Is “Fear of Passive Movement” a Distinctive Component of the Fear-Avoidance Model in Whiplash?

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Abstract

**Aims:** 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 and construct validity were tested in chronic whiplash patients.

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

**Conclusions:** While being reliable, the TSK-PM failed to demonstrate distinctive construct validity vs. the TSK. Modifications to the current version of the TSK-PM might improve its construct validity in future studies.

Introduction

In whiplash-associated disorder (WAD), many psychosocial factors are accounted for in the Fear-Avoidance Model. Many of these factors have been shown to correlate strongly with current self-ratings of disability and with prognosis. The Tampa Scale for Kinesiophobia (TSK) and the Fear-Avoidance Beliefs Questionnaire 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, and 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 (C-NOS) than the original TSK.

**Methods**

**Revision of TSK**

We asked permission to modify the TSK from Prof. J. Vlaeyen. All items were reviewed by the authors for applicability. Fourteen of 17 items were retained (original items #2, 4, 9, and 12 were excluded).

Tampa Scale for Kinesiophobia – PM

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
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 if they presented with neck pain of at least two weeks duration. Both males and females ages 18-70 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. A sample size estimate for Pearson’s Coefficient of 0.90, with beta level of 0.80 determined that 19 pairs of measurements were required. Data was analyzed with intra-class correlation (ICC) for test-retest reliability.19

Study 2: Validity
Males and females, ages 18-65 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.
1. NDI: Developed in 1991, the NDI is the most commonly used measure of self-rated disability due to neck pain16. It has excellent reliability and validity.20 It is composed of 10 items; each item is scored out of five for a total score out of 50.
2. TSK: The TSK was developed in 1990 by Kori, Miller, and Todd18 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 four for a total score out of 68.
3. Ranges of motion (ROM): 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 (degrees) summed from six 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 beta level at 0.80, for r = 0.70, 18 pairs of data are required. Given that two primary analyses were performed (TSK-P/TSK and NDI/TSK), 40 subjects were required.

Data Analysis
Pearson’s correlation coefficients were used to assess the univariate associations of the NDI, TSK, TSK-PM, total range of motion and pain severity scores as well as with age, gender, and duration [months]. Next, a linear regression analysis was conducted to assess the importance of variables in relation to one another when predicting self-rated disability. A multivariable analysis was planned if any univariate correlations were significant. A p-value of 0.05 was considered statistically significant. Post, hoc analyses for any significant findings were performed with t-tests with Holm’s correction.

Results
Eleven subjects completed the test-retest study and 49 subjects completed all the required measures for Study 2 (31 males, 18 females). The mean 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. 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). Univariate correlations are shown in Table 2. The highest and only significant correlation found was TSK / TSK-PM = 0.84 (p = 0.0000). As no other important univariate correlations with the TSK-PM were obtained, a multiple regression analysis was not performed. Both forms of non-organic signs as well as the NDI had significant correlations with other variables.

<table>
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<th>Variable</th>
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<tbody>
<tr>
<td>NDI %</td>
<td>51.9 (20.5)</td>
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<td>NDI /50</td>
<td>26 (10.2)</td>
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<td>TSK %</td>
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<th>TSK - PM</th>
<th>Pain VAS</th>
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<tr>
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<td>TSK</td>
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<tr>
<td>TSK - PM</td>
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<td>NS</td>
<td>0.84 (p = 0.0000)</td>
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<td>Pain VAS</td>
<td>-0.43 (p = 0.0008)</td>
<td>0.66</td>
<td>NS</td>
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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 been 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 motion-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, 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., 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

Despite being found to be reliable and internally consistent, 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. Secondly, validity of the C-NOS tests for cervical non-organic pain behavior in WAD patients has been given support.

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