Research Article

Comparison of Psychometric Properties of the Original and Brief Version of the Tampa Scale for Kinesiophobia

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ABSTRACT

Introduction: Some accurate tools exist to assess fear-avoidance behavior, such as the Tampa scale for kinesiophobia (TSK) in individuals with musculoskeletal problems. The current research aims to compare the psychometric characteristics of the original 17-items TSK questionnaire and its 11-item brief version in chronic non-specific low-back pain (CNSLBP).

Materials and Methods: In this test development study, 295 patients with CNSLBP referred to the physiotherapy clinic of Milad Hospital in Tehran city, Iran were evaluated. Confirmatory factor analysis (CFA) and α Cronbach was conducted to assess the validity and reliability of the original and brief version of the TSK, respectively. For goodness-of-fit, the X^2/df, root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), and comparative fit index (CFI) indices were used.

Results: Internal consistency specified by Cronbach's α was 0.949 for the original version of the questionnaire and 0.927 for the brief one. Based on the CFA findings, the goodness-of-fit indices for the brief version were GFI=0.921, RMSEA=0.078 (90% confidence interval (CI), 0.062%-0.094%), comparative fit index (CFI)=0.981, and X^2/df=2.791. These indices for the original one were 0.882, 0.066 (90% CI, 0.055%-0.076%), 0.983, and 2.270, respectively. A significant correlation was found between these two versions (P<0.001). These findings confirm the adequacy of the brief version of the TSK.

Conclusion: The brief version of TSK can be considered a reliable and valid tool to evaluate somatic focus and activity avoidance in patients with CNSLBP.

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1. Introduction

Fear of movement (kinesiophobia) is known as one significant factor effecting disability development and chronic pain [1]. To assess fear of movement, varied questionnaires, such as the "fear-avoidance belief questionnaire" (FABQ) and the Tampa scale for kinesiophobia (TSK) can be used as two common and valid questionnaires for this purpose [1].

The original version of TSK includes 17 items evaluating the fear of movement for people suffering from musculoskeletal disorders. The score of each item is based on a 4-point Likert scale, with a scoring range from 1 strongly disagree to 4 strongly agree. The range of total scores is between 17 to 68, where higher scores show higher levels of pain-related fear of movement [2]. This questionnaire has been validated and applied for varied disorders, including neck pain, low-back pain, anterior cruciate ligament-deficient patients [3], temporomandibular joint injuries, Parkinson's disease, and post-surgery patients [4-7]. The original version of TSK was first developed in English and then translated and validated in more than ten languages [8-10].

Several versions of TSK have been presented based on the number of items, including 11, 13, and 17 items [11-15]. Studies in this domain are classified into two groups, studies focusing on the translation and validation of the questionnaire in different languages, and studies examining the psychometric properties of TSK in various disorders.

Psychometric characteristics of the TSK-17 have been studied in people suffering from neck pain, chronic pain, and low-back pain [10, 16-18]. A brief version of TSK may be helpful to evaluate individuals with musculoskeletal problems, thereby making it easier with less time. However, no further investigation is currently conducted on the shortened version of the TSK. Therefore, the current research was conducted to compare psychometric characteristics of the original 17-items TSK questionnaire and its 11-item brief version in chronic non-specific low-back pain (CNSLBP).

2. Materials and Methods

In this test development study, 295 individuals with CNSLBP referred to a physical therapy clinic of Milad Hospital in Tehran city were evaluated. Patients completed the consent form to participate in this study. The inclusion criteria included individuals with the age of 20-70 years, having CNSLBP, i.e. the pain is not attributable to a non-recognizable specific pathology, or persistent pain lasting for at least 3 months. The exclusion criteria included patients with spinal fractures, severe back radiculopathy, severe deformities, such as scoliosis or kyphosis, spinal stenosis, other conditions such as pregnancy, spondylolisthesis, tumors, or a history of spine surgery in the last six months. Patients were included in the research after all criteria were checked by a specialist physician. Jafari et al. translated and validated the TSK [16]. In this study, the brief version of the TSK with 5 items [3, 5, 6, 11, 15] for somatic focus and 6 items [1, 2, 7, 10, 13, 17] for activity avoidance and the original 17-item were used. Finally, the psychometric characteristics of the original and brief version of TSK have been compared.

Statistical analyses

The internal consistency and adequacy of items were measured through Cronbach's α and item-scale analysis, respectively. Mardia's test and coefficient were conducted to assess the multivariate normal distribution for the variables, and the elliptical theory estimation was calculated based on the presence of kurtosis (Mardia's coefficient=79.86 and 23.07, normalized estimate=26.98 and 11.72 for the original and brief versions, respectively).

The confirmatory factor analysis (CFA) was performed for surveying the construct validity. goodness-of-fit criteria were defined as the X^2/df, root mean square error of approximation (RMSEA), confirmatory fit index (CFI), and goodness-of-fit index (GFI) indices. A $X^2/df<3$, RMSEA<0.08, and GFI and CFI>0.88 (with lower and upper bounds specified by a 90% confidence interval (CI) at <0.1) were considered appropriate [19-21]. Moreover, the Pearson correlation coefficient between the original version (17 items) and its brief version (11 items) as well as their subscales were also calculated. SPSS software, version 22 was used for data analysis.

3. Results

The internal consistency of the tool was examined by Cronbach's α. This coefficient equaled 0.927 for the entire brief questionnaire, 0.860 for the 5-item somatic focus subscale, and 0.868 for the six-item activity avoidance subscale, showing excellent reliability on the subscales and the whole brief questionnaire. These indices for the original version were 0.949, 0.931, and 0.971, respectively.

The inappropriateness of items was investigated through 'Cronbach's α if item deleted' technique. Omitting any items did not significantly increase the reliability coefficient. The corrected item-total correlation was applied to evaluate the correlation between scored items and the total score of the TSK questionnaire and all of them were significant and positive. Thus, no item was selected for elimination, and all of them were considered appropriate.

The somatic focus subscale contains 5 items, including 3, 5, 6, 11, and 15. The activity avoidance subscale included 6 items of 1, 2, 7, 10, 13, and 17. The CFA for this brief questionnaire was conducted with these two subscales and the elliptical theory estimates were calculated based on the existence of kurtosis. Figure 1 illustrates the results of this analysis.

Goodness-of-fit indices were $X^2/df=2.791$, RMSEA=0.078, CFI=0.981, GFI=0.921, (90% CI: 0.062-0.094). According to the coefficients, the brief version of the TSK instrument had an adequate structure with these two subscales. Table 1 presents these criteria for the original version.

Regarding the correlations between the two questionnaire versions, significant correlation coefficients were found between the original total and related subscales scores, the brief total and related subscales scores, the total original and brief scores, and related subscales original and brief scores (Table 2).

4. Discussion

The current research was conducted to compare the psychometric properties of the original 17-item TSK questionnaire and its 11-item brief version in CNSLBP. The internal consistency and construct validity of the short form were evaluated for patients with CNSLBP. We performed the CFA with elliptical theory estimates due to the kurtosis of the multivariate distribution of the items. Moreover, the appropriateness of the items on two subscales and the possibility of their elimination were evaluated.

Based on the findings, we did not find any items for deletion in this brief version of the TSK questionnaire, thereby confirming its reliability and validity. Therefore, we propose this modified and brief form of TSK for re-
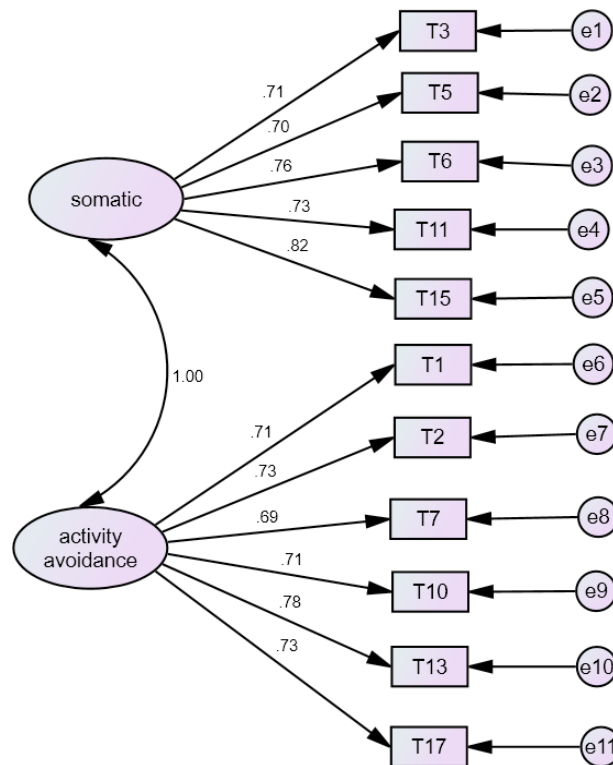

Figure 1. Standardized regression coefficients of the CFA

search objectives in the future.

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Table 1. The goodness of fit statistics

TSK Version	Indices				
	X²/df	GFI	CFI	RMSEA (90% CI)	Cronbach's α
Original (17 items)	2.270	0.882	0.983	0.066 (0.055-0.076)	0.949
Brief (11 items)	2.791	0.921	0.981	0.078 (0.062-0.094)	0.927

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Abbreviations: TSK: Tampa scale for kinesiophobia; CFI: Comparative fit index; GFI: Goodness-of-fit index; RMSEA: root mean square error of approximation.

Significance level was considered at P<0.001.

Table 2. Pearson correlation coefficient

TSK Version		Original			Brief	
		Somatic Focus	Activity Avoidance	Total Score	Somatic Focus	Activity Avoidance
Original	Activity avoidance	0.819	-	-	-	-
	Total score	0.921	0.978	-	-	-
Brief	Somatic focus	0.946	0.835	0.945	-	-
	Activity avoidance	0.867	0.953	0.838	0.953	-
	Total score	0.971	0.961	0.983	0.866	0.982

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TSK: Tampa scale for kinesiophobia.

The results of this research were consistent with the findings of previous works in which two factors, including somatic focus and activity avoidance, were acquired for TSK [3, 10]. Several versions of the TSK contain 17, 14, and 11 items [11, 12]. The current work applied a version of TSK-11 and confirmed its excellent psychometric properties. Concerning the previous studies, Mintken et al. investigated the reliability and validity of TSK in people with shoulder pain referred to physiotherapy [4]. They employed TSK-11 and mentioned that pain-related fear may be a main outcome in these individuals. Tkachuk and Harris proposed a short form of TSK (TSK-11) and investigated the psychometric characteristics of this new version. They concluded that TSK-11 is a reliable, valid, and brief instrument for assessing fear of movement in people with chronic pain [12]. Archer et al. surveyed the factor structure of the short form of TSK among individuals following a spinal operation for degenerative disorders. In that study, 137 patients treated by spinal surgery completed the TSK within three months after discharge. The results revealed that the short form of the TSK is considered a useful tool to evaluate the fear of movement in individuals undergoing surgery [11].

In a previous study, finally, the results of the evaluation of the original form of TSK indicated high validity and reliability in people with CNSLBP [18]. In the current study, the shortened version of TSK also had the same results. Therefore, since the brief version of TSK like its original ones had acceptable statistical criteria, it can be utilized for individuals with CNSLBP. Thus, it is easier to implement and takes less time in clinical practice.

One limitation of the present research was that sample included just individuals with CNSLBP. Therefore, the results cannot be generalized to people with acute low-back pain. It is suggested to evaluate the test-retest reliability of brief TSK in a future study.

5. Conclusion

Findings presented here indicated that the brief form of TSK has high reliability and validity in individuals having CNSLBP and includes two subscales, the second factor (activity avoidance) on 6 items and the first factor (somatic focus) on 5 items. Although suitable statistical properties were found for the original version of TSK, it is suggested to apply its short version in clinical evaluation and research due to taking less time.

Ethical Considerations

Compliance with ethical guidelines

Funding

Authors' contributions

Conflict of interest

Acknowledgments

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