmieri LN, Verheyen CC, Jansen J, Koeter S. Patient-reported outcome measures in hallux valgus surgery. A review of literature. *Foot Ankle Surg*. 2015;21(1):11-15.
 36. Szende A, Janssen B, Cabases J. *Self-reported Population Health: An International Perspective Based on EQ-5D*. Dordrecht, the Netherlands: Springer Open; 2014.
 37. Tonosu J, Takeshita K, Hara N, et al. The normative score and the cut-off value of the Oswestry Disability Index (ODI). *Eur Spine J*. 2012;21(8):1596-1602.
 38. van Groningen B, van der Steen MC, Reijman M, Bos J, Hendriks JG. Outcomes in chevron osteotomy for hallux valgus in a large cohort. *Foot (Edinb)*. 2016;29:18-24.