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RESEARCH ARTICLE

VALIDITY AND RELIABILITY OF THE SINGLE-ITEM KINESIOPHOBIA SCALE IN PERSONS WITH NECK AND BACK PAIN

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ABSTRACT

Purpose: Kinesiophobia is a significant concern in individuals with neck and back pain. This study aimed to evaluate the measurement properties of the Single-Item Kinesiophobia Scale (SKS) including test-retest reliability and convergent validity.

Material and Methods: A total of 101 participants (n=38 with neck pain and n=63 with back pain) were included. The SKS was applied twice 7-14 days apart. Test-retest reliability was assessed using intraclass correlation coefficients (ICCs). Validity was examined through correlations with established measures: the Tampa Scale for Kinesiophobia (TSK), Neck Disability Index (NDI), Oswestry Disability Index (ODI), and Visual Analog Scale (VAS) during activity and rest. Floor/ceiling effects and score distribution were also analyzed.

Results: The SKS demonstrated moderate test-retest reliability [neck pain: ICC=0.56 (95%CI: 0.30–0.75), back pain: 0.52 (95%CI: 0.31–0.68)] in both groups. It showed moderate correlations with the TSK (neck pain: rho= 0.446; back pain: rho=0.555), but only small correlations with the VAS (rho=0.261–0.265) and the ODI (rho=0.278) in the back pain group. No significant correlations were found between the SKS and VAS or NDI in the neck pain group.

Conclusion: The SKS is a simple and feasible screening tool for kinesiophobia but should be used alongside comprehensive measures due to its moderate psychometric properties and limitations.

Keywords: Kinesiophobia, Pain, Neck Pain, Back Pain

INTRODUCTION

Kinesiophobia is characterized by an excessive, irrational, and debilitating fear of movement, driven by the belief that physical activity may lead to injury. Originally defined by Kori et al. (1990), kinesiophobia is considered a key component of the fear-avoidance model, in which individuals interpret pain as threatening and subsequently avoid movement or activity, leading to a cycle of physical deconditioning, increased disability, and chronic pain (1–4). This psychological factor is frequently observed in individuals with musculoskeletal pain, particularly those experiencing neck or back pain, and has been linked to poorer rehabilitation outcomes, delayed recovery, lower participation in physical activity, and poorer quality of life (5–11). It is also recognized as a mediator between pain and disability, emphasizing its importance as a treatment target in both physiotherapy and multidisciplinary pain

management (12). These findings highlight the clinical relevance of accurately identifying and treating kinesiophobia to optimize outcomes in patients with persistent pain.

The presence and severity of kinesiophobia have been generally assessed using multi-item scales, which provide detailed insights into patients' fear of movement from different aspects. The Tampa Scale for Kinesiophobia (TSK) is one of the most commonly used kinesiophobia measurement tools in different populations, and it includes 17 items (1). Shorter versions, such as the TSK-13, TSK-11 and TSK-4 have also been developed to improve feasibility while maintaining validity and reliability (13,14). In addition, the Kinesiophobia Causes Scale (KCS) has been proposed as a more comprehensive tool to assess the cognitive-behavioral origins of kinesiophobia (15). While these multi-item instruments provide a detailed insight into the complex nature of fear of movement, their length and time to complete may pose challenges, particularly in time-constrained clinical settings or for individuals with attentional or cognitive limitations.

To address these limitations, single-item scales have been proposed as efficient alternatives, offering a quick and straightforward way to capture essential psychological constructs without compromising clinical utility and overburdening respondents. In people with sciatica, a single substitute question for the TSK demonstrated comparable or superior predictive ability for leg pain severity and global perceived effect at one-year follow-up, and it was moderately correlated with TSK (16). However, for such short instruments to be useful in clinical decision-making, their measurement properties need to be rigorously evaluated.

The Single-Item Kinesiophobia Scale (SKS) was used as a brief, pragmatic tool to assess the presence and intensity of kinesiophobia (16). Despite its simplicity, evidence of its reliability and validity remains limited. Determining the psychometric properties of the SKS is essential to ensure its accuracy and consistency in measuring kinesiophobia in different populations and settings. Therefore, the aim of this study was to assess the test-retest reliability and convergent validity of the SKS in people with neck and back pain. By demonstrating its measurement properties, we hope to support the integration of the SKS into routine clinical practice, particularly in fast-paced or resource-limited settings where rapid yet valid screening is essential to guide rehabilitation and monitor progress.

MATERIALS AND METHODS

All participants provided written informed consent before inclusion in this cross-sectional, methodological study. The Non-interventional Clinical Research Ethics Committee of Izmir Katip Celebi University (Date: 21.04.2022, Approval Number: 0178) approved the study.

Participants

Although there is no universally accepted consensus, validation studies typically recommend a minimum sample size of 2 to 20 participants per item. As the SKS is a single-item scale, this would suggest a required sample size of 2 to 20 participants (17). In addition, the sample size was determined on the basis of the COSMIN guidelines, which were developed to ensure adequate quality in the evaluation of self-report scales. According to these guidelines, a minimum of 50 participants is recommended to obtain results of sufficient quality for test-retest reliability and construct validity (18). Therefore, this study planned to include 100 participants (n=50 with back pain and n=50 with neck pain).

Individuals with neck pain were eligible for inclusion if they: (1) had experienced chronic neck pain for a minimum of three months, (2) were between 18 and 65 years old, and (3) possessed sufficient proficiency in Turkish to understand and communicate effectively. Similarly, individuals with back pain were included if they: (1) had experienced chronic back pain for at least three months, (2) were within the age range of 18 to 65 years, and (3) had adequate Turkish language skills for comprehension and communication. Exclusion criteria for both groups consisted of: (1) a prior history of fractures or surgical procedures, and (2) the presence of any inflammatory or neurological condition.

Outcome measures

Single-Item Kinesiophobia Scale (SKS):

The SKS is designed as a single-item visual analog scale to assess kinesiophobia. Participants was asked to rate their fear of movement on a scale from 0 to 10. They were asked, "How much fear do you have that your neck/back pain would be increased by physical activity?" and rate from 0 (no fear) to 10 (very much fear) (16). The SKS was applied twice 7-14 days apart to assess test-retest reliability.

Table 1. Descriptive measures of the participants

	Neck pain (n=38)	Back pain (n=63)
Age	49 (43.5-58)	47 (37-60)
Sex: Female/Male, n (%)	25 (65.8%)/13 (34.3%)	40 (63.5%)/23 (36.5%)
Single-item Kinesiophobia Scale	5 (1-7.12)	5.5 (3-8)
Tampa Scale for Kinesiophobia	41.5±7.6	43.5±7.4
Neck Disability Index	34.1±14.5	NA
Oswestry Disability Index	NA	28.8 (18-42.2)
Visual Analog Scale-rest	4 (3-5)	5 (3-6)
Visual Analog Scale-activity	6 (5-7)	7 (6-9)

Values are presented as mean±standard deviation or median (interquartile range).
NA: not applicable, n: number

Tampa Scale for Kinesiophobia (TSK):
The TSK is a 17-item questionnaire designed to assess fear of movement and re-injury. It evaluates aspects related to work activities, injury/re-injury concerns, and fear-avoidance behaviors. Responses are recorded on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). The total score varies between 17 and 68, with higher scores reflecting greater kinesiophobia. The Turkish adaptation of the scale has been validated and demonstrated to be reliable (19).

Neck Disability Index (NDI):
The NDI is a 10-item questionnaire designed to assess disability and functional limitations associated with neck pain. Higher scores reflect greater levels of disability. The Turkish version has been validated and proven to be reliable for individuals with neck pain (20).

Oswestry Disability Index (ODI):
The ODI measures functional impairment in individuals with low back pain (21). It includes 10 items covering aspects such as pain intensity, self-care, lifting/carrying, walking, sitting, standing, sleeping, pain fluctuation, travel, and social life. The total score is doubled and presented as a percentage, ranging from 0 (no disability) to 100 (maximum disability). Higher scores indicate greater disability levels. The Turkish adaptation has been validated and found to be reliable for individuals with low back pain (22).

Visual Analog Scale (VAS):
The VAS is a 10 cm scale used to measure pain intensity. Patients indicate their pain level at rest and during activity by marking a point on two separate 10 cm lines. The scale ranges from "no pain" at the starting point to "the worst pain experienced" at the endpoint (10). Pain intensity is determined by measuring the distance in centimeters from the starting point to the marked location, with higher scores representing greater pain severity (23).

Statistical analysis
Data analysis was performed using IBM SPSS Statistics for Windows (Version 25.0, Armonk, NY: IBM Corp.). The normality of data distribution was assessed through the Kolmogorov-Smirnov test and visual inspection of histograms. Descriptive statistics were reported as mean (standard deviation) for normally distributed continuous variables, median (interquartile range) for non-normally distributed continuous variables, and frequency (percentage) for categorical variables.

Test-Retest Reliability:
Relative test-retest reliability was assessed using the intraclass correlation coefficient (ICC) with a two-way random-effects model. Absolute reliability was examined through the repeatability coefficient and Bland-Altman analysis. ICC values were interpreted as follows: <0.25 indicating very low reliability, 0.26–0.49 as low, 0.50–0.69 as moderate, 0.70–0.89 as high, and ≥0.90 as very high reliability (24).

Table 2. Test-retest reliability of Single-item Kinesiophobia Scale

	Test	Retest	ICC (95%CI)
Neck pain (n=38)	5 (1-7.12)	3.5 (0-6.12)	0.56 (0.30-0.75)
Back pain (n=63)	5.5 (3-8)	5 (0-7)	0.52 (0.31-0.68)

Abbreviations: ICC: Intraclass correlation coefficients, 95% CI: 95% confidence interval

Convergent Validity:
The convergent validity analysis was based on predefined hypotheses, expecting a moderate to strong correlation between the SKS scores and other kinesiophobia, pain, and disability measures. Depending on the distribution of the data, either Spearman or Pearson correlation coefficients were computed. Correlations were interpreted as small (0.10–0.29), moderate (0.30–0.49), and strong (≥0.50) (25).

Table 3. Correlation coefficients between SKS, TSK, and other outcome measures

		TSK	NDI	ODI	VAS-activity	VAS-rest
Neck pain (n=38)	SKS	0.446**	0.031	NA	0.120	0.204
	TSK	1	0.386*	NA	0.216	0.320*
Back pain (n=63)	SKS	0.555**	NA	0.278*	0.265*	0.261*
	TSK	1	NA	0.437**	0.196	0.196

** p<0.01
* p<0.05
Abbreviations: SKS: Single-item Kinesiophobia Scale, TSK: Tampa Scale for Kinesiophobia, NDI: Neck Disability Index, ODI: Oswestry Disability Index, VAS: Visual Analog Scale, NA: not applicable

0	0.5	1

Floor and Ceiling Effects:
To assess floor and ceiling effects, the proportion of participants who obtained the lowest and highest possible scores on the SKS was calculated. A threshold of more than 15% was considered indicative of a floor or ceiling effect (26).

RESULTS

In total, 101 participants (38 persons with neck pain and 63 persons with back pain) were recruited in the study. The median age of the neck pain group was 49 (43.5-58) years and 47 (37-60) in the back pain group. The participants' median scores on the SKS were 5 (1-7.12) in the neck pain group and 5.5 (3-8) in the back pain group. The mean TSK scores were 41.5 (7.6) and 43.5 (7.4) in neck and back pain groups, respectively. All descriptive characteristics of the participants are presented in Table 1.
All participants were included in the test- retest analysis. The test-retest reliability (i.e., ICC) scores are presented in Table 2. ICC of the SKS was 0.56 (95%CI: 0.30 to 0.75) in the neck pain group and 0.52 (95%CI: 0.31 to 0.68) in the back pain group. It means that both groups showed moderate test-retest reliability.
Bland-Altman figures are presented in Figure 1, showing most of the participants are in between the lower and upper limit of agreement lines.
Correlation coefficients between SKS, TSK, and other outcome measures are presented in Table 3. In the neck pain group, the SKS showed a moderate correlation with the TSK (rho=0.446, p=0.005), confirming our hypothesis. However, no significant correlations were found between the SKS and the NDI, VAS during activity, or VAS at rest. The TSK, in contrast, showed a moderate correlation with the NDI (rho=0.386, p=0.17) and VAS at rest (rho=0.320, p=0.049), while the correlation with VAS during activity was nonsignificant. In the back pain group, the SKS demonstrated a strong correlation with the TSK (rho=0.555, p<0.001), and small but significant correlations with the ODI (rho=0.278, p = 0.027), VAS during activity (rho=0.265, p=0.035), and VAS at rest (rho=0.261, p=0.039). The TSK also showed a moderate correlation with the ODI (rho = 0.437, p<0.001), but nonsignificant correlations with both VAS measures (rho=0.196, p=0.125 for both). Overall, 25% of the a priori hypotheses were confirmed.
Six persons (15.8% of the sample) had a score of 0, and 4 persons (10.5%) had a score of 10 in the group of neck pain. In persons with back pain, seven persons (11.1% of the sample) had a score of 0, and 8 persons (12.7%) had a score of 10. Frequencies are presented in Figure 2-A and B.

DISCUSSION

This study investigated measurement properties of the SKS in those with neck pain and back pain. Our findings showed that the test-retest reliability of SKS is moderate in both study groups. The SKS showed a moderate correlation with the TSK in the neck pain group and a strong correlation in the back pain group. However, the overall validation results were mixed, with only 25% of a priori hypotheses confirmed, raising important considerations about the scale's comprehensiveness in capturing the complexity of kinesiophobia. Additionally, the SKS showed a floor effect in persons with neck pain.

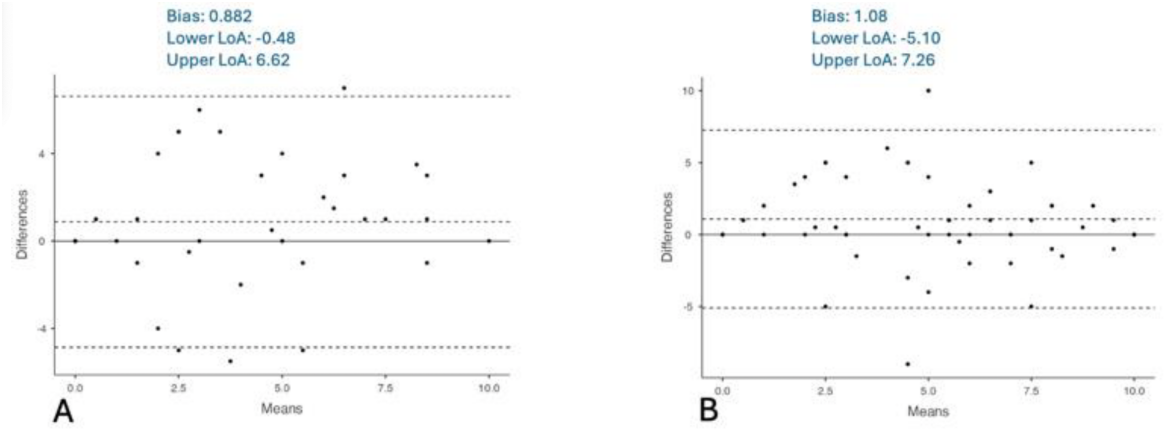

Figure 1. A) Bland-Altman plot of Single-item Kinesiophobia Scale in persons with neck pain B) Bland-Altman plot of Single-item Kinesiophobia Scale in persons with back pain

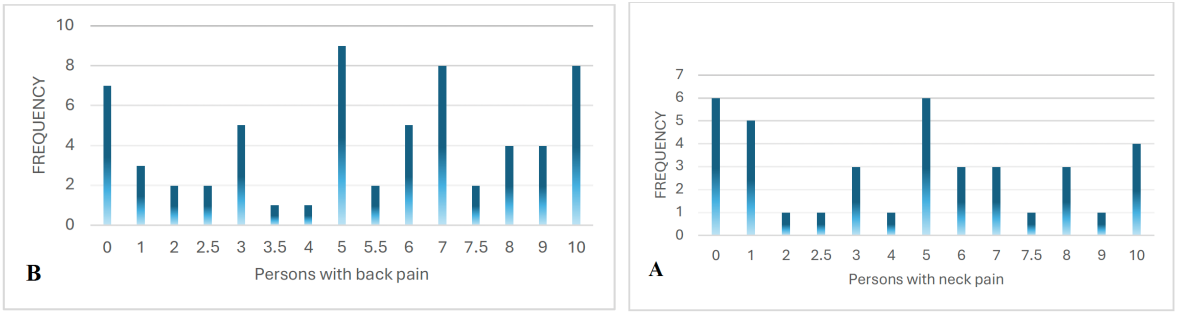

Figure 2. A) Frequency of answers in persons with neck pain B) Frequency of answers in persons with back pain

The SKS showed moderate correlations with the TSK in the neck pain group and strong correlations in the back pain groups, supporting its validity as a short measure of kinesiophobia. A similar correlation value (r=0.46) between the SKS and TSK was also reported in individuals with sciatica (16). This finding suggests that the SKS captures a general fear of movement construct, particularly in individuals with back pain.

The difference in the magnitude of correlations between SKS and TSK in the neck and back pain groups may stem from back pain being more closely associated with kinesiophobia. Alternatively, it could also be related to the slightly higher pain levels observed in the back pain group. In contrast, correlations with disability (NDI, ODI) and pain intensity (VAS) were either small or non-significant. However, higher correlations were found with the extended version (i.e., TSK), highlighting its sensitivity to the multifaceted nature of kinesiophobia, making it a more comprehensive tool for assessing its relationship with disability. These findings may reflect the limitations of a single-item measure in capturing the multidimensional nature of kinesiophobia, which often encompasses emotional, cognitive, and behavioral components contributing to pain-related disability in these populations (3, 27).

The reduced validity of the SKS in the neck pain group could be attributed to both clinical and methodological factors. Neck pain presentations may be more variable and less functionally impairing than back pain, resulting in a narrower range of kinesiophobia scores (7). Additionally, the smaller sample size in the neck pain group may have limited the statistical power to detect meaningful correlations. The lower mean scores in both SKS and TSK also suggest that individuals with neck pain may generally report lower kinesiophobia levels, consistent with previous studies that have reported more pronounced fear-avoidance behaviors in those with back pain (28).

The frequency analysis revealed potential floor effects in the neck pain group. Approximately 15.8% of participants with neck pain and 11.1% of those with back pain scored the minimum value (0). Although the threshold value of 15% was not reached, 10.5% of participants with neck pain and 12.7% of those with

back pain marked the maximum score of 10. The greater number of participants scoring 0 in the neck pain group, along with the lower SKS and TSK scores, support the notion that kinesiophobia is more pronounced in individuals with back pain (28). Increased floor and ceiling effect limits the scale's sensitivity to detect low-to-moderate levels of kinesiophobia or subtle changes over time. Such effects may restrict its utility for assessing changes in kinesiophobia in response to interventions. Although a 10-point numerical format enhances usability, it may not fully reflect the psychological dimensions of kinesiophobia.

This study has several limitations. First, although we aimed to recruit 50 participants per group; however, due to time and logistical constraints, we were unable to reach this target in the neck pain group. The lower correlation and reliability values in this group may be due to increased variability and reduced stability of the estimates resulting from the small sample size. Additionally, since we included only individuals with chronic pain, our findings cannot be generalized to those in the acute or subacute phases.

Despite these limitations, the SKS presents some practical benefits. Its brevity and simplicity make it appealing for use in busy clinical settings or for populations with time or cognitive constraints. However, it should be used as a preliminary screening tool rather than a standalone diagnostic measure. In research contexts where detailed profiling of psychological factors is required, more extensive, validated instruments such as the TSK or KCS may be more suitable. Comparing the SKS to these multidimensional tools in future studies could further clarify its utility.

CONCLUSION

In conclusion, while the SKS demonstrates moderate reliability and validity, its psychometric limitations warrant cautious interpretation. The scale's brevity is advantageous in clinical practice, but its limited sensitivity and narrow construct coverage restrict its utility as a comprehensive outcome measure. Clinicians and researchers should use the SKS cautiously, supplementing it with more comprehensive tools when a detailed assessment is needed.

Given that the SKS is a single-item scale, it holds strong potential for use in busy clinical settings. Its brevity allows for rapid administration without placing an additional burden on clinicians or patients. It can be easily integrated into routine assessments to quickly capture patients' perceptions, support clinical decision-making, and monitor changes over time. This makes the SKS especially valuable in time-constrained environments where comprehensive tools may not be feasible. However, to enhance its clinical and research applicability, future work should explore ways to broaden the scope of the scale. This could include adding complementary items or combining the SKS with brief contextual questions. Further research should also examine the responsiveness of the SKS to therapeutic interventions and assess whether it can predict meaningful functional or psychological outcomes over time.

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Conflict of interest: The authors have no conflicts of interest to declare.

Ethical approval: The Non-interventional Clinical Research Ethics Committee of Izmir Katip Celebi University (Date: 21.04.2022, Approval Number: 0178) approved the study.

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