

The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS), 2026

Volume 22, Pages 38-49

ICMeHeLS 2026: International Conference on Medical, Health and Life Sciences

## Targeted Geriatric Assessment for Fast-Paced Healthcare Settings (TaGA): Validity and Reliability Study of the Turkish Version

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**Abstract:** This study aimed to describe the cross-cultural adaptation of the Turkish version of the Targeted Geriatric Assessment (TaGA) and to evaluate its test–retest reliability, concurrent validity, known-groups validity, and ability to discriminate frailty. This methodological study was conducted in two phases. In the first phase, the TaGA was cross-culturally adapted into Turkish according to internationally accepted guidelines. In the second phase, test–retest reliability was evaluated in 29 community-dwelling older adults, while validity analyses were performed in 98 older adults. Reliability was assessed using the intraclass correlation coefficient (ICC), Pearson and Spearman correlation coefficients, the standard error of measurement (SEM), and the minimal detectable change (MDC). Validity was examined through concurrent validity, known-groups validity, and receiver operating characteristic (ROC) curve analyses. The total TaGA score demonstrated excellent test–retest reliability, with an ICC (2,1) of 0.908 (95% CI: 0.817–0.959). Pearson and Spearman correlation coefficients were 0.912 and 0.929, respectively. The SEM and MDC were calculated as 0.038 and 0.105, respectively. Concurrent validity analyses showed that the total TaGA score was significantly associated, in the expected direction, with the Clinical Frailty Scale, FRAIL Scale, Geriatric Depression Scale, Barthel Index, Mini-Mental State Examination, Mini Nutritional Assessment, and the number of medications. In the known-groups validity analysis, frail participants had significantly higher TaGA scores than non-frail participants. ROC analysis demonstrated good discriminative ability for frailty, with an area under the curve (AUC) of 0.857, an optimal cutoff score of 0.350, a sensitivity of 85.7%, and a specificity of 75.3%. These findings indicate that the Turkish version of the TaGA is a reliable and valid instrument for the rapid screening of geriatric risks and frailty among older adults.

**Keywords:** Targeted geriatric assessment (TaGA), Geriatric frailty screening, Validity and reliability study, Comprehensive geriatric assessment, Frailty

### Introduction

The rapid growth of the older adult population has highlighted the need for healthcare systems to adopt multidimensional approaches that address not only diseases but also functional status, frailty, cognitive function, nutritional status, depressive symptoms, social support, and medication use. Comprehensive Geriatric Assessment (CGA) represents the gold standard for such multidimensional evaluation. However, the time and resources

required to perform a full CGA may limit its routine use in busy outpatient clinics, emergency departments, and other fast-paced healthcare settings (Parker et al., 2018).

Clinical decision-making in these settings often requires the rapid identification of geriatric risks to facilitate timely prioritization of care. Therefore, there is a growing need for brief, practical, and multidimensional screening instruments capable of identifying older adults at increased risk. The Targeted Geriatric Assessment (TaGA) was developed to address this need by providing a targeted assessment of geriatric risks that can be completed in approximately 10 minutes. The TaGA evaluates ten domains, including social support, hospital admissions, falls, medication use, functional status, cognitive performance, self-rated health, depressive symptoms, nutritional status, and gait speed. Each domain is converted into a deficit score ranging from 0 to 1, and the overall TaGA score is calculated as the mean of these domain scores. This scoring system provides clinicians with an overall estimate of geriatric risk while simultaneously identifying specific domains that may require priority intervention (Aliberti et al., 2018).

The adaptation of a measurement instrument into another language involves more than a literal translation. It requires the establishment of conceptual equivalence, cultural relevance, feasibility, and the confirmation of the instrument's psychometric properties within the target population (Wild et al., 2005). Accordingly, the Turkish version of the TaGA underwent a rigorous cross-cultural adaptation process, including forward translation, back translation, expert review, and subsequent psychometric evaluation.

Older adults in Türkiye represent a heterogeneous population with respect to healthcare utilization, family support, educational level, living environment, and burden of comorbidities, reflecting substantial sociodemographic and regional diversity (TÜİK, 2024; WHO, 2020). These differences highlight the importance of validating geriatric screening instruments within the target population before their implementation in clinical practice. Establishing the psychometric properties of the Turkish version of the TaGA may facilitate standardized geriatric assessment in both clinical practice and research settings. Therefore, the aim of this study was to describe the cross-cultural adaptation of the Turkish version of the Targeted Geriatric Assessment (TaGA) and to evaluate its test–retest reliability, concurrent validity, known-groups validity, and ability to discriminate frailty.

## **Method**

### **Research Design**

This methodological study was conducted in two phases to evaluate the psychometric properties of the Turkish version of the Targeted Geriatric Assessment (TaGA). In the first phase, the cross-cultural adaptation of the instrument was completed, followed by an assessment of test–retest reliability by administering the Turkish version of the TaGA to the same participants on two separate occasions. In the second phase, the validity of the instrument was evaluated in a larger sample by examining the relationships between TaGA scores and established measures of frailty, functional status, cognition, nutritional status, depressive symptoms, and medication use, as well as by assessing known-groups validity. This study design enabled the comprehensive evaluation of both the temporal stability and the construct validity of the Turkish version of the TaGA. The psychometric evaluation included test–retest reliability, domain-level reliability, concurrent validity, known-groups validity, and receiver operating characteristic (ROC) analysis.

### **Translation and Cultural Adaptation**

The Turkish adaptation of the Targeted Geriatric Assessment (TaGA) was conducted in accordance with internationally accepted guidelines for the cross-cultural adaptation of health measurement instruments (Beaton et al., 2000). Permission to translate and adapt the original instrument was obtained from the developer before the adaptation process began. The original English version was independently translated into Turkish by two bilingual translators whose native language was Turkish and who were familiar with medical terminology. The two forward translations were compared and synthesized into a single preliminary Turkish version. This version was then independently back-translated into English to verify conceptual equivalence with the original instrument. An expert committee reviewed all translated versions and resolved any discrepancies to ensure semantic, idiomatic, experiential, and conceptual equivalence, as recommended by Beaton et al. The pre-final Turkish version was subsequently pilot-tested in older adults to evaluate the clarity, comprehensibility, and cultural appropriateness of the items. Based on participant feedback, minor modifications were made where necessary, and the final Turkish version of the TaGA was established.

## Participants and Data Collection

Community-dwelling older adults aged 60 years and above were recruited for this study. Individuals were eligible if they were able to communicate in Turkish and had a Mini-Mental State Examination (MMSE) score of 18 or higher. Individuals receiving palliative care, requiring hospitalization, unable to communicate in Turkish, or unwilling to participate were excluded. Test–retest reliability was evaluated using data obtained from 29 participants who completed the Turkish version of the TaGA on two separate occasions. Validity analyses were conducted in a sample of 98 participants by comparing the total TaGA score with the Clinical Frailty Scale (CFS), FRAIL Scale, Barthel Index, MMSE, Geriatric Depression Scale (GDS), Mini Nutritional Assessment (MNA), and the number of medications. A standardized demographic data collection form was used to record participants' age, sex, educational level, marital status, living arrangement, comorbidities, medication use, history of falls, and previous hospitalizations. These variables were collected to describe the characteristics of the study population.

## Measures

*Targeted Geriatric Assessment (TaGA)*; The TaGA is a multidimensional screening instrument designed to rapidly assess geriatric risk in older adults. It consists of ten domains: social support, hospital admissions, falls, medication use, functional status, cognitive performance, self-rated health, depressive symptoms, nutritional status, and gait speed. Each domain is scored as a deficit ranging from 0 to 1, and the total TaGA score is calculated as the mean of the domain scores. Higher scores indicate greater geriatric risk (Aliberti et al., 2018).

*FRAIL Scale*; The FRAIL Scale is a brief screening instrument that assesses frailty across five domains: fatigue, resistance, ambulation, illnesses, and weight loss (Morley et al., 2012). It was used as a comparator measure to evaluate the concurrent validity of the Turkish version of the TaGA. The Turkish version of the FRAIL Scale has previously demonstrated acceptable validity and reliability for assessing frailty in older adults (Hymabaccus et al., 2023).

*Clinical Frailty Scale (CFS)*; The Clinical Frailty Scale (CFS) is a clinician-rated instrument that classifies older adults according to their overall level of fitness and frailty based on clinical judgment, considering functional status, comorbidities, cognition, and dependence in activities of daily living (Rockwood et al., 2005). Higher scores indicate greater levels of frailty. In the present study, the CFS was used as a comparator measure to evaluate the concurrent validity and discriminative ability of the Turkish version of the TaGA (Aşık et al., 2022).

*Barthel Index (BI)*; The Barthel Index (BI) is a widely used instrument that assesses independence in activities of daily living (ADL), with higher scores indicating greater functional independence (Fi, 1965). In the present study, the BI was used as a comparator measure to evaluate the concurrent validity of the Turkish version of the TaGA. The Turkish version of the BI has demonstrated acceptable validity and reliability in older adults and was therefore selected as a comparator measure for concurrent validity.

*Mini-Mental State Examination (MMSE), Geriatric Depression Scale (GDS), and Mini Nutritional Assessment (MNA)*; The Mini-Mental State Examination (MMSE) was used to assess global cognitive function (Güngen et al., 2002), the Geriatric Depression Scale (GDS) was used to evaluate depressive symptoms (Yesavage et al., 1982), and the Mini Nutritional Assessment (MNA) used and validated for the assessment of geriatric syndromes in older adults (Garry & Vellas, 1999). In the present study, these instruments were included as comparator measures to evaluate the concurrent validity of the Turkish version of the TaGA.

## Statistical Analysis

Descriptive statistics were calculated for all variables. Test–retest reliability was evaluated using the intraclass correlation coefficient (ICC [2,1]), Pearson and Spearman correlation coefficients, paired-samples *t* test, Wilcoxon signed-rank test, Bland–Altman analysis, the standard error of measurement (SEM), and the minimal detectable change at the 95% confidence level (MDC<sub>95</sub>). The ICC (2,1) model was based on a two-way random-effects model with absolute agreement, as recommended for reliability studies (Koo & Li, 2016). Bland–Altman analysis was used to examine agreement and identify potential systematic bias between repeated measurements (Bland & Altman, 1986). Domain-level reliability was assessed using ICC, Pearson correlation coefficients, linearly weighted kappa coefficients, and percentage agreement. For the nutrition domain, the limited variability observed at the second assessment was taken into account when interpreting the reliability estimates. Concurrent validity was examined by assessing the associations between the total TaGA score and established comparator measures.

using Pearson and Spearman correlation analyses. Known-groups validity was evaluated by comparing TaGA scores between frail and non-frail participants. The discriminative ability of the TaGA for identifying frailty was assessed using receiver operating characteristic (ROC) curve analysis. The area under the curve (AUC), optimal cutoff score, sensitivity, and specificity were reported. Statistical significance was set at  $p < 0.05$ .

## Results and Discussion

### Reliability Sample and Score Distribution

Data from 29 participants who completed the Turkish version of the TaGA at two time points were included in the test–retest reliability analysis. The mean total TaGA score was  $0.246 \pm 0.131$  at the first assessment (T1) and  $0.234 \pm 0.120$  at the second assessment (T2). The median scores were 0.250 and 0.200, respectively. The minimum and maximum total scores ranged from 0.000 to 0.500 at both assessments.

Table 1. Descriptive statistics for the total TaGA score

| Measures  | n  | Mean  | SS    | Median | Min   | Maks  |
|-----------|----|-------|-------|--------|-------|-------|
| Measure 1 | 29 | 0,246 | 0,131 | 0,250  | 0,000 | 0,500 |
| Measure 2 | 29 | 0,234 | 0,120 | 0,200  | 0,000 | 0,500 |

The prevalence of deficits and descriptive statistics for each TaGA domain at the first and second assessments are presented in Table 2. At the first assessment, the highest deficit prevalence was observed for self-rated health and gait speed (82.8%), whereas social support and nutritional status showed the lowest prevalence (13.8%).

Table 2. Prevalence of deficits and descriptive statistics of TaGA domains in the test–retest reliability sample (n = 29)

| TaGA domain           | TaGA domain | TaGA domain | TaGA domain |
|-----------------------|-------------|-------------|-------------|
| Social support        | 13,8        | 0,069       | 0,103       |
| Hospital admission    | 62,1        | 0,362       | 0,362       |
| Falls                 | 27,6        | 0,207       | 0,224       |
| Medication use        | 27,6        | 0,138       | 0,155       |
| Functional status     | 24,1        | 0,138       | 0,103       |
| Cognitive performance | 41,4        | 0,276       | 0,241       |
| Self-rated health     | 82,8        | 0,569       | 0,500       |
| Depressive symptoms   | 20,7        | 0,138       | 0,172       |
| Nutritional status    | 13,8        | 0,069       | 0,000       |
| Gait speed            | 82,8        | 0,552       | 0,466       |

**Abbreviations:** TaGA, Targeted Geriatric Assessment; T1, first assessment; T2, second assessment.

### Test-Retest Reliability of the Total Score

Table 3. Test–retest reliability of the total TaGA score (n = 29)

| Indicator                           | Value              |
|-------------------------------------|--------------------|
| ICC (2,1)                           | 0,908              |
| 95% CI                              | 0,817-0,959        |
| Pearson correlation coefficient     | 0,912; $p < 0,001$ |
| Spearman correlation coefficient    | 0,929; $p < 0,001$ |
| Mean difference (T2 – T1)           | -0,011             |
| SD of the differences               | 0,054              |
| Paired-samples <i>t</i> test        | 0,278              |
| Wilcoxon signed-rank test           | 0,289              |
| Standard error of measurement (SEM) | 0,038              |
| Minimal detectable change (MDC95)   | 0,105              |
| Limits of agreement                 | -0,116-0,094       |

The test–retest reliability results for the total TaGA score are presented in Table 3. The ICC (2,1) was 0.908 (95% CI: 0.817–0.959). Pearson and Spearman correlation coefficients were 0.912 and 0.929, respectively (both  $p < 0.001$ ). The mean difference between the two assessments was  $-0.011 \pm 0.054$ . No significant differences were observed between the first and second assessments according to the paired-samples *t* test ( $p = 0.278$ ) or the

Wilcoxon signed-rank test ( $p = 0.289$ ). The SEM was 0.038, the MDC<sub>95</sub> was 0.105, and the limits of agreement ranged from -0.116 to 0.094.

Figure 1. Bland–Altman plot illustrating the agreement between the first (T1) and second (T2) assessments of the total Targeted Geriatric Assessment (TaGA) score. The solid blue line represents the mean difference (bias = -0.011), while the dashed red lines indicate the 95% limits of agreement (-0.116 to 0.094). Most observations were distributed within the limits of agreement, indicating good agreement between repeated measurements.

### Domain-Level Reliability

The domain-level reliability results are presented in Table 4. The highest ICC was observed for the medication use domain (ICC = 0.920), followed by falls (ICC = 0.897), functional status (ICC = 0.868), hospital admission (ICC = 0.835), and depressive symptoms (ICC = 0.810). Moderate ICC values were observed for the social support (ICC = 0.529), cognitive performance (ICC = 0.632), self-rated health (ICC = 0.592), and gait speed (ICC = 0.721) domains. ICC and Pearson correlation coefficients could not be calculated for the nutritional status domain because no variability was observed at the second assessment.

Table 4. Domain-level test–retest reliability of the Turkish version of the TaGA (n = 29)

| Domain                | ICC (2,1) | 95% CI       | Pearson $r$ | Weighted $\kappa$ | Agreement (%) |
|-----------------------|-----------|--------------|-------------|-------------------|---------------|
| Social support        | 0.529     | -0.057–0.891 | 0.536       | 0.521             | 86.2          |
| Hospital admission    | 0.835     | 0.592–0.966  | 0.830       | 0.790             | 86.2          |
| Falls                 | 0.897     | 0.714–1.000  | 0.897       | 0.839             | 89.7          |
| Medication use        | 0.920     | 0.714–1.000  | 0.920       | 0.917             | 96.6          |
| Functional status     | 0.868     | 0.481–1.000  | 0.874       | 0.826             | 93.1          |
| Cognitive performance | 0.632     | 0.263–0.821  | 0.634       | 0.488             | 65.5          |
| Self-rated health     | 0.592     | 0.205–0.865  | 0.604       | 0.583             | 75.9          |
| Depressive symptoms   | 0.810     | 0.333–0.968  | 0.811       | 0.722             | 86.2          |
| Nutritional status    | —         | —            | —           | 0.000             | 86.2          |
| Gait speed            | 0.721     | 0.506–0.870  | 0.744       | 0.611             | 69.0          |

### Concurrent Validity

The concurrent validity results are presented in Table 5. The total TaGA score showed significant correlations with all comparator measures in the expected directions (all  $p < 0.001$ ). Positive correlations were observed with the Clinical Frailty Scale, FRAIL Scale, Geriatric Depression Scale, frailty status, and the number of medications, whereas negative correlations were found with the Barthel Index, Mini-Mental State Examination, and Mini Nutritional Assessment. The strongest correlations were observed with the Clinical Frailty Scale ( $r = 0.649$ ,  $p = 0.604$ ) and the Mini Nutritional Assessment ( $r = -0.549$ ,  $p = -0.489$ ).

Table 5. Concurrent validity of the Turkish version of the TaGA

| Comparator measure            | Expected direction | Pearson $r$ | Spearman $\rho$ | p-value |
|-------------------------------|--------------------|-------------|-----------------|---------|
| Clinical Frailty Scale        | +                  | 0.649       | 0.604           | <0.001  |
| FRAIL Scale                   | +                  | 0.525       | 0.532           | <0.001  |
| Barthel Index                 | –                  | -0.503      | -0.411          | <0.001  |
| Mini-Mental State Examination | –                  | -0.344      | -0.342          | <0.001  |
| Geriatric Depression Scale    | +                  | 0.492       | 0.556           | <0.001  |
| Mini Nutritional Assessment   | –                  | -0.549      | -0.489          | <0.001  |
| Frailty status                | +                  | 0.554       | 0.511           | <0.001  |
| Number of medications         | +                  | 0.360       | 0.401           | <0.001  |

## Known-Groups Validity and Discriminative Ability

The results of the known-groups validity analysis are presented in *Table 6*. Frail participants had significantly higher total TaGA scores than non-frail participants ( $0.440 \pm 0.130$  vs.  $0.254 \pm 0.112$ ,  $p < 0.001$ ). The ROC curve analysis demonstrated an area under the curve (AUC) of  $0.857$  for identifying frailty. The optimal cutoff score was  $0.350$ , with a sensitivity of  $85.7\%$  and a specificity of  $75.3\%$ . The ROC curve is presented in *Figure 2*.

Table 6. Known-groups validity of the Turkish version of the TaGA

| Group     | n  | Mean $\pm$ SD     | Median | p-value          |
|-----------|----|-------------------|--------|------------------|
| Non-frail | 77 | $0.254 \pm 0.112$ | 0.250  |                  |
| Frail     | 21 | $0.440 \pm 0.130$ | 0.440  | <b>&lt;0.001</b> |

Table 7. Receiver operating characteristic (ROC) analysis for frailty

| Parameter                  | Value          |
|----------------------------|----------------|
| Reference standard         | Frailty status |
| Sample size                | 98             |
| Area under the curve (AUC) | 0.857          |
| Optimal cutoff score       | 0.350          |
| Sensitivity                | 85.7%          |
| Specificity                | 75.3%          |

## Discussion

The findings of the present study indicate that the Turkish version of the Targeted Geriatric Assessment (TaGA) demonstrates excellent test-retest reliability, good concurrent validity, satisfactory known-groups validity, and good discriminative ability for identifying frailty among community-dwelling older adults. The total TaGA score showed an ICC of  $0.908$ , indicating excellent reliability according to the recommendations of (Koo & Li, 2016). Furthermore, the SEM and  $MDC_{95}$  values provide clinically meaningful information beyond reliability coefficients by quantifying measurement error and identifying the minimum amount of change required to represent true change over repeated assessments (Beckerman et al., 2001). These measurement properties support the use of the Turkish version of the TaGA for both cross-sectional assessment and longitudinal follow-up.

As a multidimensional assessment instrument, the TaGA is designed to evaluate multiple domains of geriatric health rather than a single clinical construct. Therefore, moderate to strong correlations with established measures of frailty, functional status, cognition, nutrition, depression, and medication use were expected. The significant positive correlations observed with the Clinical Frailty Scale, FRAIL Scale, Geriatric Depression Scale, frailty status, and the number of medications, together with the negative correlations with the Barthel Index, Mini-Mental State Examination, and Mini Nutritional Assessment, support the concurrent validity of the Turkish version. These findings indicate that the Turkish version preserves the multidimensional conceptual framework of the original instrument while demonstrating appropriate associations with established geriatric assessment measures.

The known-groups validity analysis further demonstrated that frail participants had significantly higher TaGA scores than non-frail participants. In addition, the ROC analysis showed good discriminative performance for identifying frailty, with an AUC of  $0.857$ . The optimal cutoff score of  $0.350$  yielded a sensitivity of  $85.7\%$  and a specificity of  $75.3\%$ , suggesting that the Turkish version of the TaGA can successfully distinguish between frail and non-frail older adults. These findings support the use of the Turkish version of the TaGA as a screening instrument for identifying individuals who may benefit from a more comprehensive geriatric assessment. However, the proposed cutoff score should be interpreted as a screening threshold rather than a diagnostic criterion and should be externally validated in independent populations before routine clinical implementation.

The TaGA was originally developed as a brief multidimensional assessment tool for rapidly identifying geriatric risk in busy healthcare settings where comprehensive geriatric assessment may not always be feasible. The original validation study reported excellent inter-rater reliability (ICC =  $0.92$ ), a strong correlation with the Frailty Index (Spearman coefficient =  $0.79$ ), superior discrimination of frailty compared with the Identification of Seniors at Risk (ISAR), and a mean administration time of approximately  $9.5$  minutes (Aliberti et al., 2018). Similarly, the Turkish version demonstrated excellent reliability and good discriminative ability, indicating that the cross-cultural adaptation process preserved the psychometric characteristics of the original instrument. Although the cutoff score identified in the present study differs from that reported in the original validation study, this difference is expected because cutoff values are influenced by population characteristics, frailty prevalence, and the reference

standard used for classification. Overall, the present findings indicate that the Turkish version retains the multidimensional measurement properties and clinical applicability of the original TaGA.

Comprehensive geriatric assessment is considered the reference approach for evaluating older adults because it simultaneously addresses functional, cognitive, nutritional, psychological, and social domains rather than focusing on a single clinical outcome (Ellis et al., 2011; Veronese et al., 2022). However, the implementation of CGA may be limited in routine clinical practice because of the time, expertise, and multidisciplinary resources required. Consequently, several brief geriatric screening instruments have been developed to facilitate the early identification of older adults who require comprehensive assessment (Parker et al., 2018). Consistent with this multidimensional perspective, the Turkish version of the TaGA demonstrated significant associations with established measures representing these domains. Although several brief geriatric screening instruments, including the Rapid Geriatric Assessment (RGA), have recently been adapted for use in Türkiye (Çavdar et al., 2025), each instrument targets different clinical constructs and uses different scoring systems. Unlike most existing screening tools, the TaGA integrates ten geriatric domains into a cumulative deficit-based score, providing both an overall estimate of geriatric risk and domain-specific information to guide clinical decision-making. Therefore, the present study provides psychometric evidence supporting the use of the Turkish version of the TaGA as a brief multidimensional screening instrument for Turkish-speaking older adults.

At the domain level, medication use, falls, hospital admission, functional status, and depressive symptoms demonstrated higher reliability than social support, cognitive performance, self-rated health, and gait speed. Higher reliability observed in objectively assessed domains is expected because these variables are generally less susceptible to short-term fluctuations than self-reported measures. In contrast, self-rated health and perceived social support may vary according to temporary physical, emotional, and environmental factors. No ICC could be estimated for the nutritional status domain because no variability was observed at the second assessment. This finding should be interpreted cautiously, as it is more likely to reflect the limited variability of the study sample than inadequate measurement performance of the nutritional domain. Future studies including more heterogeneous populations with a broader range of nutritional risk are warranted to further evaluate the reliability of this domain.

### **Strengths and Limitations**

The present study has several strengths. To our knowledge, this is the first study to evaluate the cross-cultural adaptation and psychometric properties of the Turkish version of the Targeted Geriatric Assessment (TaGA). A major strength of the study is the comprehensive evaluation of multiple psychometric properties, including test-retest reliability, measurement error, concurrent validity, known-groups validity, domain-level reliability, and discriminative ability for frailty. Furthermore, the inclusion of several well-established geriatric assessment instruments as comparator measures strengthened the evaluation of construct validity and provided a comprehensive assessment of the multidimensional performance of the Turkish version of the TaGA.

Nevertheless, several limitations should be acknowledged. First, the test-retest reliability analysis was conducted in a relatively small reliability sample, which may have contributed to the wide confidence intervals observed for some domain-specific ICC estimates. Second, the absence of variability in the nutritional status domain at the second assessment prevented the estimation of ICC and Pearson correlation coefficients for this domain. Third, frailty status was used as the reference standard for the ROC analysis; therefore, the proposed cutoff score may differ when evaluated against other clinically relevant outcomes. Finally, because this study evaluated the cross-sectional psychometric properties of the Turkish version of the TaGA, its predictive validity for clinically important outcomes, including hospitalization, falls, functional decline, institutionalization, and mortality, could not be determined.

### **Clinical Implications and Future Directions**

The findings of this study suggest that the Turkish version of the TaGA may serve as a practical multidimensional screening instrument for identifying older adults who may benefit from comprehensive geriatric assessment. In addition to providing an overall estimate of geriatric risk, domain-specific scores may assist healthcare professionals in identifying priority areas for further assessment and individualized care planning. The MDC<sub>95</sub> value may facilitate the interpretation of longitudinal changes by distinguishing true clinical change from measurement error. However, the proposed cutoff score should be interpreted as a screening threshold rather than a diagnostic criterion and should always be considered in conjunction with comprehensive clinical assessment.

Future multicenter studies should evaluate the predictive validity, responsiveness, and external validity of the Turkish version of the TaGA in larger and more heterogeneous populations. Additional research should also investigate its ability to predict clinically relevant outcomes, including hospitalization, falls, functional decline, institutionalization, and mortality, as well as its applicability across different healthcare settings.

## **Conclusion**

The Turkish version of the Targeted Geriatric Assessment demonstrated excellent test–retest reliability, good concurrent validity, satisfactory known-groups validity, and good discriminative ability for identifying frailty among community-dwelling older adults. These findings support the reliability and validity of the Turkish version of the TaGA as a brief multidimensional geriatric screening instrument for Turkish-speaking older adults. The instrument may facilitate the identification of individuals who could benefit from comprehensive geriatric assessment, particularly in settings where rapid multidimensional screening is needed. Further multicenter and longitudinal studies are warranted to confirm these findings, evaluate predictive validity and responsiveness, and examine the performance of the proposed cutoff score in different clinical populations.

## **Scientific Ethics Declaration**

\* Ethical approval for this study was obtained from the appropriate Institutional Ethics Committee, and permission to translate and use the Targeted Geriatric Assessment (TaGA) was obtained from the original developer. Written informed consent was obtained from all participants prior to enrollment in the study.

\* The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

## **Data Availability Statement**

\* The anonymized datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request, subject to ethical and institutional regulations. The English and Turkish versions of the scale in which the study was conducted are attached.

## **Conflict of Interest**

\* The authors declare that they have no competing interests.

## **Funding**

\* This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## **Authors' Contributions**

**Elif Kocaman:** Conceptualization, methodology, investigation, data collection, formal analysis, interpretation of the data, and drafting of the manuscript.

**Neslihan Fırat:** Methodology, data curation, formal analysis, interpretation of the data, manuscript writing, and critical revision of the manuscript.

**Özge Taş:** Formal analysis and interpretation of the data.

**Aynur Ayşe Karaduman:** Supervision, methodology, interpretation of the findings, critical revision of the manuscript, and final approval of the version to be published.

All authors read and approved the final manuscript.

## AI Disclosure Statement

\* During the preparation of this manuscript, the authors used an artificial intelligence–assisted writing tool for language editing, academic formatting, and improving clarity and consistency of expression. No artificial intelligence tool was used to generate, analyze, or interpret the study data. The authors take full responsibility for the scientific content, analyses, interpretations, and the final version of the manuscript.

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### To cite this article:

Kocaman, E., Fırat, N. Tas, O. & Karaduman, A. A. (2026). Targeted geriatric assessment for fast-paced healthcare settings (TaGA): Validity and reliability study of the Turkish version. *The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS)*, 22, 38-49.

Appendix 1. TaGA-Targeted Geriatric Assessment for rapid healthcare settings Turkish version

| SOSYAL DESTEK                                                                                                                                                                            | Kiminle yaşıyorsun?                                                                                   | Yalnız<br>[sonraki soru]           | Aile veya bakıcı<br>[ 0.0] | Kurumda Yaşıyor<br>[0.5]       | Puan       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------|--------------------------------|------------|
| Sadece yalnız yaşayanlar için: Bir yatağa bağımlı olsaydınız, size yardım edebilecek kişilere ulaşılır mı?                                                                               |                                                                                                       |                                    |                            |                                |            |
| Her zaman veya neredeyse her zaman<br>[0.5]                                                                                                                                              |                                                                                                       | Bazen, nadiren veya asla<br>[ 1.0] |                            |                                |            |
| <b>HASTANE BAŞVURULARI</b><br>Son 6 Ayda                                                                                                                                                 | Hiç<br>[ 0.0]                                                                                         | Acil Servis Ziyareti<br>[0.5]      | Hastaneye Yatış<br>[1.0]   |                                |            |
| <b>DÜŞMELER</b><br>Son 12 Ayda                                                                                                                                                           | Hiç<br>[ 0.0]                                                                                         | 1 Düşme<br>[0.5]                   | ≥2 Düşme<br>[1.0]          |                                |            |
| <b>İLAÇLAR</b><br>Sürekli Kullanımdaki Sayı                                                                                                                                              | <5<br>[ 0.0]                                                                                          | 5-9<br>[0.5]                       | >10<br>[1.0]               |                                |            |
| <b>FONKSİYONELLİK</b>                                                                                                                                                                    | <b>Günlük Yaşam Aktivitelerinde Katz Bağımsızlık İndeksi</b> (Katz ve diğerleri, 1976)                |                                    |                            |                                |            |
| <b>Banyo Yapma:</b> Tamamen kendi kendine yıkanır veya vücudunun yalnızca tek bir bölümünü yıkamak için yardıma ihtiyaç duyar.                                                           |                                                                                                       |                                    |                            |                                | Hayır<br>1 |
| <b>Giyinme:</b> dolaplardan kıyafet alır ve düğmeli elbise ve dış giysileri giyer.                                                                                                       |                                                                                                       |                                    |                            |                                | Evet<br>0  |
| <b>Tuvalet:</b> Yardımsız tuvalete gider, Kıyafetini çıkarır, tuvaletini yapar ve kıyafetlerini tekrar giyer.                                                                            |                                                                                                       |                                    |                            |                                | 1          |
| <b>Transfer:</b> Yataktan sandalyeye ve ya tersi etkinliği tek başına ve ya baston ya da cihaz yardımıyla yapar.                                                                         |                                                                                                       |                                    |                            |                                | 0          |
| <b>Kontinans:</b> İdrara çıkma ve dışkılama üzerinde tam bir öz kontrol sağlar.                                                                                                          |                                                                                                       |                                    |                            |                                | 1          |
| <b>Beslenme:</b> Yiyecekleri tabaktan yardım almadan ağzına götürür.                                                                                                                     |                                                                                                       |                                    |                            |                                | 0          |
| [ 0.0] 0 Puan                                                                                                                                                                            |                                                                                                       | [0.5] 1-2 Puan                     |                            | [1.0] ≥ 3 Puan                 |            |
| <b>KOGNİTİF DURUM</b>                                                                                                                                                                    | <b>Eğitim Düzeyi İle Düzeltilmiş 10 Puanlı Bilişsel Tarama Aracı</b> (Apolinario ve diğerleri, 2016): |                                    |                            |                                |            |
| Zaman Oryantasyonu: Bugünün tarihi <input type="radio"/> Ay <input type="radio"/> Yıl <input type="radio"/>                                                                              |                                                                                                       |                                    |                            |                                |            |
| Şu kelimeleri tekrarlayın: Araba-Vazo-Tuğla (Gerekirse 3 denemeye kadar; _____)                                                                                                          |                                                                                                       |                                    |                            |                                |            |
| Kategorik Akıcılık: 1 Dakikada Hayvanlar <input type="radio"/> 0-5=0 <input type="radio"/> 6-8=1 <input type="radio"/> 9-11=2 <input type="radio"/> 12-14=3 <input type="radio"/> ≥15 =4 |                                                                                                       |                                    |                            |                                |            |
| 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____                                                                                                                  |                                                                                                       |                                    |                            |                                |            |
| 9. _____ 10. _____ 11. _____ 12. _____ 13. _____ 14. _____ 15. _____ 16. _____                                                                                                           |                                                                                                       |                                    |                            |                                |            |
| Kelime hatırlama: Araba <input type="radio"/> Vazo <input type="radio"/> Tuğla <input type="radio"/>                                                                                     |                                                                                                       |                                    |                            |                                |            |
| Ham Skor(10 CS): ____/10 Eğitim göre düzeltilmiş puan (10-CS-Eğit.): ____/10                                                                                                             |                                                                                                       |                                    |                            |                                |            |
| (örgün eğitim yok: 2 puan ekleyin: 1-3 yıllık eğitim: 1 puan ekleyin; maksimum puan-10)                                                                                                  |                                                                                                       |                                    |                            |                                |            |
| [ 0.0] ≥8 Puan                                                                                                                                                                           |                                                                                                       | [0.5] 6-7 Puan                     |                            | [1.0] 0-5 Puan                 |            |
| <b>ÖZ SAĞLIK BİLDİRİMİ</b>                                                                                                                                                               | "Genel olarak sağlığınızın mükemmel, çok iyi, iyi, orta veya kötü olduğunu söyleyebilir misiniz?"     |                                    |                            |                                |            |
| Cevap verilemiyor (eğer 10-CS skoru=0 ise)                                                                                                                                               | Mükemmel/Çok iyi<br>[ 0.0]                                                                            | İyi<br>[0.5]                       | Orta / kötü<br>[1.0]       |                                |            |
| <b>DEPRESYON SEMPTOMLARI</b>                                                                                                                                                             | <b>4 Maddelik Geriatrik Depresyon Ölçeği</b> (van Marwijk ve ark. 1995)                               |                                    |                            |                                |            |
| Cevap verilemiyor (eğer 10-CS skoru=0 ise)                                                                                                                                               | -Genel olarak hayatınızdan memnun musunuz?                                                            |                                    |                            |                                | Hayır<br>1 |
|                                                                                                                                                                                          | -Aktivitelerinizin ve ilgi alanlarınızın birçoğunu bıraktınız mı?                                     |                                    |                            |                                | Evet<br>0  |
|                                                                                                                                                                                          | -Çoğu zaman kendinizi mutlu hissediyor musunuz?                                                       |                                    |                            |                                | 1          |
|                                                                                                                                                                                          | - Evde kalmayı dışarı çıkmaya tercih eder misiniz?                                                    |                                    |                            |                                | 0          |
| [ 0.0] 0-1 Puan                                                                                                                                                                          |                                                                                                       | [0.5] 2 Puan                       |                            | [1.0] 3-4 Puan                 |            |
| <b>BESLENME DURUMU</b>                                                                                                                                                                   | Kilo kaybı: ≥ 4.5 kg önceki yıl içerisinde Hayır <input type="radio"/> Evet <input type="radio"/>     |                                    |                            |                                |            |
|                                                                                                                                                                                          | Beden Kitle İndeksi (BKİ) _____ (kilo-kg) / (boy-m) <sup>2</sup>                                      |                                    |                            |                                |            |
| Not: BMI mevcut değilse baldır çevresi (CC) ile değiştirin: CC <31 cm (veya 12,2 inç) bozulma anlamına gelir.                                                                            |                                                                                                       |                                    |                            |                                |            |
| [0.0] kilo kaybı yok ve BKİ ≥ 22                                                                                                                                                         |                                                                                                       | [0.5] kilo kaybı veya BKİ < 22     |                            | [1.0] kilo kaybı ve BKİ < 22   |            |
| <b>YÜRÜME HIZI</b>                                                                                                                                                                       | Her zamanki tempoda iki kez 4,5 metre yürütün; en iyi performansı dikkate alın.                       |                                    |                            |                                |            |
| Zaman 1: _____ sn                                                                                                                                                                        |                                                                                                       | Zaman 2: _____ sn                  |                            |                                |            |
| [ 0.0] ≤ 4.4 s                                                                                                                                                                           |                                                                                                       | [0.5] 4.5-7.5s                     |                            | [1.0] ≥ 7.6 s veya yürüyemiyor |            |
| TaGA puanı (0'dan 1'e: puanların toplamının değerlendirilen alan sayısına bölümü)                                                                                                        |                                                                                                       |                                    |                            |                                |            |

Appendix 2. TaGA-Targeted Geriatric Assessment for rapid healthcare settings original version

| SOCIAL SUPPORT                                                                                                                                                                                                 |  | Who do you live with?                                                                                                  | Alone<br>[next question]              | Family or caregiver<br>[ 0.0 ]          | Institutionalized<br>[0.5] | POINTS |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|----------------------------|--------|
| Only for those who live alone:<br>How often would someone be available to help you if you were confined to bed?                                                                                                |  |                                                                                                                        | Always or almost always<br>[ 0.5 ]    | Sometimes, rarely or never<br>[ 1.0 ]   |                            | _____  |
| PREVIOUS ADMISSIONS                                                                                                                                                                                            |  | None<br>[ 0.0 ]                                                                                                        | Emergency department visit<br>[ 0.5 ] | Hospitalization<br>[ 1.0 ]              |                            | _____  |
| In the prior six months:                                                                                                                                                                                       |  |                                                                                                                        |                                       |                                         |                            |        |
| FALLS                                                                                                                                                                                                          |  | None<br>[ 0.0 ]                                                                                                        | 1 fall<br>[ 0.5 ]                     | ≥ 2 falls<br>[ 1.0 ]                    |                            | _____  |
| In the last 12 months:                                                                                                                                                                                         |  |                                                                                                                        |                                       |                                         |                            |        |
| MEDICATIONS                                                                                                                                                                                                    |  | < 5<br>[ 0.0 ]                                                                                                         | 5 – 9<br>[ 0.5 ]                      | ≥ 10<br>[ 1.0 ]                         |                            | _____  |
| Number in continuous use:                                                                                                                                                                                      |  |                                                                                                                        |                                       |                                         |                            |        |
| FUNCTIONALITY                                                                                                                                                                                                  |  | Katz Index of Independence in Activities of Daily Living (Katz et al., 1976):                                          |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | No Yes                                                                                                                 |                                       |                                         |                            |        |
| Bathing: bathes self completely or needs help in bathing only a single part of the body.                                                                                                                       |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
| Dressing: gets clothes from closets and puts on clothes and outer garments complete with fasteners.                                                                                                            |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
| Toileting: goes to toilet, gets on and off, arranges clothes, cleans genital area without help.                                                                                                                |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
| Transferring: moves in and out of bed or chair unassisted. Mechanical transferring aides are acceptable.                                                                                                       |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
| Continence: exercises complete self control over urination and defecation.                                                                                                                                     |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
| Eating: gets food from a plate into the mouth without help.                                                                                                                                                    |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | [ 0.0 ] 0 points                                                                                                       | [ 0.5 ] 1 – 2 points                  | [ 1.0 ] ≥ 3 points                      |                            | _____  |
| COGNITIVE STATUS                                                                                                                                                                                               |  | Education-corrected 10-Point Cognitive Screener (Apolinario et al., 2016):                                             |                                       |                                         |                            |        |
| Temporal orientation: <input type="checkbox"/> today's date <input type="checkbox"/> month <input type="checkbox"/> year                                                                                       |  |                                                                                                                        |                                       |                                         |                            |        |
| Repeat these words: CAR – VASE – BRICK (up to 3 attempts if necessary; does not score)                                                                                                                         |  |                                                                                                                        |                                       |                                         |                            |        |
| Categorical fluency: animals in 1 min <input type="checkbox"/> 0-5 = 0 <input type="checkbox"/> 6-8 = 1 <input type="checkbox"/> 9-11 = 2 <input type="checkbox"/> 12-14 = 3 <input type="checkbox"/> ≥ 15 = 4 |  |                                                                                                                        |                                       |                                         |                            |        |
| 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____                                                                                                                                        |  |                                                                                                                        |                                       |                                         |                            |        |
| 9. _____ 10. _____ 11. _____ 12. _____ 13. _____ 14. _____ 15. _____ 16. _____                                                                                                                                 |  |                                                                                                                        |                                       |                                         |                            |        |
| Word recall: <input type="checkbox"/> CAR <input type="checkbox"/> VASE <input type="checkbox"/> BRICK                                                                                                         |  |                                                                                                                        |                                       |                                         |                            |        |
| Crude score (10-CS): _____ /10                                                                                                                                                                                 |  | Education-corrected score (10-CS-Edu): _____ /10                                                                       |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | (no formal education: add 2 points; 1–3 years of education: add 1 point; max score=10)                                 |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | [ 0.0 ] ≥ 8 points                                                                                                     | [ 0.5 ] 6 – 7 points                  | [ 1.0 ] 0 – 5 points                    |                            | _____  |
| SELF-RATED HEALTH                                                                                                                                                                                              |  | "In general, would you say that your health is excellent, very good, good, fair, or poor?"                             |                                       |                                         |                            |        |
| <input type="checkbox"/> Unable to answer<br>(if 10-CS crude score=0)                                                                                                                                          |  | Excellent or very good<br>[ 0.0 ]                                                                                      | Good<br>[ 0.5 ]                       | Fair or poor<br>[ 1.0 ]                 |                            | _____  |
| DEPRESSIVE SYMPTOMS                                                                                                                                                                                            |  | 4-item Geriatric Depression Scale (van Marwijk et al., 1995):                                                          |                                       |                                         |                            |        |
| <input type="checkbox"/> Unable to answer<br>(if 10-CS crude score=0)                                                                                                                                          |  | No Yes                                                                                                                 |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Are you basically satisfied with your life?                                                                            |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Have you dropped many of your activities and interests?                                                                |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | 0 1                                                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Do you feel happy most of the time?                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | 1 0                                                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Do you prefer to stay at home, rather than going out and doing new things?                                             |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | 0 1                                                                                                                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | [ 0.0 ] 0 – 1 point                                                                                                    | [ 0.5 ] 2 points                      | [ 1.0 ] 3 – 4 points                    |                            | _____  |
| NUTRITIONAL STATUS                                                                                                                                                                                             |  | Weight loss: ≥ 10 pounds in the prior year <input type="checkbox"/> No <input type="checkbox"/> Yes                    |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Body mass index (BMI): _____ (weight in kg) / (height in m) <sup>2</sup>                                               |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Note: if BMI is not available, replace it with calf circumference (CC); CC < 310 mm (or 12.2 inches) means impairment. |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | [ 0.0 ] no weight loss and BMI ≥ 22                                                                                    | [ 0.5 ] weight loss or BMI < 22       | [ 1.0 ] weight loss and BMI < 22        |                            | _____  |
| GAIT SPEED                                                                                                                                                                                                     |  | Walking two times 4.5 meters at a usual pace; consider the best performance.                                           |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | Time 1: _____ seconds Time 2: _____ seconds                                                                            |                                       |                                         |                            |        |
|                                                                                                                                                                                                                |  | [ 0.0 ] ≤ 4.4 seconds                                                                                                  | [ 0.5 ] 4.5 – 7.5 seconds             | [ 1.0 ] ≥ 7.6 seconds or unable to walk |                            | _____  |
|                                                                                                                                                                                                                |  | TaGA score (from 0 to 1: sum of the points divided by the number of evaluated domains)                                 |                                       |                                         |                            | _____  |