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Validity and Reliability of the Turkish Version of the Elbow Self-Assessment Score in Patients with Elbow Disorders

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ABSTRACT

Objective: This study was designed to investigate the validity and reliability of the Turkish version of the Elbow Self-Assessment Score (ESAS) in the Turkish population.

Materials and Methods: Two hundred six patients presenting with elbow disorders were enrolled. The ESAS scale was translated into Turkish (ESAS-TR). Criterion validity was assessed through Pearson's correlation coefficients with the Disabilities of the Arm, Shoulder, and Hand (DASH), Mayo Elbow Performance Score (MEPS), and Visual Analog Scale (VAS).

Results: Strong and moderate correlations were found between ESAS-TR and VAS (r=0.61, p<0.001), DASH (r=0.96, p<0.001), and MEPS (r=-0.90, p<0.001). Test-retest reliability of ESAS-TR was excellent (Intraclass Correlation Coefficient [ICC]=0.97, 95% confidence interval [CI] 0.73–0.99).

Conclusion: The ESAS-TR demonstrated strong validity and reliability in assessing range of motion, pain, quality of life, and elbow function among individuals with elbow disorders within the Turkish population.

Keywords: Elbow, measurement properties, pain, patient-reported outcomes, validity.

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INTRODUCTION

The elbow joint exhibits remarkable stability attributed to its bony anatomy and the surrounding musculature and ligaments.[1] However, overuse syndromes, fractures, and dislocations may still occur in the elbow joint.[2,3] Inflammatory conditions may also manifest.[4] These disorders adversely affect quality of life, as they cause pain in the elbow joint.[5]

Patient-reported outcome measurement (PROM) tools that evaluate elbow disorders are very popular in determining treatment outcomes. Elbow rating scales are easy and inexpensive methods for collecting patient data in research and clinical care.[6] There are PROM tools available to assess elbow disorders.[7,8] In 2017, the Elbow Self-Assessment Score (ESAS) was developed to measure both objective and subjective parameters of the elbow and was reported as a valid and reliable measurement.[9] Nevertheless, the ESAS was not available in any other language, necessitating the

development of tools to establish its validity and reliability to facilitate both subjective and objective evaluations of the elbow within the Turkish population. The objective of this study was to cross-culturally adapt the Elbow Self-Assessment Score into Turkish (ESAS-TR) and determine its validity and reliability in the Turkish population.

MATERIALS AND METHODS

Participants

This study was approved by Kırşehir Ahi Evran University Clinical Research Ethics Committee (No: 2022-21/179, Date: 22/11/2022). Two hundred six individuals were recruited from Kırşehir Ahi Evran Training and Research Hospital's Physiotherapy and Rehabilitation Department. Inclusion criteria included traumatic soft tissue injury, bone injury, and degenerative disorders affecting the elbow, while individuals with cognitive or neurological disorders were excluded. Written informed consent was obtained from all participants. The recruitment process of participants is shown in Figure 1.

Outcome Measurements

We collected demographic data from participants, including sex, age, injured side, dominant side, and diagnosis. Assessment involved the use of the Visual Analog Scale (VAS), Disabilities of the Arm, Shoulder, and Hand (DASH), Mayo Elbow Performance Score (MEPS), and ESAS-TR, administered by skilled physiotherapists specializing in upper extremity rehabilitation. All evaluations were conducted on the same day. Additionally, the ESAS-TR was readministered to all participants after 7–14 days to evaluate test-retest reliability.[10,11]

Visual Analog Scale

Pain intensity was assessed using the VAS along a 10 cm horizontal line. In this scale, "0" signifies the absence of pain, while "10" represents unbearable pain.[12]

Disabilities of the Arm, Shoulder and Hand

The Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire consists of 30 items that assess upper extremity function. Each item uses a 5-point Likert scale (1=no difficulty, 5=unable to perform). Scores range from 0 to 100, with higher scores indicating greater disability.[8] The DASH was selected due to its adaptation and validation within Turkish culture, making it suitable for criterion validity assessment.

Mayo Elbow Performance Score

The Mayo Elbow Performance Score was used in the clinical evaluation of participants. This scale evaluates pain, range of motion, stability, and elbow function with a total score of 100 points. A score of 90 and above is considered excellent, a score of 75–89 is considered good, a score of 60–74 is moderate, and a score below 60 is poor.[7,13]

Elbow Self-Assessment Score

The ESAS was designed to provide a comprehensive evaluation of the elbow joint, encompassing both subjective and objective measures. Comprising 22 questions, the scale includes photographic representations to assess the range of motion. Each question is scored between 0 and 10, with the total score converted to a 100% scale. A higher score indicates greater disability. The cross-cultural adaptation of the ESAS scale into Turkish followed the guidelines outlined by Beaton et al.,[14] implemented in the following sequence:

KEY MESSAGES

- The Turkish version of the Elbow Self-Assessment Score (ESAS-TR) is validated for assessing pain, elbow function, range of motion, and quality of life in individuals with elbow discomfort.
- The test-retest reliability of the ESAS-TR is excellent.
- The ESAS-TR is an effective measurement tool for assessing individuals with elbow discomfort in the Turkish population.

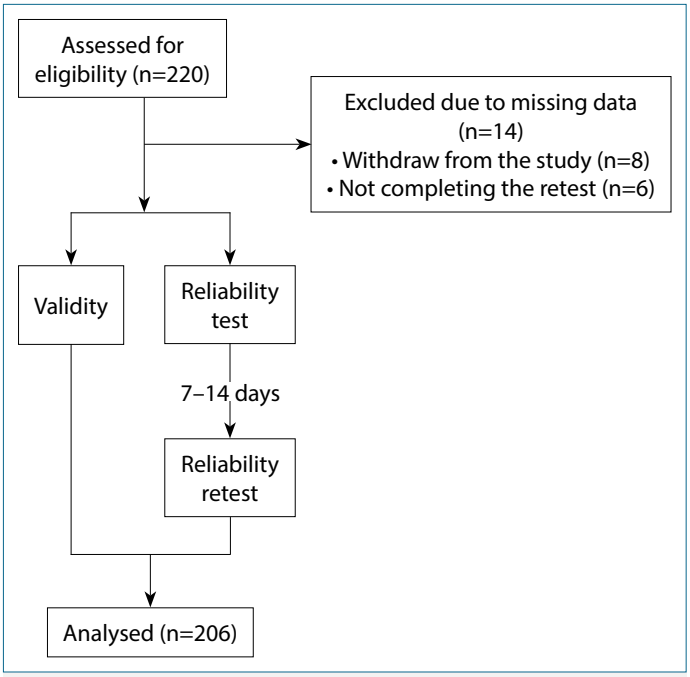

Figure 1. Study flowchart.

The ESAS was translated into Turkish through collaboration with a native Turkish translator proficient in German and another translator fluent in Turkish. The involvement of two experienced translators, each with expertise in the field, aimed to mitigate potential terminology errors and ensure consistency in interpretation.

The translators and researchers reached a consensus by reviewing and comparing the two translated versions of the ESAS, resulting in the designation of the scale as ESAS-TR. Subsequently, ESAS-TR underwent back-translation by four independent translators who were not involved in the initial process. This phase aimed to assess ESAS-TR by comparing it with the original ESAS, thereby identifying any errors or inconsistencies. Suggestions for modifications were made to address any disagreements or inconsistencies in meaning (Appendix 1).

Sample Size Calculation

Sample size calculation for validity was based on a minimum 5 or 10 events per variable, one of the most common methods for estimating sample size in observational studies.[15] Each item of the ESAS was considered a variable, resulting in a minimum required sample size of 220 participants (10x22 items) in total.

Statistical Analysis

Descriptive statistics were computed to characterize the study sample. Continuous data were presented as mean and standard deviation, while categorical data were presented as frequencies. It was determined that the data fit a normal distribution. Pearson's correlation coefficients were used to assess criterion validity, categorized as <0.3 (weak), 0.3 to 0.7 (moderate), and >0.7 (strong) correlations.[16] The Intraclass Correlation Coefficient (ICC) (two-way random, absolute agreement) was used to evaluate test-retest reliability, categorized as follows: <0.5 for poor reliability, 0.5 to 0.75 for moderate reliability, 0.75 to 0.9 for good reliability, and >0.90 for excellent reliability.[17] Statistical analyses were conducted using licensed SPSS software.

RESULTS

We enrolled 206 participants (mean age 47.7±10.4 years, 125 females) with elbow disorders from June to December 2022. The demographic information and PROM scores are shown in Table 1.

Criterion validity with other PROMs is shown in Table 2. Correlations were found between ESAS-TR and DASH (r=0.96), VAS (r=0.61), and MEPS (r=-0.90) (Fig. 2). Test-retest reliability of the ESAS-TR was excellent (ICC=0.97, 95% Confidence Interval [CI] 0.73–0.99).

Table 1. Descriptive features of participants

Demographics (n=206)	Mean±SD	n (%)	Min–Max
Age, years	47.7±10.4		22–65
BMI, kg/m^2	28.1±4.0		18.7–37.7
Gender			NA
Male		81 (39.3%)	
Female		125 (60.7%)	
Dominant side			NA
Right		174 (84.4%)	
Left		32 (15.6%)	
Injured side			NA
Right		133 (64.5%)	
Left		73 (35.5%)	
Diagnoses			
Elbow joint dislocation		26 (12.6%)	
Lateral epicondylitis		48 (23.3%)	
Medial epicondylitis		25 (12.1%)	
Ulnar tunnel syndrome		23 (11.1%)	
Radial head fracture		48 (23.3%)	
Chronic olecranon bursitis		20 (9.7%)	
Elbow osteoarthritis		16 (7.7%)	
ESAS - Turkish Scale (test)	70.6±5.9		60.0–85.5
ESAS - Turkish Scale (retest)	69.6±5.4		59.5–84.7
VAS Scale (test)	6.8±1.0		2.0–9.0
DASH Scale (test)	71.5±5.7		60.0–85.8
MEPS Scale (test)	47.3±6.1		30.0–60.0

SD: Standard deviation; NA: Not applicable; BMI: Body mass index; ESAS: Elbow Self-Assessment Score; VAS: Visual Analog Scale; DASH: Disabilities of the arm, shoulder, and hand; MEPS: Mayo Elbow Performance Score.

Table 2. Pearson's correlation coefficients (r) for the criterion validity of the Turkish Version of the Elbow Self-Assessment Score with other Patient-Reported Outcome Measurements

PROMs	ESAS-TR	
	r	p
DASH	0.96	<0.001
VAS	0.61	<0.001
MEPS	-0.90	<0.001

PROM: Patient-Reported Outcome Measurement; ESAS-TR: Turkish Version of the Elbow Self-Assessment Score; VAS: Visual Analog Scale; MEPS: Mayo Elbow Performance Score.

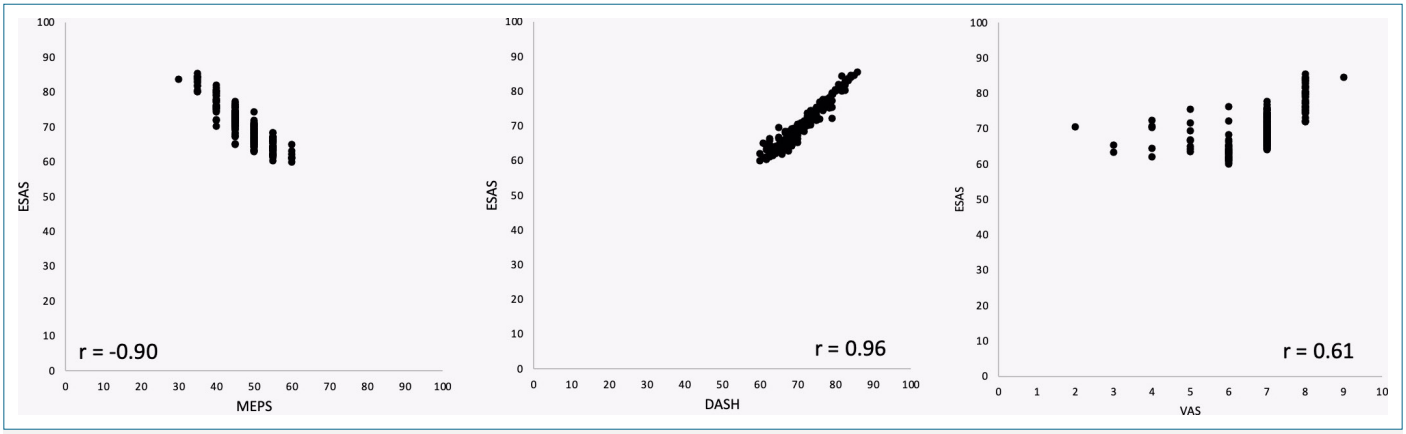

Figure 2. Pearson's correlation coefficients (r) for the criterion validity of the Turkish Version of the Elbow Self-Assessment Score (ESAS-TR) with other Patient-Reported Outcome Measurements (PROMs).

DISCUSSION

The cross-cultural adaptation and translation of the Elbow Self-Assessment Score into Turkish were successful. The results indicate that the Turkish version of the Elbow Self-Assessment Score (ESAS-TR) is a reliable and valid questionnaire for assessing pain, elbow function, and quality of life, with both objective and subjective items, for patients with elbow disorders in the Turkish population.

Several PROM tools have been validated and found to be reliable in Turkish for evaluating elbow disorders. However, the literature is limited regarding tools that evaluate both objective and subjective parameters of the elbow within a single comprehensive scale. The ESAS is an integrated questionnaire covering all aspects of elbow disorders, with self-reported subjective and objective parameters, including pain, elbow function, and quality of life.[9] Another advantage of the ESAS is its universal clinical applicability, as it is not restricted to specific elbow pathologies or patient demographics. Therefore, the cross-culturally adapted Turkish version of the ESAS will be beneficial for evaluating both objective and subjective parameters of elbow disorders within the Turkish population.

In the original study of the ESAS, strong associations were reported with the Quick Disabilities of the Arm, Shoulder, and Hand (r=0.84), Brober and Morrey Score (BMS) (r=0.73), Patient-Rated Elbow Evaluation Score (PREE) (r=0.90), Oxford Elbow Score (OES) (r=0.87), and the MEPS (r=0.70).[9] Our findings are similar to the original ESAS, as we found significant correlations between the ESAS-TR and DASH, MEPS, and VAS. In the Turkish validity and reliability study of the MEPS scale, a strong correlation (r=-0.61) was also found with DASH.[13] Another measurement tool, the Turkish version of the PREE, reported a strong correlation (r=0.64) with DASH.[18] In contrast, the Turkish version of the DASH exhibited a weak correlation (r=0.22) with VAS,[19] whereas the correlation between ESAS-TR and VAS was strong. Overall, ESAS-TR demonstrated correlation levels with MEPS, DASH, and VAS similar to the original ESAS and other existing PROMs in Turkish for assessing elbow disorders. Consequently, ESAS-TR emerges as a valid measurement tool.

The recommended time frame between test-retest assessments varies from 2 days to 2 weeks.[20] To uphold the test-retest reliability of ESAS-TR, we opted for a 7–14 day interval. The ESAS-TR demonstrated excellent reliability (ICC=0.97). In the original study, test-retest reliability was good (ICC=0.76), which was lower than our findings.[9] Similarly, the Turkish version of MEPS showed good test-retest reliability (ICC=0.89), while both the Turkish versions of DASH (ICC=0.91) and the PREE (ICC=0.97) demonstrated excellent test-retest reliability.[18] Consistent with existing literature, ESAS-TR emerges as a reliable questionnaire with the highest test-retest reliability.

Numerous scoring systems are currently available for assessing dysfunction and pain in upper extremity disorders; however, consensus on the most appropriate questionnaire remains elusive.[21] One primary drawback of many assessment systems is the requirement for in-person assessment, which can inconvenience patients.[22] Additionally, most patient-reported outcomes provide only specific scores, complicating comparisons across studies.[22] Addressing this challenge by employing multiple questionnaires increases participant burden[23] and reduces patient motivation to participate.[22] The ESAS stands out as an original scale developed for evaluating elbow dysfunctions, similar to the OES, DASH, and MEPS scales.[7,8,24] Unlike other elbow joint evaluation scales, ESAS assesses the elbow both subjectively and objectively. To our knowledge, no cultural adaptation of ESAS has been undertaken to date. Therefore, our study potentially represents the inaugural cross-cultural adaptation of ESAS, with findings that align with existing valid and reliable tools in the literature.

Study Limitation

This study had several limitations. Firstly, while the original ESAS comprises three subscales, there is a lack of clarity regarding which questions should be included in each subscale. Consequently, we were unable to conduct further analyses, such as assessing the internal consistency of ESAS-TR. Secondly, the absence of existing literature limited the scope of discussion regarding our findings, given that the original ESAS lacks adaptations, validity, and reliability assessments in other languages.

CONCLUSION

In conclusion, the Turkish version of the ESAS has demonstrated reliability and validity in measuring patient-reported outcomes in Turkish-speaking individuals with elbow disorders. The ESAS-TR is recommended for use by healthcare professionals because it provides a comprehensive assessment of elbow disorders, including both objective and subjective parameters.

Ethics Committee Approval: The Kırşehir Ahi Evran University Clinical Research Ethics Committee granted approval for this study (date: 22.11.2022, number: 2022-21/179).

Author Contributions: Concept – İC, MC; Design – AT, MY; Supervision – İC, MC; Resource – AT, MY; Materials – AYK; Data Collection and/or Processing – AYK; Analysis and/or Interpretation – AT, MY; Literature Search – AYK; Writing – İC, MC; Critical Reviews – İC, MC.

Conflict of Interest: The authors have no conflict of interest to declare.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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Hastanın Kimliği

Tarih:			
Cinsiyet:	erkek ☐	kadın ☐	
Hangi dirseğiniz etkilendi?	sağ ☐	sol ☐	her ikisi de ☐
Her iki dirseğiniz de etkilendiyse: Anketi hangi dirseğiniz için dolduruyorsunuz?	sağ ☐	sol ☐	
Çalışıyor musunuz?:	Evet ☐	Hayır ☐	Emekli(_____%MdE) ☐ Ev Hanımı ☐
"evet" ise: Mesleğiniz?			
"hayır" ise: Dirseğiniz yüzünden mi çalışmıyorsunuz?	Evet ☐	Hayır ☐	
Dirseğinizin ağrısını gidermek için ilaç alıyor musunuz?	Evet ☐	Hayır ☐	
Evet ise, hangi ilaçları alıyorsunuz?			

1. Son 4 hafta içerisinde dirseğinizdeki en şiddetli ağrının şiddeti ne kadardı?

Ağrım olmadı — Dayanılmaz biçimdeydi

2. Son 4 hafta içerisinde dirseğinizdeki ağrınızın ortalama şiddeti ne kadardı?

Ağrım olmadı — Dayanılmaz biçimdeydi

3. Son 4 hafta içerisinde dirseğinizde ne sıklıkla ağrı duydunuz?

Hiç duymadım — Sürekli duydum

4. Son 4 hafta içerisinde dirseğinizde ne sıklıkla gece ağrıları duydunuz?

Hiç duymadım — Sürekli duydum

5. Son 4 hafta içerisinde, istirahat halindeyken dirseğinizde ne sıklıkla ağrı hissettiniz?

Hiç hissetmedim — Sürekli hissettim

6. Son 4 hafta içerisinde, dirseğinizi hareket ettirdiğinizde ağrılarınız arttı mı?

Hiç artmadı — Dayanılma biçimde arttı

7. Dirseğim son 4 hafta içerisinde karıncalandı ve/veya uyuştu (Etkilenen taraf ön kol ya da el bölgesinde karıncalanma veya uyuşma olduysa da lütfen cevaplayınız!)

Hiç olmadı — Dayanılmaz biçimdeydi

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

8. Lütfen yapabildiğiniz hareketleri çarpıyla işaretleyin (çok sayıda kutucuğu işaretleyebilirsiniz)!

☐ ☐ ☐ ☐ ☐

9. Lütfen yapabildiğiniz hareketleri çarpıyla işaretleyin (çok sayıda kutucuğu işaretleyebilirsiniz)!

☐ ☐ ☐ ☐ ☐

10. Dirseğinizle gösterilen pozisyonda kaç kilogramlık bir alışveriş çantasını yaklaşık 5 saniye boyunca tutabilirsiniz?

_____(Lütfen buraya kilogram girin)

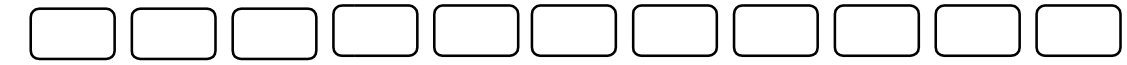
11. Son 4 hafta içerisinde dirseğinizdeki dengesizlik hissi ne kadar güçlüydü?

Dengesizlik yoktu — Dayanılmaz derecedeydi

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

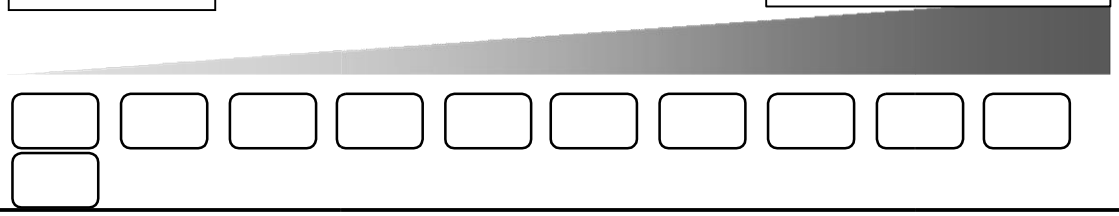
12. Dirseğinizin kolunuzun gücünü kısıtladığı hissine kapılıyor musunuz?

Hiç bir zaman — Tamamen



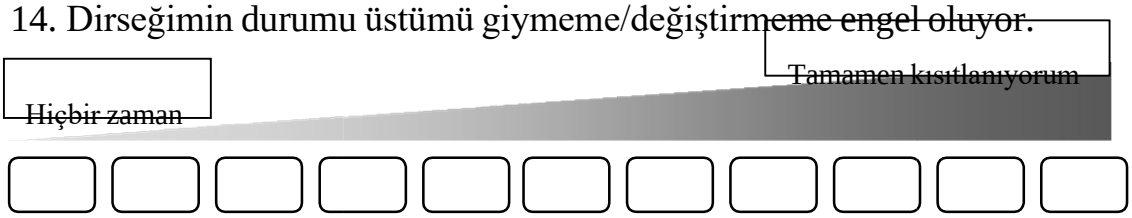
13. Dirseğim nesneleri taşımama engel oluyor.

Hiçbir zaman — Tamamen engelliyor



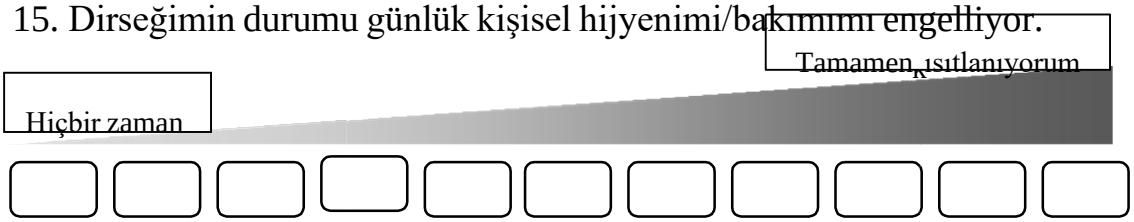
14. Dirseğimin durumu üstümü giymeme/değiştirmeme engel oluyor.

Hiçbir zaman — Tamamen kısıtlanıyorum



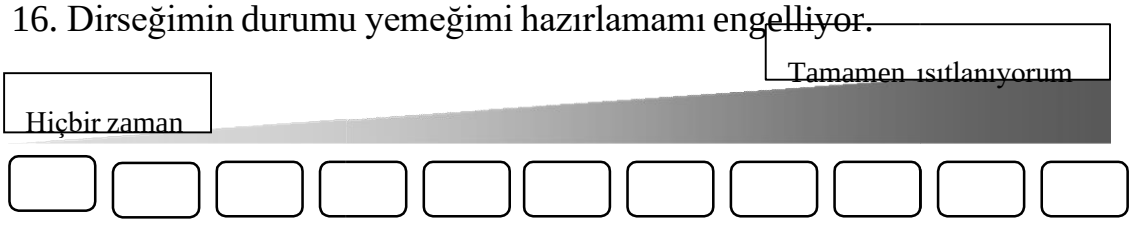
15. Dirseğimin durumu günlük kişisel hijyenimi/bakımımı engelliyor.

Hiçbir zaman — Tamamen kısıtlanıyorum



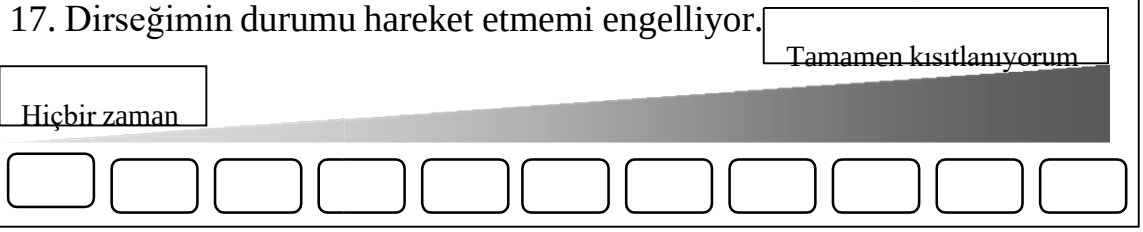
16. Dirseğimin durumu yemeğimi hazırlamamı engelliyor.

Hiçbir zaman — Tamamen kısıtlanıyorum



17. Dirseğimin durumu hareket etmemi engelliyor.

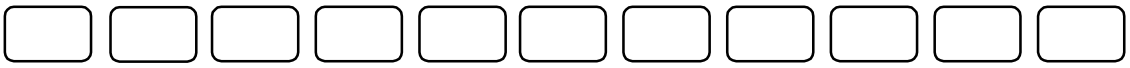
Hiçbir zaman — Tamamen kısıtlanıyorum



18. Dirseğimin durumundan dolayı yaşam kalitemin azaldığın hissediyorum.

Evet, çokça

Hiç doğru değil



19. Sık sık dirseğimin durumunu ve onunla ilintili olan ağrıları düşünüyorum.

Her zaman

Hiç doğru değil

20. Dirseğimin durumu spor / boş zaman aktivitelerinde beni engeller.

Tamamen kısıtlanıyorum

Hiçbir zaman

21. Dirseğinizin durumu işinize engel olur mu?

Tamamen kısıtlanıyorum

Hiçbir zaman

22. Kolunuzun üzerinden destek alırken rahatsızlık duyuyor musunuz?

Sorunsuzca yapıyorum

Tamamen kısıtlanıyorum

Yardımlarınız için teşekkür ederiz!