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## The applicability of the Tampa Scale of Kinesiophobia for patients with sub-acute neck pain: a qualitative study

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**Abstract** The purpose of this study was to qualitatively evaluate patients understanding and interpretation of the wording used in test items of the Tampa Scale of Kinesiophobia (TSK). The TSK was developed to measure fear of movement in patients suffering from low back pain. The TSK is being increasingly used for other pain conditions. Patients with sub-acute neck pain experience problems while completing this questionnaire. The aim of this study was to elicit these problems. The study was conducted within the framework of a randomised controlled trial. The Three-Step Test Interview (TSTI) was used to collect data on the thoughts or considerations of respondents while completing the TSK. In the analysis, each transcribed interview was divided into three segments. The thoughts and considerations were then analysed and categorised per item. During the TSTI two problems were identified. One concerned the meaning of specific words used, like “dangerous” and “injury”. The other problem was that several implicit assumptions within some items make it difficult for respondents to answer these items. It was concluded that in the development and validation of questionnaires like the TSK, not only quantitative psychometric properties are important, but also qualitative research has an important contribution to enhance applicability.

**Keywords** Kinesiophobia · Qualitative research · Neck pain · Three-step interview test

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## 1 Introduction

Patients suffering pain often report fears that they are afraid that movement will exacerbate their symptoms. Fear of pain, and fear of movement or re-injuring tissues are important factors in the development and maintenance of pain (Vlaeyen and Linton 2000; Butler and Moseley 2003). Fear might contribute to how a patient moves, behaves and experiences his or her pain. The transition from acute to chronic pain is believed to be influenced by fear of movement, and among many other factors such as cognitive, behavioural and social factors (Gatchel 1996). The fear-avoidance model suggests possible pathways by which pain patients become enmeshed in a downward spiral of increasing avoidance, disability and pain (Vlaeyen and Linton 2000). Although most research on the fear-avoidance model has been carried out in chronic low back pain patients, this model also yields an interesting perspective on the development of chronic neck pain (Vlaeyen and Linton 2000; Nederhand et al. 2004).

The Tampa Scale for Kinesiophobia (TSK) was developed (Kori et al. 1990) and translated into Dutch by Vlaeyen et al. (1995) (see Appendix for the English version). The TSK is a psychological self-completion questionnaire consisting of 17 items, and, each item is scored on a 4-point Likert scale with response options ranging from 'strongly agree' to 'strongly disagree'. Sum-scores range from 17 to 68, with higher scores indicating more fear of movement and/or (re-)injury. Four items are phrased in reversed key (items 4, 8, 12 and 16). Several studies (Crombez et al. 1999; Swinkels-Meewisse et al. 2003) have found evidence for the validity, i.e. predictive validity and construct validity, and the reliability, i.e. internal consistency and test-retest reliability in chronic and acute low back pain patients, of the Dutch version of the TSK.

To be valid and applicable, the items in a questionnaire should measure what they are supposed to measure and therefore be fully understood. Nevertheless, in practice not all items meet this prerequisite. A possible explanation could be that respondents do not understand the items in a questionnaire, or misinterpret the items or the response options. In other words, like most social research tools, they are open to various different interpretations. Quantitative psychometric analyses, such as factor analysis, internal consistency and construct validity, will highlight some problems with the structure or formulation of items of a questionnaire but they are not very sensitive with regard to problems concerning the way in which patients interpret items, or their intended meaning when they select a response. The basic assumption is that patients are able to understand the meaning of the items, that items are understood in the same way by all patients, and that all patients are willing and able to respond to all items (Collins 2003).

During a randomised clinical trial on neck pain patients (Pool et al. 2006), some of the TSK items appeared to cause problems. Some patients had to think for a long time about specific items, they did not understand some items or specific words in certain items, and they asked the research assistants for additional information before they could respond to some of the items.

The objective of the present qualitative study was to find out what problems patients with sub-acute neck pain encounter when completing the TSK. Therefore the aims were to investigate how patients interpret the questions, which considerations patients had for their specific interpretation of the items, and whether their thoughts and considerations were appropriate for the available response options. In other words, is the questionnaire applicable for use in sub-acute neck pain patients.

## 2 Method

This qualitative study was conducted within the framework of a randomised clinical trial. Patients were recruited by a general practitioner or a physical therapist, and they were all patients with sub-acute non-specific neck pain, defined as pain in the cervical region existing for at least 4 weeks, but no longer than 12 weeks. The neck pain could radiate to the shoulder region or the upper extremities, or be accompanied by headache, but the main complaint had to concern the neck. Other inclusion criteria were: age between 18 and 70 years, and a new episode of pain (defined as no neck pain in the previous 4 months) and no therapy for neck complaints in the previous 4 months. The exclusion criterion was: specific neck pain, for example due to rheumatoid arthritis, disc herniation, neurological diseases or malignancy.

In this study the Three-Step Test Interview (TSTI) (Van der Veer et al. 2003; Hak et al. 2004; Hak et al. 2006) was used. The aim of the TSTI is to identify problems with self-administered questionnaires, and it collects data on how respondents actually complete a questionnaire. The ‘think-aloud techniques’, that are used, results in a cognitive interview, which consists of the following three steps:

### (1) Concurrent think-aloud

During this first step the respondent fills in the questionnaire while thinking aloud. Thus, the respondent verbalizes his/her thoughts. This phase is completely observational, which means that no intervention, questions or comments from the interviewer are allowed, but only encouragement for the patient, if necessary, to think aloud. Thus, the respondent should fill in the questionnaire as if he/she were alone in the room. The interviewer makes notes about the respondent’s behaviour (silences, hesitation, skipping of questions, correction of the response category) and verbalized thoughts. These notes will be used in step 2 and 3 of the TSTI.

### (2) Retrospective interview

The second step is a more narrative approach, aimed at clarifying the first step (e.g. “I noticed that you hesitated between two response categories, why was that?”). The interviewer only discusses those observed actions or thoughts which he/she feels doubtful. It is important that the respondent reflects on the first step. He or she should not correct an answer in this phase but explain why he/she did or said something in the previous step.

### (3) Semi-structured interview

The final step is an in-depth interview aimed at eliciting the patient’s considerations and opinions. Additional data is collected, i.e. the patient’s opinion about the questionnaire or the response categories etc, and this information is added to the observational data. It is the only step in the TSTI in which the respondent is allowed, for example, to explain his/her response behaviour, make comments about the items, the questionnaire or give additional information.

During the phase of data collection we used the saturation principle to decide whether additional patients were needed. Patient recruitment stopped if it was expected that no further information should add to the final conclusion. This also meant that in the end of the research the duration of the interviews was diminished, as the in-depth interview focussed on the new information. The research was ended when additional patients did not add further information.

Before the interviews took place the patients were informed about the procedure, and they were asked if they wished to participate. The TSTI, which was held in the patient’s home, i.e. close to the natural environment of the patient, took between 1 and 2 h, was audio-taped with

a digital voice-recorder, transcribed verbatim and analysed. In the process of analysis, each transcribed interview was divided into three segments, according to the three steps of the TSTI. After fragmentation of the text protocol, the fragments were labelled and categorised, and a table was constructed with the most frequently used labels. (Banister et al. 1994). The labels were then analysed and described.

The interviews and analysis were performed by an experienced qualitative researcher (SH).

### 3 Results

#### 3.1 Process

After 13 patients, 7 women and 6 man, saturation was completed. The average age was 51 years. The think-aloud method was a new experience for all of the patients participating in the research. None of them had ever filled in a questionnaire whilst thinking aloud. For this reason the first phase was difficult for some of the patients. Furthermore, we noticed that some of the patients took their time when filling in the questionnaire, while others answered the questions relatively quickly. The fact that some patients answered the questions quite quickly did not necessarily mean that the questions were more clear to them. The second step of the TSTI provided more insight into their thoughts and considerations. Although the patients did clarify their answers, talking about the items and the response options, often changed their interpretation and this sometimes led to the wish to change their initial response. This could mean that they did not completely understand the items, or misinterpreted the items in the first step. In the third and final step of the TSTI the patients did not hesitate to provide additional information. This step clearly was less problematic than the first two steps. Most remarks concerned the response options and the formulation of a number of questions. One patient even made a comment that from now on he/she will think aloud filling in questionnaires.

#### 3.2 Results regarding the TSK

During the interview two main problems were identified. One concerned words within the items, which the patients found difficult to interpret. The two words that most frequently raised problems were “dangerous” and “injury”. The other problem was that implicit assumptions of the questionnaire were interpreted different by the patients (See Table 1).

The questionnaire originally was developed in a population of chronic low back pain patients who often consider their complaints as frightening for their activities in daily life. In the current study an important theme was, “are my neck complaints ‘dangerous’ or not”? Most patients disagree with this word and found that the word dangerous was not the appropriate way of describing their health status. In items 3, 8, 11 and 16 the word dangerous or dangerously are used. Patient 3 as an example; “*What’s dangerous? You can think of “am I going to die soon?” or is it an illness that can’t be cured, or something like that. I think it’s rather strongly put.*”

The phrase “*put my body at risk for the rest of my life*” also falls into the same category. Sub-acute neck complaints are not perceived by patients as a risk for severe disability for the rest of their lives. It “hurts but it does no harm” is more likely to be what most patients think. They then find it difficult to choose the appropriate answer, because they feel that “dangerous” is not an issue with regard to their health status.

**Table 1** The Tampa Scale of Kinesiophobia, with identified problems indicated: different words in bold and implicit assumptions in italic, underlined and bold

1.	I'm afraid that I might injury myself if I exercise
2.	If I were to try to overcome it, my pain would increase
3.	My body is telling me I have something <b>dangerously</b> wrong
4.	My pain would probably be relieved if I were to exercise
5.	People aren't taking my medical condition seriously enough
6.	My accident has put my body at risk for the rest of my life
7.	Pain always means I have <b>injured</b> my body
8.	Just because something aggravates my pain does not mean it is <b>dangerous</b>
9.	I am afraid that I might <b>injure</b> myself accidentally
10.	Simply being careful that I do not make any <u><b>unnecessary movements</b></u> is the safest thing I can do to prevent my pain from worsening
11.	I wouldn't have this much pain if there weren't something potentially <b>dangerous</b> going on in my body
12.	Although my condition is painful, I would be better off if I were <u><b>physically active</b></u>
13.	Pain lets me know when to stop <u><b>exercising</b></u> so that I don't <b>injure</b> myself
14.	It's really not safe for a person with a condition like mine to be <u><b>physically active</b></u>
15.	I can't do all the things normal people do because it's too easy for me to get <b>injured</b>
16.	Even though something is causing me a lot of pain, I don't think it's actually <b>dangerous</b>
17.	No one should have to <u><b>exercise</b></u> when he/she is in pain

The second problematic word was “injury”. This word is used in questions 7, 13 and 15. The word injury is ambiguous and the Dutch translation, ‘letsel’, might have different meanings. Some patients interpret this word as “*there is something wrong*” or “*something has been broken*”, or “*there is a problem*” or “*there must have been an accident*”. Patient 2 said, as an example: “...*look, if you think about injury you think perhaps that something is broken or you have been wounded or it's really bad, but in your neck it is just 'wear and tear' and that sort of thing...*”.

Another problem is that the implicit assumption made in some items does not apply to the experience or current status of the patients. ‘Physically active’ or ‘exercises’ in the items 12, 13, 14 and 17 were interpreted by patients as meaning that they did not exercise at all or were not physically active. Examples are “*I would be better off if I was physically active*”. Most patients reacted by saying “*I am physically active*”. This led to problems in choosing the appropriate response option. In item 10 “*unnecessary movements*” raised a lot of questions about what exactly unnecessary movements are. Another problem was the word “*normal*” in item 10, which seemed for some patients with sub-acute neck pain to mean that they were not “*normal*”. The meanings that patients attribute to the above-mentioned words seem to differ from the meanings attributed by those who developed the questionnaire.

An additional finding in step three was that patients often commented on the lack of a response option “*not applicable*”.

## 4 Discussion

The purpose of this study was to qualitatively evaluate patients understanding and interpretation of the wording used in test items of the TSK. This may be an important missing step in the development of many psychometric questionnaires.

Quantitative research on the Dutch version of the TSK for patients with low back pain showed acceptable validity and reliability (Vlaeyen et al. 1995). Furthermore, a confirmatory factor analysis suggested a two-factor model, an activity avoidance focus (items 1, 2, 9, 10, 13, 14, 15, and 17) and a pathological somatic focus (items 3, 5, 6, 7, 11) (Goubert et al.

2004). Patients with neck pain appeared to have difficulty with some items when completing the TSK. Qualitative studies of how patients experience and respond to questionnaires can identify these problems, but are still few and far between (Paterson 2004).

One cause of these problems could be the translation of the questionnaire from English into Dutch. Some correctly translated words can still be interpreted differently. Examples in the TSK are the words “dangerous” and “injury”. In Dutch these might have a different meaning within a certain context. It also is possible that the connotation of the above-mentioned words is different for patients with sub-acute neck pain than for patients with chronic low back pain. The difference between these two groups of patients is the location of the pain and the duration of the pain. In questionnaires it is assumed that the attributions and beliefs of the patients in both pain groups are the same, but it is in fact likely that when completing questionnaires patients with chronic low back pain will have a different subjective feeling about the meaning of words such as “dangerous” or “injury”. Furthermore, the impact of chronic low back pain on activities in daily life is greater than that of sub-acute neck pain (Hoving et al. 2002). Activities such as sitting, standing and moving around are less affected. However, the extent to which these differences influence the total score and the interpretation of the TSK is not known.

In our study it became clear that some words that are used in the TSK items are troublesome for patients and the question that arises is: should these items be replaced or rephrased? If words are too extreme the patients do not consider these specific words to be appropriate, and find it difficult to choose a suitable answer, should this change the original TSK? Furthermore, fear-avoidance beliefs and pain catastrophizing are already found in a healthy population, and it has been suggested that both factors contribute to the transition from acute to chronic pain (Buer and Linton 2002). According to Buer and Linton, the localisation of the pain has limited influence. However, it became clear during our study that patients suffering from sub-acute neck pain has less pain related fear than patients suffering from low back pain. It can be hypothesized that neck pain patients have different beliefs, compared to patients suffering from chronic low back pain, specially concerning the meaning of “dangerous” and “injury”.

Another finding concerned criticism about the lack of choice in response categories, specially with regard to “not applicable”. Because of the above mentioned difference in attribution some items do not seem to be appropriate. For example for a patient who is active in sports and exercise regularly, item 14 is hard to answer with the available response categories. Adding ‘not applicable’ as an option would make the choice of categories more suitable.

The advantage of TSTI is its clear structure. It is easy to use, and although some patients had to be encouraged to think aloud it is possible to obtain insight into their interpretation of thoughts and considerations when answering all items of the TSK. In the second step the interviewer can ask for more information and the patient has an opportunity to elaborate on the questionnaire and reflect on further details in the final step. However, this cognitive interview technique does not include a wider enquiry into people’s lives and problems, because it specifically aims to adhere closely to the content of the questionnaire. The only disadvantage of using the TSTI is its time consuming approach. But using the saturation principle it is not necessary to include a large amount of patients.

It has been suggested that the TSK should be used without the reversed keys of items 4, 8, 12 and 16, because the factor analysis showed a weak association with the total TSK score (Houben et al. 2005) and they were not considered to be appropriate. One could hypothesize that specific words used in these items were troublesome. In our study the patients had no specific problems with difficult or ambiguous words or inadequate assumptions in these reversed key items.

Our study suggests that a ‘patient-centred’ approach such as the TSTI to improve the formulation of item’s, are an important aspect in the development and validation of a questionnaire. Furthermore, this study showed that many of the issues mentioned above can affect the interpretation of the questionnaire. Patients with sub-acute neck pain seems to have less pain related fear, possibly due to the duration of the pain. Neck pain therefore seems to have different psychological consequences (Sterling et al. 2005). Words such as “dangerous” or “injury” seem to have a different meaning for patients with neck pain than for patients with other chronic pain conditions. To extent to which these problems influence the interpretation of the TSK score is still a subject of debate. Furthermore, the above-mentioned problems have, in our opinion, an effect on the applicability of the TSK, so further research must be carried out to determine whether and, if so how these problems can be addressed. The effect of adaptation of the TSK to other pain conditions also needs to be studied.

In qualitative research the main aim is to collect opinions about for example the interpretation of questionnaires such as the TSK rather than to collect data of a population sample. The principle of saturation is used to ensure that all important meanings and opinions are collected. A representative sample and generalisation to the total population are no issues in qualitative research. When new patients does not add new information the research can end. In the current study after 13 patients the saturation was completed.

## 5 Conclusion

It is recommended that qualitative research should be carried out to supplement quantitative research in the validation of a psychological questionnaire. It is important that not only all the psychometric properties are assessed but that also interpretations and thoughts about meaning of words and considerations in choosing a response option are important issues in the development and validation of questionnaires.

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