Original Article

Cross-cultural adaptation of an instrument to measure work-related activities that may contribute to osteomuscular symptoms*

Adaptação cultural de instrumento que avalia atividades do trabalho e sua relação com sintomas osteomusculares

Adaptación cultural de un instrumento que evalúa actividades del trabajo y su relación con síntomas osteomusculares

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ABSTRACT

Objective: To translate the Work-Related Activities Questionnaire into Brazilian Portuguese and to evaluate its cross-cultural adaptation among a sample of Brazilian workers**. Methods**: International standard recommendations were followed to translate and back-translate the instrument, and to establish the cross-cultural adaptation of the instrument using content experts and pretest. A field testing of the instrument was conducted with 40 Brazilian workers. **Results**: The procedure used to establish the cross-cultural adaptation of the instrument was found to be adequate. The panels of experts evaluated the initial content validity of the items of the instrument and suggested necessary revisions to achieve an acceptable content validity. In the pretest, 7.5% of individuals suggested changes in one of the items of the instrument. In addition, 17.5% of the individuals reported having difficulty understanding the instructions to complete the instrument. These findings led to further revision of the instrument. **Conclusion**: The Brazilian version of the instrument was adequately cross-culturally adapted and validated.

Keywords: Human engineering**;** Cumulative trauma disorders, Risk factors, Occupational health; Translations

RESUMO

Objetivo: Traduzir e adaptar culturalmente o questionário *Work-related activities that may contribute to job-related pain and/or injury* para o português falado no Brasil e verificar a validade de conteúdo desta nova versão. **Métodos:** A adaptação cultural seguiu normas internacionalmente aceitas com as etapas de tradução, síntese, retro-tradução, avaliação por um comitê de especialistas e pré-teste. Esta versão do instrumento foi aplicada em 40 trabalhadores. **Resultados:** O procedimento de adaptação cultural foi realizado com sucesso. O comitê de especialistas verificou a validade de conteúdo e realizou algumas modificações. No pré-teste, 7,5% dos indivíduos indicaram sugestões para um item do questionário e 17,5% demonstraram dificuldades no entendimento da instrução. Informações adicionais foram incluídas para tornar o instrumento final mais compreensível. **Conclusões:** A versão brasileira deste instrumento foi obtida com sucesso.

Descritores: Engenharia humana; Transtornos traumáticos cumulativos; Fatores de risco; Saúde do trabalhador; Tradução

RESUMEN

Objetivo: Traducir y adaptar culturalmente el cuestionario *Work-related activities that may contribute to job-related pain and/or injury* al portugués hablado en el Brasil y verificar la validez de contenidos de esta nueva versión. **Métodos:** La adaptación cultural siguió normas internacionalmente aceptadas con las etapas de traducción, síntesis, retro-traducción, evaluación por un comité de especialistas y pre test. Esta versión del instrumento fue aplicada a 40 trabajadores. **Resultados:** El procedimiento de adaptación cultural fue realizado con éxito. El comité de especialistas verificó la validez de contenido y realizó algunas modificaciones. En el pre test, el 7,5% de los individuos indicaron sugerencias para un item del cuestionario y el 17,5% demostraron dificultades en el entendimiento de la instrucción. Las informaciones adicionales fueron incluidas para conseguir que el instrumento final sea más comprensible. **Conclusiones:** La versión brasileña de este instrumento fue obtenida con éxito.

Descriptores: Ingeniería humana; Trastornos de traumas acumulados; Factores de riesgo; Salud laboral; Traducción

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Received article **21/11/2007** and accepted **07/05/2008**

INTRODUCTION

Musculoskeletal disorders include a large number of inflammatory and degenerative conditions[1, 2] that are generally caused by physical demand on work[3]. There are a range of factors related to work that may contribute to the development of these disorders such as: repetitive motions, forceful exertions, static work, vibration, organizational and psychosocial factors[1, 4, 5]. Many studies have already shown this relation between work factors and symptoms[2, 5-11].

Work-related disability is most caused by musculoskeletal disorders for many occupational groups[9]. A good way to assess the prevalence and incidence of these symptoms and work factors are questionnaires at the job site[12].

The present work studied a simple questionnaire about musculoskeletal symptoms and work risk factors to be applied on Brazilian employees. It is largely used in the United States showing easy administration among the subjects. Since this instrument was originally written in English language and no similar validated questionnaire about this theme exists in Brazil, a cultural adaptation was necessary.

The cross-cultural adaptation process should follow international guides to keep the equivalence between the original and target versions[13].

Translation and cultural adaptation of this questionnaire to the Brazilian population would allow ergonomic analysis directly on workplace as well as comparison of the results with different countries and cultures.

The Questionnaire "Work-related activities that may contribute to job-related pain and/or injury"

The instrument, translated and adapted to the Brazilian-Portuguese language, was the "Work-related activities that may contribute to job-related pain and/or injury". It was originally developed by Rosecrance et al. in the United States in 1993 and its psychometric properties were published in 2002[12].

The goal of the questionnaire is to identify the most problematic activities related to job that may contribute to the development of musculoskeletal disorders. Thus, it allows prioritizing ergonomic interventions, evaluating their effectiveness, and preventing musculoskeletal disorders related to work.

The "Work-related activities that may contribute to job-related pain and/or injury" has been developed to obtain information about the employees` perceptions of 15 different job factors. In this type of instrument, the employees are asked to indicate how much of a problem each factor contributed to symptoms related to work using a scale from 0 to 10 (where 0 means no problem and 10 major problem)[12].

The questionnaire can be filled quickly during the work day and presents a high acceptability. The analyses can be made separately for each question using the above mentioned 0-10 scale[6-8].

A reliability of 0.8, measured by the Kappa coefficient, was obtained with a group of mason tenders through the test-retest procedure at one-week interval[8].

The aim of the present study was to translate and adapt culturally the questionnaire entitled Work-related activities that may contribute to job-related pain and/or injury to Brazilian-Portuguese language and to verify the content validity of this new version.

METHODS

Study Design and Subjects

The study was carried out in a metallurgic industry located at a city in the State of São Paulo, Brazil. It involved 40 employees, where half of them were from the production sector and the other half from the administrative one. Only participants with age higher than 18 years and that have been performing the same work tasks by at least three months were included.

Cross-Cultural Adaptation Process

The instrument was adapted culturally following methodological guides recommended by many researches[13-19]. The stages were: translation, synthesis, back-translation, revision by a committee, and pretesting.

Initial translation into the Brazilian-Portuguese language and Synthesis

The first stage was the translation of the instrument from the English language to the Brazilian-Portuguese one. To this end, two bilingual translators with the Brazilian-Portuguese language as their mother tongue made two independent translations. One of them had already experiences in health care area and knew about the concepts involved in the questionnaire while the other neither had experiences in health care nor knowledge about the involved concepts.

A meeting with the researchers and translators was arranged in order to achieve a common translation (synthesis) that was obtained by analyzing the individual translations.

Back-Translation

Having obtained the common translation, the instrument was translated back into the English language by another two different translators. They were bilingual persons having the English language as their mother tongue. These two back-translators had no knowledge about the concepts involved in the questionnaire and they also produced two independent back-translations.

Reviewer's Committee (Content validity)

At this stage, the content validity was firstly assessed

on a quantitative way followed by a qualitative analysis.

To accomplish that, a committee of six bilingual experts was organized: one physician specialized on occupational health, two nurses specialized on cross-cultural adaptation, one physical therapist that works in ergonomic area, one security engineer, and one professional translator. They received the translations, the synthesis, the two back-translations, and an instrument developed to facilitate their analyses prepared by the researchers.

Firstly, each judge made an initial independent assessment during ten days. The calculation of the percent agreement score, an important measurement to determine in a quantitative way the content validity[20], was possible with her/his judgment reports.

The percent agreement score was obtained for each item to determine if it was corresponding with the original concept, using the following formula[21]:

$$\% \text{ agreement} = \frac{\text{number of judges agreeing}}{\text{total number of judges}} \times 100 \quad (1)$$

The questionnaire items were considered with a good agreement by the Committee only when the agreement percentage was about 90%[20].

For the qualitative analysis, a discussion about the judges' suggestions was performed. The goal was to consolidate all the versions of the instrument and indicate which characteristics should be considered in the pre-final version. A consensus was reached achieving semantic, idiomatic, experiential, and conceptual equivalence[13].

After all suggestions made by the judges, the pre-final version was developed for field testing.

Test of the Pre-final Version

The pretest was applied on 40 subjects. Each of them filled the adapted instrument and, after that, they were individually interviewed to determine their understanding about the comprehension of words and items as well as the self-administered application itself[17].

Among the subjects, 20 of them were from production sectors of a metallurgical industry, 15 from the administrative sector of the same industry, and five liberal workers. Due to the fact that they presented different school levels, the verification of the population knowledge about the items and responses in a better way was allowed.

After the conclusion of pretest, the final Brazilian-Portuguese version was finally obtained. Appendix 1 presents the original and translated versions.

Data analysis

The questionnaire data were inserted in commercial statistical software (Excel/2003 for Microsoft Windows). Descriptive statistics were used to describe the sample, to verify the content validity of the adapted instrument, and to determine the pretest results.

Ethical Considerations

The full protocol was approved by the University's Research Ethics Committee. All subjects participating in the study were asked to sign an informed consent.

RESULTS

Description of the Sample

A total of 40 subjects participated in the study, with mean age of 29,9 +/- 8,2 years old. Most of them were men, representing 67,5% of total.

Reviewers' committee

The results of the meeting with the Expert Committee are presented in Table 1. They were calculated from the equation (1) presented before.

Table 1 - Percent agreement score calculated from the Expert Committee meeting

	Judges						TA	TJ	PAS (%)
	1	2	3	4	5	6			
Title	NA	A	NA	NA	NA	A	**2**	**6**	**33,3**
Instructions	A	A	NA	A	A	NA	**4**	**6**	**66,6**
Q1	NA	A	NA	NA	A	NA	**2**	**6**	**33,3**
Q2	NA	NA	NA	NA	NA	NA	**0**	**6**	**0,0**
Q3	A	A	A	A	A	A	**6**	**6**	**100,0**
Q4	A	A	A	A	A	A	**6**	**6**	**100,0**
Q5	NA	A	A	NA	A	NA	**3**	**6**	**50,0**
Q6	NA	A	NA	A	A	A	**4**	**6**	**66,6**
Q7	A	A	A	A	A	A	**6**	**6**	**100,0**
Q8	NA	A	NA	NA	A	A	**3**	**6**	**50,0**
Q9	NA	NA	NA	NA	NA	A	**1**	**6**	**16,6**
Q10	A	A	NA	A	A	NA	**4**	**6**	**66,6**
Q11	NA	A	A	NA	A	NA	**3**	**6**	**50,0**
Q12	A	A	A	A	A	A	**6**	**6**	**100,0**
Q13	A	A	A	A	A	NA	**5**	**6**	**83,3**
Q14	A	A	A	A	A	NA	**5**	**6**	**83,3**
Q15	A	A	A	A	NA	NA	**4**	**6**	**66,6**
Lay-out	A	A	A	A	A	A	**6**	**6**	**100,0**

TA=total of the judges that agreed with the item; TJ=total of Expert Committee's judges; PAS(%)= percent agreement score calculated from the equation (1); NA=not agreement; A= agreement.

Questions 3, 4, 7, 12 and the new lay-out of the adapted questionnaire had a percent agreement score of 100% and, therefore, no modifications were necessary.

However, simple grammar modifications were applied to most of the questions to facilitate the understanding of the statements, such as exchange of words, replacement by synonyms, and inclusion of verb at the beginning of the sentence.

The most extensive changes proposed by the Expert Committee were about the instruction, title, and questions 9 and 11. These were made to make the adapted version closer to the original and to make items more clear.

Pretest

Descriptive analyses showed that 7,5% of the subjects indicated some observations about the 15th item during

the pretest. They presented difficulties to understand the sentence and suggested an inclusion of a verb to improve the meaning of this item.

Furthermore, 35% of the participants of the administrative sector, which corresponds to the 17,5% of the whole studied population, demonstrated difficulties regarding the instruction of the adapted questionnaire. They did not understand how to answer the questions when the situation presented did not fit their current jobs. Additional information was included on the instruction of the questionnaire in order to clarify its comprehension. Before, the instructions were "This list describes things at work that could contribute to job-related pain and injury. Please indicate, on a scale of 0 to 10, how much of a problem (if any) each item is for you by circling the appropriate number". It was changed to a new one: "This list describes situations that could contribute to pain and injury related to your present job. Please circle on a scale of 0 to 10 (0=no and 10=extremely), how much each item is a problem to you. Indicate "no problem" for activities that are not related to your work".

DISCUSSION

It is worth to point out that there are instruments to analyze the prevalence of symptoms and physical stress at work. However, most of them are extensive, complicated, and a previous specific training is needed[22-24]. On the other hand, the present research studied a simple, quick, and self-administered questionnaire.

At the present time, there are a great number of questionnaires developed on a certain culture. The process of translation and cultural adaptation has been considered essential for comparisons between studies from different countries, languages, and cultures[25]. A well linguistically translation is not sufficient because items must also be adapted culturally to preserve the conceptual meaning of the questionnaire[17].

Many instruments have been adapted culturally in ergonomic area[18, 19, 22, 25-27]. The cross-cultural adaptation process of the Work-related activities that may contribute to job-related pain and/or injury to Brazilian-Portuguese language followed standardized guides: translation, synthesis, back-translation, Expert Committee, and pretesting.

Content validity determines the content relevance of items on an instrument and it can be judged by a panel of experts on the specific questionnaire's area[28, 29].

It is worth to mention that all the procedure used in the judgment of the content validity must be given to the judges in a well structured form in order to allow an independent initial judgment before the meeting with the other experts[30]. Specific instructions should be given from which the judges can determine the relevance of the content of the items and the whole instrument, as followed in the present study.

The quantitative analysis of this type of validity[20] can be very important to understand the research findings and their practical applications[28]. The qualitative evaluation allows that judges can discuss their own suggestions to produce the necessary cultural adaptations on the instrument content after a consensus has been achieved[29].

Others studies have already verified content validity considering the same stages carried out in this research[31, 32].

The pretest was the final step of the adaptation process and it provided useful information about how a person interprets questionnaires' items[13].

The changes made on the adapted version were authorized by the author of the original instrument after previous consultation.

After all the stages have been completed, the whole process of the cross-cultural adaptation finished.

The evaluation of the psychometric properties of the final version is currently being verified by the authors of this study. Reliability will be estimated through stability assessment (test-retest) and validity will be obtained by comparing contrasting groups and using a convergent instrument.

CONCLUSIONS

The cross-cultural adaptation process of the questionnaire about musculoskeletal symptoms and work risk factors to be used on Brazilian population was successfully completed following internationally accepted methodologies.

Modifications on the Brazilian-Portuguese version of the Work-related activities that may contribute to job-related pain and/or injury were made based on the Expert Committee and pretest results, which allowed the validation of its content to this language.

ACKNOWLEDGEMENTS

We acknowledge the financial support from the Brazilian agencies CAPES, CNPq, and FAPESP.

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APPENDIX 1

Work related activities that may contribute to job-related pain and/or injury Instrumento sobre fatores do trabalho que podem contribuir para sintomas osteomusculares

Instruction: This list describes things at work that could contribute to job-related pain and injury. Please indicate, on a scale of 0 to 10, how much of a problem (if any) each item is for you by circling the appropriate number.
(0 = not difficult at all 10 = extremely difficult)

Instrução: Esta lista descreve situações que poderiam contribuir para o desenvolvimento de dor e lesão relacionadas às suas atividades atuais de trabalho. Favor circular em uma escala de 0 a 10 (sendo 0 = nenhum e 10 = muito), quanto cada item constitui um problema para você. Assinale "nenhum problema" para as atividades que não fazem parte do seu trabalho.
(0 = nenhum problema 10 = muito problema)

1. Performing the same task over and over. Realizar a mesma tarefa repetidamente.	0	1	2	3	4	5	6	7	8	9	10
2. Working very fast for short periods (lifting, grasping, pulling, etc.). Trabalhar rápido durante curtos períodos (levantar, segurar, puxar, etc.).	0	1	2	3	4	5	6	7	8	9	10
3. Having to handle or grasp small objects. Ter que manusear ou segurar objetos pequenos.	0	1	2	3	4	5	6	7	8	9	10
4. Insufficient breaks or pauses during the work day. Intervalos ou pausas insuficientes durante a jornada de trabalho.	0	1	2	3	4	5	6	7	8	9	10
5. Working in awkward or cramped positions. Trabalhar em posições desconfortáveis/inadequadas ou em espaço muito apertado.	0	1	2	3	4	5	6	7	8	9	10
6. Working in the same position for long periods (standing, bent over, sitting, kneeling, etc.). Trabalhar na mesma posição por longos períodos (em pé, inclinado, sentado, ajoelhado, etc.).	0	1	2	3	4	5	6	7	8	9	10
7. Bending or twisting your back in an awkward way. Curvar ou torcer suas costas de maneira desconfortável.	0	1	2	3	4	5	6	7	8	9	10
8. Working near or at your physical limits. Trabalhar próximo ou no seu limite físico.	0	1	2	3	4	5	6	7	8	9	10
9. Reaching or working over your head or away from your body. Alcançar ou trabalhar em um nível acima da sua cabeça ou afastado do seu corpo.	0	1	2	3	4	5	6	7	8	9	10
10. Hot, cold, humid, wet conditions. Trabalhar em ambiente quente, frio, úmido ou molhado.	0	1	2	3	4	5	6	7	8	9	10
11. Continuing to work when injured or hurt. Continuar trabalhando quando está com alguma dor ou com alguma lesão.	0	1	2	3	4	5	6	7	8	9	10
12. Carrying, lifting, or moving heavy materials or equipment. Carregar, levantar ou mover materiais ou equipamentos pesados.	0	1	2	3	4	5	6	7	8	9	10
13. Work scheduling (overtime, length of workday). Jornada de trabalho (duração do trabalho, horas extras).	0	1	2	3	4	5	6	7	8	9	10
14. Using tools (design, weight, vibration, etc.). Usar ferramentas (formato, peso, vibração, etc.).	0	1	2	3	4	5	6	7	8	9	10
15. Training on how to do the job. Trabalhar sem receber treinamento.	0	1	2	3	4	5	6	7	8	9	10