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*Research article*

# Validation of the Romanian Version of the Modified Fatigue Impact Scale (MFIS) in Multiple Sclerosis Patients

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**Abstract:** Fatigue is one of the most frequent and disabling symptoms in multiple sclerosis (MS), with major impact on quality of life. Reliable, culturally adapted instruments are essential for accurate assessment. To validate the Romanian version of the Modified Fatigue Impact Scale (MFIS) in MS patients. We conducted a cross-sectional study of 30 patients diagnosed according to the revised McDonald criteria. Participants had a mean age of 35.5 years; 66.7% were women. The MFIS was translated and culturally adapted using a standardized forward–backward procedure. Psychometric evaluation included internal consistency, construct validity (exploratory factor analysis and correlations with clinical variables), and discriminative validity (ROC analysis). The Romanian MFIS showed good internal consistency (Cronbach's alpha = 0.821). Sampling adequacy was acceptable (KMO = 0.646; Bartlett $p < 0.001$). Exploratory factor analysis suggested a two-factor solution explaining 68.3% of the variance, with a weaker contribution from the psychosocial domain; given the small sample, this structure should be considered preliminary. MFIS scores correlated significantly with disability as measured by EDSS. In ROC analyses, EDSS demonstrated good discrimination of clinically relevant fatigue (AUC = 0.848, 95% CI 0.653–1.000; $p = 0.05$), whereas demographic variables did not. The Romanian MFIS is the first culturally adapted and validated version available for Romanian MS patients. It is a reliable tool for assessing multidimensional fatigue and can support both clinical use and integration into multicenter research. However, findings regarding its factorial structure are preliminary and require confirmation in larger, more diverse cohorts and responsiveness to change.

**Keywords:** Multiple Sclerosis; Fatigue; Modified Fatigue Impact Scale; Validation study; Psychometrics; Romanian version

## 1. Introduction

Multiple Sclerosis (MS) is a chronic, inflammatory, and demyelinating neurological disease of the central nervous system, characterized by high clinical and evolutionary variability. Among its most frequent and disabling manifestations is fatigue, reported by more than two-thirds of patients and recognized as one of the main causes of reduced quality of life and limitations in daily activities [1–3].

Fatigue in MS is defined as the difficulty in initiating or sustaining voluntary activities [1]. It can be physiological (non-pathological) or pathological, the latter being

characterized by prolonged persistence, lack of improvement with rest, and a major negative impact on physical and cognitive functioning [4,5]. Therefore, the accurate assessment of fatigue is essential for both clinical practice and research, as it enables the quantification of the symptom and the monitoring of responses to therapeutic and rehabilitation interventions [3-5].

Several standardized instruments have been developed over time to assess fatigue in MS patients, the most frequently used being the Fatigue Severity Scale (FSS) and the Fatigue Assessment Scale (FAS) [5,6]. Complementing these tools, the Modified Fatigue Impact Scale (MFIS) has proven to be an internationally validated instrument, capable of capturing not only the severity of the symptom but also its impact on the physical, cognitive, and psychosocial dimensions of patients' lives [6,7].

The original Fatigue Impact Scale (FIS) includes 40 items, but to facilitate its use in clinical settings, a shorter version – MFIS – was developed, consisting of 21 items. The psychometric properties of the MFIS have been validated in multiple clinical contexts, including patients with MS [8–10], Parkinson's disease [11], and traumatic brain injury [12]. Furthermore, in some studies, the factorial structure has been adapted by integrating the cognitive dimension into the other domains, suggesting a better theoretical coherence [11,13].

Despite the widespread use of the MFIS internationally, no culturally adapted and validated Romanian version has been available to date. This gap has limited both the standardized assessment of fatigue in Romanian MS patients and the possibility of integrating Romanian cohorts into multicenter studies. Addressing this unmet need, the present study aimed to develop and validate the first Romanian version of the MFIS, through translation, cultural adaptation, and psychometric testing in a cohort of patients with MS.

Thus, the objective of this study was to validate the Romanian version of the MFIS through:

1) translation and cultural adaptation of the instrument;
2) evaluation of psychometric properties (internal consistency and construct validity through correlations with relevant clinical measures and exploratory factor analysis);
3) analysis of fatigue levels in a cohort of 30 MS patients hospitalized in the Neurological Rehabilitation Department of the Clinical Rehabilitation Hospital Iași.

## 2. Materials and Methods

### Study design and participants

This was a cross-sectional observational study conducted in the Neurological Rehabilitation Department of the Clinical Rehabilitation Hospital, Iași. We enrolled 30 consecutive adults with a confirmed diagnosis of MS.

**Inclusion criteria:** diagnosis according to the revised McDonald criteria; age 18–60 years; ability to understand and complete the questionnaire; written informed consent.

**Exclusion criteria:** severe cognitive/psychiatric disorders interfering with completion; comorbidities known to cause significant fatigue (e.g., hypothyroidism, severe anemia); MS relapse in the previous 30 days.

Collected variables: age, sex, disease duration, and EDSS score. The study was approved by the local ethics committee and conducted in accordance with the Declaration of Helsinki.

**Translation and cultural adaptation**

The MFIS was translated into Romanian following widely accepted guidelines for cross-cultural adaptation of patient-reported outcome measures. The process comprised the following pre-specified steps**:**

1. Forward translation: two independent native Romanian translators (fluent in English) produced forward translations.
2. Reconciliation: a third reviewer synthesized a reconciled forward version.
3. Back-translation: an independent native English translator, blinded to the original instrument, produced a back-translation.
4. Expert committee review: a multidisciplinary panel (neurologist, rehabilitation specialist, psychometrician, language specialist) compared all versions, resolved discrepancies, ensured conceptual equivalence, and produced a pre-final Romanian version**.**
5. Cognitive debriefing/pilot testing: the pre-final version was tested in a small convenience sample of MS patients to assess clarity, relevance, and comprehensibility; verbatim feedback was collected and minor wording adjustments were made (no changes to item intent).
6. Proofreading and finalization: layout and formatting were standardized; the final version (MFIS-Ro) was approved by the panel. Permission to translate/adapt the instrument was obtained from the rights holder.

**Instruments**

- MFIS-Ro: 21 items across three subscales—Physical (9 items), Cognitive (10 items), Psychosocial (2 items). Each item is scored on a 5-point Likert scale (0=never to 4=almost always); total score 0–84**,** higher scores indicate more severe fatigue.
- EDSS: Expanded Disability Status Scale, used to capture neurological disability.

**Statistical analysis**

All analyses were performed in SPSS v25.0 (IBM Corp.)**.** Two-sided $\alpha = 0.05$**.**

Data preparation**:** normality was checked with Shapiro–Wilk; continuous data are reported as mean±SD/median (IQR) as appropriate; categorical data as counts and percentages. Outliers were inspected; missing item-level data, when present, were handled by person-mean imputation within subscale when ≥80% of items for that subscale were answered; otherwise the subscale score was set to missing (listwise deletion in factor analysis). Floor/ceiling effects were inspected (>15% at minimum/maximum).

**Internal consistency**

Internal consistency was quantified using Cronbach's alpha for the total scale and subscales, with 95% bootstrap confidence intervals (1,000 resamples)**.** Item-total correlations and "alpha if item deleted" were examined to identify poorly performing items.

**Construct validity – Exploratory factor analysis (EFA)**

Given the expected correlation between dimensions of fatigue, we conducted EFA on the item correlation matrix (not on the raw covariance matrix) to avoid scale-dependent eigenvalues.

- Sampling adequacy: KMO statistic and Bartlett's test of sphericity (KMO ≥0.60 acceptable; Bartlett $p<0.05$ required).

- Number of factors retained: combination of Kaiser's criterion (eigenvalue >1), Cattell's scree plot, and Horn's parallel analysis (Monte Carlo simulation) to guard against over-extraction in small samples.
- Rotation: oblimin (oblique) rotation to allow factor correlation; varimax (orthogonal) was checked in sensitivity analyses.
- Item retention thresholds: primary loading ≥0.40 with cross-loading difference ≥0.20; items failing thresholds were flagged for review but retained if conceptually essential.

  Because the sample size (N=30) is small relative to the number of items, all EFA findings are considered exploratory and interpreted cautiously; confirmatory analysis is deferred to future, larger samples.

**Convergent validity**

We examined associations between MFIS-Ro scores (total and subscales) and EDSS using Pearson's r when both variables were approximately normal, or Spearman's ϱ otherwise; effect sizes are reported alongside p-values.

**Discriminative validity – ROC analysis**

To evaluate clinical discrimination, we defined "presence of clinically relevant fatigue" a priori based on a literature-derived MFIS total cut-off (primary analysis), and we conducted sensitivity analyses using an alternative, more conservative cut-off.

- Predictor variables: EDSS (primary), age, sex, and disease duration.
- Crucially, MFIS itself was not used as a predictor in ROC analyses since the outcome is defined by MFIS; doing so is tautological and can yield spuriously perfect AUC values.
- ROC curves and AUC with 95% CIs were computed using non-parametric methods; the Youden index (J) determined optimal thresholds, with corresponding sensitivity/specificity reported.

## 3. Results

**General characteristics of the cohort**

Regarding the descriptive data for the variable age, the minimum age in the study cohort was 18 years and the maximum was 56 years, with a mean value of 35.50 years. Analysis of the distribution of the overall MFIS score revealed a mean of 39.43 in the study group.

The histogram of age distribution indicated a homogeneous pattern (Fig. 1). In contrast, the highest MFIS scores were observed in the age group around 40 years, ranging between 30 and 60 years, with the graphical representation also suggesting a relatively homogeneous distribution of the data.

**Table 1. Descriptive variables analyzed in the study**

| Descriptive Statistics | | | | |
|---|---|---|---|---|
| | N | Minimum | Maximum | Mean |
| | | | | |
| Age | 30 | 18 | 56 | 35.50 |
| Total MFIS score | 30 | 3 | 72 | 39.43 |

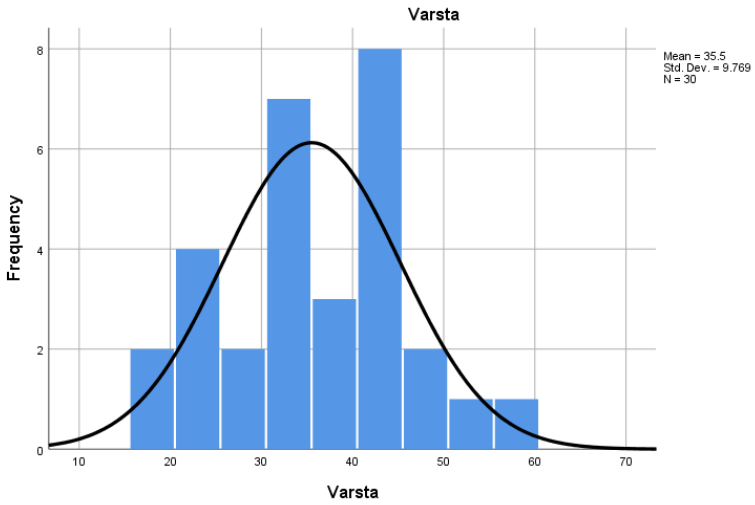


**Fig. 1. Histogram of age distribution in the study cohort (the female-to-male ratio was balanced, but without statistical significance)**

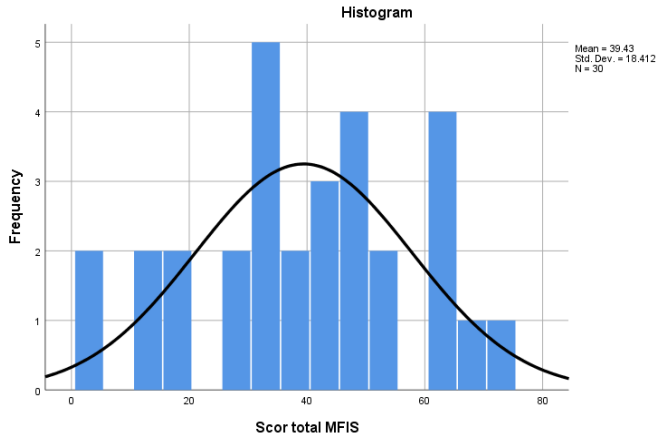


**Fig. 2. Overall MFIS score and its mean value**

Regarding sex distribution, the study cohort included 20 women (66.7%) and 10 men (33.3%) (Table 2).

**Table 2. Sex distribution in the study cohort**

| Sex | | |
|---|---|---|
| Sex distribution | Frequency | Percentage |
| Female | 20 | 66.7 |
| Male | 10 | 33.3 |
| Total | 30 | 100.0 |

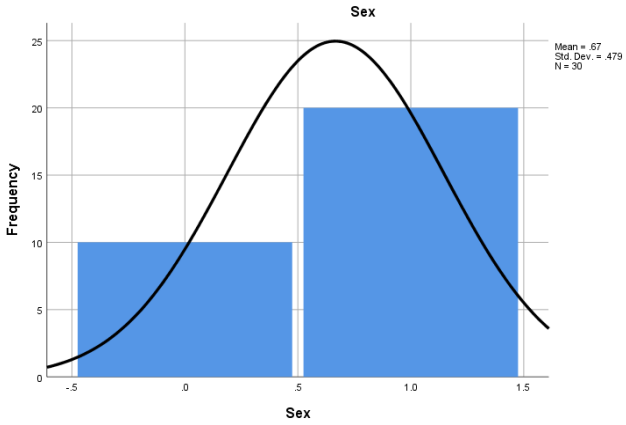


**Fig. 3. Histogram of sex distribution in the study cohort (female-to-male ratio was unbalanced, without statistical impact)**

Descriptive data regarding disease duration and EDSS score showed that the minimum disease duration was 2 years and the maximum was 26 years, with a mean of 8.47 years. Analysis of the EDSS scores revealed a mean of 2.6, with a minimum of 1 and a maximum of 6.5 in the study cohort (Table 3).

**Table 3. Demographic analysis of disease duration and EDSS score**

| Statistics | | | |
|---|---|---|---|
| | | Disease duration | EDSS score |
| N | Valid | 30 | 30 |
| Mean | | 8.47 | 2.600 |
| Median | | 6.50 | 2.000 |
| Minimum | | 2 | 1.0 |
| Maximum | | 26 | 6.5 |

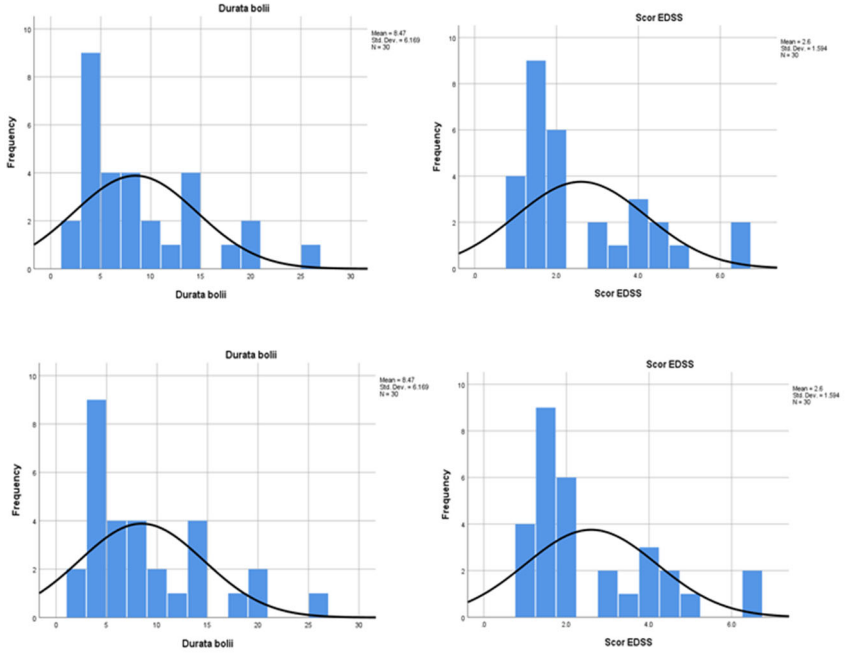


**Fig. 4. Histogram of disease duration and EDSS score distribution in the study cohort (distribution was not heterogeneous, with no statistical impact)**

Statistical analysis of the mean item scores of the MFIS subscales showed values ranging between 18.90 and 3.13. The standard deviation demonstrated variability between approximately 2.270 and 10.244 for the tested subscales.

In this case, the Kurtosis indicator measured the degree of distribution of the tested variables. All analyzed variables displayed a "flat" distribution of data within the study, while the standard error of Kurtosis was consistent across items (0.833) (Table 4).

**Table 4. Descriptive analysis of variables related to the MFIS questionnaire components**

| Analysis of variables | | | |
|---|---|---|---|
| | Physical subscale | Cognitive subscale | Psychosocial subscale |
| Mean | 18.90 | 17.40 | 3.13 |
| Std. Error of Mean | 1.546 | 1.870 | .414 |
| Std. Deviation | 8.470 | 10.244 | 2.270 |
| Kurtosis | -.421 | -1.078 | -.296 |
| Std. Error of Kurtosis | .833 | .833 | .833 |

**Statistical validation of the MFIS questionnaire**

The application of the statistical analysis using the *Correlation Matrix* in this study aimed primarily to determine whether the MFIS subscales present a statistically significant correlation level, with values closer to 1 indicating positive correlations and values closer to –1 indicating negative correlations. This statistical model demonstrates whether these variables have potential as factors reflecting the strength of correlation between them.

All subscales showed strong correlations, with a high level of statistical significance. This finding illustrates that the MFIS subscales are appropriate for studying fatigue in individuals with MS (Table 5).

**Table 5. Results of the Correlation Matrix analysis**

| Correlation Matrix | | | | |
|---|---|---|---|---|
| | | Physical subscale | Cognitive subscale | Psychosocial subscale |
| Correlation | Physical subscale | 1.000 | .600 | .790 |
| | Cognitive subscale | .600 | 1.000 | .487 |
| | Psychosocial subscale | .790 | .487 | 1.000 |
| Sig. (1-tailed) | Physical subscale | | .000 | .000 |
| | Cognitive subscale | .000 | | .003 |
| | Psychosocial subscale | .000 | .003 | |

Cronbach's Alpha in this case showed a value of 0.821, indicating a very good level of internal consistency for each scale. A value between 0.7 and 0.8 is generally considered acceptable reliability.

**Table 6. Results of the Cronbach's Alpha analysis**

| Assessment of reliability | |
|---|---|
| Cronbach's Alpha | N Items |
| .821 | 4 |

**Kaiser-Meyer-Olkin and Bartlett's Test**

The application of the Kaiser-Meyer-Olkin (KMO) test indicates whether the proportion of variance among the tested variables of the MFIS reflects a common variance within the scale. The KMO value obtained was 0.646, which is considered acceptable. Bartlett's test of sphericity evaluates whether the initial structure of the MFIS significantly differs from a proposed identity matrix, with the aim of determining whether the items are sufficiently correlated and consistent with each other. The Chi-square value was approximately 38.699, indicating statistical significance ($p < 0.001$). Therefore, this result demonstrates that the correlation matrix is appropriate for factor analysis (Table 7).

**Table 7. Results of the Kaiser-Meyer-Olkin and Bartlett's test**

| KMO and Bartlett's test of sphericity | | |
|---|---|---|
| Kaiser-Meyer-Olkin | | .646 |
| Bartlett's test of sphericity | Approx. Chi-Square | 38.699 |
| | Df | 3 |
| | Sig. | .000 |

**Communalities Analysis**

Table 8 presents the statistical analysis of communalities, specifically illustrating the degree of variance for each MFIS subscale that can be explained or influenced by other factors within the questionnaire.

- **Physical subscale:** The rescaled extraction value was 0.706, indicating that 70.6% of the variance in this subscale is explained by the other components of the questionnaire, thus providing a significant contribution to the model.
- **Cognitive subscale:** The rescaled extraction value was 0.880, meaning that 88% of the total variance is explained by this subscale. This represents the most important subscale within the model.
- **Psychosocial subscale:** The rescaled extraction value was 0.464, explaining only 46.4% of the total variance. This indicates that the psychosocial subscale contributes less compared to the other main components.

In conclusion, the extracted principal components accurately explain the physical and cognitive subscales, with the cognitive subscale being particularly strong. Although the psychosocial subscale contributes to a lesser degree, it remains significant within the questionnaire.

**Table 8. Results of the communalities analysis**

| Communalities | | | | |
|---|---|---|---|---|
| | Raw | | Rescaled | |
| | Initial | Extraction | Initial | Extraction |
| Physical subscale | 71.748 | 50.655 | 1.000 | .706 |
| Cognitive subscale | 104.938 | 92.293 | 1.000 | .880 |
| Psychosocial subscale | 5.154 | 2.393 | 1.000 | .464 |
| Extraction Method: Principal Component Analysis. | | | | |

**Scree Plot Analysis**

The scree plot was used to analyze whether the principal components of the factorial model are valid and to visualize the eigenvalues that are statistically significant for each component. On the X-axis, the number of tested components is represented (in this case, from 1 to 3), while the Y-axis illustrates the eigenvalues corresponding to each component.

The first component presented a much higher eigenvalue compared to the others, approximately 140, while the second was close to 40. This confirms that these two components explain the majority of the total variance of the MFIS questionnaire. For the third component, eigenvalues decreased sharply and then reached a plateau, indicating that these additional components do not contribute significantly to explaining the total variance of the MFIS.

In conclusion, the steep slope of the scree plot suggests that the first two components are the most important. Thus, retaining only the first two components would likely be sufficient for dimensionality reduction in the statistical analysis, and they can be considered key determinants of the reliability and validity of the MFIS questionnaire.

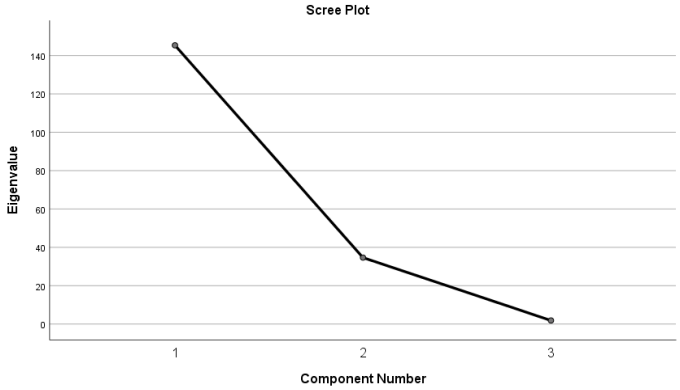


**Fig. 5. Correlation analysis based on the Scree Plot scales**

The significance of Table 9 highlights the analysis of how many principal components (factors) can be extracted from the entire tested algorithm. This statistical indicator examines the degree of variance that can be explained by each component, as well as the cumulative variance.

- For Component 1 (Physical), the Eigenvalue was 145.342, with 79.928% of the variance explained. This indicates that the first component accounts for almost 80% of the entire variation of the MFIS data.
- For Component 2 (Cognitive), the Eigenvalue was 34.644, with 19.052% of the variance explained. Together with Component 1, it accounts for 98.980% of the variance, illustrating a highly sensitive result.
- For Component 3 (Psychosocial), the Eigenvalue was 1.854, with 1.020% of the variance explained. Although this component is characterized by lower variance, it remains a specific subscale of the questionnaire.

In conclusion, only the first two components were retained (eigenvalues > 1). These results demonstrate that, in the rescaled variance, 68.329% of the total variance is explained (Table 9).

**Table 9. Total variance explained analysis**

| | Component | Initial Eigenvalues[a] | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|
| | | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| Raw | 1 | 145.342 | 79.928 | 79.928 | 145.342 | 79.928 | 79.928 |
| | 2 | 34.644 | 19.052 | 98.980 | | | |
| | 3 | 1.854 | 1.020 | 100.000 | | | |
| Re-scaled | 1 | 145.342 | 79.928 | 79.928 | 2.050 | 68.329 | 68.329 |
| | 2 | 34.644 | 19.052 | 98.980 | | | |
| | 3 | 1.854 | 1.020 | 100.000 | | | |

**Receiver Operating Characteristic (ROC) Analysis**

The sensitivity of the variables age, sex, EDSS score, and disease duration in relation to the overall MFIS score was assessed using Receiver Operating Characteristic (ROC) analysis. The analysis was performed based on the following cut-off: a total MFIS score greater than 10 was considered pathological (according to literature sources suggesting this threshold as significant).

- Age: The area under the curve (AUC) was 0.241, indicating poor discriminatory capacity regarding the MFIS score. The p-value was not statistically significant (p = 0.228), suggesting that age is not a relevant factor in this context.
- Sex: The AUC was 0.321, reflecting nonsignificant discriminatory power (AUC < 0.5), with no statistical significance (p = 0.406). This indicates that sex is not a sensitive variable in relation to the MFIS.
- Disease duration: The AUC was below 0.5, suggesting very poor discriminatory capacity, indicating that this variable has weak sensitivity in relation to the MFIS (Fig. IV.5).
- EDSS score: The AUC was 0.848, indicating significant discriminatory power, with the result reaching statistical significance (p = 0.050). This confirms that the EDSS score is a determinant and sensitive factor in relation to the MFIS.

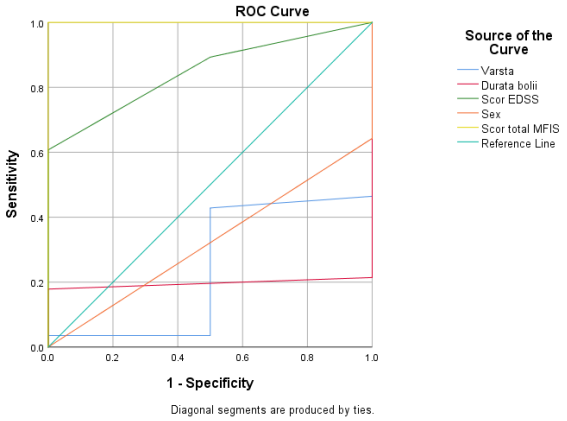


**Fig. 6. Sensitivity analysis of age, sex, EDSS score, disease duration, and the overall MFIS score (ROC curve)**

## 4. Discussion

This study aimed to translate, culturally adapt, and validate the Modified Fatigue Impact Scale (MFIS) into Romanian for use in patients with multiple sclerosis (MS). The results suggest that the Romanian version (MFIS-Ro) is a valid and reliable instrument for assessing fatigue, showing good internal consistency and significant

correlations with clinical disability. However, some statistical findings must be interpreted with caution due to the small sample size.

**Internal consistency and factorial structure**

The Cronbach's alpha coefficient obtained (0.821) indicates good internal consistency of the MFIS-Ro, in line with international validation studies where alpha typically ranged between 0.79 and 0.91 [14,15]. This suggests that the items measure a common construct, namely the perception of fatigue. Exploratory factor analysis indicated a bidimensional structure explaining 68.3% of the variance, with strong contributions from the physical and cognitive domains and a weaker contribution from the psychosocial domain. Nevertheless, given the small sample size, these findings must be considered preliminary. The two-factor solution may reflect sample variability rather than a genuine cultural difference. Other studies have reported variability in factorial structures, with some retaining the classical three dimensions [16,17], while others proposed alternative groupings [17]. Thus, the dimensionality of MFIS should be further examined in larger, representative Romanian cohorts.

**Correlations with clinical variables**

As expected, MFIS-Ro scores correlated positively with EDSS, confirming the relationship between fatigue severity and neurological disability. This aligns with previous research showing that fatigue is strongly associated with disease progression and disability accumulation [16]. In contrast, age, sex, and disease duration were not significantly related to fatigue, consistent with literature describing fatigue as a multifactorial symptom influenced by neurobiological and psychological mechanisms rather than demographic characteristics alone.

ROC curve analysis supported the discriminative validity of MFIS-Ro in relation to EDSS (AUC = 0.848, p = 0.05). It is implausible and likely reflects a statistical artifact of the small sample size rather than a genuine psychometric property. This further emphasizes the need for replication in larger studies with more robust methodology.

**Comparison with other international validations**

International validations of the MFIS provide a useful framework for interpreting our results.

Italy: Piscitelli et al. (2024) validated both the MFIS-21 and FIS-40 in an Italian cohort, reporting Cronbach's alpha values above 0.85 and, through Rasch analysis, the need for statistical adjustments to preserve dimensional coherence. They concluded that MFIS shows excellent reliability, but its factorial structure requires further confirmation depending on cultural context [14].

Serbia: Tamaš et al. (2024) validated the MFIS in Serbian MS patients, obtaining results similar to ours-high internal consistency and positive correlations with EDSS and disease duration. Their study confirmed that MFIS is sensitive to disability level but independent of sex and age [16].

Denmark: Riemenschneider et al. (2022) applied a complex methodology consistent with COSMIN standards and confirmed MFIS validity both in cross-sectional assessments and rehabilitation contexts, demonstrating responsiveness to clinical change [15].

USA: The original MFIS version has been applied in multiple clinical populations. Schiehser et al. highlighted that the factorial structure may vary depending on the population (MS, Parkinson's disease, TBI), underlining both the flexibility and the limitations of the instrument [17].

Taken together, the Romanian results align with international trends, supporting the validity and reliability of MFIS-Ro.

**Relevance in the Romanian context**

An important step for the Romanian clinical setting is represented by the study conducted by Maier et al. (2023), which investigated sociodemographic and clinical determinants of fatigue in MS patients using the MFIS. Their findings demonstrated positive correlations of fatigue with age, number of relapses, disease duration, and depression, and negative correlations with cognitive performance [18]. In contrast, our study formally validated the Romanian version of the MFIS, including factorial analysis and psychometric testing. Thus, MFIS-Ro becomes the first culturally and linguistically validated tool for assessing fatigue in Romanian MS patients.

**Theoretical implications for understanding fatigue**

Our results support the multidimensional nature of fatigue, a phenomenon recognized as encompassing physical, cognitive, and psychosocial components. Neurobiological research suggests that MS-related fatigue results from a combination of mechanisms: chronic inflammation, demyelinating lesions, neuronal network dysfunction, and neurotransmitter alterations [19]. Psychological factors such as depression and anxiety further modulate the perception of fatigue, interacting with its neurobiological substrate.

This complexity justifies the use of multidimensional instruments such as the MFIS, instead of unidimensional tools (e.g., FSS), since only multidimensional scales can adequately capture the true impact of fatigue on patients' daily lives.

**Clinical and practical implications**

The validation of MFIS-Ro has direct implications for clinical practice in Romania.

**Clinicians can now use this tool to:**

- perform baseline evaluations of patients, identifying both the level and type of fatigue;
- monitor fatigue longitudinally, especially in the context of rehabilitation or pharmacological treatment;
- assess the effectiveness of interventions, including physical exercise programs, occupational therapy, and psychological support.

In addition, MFIS-Ro facilitates the integration of Romanian patients into international multicenter studies, ensuring data comparability and contributing to research advancement.

**Limitations and future perspectives**

This study has certain limitations. The relatively small sample size (30 patients) restricts the generalizability of the findings. The absence of complementary instruments (quality of life questionnaires, cognitive tests) reduces the strength of convergent validity. Furthermore, the cross-sectional design does not allow assessment of the responsiveness of MFIS-Ro to change.

Future studies should include larger and more diverse samples, correlate MFIS-Ro with other instruments (FSS, FAS, quality of life questionnaires), and explore the responsiveness of the scale in rehabilitation and treatment contexts. It would also be useful to investigate the relationship between MFIS-Ro and objective biomarkers of fatigue, such as neuroimaging parameters and inflammatory markers.

## 5. Conclusions

MFIS-Ro demonstrated strong psychometric properties, including high internal consistency and significant correlations with clinical measures of disability. The exploratory factor structure observed in this study should be interpreted cautiously and requires confirmation in larger and more diverse cohorts.

MFIS-Ro represents the first culturally adapted and validated instrument for the assessment of fatigue in Romanian MS patients. It can be reliably used in both clinical practice and research to evaluate the multidimensional impact of fatigue, to monitor changes over time, and to assess the effectiveness of therapeutic and rehabilitation interventions.

Future studies should further validate these findings, explore the responsiveness of MFIS-Ro to clinical changes, and compare its performance with other fatigue and quality-of-life measures.

**Author Contributions:** Conceptualization, LB. and I.D.C; methodology E.B.I.; software V.L.; validation, A.C. and D.R.; formal analysis C.G. and D.A.; resources, C.G.; data curation L.B.; writing-original draft preparation L.B.; writing-review and editing L.B. and D.R. All authors have read and agreed to the published version of the manuscript.

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**Conflicts of Interest:** The authors declare no conflict of interest.

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