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Original Research

Reliability and Validity of the Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain (ADAP Shoulder Scale)

Walter Ansanello, PT, ME[1], Felipe José Jandre dos Reis, PT, PhD[2,3], Marcela Camargo Tozzo, PT[1], Salomão Chade Assan Zatiti, MD, PhD[4], Ann Meulders, PhD[5,6], Johan W.S. Vlaeyen, PhD[5,6], Anamaria Siriani de Oliveira, PT, PhD[1,*]

[1]Department of Health Sciences, Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, São Paulo, Brazil
[2]Physical Therapy Department, Instituto Federal do Rio de Janeiro (IFRJ), Postgraduation Program – Clinical Medicine Department of Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil
[3]Pain in Motion Research Group, Department of Physiotherapy, Human Physiology and Anatomy, Faculty of Physical Education & Physiotherapy, Vrije Universiteit Brussel, Brussels, Belgium
[4]Department of Orthopaedic Surgery, Hospital Especializado de Ribeirão Preto, Ribeirão Preto, São Paulo, Brazil
[5]Research Group Health Psychology, Faculty of Psychology and Educational Sciences, KU Leuven, Leuven, Belgium
[6]Experimental Health Psychology, Department of Clinical Psychological Science, Maastricht University, Maastricht, The Netherlands

*Address all correspondence to Dr Anamaria Siriani de Oliveira at: siriani@fmrp.usp.br

Abstract

Objective. The Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain (ADAP Shoulder Scale) was developed to assess pain-related avoidance behavior during daily activities in people with shoulder pain. However, its measurement properties must be verified according to international guidelines. As such, this study investigated the following 4 measurement properties of the ADAP Shoulder Scale: reliability, measurement errors, convergent validity, and floor and ceiling effects.

Methods. The sample comprised 100 individuals with chronic shoulder pain (43 men and 57 women; mean duration of symptoms of 29.7 [SD = 89.0] months; mean age of 44.9 [SD = 15.9] years). The mean test–retest reliability range was 5 days via the intraclass correlation coefficient (ICC). Measurement errors included the standard error of measurement and the minimal detectable change. Convergent validity was analyzed by applying the Pearson correlation with the Tampa Scale for Kinesiophobia, Pain Catastrophizing Scale, and Shoulder Pain and Disability Index.

Results. The ADAP Shoulder Scale showed excellent test–retest reliability, both in all domains and in the total score [ICC(2,1) = 0.94; 95% CI = 0.92–0.96]. The standard errors of measurement for the free-movement, high-effort, and self-care domains were 8.1%, 6.0%, and 7.6%, respectively. The minimal detectable change for the total score of the ADAP Shoulder Scale was 16.0%. The total score of the ADAP Shoulder Scale was low to moderately correlated with the total scores of the Tampa Scale for Kinesiophobia ($r = 0.52$), Pain Catastrophizing Scale ($r = 0.30$), and Shoulder Pain and Disability Index ($r = 0.72$). No floor or ceiling effects were detected in the total score.

Conclusion. The ADAP Shoulder Scale is a reliable, valid instrument for assessing avoidance behavior in adults who have chronic shoulder pain and are not athletes.

Impact. This study provides evidence that the ADAP Shoulder Scale is appropriate for clinical and practical use in people with chronic shoulder pain.

Keywords: Avoidance Learning, International Classification of Functioning, Disability and Health, Pain Measurement, Result Reproducibility, Shoulder Pain

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Introduction

Shoulder pain is a common musculoskeletal complaint, with an annual incidence rate of 23.1 per 1000 persons.[1] Indeed, a range of musculoskeletal shoulder conditions are known to cause pain and functional impairment, often leading to different types and levels of impairment in activities of daily living (ADLs).[2] In this context, a variety of studies have found poor recovery rates in people showing high levels of fear of pain and movement and associated activity avoidance behavior,[3–6] which can ultimately lead to disability and social isolation.[7–10]

With reference to the current literature, studies among people with shoulder pain have evaluated fear of pain, fear of (re)injury, and movement/activity avoidance behavior solely with instruments that were not specific to their target regions/populations.[5,7–12] This highlights the need for a measure that can uniquely target to measure psychosocial factors related to the shoulder complex region, thus improving our understanding of how avoidance behavior influences shoulder pain. Moreover, a measure that can uniquely target the shoulder can optimize resources and provide more accurate information about the effectiveness of motion-based interventions.[13,14]

The newly developed Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain (ADAP Shoulder Scale) is designed to assess avoidance behavior in people with shoulder pain, and has already been subjected to content validity and structural analyses.[15] However, other important measurement properties have not been analyzed, including test–retest reliability, convergent validity, and floor and ceiling effects. The reliability test assesses the consistency and stability of the tool, while convergent validity, a type of construct validity, indicates correlations with similar constructs. Additionally, the floor and ceiling effects indicate the presence of minimum and maximum possible scores, respectively, and provide information on the lower and upper limits of the measurement range. As such, this study evaluated the ADAP Shoulder Scale for reliability, convergent validity, and ceiling and floor effects, with the aim of confirming its suitability for use in people with shoulder pain. We hypothesized the following: The ADAP Shoulder Scale will exhibit moderate (0.40–0.75) or excellent (>0.75) test–retest reliability and moderate convergent validity ($r \geq 0.5 < 0.7$) (vs similar construct scales), including beliefs about movement and self-reported dysfunction, without ceiling and floor effects.

Methods

Ethical Considerations and Study Type

This was a cross-sectional study in which participation was voluntary. All participants signed the Informed Consent Form approved by the local ethics committee (CAAE: 79517717.0.0000.5414). This study was conducted in accordance with the Declaration of Helsinki. Moreover, the scale was developed according to international guidelines for the development of new methods to assess the results of patient reports, as outlined by the Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN).[16,17] The COSMIN guidelines recommend a minimum of 100 participants for sufficient reliability, measurement errors, and validity assessments.[18]

Participants

We employed the convenience sampling method to recruit people with different musculoskeletal conditions and shoulder pain symptoms from public and private rehabilitation centers. The inclusion criteria were as follows: chronic shoulder pain (duration of at least 3 months) of traumatic or atraumatic origin and an age of 18 years or older. All those who reported having had shoulder pain for more than 3 months were invited to participate. The exclusion criteria were as follows: neurological or rheumatological disease, active local or systemic infections, history of tumors, severe visual impairment, traumatic conditions awaiting surgery, medical determinations to restrict movement, and reporting of pain intensity of <3 of 10 in relation to the week before the assessment. The description of participants include sex, age, duration of symptoms, functional level, pain intensity, pain or avoidance-related symptoms, and catastrophic pain-related thoughts.

Measurements

ADAP Shoulder Scale

The ADAP Shoulder Scale assesses pain avoidance behavior during daily activities in people with shoulder pain. It was designed based on analyses of shoulder-related activities listed in the activity and participation domain of the International Classification of Functioning, Disability, and Health (ICF),[15] with developmental contributions from specialists, health care professionals, and people with shoulder pain (the target population). The scale comprises 15 items covering avoidance behavior related to shoulder pain,[15] with a focus on daily activities of people with unilateral or bilateral pain. Total scores are expressed as percentages (0 = no avoidance, 100 = extreme avoidance)[15] The 15 items are distributed across 3 domains: free movement (5 items), scored as follows: total = [(sum × 10)/5]; high effort (7 items), scored as follows: total = [(sum × 10)/7]; and self-care (3 items), scored as follows: total = [(sum × 10)/3]. A total scale score was calculated as follows: total = [(sum × 10)/15].[15] A comprehensive description of the application and scoring process can be found in the Supplementary Material. The average time needed to respond was approximately 5 minutes. If any presented images depicted activities that were not a part of the patient's daily life (even prior to the shoulder problem), the sum of the total score or domain could simply be divided by the number of items answered.

The ADAP Shoulder Scale demonstrated entire internal consistency based on Cronbach α values of 0.92 for the free-movement domain (factor 1), 0.89 for the high-effort domain (factor 2), and 0.92 for the self-care domain (factor 3). The intercorrelations between the domains were moderate: 0.69 between free movement and high effort, 0.60 between free movement and self-care, and 0.49 between high effort and self-care. Free movement (factor 1) demonstrated internal consistency ranging from 0.6 to 0.82, while those for high effort (factor 2) and self-care (factor 3) ranged from 0.41 to 0.67 and from 0.75 to 0.83,[15] respectively. The domain internal consistency of each photo item was moderate to high.[15]

Tampa Scale for Kinesiophobia

The Tampa Scale for Kinesiophobia (TSK) was developed to quantify the harm beliefs related to movement in several pain

conditions.[8,19,20] It comprises 17 items that are rated on a 4-point Likert scale, so that the total scores range from 17 to 68.[20] The Brazilian version of the TSK has demonstrated stable test–retest reliability and good internal consistency in people with chronic low back pain.[21] Specifically, higher scores indicate a higher fear of movement-related pain, with 30 used as a cutoff point between low and high values.[20] Scores exceeding 40 indicate high kinesiophobia.[22]

Pain Catastrophizing Scale

The Pain Catastrophizing Scale (PCS) assesses the degree of pain-related catastrophic thinking. It comprises 13 items pertaining to pain-related catastrophic thoughts, feelings, and behaviors, each of which are rated on a 5-point scale (0 = minimal, 4 = very intense). Thus, total scores may range from 0 to 52, with higher scores indicating more pain-related catastrophic thinking. The items are spread across 3 domains, including rumination, magnification, and helplessness.[23] The PCS has demonstrated moderate to excellent internal consistency (α coefficients: 0.87 for total PCS, 0.87 for rumination, 0.66 for magnification, and 0.78 for helplessness).[23]

Shoulder Pain and Disability Index

The Shoulder Pain and Disability Index (SPADI) assesses function and pain in people with shoulder pain.[24] SPADI is one of the most widely used tools for assessing the loss of function and shoulder pain.[25,26] Specifically, the SPADI comprises 13 items pertaining to the ability to perform basic ADLs, each of which is scored on a numerical scale ranging from 0 to 10. The scoring system is arranged such that total scores may range from 0 (best) to 100 (worst), with higher scores representing greater disability and pain intensity.[25,26] There are 2 domains. First, the SPADI disability domain represents shoulder function. ADLs are based on 8 items (eg, "How much difficulty do you have washing your hair?"). The scores on the SPADI disability domain may range from 0 (no difficulty) to 80 (failed to do it) and can be expressed as a percentage. Second, the SPADI pain domain comprises 5 items related to pain (eg, "How severe is your pain when lying on the involved side?"). The scores on the SPADI pain domain may range from 0 (no pain) to 50 (worst pain imaginable) and can also be expressed as a percentage. Finally, the scores on each domain are calculated by dividing the sum of the marked items by the maximum possible score of the marked items and then multiplying the result by 100.

The Brazilian version of the SPADI has demonstrated sufficient test–retest reliability (0.90–0.94) and internal consistency (0.87–0.89).[24] The "2/3 lack rule," which is used with numerous instruments, was applied, meaning that at least 6 of 8 items in the function domain and 3 of 5 items in the pain domain must be answered.[25,26] Severity and empirical normative cutoff points were not determined.[27]

Procedure

The participants with shoulder pain who were selected for the study were evaluated on 2 separate days. On the first day, all scales including the ADAP Shoulder Scale, TSK, PCS, and SPADI were administered. On the second day, only the ADAP Shoulder Scale and the Patients' Global Impression of Change Scale were used.[18]

The reliability domain contains 3 measurement properties: internal consistency, reliability, and measurement error.[28] The ADAP Shoulder Scale was previously analyzed for internal consistency.[15] In the present study, we analyzed the test–retest reliability of the scale at 2 time points. The interval between the first and second ADAP Shoulder Scale measurements ranged from 3 to 7 days. We assessed health status stability with the Patients' Global Impression of Change Scale, on which patients indicated whether they believed that their symptoms were better, the same, or worse in the retest session than in the initial test session.[17] We only included patients who indicated "the same" in the reliability study.

A given measurement error can be presented as a standard error of measurement (SEM) or minimal detectable change (MDC). The SEM uses the same units as the measurement of interest[29]; in this case, it is expressed as a percentage, simplifying clinical interpretation. The MDC is defined as the minimal difference that is not attributable to variations in the measurement.[30] It is the minimal amount of change in a patient's score that ensures that the change is not the result of an examiner's measurement error.

Validity measurement properties include content and convergent validity.[28] As mentioned earlier, the ADAP Should Scale has previously been tested for content validity.[15] Convergent validity uses hypothesis testing and can be performed by comparing 2 or more tools resembling the desired construct.[28] In this study, we compared the convergent validity of the ADAP Shoulder Scale with that of the TSK and PCS, which have a similar construct, and SPADI, which was developed for the same population but employs a construct for self-reported pain and dysfunction. As such, we hypothesized that the ADAP Shoulder Scale would show moderate correlations with the TSK, PCS, and SPADI. The convergent correlation of the ADAP Shoulder Scale with the TSK, PCS, and other population-based disability scales was based on the development of previous scales for people with low back[31] and cervical pain.[32]

Floor and ceiling effects are related to response range limits. Considering that a total score on the ADAP Should Scale may range from 0 to 100, these minimum and maximum values represent the lowest (floor effect) and highest (ceiling effect) limits, respectively.[17,26,33] In a given population, the presence of floor or ceiling effects can affect scale responsiveness and interpretability[17]; such effects occur when the full range of variation in the score of an instrument is unable to assess different levels of construct presentation. For the ADAP Shoulder Scale, this means that the impacts of avoiding shoulder movement will be underestimated with a ceiling effect and overestimated with a floor effect.

Data Analysis

All analyses were conducted with IBM SPSS v21 for Windows (IBM, North Castle, NY, USA). Specifically, the ICC(2,1) was used to determine the test–retest reliability of the ADAP Shoulder Scale, with a 2-way randomized single-measurement absolute-agreement model.[34] In this context, reliability may be rated as poor (<0.40), moderate (0.40–0.75), or excellent (>0.75).[35]

We calculated measurement errors with the SEM and MDC.[18] The SEM was calculated as pooled SD $\times$ $\sqrt{(1 - \text{ICC})}$.[29] The MDC was calculated as $1.96 \times \sqrt{2} \times \text{SEM}$ for a 95% CI.[17,29,36] The unit of the SEM and MDC is percentage.

The Pearson correlation coefficient was used to calculate convergent construct validity between all domains of the ADAP Shoulder Scale, TSK, and SPADI.[31] We also used the

Table 1. Sample Characteristics ($N = 100$)[a]

Characteristic	Mean (SD)	Median (Minimum–Maximum)
Age, y	44.9 (15.9)	44 (18–89)
Duration of symptoms, mo	29.7 (89.0)	4 (3–840)
First test of the ADAP Shoulder Scale free-movement domain, %	49.9 (25.7)	42 (0–100)
First ADAP Shoulder Scale high-effort domain test, %	34.0 (27.5)	29.0 (0–95.7)
First ADAP Shoulder Scale self-care domain test, %	16.2 (23.3)	0.0 (0–90)
First ADAP Shoulder Scale total score test, %	36.8 (24.1)	33.6 (0–94.6)
Second ADAP Shoulder Scale free-movement domain test, %	49.8 (26.0)	45.0 (0–98)
Second ADAP Shoulder Scale high-effort domain test, %	34.0 (28.0)	26.4 (0–91.4)
Second ADAP Shoulder Scale self-care domain test, %	21.8 (24.6)	11.6 (0–86.6)
Second ADAP Shoulder Scale total score test, %	36.8 (24.6)	28.6 (0–91.3)
TSK total, scores	40.3 (8.8)	39.5 (26–61)
PCS magnification, points	5.3 (3.1)	5.0 (0–12)
PCS rumination, points	8.0 (3.5)	8.0 (0–16)
PCS hopelessness, points	9.6 (5.5)	9.0 (0–24)
PCS total, %	23.0 (11.4)	21.0 (0–52)
SPADI disability, %	47.8 (23.5)	48.7 (5–100)
SPADI pain, %	63.7 (21.5)	68.0 (24–100)
SPADI total, %	53.9 (21.7)	53.8 (16.1–100)

[a]ADAP Shoulder Scale = Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain; PCS = Pain Catastrophizing Scale; SPADI = Shoulder Pain and Disability Index; TSK = Tampa Scale for Kinesiophobia.

Table 2. ADAP Shoulder Scale Reliability Measure Properties[a]

Scale	Mean (SD) at:		ICC(2,1) (95% CI)	SEM (%)	MDC (%)
	First Visit	Second Visit			
Free-movement domain	49.9 (25.7)	49.8 (26.0)	0.90 (0.85–0.93)	8.1	22.6
High-effort domain	34.0 (27.5)	34.0 (28.0)	0.94 (0.92–0.98)	6.0	16.8
Self-care domain	16.2 (23.3)	21.8 (24.6)	0.90 (0.86–0.93)	7.6	21.3
Total score	36.8 (24.1)	36.8 (24.6)	0.94 (0.92–0.96)	5.9	16.0

[a]One hundred people participated in the first and second visits. ADAP Shoulder Scale = Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain; MDC = minimal detectable change; SEM = standard error of measurement.

ADAP Shoulder Scale and SPADI total values in the correlation analysis. A given correlation coefficient could range across 5 degrees, including very high (r: ≥0.9–1), high (r: ≥0.7 to <0.9), moderate (r: ≥0.5 to <0.7), low (r: ≥0.3 to <0.5), and insignificant (r: ≥0 to <0.3).[37]

Floor and ceiling effects were determined based on the minimum and maximum scores of the total ADAP Shoulder Scale and its domains, respectively. Floor (0) and ceiling (100) effects were considered present given a prevalence of ≥15% in the sample.[17,26,33]

Role of the Funding Source

The funders played no role in the design, conduct, or reporting of this study.

Results

Participant Demographic Characteristics

The study sample comprised 100 people with shoulder pain, including 57 women (57%) and 43 men (43%). Table 1 lists their demographic characteristics and questionnaire scores.

Test–Retest Reliability

The overall test–retest ICC(2,1) of the subscales included 100 participants and ranged from 0.86 to 0.98. All item-analysis correlations were considered statistically significant. The SEM domain values were 8.1% for free movement, 6.0% for high effort, and 7.6% for self-care. The total ADAP Shoulder Scale MDC was 16.0% (Tab. 2).

Convergent Validity

According to the results of the correlation analyses, the total ADAP Shoulder Scale score demonstrated moderate correlations with the TSK, low correlations with the PCS, and moderate correlations with the total SPADI scores. Considering all ADAP Shoulder Scale and SPADI domains, the correlations ranged from weak to moderate (Tab. 3).

Ceiling and Floor Effects

The total ADAP Shoulder Scale score showed no floor or ceiling effects. Of all 100 participants, 3% and 1.0% had the minimum and maximum scores, respectively.

The free-movement and high-effort domains further showed no floor or ceiling effects. Here, 4% and 1.0% of participants had the minimum and maximum scores on the free-movement domain, respectively, whereas 9% and 1.0% had the minimum and maximum scores on the high-effort domain, respectively.

However, the self-care domain showed a floor effect but no ceiling effect. Here, 34.0% and 1.0% of participants had the minimum and maximum scores, respectively; in other words, none of the participants exhibited maximum responses in this domain.

Discussion

This study examined the ADAP Shoulder Scale for test–retest reliability and convergent construct validity, with the aim of confirming its suitability for use among people with

Table 3. Correlations of ADAP Shoulder Scale, TSK, PCS, and SPADI ($N = 100$)[a]

Scale	Free-Movement Domain	High-Effort Domain	Self-Care Domain	ADAP Shoulder Scale Total	TSK	PCS	SPADI Total	SPADI Disability	SPADI Pain
Free-movement domain		0.69[b]	0.55[b]	0.84[b]	0.46[b]	0.26[b]	0.57	0.56[b]	0.50[b]
High-effort domain			0.80[b]	0.95[b]	0.48[b]	0.27[b]	0.71[b]	0.69[b]	0.64[b]
Self-care domain				0.85[b]	0.47[b]	0.26[b]	0.66[b]	0.64[b]	0.61[b]
ADAP Shoulder Scale total					0.52[b]	0.30[b]	0.72[b]	0.71[b]	0.65[b]
TSK						0.31[b]	0.42	0.22	0.73
PCS							0.32	0.00	0.89
SPADI total								0.97[b]	0.91[b]
SPADI disability									0.79[b]
SPADI pain									

[a] ADAP Shoulder Scale = Avoidance of Daily Activities Photo Scale for Patients With Shoulder Pain; PCS = Pain Catastrophizing Scale; SPADI = Shoulder Pain and Disability Index; TSK = Tampa Scale for Kinesiophobia. [b] $P < .01$.

chronic shoulder pain, according to COSMIN international guidelines. In sum, the scale demonstrated excellent test–retest reliability. The total ADAP Shoulder Scale score was low and moderately correlated with the scores of other scales with similar constructs.

In clinical practice, evaluators using the ADAP Shoulder Scale should consider variations of 8.1% in the free-movement domain, 6.0% in the high-effort domain, 7.6% in the self-care domain, and 5.9% in the total score as random errors within the normal instrument measurement range.[17] Conversely, variations of 22.6% in the free-movement domain, 16.8% in the high-effort domain, 21.3% in the self-care domain, and 16% in the total score indicate minimal score changes corresponding to noticeable changes in activity avoidance. These variations were projected from MDC values obtained in this study, and should not be confused with minimal clinically important differences. Minimal clinically important differences are obtained from the patient's perspective—that is, when the patient perceives clinical changes or differences in any evaluated symptom.[17] This is analyzed by responsiveness, which is a step that is not yet a component of the ADAP Shoulder Scale.

The total ADAP Shoulder Scale percentage showed a moderate correlation with the total TSK, which assesses beliefs about the relationship between movement, any new lesion, and pain. The free-movement, high-effort, and self-care domains reached low correlations with the TSK. The self-care domain of the ADAP Shoulder Scale includes basic ADLs, which represent autonomy in adults and are considered important activities in the presence of shoulder pain.[38] This scale differs from the TSK items, which assess the belief that general or unspecified movements can generate pain and/or worsen lesions and may help explain the lower correlation between the self-care domain of the ADAP Shoulder Scale and TSK. In general, we hypothesized a moderate correlation because the TSK contains only 1 evaluation domain,[8,19,20] which was originally defined to assess low back pain. By contrast, the ADAP Shoulder Scale was specifically designed for its target population (people with shoulder pain), and contains a construct that is related to the individual's behavior rather than their understanding of the clinical condition (avoidance).[15]

The correlation analysis revealed that the ADAP Shoulder Scale and PCS had a low correlation coefficient ($r = 0.30$), while other scales with photographs and similar constructs showed insignificant to low correlations when related to the PCS.[31,32] For instance, the Photograph Series of Daily Activities—Short Electronic Version (PHODA-SeV)[31] had an insignificant correlation ($r = 0.23$) in individuals with low back pain, and the Pictorial Fear of Activity Scale-Cervical (PFActS-C)[32] had a low correlation ($r = 0.40$) in individuals with neck pain. On the other hand, the PCS exhibited moderate correlations with scales of pain intensity, anxiety, depression, and the TSK.[39] In the current study, the correlation between TSK and PCS was also low ($r = 0.31$). Individual vulnerability factors such as catastrophic thoughts did not show correlation with avoidance behavior in the cross-sectional study.

This study found a low-to-moderate correlation between the ADAP Shoulder Scale and SPADI. The PHODA-SeV,[31] and PFActS-C[32] also had low-to-moderate correlations with specific lumbar and cervical disability scales, respectively. People with shoulder pain participated in the development of both the ADAP Shoulder Scale and SPADI, which may justify the presence of similar items. Although the ADAP Shoulder Scale and SPADI constructs are distinct, each were specifically designed for people with shoulder disorders here, the fear-avoidance model assumes that avoidance directly influences the patient's perceived dysfunction.[3,10,40] The application of both the SPADI and the ADAP Shoulder Scale enable the identification of the specific needs of individuals with shoulder pain in relation to their functional demands, pain presence, or avoidance behavior in each task. It is assumed that, in the presence of avoidance behavior, an approach based on the fear-avoidance model should be incorporated into the traditional treatment. However, this assumption needs to be validated in future clinical studies with this population to assess its additional effect on the treatment outcome.

Although the total ADAP Shoulder Scale score showed no floor or ceiling effects, we did detect a floor effect in the self-care domain. As such, the self-care domain could not assess the full impact of basic activity avoidance behavior in our sample of people with shoulder pain; for example, it could not assess caring for teeth (ICF: d5201), eating (ICF: d550), or drinking (ICF: d560). In this domain, activities are not aversive and may even be considered pleasant (eg, taking a shower). On the contrary, 12.0% of the sample still scored above 50% on the self-care domain (ie, ~10% of the sample showed considerable basic self-care activity avoidance, that is, >50% in the self-care domain). Further studies should include people with traumatic or postoperative shoulder disorders, adhesive capsulitis, and/or painful neuropathic conditions, in

which pain intensity and perceived threats can generate more evident avoidance behaviors. Such approaches may help confirm whether the self-care domain overestimates the impact of avoiding shoulder movements or if the current findings are specific to this study, as we included a considerable number of people with atraumatic and chronic shoulder conditions.

Limitations

This study also had some limitations. Notably, we did not include other scales with the same construct in our validation and correlation tests. Additionally, the inclusion of people with the "presence of shoulder pain" resulted in a sample of participants with only a moderate degree of pain according to ICF qualifiers, as the mean total score on the SPADI was 40.3.[41] Thus, research that includes samples with more heterogeneous disability levels may increase our understanding of the measurement properties of the ADAP Shoulder Scale.

Future studies should aim to determine responsiveness and define the ADAP Shoulder Scale minimal clinically important difference. Furthermore, the ADAP Shoulder Scale should be tested as a prognostic tool for chronic shoulder pain as with the TSK in a sample of people undergoing shoulder surgery.[42] The scale can be used in clinical trials to define exposure hierarchies for people with severe shoulder movement avoidance behaviors.

Conclusion

The ADAP Shoulder Scale is reliable, and valid instrument for assessing avoidance behavior in adults who have chronic shoulder pain and are not athletes. The mean response time was approximately 5 minutes. Considering the total ADAP Shoulder Scale percentage, a variation of 16% indicates a minimal score change, corresponding to a noticeable activity avoidance change. We did not detect any floor or ceiling effects in the total scale score.

Author Contributions

Walter Ansanello (Conceptualization-Equal, Data curation-Equal, Formal analysis-Equal, Investigation-Equal, Methodology-Equal, Project administration-Equal, Resources-Equal, Validation-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal), Felipe Reis (Conceptualization-Equal, Data curation-Equal, Formal analysis-Equal, Investigation-Equal, Methodology-Equal, Project administration-Equal, Resources-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal), Marcela Tozzo (Data curation-Equal, Formal analysis-Equal, Investigation-Equal, Methodology-Equal, Resources-Equal, Validation-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal), Salomão Zatiti (Investigation-Equal, Methodology-Equal, Visualization-Equal, Writing – original draft-Equal), Ann Meulders (Investigation-Equal, Methodology-Equal, Validation-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal), Johan Vlaeyen (Investigation-Equal, Methodology-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal), Anamaria Oliveira (Conceptualization-Lead, Data curation-Equal, Investigation-Equal, Methodology-Equal, Project administration-Lead, Supervision-Lead, Validation-Equal, Visualization-Equal, Writing – original draft-Equal, Writing – review & editing-Equal).

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Ethics Approval

All participants signed the informed consent form approved by the local ethics committee (CAAE: 79517717.0.0000.5414).

Data Availability

The data that support the findings of this study are available from the corresponding author, ASO, upon reasonable request.

Disclosures

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

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