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# Pain *Locus* of control scale: adaptation and reliability for elderly

## Escala de *Locus* de controle da dor: adaptação e confiabilidade para idosos

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## Abstract

**Background:** Pain is considered a multidimensional experience and is very common in the elderly. The pain locus of control has become essential to understand how the perceptions, expectations and beliefs are related to individual behavior, attitudes, coping and adherence of the elderly with regards to the health conditions and with the proposed treatment. Studies focused on adaptation and reliability of instruments are necessary for health professionals. **Objectives:** The present study performed the cross-cultural adaptation of the *Pain Locus of Control Scale* (C form of *Multidimensional Health Locus of Control*) for Brazil and assessed its intra and inter-examiner reliability among a sample of 68 elderly individuals with non-oncological pain living in the community. **Methods:** The cross-cultural adaptation of the scale was performed using the methodology standardized by Beaton et al. (2000)*. Pearson's correlation coefficient (PCC) and the intraclass correlation coefficient (ICC) were used for the statistical analysis ($p \leq 0.05$). **Results:** Average age of the subjects was 69.6 ± 5.5 years; most were women, with low levels of income and education. The average pain duration was 10.2 years and the main clinical diagnosis was osteoarthritis. The reliability of the scale was adequate, with a regular to very strong correlations (PCC = 0.60 to 0.93) and a moderate to nearly perfect ICC (0.60 to 0.93), in mainly the *chance locus of control* and *medical and healthcare professionals locus of control* subscales. **Conclusion:** An adequate reliability and applicability was observed in our sample after adjustments and adaptations of the scale for use in elderly

**Key words:** pain control; reliability; cross-cultural adaptation; elderly.

* Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-91.

## Resumo

**Contextualização:** A dor é considerada uma experiência multidimensional e muito prevalente em idosos. O *locus* de controle da dor tem se tornado fundamental para entender como percepções, expectativas e crenças individuais se relacionam a comportamentos, atitudes, enfrentamento e aderência dos idosos frente às condições de saúde e propostas de tratamento. Estudos focados na adaptação e confiabilidade de instrumentos são necessários para os profissionais de saúde. **Objetivos:** Realizar a adaptação transcultural, para o Brasil, do instrumento *Pain Locus of Control Scale* (forma C da *Multidimensional Health Locus of Control* ) e avaliar sua confiabilidade intra e interexaminadores em uma amostra de 68 idosos comunitários, com dor crônica não oncológica. **Métodos:** A adaptação transcultural da escala foi feita conforme metodologia padronizada por Beaton et al. (2000)*. Para análise estatística, foram usados os coeficientes de correlação de *Pearson* (CCP) e de correlação intraclasse (CCI) ($p \leq 0.05$). **Resultados:** A média de idade dos idosos foi de 69,6±5,5 anos, predominando mulheres, de baixa renda e escolaridade. O tempo médio de evolução da dor foi de 10,2 anos, e o principal diagnóstico clínico foi a osteoartrite. A confiabilidade da escala mostrou-se adequada com correlação de regular a muito forte (CCP=0,60 a 0,93) e de moderada a quase perfeita (CCI =0,60 a 0,93), principalmente nas subescalas de controle ao acaso e de profissionais médicos e de saúde. **Conclusão:** Após as adaptações e as adequações da escala para aplicação em idosos, verificou-se sua aplicabilidade e confiabilidade adequadas na amostra estudada.

**Palavras-chave:** controle da dor; confiabilidade; adaptação transcultural; idosos.

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## Introduction

Estimates indicate that 80% of elderly have health problems that predispose them to the development of chronic pain. Brazilian population data showed that over 60% of elderly reported chronic diseases which cause pain[1]. In American physical therapy clinics, 50% of patients were elderly who reported pain as the main complaint[2].

Impacts of chronic pain on quality of life of the elderly are associated with depression, disability and mortality[3]. The high prevalence of chronic pain requires the use of greater financial and health resources, which reflects negatively on health systems, on the individual and on the society[4].

The most used approach for the treatment of chronic pain is medication. In the elderly, some limitations of this therapy deserve consideration: the high cost, the frequent side effects and lower efficiency in improving symptoms. These limitations stimulate the search for other approaches, such as physical therapy, psychotherapy and behavioral therapy[5,6].

Pain is considered as a multidimensional experience[14]. Studies related to the experience of persistent pain point to the need of considering a biopsychosocial perspective for evaluation and treatment. In this model, the psychosocial factors interact with the biological ones[5,7].

Among the most widely used instruments to assess pain, there are the Visual Analogue Scale (VAS) and McGill Pain Questionnaire. The VAS is a unidimensional measure of pain intensity[8]. The McGill Pain Questionnaire, although multidimensional (assessing properties, quality, spatial distribution and pain intensity), does not address the individual's expectations and beliefs regarding pain. Instruments focused on these factors are necessary when considering their interference on individual's attitudes toward the proposed treatment[9].

Evidence show that psychological factors seem to interfere more strongly than social, demographic and physical factors on the painful experiences and they show to be important mediators in the treatment of chronic pain. Previous studies, with multivariate statistical analysis in adults and elderly with chronic pain, concluded that psychological factors (perception of pain control, feeling of incapacity in dealing with pain and passive coping strategies) are associated with depression, poorer quality of life, with functional disability and pain intensity[10-12].

According to the factors related to pain, stands the perception of pain control, the locus of control (LC), based on social learning theory[13]. The theory argues that, based on personal previous experiences, people acquire a perception of pain control that can be influenced by new experiences[14]. The pain LC has become critical to understand how the perceptions, expectations and beliefs relate to individual behavior, attitudes, coping and adherence of older people facing their health conditions and proposed treatment[14].

There are two forms which the individuals may experience predominantly who or what has control of the events of their life: internally (the individuals realize that life events are controlled by themselves) or externally[15]. External factors are divided into chance control (the individual realizes that life events are controlled by factors such as chance, luck or fate) or powerful people (the individual realizes that whoever controls the events are health professionals, family and others)[14,15].

Based in this theory, Wallston, Wallston and De Vellis[15] formulated the *Multidimensional Heath Locus of Control* (MHCL) scale (A and B forms), developed to evaluate LC of general states of health. These forms have been translated and adapted for Brazil and its psychometric properties have already been tested in the Brazilian population[16,17]. The A and B forms are more appropriate to observe the perception of LC of general states of health, limiting their observation to specific health conditions, such as cancer and pain[18-20].

Due to the need for adaptation of the A and B forms to assess pain, the author of the original scale proposed the development of a C form[20]. This scale aims to classify the location in which individuals realize predominantly who or what stops the control of their pain. Factor analysis of the main components of this new scale revealed four dimensions: internal LC, chance LC, other people LC ( friends and family), doctor and health professional LC[20]. There were no other published studies that have cross-culturally adapted and evaluated the psychometric properties of this new specific scale for pain and/or elderly in Brazil. Studies indicate that individuals who perceive pain control externally have greater functional disability, exhibit more psychological changes, use more health services and more often use coping strategies, such as catastrophic thoughts, prayers, and reduced activities[17,21]. In contrast, individuals who have a sense of internal LC describe pain with less frequency and intensity, have higher pain threshold, better functionality and use coping strategies focused on the problem. They also show less psychological alterations, greater social integration, more adherence to orientation treatments and better health conditions[22,23].

Although the LC is identified as relevant and widely studied[19,21] in Brazil, in the literature review carried out for the present study, few studies that use the construct of health and pain LC[16,17] were found. No published study, methodologically standardized, of translation and cross-cultural adaptation and about the reliability analysis about the C form scale for the assessment of pain LC in the Brazilian elderly was found.

Behavioral therapy is based on teaching individuals cognitive and behavioral strategies to control pain; inform about the effect of specific strategies (thoughts, beliefs and attitudes), emotions ( fear of pain) and behaviors (avoiding activities due

to fear of pain) and emphasize the primary role that they have to control pain and their adaptation against pain[2].

Behavior therapy may be comparable with physical therapy performance because both promote adoption of strategies of self-management for the treatment of pain[24]. Knowing the pain LC of patients allow the physical therapist and other health professionals to motivate the modification of inadequate behaviors and the use of specific coping skills, which influences in the improvement of adherence to exercises and of the functional capacity[9].

The aim of this study was to perform the translation and cross-cultural adaptation of the *Pain Locus of Control Scale* (C form) for Brazilian elderly with chronic pain, living in the community, and to assess its intra and inter-examiner reliability.

# Methods

This study was approved by the Ethics in Research Committee of The Universidade Federal de Minas Gerais (UFMG), Belo Horizonte (MG), Brazil (ETIC 110/06). Sixty eight community Brazilian seniors with chronic nonmalignant pain, persistent for more than three months and aged over 60 years participated: 30 seniors in the pilot phase to observe the applicability of the scale and 38 during the reliability analysis. Participants were recruited from outpatient services Clinics School of Belo Horizonte (MG), Brazil.

Individuals with acute pain, with visual and/or hearing deficits and those with cognitive impairment assessed by Mini-mental State Examination (Brazilian version)[25] were excluded.

## Instruments

For sample characterization, a structured questionnaire developed by the authors, containing sociodemographic and clinical data was applied.

The scale translated and adapted for the Brazilian elderly population used in this study was the C form of the *Multidimensional Heath Locus of Control* (MHCL) scale, which showed acceptable psychometric properties in the original study in a American sample (n=588) composed by adults: internal consistence with Cronbach's alpha greater than 0.7 in all subscales. The test-retest reliability, with an interval of six weeks, through the Pearson's Correlation Coefficient (PCC), showed correlations from regular (r=0.40) to strong (r=0.80)[20].

Following the recommendation of the author the application of the scale was performed by replacing the word health with the word pain. The scale has 18 items divided into four subscales, which correspond to the factors measured by the instrument: internal LC perception (6 items), chance LC (6 items), doctors and health professionals LC: (3 items) and others LC (3 items)[20]. Considering the low education level of the Brazilian elderly, after authorization by the author of the original scale, it was applied as an interview, and were used only four options of answers: "strongly disagree" (1 point), "slightly disagree" (2 points), "slightly agree" (3 points) and "strongly agree" (4 points), unlike the original scale which includes six options. Each subscale receives an independent score, ranging from 6 to 24 (internal and chance LC subscales) and from 3 to 12 (health professionals and others LC subscales). Each subscale can be applied separately and the higher its score, the higher is the LC dimension. The predominant perceptions of pain control were analyzed considering the subscales with higher scores.

## Procedures

After the author's authorization for the cross-cultural adaptation of the scale and the informed consent form was signed by the participants, the study was divided into two phases. The first phase took place the process of translation and cross-cultural adaptation of the scale, following the methodology proposed by Beaton et al.[26], which comprises the following steps: translation, synthesis of translations, back translation, discussion with a committee of specialists and application of the pre-final version of the scale (pilot phase). In the pilot phase, the pre-final version was applied to 30 seniors. On that opportunity, some expressions were found difficult to understand by the participants. They were again submitted for analysis of the expert committee.

The interdisciplinary discussion with the participants of the committee, two doctors (anesthesiologists and geriatricians), a psychologist, a physiotherapist, a methodologist of the scientific research, a translator and back translator, helped in solving the semantic, idiomatic, cultural and conceptual discrepancies between the original and adapted version of the scale. After this second discussion, the final version was established to collect data for reliability analysis (Appendix 1). Discussion with the expert committee culminated in suggestions to facilitate understanding of the scale by the elderly: initial explanation on how to complete the scale, permission for the spontaneous speech of the elderly after reading each item and use of a visual scale with the four options of answers.

The explanation on how to complete the scale was performed as following: prior to the application, it was explained to the participants that there was no right or wrong answers and that, agreeing or not, would depend on their individual experiences related to pain. The permission of the seniors' spontaneous speech, after reading each item by the examiner, facilitated the understanding. At that moment, the elderly, through previously experienced situations and repeating phrases with other

words, they understood better the item and chose answers more safely. For example, during the completion of item 6: "I am directly responsible for my pain getting better or worse", after reading the sentence, the examiner asked the participants: "Do you think that you can improve or worsen your pain? Give me an example.

When using the visual scale with the response options for the score of each item, after reading the sentence, the participants were asked whether they agreed or not with the item. From that first answer, the visual scale with four options (written in letter size 18 and different colors) were read and shown to the participant to select the final answer.

The evaluations were performed at office with only the presence of the examiner and the participant. Two examiners, previously trained, were responsible for data collection.

In the second phase of the study concerning the analysis of intra and inter-reliability, the scale was applied independently and blinded to the previous result. For the analysis of inter-examiner reliability, the participant attended on the first day of evaluation, and the two examiners applied the scale at different moments.

For the analysis of intra examiner reliability, the participant returned in a second day of evaluation, in a maximum interval of five days and answered the scale to the same examiner. No additional treatment could be initiated during the period between the two evaluations. The maximum interval of five days was adopted based on the availability of the participant and in order to avoid changes on the perception of the pain LC.

## Statistical analysis

Data on the sample characteristics were analyzed using measures of central tendency and dispersion and frequency distribution based on the distribution of each variable.

Pearson's correlation coefficient (PCC) and the intraclass correlation coefficient (ICC) were used for the reliability analysis. For the PCC analysis, the sample size calculation indicated the need for 22 seniors and for the ICC analysis, the need of 28 seniors. The calculations considered correlation (PCC) and reliability (ICC) coefficients equal or higher than 0.5, using two repeated measures, a power of 80% and a significance level of 5%.

The interpretation of the results obtained for the ICC was based on the cutoffs suggested by Landis and Koch[27]: below 0 = poor; 0 to 0.20 = weak; 0.21 to 0.40 = regular; 0.41 to 0.60 = moderate; 0.61 to 0.80 good and 0.81 to 1 = nearly perfect[27]. For the interpretation of the PCC results, the criteria adopted was the one suggested by Tiboni[28]: r=0.0 (no correlation); 0.1 to 0.3 (weak); 0.31 to 0.6 (regular); 0.61 to 0.9 (strong), 0.91 to 0.99 (very strong) and 1.0 (perfect)[28].

# Results

The mean age was 69.6±5.5 (range from 60 to 81) years. The clinical and social-demographic data can be observed in the Table 1.

The results show higher levels of reliability on the subscales of chance LC and doctors and health professionals LC. The subscale that showed lower reliability was others LC as family and friends.

The mean values for each subscale in both evaluations to demonstrate the intra and inter reliability with the PCC and the ICC can be observed in Tables 2 and 3.

In implementing the first version of the scale, 53.4% reported reasonable difficulty and 20%, a lot of difficulty in

**Table 1.** Clinical and social-demographic characteristics of the studied sample (n=68).

| Variables | n | % |
|---|---|---|
| Gender | | |
| Female | 58 | 85.3 |
| Male | 10 | 14.7 |
| Age (years) | | |
| Mean ± SD (range) | 69.6±5.5 (60-81) | |
| Marital status | | |
| Married | 32 | 47 |
| Single | 3 | 4.4 |
| Widow | 27 | 39.7 |
| Divorced | 6 | 8.9 |
| Educational level (years) | | |
| 0 | 12 | 17.6 |
| 1 to 7 | 51 | 75 |
| 8 or more | 5 | 7.4 |
| Financial income | | |
| No income | 6 | 8.8 |
| Up to 2 minimum wages | 54 | 79.4 |
| 2 to 5 minimum wages | 6 | 8.8 |
| 5 to 10 minimum wages | 2 | 3 |
| Major pain location | | |
| Cervical spine / head and face | 5 | 7.3 |
| Upper limb and shoulder | 13 | 19.1 |
| Thoracic spine | 3 | 4.4 |
| Lumbar spine | 16 | 23.5 |
| Pelvis and hip | 5 | 7.3 |
| Lower limb | 27 | 39.7 |
| Foot | 4 | 5.9 |
| Pain duration (years) | | |
| Mean ± SD (range) | 10.22±10.43 (0.5-51) | |
| Major clinical diagnosis | | |
| Osteoarthritis | 50 | 73.5 |
| Osteoporosis and osteoporotic fracture | 10 | 14.7 |
| Inflammatory musculoskeletal changes | 12 | 17.6 |
| Fibromyalgia | 8 | 11.8 |
| Other rheumatological disease | 5 | 7.35 |

SD = Standard Deviation.

**Table 2.** Results from the intra rater reliability analysis through the Pearson's Correlation Coefficients (PCC) and Intraclass Correlation Coefficients (ICC).

| *Locus* of control subscale | Rater in first time Mean (SD) | Rater in second time Mean (SD) | ICC (p value) | PCC (p value) |
|---|---|---|---|---|
| Internal | 19.6±3,7 | 20±3.25 | 0.72* | 0.72* |
| Chance | 14±5.12 | 12.9±5 | 0.90* | 0.90* |
| Doctors | 10.5±2.13 | 10.6±2,11 | 0.93* | 0.93* |
| Other people | 7.9±3 | 7.35±3.15 | 0.60* | 0.60* |

* p<0.0001. SD = Standard Deviation.

**Table 3.** Results from the inter-rater reliability analysis through the Pearson's Correlation Coefficients (PCC) and Intraclass Correlation Coefficients (ICC).

| *Locus* of control subscale | Rater 1 Mean (SD) | Rater 2 Mean (SD) | ICC (p value) | PCC (p value) |
|---|---|---|---|---|
| Internal | 20±3.8 | 19.7±4,5 | 0.77* | 0.79* |
| Chance | 13.5±5.4 | 14.1±5.26 | 0.90* | 0.90* |
| Doctors | 10.9±2.8 | 11±1.88 | 0.80* | 0.81* |
| Other people | 7.9±3.15 | 6.9±3.11 | 0.72* | 0.72* |

* p<0.0001. SD = Standard Deviation.

completing the scale. After the adjustments suggested by the expert committee, the results indicated that 42% reported no difficulty; 31.6%, reasonable, 26.4%, little difficulty and no elderly reported lot of difficulty.

## Discussion

During the translation and back translation process, a difficulty observed, already reported in the literature, was the choice of synonyms for terms that were adjectives or described feelings, as the terms: *a big role* and *plays a big part*[29]. Considering that some terms have no equivalents in Portuguese, it was necessary a translation based on the context. Faced with the difficulty of literal translation, the subjectivity of the construct assessed by the scale and characteristics of the sample, Brazilian elderly, in which emotional and cognitive peculiarities rules are inherent to the aging process, it became indispensable an adaptation in the application of the scale. This allowed spontaneous speech and examples by the elderly for the choice of answers. This form of application facilitated the understanding of items for this specific population.

The accomplishment of a pilot phase (application of the scale in 30 seniors), before establishing the final version, has strengthened the importance of this stage as well as the discussion with the expert committee in the translation process and adaptation of instruments. It is recommended that the application of the scale in the elderly do the following steps: explanation about on how to complete the scale, permission of spontaneous speech and use of a visual scale by the elderly for the choice of answers. In this sense, Scherest, Fay and Zaidi[30] point that, often, it is more important to explain the meaning of an expression than to try pair synonymous words[30].

The reliability of the subscales measured by the instrument shown to be adequate with intra and inter reliability in at least moderate for ICC and regular to very strong for the PCC. The comparison of the observed results with the one of other studies was limited due to the different forms of reliability analysis suggested by the literature. Most of them evaluated the reliability of the scale using only an internal consistency of the A or B forms of the MHLC scale[16, 21]. Wallston, Stein and Smith[20] used the C form of the scale, as in this study for analysis of test-retest reliability in a population of young well-educated, with various types of chronic nonmalignant pain. These authors observed a PCC ranging from regular to strong in the subscales in an interval of six weeks: r=0.80 in internal LC subscale, r=0.72 in chance LC, r=0.58 in doctors and health professionals LC and r=0.40 in others LC[20].

In the present study, there were observed higher correlations in the PCC when compared to the study of Wallston, Stein and Smith[20]. These differences may be related to the interval between the administrations of the scale that, in the present study, was a maximum of five days and, in the earlier study, six weeks. Wallston, Stein and Smith[20] justify that the interval of six weeks among the applications might have influenced the perceptions of control sources by the participants, interfering in the reliability[20]. These findings strengthen the evidence, already reported by other authors, that the pain LC is a subjective construct that can therefore be influenced by new experiences[21, 22].

In this study, there was a greater reliability of answers in subscales chance and doctors and health professionals LC and

a lower reliability on the subscales of internal and others LC. Although no studies that discuss these differences was found, these findings may be related to events, lived daily experiences and experiences reported by the elderly that seem to influence the perceptions of pain control.

During the second administration of the scale for the intra examiner reliability analysis, which allowed an interval of until five days among the applications, objective situations were consciously reported: three elderly noticed the difference in choice of answers provided to the examiner and justified with happened events. One of them reported to carry excessive weight and have done a lot of cleaning at home, another reported to have a pleasurable social contact with a neighbor, and the other reported to have an argument with family members. These facts even trivial may have influenced the choice of answers and reflected in a lower reliability of the subscales that assess the pain perception of internal and other LC.

The number of items contained in the others LC subscale (three items) may have influenced the lower reliability in the answers, as has already been pointed in another study[20]. However, this justification must be interpreted cautiously because lower reliability was not observed in the subscale doctors and health professionals, which also has three items.

With regards to the factors that seem to influence the belief of chance and doctors and health professionals LC, it was not allowed to start new treatments or medical consultations in the interval between applications. No participant reported different facts from those of the first assessment that might have influenced their beliefs.

Although the literature indicates that the intra examiner reliability is, in most studies, better than the inter examiner reliability, in the present study, this result was different. This result may have been influenced by the interval between applications to reliability analysis: applications were on the same day for analysis of inter examiners, with an interval of approximately 60 minutes and it was allowed a maximum of five days between applications for analyzing the intra examiner. The interval of five days may have provided the occurrence of events in the participants' lives that influenced the reliability estimates of the subscales. It is emphasized that this is a multidimensional scale in which daily situations that reflect on the emotional response possibly impact on the elderly answers. In this study, even with different scores on the subscales between the two evaluations, the elderly continued to be classified with the same preferential belief with regards to pain control.

In this study, it was observed that the form of application of the scale, allowing the elderly report and using the visual scale for the choice of answers, contributed to the observed consistency and the reliability indexes.

Some limitations of this study deserve consideration. The sample was recruited by convenience and there was clinical heterogeneity of the elderly, which may have affected the results.

## Conclusions

The study showed the applicability of the pain LC scale in a community sample of elderly with chronic pain. The use of this scale will increase the knowledge of pain LC of elderly allowing thus a more appropriate approach to chronic pain among this population. This study should be viewed as an initial mark towards the development the version of the instrument *Pain Locus of Control* (PLOC-C) to Brazilian Portuguese, since larger sample and with different characteristics should be evaluated, besides the accomplishment of studies that investigate other psychometric properties.

## References


1. Dellarozza MSG, Pimenta CAM, Matsuo T. Prevalência e caracterização da dor crônica em idosos não institucionalizados. Cad Saúde Pública. 2007;23(5):1151-60.
2. Beissner K, Henderson CR Jr, Papaleontioul M, Olkhovskaya Y, Wigglesworth J, Reid MC. Physical Therapists use of cognitive-behavioral therapy for older adults with chronic pain: a nationwide survey. Phys Ther. 2009;89(5):456-69.
3. Harris T, Cook DG, Victor C, DeWilde S, Beighton C. Onset and persistence of depression in older people-results from a 2-year community follow-up study. Age Ageing. 2006;35(1):25-32.
4. Geertzen JH, Van Wilgen CP, Schrier E, Dijkstrap PU. Chronic pain in rehabilitation medicine. Disabil Rehabil. 2006;28(6):363-7.
5. Barry LC, Gill TM, Kerns RD, Reid MC. Identification of pain-reduction strategies used by community-dwelling older persons. J Gerontol A Biol Sci Med Sci. 2005;60(12):1569-75.
6. Blumstein H, Gorevic PD. Rheumatologic illnesses: treatment strategies for older adults. Geriatrics. 2005;60(6):28-35.
7. Perez RS. Defining pain. Disabil Rehabil. 2006;28(6):339-41.
8. Santos CC, Pereira LSM, Resende MA, Magno F, Aguiar V. Aplicação da versão brasileira do questionário de dor Mcgill em idosos com dor crônica. Acta Fisiatrica. 2006;13(2):75-82.
9. Salvetti MG, Pimenta CAM. Validação da chronic pain self-efficacy scale para a língua portuguesa. Rev Psiquiatr Clín. 2005;32(4):202-10.
10. Tsai YF. Gender differences in pain and depressive tendency among Chinese elders with knee osteoarthritis. Pain. 2007;130(1-2):188-94.
11. Monsivais D, McNeill J. Multicultural influences on pain medication attitudes and beliefs in patients with nonmalignant chronic pain syndromes. Pain Manag Nurs. 2007;8(2):64-71.
12. Samwel HJA, Evers AW, Crul BJ, Kraaimaat FW. The role of helplessness, fear of pain, and passive pain-coping in chronic pain patients. Clin J Pain. 2006;22(3):245-51.
13. Rotter J. A teoria da personalidade social. In: Schultz DP, Schultz SE (editores). Teorias da personalidade. São Paulo: Thomson Learning; 2006. p. 414-31.
14. Dela Coleta MF. Locus de controle da saúde. In: Dela Coleta MF (editor). Modelos para pesquisa e modificação de comportamentos de saúde: teorias, estudos e instrumentos. São Paulo: Cabral Editora e Livraria Universitária; 2004. p. 199-238.

15. Wallston KA, Wallston BS, De Vellis R. Development of the multidimensional health locus of control (MHCL) scales. Health Education & Behavior. 1978;6(1):160-70.

16. Paine P, Pasquali L, Paulo Ede S, Bianchi AL, Solha AC. Psychometric properties of the brazilian health locus of control scale. Psychol Rep. 1994;75(1 Pt 1):91-4.

17. Rosero JER, Ferriani MGC, Dela Coleta MF. Escala de locus de controle da saúde-MHCL: estudo de validação. Rev Latinoam Enferm. 2002;10(2):179-84.

18. Luszczynska A, Schwarzer R. Multidimensional health locus of control: comments on the construct and its measurement. J Health Psychol. 2005;10(5):633-42.

19. Wallston KA. The validity of the multidimensional health locus of control scales. J Health Psycol. 2005;10(4):623-31.

20. Wallston KA, Stein MJ, Smith CA. Form C of the MHLC scale: a condition-specific measure of locus of control. J Pers Assess. 1994;63(3):534-53.

21. Gibson SJ, Helme RD. Cognitive factors and the experience of pain and suffering in older persons. Pain. 2000;85(3):375-83.

22. Coughlin AM, Badura AS, Fleisher TD, Guck TP. Multidisciplinary treatment of chronic pain patients: it´s efficacy in changing patient locus of control. Arch Phys Med Rehabil. 2000;81(6):739-40.

23. Cross MJ, March LM, Lapsey HM, Byrne E, Brooks PM. Patients self-efficacy and health locus of control: relationships with health status and arthritis-related expenditure. Rheumatology (Oxford). 2006;45(1):92-6.

24. Herning MM, Cook JH, Schneider JK. Cognitive behavioral therapy to promote exercise behavior in older adults: implications for physical therapists. J Geriatr Phys Ther. 2005;28(2):34-8.

25. Bertolucci PHF, Brucki SMD, Campacci SR, Juliano Y. O mini-exame do estado mental em uma população geral – impacto da escolaridade. Arq Neuropsiquiatr. 1994;52(1):1-7.

26. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-91.

27. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33(1):159-74.

28. Tiboni CGR. Estatística básica para o curso de turismo. 2ª Ed. São Paulo: Atlas; 2003.

29. Andrade M, Shirakawa I. Versão brasileira do defense style questionnaire (DSQ) de Michael Bond: problemas e soluções. Rev Psiquiatr Rio Gd Sul. 2006;28(2):144-60.

30. Scherest L, Fay TL, Zaidi SMH. Problems of translation in cross-cultural research. J Cross Cult Psychol.1972;3(1):41-56.

**Appendix 1.** - Pain locus of control scale- C Form / Pain Locus of Control Scale – C Form (PLOC-C).

Instructions for completing the scale (to be read to the patient, if applied as an interview): each item below is a belief statement about your pain that you may agree or disagree. Beside each statement is a scale that ranges from strongly disagree (1) to strongly agree (4). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer EVERY ITEM and that you circle ONLY ONE number per item. There are no right or wrong answers.

Scoring instructions for the scale (used by the examiner): The score on each subscale is the sum of the values circled for each item on the subscale (where 1 = strongly disagree and 4 = strongly agree). All of the subscales are independent of one another. There is no such thing as a "total" score. The score is observed in each subscale so that the subscale with the highest score reflects the prevailing belief of the individual in the control of pain.

| Subscale | Possible range | Items |
|---|---|---|
| Internal locus of control | 6-24 | 1,6,8,12,13,17 |
| Chance locus of control | 6-24 | 2,4,9,11,15,16 |
| Doctors and health care professionals locus of control | 3-12 | 3,5,14 |
| Other people locus of control | 3-12 | 7,10,18 |

| | | Strongly disagree | Slightly disagree | Slightly agree | Strongly agree |
|---|---|---|---|---|---|
| 1 | If my pain worsens, it is my own behavior which determines how soon I will feel better again. | 1 | 2 | 3 | 4 |
| 2 | As to my pain, what will be will be. | 1 | 2 | 3 | 4 |
| 3 | If I see my doctor regularly, I am less likely to have problems with my pain. | 1 | 2 | 3 | 4 |
| 4 | Most things that affect my pain happen to me by chance. | 1 | 2 | 3 | 4 |
| 5 | Whenever my pain worsens, I should consult a medically trained professional. | 1 | 2 | 3 | 4 |
| 6 | I am directly responsible for my pain getting better or worse. | 1 | 2 | 3 | 4 |
| 7 | Other people play a big role in whether my pain improves, stays the same, or gets worse. | 1 | 2 | 3 | 4 |
| 8 | Whatever goes wrong with my pain is my own fault. | 1 | 2 | 3 | 4 |
| 9 | Luck plays a big part in determining how my pain improves. | 1 | 2 | 3 | 4 |
| 10 | In order for my pain to improve, it is up to other people to see that the right things happen. | 1 | 2 | 3 | 4 |
| 11 | Whatever improvement occurs with my pain is largely a matter of good fortune. | 1 | 2 | 3 | 4 |
| 12 | The main thing which affects my pain is what I myself do. | 1 | 2 | 3 | 4 |
| 13 | I deserve the credit when my pain improves and the blame when it gets worse. | 1 | 2 | 3 | 4 |
| 14 | Following doctor's orders to the letter is the best way to keep my pain from getting any worse. | 1 | 2 | 3 | 4 |
| 15 | If my pain worsens, it's a matter of fate. | 1 | 2 | 3 | 4 |
| 16 | If I am lucky, my pain will get better. | 1 | 2 | 3 | 4 |
| 17 | If my pain takes a turn for the worse, it is because I have not been taking proper care of myself. | 1 | 2 | 3 | 4 |
| 18 | The type of help I receive from other people determines how soon my pain improves. | 1 | 2 | 3 | 4 |