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Is “fear of passive movement” a distinctive component of the Fear-Avoidance Model in whiplash?

Howard Vernon, DC, PhD[1]
Rocco Guerriero, DC[1]
Shawn Kavanaugh, DC[1]
Aaron Puhl, DC, MSc[1]

Objectives: *Modify the Tampa Scale for Kinesiophobia (TSK) for ‘fear of passive motion’ beliefs.*

Methods: *With permission, a 14-item modification, the TSK-PM (passive movement), was created. Test-retest reliability was tested first. Construct validity was tested in chronic whiplash patients by comparing the TSK-PM with the TSK, the Neck Disability Index (NDI) and cervical ranges of motion.*

Results: *The TSK-PM showed high test-retest reliability (r = 0.83) and high correlation with the original TSK (r = 0.84). Low, non-significant correlations were found with other variables. NDI scores were strongly correlated with ranges of motion.*

Conclusions: *While having high test-retest reliability and a single factor structure, the TSK-PM failed to demonstrate distinctive construct validity vs the original TSK. The original TSK is likely to be sufficient to assess*

Objectifs : *Modifier l’échelle de Tampa (TSK) pour l’évaluation de l’indice de kinésiophobie pour définir la « crainte du mouvement passif ».*

Méthodologie : *Un questionnaire TSK-MP (mouvements passifs) a été créé en modifiant 14 points de la TSK avec permission. Tout d’abord, on a évalué la fiabilité de test-retest. La validité conceptuelle a été testée chez des patients souffrant d’entorse cervicale chronique en comparant le TSK-MP avec la TSK, l’indice d’incapacité cervicale (NDI) et les amplitudes de mouvement cervical.*

Résultats : *Le TSK-MP a montré une grande fiabilité test-retest (r = 0,83) et une forte corrélation avec la TSK originale (r = 0,84). On a observé de faibles corrélations non significatives avec d’autres variables. Les résultats de l’indice d’incapacité cervicale étaient fortement corrélés avec les amplitudes de mouvement.*

Conclusions : *Tout en ayant une haute fiabilité test-retest et une structure à un seul facteur, le TSK-MP n’a pas démontré une validité conceptuelle distincte par rapport à la TSK originale. La TSK originale est probablement suffisante pour évaluer la crainte d’être*

[1] Canadian Memorial Chiropractic College, Toronto, Ontario
Corresponding author: hvernon@cmcc.ca
T: (416) 482-2340
Canadian Memorial Chiropractic College, 6100 Leslie Street, Toronto, Ontario, Canada
M2H 3J1

fear of being moved in neck pain patients in a clinical setting. Modifications to the current version of the TSK-PM might improve its construct validity in future studies.

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déplacé chez les patients atteints de douleurs cervicales dans un cadre clinique. Les modifications apportées à la version actuelle du TSK-MP pourraient améliorer sa validité conceptuelle dans des études futures.

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MOTS CLÉS : chiropratique, kinésiophobie, entorse cervicale, coup du lapin, fiabilité

Introduction

In whiplash-associated disorder (WAD), many psychosocial factors are accounted for in the Fear-Avoidance Model.[1-13] Many of these factors have been shown to correlate strongly with current self-ratings of disability[9,11,14,15] and with prognosis[12,13].

The Tampa Scale for Kinesiophobia[16] (TSK) and the Fear-Avoidance Beliefs Questionnaire[17] assess movement-related anxiety; i.e., a patient's beliefs about the degree to which the movements they might undertake might aggravate their pain and, accordingly, whether they would perform these movements or activities. The fundamental construct being assessed is fear of moving.

These active movements undertaken by the patient, and beliefs thereof, are not the only kind of movement encountered by whiplash sufferers who become patients in a healthcare setting. Passive motions are commonly applied in both the diagnostic and therapeutic settings, especially in manual therapy. If a patient had any anxiety about these kinds of movements, it would best be termed a fear of being moved. This construct has not been well-studied. Given the frequency of circumstances where passive motion is applied to patients, especially in manual therapy, assessing a patient's attitudes and beliefs about this could make an important and distinctive contribution to the overall management of their pain condition. Modifications to therapy and education could be made to address these issues.

Accordingly, we undertook a modification of the TSK to assess 'fear of passive movement' beliefs (TSK-PM (passive movement)). We first modified the TSK for this purpose. Then, the test-retest reliability of this modified version was established in a sample of neck pain patients. Then, we explored its validity in a sample of chronic WAD patients by comparing TSK-PM scores with scores on the Neck Disability Index (NDI), the original TSK, active cervical ranges of motion. We predicted that the TSK-PM would only mildly correlate with the TSK and that it would more strongly correlate with ranges of motion and with cervical non-organic signs than the original TSK.

Methods

Revision of TSK: Permission to modify the TSK was obtained from Prof. J. Vlaeyan.[9,10] All items were reviewed by the authors for applicability. Fourteen of seventeen items were retained (original items #2, 4, 9 and 12 were excluded). Four items were retained in their original form (original items #6, 7, 15 and 16). The remaining nine items were revised by changing the wording from an active to a passive voice, principally by using the phrase "if someone moves me". The scoring was the same; responses ranged from 1 – strongly disagree, 2 – disagree, 3 – agree, 4 – strongly agree. Items 3, 7 and 13 are reversed in scoring as a validity check (See: Figure 1).

Study 1: Reliability: Subjects were recruited at a chiropractic teaching clinic. They were eligible if they presented with neck pain of at least 2 weeks duration. Both males and females 18-70 years of age were included. After providing informed consent, subjects completed the TSK-PM. Upon return to a treatment clinic for a follow-up visit within 48 hours, they completed the TSK-PM for a second time. Descriptive data were also obtained. As a very high level of correlation for test-retest reliability was expected, a sample size estimate for Pearson's Coefficient of 0.90, with a power of 0.80 determined that 19 pairs of measurements were required. Data was analyzed with ICC for test-retest reliability.[18] Internal consistency was not ana-

1.	I'm afraid that I might be injured if someone moves me	1	2	3	4
2.	My body is telling me that I have something dangerously wrong if it hurts when someone moves me	1	2	3	4
3.	My pain won't be made worse if someone moves me	1	2	3	4
4.	People aren't taking my medical condition seriously enough	1	2	3	4
5.	My accident has put my body at risk for the rest of my life	1	2	3	4
6.	Pain always means I have injured my body	1	2	3	4
7.	Just because it hurts when someone moves me does not mean that it is dangerous	1	2	3	4
8.	Being careful not to have anyone move me is the safest thing I can do to prevent my pain from worsening	1	2	3	4
9.	I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
10.	My pain will let me know when to stop someone from moving me so that I don't get injured	1	2	3	4
11.	It's really not safe for a person with a condition like mine if someone moves me	1	2	3	4
12.	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
13.	Even though something is causing me a lot pain, I don't think it's actually dangerous	1	2	3	4
14.	No one should have to be moved by someone when they are in pain	1	2	3	4

Figure 1
Tampa Scale for Kinesiophobia – PM

lyzed, as this has been demonstrated to be adequate in the original TSK.[9,10]

Study 2: Validity: Males and females, 18-65 years of age were recruited with whiplash-related complaints of chronic neck pain (with or without headaches). Neck pain was defined as from C0-T3, anterior or posterior to the neck and laterally to the lateral scapular border. Subjects were excluded if they had radiating pain into the arms or if they had sustained a closed head injury and were exhibiting signs and symptoms of post-concussion syndrome. No WAD IV subjects were included. Subjects were not excluded if they had additional pain elsewhere in the body.

Outcome measures: In addition to the TSK-PM, the following outcome measures were used in order to compare the TSK-PM to prior studies of the TSK with respect to these measures.

1. NDI: Developed in 1991, the NDI is the most commonly used measure of self-rated disability due to neck pain.[19] It has excellent reliability and validity.[20] It is composed of 10 items; each item is scored out of 5 for a total score out of 50.

2. TSK: The TSK was developed in 1990 by Kori, Miller and Todd[16] to measure fear avoidance beliefs. Its reliability and validity have been well-documented.[21-23] It is composed of 17 items; each item is scored out of 4 for a total score out of 68.

3. Ranges of motion: Cervical ranges of motion were measured with the CROM goniometer. Head goniometers have good reported test-retest reliability.[24,25] Two trials were obtained and averaged. The data point was the total ROM summed from 6 individual ranges.

4. Age, gender, duration of complaint (time since WAD injury) and pain severity on a 100 mm VAS were also obtained.

Sample Size Estimate: At an alpha level of .01 and a power of 0.80, for r = 0.70, 18 subjects are required. Given that two primary analyses were performed (TSK-P/TSK and NDI/TSK), 40 subjects were required.

Data Analysis: Data for each variable were tested for normality with Kolmogorov-Smirnov test. For data demonstrating normality, Pearson's correlation coefficients were used to assess the univariate associations of the NDI, TSK, TSK-PM, total range of motion and pain se-

Table 1.
Mean scores of clinical variables

VARIABLE	MEAN (SD)
NDI % NDI /50	51.9 (20.5) 26 (10.2)
TSK %	65.7 (9.8)
VAS %	51 (24)
TOTAL ROM (degrees)	300.9 (68.6)

Table 2.
Univariate Correlations (Spearman correlation coefficient (p-value))

	Total ROM	NDI	TSK	TSK – PM	Pain VAS
Total ROM	1.00				
NDI	–0.30 (0.04)	1.00			
TSK	0.02 (0.86)	0.15 (0.31)	1.00		
TSK – PM	–0.00 (0.98)	0.18 (0.22)	0.76 (<0.00)	1.00	
Pain VAS	–0.24 (0.14)	0.69 (<0.00)	0.28 (0.08)	0.16 (0.31)	1.00

verity scores as well as with age. For data not demonstrating normality, Spearman's Rho was used.[26] A multivariate analysis was planned if any univariate correlations were significant. A p-value of 0.05 was considered statistically significant.

Results

Eleven (11) subjects completed the test-retest study. Forty-nine (49) subjects completed all the required measures for Study 2 (31 males, 18 females). The mean (sd) age and duration of symptoms were 39.9 (12.5) years and 9.7 (6.2) months, respectively.

Study 1: The test-retest reliability was 0.83 (95% CI from 0.72 to 0.92).

Study 2: The mean NDI, TSK, pain VAS and ROM scores are shown in Table 1. The mean total ROM represents approximately a 20% reduction in total ranges of motion (normal = 360 degrees).

None of the variables' datasets demonstrated normality. As such, Spearman's Rho was used to calculate the univariate correlations which are shown in Table 2. The highest and only significant correlation found was TSK / TSK-PM = 0.84 (p = 0.00). As no other important univariate correlations with the TSK-PM were obtained, multivariate analysis was not performed. Both forms of non-organic signs as well as the NDI had significant correlations with other variables. TSK and TSK-PM had no significant correlations with any of the other variables.

Discussion

This study produced a modified version of the TSK to account for the construct of "fear of being moved" or "fear of passive motion" beliefs. We found a high degree of test-retest reliability in the TSK-PM. However, in this sample of chronic WAD subjects, we failed to find a strong distinction between the original and modified versions of the TSK.

This finding may have occurred because the TSK-PM does validly measure 'fear of passive motion' beliefs, but these are simply not different enough from 'fear of active motion' beliefs. Contrarily, the modifications made to the TSK may not have adequate enough to permit valid measurement of a distinctive set of beliefs. The creation of a different instrument, not the minor modification of an existing one may be required to resolve this issue.

Our findings can be interpreted as supporting the original TSK in assessing movement-related anxiety for both active and passive movements. Should a clinician be concerned about "fear of being moved" in their patients, the original TSK probably provides an adequate measure of that attribute.

We also failed to find strong correlations between scores of either version of the TSK with scores of self-rated disability, current pain intensity, ranges of cervical motion and standard or novel cervical non-organic signs. This is contrary to other studies[4,5,12,13], and may be a statistical issue, as we found that TSK and TSK-PM scores

were considerably higher and less varied than NDI scores and scores for ranges of motion and non-organic signs. It may also be due to the fact that our subjects suffered with chronic whiplash-related pain. The situation may be different in subjects with sub-acute pain whose pain-related beliefs may not have become so entrenched.

In addition to the findings directly related to the TSK-PM, our study has other important results. The significant correlation between NDI scores and ranges of neck motion confirms the results of Howell et al.[27], although the correlation between ROM and pain VAS scores was slightly higher.

The limitations of this study pertain to the limits of interpretation of the negative results with respect to the TSK-PM: chronic WAD patients with relatively high fear avoidance beliefs. As noted above, replication in acute WAD patients is recommended.

Conclusion

While having high test-retest reliability and a single factor structure, a modified version of the TSK to account for fear of passive motion beliefs has failed to demonstrate construct validity in a sample of chronic WAD patients. In fact, we have found that this construct is likely incorporated into the original TSK. Secondarily, validity of the C-NOS tests for cervical non-organic pain behaviour in WAD patients has been given support.

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