

EFAS Score – Multilingual development and validation of a patient-reported outcome measure (PROM) by the score committee of the European Foot and Ankle Society (EFAS)

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ABSTRACT

Background: A scientifically sound validated foot and ankle specific score validated ab initio for different languages is missing. The aim of a project of the European Foot and Ankle Society (EFAS) was to develop, validate, and publish a new score (the EFAS-Score) for different European languages.

Methods: The EFAS Score was developed and validated in three stages: (1) item (question) identification, (2) item reduction and scale exploration, (3) confirmatory analyses and responsiveness. The following score specifications were chosen: scale/subscale (Likert 0–4), questionnaire based, outcome measure, patient related outcome measurement. For stage 3, data were collected pre-operatively and at a minimum follow-up of 3 months and mean follow-up of 6 months. Item reduction, scale exploration, confirmatory analyses and responsiveness were executed using analyses from classical test theory and item response theory.

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Results: Stage 1 resulted in 31 general and 7 sports related questions. In stage 2, a 6-item general EFAS Score was constructed using English, German, French and Swedish language data. In stage 3, internal consistency of the scale was confirmed in seven languages: the original four languages, plus Dutch, Italian and Polish (Cronbach's Alpha >0.86 in all language versions). Responsiveness was good, with moderate to large effect sizes in all languages, and significant positive association between the EFAS Score and patient-reported improvement.

No sound EFAS Sports Score could be constructed.

Conclusions: The multi-language EFAS Score was successfully validated in the orthopaedic ankle and foot surgery patient population, including a wide variety of foot and ankle pathologies. All score versions are freely available at www.efas.co.

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1. Introduction

A scientifically sound validated foot and ankle specific outcome measure for different European languages is still missing. Indeed, language-specific cross cultural validation in other languages than English is largely absent [1,2]. Some outcome measures were validated for specific pathologies such as hallux valgus, ankle arthritis or flatfoot [3–6]. The European Foot and Ankle Society (EFAS) established in 2013 a Score Committee in order to develop, validate, and publish a new score, the “EFAScore” for different European languages which is not specific for single pathologies. The principal aim was to develop and validate the EFAS Score simultaneously for different European languages.

2. Methods

Previous scores were analysed and different types of scores were taken into consideration [1–31]. The EFAS patient-reported outcome measure (PROM), the “EFAS Score”, was developed and validated in three stages: (1) item identification, (2) item reduction and scale exploration, (3) confirmatory analyses and responsiveness.

2.1. Type of score

We aimed to develop a questionnaire-based PROM, with one or more subscales depending on the results of the development process. After discussing different types of rating scales, a 5-point Likert scale (0–4) was chosen.

2.2. Questions – item identification

In the first stage, potentially relevant items from existing questionnaires were identified [1,2,4,6–30]. These items were combined into one pool of items that were taken forward into stage 2 of the development process. Given the low relevance of items related to sports activities for some diagnostic groups, it was decided at this point to develop two separate scores: a general-item score and a sports-specific score. Additionally, to ensure comparability of outcomes, it was decided to use 5-point Likert rating scales for all items in the patient data collections for stages 2 and 3 of the process, regardless of the original scoring method of the questionnaire from which the item had been mutated. In total, 31 general items and 7 sports-specific items were taken forward into the second phase of the project.

2.3. Item reduction and scale exploration

Through a process of forward and backward translation by bilingual translators, the original English pool of 38 items was translated into German, French and Swedish. These four language versions were then used for the stage 2 data collection. Participants were recruited from orthopaedic foot and ankle surgery

departments. Inclusion criteria for participants were clinical and imaging indications for foot and ankle surgery and age ≥ 18 years. No exclusion criteria were used other than an inability to complete a written questionnaire. Data collection was performed in France, Germany, Sweden and Ireland. In addition to providing an answer to each item on a 5-point scale, all participants also rated the relevance of the item to their situation on a 5-point scale.

Following data collection, the following analytic steps were taken to reduce the item pool into one general EFAS Score and one EFAS Sports Score. All steps were performed separately for each language version and separately for the general and sports-specific items unless stated otherwise.

1. Items with a ceiling effect (i.e. already at the highest possible level for a large proportion of patients), low perceived relevance and a high proportion of missing values were noted and shortlisted for exclusion in subsequent steps.
2. Using all items, a principal component analysis (PCA) was performed. A PCA identifies clusters (principal components) of closely related items through a matrix of inter-item correlations. Principal components were retained into the next step if the eigenvalue >1 and if it was located left of the elbow of the screen plot. Then, items were excluded from further analysis if they showed no clear association with any of the retained principal components, or if they showed a high association (item load >0.40) on more than one principal component. Cronbach's Alpha was computed for each of the identified principal components to explore their reliability. Any item showing a detrimental effect on scale reliability (i.e., Cronbach's Alpha would improve if the item was removed) was then excluded from further analysis. Finally, any item showing an item-scale correlation of $r < 0.60$ was excluded. At the end of this step, the remaining items in their respective principal components would provide optimal scale reliability according to classic test theory.
3. An item-response theory (IRT) analysis was performed for each of the identified scales (i.e., principal components) to further reduce the number of items and optimize scale unidimensional. These analyses were performed combining available data from all language versions. Items were first excluded if they showed reverse thresholds. It is expected that for any valid item, the probability of providing a certain response is closely linked to the underlying level of the trait that is measured. The order in which each response is the most likely response is a logical sequence. Two examples are provided to illustrate this in Fig. 1 a–b. Fig. 1 a shows an item with no reverse thresholds: for each of the five responses to the item, a level of the underlying trait (on the x-axis) can be identified at which that response is the most likely response (as signified by the probability level on the y-axis) and the order in which the five responses are most likely is logically progressing from response 1 to response 5. In contrast, Fig. 1 b shows an item for which only the two most extreme responses are ever the

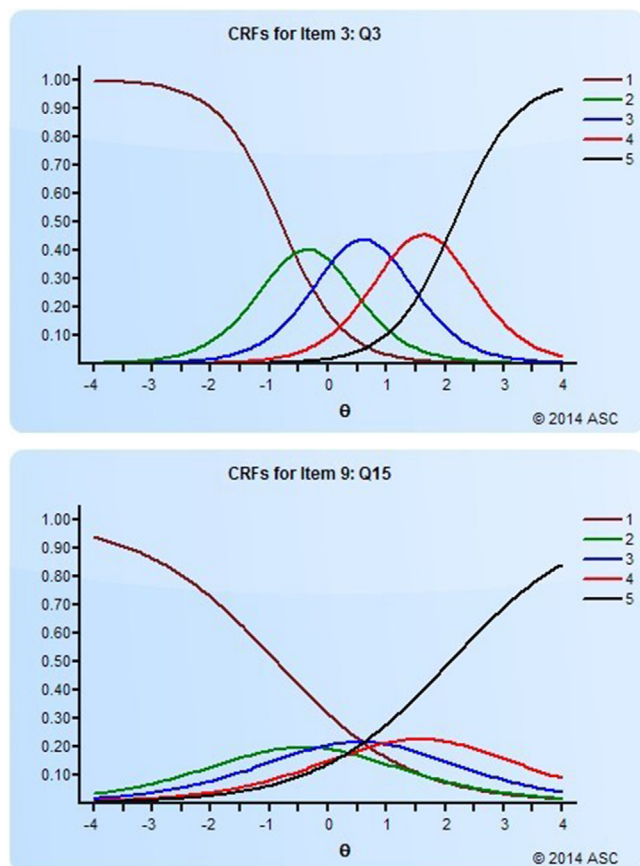


Fig. 1. (a) and (b) Cumulative response functions for an item showing no reverse thresholds (a) and an item showing reverse thresholds (b). X-axis: 'true level of underlying trait'; y-axis: probability of response.

most likely. This item in 1b would not pass the test for reverse thresholds and would therefore be excluded from the scale.

Then, a backward elimination process was used. Starting from the full remaining pool of items, at each step the worst-performing item was excluded. This was based on three parameters:

- 1) *The slope parameter (a).* This parameter represents how well an individual item can differentiate between patients with different "true" levels of the trait that is being measured. Higher values indicate better discrimination, with $a = 0.3$ as the minimum acceptable value.
- 2) *The item difficulty parameter (b).* This parameter indicates how commonly and severely a specific health issue (i.e. individual item) is flagged up by patients due to their foot/ankle problem. E.g., if 'pain during walking' is more likely to occur than 'pain while at rest' this would be reflected in different 'b' parameters for those two items, showing that more patients are experiencing more severe pain during walking than at rest. A value between -3.0 and $+3.0$ was deemed acceptable.
- 3) *The p value of the Chi-Square statistic.* A significant p-value shows that the item does not fit the IRT model. Essentially, an IRT model expects items to fit into one hierarchy, from 'easy' to 'difficult' items. If a patient identifies severe health issues by selecting an affirmative response to a 'difficult' item, then logically 'easier' items should also show an affirmative response given that they ask after closely related but mild-to-moderate health issues. A significant p-value flags up that an item does not fit into this hierarchy and therefore does not fit the scale.

Table 1

Demographic data. N = sample size; F = female; L/R/B = left/right/both; N/A = not available.

		N	Age (mean \pm SD)	Sex (% F)	Affected side (% L/R/B)
English	Stage 2	100	56.5 \pm 16.7	65.0	42.0/58.0/0.0
	Stage 3	102	54.0 \pm 14.4	66.7	41.2/57.8/1.0
French	Stage 2	100	56.5 \pm 13.9	67.0	40.5/58.3/1.2
	Stage 3	331	57.1 \pm 15.2	77.6	52.6/43.2/1.5
German	Stage 2	100	51.2 \pm 15.9	64.0	42.4/54.5/3.0
	Stage 3	501	50.5 \pm 18.7	65.5	47.9/51.9/0.2
Swedish	Stage 2	107	51.3 \pm 14.5	70.1	51.5/42.6/5.9
	Stage 3	173	N/A	65.9	46.8/51.4/1.7
Dutch	Stage 3	103	53.9 \pm 16.5	74.8	57.3/42.7/0.0
Italian	Stage 3	102	N/A	61.8	40.2/44.1/15.7
Polish	Stage 3	111	45.9 \pm 14.1	73.0	47.7/51.4/0.9

The worst performing item was removed from further analyses. The item to be excluded at each step was identified through the following hierarchy of criteria:

- a) a slope parameter of $a < 0.3$.
- b) an item difficulty parameter outside the accepted range of values, i.e. $b < -3.0$ or $b > 3.0$.
- c) If criteria (a) and (b) did not apply to any item, the item with the most significant p value of the Chi-Square statistic was removed. For this criterion the significance level was Bonferroni corrected per analysis for an overall critical value of $p < 0.05$.
- d) The process was concluded when all remaining items showed good fit to the IRT model by having acceptable slope and item difficulty parameters and a non-significant p value for the Chi-Square test.

2.4. Confirmatory analysis and responsiveness

Data collection for this final stage took place in the four original language versions, as well as Dutch, Italian and Polish.

Inclusion criteria for participants were scheduled foot and ankle surgery. No exclusion criteria were used other than an inability to complete a written questionnaire. Data was collected preoperatively and at postoperative follow-up. Minimum postoperative follow-up of 3 months and mean follow-up of 6 months was postulated (Table 1). As necessary score sheet numbers, 500 were postulated for two languages and 100 for all others (Table 1). To confirm the internal consistency for each language version, Cronbach's Alpha of the EFAS Score was computed for each language version separately. To establish the responsiveness of the EFAS Scores, both distribution-based and criterion-based analyses were used. Distribution-based measures of responsiveness included the effect size (ES) and minimal important difference (MID). The criterion-based measure of responsiveness used was the linear association (Pearson's correlation) between improvement on the EFAS Score and a 5-point Likert scale anchor question: did the surgery improve the foot and/or ankle problem? (0 = no, not at all; 4 = Yes, very much).

The ES was calculated as the difference between the baseline and 6-month follow-up mean EFAS Score, divided by the standard deviation of the baseline EFAS Score:

The MID was considered to be equal to the standard error of measurement (SEM) of the baseline EFAS score. The SEM was calculated as:

$$SEM = SD * \sqrt{1 - r} \quad (1),$$

where:

SD = standard deviation of the EFAS Score baseline score
 r = value of Cronbach's Alpha for the EFAS Score at baseline.

To assess the responsiveness of the EFAS Score using the MID, the percentage of participants with an improvement in their EFAS score between baseline and follow-up exceeding the MID was identified.

Statistical analyses were performed in SPSS (IBM SPSS Statistics 23, IBM, Armonk, NY, USA). The IRT modelling was performed in XCalibre 4 (Assessment Systems, Inc.)

2.5. Ethics

Approvals from the relevant ethical committees in different contributing countries were obtained, adhering to all local legislation.

3. Results

Tables 1 and 2 show the language-specific demographic data (Table 1) and diagnoses (Table 2) for the patient samples in stages 2 and 3 of the development process.

3.1. Item reduction

The 31 general items showed a wide spread of perceived relevance, proportion of missing values and floor and ceiling effects. Full descriptive for the four languages can be found in the Supplementary materials (Tables S1a–d, www.efas.co). Then, the PCAs were performed and item contribution to the identified subscales was analysed. Full results of the PCA for each of the four languages (scree plots, item loading on the principal components, item-scale correlations and Cronbach's alpha if item deleted) can be found in the Supplementary materials, Fig. S1a–d, Tables S2a–d and S3a–d (www.efas.co). Table 3 summarises the findings, indicating which items were retained for further analyses and which items were dropped due to any of the previously stated criteria.

In two languages, French and English, the dominant principal component included both pain and physical function items. In the two other languages (German and Swedish), pain and physical function were identified as two separate principal components. In both cases, however, the correlation between those two subscales was significant: $r=0.66$ in German, and $r=0.28$ in Swedish.

Based on these findings, the retained items were taken forward into the IRT modelling with the aim to construct a single scale including both pain and physical function items. Additionally, to preserve the potential of the final EFAS Score to cover other issues relevant to patients than pain and physical function, two items relating to footwear were retained for the final step of the item reduction process. In total, 16 of the general items proceeded into the IRT modelling.

Table 3

Summary of results of the PCA. For the four individual language columns: ✓ = item retained, <blank> = item excluded. For the overall column: Y = item retained in all four languages, ~ = item retained in three languages, <blank> = item retained in <3 languages.

Item	German	French	Swedish	English	Overall
Q1	✓		✓	✓	~
Q2	✓	✓	✓	✓	Y
Q3	✓	✓	✓	✓	Y
Q4	✓		✓		
Q5				✓	
Q6	✓	✓			
Q7	✓	✓	✓	✓	Y
Q8	✓	✓	✓	✓	Y
Q9	✓	✓			
Q10	✓	✓		✓	~
Q11	✓	✓	✓	✓	Y
Q12	✓	✓	✓		~
Q13		✓			
Q14					
Q15	✓		✓		
Q16					
Q17	✓	✓	✓	✓	Y
Q18	✓	✓			
Q19	✓	✓		✓	~
Q20				✓	
Q21	✓	✓		✓	~
Q22	✓		✓		
Q23	✓	✓	✓		~
Q24	✓	✓		✓	~
Q25	✓	✓	✓		~
Q26	✓			✓	
Q27		✓			
Q28	✓				
Q29					
Q30					
Q31	✓	✓			
QS1	✓	✓	✓	✓	Y
QS2		✓	✓	✓	~
QS3	✓	✓	✓	✓	Y
QS4	✓	✓	✓	✓	Y
QS5	✓	✓	✓	✓	Y
QS6	✓		✓	✓	~
QS7	✓	✓	✓	✓	Y

The results of the item reduction through the IRT analysis are provided in Table 4 for the general items.

This process resulted in a 6-item scale. Table 5 lists the six items in order of difficulty, providing insight into the hierarchy of items within the scale. The table shows that patients will most easily provide a low score to Q17 (indicating severe issues with pain during physical activity) while pain at rest (Q1) is least likely to be flagged up as a problem by patients. Both footwear items, retained after the previous step, were excluded in the first step of IRT modelling due low relevance.

Table 2

Prevalence of primary diagnoses, in %, based on ICD-10 codes.

		Osteoarthritis (M19)	Deformities (M20-21, Q66)	Soft-tissue disorders (M60-79)	Other musculoskeletal (M)	Other diagnoses
English	Stage 2	25.0	29.0	21.0	10.0	15.0
	Stage 3	7.8	49.9	14.7	18.6	7.8
French	Stage 2	29.0	52.0	15.0	2.0	2.0
	Stage 3	7.8	65.2	4.2	1.5	21.3
German	Stage 2	33.0	36.0	13.0	6.0	12.0
	Stage 3	37.1	56.1	3.2	0.0	3.4
Swedish	Stage 2	14.9	36.4	17.6	7.3	23.8
	Stage 3	10.4	42.2	22.0	12.1	13.3
Dutch	Stage 3	7.8	81.6	6.8	1.0	2.8
Italian	Stage 3	6.8	65.7	7.9	7.9	9.7
Polish	Stage 3	3.6	49.5	3.6	18.9	22.6

3.2. Confirmatory analyses and responsiveness

Using news samples of patients, and including three new languages (Dutch, Italian and Polish), the 6-item EFAS Score was then evaluated for internal consistency and responsiveness.

The internal consistency of the scale was excellent in all seven language versions. Cronbach’s Alpha was 0.86 in German; 0.86 in French; 0.92 in English; 0.87 in Swedish; 0.91 in Italian; 0.88 in Dutch and 0.86 in Polish.

Responsiveness of the EFAS Score is shown in Table 6 and Fig. 2a–g. Moderate (ES > 0.5) or large (ES > 0.8) effect sizes were found in all language versions. A clear majority of patients showed a minimally important difference following surgery, ranging from 57.6% in German to 94.1% in English. The change in EFAS Scores between baseline and follow-up was significantly correlated with the patient-reported change in health status. Fig. 2a–g shows this positive association.

Table 4
Results of the item reduction through the IRT analysis. RT = reverse thresholds.

Item	Step 1	Step 2		P of Chi-Sq	Status
	RT present?	'a'	'b'		
Q1	No	0.900	−0.397	0.150	Included
Q2	No	–	–	<0.005	Removed step 2.4
Q3	No	–	–	<0.004	Removed step 2.1
Q7	No	1.506	0.593	0.148	Included
Q8	No	1.478	0.123	0.425	Included
Q10	No	–	–	<0.004	Removed step 2.2
Q11	Yes	–	–	N/A	Removed step 1
Q12	No	–	–	<0.006	Removed step 2.5
Q15	Yes	–	–	N/A	Removed step 1
Q17	No	1.212	0.848	0.087	Included
Q19	No	–	–	<0.006	Removed step 2.6
Q21	No	0.950	0.222	0.782	Included
Q22	Yes	–	–	N/A	Removed step 1
Q23	No	–	–	N/A	Removed step 2.7-RT
Q24	No	1.070	0.561	0.084	Included
Q25	No	–	–	<0.005	Removed step 2.3

Table 5
Items included in EFAS Score based on IRT modelling with their item difficulty parameter.

Item	Question	Difficulty ('b')
Q1	Do you have pain in your foot and/or ankle when you are at rest?	−0.397
Q8	How far can you walk before you get pain in your foot and/or ankle	0.123
Q21	How much has your gait (i.e., the way you walk) changed because of your foot and/or ankle problem?	0.222
Q24	Do you have difficulty walking on uneven surfaces?	0.561
Q7	Do you have pain in your foot and/or ankle when you are walking?	0.593
Q17	How often do you have pain in your foot and/or ankle during physical activity?	0.848

Table 6
Responsiveness of the EFAS Score.

	German	French	English	Swedish	Dutch	Polish	Italian
Duration of follow up in days: mean (sd)	296 (116)	202 (31)	380 (31)	N/A	197 (29)	193 (39)	172 (20)
Distribution-based metrics							
Effect Size	0.53	0.79	1.76	0.76	0.84	0.84	1.37
SEM (baseline)	0.3	0.35	0.29	0.34	0.31	0.37	0.28
% of patients improving > SEM	57.6	63.5	94.1	61.4	70.1	73	90.3
Anchor-based metric							
Pearson correlation between change in EFAS Score and patient-reported improvement	0.42	0.45	0.36	0.5	0.48	0.48	0.4

3.3. EFAS-Sports Score

The separate EFAS Sports Score was developed similarly to the general EFAS-PROM. For the sports-related items (QS1–QS7), descriptives from stage 2 of the process can be found in Supplementary Tables S1a–d. The PCA found one principal component for these items in all four languages. Based on the descriptives and the outcome of the PCA, all seven sports-related items were retained into the IRT modelling step, with an aim to construct a single EFAS Sports Score.

Table 7 shows the results of the IRT modelling on the sports-related items. No scale meeting the requirements of the IRT model could be constructed in these analyses. Due to this result, no confirmatory and responsiveness analyses were performed for the EFAS Sports Score.

4. Discussion

A six-item, single-scale EFAS Score was successfully developed and validated simultaneously in seven European languages. This outcome measure covers pain and physical function and was found to be internally consistent, unidimensional and responsive to change in samples of orthopaedic foot and ankle surgery patients. The maximum score is 24 points (best possible) and the minimum score is 0 points (worst possible).

Many foot and ankle scores were developed previously [1,2,4,6–30]. However, all of the above scores were developed and/or validated in English except VAS FA (Visual Foot and Ankle Scale, English, German, Italian, Thai) and SEFAS (Self-Reported Foot and Ankle Score, Swedish version) [1,2,32]. The language-specific validation was necessary because simple translation of a validated score does not necessarily result in a validated translated score [1,2]. This issue is especially important for Europe where numerous languages are spoken. The most widely spoken mother tongues in Europe are German (18%), English (13%), Italian (13%), French (12%), Spanish (8%), Polish (8%) and Dutch (4%) (source Wikipedia, February 20, 2018). Therefore, a need for different language-specific (validated) scores, especially in Europe, is clear. Another issue is that some scores are only validated for specific pathologies such as hallux valgus, ankle arthritis or flatfoot [3–6]. EFAS recognized the need and importance for a non-pathology specific score in different European

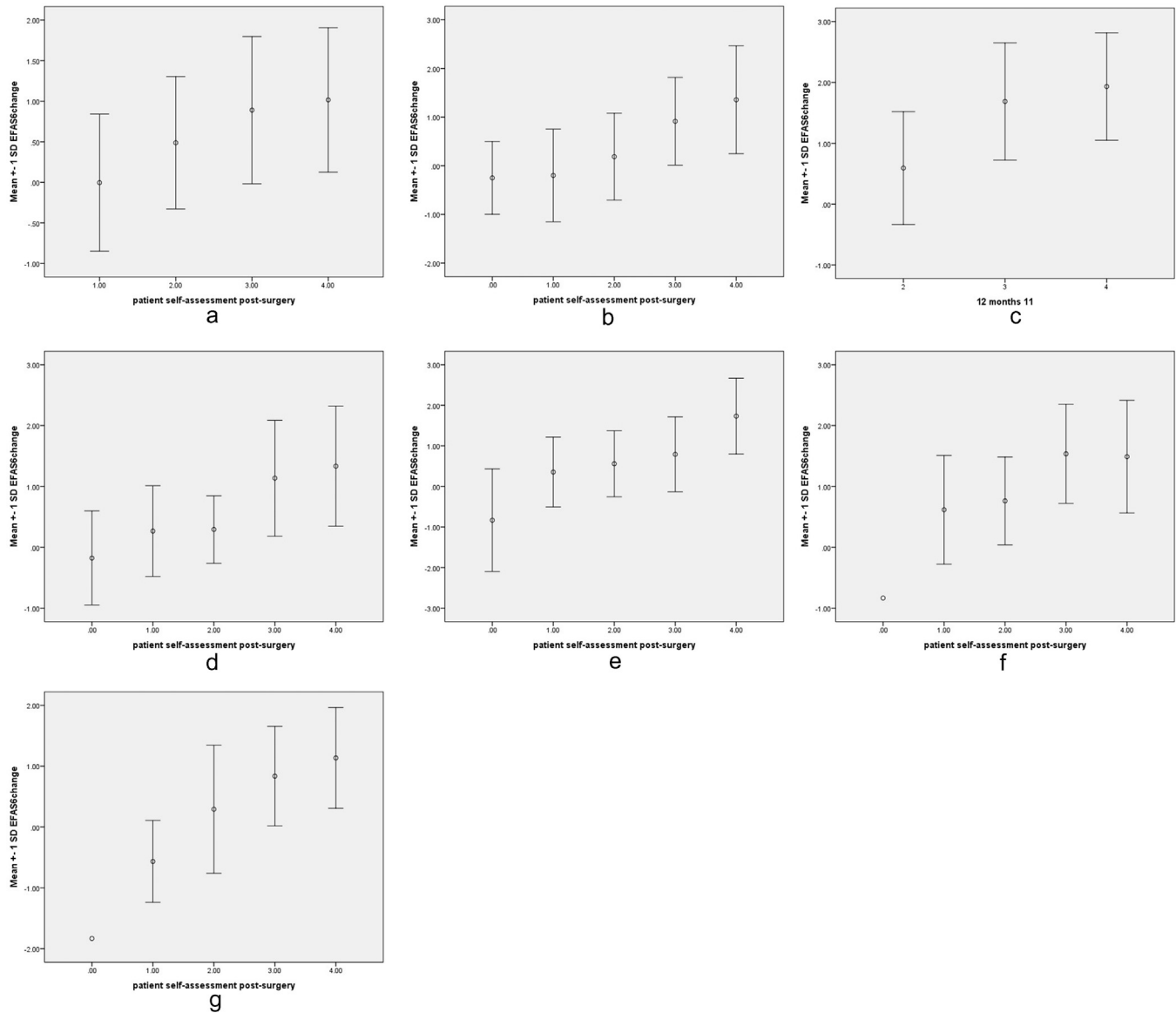


Fig. 2. (a–g) Association between change in EFAS Score from pre- to post-surgery and patient self-reported improvement (a, German; b, French; c, English; d, Swedish; e, Dutch; f, Italian; g, Polish).

languages and therefore undertook the process described in the present study. The Score Committee comprised foot and ankle surgeons from different European countries completed with technical advisor (PhD for biomechanics) and an expert in outcome measure development and validation [33–39]. Patient involvement in the development of the EFAS Score was twofold: items were selected from questionnaires that had been developed using patient statements, and in stage 2 of the process, all questions that were

deemed to be of low relevance by patients were excluded from further consideration.

The process of item reduction started with a pool of 31 candidate items and finished with the definitive 6-item EFAS Score. Using an analytical approach from classical test theory, the pool was reduced to 15 items while identifying the main underlying constructs of pain and physical function. Then, using item-response modelling, an unidimensional scale was identified

Table 7
Results of the IRT modelling on the sports-related items. K = number of items in analysis; RT = reverse thresholds; OK = item retained for next step of analysis; a significant P-value ($P < 0.05$) indicates lack of fit to the IRT model.

Item	Step 1 (K = 7)	Step 2 (K = 6)	Step 3 (K = 5)	Step 4 (K = 4)	Step 5 (K = 3)	Step 6 (K = 2)
QS1	OK	OK	OK	OK	OK	$P < 0.001$
QS2	$P = 0.005$	$P < 0.001$	$P < 0.001$	–	–	–
QS3	OK	OK	OK	OK	$P < 0.001$	$P < 0.001$
QS4	OK	OK	OK	OK	RT, $P < 0.001$	–
QS5	RT, $P = 0.03$	RT, $P < 0.001$	–	–	–	–
QS6	RT, $P < 0.001$	–	–	–	–	–
QS7	$P = 0.005$	OK	$P = 0.035$	RT, $P < 0.001$	–	–

comprising six items covering both pain and physical function. This scale had superior measurement properties over other variants that captured wider issues such as footwear and assistive device use, and was therefore preferred. Due to the simultaneous development of the EFAS Score in multiple languages, the development and validation process was highly complex. The analytical process was designed to do justice to the original aim of developing an outcome measure that is easy to use in clinical practice (i.e., short; relevant; generically applicable; valid and responsive) across different languages, health care systems and diagnostic groups, while maintaining optimal scientific credibility.

Not all measurement properties of the EFAS Score have been established. In particular test-retest reliability, i.e. reproducibility of the score in a stable (pre-surgery) population, was not included in the present study. As a result, the MID of the EFAS Score as reported in this study was based on the internal consistency of the scale (Cronbach's Alpha) rather than test-retest reliability. In future, if the test-retest reliability becomes available, this may lead to an adjustment in the SEM and therefore MID of the EFAS Score.

The process to develop the EFAS Sports Score was ultimately unsuccessful. The questions related to sports activities were not relevant to a large proportion of the patients, and suffered from a high proportion of missing values. This meant the IRT

modelling did not result in a unidimensional EFAS Sports Score. Based on the findings of the IRT model, a 4-item EFAS Sports Score could be considered, as this was the best-performing option. In that scale, three items fit the scale well with a fourth item showing some issues. Removing the fourth item, however, then resulted in the remaining three items not forming a scale that fit the constraints of the IRT model. Further analyses in specific patient groups, for whom sports-related questions are relevant, is warranted.

In conclusion, the EFAS Score has been successfully validated for orthopaedic foot and ankle surgery populations incorporating a wide variety of foot and ankle pathologies, including language-specific validation in seven languages so far (English, German, French, Swedish, Dutch, Italian, Polish). Validation for other languages (Finnish, Portuguese, Spanish) is in progress. All score versions are freely available at www.efas.co.

Conflict of interest statement

The EFAS Score Committee was funded by the European Foot and Ankle Society (EFAS).

Appendix A, EFAS Score, English version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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EFAS Score

Below you will find 6 questions relating to your foot and/or ankle problem.

Please answer each question by selecting the answer that best describes your situation in the last week. Each question can be answered on a 5-point scale, with descriptions given for the two endpoints of the scale.

If a question does not apply to you, please indicate this by checking the N/A box on the left.

QUESTIONS

No.	Question	Answer
1 N/A <input type="radio"/>	Do you have pain in your foot and/or ankle when you are at rest?	Always 0 1 2 3 4 Never
2 N/A <input type="radio"/>	How far can you walk before you get pain in your foot and/or ankle	Impossible 0 1 2 3 4 No limitation
3 N/A <input type="radio"/>	How much has your gait (i.e., the way you walk) changed because of your foot and/or ankle problem?	Extreme gait change change 0 1 2 3 4 No
4 N/A <input type="radio"/>	Do you have difficulty walking on uneven surfaces?	Always 0 1 2 3 4 Never

5 N/A <input type="radio"/>	Do you have pain in your foot and/or ankle when you are walking?	Always 0	1	2	3	Never 4
6 N/A <input type="radio"/>	How often do you have pain in your foot and/or ankle during physical activity?	Always 0	1	2	3	Never 4

SPORTS QUESTIONS

Please only answer these questions if you regularly engage in sports activities, if a specific question does not apply to your chosen sport, please check the N/A box

No.	Question	Answer				
S1 N/A <input type="radio"/>	Can you run?	Impossible 0	1	2	3	No limitation 4
S2 N/A <input type="radio"/>	Can you jog?	Impossible 0	1	2	3	No limitation 4
S3 N/A <input type="radio"/>	Do you have problems landing after jumping?	Impossible 0	1	2	3	No limitation 4
S4 N/A <input type="radio"/>	Are you able to perform your sports with your usual technique?	Impossible 0	1	2	3	No limitation 4

You have now finished this survey. Thank you very much for your co-operation!

Appendix B, EFAS Score, German version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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EFAS Score

Auf der folgenden Seite finden Sie 6 Fragen zur Ihren Problemen am Fuß und/oder Sprunggelenk.

Bitte beantworten Sie alle Fragen so, dass Sie Ihre Situation innerhalb der letzten Woche am passendsten beschreiben. Jede Frage hat 5

Antwortmöglichkeiten, d.h. eine 5-Punkte-Skala mit einer Beschreibung der Antworten bzw. Endpunkte.

Falls eine Frage für Sie nicht zutrifft, kreuzen Sie bitte "n.z." an und beantworten die Frage nicht.

FRAGEN

Nr.	Frage	Antwort										
1 n.z. <input type="radio"/>	Haben Sie in Ruhe Schmerzen im Fuß / Sprunggelenk?	<table style="width: 100%; border: none;"> <tr> <td style="text-align: left;">Immer</td> <td></td> <td></td> <td></td> <td style="text-align: right;">Nie</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> </table>	Immer				Nie	0	1	2	3	4
Immer				Nie								
0	1	2	3	4								
2 n.z. <input type="radio"/>	Wie weit können Sie gehen bis Sie Schmerzen am Fuß / Sprunggelenk bekommen?	<table style="width: 100%; border: none;"> <tr> <td style="text-align: left;">Gehen unmöglich</td> <td></td> <td></td> <td></td> <td style="text-align: right;">Keine Einschränkung</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> </table>	Gehen unmöglich				Keine Einschränkung	0	1	2	3	4
Gehen unmöglich				Keine Einschränkung								
0	1	2	3	4								
3 n.z. <input type="radio"/>	Wie stark hat sich Ihr Gang (d.h. die Art wie Sie gehen) wegen Problemen am Fuß / Sprunggelenk verändert?	<table style="width: 100%; border: none;"> <tr> <td style="text-align: left;">Extremer Veränderung</td> <td></td> <td></td> <td></td> <td style="text-align: right;">Keine Veränderung</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> </table>	Extremer Veränderung				Keine Veränderung	0	1	2	3	4
Extremer Veränderung				Keine Veränderung								
0	1	2	3	4								
4 n.z. <input type="radio"/>	Haben Sie Schwierigkeiten beim Gehen auf unebenem Untergrund?	<table style="width: 100%; border: none;"> <tr> <td style="text-align: left;">Immer</td> <td></td> <td></td> <td></td> <td style="text-align: right;">Nie</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> </table>	Immer				Nie	0	1	2	3	4
Immer				Nie								
0	1	2	3	4								

5 n.z. <input type="radio"/>	Haben Sie Schmerzen im Fuß / Sprunggelenk beim Gehen?	Immer 0	1	2	3	Nie 4
6 n.z. <input type="radio"/>	Wie oft haben Sie Schmerzen im Fuß / Sprunggelenk während körperlicher Aktivität?	Immer 0	1	2	3	Nie 4

SPORTFRAGEN

Bitte beantworten Sie diese Fragen nur wenn Sie regelmäßig Sport treiben.

Bei Fragen, die für Ihre sportliche Betätigung nicht zutreffen, kreuzen Sie

bitte n.z. an und beantworten die Frage nicht.

Nr.	Frage	Antwort				
S1 n.z. <input type="radio"/>	Können Sie rennen/schnell laufen?	Unmöglich 0	1	2	3	Keine Einschränkung 4
S2 n.z. <input type="radio"/>	Können Sie joggen/langsam laufen?	Unmöglich 0	1	2	3	Keine Einschränkung 4
S3 n.z. <input type="radio"/>	Haben Sie Probleme bei der Landung nach einem Sprung?	Unmöglich 0	1	2	3	Keine Einschränkung 4
S4 n.z. <input type="radio"/>	Können Sie Ihren Sport mit Ihrer üblichen Technik ausüben?	Unmöglich 0	1	2	3	Keine Einschränkung 4

Sie haben nun den Fragenbogen vollständig ausgefüllt. Vielen Dank für Ihre Mithilfe!

Appendix C, EFAS Score, French version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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Score de l'EFAS

Vous trouverez ci-dessous 6 questions relatives à votre problème de pied ou cheville et 4 questions concernant la pratique sportive.

Nous vous prions de répondre à chaque question en choisissant la réponse qui décrit le mieux votre situation **au cours de la semaine précédente**. Il faut répondre à chaque question sur une échelle de 5 points, selon les indications données pour les deux extrémités de l'échelle.

Si une question ne s'applique pas pour vous, veuillez l'indiquer en cochant la case N/A (non applicable) à gauche.

QUESTIONS

No.	Question	REPONSE
1 N/A <input type="radio"/>	Avez-vous des douleurs du pied et/ou de la cheville quand vous êtes au repos ?	Toujours 0 1 2 3 4 Jamais
2 N/A <input type="radio"/>	Quelle distance pouvez-vous marcher avant de ressentir une douleur de votre pied et/ou de votre cheville ?	Impossible limitation 0 1 2 3 4 Aucune
3 N/A <input type="radio"/>	Dans quelle mesure votre démarche (c'est à dire la façon de marcher) a changé à cause de	Changement Aucun changement très sévère 0 1 2 3 4

	vos problèmes de pied et/ou de cheville?					
4 N/A <input type="radio"/>	Avez-vous des difficultés pour marcher en terrain irrégulier ?	Toujours 0	1	2	3	Jamais 4
5 N/A <input type="radio"/>	Avez-vous des douleurs du pied et/ou de la cheville quand vous marchez ?	Toujours 0	1	2	3	Jamais 4
6 N/A <input type="radio"/>	Avez-vous souvent une douleur du pied et/ou de la cheville pendant l'activité physique ?	Toujours 0	1	2	3	Jamais 4

QUESTIONS SPORTIVES.

Répondez à ces questions uniquement si vous pratiquez régulièrement une activité sportive. Si une question ne s'applique pas pour vous, veuillez l'indiquer en cochant la case N/A.

No.	Question	REPONSE				
S1 N/A <input type="radio"/>	Pouvez-vous courir?	Impossible limitation 0	1	2	3	Aucune 4
S2 N/A <input type="radio"/>	Pouvez-vous faire du jogging?	Impossible limitation 0	1	2	3	Aucune 4
S3 N/A <input type="radio"/>	Avez-vous des problèmes pour vous réceptionner d'un saut?	Impossible limitation 0	1	2	3	Aucune 4
S4 N/A <input type="radio"/>	Est-ce que vous pouvez pratiquer vos sports avec votre technique habituelle?	Impossible limitation 0	1	2	3	Aucune 4

Vous avez terminé ce questionnaire.

Merci pour votre collaboration.

Appendix D, EFAS Score, Swedish version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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EFAS Score

Här nedan ser Du 6 frågor relaterade till Dina problem från foten och/eller fotleden.

Var vänlig besvara varje fråga genom att välja det alternativ som bäst beskriver Din situation under den senaste veckan. Varje fråga kan besvaras på en 5-gradig skala där betydelsen av värdet 0 respektive 4 är beskrivet i ord.

Om en fråga inte alls passar in på Din situation, kryssa då i rutan N/A till vänster

FRÅGOR

	Fråga	Svar
1 N/A	Har Du smärtor i foten och/ eller fotleden i vila?	Alltid 0 1 2 3 Aldrig 4
2 N/A	Hur långt kan Du gå utan att få ont i fot och/eller fotled?	Omöjligt 0 1 2 3 Ingen begränsning 4
3 N/A	Hur mycket har Din gångförmåga förändrats pga. problem från fot och/ eller fotled.	Extremt mycket 0 1 2 3 Inget alls 4
4 N/A	Har Du svårt att gå på ojämnt underlag?	Alltid 0 1 2 3 Aldrig 4
5 N/A	Har Du smärtor i foten/fotleden när Du går?	Alltid 0 1 2 3 Aldrig 4
6 N/A	Hur ofta får du ont i foten och/ eller fotleden under fysisk aktivitet?	Alltid 0 1 2 3 Aldrig 4

SPORTFRÅGOR

Besvara dessa frågor bara om Du regelbundet deltar i sportaktiviteter . Kryssa rutan

N/A om en specifik fråga inte är relevant för den aktivitet Du deltar i.

No.	Fråga	Svar
S1 N/A	Kan du springa?	Omöjligt begränsning 0 1 2 3 Ingen 4
S2 N/A	Kan du jogga?	Omöjligt begränsning 0 1 2 3 Ingen 4
S3 N/A	Har du problem när Du landar efter att ha hoppat?	Omöjligt begränsning 0 1 2 3 Ingen 4
S4 N/A	Kan Du delta i sport med Din sedvanliga teknik?	Omöjligt begränsning 0 1 2 3 Ingen 4

Du har nu besvarat denna enkät. Stort tack för att du velat medverka.

Appendix E, EFAS Score, Dutch version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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EFAS Score

Deze vragenlijst bestaat uit 6 vragen die te maken hebben met uw voet- en enkelklachten.

Selecteer alstublieft bij iedere vraag het antwoord dat het beste uw situatie beschrijft gedurende de afgelopen week. Het antwoord op iedere vraag kan worden aangegeven met een 5-punten schaal, waarop de twee eindpunten van de schaal beschreven staan.

Wanneer een vraag voor u niet van toepassing is, dan dient u dat aan te geven in het rondje onder NVT (niet van toepassing) links van de vraag.

ALGEMENE VRAGEN

No.	Vraag	Antwoord
1 nvt <input type="radio"/>	Heeft u in rust pijn aan uw voet en/of uw enkel?	Altijd Nooit 0 1 2 3 4
2 nvt <input type="radio"/>	Kunt u ver lopen voordat u pijn krijgt in uw voet en/of enkel?	Onmogelijk Geen probleem 0 1 2 3 4
3 nvt <input type="radio"/>	In hoeverre is uw looppatroon (manier van lopen) veranderd door uw voet en/of enkel problemen?	Heel erg veranderd Niet veranderd 0 1 2 3 4
4 nvt <input type="radio"/>	Heeft u pijn aan uw voet en/of uw enkel bij het lopen op ongelijk terrein?	Altijd Nooit 0 1 2 3 4

5 nvt <input type="radio"/>	Heeft u pijn in uw voet en/of enkel tijdens het lopen?	Altijd 0	1	2	3	Nooit 4
6 nvt <input type="radio"/>	Heeft u pijn in uw voet en/of enkel tijdens fysieke inspanning?	Altijd 0	1	2	3	Nooit 4

SPORT VRAGEN

Deze vragen, alstublieft, alleen beantwoorden wanneer u regelmatig sport bedrijft. Wanneer een vraag niet van toepassing op de door u beoefende sport, dan graag het vakje NvT invullen.

No.	Vraag	Antwoord
S1 nvt <input type="radio"/>	Kunt u rennen?	Onmogelijk 0 1 2 3 4 Geen beperking
S2 nvt <input type="radio"/>	Kunt u joggen?	Onmogelijk 0 1 2 3 4 Geen beperking
S3 nvt <input type="radio"/>	Heeft u problemen bij het neerkomen vanuit een sprong?	Onmogelijk 0 1 2 3 4 Geen beperking
S4 nvt <input type="radio"/>	Kunt u uw sport met uw normale techniek uitvoeren?	Onmogelijk 0 1 2 3 4 Geen beperking

U bent klaar met het invullen van de lijst. Veel dank voor uw medewerking!

Appendix F, EFAS Score, Italian version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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Punteggio EFAS

In calce troverai 6 domande che riguardano il tuo problema inerente al piede e/o caviglia.

Dovresti rispondere a ciascuna domanda, selezionando la risposta che descriva al meglio la tua situazione nel corso dell'ultima settimana. La risposta ad ogni domanda è su una scala da 0 a 4, con la descrizione relativa ad ogni margine.

Qualora una domanda non sia applicabile nel tuo caso, dovresti indicarlo barrando la casella N/A a sinistra.

Le seguenti domande si riferiscono alla sua problematica alla caviglia o al piede allo stato attuale (anche se prima dell'intervento)

No.	Domanda	Risposta
1 N/A	Ha dolore quando è a riposo?	Sempre quasi sempre talvolta quasi mai Mai 0 1 2 3 4
2 N/A	Quanto riesce a camminare prima di provare dolore?	Nessuna Impossibile poco abbastanza tanto limitazione 0 1 2 3 4
3 N/A	Quanto le è cambiato il di camminare a causa del suo problema al piede e/o caviglia?	Cambiamento NessunoEstremo tanto abbastanza poco cambiamento 0 1 2 3 4
4 N/A	Ha difficoltà a camminare sulle superfici non-livellate (sconnesse)?	Sempre quasi sempre talvolta quasi mai Mai 0 1 2 3 4
5 N/A	Ha dolore mentre cammina?	Sempre quasi sempre talvolta quasi mai Mai 0 1 2 3 4

6 N/A	Quante volte ha dolore durante l'attività fisica?	Sempre 0	quasi sempre Mai 1	talvolta 2	quasi mai 3	4
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DOMANDE RELATIVE ALLO SPORT

Dovresti rispondere a queste domande solo se svolgi delle attività sportive con regolarità. Qualora una domanda specifica non sia applicabile al tuo sport, dovresti barrare la casella N/A.

N.	Domanda	Risposta				
S1 N/A	Riesci a fare jogging?	Impossibile limitazione 0	1	2	3	Nessuna 4
S2 N/A	Riesci a correre?	Impossibile limitazione 0	1	2	3	Nessuna 4
S3 N/A	Hai problemi nell'atterrare dopo aver saltato?	Impossibile limitazione 0	1	2	3	Nessuna 4
S4 N/A	Sei in grado di svolgere il tuo sport nello stesso modo in cui lo facevi prima dell'insorgenza della malattia?	Impossibile limitazione 0	1	2	3	Nessuna 4

Adesso hai completato questo sondaggio. Grazie della tua collaborazione!

Appendix G, EFAS Score, Polish version.

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

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EFAS Score

Poniżej znajduje się 6 pytań dotyczących stanu Państwa stopy i/lub kostki. Proszę dla każdego pytania zaznaczyć odpowiedź najlepiej odpowiadającą sytuacji w ostatnim tygodniu. Odpowiedzi dla każdego pytania proszę zaznaczyć na pięciopunktowej skali. Podano opis skrajnych wartości skali. Jeśli jakieś pytanie Państwa nie dotyczy, proszę zaznaczyć pole N/D po lewej stronie.

PYTANIA

Nr.	Pytanie	Odpowiedź
1 N/D <input type="radio"/>	Czy stopa/kostka boli kiedy Pan/Pani odpoczywa?	Zawsze 0 1 2 3 4 Nigdy
2 N/D <input type="radio"/>	Ile jest Pan/Pani w stanie przejść nim pojawi się ból w stopie/stawie skokowym?	Nieosiągalne 0 1 2 3 4 Bez ograniczeń
3 N/D <input type="radio"/>	Jak zmienił się Pana/Pani chód (sposób poruszania) z powodu problemu ze stopą/kostką?	Skrajna zmiana 0 1 2 3 4 Bez zmian
4 N/D <input type="radio"/>	Czy ma Pan/Pani problem z chodzeniem po nierównej powierzchni?	Zawsze 0 1 2 3 4 Nigdy

5	Czy odczuwa Pan/Pani ból w stopie/kostce podczas chodzenia?	Zawsze				Nigdy
N/D		0	1	2	3	4
<input type="radio"/>						
6	Jak często odczuwa Pan/Pani ból stopy/kostki w podczas aktywności fizycznej?	Zawsze				Nigdy
N/D		0	1	2	3	4
<input type="radio"/>						

To już wszystkie pytania. Dziękujemy za wypełnienie kwestionariusza!

PYTANIA DOTYCZĄCE SPORTU

Proszę odpowiedzieć na te pytania jedynie jeśli regularnie uprawiają Państwo sport. Jeśli któreś z pytań nie ma zastosowania w Państwa dyscyplinie, proszę zaznaczyć N/D.

Nr.	Pytanie	Odpowiedź
S1	Czy jest Pan/Pani w stanie biegać?	Niemożliwe
N/D		0 1 2 3 4
<input type="radio"/>		Bez ograniczeń
S2	Czy jest Pan/Pani w stanie truchtać?	Niemożliwe
N/D		0 1 2 3 4
<input type="radio"/>		Bez ograniczeń
S3	Czy ma Pan/Pani problem z lądowaniem przy skoku?	Niemożliwe
N/D		0 1 2 3 4
<input type="radio"/>		Bez ograniczeń
S4	Czy jest Pan/Pani w stanie uprawiać swój sport w zwyczajny sposób?	Niemożliwe
N/D		0 1 2 3 4
<input type="radio"/>		Bez ograniczeń

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