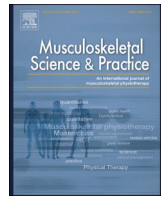Contents lists available at ScienceDirect

Musculoskeletal Science and Practice

journal homepage: www.elsevier.com/locate/msksp

Original article

Cross-cultural adaptation of the Avoidance of Daily Activities Photo Scale for Turkish patients with shoulder pain: Reliability and validity assessment according to the COSMIN guideline☆

Pinar Kuyulu Haksal [a,b,1], Kubra Caylan Gurses [a,1], Birgul Dingirdan [a,c], Busra Pakoz [a], Irem Duzgun [a], Anamaria Siriani de Oliveira [d], Elif Turgut [a,*]

[a] Hacettepe University, Faculty of Physiotherapy and Rehabilitation, Department of Physiotherapy and Rehabilitation, Ankara, Türkiye
[b] SANKO University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Gaziantep, Türkiye
[c] Sakarya University of Applied Sciences, Department of Physiotherapy and Rehabilitation, Sakarya, Türkiye
[d] University of São Paulo, Ribeirão Preto Medical School, Health Sciences Department, Brazil

ABSTRACT

Context: People with chronic or long-term pain may develop various psychosocial symptoms such as fear and avoidance of behavior due to pain. Reliable and valid quality of life tools must be available in Turkish to specifically assess avoidance of behavior in people with shoulder pain.
Objectives: This study aimed to translate and culturally adapt the Avoidance of Daily Activities Photo Scale for Patients with Shoulder Pain and to evaluate the psychometric properties of its Turkish version (ADAP-Tr) in patients with shoulder pain.
Methods: Translation, adaptation, and validation were performed according to the COSMIN (COnsensus-based Standards for the selection of health Measurement INstruments) guidelines. The internal consistency, reliability, construct validity, and discriminant validity of the ADAP-Tr were tested. The Pain Catastrophizing Scale (PCS), Tampa Scale for Kinesiophobia (TSK), and Shoulder Pain and Disability Index (SPADI) were applied for validation purposes.
Results: The study included a total of 162 participants with shoulder pain. The internal consistency of the ADAP-Tr showed excellent reliability with a Cronbach's α of 0.94 and a test-retest assessment of 0.88 ICC (95% CI, 0.83-0.91). The standard error of measurement was 1.85 points, and the minimal detectable change was determined 5.12 points. There was a low to high correlation among the ADAP-Tr and PCS (r = 0.481, p < .001), TSK (r = 0.448, p < .001), and SPADI (r = 0.826, p < .001) scores.
Conclusions: The ADAP-Tr was shown to be a valid and strong reliability tool to use in clinical and research settings as a shoulder-specific measurement tool.

1. Introduction

Shoulder pain is one of the most common conditions that can limit daily life activities and function in the general population (Crookes et al., 2023). Modern pain science revealed that pain is a complex condition that requires a comprehensive biopsychosocial approach to both assessment and treatment (Sluka, 2016.). There is an association between pain and psychosocial impairments (Crookes et al., 2023).

Pain is a subjective experience, and psychometric measures are used to quantify and characterize this experience and psychosocial symptoms with standardized instruments, and patient-reported outcome measures (PROMs), thus providing a more reliable and valid assessment across individuals. These scores serve as guides for treatment decisions and help to evaluate treatment outcomes (Sluka, 2016; Tegenborg et al., 2023). The cross-cultural adaptation of these instruments is essential for their application to diverse populations, facilitating a deeper

understanding of individuals' pain experiences. The cross-cultural adaptation process allows the development of more comprehensive and individualized treatment plans for wider populations. Furthermore, healthcare professionals' comprehension of the psychometric measures in adapted instruments enables them to implement appropriate interventions, enhancing the accuracy, objectivity, and clinical utility of pain assessment (Sluka, 2016; Tegenborg et al., 2023).

The psychometric properties determine the quality of the scales used to assess pain and ensure accurate assessment of pain, and for this purpose, the Consensus-based Standards for the Selection of Health Status Measurement Instruments (COSMIN) guidelines have been used to attempt to provide these parameters. The COSMIN guidelines is an internationally recognized set of standards for assessing the methodological quality of studies of the measurement properties of health-related PROMs, such as questionnaires or scales, used in clinical research and practice (Mokkink et al., 2010a, 2010b). These guidelines provide a framework for assessing the reliability, validity, responsiveness, interpretability, and other measurement properties of health PROMs (Mokkink et al., 2010a, 2010b) and a guideline to perform cross-cultural adaptation process.

Recently, Ansanello et al. (2022a,b) developed the Avoidance of Daily Activities Photo Shoulder Scale (ADAP-Shoulder-Scale) to measure avoidance behaviors associated with shoulder pain in patients with shoulder pain. The ADAP-Shoulder-Scale comprises 15 items, each designed based on an analysis of shoulder-related activities listed in the activity and participation domain of the International Classification of Functioning, Disability and Health (ICF). It aims to assess avoidance behavior during activities of daily living in patients experiencing shoulder pain (Ansanello et al., 2022, 2023; Ansanello et al., 2023a,b). The scale was originally developed in Brazilian Portuguese and simultaneously published in both Brazilian Portuguese and American English. Therefore, the primary aim of this study was to translate the ADAP-Shoulder-Scale into Turkish and conduct its cross-cultural adaptation. The secondary aim of the study was to assess the validity and reliability of the Turkish version of the ADAP-Shoulder-Scale following COSMIN guidelines.

2. Methods

The measurement properties were defined according to COSMIN guidelines (Mokkink et al., 2010c), and this manuscript followed the reporting guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines (von Elm et al., 2008). The study flow comprised the following steps: (1) translation of the scale into Turkish according to standard guidelines (Beaton et al., 2000a,b), (2) identification of the specific study population, (3) analysis of collected data based on predefined criteria, (4) analysis of the data according to the study criteria, and (5) assessment of validity, reliability, and retesting.

2.1. Setting

This observational study was approved by Hacettepe University Ethics of Non-Interventional Research Committee (SBA 23/349). Between November 2023 and February 2024, the ADAP Shoulder Scale was translated into Turkish and administered face-to-face to participants with shoulder pain for psychometric evaluation with their informed consent. The questionnaires were administered in electronic copy via Google Forms, so the data transfer was automatically transferred into a database and the quality of data entry was ensured.

2.2. Participants

Participants were patients with shoulder pain admitted to Hacettepe University Sports Physiotherapy Unit, an outpatient clinic at the university setting. A total of 174 individuals were assessed for eligibility

criteria, of which 162 participants met the requirements. Patients with shoulder pain were included if they experienced pain for at least three months and were aged between 18 and 64 years. Participants with neurologic and/or rheumatologic disease, active local or systemic infection, history of cancer, severe visual impairment, emergency surgery and participants who have received injections within the last 3 months were excluded from the study. Flowchart of the participants presented at Appendix I.

Demographic information (age, gender, weight, height, Body mass Index), dominant extremity, affected extremity, symptom duration, Tegner score, and American Shoulder and Elbow Surgeons Score (ASES) score were recorded and presented to describe the characteristics of the population and shoulder functional status.

2.3. Cross-cultural adaptation

The original ADAP-Shoulder-Scale consists of 15 photographs and a questionnaire corresponding to 15 ICF activity items. It is a self-report PROMs scale used to assess pain avoidance behaviors in activities of daily living in patients with shoulder pain (Ansanello et al., 2022a,b). The items focusing on the activities of daily living of people with unilateral or bilateral shoulder pain and covering pain-related avoidance behaviors were divided into 3 domains: free movement (5 items), high effort (7 items), and self-care (3 items) (Ansanello et al., 2022a,b). The total score is calculated by multiplying the total score by 10 and dividing it by the total number of items in the scale (15 items). The items were answered on a scale ranging between 0 and 10. Higher scores display a greater degree of pain avoidance behavior. The highest score to be obtained from the scale is 100 and the lowest score is 0.

The translation and cross-cultural adaptation of the ADAP-Shoulder-Scale were carried out in seven stages according to the standard guideline (Beaton et al., 2000a,b) for scale translation and cross-cultural adaptation (Appendix II). Firstly, permission to original scale were obtained. Secondly, a literal and conceptual translation of the original ADAP-Shoulder-Scale was translated from English to Turkish by two translators who were fluent in English. The introductory section of the scale, a question within the scale, activities, numerical avoidance scale anchors, and scoring section were translated. In the third stage, both the English version and the Turkish translation were compared and reviewed by a bilingual person who highlighted conceptual errors or inconsistencies in the translations to create a first Turkish translation. In the fourth stage, two native English speakers with a good command of Turkish, unaware of the purpose of the study and without access to the original English version, were asked separately to translate the finalized Turkish version back into English. In the fifth stage, the back-translated version of the ADAP-Shoulder-Scale Turkish version was compared with the original English version of the ADAP-Tr scale by a committee consisting of a methodologist, a linguist, and a language expert. In the final stage, pre-tests were conducted to determine any misconceptions. After this stage, n = 10 participants (age: 44.8(11.8) years; 4 female/6 male; Body Mass Index (BMI)): 26.8(2.82) kg/m^2) included and the first version of ADAP-Tr was conducted for comprehensibility. Additionally, they were asked whether each image was related to the activity specified in the ICF code, and if any changes were needed. Furthermore, participants were also asked if they wanted to add any culturally specific activities (yes or no). According to feedback and comments obtained from this pilot testing and the expert panel, the final version of ADAP-Tr was created.

2.4. Psychometric assessment

2.4.1. Test-retest reliability

The ADAP-Tr scale was administered to all participants (Round 1) and re-tested (Round 2) within 3–7 days after the initial assessment. For the retest, it was planned to recruit only participants whose health status did not change between the two assessments. The participants

interviewed to identify the change in health status between testing sessions by asking their perceived health status in an ordinal scale: "worse", "no change", and "better". No participants were excluded due to the health status change.

2.4.2. Validity

Construct validity (convergent validity) of the ADAP-Tr was assessed by calculating the Pearson product-moment correlation between ADAP-Tr scores and scores from each of the following assessment tools, all previously translated and validated in Turkish based on self-reported status: The Shoulder Pain and Disability Index (SPADI), the Pain Catastrophizing Scale (PCS), the Tampa Scale for Kinesiophobia (TSK) (Bumin et al., 2008a,b; Celik et al., 2013a,b; Ugurlu et al., 2017; Yilmaz et al., 2011). The scales were administered to the patients in randomized order during Round 1.

SPADI is a self-report questionnaire measuring pain and disability in the shoulder, consisting of 13 items in total with 2 subscales: pain and disability. The items are scored on a visual analog scale ranging from 0 (no pain or difficulties) to 10 (unbearable pain). 0 (minimum score) represents the best functional level, while 100 (maximum score) represents the worst functional level (Bumin et al., 2008a,b).

The PCS is a self-administered 13-item questionnaire with 3 subscales including helplessness, magnification, and rumination (Fernandes et al., 2012; Sullivan et al., 2001). For each item, the respondent is asked to select one of the following options: never = 0, slightly = 1, moderately = 2, greatly = 3, always = 4. PCS scores range from 0 to 52 points and higher scores indicate more catastrophic thoughts about pain (O'Sullivan and Beales, 2007).

TSK is a 17-item questionnaire that evaluates fear of re-injury, movement, and physical activity (Dupuis et al., 2023). Each question is scored on a 4-point Likert scale to be marked from "1″ to "4″. The total score ranges from 17 to 68. Higher scores indicate a greater fear of movement associated with pain.

2.5. Statistical analyses

Sample size estimation was carried out according to previous recommendations (Anthoine et al., 2014a,b). For each item of the scale, 10 participants were calculated and a minimum of 150 participants were preplanned to be included in this study (Anthoine et al., 2014a,b).

Descriptive statistics were computed for the participants' data, including means, standard deviations, medians, counts, and percentages. Statistical significance was set at $p < .05$. All analyses were conducted using SPSS Statistics 26.0 software.

Test-retest reliability of the ADAP-Tr was assessed using the intraclass correlation coefficient (ICC) with corresponding 95% confidence intervals (CI), along with correlation analysis. Reliability was categorized as poor (<0.40), moderate (0.40-0.75), or excellent (0.75<) (Marx et al., 2003). Internal consistency was evaluated using Cronbach's α coefficients, with values below 0.6 indicating poor internal consistency, values from 0.6 to 0.7 suggesting reasonable consistency, and values from 0.7 to 0.95 considered adequate consistency (Terwee et al., 2007). The precision of ADAP-Tr was evaluated by calculating the Standard Error of Measurement (SEM). Larger SEM values indicate reduced measurement precision. The Minimal Detectable Change (MDC) was calculated using formula $1.96 \times \sqrt{2} \times \text{SEM}$, where p represents the reliability coefficient (de Vet et al., 2006).

Pearson's correlation coefficients were used to examine the construct validity between the ADAP-Tr, PCS, TSK, and all domains of the SPADI. The correlations were categorized as very high (r: ≥0.9 to 1), high (r: ≥0.7 to < 0.9), moderate (r: ≥0.5 to < 0.7), low (r: ≥0.3 to < 0.5), or insignificant (r: ≥0 to <0.3) (Harput et al., 2017).

The structural validity of the ADAP-Tr was assessed through exploratory factor analysis using principal component analysis with varimax rotation. The distribution of total scores was evaluated for ceiling and floor effects, with effects considered present if more than

15% of participants achieved the lowest or highest possible total score (de Vet et al., 2006).

The cut-off value was determined using the formula Mean ± 2 SD (Sharma and Jain, 2014). Based on ASES total score obtained in Round 1, all participants were divided into two groups (1) relatively higher disability (0–59.5 points) vs (2) relatively lower disability individuals (59.6–100 points). Discriminant validity was examined using the *independent t-test*.

3. Results

3.1. Cross-cultural adaptation process

The Turkish translation of the ADAP-Shoulder-Scale was followed by the English translation, and no linguistic problems were encountered. The translation of the question sentence was not disputed, no image changes and no additional activities were suggested by the participants. The final version of the ADAP-Tr was presented as a supplementary file (Appendix III). The overall administration of ADAP-Tr was completed in 3 min to 10 min duration.

3.2. Study participants

Total of 162 participants with shoulder pain were included at Round 1 and 151 participants were completed the reliability study since 11

Table 1
Demographic information of the participants.
BMI: Body Mass Index; ASES: American Shoulder and Elbow Surgeons Score; ADLQ: Activities of Daily Living Questionnaire; m: meter; kg:kilogram; kg/m²: kilogram/square meter; mos: month; y:year; R: right; L: Left; RCRSP:Rotator cuff-related shoulder pain; FS: Frozen Shoulder; SI: Shoulder Instability; BT: Biceps Tendinitis; SLAP-L: Superior Labrum Anterior Posterior Lesion.

Variables	Round 1	Min-max	Round 2	Min-max
	n = 162		n = 151	
	Mean (SD)		Mean (SD)	
Age, y	37.9(15.1)	18–66	38(15.1)	18–66
Gender, n (%)				
Female	90 (55.6%)		86 (%57)	
Male	72 (44.4%)		65 (%43)	
Weight (kg)	76.5 (18.2)	45–160	75.9 (17.9)	45–160
Height (m)	1.69 (10.6)	1.50–1.98	1.69 (10.57)	1.5–1.94
BMI (kg/m²)	26.5 (5.5)	17.8–53.4	26.4 (5.5)	17.8–53.4
Dominant	%88.9 (R)		%88.7 (R)	
Extremity	%11.1 (L)		%11.3 (L)	
Affected	%58 (R)		%57.6 (R)	
Extremity	%42 (L)		%42.4 (L)	
Symptom	3 mos (34%)		3 mos (33.8%)	
Duration	3 mos- 1y (25.3%)		3 mos- 1 y (27.2%)	
	1 y+ (40.7%)		1 y+ (39.1%)	
Tegner score %	6.8% (0)	0–10	%5.3 (0)	0–10
(score)	19.1% (1)		%19.9 (1)	
	11.1% (2)		%11.9 (2)	
	17.9% (3)		%19.2 (3)	
	11.1% (4)		%11.9 (4)	
	6.8% (5)		%6.6 (5)	
	11.1% (6)		%10.6 (6)	
	4.3% (7)		%4 (7)	
	2.5% (8)		%2 (8)	
	8 % (9)		%7.9 (9)	
	1.2% (10)		%7 (10)	
ASES	56 (22.3)	0–100	55.5 (21.9)	0–100
ASES ADLQ	27.1 (12.9)	0–50	26.5 (12.8)	0–50
ASES Pain	29.1 (12.5)	0–50	29 (12.4)	0–50
Diagnosis (n)	RCRSP (149)		RCRSP (138)	
	FS (4)		FS (4)	
	SI (4)		SI (4)	
	BT (3)		BT (3)	
	SLAP-L (1)		SLAP-L(1)	

participants have not appeared at Round 2. Table 1 displays the characteristics of the participants.

3.3. Reliability

The test re-test demonstrated excellent reliability with an ICC of 0.88 (*95%CI),* 0.83–0.91). The SEM was calculated as 1.85 points for all participants, and the MDC was determined to be 5.12 points (Table 2). Regarding internal consistency, the ADAP-Tr Scale exhibited adequate reliability, as assessed by the correlation strength among the 15 items, with a Cronbach's alpha value of 0.94 (*95%CI,* 0.93–0.95). The test-retest reliability of the ADAP-Tr Scale subscale was ICC = 0.84 (*95% CI,* 0.78–0.88) for the free movement domain, ICC = 0.88 (95%CI, 0.84–0.91) for the high effort domain and ICC = 0.71 (*95%CI,* 0.60–0.79) for the self-care domain.

3.4. Structural and construct validity with floor and ceiling effects

Principal component analysis revealed a single underlying factor of the ADAP-Tr, explaining 78.2% of the variance, with an eigenvalue of 8.66. The ADAP-Tr demonstrated significant positive correlations with SPADI, PCS, and TSK scores, with correlation coefficients *(r)* ranging between 0.397 and 0.826 across all identified scales (Table 3). Calculated floor (3.7%) and ceiling effects (*none*) were acceptable for the ADAP-Tr total score.

3.5. Discriminant validity

Based on the ASES total score cut-off value of 59.5 points participants were separated into two groups: (1) relatively lower disability group with scores above cut-off value (mean [SD] = 76 [12.4], n = 72) and (2) relatively higher disability with scores under cut-off value (mean [SD] = 40 [13.8], n = 90). A significant difference was observed between relatively lower and higher disability groups (mean difference: 27.4 points, *p* < .001) on ADAP-Tr scores (Table 3).

4. Discussion

This study aimed to assess the reliability and validity of the ADAP-Tr and the findings of this study provide convincing evidence supporting the reliability of the scale, which exhibited a high level of internal consistency. Furthermore, the ADAP-Tr showed significant associations with clinical assessments, including shoulder function, kinesiophobia, and beliefs about pain. Thus, the ADAP-Tr questionnaire demonstrates validity and reliability in the assessment of individuals with shoulder pain in the Turkish population.

To date, ADAP-Tr is the first scale that the original ADAP-Shoulder-Scale has been adapted to another culture. In this study, the internal consistency of the ADAP-Tr calculated using Cronbach's alpha index was 0.94 and this value is considered excellent (Ansanello et al., 2023a,b).

Table 2
Test, Re-Test Reliability of the ADAP-Tr obtained at Round 2 (n = 151).

Score (points)	Test, mean (SD)	Re-Test, mean (SD)	ICC (95% CI)	SEM₉₅	MDC₉₅
Free movement domain	42.8 (28.3)	41.2 (26.2)	0.84 (0.78–0.88)	2.30	6.37
High effort domain	50.2 (26.4)	48.4 (25.9)	0.88 (0.84–0.91)	2.15	5.95
Self-care domain	20.6 (22.9)	22.8 (22.2)	0.71 (0.60–0.79)	1.87	5.18
Total Score	41.1 (23.6)	40.9 (22.7)	0.88 (0.83–0.91)	1.85	5.12

ADAP-Tr: Avoidance of Daily Activities Photo Scale- Turkish; MDC: Minimal Detectable Change; SEM: Standard Error of Measurement.

Likewise, the internal consistency of the original ADAP-Shoulder-Scale was reported as 0.92 (Ansanello et al., 2023a,b). The ADAP-Tr demonstrated strong test-retest reliability with an ICC of 0.88 including all three subscales of the ADAP-Tr: free movement domain, high effort domain, and self-care domain. Considering subscales separately, for the free movement domain, the reaching movement (ICF code: d4452) had the highest avoidance score; for the high effort domain, the activity of carrying on the shoulders, hips, and back (ICF code: d4303) showed the highest avoidance score. Additionally, the lowest scores were recorded for the self-care domain, such as caring for teeth (ICF code: d5201), eating (ICF code: d550), and drinking (ICF code: d560). Similarly, Ansenello et al. (Ansanello et al., 2022a,b) reported high scores on the ADAP-Shoulder-Scale in the reaching activity in the free movement domain and the shoulder, the activity of carrying on the shoulders, hip, and back in the high effort domain, but similar low scores in the self-care domain. Upon examination of the results from both studies, it was discovered that individuals experiencing shoulder pain exhibited greater avoidance behavior in activities related to reaching and carrying activities. Conversely, less avoidance behavior was observed in the self-care domain.

Ansenello et al. (Ansanello et al., 2022a,b) administered SPADI for validity testing and reported that the ADAP-Shoulder-Scale has a high correlation with SPADI scores. Similarly, there was a high correlation between ADAP-Tr total score and SPADI total score, SPADI-pain, and SPADI-disability subscores (*r* ranges from 0.78 to 0.82). The reason for this relationship is that the SPADI scale, similar to the ADAP-Tr scale, is a questionnaire that assesses pain and dysfunction with items that directly address upper extremity activities according to the ICF (Philbois et al., 2016). SPADI mainly assesses pain and functional ability on a numeric scale where functional activities were assessed with eight questions designed to measure the degree of difficulty an individual of daily living that requires upper extremity use such as washing, dressing, reaching, and carrying. On the other hand, ADAP-Tr examines which activities cause avoidance behavior, not the difficulty or the reason for avoidance. Additionally, in this study, investigating discriminant validity was another focus of the research question. Individual ASES scores were used to separate the study population based on their clinical status. They were grouped into participants with relatively lower and higher disability. ADAP-Tr was successful in showing the difference between those groups and this finding further supports the use of ADAP-Tr in clinical practice and research.

Although there are many available PROMs developed for shoulder function and disability assessments the main concern of this study was to use a photo scale that combines a text question with ICF activity images to assess avoidance behavior due to shoulder pain. ADAP-Tr items were easily understood by the patients and quickly administered with the same question text combining several activity photos. There were no additional suggestions obtained from the population to include a different daily life activity. However, it should be noted that the scale is only developed to assess avoidance behavior in daily life activities, however, it does not provide any information about avoidance behaviors related to sports or athletic activities. Further research is needed to develop a photo scale to assess avoidance behavior during athletic activities to support building an activity modification or gradual exposure to sporting activities plan.

Our study has limitations as it only provides results for individuals experiencing unilateral shoulder pain, without specifying a particular disease, in a wide range of activity statuses based on Tegner Score, indicating a combination of physically active population and sedentary population. However, population characteristics and diagnostics have been well-defined. Furthermore, due to the lack of an established gold standard measurement for assessing avoidance behavior due to shoulder pain, we relied on available clinical PROMs for validity purposes, which focus on disability, kinesiophobia, and pain catastrophizing. Thus, the objective correlation of ADAP-Tr score with other clinical tests or findings is unknown. Furthermore, the responsiveness of the ADAP-Tr was

Table 3

Correlation Between ADAP-Tr Scores and Outcome Measures obtained in all participants and relatively high and low disability subgroups at Round 1.

		ADAP-Tr	TSK	PCS Rumination	PCS Helplessness	PCS Magnification	PCS Total	SPADI Total	SPADI-Pain	SPADI Disability
All participants (n = 162)	Mean	41.4	41.3	7.1(5)	9(5.3)	4.8(2.8)	19.6	48.8	57.7(24)	43.3
	(SD)	(22.9)	(6.5)				(11.6)	(23.8)		(25.3)
	r	–	0.448	0.436	0.476	0.397	0.481	0.826	0.785	0.799
	p	–	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Relatively high disability group (ASES,0–59.5) n = 90	Mean	53.2	43.2	8(4.9)	10(5.3)	5.1(2.8)	21.8	61.9	71.4	56(22.6)
	(SD)	(19.9)	(6.7)				(11.5)	(19.7)	(17.4)	
	r		0.338	0.440	0.466	0.327	0.454	0.704	0.629	0.680
	p		0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Relatively low disability group (ASES, 59.6–100) n = 72	Mean	25.8	38.7	6(5)	7.7(5.4)	4.2(2.7)	16.8	32.5	40.7(22)	27.4
	(SD)	(18.6)	(6.3)				(11.8)	(19.6)		(20.4)
	r	–	0.387	0.381	0.415	0.465	0.470	0.808	0.727	0.782
	p	–	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

ADAP-Tr: Avoidance of Daily Activities Photo Scale- Turkish; TSK: Tampa Scale for Kinesiophobia; PCS: Pain Catastrophizing Scale; SPADI: Shoulder Pain and Disability Index; ASES: American Shoulder and Elbow Surgeons Score.

not investigated in this study and these psychometric features should be investigated in future studies.

The Turkish version of the ADAP-Tr was found to be valid, consistent, and reliable. The results indicate that the ADAP-Tr could be beneficial in identifying avoidance behaviors in individuals with shoulder pain. This information can be used to inform treatment strategies, monitor progress, and evaluate the effectiveness of interventions aimed at improving shoulder function and reducing pain-related disability.

Ethical approval

This observational study was approved by Hacettepe University Ethics of Non-Interventional Research Committee (SBA 23/349).

CRediT authorship contribution statement

Pinar Kuyulu Haksal: Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Kubra Caylan Gurses:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Birgul Dingirdan:** Data curation. **Busra Pakoz:** Data curation. **Irem Duzgun:** Supervision, Conceptualization. **Anamaria Siriani de Oliveira:** Supervision. **Elif Turgut:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.msksp.2024.103180.

References

Ansanello, W., Dos Reis, F.J.J., Tozzo, M.C., et al., 2022a. Development of the avoidance daily activities photo scale for patients with shoulder pain. Phys. Ther. 102 https://doi.org/10.1093/ptj/pzab268.

Ansanello, W., Dos Reis, F.J.J., Tozzo, M.C., et al., 2022b. Development of the avoidance daily activities photo scale for patients with shoulder pain. Phys. Ther. 102 (2).

Ansanello, W., Dos Reis, F.J.J., Tozzo, M.C., et al., 2023a. Reliability and validity of the avoidance of daily activities photo scale for patients with shoulder pain (ADAP Shoulder Scale). Phys. Ther. 103 https://doi.org/10.1093/ptj/pzad101.

Ansanello, W., Dos Reis, F.J.J., Tozzo, M.C., et al., 2023b. Reliability and validity of the avoidance of daily activities photo scale for patients with shoulder pain (ADAP shoulder scale). Phys. Ther. 103 (12).

Anthoine, E., Moret, L., Regnault, A., et al., 2014a. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual. Life Outcome 12, 176. https://doi.org/10.1186/s12955-014-0176-2, 20141209.

Anthoine, E., Moret, L., Regnault, A., et al., 2014b. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual. Life Outcome 12, 176.

Beaton, D.E., Bombardier, C., Guillemin, F., et al., 2000a. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine 25, 3186–3191. https://doi.org/10.1097/00007632-200012150-00014.

Beaton, D.E., Bombardier, C., Guillemin, F., et al., 2000b. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine 25 (24), 3186–3191.

Bumin, G., Tüzün, E., Tonga, E., 2008a. The shoulder pain and disability index (SPADI): cross-cultural adaptation, reliability, and validity of the Turkish version. J. Back Musculoskelet. Rehabil. 21, 57–62. https://doi.org/10.3233/BMR-2008-21108.

Bumin, G., Tüzün, E., Tonga, E., 2008b. The shoulder pain and disability index (SPADI): cross-cultural adaptation, reliability, and validity of the Turkish version. J. Back Musculoskelet. Rehabil. 21, 57–62.

Celik, D., Atalar, A.C., Demirhan, M., et al., 2013a. Translation, cultural adaptation, validity and reliability of the Turkish ASES questionnaire. Knee Surg. Sports Traumatol. Arthrosc. 21, 2184–2189. https://doi.org/10.1007/s00167-012-2183-3, 20120830.

Celik, D., Atalar, A.C., Demirhan, M., et al., 2013b. Translation, cultural adaptation, validity and reliability of the Turkish ASES questionnaire. Knee Surg. Sports Traumatol. Arthrosc. 21 (9), 2184–2189.

Crookes, T., Wall, C., Byrnes, J., et al., 2023. Chronic shoulder pain. Aust J Gen Pract 52 (11), 753–758.

de Vet, H.C., Terwee, C.B., Knol, D.L., et al., 2006. When to use agreement versus reliability measures. J. Clin. Epidemiol. 59 (10), 1033–1039.

Dupuis, F., Cherif, A., Batcho, C., et al., 2023. The tampa scale of kinesiophobia: a systematic review of its psychometric properties in people with musculoskeletal pain. Clin. J. Pain 39 (5), 236–247.

Fernandes, L., Storheim, K., Lochting, I., et al., 2012. Cross-cultural adaptation and validation of the Norwegian pain catastrophizing scale in patients with low back pain. BMC Muscoskel. Disord. 13, 111.

Harput, G., Tok, D., Ulusoy, B., et al., 2017. Translation and cross-cultural adaptation of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale into Turkish. Knee Surg. Sports Traumatol. Arthrosc. 25 (1), 159–164.

Marx, R.G., Menezes, A., Horovitz, L., et al., 2003. A comparison of two time intervals for test-retest reliability of health status instruments. J. Clin. Epidemiol. 56 (8), 730–735.

Mokkink, L.B., Terwee, C.B., Knol, D.L., et al., 2010a. The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: a clarification of its content. BMC Med. Res. Methodol. 10, 22.

Mokkink, L.B., Terwee, C.B., Patrick, D.L., et al., 2010b. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study. Qual. Life Res. 19 (4), 539–549.

Mokkink, L.B., Terwee, C.B., Patrick, D.L., et al., 2010c. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. J. Clin. Epidemiol. 63 (7), 737–745.

O'Sullivan, P.B., Beales, D.J., 2007. Diagnosis and classification of pelvic girdle pain disorders, Part 2: illustration of the utility of a classification system via case studies. Man. Ther. 12 (2), e1–e12.

Philbois, S.V., Martins, J., Souza, C.S., et al., 2016. Health professionals identify components of the International Classification of Functioning, Disability and Health (ICF) in questionnaires for the upper limb. Braz. J. Phys. Ther. 20 (1), 15–25.

Sharma, B., Jain, R., 2014. Right choice of a method for determination of cut-off values: A statistical tool for a diagnostic test. Asian J. Med. Sci. 5 (3), 30–34.

Sluka, K.A., 2016. Mechanisms and Management of Pain for the Physical Therapist. Lippincott Williams & Wilkins.

Sullivan, M.J., Thorn, B., Haythornthwaite, J.A., et al., 2001. Theoretical perspectives on the relation between catastrophizing and pain. Clin. J. Pain 17 (1), 52–64.

Tegenborg, S., Fransson, P., Martinsson, L., 2023. The Abbey Pain Scale: not sufficiently valid or reliable for assessing pain in patients with advanced cancer. Acta Oncol. 62 (8), 953–960.

Terwee, C.B., Bot, S.D., de Boer, M.R., et al., 2007. Quality criteria were proposed for measurement properties of health status questionnaires. J. Clin. Epidemiol. 60 (1), 34–42.

Ugurlu, M., Karakas Ugurlu, G., Erten, S., et al., 2017. Validity of Turkish form of Pain Catastrophizing Scale and modeling of the relationship between pain-related disability with pain intensity, cognitive, and emotional factors. Psychiatry and Clinical Psychopharmacology 27, 1–8.

von Elm, E., Altman, D.G., Egger, M., et al., 2008. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. J. Clin. Epidemiol. 61 (4), 344–349.

Yilmaz, Ö., Yakut, Y., Uygur, F., et al., 2011. Turkish version of the tampa scale for kinesiophobia and its test-retest reliability. Fizyoterapi Rehabilitasyon 22, 44–49.