ANALYSIS OF THE PSYCHOMETRIC PROPERTIES OF THE BRAZILIAN VERSION OF THE TAMPA SCALE FOR KINESIOPHOBIA

FABIANO BOTELHO SIQUEIRA[1], LUCI FUSCALDI TEIXEIRA-SALMELA[2], LÍVIA DE CASTRO MAGALHÃES[3]

SUMMARY

The objective of this study was to examine psychometric properties of the Tampa Scale for Kinesiophobia, which was translated and adjusted according to recommended methodology. The adjusted version, the Escala Tampa para Cinesiofobia (ETC)*, was applied to 50 subjects with non-specific chronic lumbar pain (CLP). The Rasch analysis disclosed a reliability coefficient of 0.95 for ETC items, suggesting excellent construct validity. For the subjects, this coefficient was 0.80, showing a steady answer pattern. Subjects separation rates were 2.0 and 4.5 for the items, showing that patients were divided into two kinesiophobia levels, and the items were divided into five levels. Two erroneous items have been identified, showing percentages above the 5% allowed by statistical model. These results indicate a need for modification, replacement or exclusion of those items in order to assure that the instrument assesses a single-dimensional construct. On the other hand, the presence of very difficult items suggests that ETC can be administered to subjects with higher levels of kinesiophobia. These findings indicate that ECT presents a significant potential for clinical applicability in individuals with CLP; however, a careful interpretation of the results is required, especially for answers to the items regarded as erroneous.*

Keywords: *Low back pain; Movement; Fear; Scale; Evaluation.*

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INTRODUCTION

Chronic lumbar pain (CLP) is one of the most frequent complaints of patients with musculoskeletal disorders, and its consequences include physical debilitation, employee absenteeism, and various psychological problems [1,2]. The early identification of individuals with lumbar pain potentially becoming chronic is necessary for appropriate interventions to be performed as soon as possible in order to avoid its chronic stages, thus reducing the economical, social, and personal consequences associated to this dysfunction [2].

Although many models/ theories try to explain lumbar pain, little is known about the exact mechanism and the factors influencing its chronicity[3]. The model based on clinical signs and symptoms suggests that pain is proportional to tissue injury extension. However, there are some evidences showing that the persistence of pain symptoms cannot be explained only by means of objective clinical findings [4] and, for this condition, an approach purely based on a clinical model may be insufficient. Many authors showed a poor correlation between pain severity and disability degree, and suggested that a biopsychosocial approach could provide a better understanding about pain chronicity [3-6]. According to that approach, many factors associated to functional disability, such as cognitive, emotional, environmental and social factors may influence pain chronicity [3,5-7].

In order to explain, using a biopsychosocial approach, how and why some individuals with musculoskeletal pain develop chronic pain syndrome, the cognitive model of fear of movement/(re)injury proposed by Vlaeyen et al.[6], is based on the fear of pain, specifically saying, the fear that some physical activities might cause pain and/or injury recurrence. Two contrary behavioral answers are suggested, with confronting individuals facing pain in an attempt to improve and they believe that the presence of pain does not justify a restraint to their functional activities, and avoiding individuals who are afraid of movements and believe that the activity is closely related to the presence of pain. This avoiding behavior may lead to physical and psychological disorders that would ultimately lead to pain chronicity [3,5].

The term kinesiophobia is used for defining an excessive, unreasonable, and debilitating fear of movements and physical activity, which results in feelings of vulnerability to pain, or fear of injury recurrence[8]. In this theoretical model, the catastrophe of pain leads to a fear of movements and injury recurrence, which, in turn, enhances the avoiding behavior, thus resulting in disuse and functional disability with time [9]. Vlaeyen et al.[6] reported that, in patients with CLP, inactivity can also lead to musculoskeletal deterioration, reduced muscular strength, reduced motility, and mental disorders, such as somatization and depressive symptoms.

One of the most frequently used instruments today for assessing kinesiophobia is the Tampa Scale for Kinesiophobia (TSK)[6,10]. This scale consists on a self-applicable questionnaire, containing 17 questions addressing pain and symptoms severity. Scores range from one to four points, with an "entirely disagree" answer meaning one point, "partially disagree", to two points, "partially agree", to three points, and "entirely agree" to 4 points. For obtaining a total final score, the inversion of scores for questions 4, 8, 12 and 16 is required. The final score may be at least 17 and at most 68 points; the higher the score, the higher the kinesiophobia degree.

The TSK was shown to be a valid and reliable instrument, with appropriate internal consistency *(α=0.68-0.80)*, for individuals with CLP[6,10]. Swinkels-Meewisse et al.[2] showed that the TSK has a good internal consistency *(α=0.70)* and a good test-retest reliability *(α=0,76)* in patients with acute lumbar pain as well. Using the TSK, Vlaeyen et al.[6] found that the fear of movement was the best predictor for self-report of disability when compared to clinical signs

Study conducted at the Physical Therapy Department – Federal University of Minas Gerais.

Correspondences to: Luci Fuscaldi Teixeira-Salmela, Departamento de Fisioterapia – Universidade Federal de Minas Gerais. Avenida Antonio Carlos, 6627 – Campus Pampulha - CEP 31270-010 Belo Horizonte – Minas Gerais. E-mail: lfts@ufmg.br

1. Master in Rehabilitation Sciences, Assistant Professor – Physical Therapy Department, University Center, Belo Horizonte – Uni-BH
2. PhD, Associate Professor, Physical Therapy Department, Federal University of Minas Gerais - UFMG
3. PhD, Associate Professor, Occupational Therapy Department, Federal University of Minas Gerais - UFMG

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and symptoms associated to pain severity. In a cohort study, the TSK was used in preventive programs and showed that individuals with high levels of kinesiophobia presented with a higher level of predisposition to chronicity and disability [9].

Despite of its high applicability potential in researches and in clinical practice, the TSK cannot be used in Brazil without having standardized procedures for transcultural adaptation [11]. Thus, the purpose of the present study was to assess the psychometric properties of the TSK adapted version for individuals with CLP, thus examining scale limitations in order to, whenever necessary, suggest a review of some items so that the scale could become clinically useful in our environment.

METHODOLOGY

Subjects

Fifty individuals of both genders, ages ranging from 18 to 65 years, with non-specific CLP, complaining of pain for at least three months, have been recruited from community. Individuals presenting with tumors, trauma, infections, inflammatory disorders and compromised nervous roots have been excluded from study. The study was approved by the Committee on Ethics in Research, Federal University of Minas Gerais (Ethic Opinion 263/03) and, for taking part of the study, the individuals were informed about its objectives and signed a free and informed consent form.

The instrument

A translated version of TSK was obtained by following the protocol recommended by Guillemim et al.[11], being translated into Portuguese and translated back into English by three different translators with proficiency Portuguese and English languages. Then, it was submitted to a committee of expert judges constituted of related professionals with proficiency on the matter and also fluent in both languages, as recommended by the methodology [11]. The committee discussed the equivalence between the translated version and the original one, and regarded unnecessary any item changes or removal. Due to a potentially low educational level of the participants, the committee recommended that the scale was applied by means of an interview by properly trained researchers, and not self-applied, as in the original version, and that the sentence: "First, you have to think if you agree or disagree and then you say if you agree/ disagree "entirely" or "partially" was included for better explaining to participants the indication of the alternative. The adapted end version, named "Escala Tampa para Cinesiofobia - Brasil" (ETC) is shown on Table 1 and presents, as a potential result, the maximum score of 68 points, and the minimum score of 17 points, just like the original instrument.

Procedure

The ETC-Brasil was applied by means of interviews by a trained investigator following standardized procedures. A visual scale numbered from 1 to 4 was shown to each subject, with a color scheme representing the levels of the answers. After reading each affirmative sentence of the questionnaire, the investigator asked the subject to point to the answer at the numbered and colored visual scale.

Concurrently with the questionnaire, demographic data were collected for characterizing sample, as well as data concerning time of evolution of the pan, clinical diagnosis, medication use and physical activity practice. For characterizing the individuals' degree of disability, an adapted Brazilian version Roland Morris questionnaire[12], which is consists on 24 affirmative sentences with yes/ no basis answers reporting the disabilities of patients suffering from lumbar pain. The final score is given by the sum of the "yes" answers, with cut point at score 14, indicating that any score above 14 would be indicative of an individual presenting some disability, and, the higher the score, the higher their disabilities [12]. The six-point qualitative pain scale [12] was used for assessing the severity of pain, with scores ranging from zero (no pain) to five (almost unbearable pain).

Statistical Analysis

Descriptive statistics, normality tests (Shapiro-Wilk) and CCi were calculated, using a SPSS statistical kit (version 11.0, 2001, SPSS, Inc.).

The "Rasch" model was employed for investigating psychometric properties of the scale because it transforms ordinal scores into interval measurements, which are more appropriate to statistical analysis [13]. It enables a detailed analysis of items, with specific parameters for detecting unexpected or incorrect answers, which contribute to measurements instability. By means of that analysis, it is possible to gauge each item's degree of difficulty and the individuals' kinesiophobia in a same continuous linear divided into equal intervals by items along which individuals are distributed [14]. This allows for comparing the level of subjects' kinesiophobia and items difficulty, which is essential for checking if the measurement instrument is useful for a given sample. Due to those advantages and to the ease in viewing results, the "Rasch" model has been one of the most used procedures for assessing measurement instruments in rehabilitation filed [15,16].

The basic premise of the Rasch Analysis is that, the most kinesiophobic a person is, the highest his/ her likelihood of receiving high scores in all items, whether they are easy or difficult. On the other hand, the easiest the item, the highest the potential to any person receiving a high score in that item [14,16]. When all items in a scale meet these expectations, this means that the test fits into the measurement model and the there is a probability of those individuals with higher degrees of kinesiophobia receiving higher scores when compared to those less kinesiophobic [16]. These principles, however, only apply if the set of items is able to measure a single-dimension ability [13]. The single-dimension ability is, thus, one of the basic premises of the "Rasch" model, with markers being created for identifying items that do not fit this principle.

Specific computer-based programs for "Rasch" analysis, such as the "WINSTEPS"[17], calculate both items calibration and individuals' measurements as *"MnSq (goodness-of-fit)"* and *"t"* values associated to this estimate. These values indicate if answers pattern meet the premises of the model. There are some variations, but $MnSq = 1 \pm 0.3$, with $t = \pm 2$ are regarded as reasonable values for signing items appropriateness. $MnSq > 1.3$ indicates that the scores for a given item were unexpected or incorrect. In other words, unexpectedly, people less kinesiophobic received high scores for difficult items or vice-versa. This indicates that either the item does not match the others for determining a set of abilities or there are problems for determining it, being required a review for adjustment [13]. In rebuttal, $MnSq < 0.7$ indicates little score variance for that item, that is, the answers pattern was as expected or determinant [13,17]. The first result represents a great threat for test validity, but the second signs that the item does not discriminate people with different functional levels, poorly contributing to construct definition [13].

Although low *MnSq* values sign items not discriminating people with different functional levels, poorly contributing to construct definition, this does not represent a threat for test validity and thus, such items are not a problem [13]. As the erratic score (high *MnSq*) suggests serious problems on item definition or text, the ones with $MnSq > 1.3$ values in their both formats - *"infit" and "outfit",* respectively signing fluctuations on scores and the presence of extreme scores – have been marked for review purposes. When more than 5% of the total number of items does not fit the "Rasch" model, the test items do not match in order to measure a single-dimension concept, which compromises the validity of instrument's construct [15,16].

The Rasch analysis also provides separation rates indicating in how many levels of fear severity the sample separates the items and in how many levels of kinesiophobia the items separate the sample. According to Velozo et al.[18], a test is expected to divide subjects into at least three kinesiophobia levels (low, medium, high) and this was a criterion employed in this study as well.

RESULTS

Sample characterization

Table 2 shows descriptive data related to sample characterization. Fifty

Here are some things other patients told us about their pain. For each statement, please, provide a score from 1 to 4 in case you agree or disagree with the statement. First, you must think if you agree or disagree and then say you agree/disagree entirely or partially.

		Entirely disagree	Partially disagree	Partially agree	Entirely agree
1.	I'm afraid of getting hurt if I exercise.	1	2	3	4
2.	If I tried to overcome this fear, my pain would increase.	1	2	3	4
3.	My body is telling me there is something very wrong happening with me.	1	2	3	4
4.	My pain would probably be relieved if I made some exercises.	1	2	3	4
5.	People are not taking my medical condition seriously.	1	2	3	4
6.	The injury put my body at risk for the rest of my life.	1	2	3	4
7.	Pain always means that my body is hurt.	1	2	3	4
8.	Just because something worsens my pain, it doesn't mean it is dangerous.	1	2	3	4
9.	I'm afraid of getting hurt by accident.	1	2	3	4
10.	The safest attitude I can take in order to prevent my pain from getting worse is just to be careful to not to make any unnecessary movement.	1	2	3	4
11.	I wouldn't fell so much pain if something really dangerous was not happening with my body.	1	2	3	4
12.	Although I feel pain, I would be better if I was physically active.	1	2	3	4
13.	Pain warns me when to stop exercising in order to not getting hurt.	1	2	3	4
14.	It is not really safe for a person with problems similar to mine to be physically active.	1	2	3	4
15	I cannot do all the things normal people do, because I easily get hurt.	1	2	3	4
16.	Although something causes me a lot of pain, I don't think it is really dangerous.	1	2	3	4
17.	Nobody should make exercises when in pain.	1	2	3	4

Table 1 - *Tampa Scale for Kinesiophobia - Brazil.*

individuals belonging to a community in Belo Horizonte were included in this study showing non-specific CLP, mean age 41.98 ± 13.76 years, being 24% males and 76%, females. Only 14% of the individuals were smokers and 66% were sedentary. Regarding disability assessment, using the Roland-Morris-Brasil Questionnaire, the sample presented a score of 10.10 ± 5.32. The mean pain severity was 2.04 ± 1.14. The time of evolution of the pain ranged from three to 120 months, with an average of 57.08 ± 44.46 months, with 28% of the individuals presenting with pain in the last 120 months or longer. From these subjects, 30% had not finished the elementary school, and 68% reported no other associated pathologies.

The results of the Rasch Analysis are shown on Table 3, where *MnSq* and *t (Infit and Outfit)* calibration values are described for each item. Results indicate that, of 17 items on ETC, two did not meet the expectations of the model. These are: item number 8 – "Just because something worsens my pain, it does not mean it is dangerous", and item number 5 – "People are not taking my medical condition seriously". It is noticed that, by the calibration measurement value, the questionnaire items indicating the lowest kinesiophobia level, meaning the one with the highest likelihood of an "entirely disagree" answer were items number 10 – "The safest measurement I can take for preventing my pain to become worse is simply being careful to not to make any unnecessary movement", and the item 13 – "Pain warns me when to stop the exercise to not to hurt myself". The item reporting the highest kinesiophobia level, that is, the one with the highest likelihood of an "entirely agree" answer was number 12 – "Although I feel pain, I would be better if I was physically active".

The separation rate for individuals was 2.0, indicating that the items divided people into two kinesiophobia levels. The separation rate for items was 4.52, which means that the items were divided into approximately five levels of kinesiophobia severity. The internal consistency of items was 0.95, and the reliability rate for individuals' answers was 0.80.

Figure 1 – items map – shows the continuous of kinesiophobia defined by questionnaire items, with individuals represented at left, and the kinesiophobia severity degree of items at right. This is a representation of the relationship between examined individuals' kinesiophobia severity with the kinesiophobia levels discriminated by scale items> According to this items/ individuals map, we can see some items at the top, with no alignment to any individual, which means that these items measure a very high kinesiophobia degree and no individuals existed in this sample with such fear of moving. At the bottom of the continuous, we can see that some individuals are in line with the item measuring a very low kinesiophobia level. This result characterizes the floor effect, which means that it is possible that those individuals present even lower levels of fear, if existent, but this was not detected due to the absence of items that could measure further lower kinesiophobia levels.

Variable	Average ± SD	Minimum	Maximum
Age (years)	41.98 ± 13.76	20	65
Evolution (months)	57.08 ± 44.46	3	120
Roland-Morris (score)	10.10 ± 5.32	1	22
Pain (EQD)	2.04 ± 1.14	0	5
ETC (total score)	39.18 ± 9.46	22	57

Table 2 – *Sample Characterization (n= 50).*

DISCUSSION

The purpose of the present study was to investigate the psychometric properties of a Brazilian version of the TSK in 50 individuals with CLP. Adequate test-retest reliability was observed. The results of the Rasch Analysis indicated that, from the 17 items of the ECT, two did not meet the expectations of the model: item number 8 "Just because something worsens my pain, it does not mean it is dangerous", and the item number 5 "People are not taking my medical condition seriously". The ETC showed an appropriate internal consistency and reliability of individuals' answers.

Valid and reliable instruments for assessing the specific fear of pain and movement are relevant for clinical practice and for a better

	Measurement (Calibration)	Error	Infit		Outfit	
			MnSq	t	MnSq	t
More kinesiophobia			**Maximum Estimated Measurement**			
12. Although I feel pain, I would be better if I was physically active	1.58	0.26	1.18	0.4	1.16	0.3
4. My pain would probably be relieved if I made some exercises	1.16	0.20	0.77	-0.9	1.19	0.4
14. It is not really safe for a person with problems similar to mine to be	1.08	0.20	0.84	-0.7	0.73	-0.7
2. If I tried to overcome this fear, my pain would increase	0.56	0.16	0.74	-1.5	0.60	-1.6
6. The injury put my body at risk for the rest of my life	0.44	0.16	0.87	-0.8	0.93	-0.3
17. Nobody should make exercises when in pain	0.44	0.16	0.86	-0.8	0.83	-0.7
8. Just because something worsens my pain, it doesn't mean it is dangerous *	0.23	0.15	1.42	2.1	1.71	2.5
16. Although something causes me a lot of pain, I don't think it is really dangerous	0.14	0.15	1.22	1.2	1.21	0.9
1. I'm afraid of getting hurt if I exercise	0.01	0.15	1.03	0.2	1.19	0.8
15. I cannot do all the things normal people do, because I easily get hurt	-0.24	0.14	0.87	-0.8	0.80	-1.1
5. People are not taking my medical condition seriously *	-0.29	0.14	1.45	2.3	1.65	2.7
11. I wouldn't fell so much pain if something really dangerous was not happening with my body	-0.39	0.15	0.77	-1.4	0.77	-1.2
9. I'm afraid of getting hurt by accident	-0.54	0.15	1.07	0.4	1.04	0.2
3. My body is telling me there is something very wrong happening with me	-0.59	0.15	0.86	-0.8	0.86	-0.6
7. Pain always means that my body is hurt	-0.72	0.15	1.00	0.0	1.09	0.4
13. Pain warns me when to stop exercising in order to not getting hurt	-1.33	0.18	0.85	-0.7	0.86	-0.4
10. The safest attitude I can take in order to prevent my pain from getting worse is just to be careful to not to make any unnecessary movement	-1.53	0.19	1.20	0.7	1.05	0.1
Less kinesiophobia						

***Table 3** – Calibration of items on Tampa Scale for Kinesiophobia.*

theoretical knowledge about pain and disability. There are evidences showing that CLP conditions and disability are better understood and addressed by means of a biopsychosocial model [19]. In addition, the early identification of individuals at risk of becoming chronic is required for planning an effective intervention and for preventing chronicity, thus reducing personal, social and economical consequences [2].
The ETC is an instrument that has been largely used for measuring the fear of movement and the fear of injury recurrence[20]. Studies have shown that individuals with high scores on the TSK present a worse performance in physical tests than the individuals with low scores in the scale [6,10,21]. Furthermore, high scores on ETC are more valuable for predicting an individual's level of disability than his/her clinical signs and symptoms, pain severity, duration of pain, and anxiety [10,19].
Subjects' Characteristics
The subjects in the present study showed ages and time of evolution of pain that are very similar to previous studies with patients with chronic[6] and acute pain[2], suggesting that lumbar pain affects, for an extensive time, economically active individuals. The average score on ETC of 39.18 ± 9.46 (range: 22 - 57) was equivalent to the scores of 38.4 ±7.8[6] and 44.4 ± 8.8[10] previously reported.
The average value for pain severity, as observed in this study, ranged from 0 to 5, was 2.04 ± 1.14, indicating that the degree of pain severity in individuals may be considered as moderate. Vlaeyen et al.[6] reported an average pain severity of 6.17 ± 2.35, also using the Analogous Visual Scale. No authors found a significant correlation between pain severity and kinesiophobia degree.
It is interesting to notice that although the total score on ETC reported in the present study was similar to values found in previous studies [6,10], the level of pain severity was lower, reinforcing the theory that pain severity is not a predictive factor for fear of movement. Vlaeyen et al.[6] showed that the fear of movement or the fear of injury recurrence occurs regardless of the level of pain severity.
The disability degree, as measured by Roland-Morris-Brasil, reported an average of 10.10 ± 5.32, lower than recommended cut point[12], suggesting that, in average, the individuals did not show disability. However, individual scores ranged from 1 to 22, showing a great variability of the sample.

Reliability

The test-retest reliability, with a 7-day interval was appropriate (CCI>0.80), suggesting good consistency and reproducibility of the answers. Swinkels-Meewisse et al.[2], by assessing scale reliability by means of test-retest with a 24-hour interval in patients with CLP have also found a good correlation rate (r=0.78). In the present study, ETC was applied by a single investigator, properly trained, in order to assure stability to the measurements and avoid bias from other factors that could be generated by including some investigator else. Many studies investigated the internal validity and consistency ranging from α=0,68-0,80[6,10]. Its Dutch version has also presented a well-established predictive validity and acceptable construct validity [20].
Swinhels-Meewisse et al.[2] investigated the psychometric properties of ETC in 176 individuals with acute lumbar pain, including its internal consistency and validity concurrent to *Fear-Avoidance Beliefs Questionnaire* (FABQ), which is a questionnaire with two subdivisions: labor-related fear and physical activities-related fear. The findings showed that the internal consistency was equivalent to that found in individuals with CLP reported by other studies [6,10]. Concurrent validity between ETC and FABQ ranged from poor to moderately strong (r= 0.33 to 0.38) for labor-related fears and from moderately strong to strong (r= 0.39 to 0.59) for items addressing physical activities-related fears.
The values reported in this study were higher than in previous stud-

ies, in which the internal consistency of ECT items was 0.96 and the individuals' answers reliability was 0.83. Those differences may be resultant from potential difficulties found by individuals in previous studies in interpreting items' structure and content, once, in the studies mentioned above, the questionnaire was self-applied. In this study, the questionnaire was applied as an interview, and the individual could settle any doubts arising out of the questionnaire [22].

Rasch Analysis

In the present study, the psychometric properties of the ECT were examined by means of the Rasch statistical analysis, which showed a very high reliability coefficient for items, which indicates items calibration stability. For the individuals, this coefficient was relatively high, meaning that the answers provided by them were also reliable and, therefore, those measurements can be reproduced in subsequent test applications. These findings corroborate previous results [6,10], where those properties were assessed by means of the *Alpha Cronbach's* calculation[2,6,10].

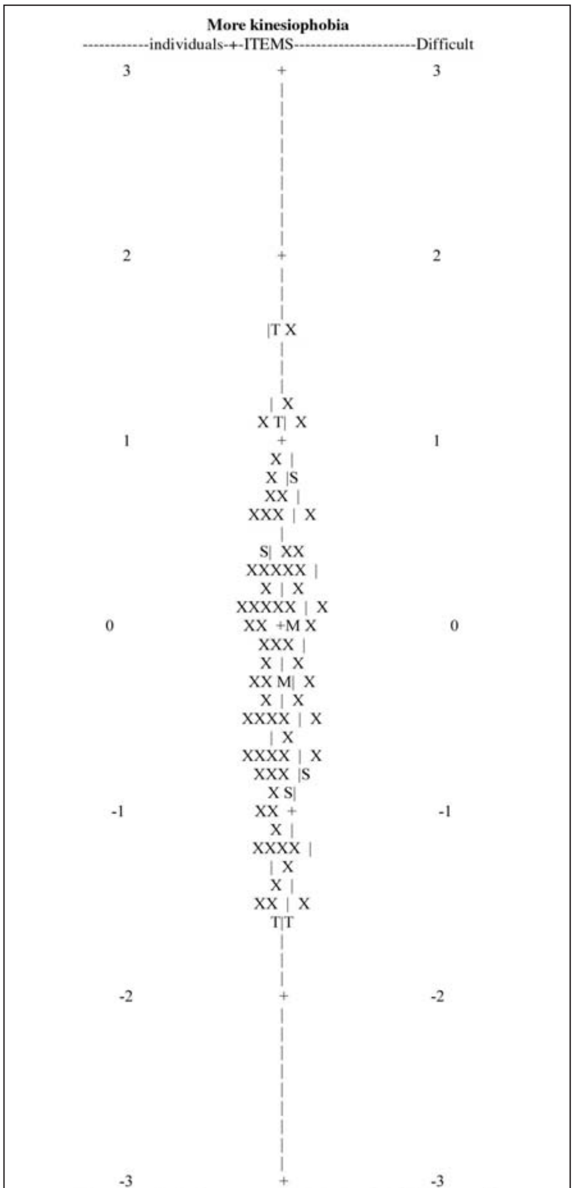

Figure 1 - *Map plotting individuals' performance concerning kinesiophobia levels on the scale.*

The Rasch Analysis pointed out as problematic items the number 5: "People are not taking my medical condition seriously", and the number 8: "Just because something worsens my pain, it does not mean it is dangerous". This means to say that the answers to these items were unexpected or controversial [15,18,23]. Unexpectedly, some individuals, even with severe kinesiophobia, disagreed with the statements of items 5 and 8, what is against the other answers provided to other items of the scale.

The variability of answers to item 5 "People are not taking my medical condition seriously" probably occurred as a result of the fact that this item is influenced by personal characteristics, such as: family structure, social-economical layer, etc. For example, people with severe kinesiophobia counting on family's support may disagree with this item, and people with severe kinesiophobia not counting on family's support may agree with this item.

Item 8 "Just because something worsens my pain, it does not mean it is dangerous" has also shown a problematic behavior and, in this case, the reason may be the poor understanding of the item due to a difficult formulation and also to the similarity between item 8 and item 16 *"although something causes me much pain, I don't think it is, in fact, dangerous"*. Indeed, upon such similar questions, an individual may fell compelled to give a different answer for each item, which has probably happened.

For the items mentioned above, this unexpected pattern of answers was more expressive for tow individuals' assessment, identified as number 2 and 47, one of them being a 63 year-old woman and a 46 year-old man, respectively. By reassessing the answers provided to other items of the scale, we could notice that these individuals perhaps did not understand well the statements related to problematic items. It must be highlighted that those results reflect kinesiophobia in individuals with moderate pain severity and with variable disability degrees and chronicity levels. It is possible that the problematic items found in this study present a distinct behavior when applied on different samples.

The two problematic items detected by the Rasch analysis represent approximately 11.7% of the total number of items in the scale, amount exceeding the 5% allowed by the statistical model. Because they do not 'match' on kinesiophobia continuous, that is, because they do not match to each other for measuring a single-dimension construct, they compromise scale construct validity, evidencing the need of reviewing, replacing or excluding these items in this sample[15,18,23,24]. Other studies using ETC factors analysis have also found construct problems.

Regarding the factorial analysis of the ECT in which empirical data were explored for discovering and detecting characteristics and relevant relationships without imposing a definitive model, two different structures were reported. The structural factor of the ECT, in the Dutch version [6], was examined in 129 individuals with CLP. They performed an analysis of the major components in all 17 items. Five items (5, 7, 8, 16 and 17) have been excluded because they presented a weight lower than 0.4.

Clark et al.[8] have also examined the internal structure of the ECT in 167 individuals with CLP by means of the analysis of major components. As a result, four items were excluded because they presented a poor association with the total score of the scale. The excluded items were those with supposedly inverted scores (4, 8, 12 and 16). Swinkels-Meewisse et al.[2] have also reported that the items with inverted scores (4, 8, 12 and 16) were the most problematic ones, and they concluded that both the internal consistency and the ECT reliability could be improved if those items were excluded.

On the top of the items map (Figure 1), two items can be seen as indicative of a higher level of kinesiophobia, to which none of the individuals of the sample scored as "entirely agree", which evidences that the scale has not presented a ceiling effect. On the bottom of the items map, we can notice that two individuals of the sample scored the item with the lowest kinesiophobia as "entirely disagree"> this floor effect shows that the scale did not present items measuring a very low level of kinesiophobia [15,18]. Nevertheless, as the score is used for measuring and identifying the

individuals with the highest degree of kinesiophobia, the presence of a floor effect does invalidate its use on clinical practice.
The results of the Rasch Analysis evidenced a low separation rate for individuals (2.2), which means that the individuals of the sample were divided into two kinesiophobia levels (high and low), but not into three, the minimum number expected for the model [15,18]. The expectations in the analysis of tests such as the ECT are the existence of a small number of individuals at the upper portion of the continuous, that is, few individuals with mild kinesiophobia, and also a small number of individuals at the lower portion of the continuous, that is, few individuals with severe. The majority of the individuals must be concentrated around the medium third of the continuous, characterizing a moderate level of kinesiophobia, but this behavior, according to the items map, was not satisfactorily reproduced. In summary, ECT did not divide the patients into distinct levels of kinesiophobia, presenting a little differentiation of patients.
The ETC shows potential to clinical applicability in individuals with CLP; however, caution must be exercised when interpreting test results, and the answers pattern must be observed, especially for those two items regarded as problematic. It is recommended that the ECT is applied in other samples and associated to other standardized instruments in order to better check its validity. If in other kinds of samples a number of erratic items above 5% persists, modifications to the scale are warranted, followed by subsequent studies for assessing the modified version.

CONCLUSION

The ETC showed a stable answers pattern and good test-retest reliability for individuals with CLP. The Rasch Analysis detected a percentage of erratic items above 5%, which compromises construction validity of the scale. The patients were divided into two kinesiophobia levels, not meeting Rasch model's expectations. No "ceiling effect" was detected for the study subjects, suggesting that ETC can be used in people with higher levels of kinesiophobia. The ETC presents a potential for clinical applicability in individuals with CLP; however, care should be taken when interpreting results, especially the answers to items regarded as problematic.

REFERENCES

1. Al-Obaidi SM, Al-Zoabi B, Al-Shuwaie N, Al-Zaabie N, Nelson RM. The influence of pain and pain-related fear and disability beliefs on walking velocity in chronic low back pain. Int J Rehabil Res. 2003; 26:101-8.
2. Swinkels-Meewisse EJ, Swinkels RA, Verbeek AL, Vlaeyen JW, Oostendorp RA. Psychometric properties of the Tampa Scale for kinesiophobia and the fear-avoidance beliefs questionnaire in acute low back pain. Man Ther. 2003; 8:29-36.
3. Vlaeyen JW, Crombez G. Fear of movement/(re)injury, avoidance and pain disability in chronic low back pain patients. Man Ther. 1999; 4:187-95.
4. Asmundson GJ, Norton PJ, Norton GR. Beyond pain: the role of fear and avoidance in chronicity. Clin Psychol Rev. 1999; 19:97-119.
5. Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. Pain. 2000; 85:317-32.
6. Vlaeyen JW, Kole-Snijders AM, Boeren RG, van EH. Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. Pain. 1995; 62:363-72.
7. Peters ML, Vlaeyen JW, Kunnen AM. Is pain-related fear a predictor of somatosensory hypervigilance in chronic low back pain patients? Behav Res Ther. 2002; 40:85-103.
8. Clark ME, Kori SH, Broeckel J. Kinesiophobia and chronic pain: psychometric characteristics and factor analysis of the Tampa scale. In: 15th Annual Scientific Meeting of the American Pain Society. Washington: American Pain Society, 1996. p.16-27.
9. Picavet HS, Vlaeyen JW, Schouten JS. Pain catastrophizing and kinesiophobia: predictors of chronic low back pain. Am J Epidemiol. 2002; 156:1028-34.
10. Crombez G, Vlaeyen JW, Heuts PH, Lysens R. Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. Pain. 1999; 80:329-39.
11. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol.1993; 46: 1417-32.
12. Nusbaum L, Natour J, Ferraz MB, Goldenberg J. Translation, adaptation and validation of the Roland-Morris questionnaire--Brazil Roland-Morris. Braz J Med Biol Res. 2001; 34:203-10.
13. Wright BD, Linacre JM. Observations are always ordinal; measurements, however, must be interval. Arch Phys Med Rehabil. 1989; 70:857-60.
14. McArthur DL, Cohen MJ, Schandler SL. Rasch analysis of functional assessment scales: an example using pain behaviors. Arch Phys Med Rehabil. 1991; 72:296-304.
15. Silverstein B, Fisher WP, Kilgore KM, Harley JP, Harvey RF. Applying psychometric criteria to functional assessment in medical rehabilitation: II. Defining interval measures. Arch Phys Med Rehabil. 1992; 73:507-18.
16. Chern JS, Kielhofner G, de las Heras CG, Magalhaes LC. The Volitional Questionnaire: psychometric development and practical use. Am J Occup Ther. 1996; 50:516-25.
17. Linacre JM. A user´s guide to Winsteps. In: Linacre JM. Ministeps rasch model computer programs. Chicago: Winsteps; 2004. p.32-45.
18. Velozo CA, Magalhaes LC, Pan AW, Leiter P. Functional scale discrimination at admission and discharge: Rasch analysis of the Level of Rehabilitation Scale-III. Arch Phys Med Rehabil. 1995; 76:705-12.
19. Burton AK, Tillotson KM, Main CJ, Hollis S. Psychosocial predictors of outcome in acute and subchronic low back trouble. Spine. 1995; 20:722-8.
20. Goubert L, Crombez G, Van DS, Vlaeyen JW, Bijttebier P, Roelofs J. Confirmatory factor analysis of the Tampa Scale for Kinesiophobia: invariant two-factor model across low back pain patients and fibromyalgia patients. Clin J Pain. 2004; 20:103-10.
21. Geisser ME, Haig AJ, Wallbom AS, Wiggert EA. Pain-related fear, lumbar flexion, and dynamic EMG among persons with chronic musculoskeletal low back pain. Clin J Pain. 2004; 20:61-9.
22. Teixeira-Salmela LF, Magalhaes LC, Souza AC, Lima MC, Lima RC, Goulart F. Adaptation of the Nottingham Health Profile: a simple measure to assess quality of life. Cad Saude Publica. 2004; 20:905-14.
23. Velozo CA, Kielhofner G, Lai JS. The use of Rasch analysis to produce scale-free measurement of functional ability. Am J Occup Ther. 1999; 53:83-90.
24. Harvey RF, Silverstein B, Venzon MA, Kilgore KM, Fisher WP, Steiner M, Harley JP. Applying psychometric criteria to functional assessment in medical rehabilitation: III. Construct validity and predicting level of care. Arch Phys Med Rehabil. 1992; 73:887-92.