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EFAS Score Validation of the Slovak Version by the Score Committee of the European Foot and Ankle Society (EFAS)

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ABSTRACT

Background: The Score Committee of the European Foot and Ankle Society (EFAS) developed, validated, and published the EFAS Score in 17 languages. Currently, the Slovak version completed data acquisition and underwent further validation.
Methods: The data were collected pre-operatively and post-operatively 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 classical test theory and item response theory.
Results: The internal consistency was confirmed in the Slovak version (Cronbach's Alpha 0.86). The Standard Error of Measurement (SEM) was 0.34 and is similar to other language versions. Between baseline and follow-up, 81% of patients showed an improvement on their EFAS score, with good responsiveness (effect size 1.30).
Conclusions: The Slovak EFAS Score version was successfully validated in patients with a wide variety of foot and ankle pathologies. All score versions are freely available at www.efas.net.
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1. Introduction

The Score Committee of the European Foot and Ankle Society (EFAS) developed, validated, and published the EFAS Score in 17 languages (English, German, French, Italian, Polish, Dutch, Swedish, Finnish, Norwegian, Turkish, Persian, Portuguese, Spanish, Estonian, Danish, Mandarin, Cantonese (in order of validation)) [1–8]. The EFAS score covers pain and physical function, and is internally consistent, unidimensional and responsive to change in samples of orthopaedic foot and ankle surgery patients [1]. The score contains six questions. The maximum score is 24 points (best possible), and the minimum 0 points (worst possible) [1]. Language-specific cross-cultural validation of a given score is necessary because simple translation of a validated score

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does not necessarily result in an instrument that provides valid scores in the target language [1]. This issue is especially important for Europe, where numerous languages are spoken [1]. The most widely spoken mother tongues in Europe are German (20%), English (15%), Italian (15%), French (14%), Spanish (9%), Polish (9%), Romanian (6%), Dutch (5%), Hungarian (3%) and Portuguese, Greek, Swedish, Czech, Slovak and Bulgarian (2% each) [7]. After having initially validated the EFAS Score in seven languages (English, German, French, Italian, Polish, Dutch, Swedish), the data acquisition in 18 other languages (Arabic, Cantonese, Catalan, Estonian, Finnish, Greek, Hungarian, Latvian, Slovak, Mandarin, Persian, Portuguese, Slovak, Slovenian, Spanish, Thai, Turkish, Welsh) started at different timepoints. The Finnish and Turkish data acquisition, analysis and publication was completed in 2020, Persian in 2021, Portuguese in 2022, Spanish and Estonian in 2023, Danish in 2024, Cantonese and Mandarin in 2025, and Norwegian in 2026 [1–8]. Data acquisition in Slovak was currently completed, and the results of the validation process and the score are presented.

2. Methods [1]

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 [1].

2.1. Type of score (initial score development) [1]

A questionnaire-based PROM, with a 5-point Likert scale (0–4) was chosen [1].

2.2. Questions - Item identification (initial score development) [1]

In the first stage of the initial validation, potentially relevant items from existing questionnaires were identified [1]. 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 [1]. In total, 31 general items and 7 sports-specific items were taken forward into the second phase of the project [1].

2.3. Item reduction and scale exploration (initial score development) [1]

Through a process of forward and backward translation performed by bilingual translators, the original English pool of 38 items was translated into German, French and Swedish [1]. These four language versions were then used for the Stage 2 data collection [1]. Participants were recruited from orthopaedic foot and ankle surgery departments [1]. Inclusion criteria for participants were clinical and imaging indications for foot and ankle surgery and age ≥ 18 years [1]. No exclusion criteria were used other than an inability to complete a written questionnaire [1]. Data collection was performed in France, Germany, Sweden and Ireland [1]. 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 [1].

Following data collection, the following analytic steps were taken to reduce the item pool into one general PROM and one sports PROM [1].

1. Items with a ceiling effect, low perceived relevance and a high proportion of missing values were noted and shortlisted for exclusion in subsequent steps [1].

2. A principal component analysis (PCA) was performed [1]. At the end of this step, the remaining items in their respective principal components would provide optimal scale reliability according to classic test theory [1].
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 optimise scale unidimensional l [1].

2.4. Confirmatory analysis and responsiveness (initial score validation) [1]

Data collection for this final stage of the initial validation took place in the four original language versions, as well as Dutch, Italian and Polish [1].

2.5. Confirmatory analysis and responsiveness Slovak version

Data collection stage of the validation was performed in Norway. Inclusion criteria for participants were being scheduled for foot and ankle surgery and age ≥ 18 years. No exclusion criteria were used other than an inability to complete a written questionnaire. Data were collected preoperatively and at postoperative follow-up. A minimum postoperative follow-up of 3 months and mean follow-up of 6 months were planned, collecting at least 100 completed score sheets. To confirm the internal consistency for each language version, Cronbach's Alpha of the EFAS Score was computed for each language version separately [1]. To establish the responsiveness of the EFAS Scores, both distribution-based and criterion-based analyses were used [1]. Distribution-based measures of responsiveness included the effect size (ES) and minimal important difference (MID) [1]. The criterion-based measure of responsiveness used was the linear association (Spearman 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) [1].

The ES was calculated as the difference between the baseline and three to six-month follow-up mean EFAS Score, divided by the standard deviation of the baseline EFAS Score [1].

The MID was considered to be equal to the standard error of measurement (SEM) of the baseline EFAS Score. The SEM was calculated as [1]:

$$SEM = SD^* \quad \sqrt{1 - r} \tag{1}$$

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 [1].

Statistical analyses were performed in SPSS (IBM SPSS Statistics 28.0.1, IBM, Armonk, NY, USA). The IRT modelling was performed in XCalibre 4 (Assessment Systems, Stillwater, MN, USA).

2.6. Ethics

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

3. Results

Table 1 shows the language-specific demographic data and Table 2 diagnoses for the patient samples.

Table 1
Slovak demographic data. N = sample size; F = Female; L/R/B = Left/Right/Both; N/A = not available.

n	Age (mean ± SD)	Sex (% F)	Affected side (% L/R/B)
100	53.6 ± 14.2	71.8	41.0/41.0/18.0

Table 2
Prevalence of primary diagnoses, in %, based on ICD-10 codes Slovak data.

Osteoarthritis (M19)	Deformities (M20-21, Q66)	Soft-tissue disorders (M60-79)	Other musculoskeletal (M)	Other diagnoses
11.0	77.0	6.0	2.0	0.0

Table 3
Responsiveness of the EFAS Score Slovak version.

Duration of follow up in days: mean (std)	197 (10)
DISTRIBUTION-BASED METRICS	
Effect Size	1.30
SEM (baseline)	0.34
% of patients improving > SEM	80.8
ANCHOR-BASED METRIC	
Pearson correlation between change in EFAS-PROM and patient-reported improvement	0.25

SEM, Standard Error of Measurement

3.1. Confirmatory analyses and responsiveness (Table 3, Fig. 1)

The internal consistency was confirmed in the Slovak version (Cronbach's Alpha 0.86). The Standard Error of Measurement (SEM) was 0.34 and is similar to other language versions. Between baseline and follow-up, 81% of patients showed an improvement on their EFAS score, with good responsiveness (effect size 1.30). The correlation between the change in EFAS score and the patient self-rated assessment is 0.25.

4. Discussion

Consistent with previously validated language versions, the Slovak EFAS score was successfully validated. It shows good internal consistency and responsiveness comparable to other language versions [1–8]. The precision (SEM) was adequate and similar to other language versions. Between baseline and follow-up, 77% of patients showed an improvement on their EFAS score.

It must be noted that the anchor-based responsiveness metric, i.e. the correlation between the change in EFAS score and the patient self-rated assessment is only 0.25, one of the lowest so far in any language. However, looking at Fig. 1, this can be partially explained by one outlier patient assessing their post-surgery improvement as very poor (score 1 on the self-assessment question), while they improved by 1.5 points on the EFAS Score. This negatively affects the entire correlation. Looking at scores 2–4 on the self-assessment compared to the change in EFAS score, the relationship is actually excellent and very consistent.

The process to develop the EFAS Sports Score was ultimately unsuccessful during the initial validation study [1]. The questions related to sports activities were not relevant to a large proportion of the patient samples, and suffered from a high proportion of missing values [1–8]. This implies that the IRT modelling did not result in a unidimensional EFAS Sports Score [1–8]. Based on the findings of the IRT model, a 4-item EFAS Sports Score could be considered, as this was the best-performing option [1–8]. The EFAS Sports Score was included in the data acquisition of all languages because this was part of the initially defined validation process that was decided not be changed during the process [1–8].

In conclusion, the Slovak EFAS Score version was successfully validated in the orthopaedic ankle and foot surgery patients, including a wide variety of foot and ankle pathologies. All score versions are freely available at www.efas.net.

Declaration of Competing Interest

None.

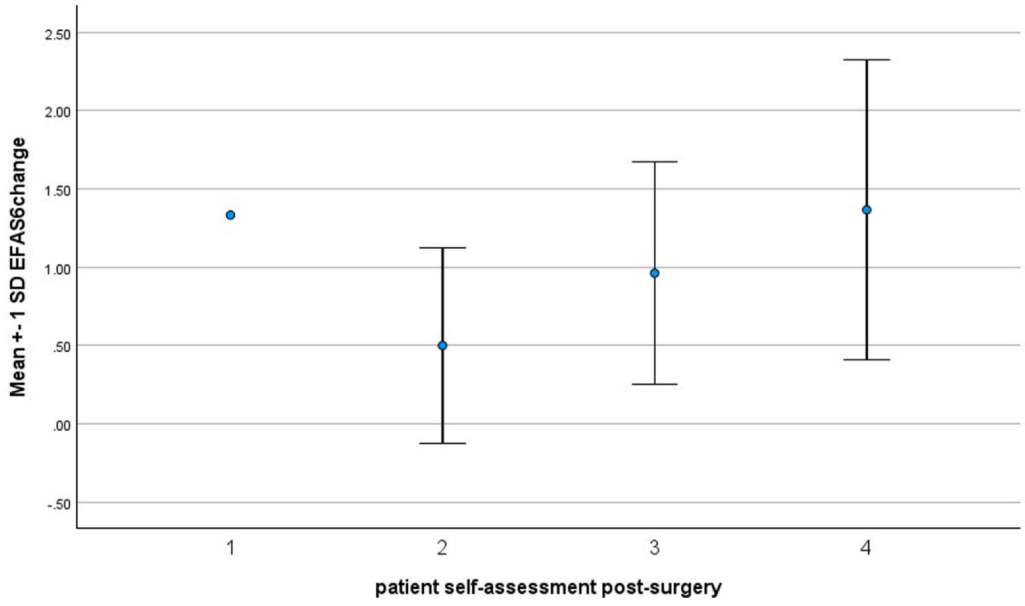


Fig. 1. Association between change in Slovak EFAS Score version from pre- to post-surgery and patient self-reported improvement.

Appendix

Appendix 1, EFAS Score, Slovak version

EUROPEAN FOOT AND ANKLE SOCIETY (EFAS)

www.efas.co

EFAS Score

Nižšie nájdete 6 otázok týkajúcich sa vášho problému s chodidlom a/alebo členkom.

Prosíme vás, aby ste na každú otázku odpovedali výberom odpovede, ktorá najlepšie vystihuje váš stav počas posledného týždňa. Každá otázka sa hodnotí na 5-bodovej škále, pričom význam jednotlivých hodnôt je uvedený na oboch koncoch škály.

Ak sa niektorá otázka na vás nevzťahuje, označte možnosť N/A (neaplikovateľné) vľavo.

OTÁZKY

Č.	Otázka	Odpoveď
1 N/A ◯	Máte bolesť v chodidle a/alebo v členku v pokoji?	Vždy 0 1 2 3 Nikdy 4
2 N/A ◯	Ako ďaleko dokážete prejsť, kým sa objaví bolesť v chodidle a/alebo v členku?	Nemožné 0 1 2 3 Bez obmedzenia 4
3 N/A ◯	Do akej miery sa zmenila vaša chôdza v dôsledku problému s chodidlom a/alebo členkom?	Výrazná zmena 0 1 2 3 Bez zmeny 4
4 N/A ◯	Máte ťažkosti pri chôdzi po nerovnom povrchu?	Vždy 0 1 2 3 Nikdy 4
5 N/A ◯	Máte bolesť v chodidle a/alebo v členku pri chôdzi?	Vždy 0 1 2 3 Nikdy 4
6 N/A ◯	Ako často pociťujete bolesť v chodidle a/alebo v členku počas fyzickej aktivity?	Vždy 0 1 2 3 Nikdy 4

OTÁZKY TÝKAJÚCE SA ŠPORTU

Tieto otázky vyplňte iba v prípade, že sa pravidelne venujete športovým aktivitám. Ak sa niektorá otázka nevzťahuje na váš šport, označte možnosť N/A – neaplikovateľné.

No.	Otázka	Odpoveď
S1 N/A ◯	Dokážete behať?	Nemožné 0 1 2 3 Bez obmedzenia 4
S2 N/A ◯	Dokážete klusať (pomaly behať)?	Nemožné 0 1 2 3 Bez obmedzenia 4
S3 N/A ◯	Máte problémy s dopadom po skoku?	Nemožné 0 1 2 3 Bez obmedzenia 4
S4 N/A ◯	Dokážete vykonávať svoje športové aktivity obvyklou technikou?	Nemožné 0 1 2 3 Bez obmedzenia 4

Dotazník ste práve vyplnili. Ďakujeme vám veľmi pekne za vašu spoluprácu!

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