Recommendations for the Cross-Cultural Adaptation of Health Status Measures

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Introduction

With the increase in the number of multi-national and multi-cultural research projects the need to adapt health status measures for use in other than the source language has also grown rapidly. Most questionnaires were developed in English speaking countries (Guillemin, 1993), but even within these countries, researchers must consider immigrant populations in studies of health especially when their exclusion could lead to a systematic bias in studies of health care utilization or quality of life (Guillemin, 1993).

The cross-cultural adaptation of a health status self-administered questionnaire for use in a new country, culture and/or language requires a unique methodology in order to reach equivalence between the original source and target languages. It is now recognized that if measures are to be used across cultures, the items must not only be translated well linguistically, but also adapted culturally in order to maintain the content validity of the instrument across different cultures. In this way we can be more confident that we are describing the impact of a disease or its treatment in a similar manner in multi-national trials or outcome evaluations. The term "cross-cultural adaptation" is used to encompass a process which looks at both language (translation) and cultural adaptation issues in the process of preparing a questionnaire for use in another setting.

Cross-cultural adaptations should be considered important to do in several different scenarios, in some cases this is more obvious than in others. Guillemin (1993) suggests five different examples of when attention should be paid to this adaptation by comparing the target (where it is going to be used) and source (where it was developed) language and culture. The first scenario is that it is to be used in the same language and culture in which it was developed. No adaptation is necessary. The other scenarios are summarized in Table 1, and reflect situations when some translation and/or adaptation will be required.

Table 1. Possible scenarios where some form of cross-cultural adaptation is required (adapted from Guillemin, 1993).

Wanting to use a questionnaire in a new population described as follows:		Results in a change in…..			Adaptation Required	
		Culture	Language	Country of use	Translation	Cultural adaptation
A	Use in same population. No change in culture, language or country from source	---	---	---	---	---
B	Use in established immigrants in source country	_	---	---	---	_
C	Use in other country, same language	_	---	_	---	_
D	Use in new immigrants, not English speaking, but in same source country	_	_	---	_	_
E	Use in another country and another language.	_	_	_	_	_

The guidelines described in this document are based on a review of cross-cultural adaptation in the medical, sociological and psychological literature. This review led to the description of a thorough

adaptation process aiming to maximize the attainment of semantic, idiomatic, experiential and conceptual equivalence between the source and target questionnaires (Guillemin, 1993). Further experience in cross-cultural adaptation of generic and disease-specific instruments, and alternative strategies driven by different research groups (Leplège A, 1994) have led to some refinements in the methodology since the 1993 publication. These changes make the process a little more time consuming, however the benefit is that the end product will be of better quality in terms of content and face validity.

The objective of the American Academy of Orthopaedic Surgeons (AAOS) is to provide guidelines for translating and adapting one or more of the AAOS outcome measures for use in another country, language or culture. In this way potential users of the instrument can verify first, they need to go through the cross-cultural adaptation process, and second, how they should proceed with the adaptation.

These guidelines will serve as a template for the adaptation process. The process involves the adaptation of individual items, the instructions for the questionnaire, and the response options. The text in the next section outlines the methodology suggested (Stages I - V). The subsequent section suggests an appraisal process whereby an advisory committee to the AAOS will assess whether or not the procedure recommended has been followed (Stage VI). If it has, it will be assumed that this is a satisfactory translation/adaptation of the questionnaire.

Adaptation strives to produce equivalency based on content. This suggests that the other statistical properties such as internal consistency, validity and reliability might be retained. However, this is not necessarily the case -- for instance if the new culture has a different way of doing a task that makes it inherently more or less difficult relative to other items. This would change the validity, certainly in terms of item-level analyses (such as item response theory, Rasch). Further testing should be done on an adapted questionnaire to verify the psychometric properties. Interesting research is ongoing in Europe who is facing an urgent need to have health status measures to use across the many countries in the EU.

Guidelines for the cross-cultural adaptation process.

The following figure outlines the cross-cultural adaptation process being recommended by the AAOS Outcomes committee. Each stage (including a summary of resources needed and reports required by the AAOS) is described in detail below. AAOS approval of the final version of the outcome measure is dependent on provision of enough evidence that the described stages have been successfully followed in the adaptation process.

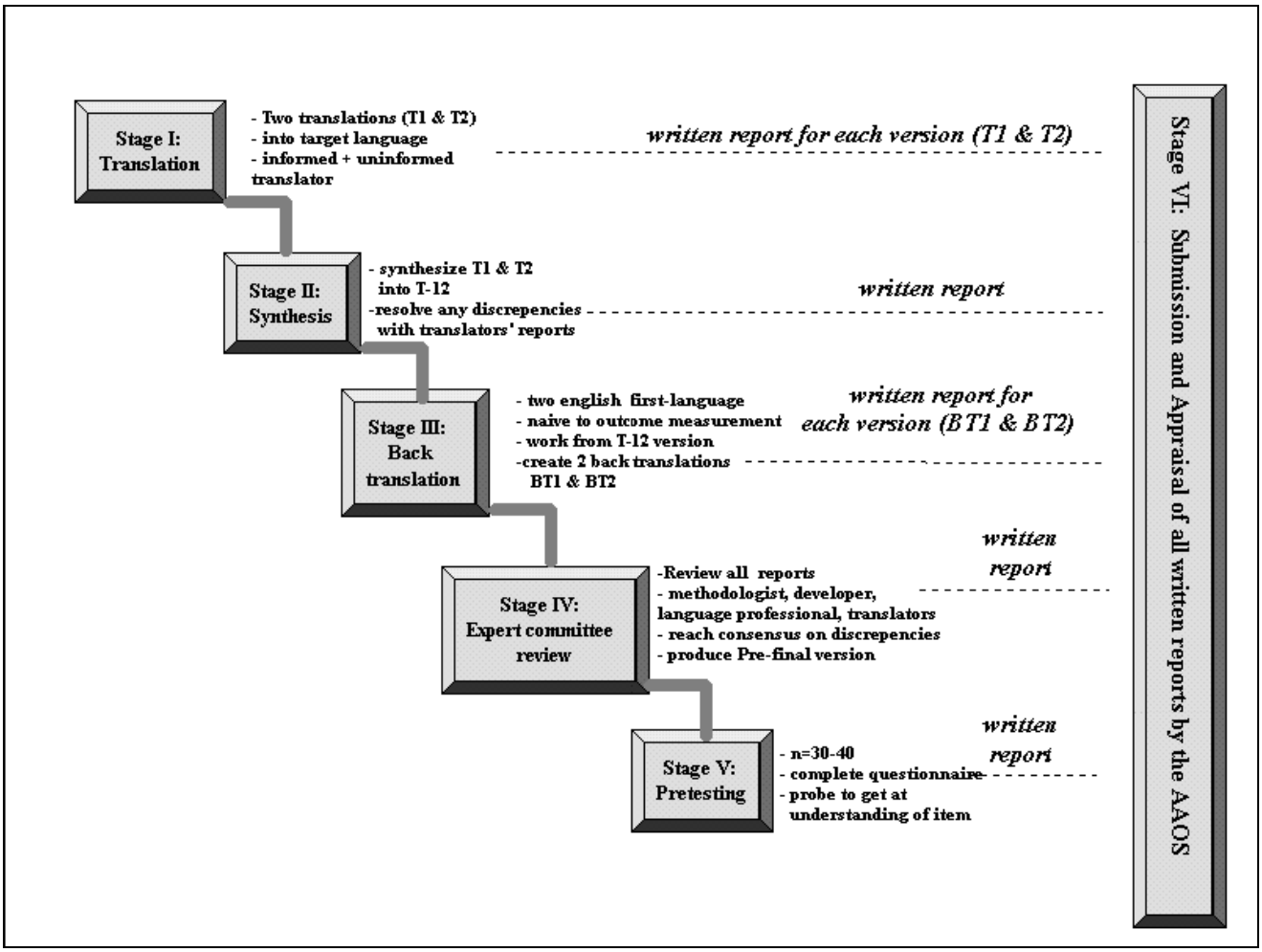

Figure 1. Graphical representation of the stages of cross-cultural adaptation recommend for approval of a translated version of an outcome measure by the AAOS.

Stage I: Initial Translation:

The first stage in adaptation is the forward translation. Many recommend that at least two forward translations are made of the instrument from the original language (source language) to the target language. In this way the translations can be compared, and discrepancies which may reflect more ambiguous wording in the original, or discrepancies in the translation process. Poorer wording choices are identified and resolved in a discussion between the translators.

The two independent translations are produced by bilingual translators with the target language as their mother tongue. Translations into the mother tongue, or first language, more accurately reflect the nuances of the language (Hendricson, 1989).

The translators each produce a written report of the translation which they did. Additional comments are made to highlight challenging phrases or uncertainties. Their rationale for their choices is also summarized in the written report. Item content, response options, and instructions are all translated in this way.

The two translators should have different profiles, or backgrounds.

Translator # 1: One of the translators should be aware of the concepts being examined in the questionnaire being translated (functional disability, or neck and shoulder disorders). Their adaptations will be aimed at equivalency from a more clinical perspective, and may produce a translation aiming at a more reliable equivalence from a measurement perspective.

Translator # 2: The other translator should neither be aware nor be informed of the concepts being quantified, and preferably have no medical/clinical background. This is called a "naive"translator and he or she is more likely to detect different meaning of the original than the first translator. They will be less influenced by an academic goal, and offer a translation that reflects the language used by that population, often highlighting ambiguous meanings in the original questionnaire (Guillemin, 1993).

Stage II: Synthesis of these translations.

The two translators, and a recording observer, sit down to synthesize the results of the translations. Working from the original questionnaire as well as the first translator's version (T1) and the second translator's (T2), a synthesis of these translations is first conducted (producing one common translation T-12), with a written report carefully documenting the synthesis process: each of the issues addressed and how it was resolved. It is important that it is resolved by consensus rather than one person compromising their feelings. The next stage works using this T-12 version of the questionnaire.

Stage III: Back-translation:

Working from the T-12 version of the questionnaire, and totally blind to the original version, the questionnaire is then translated back into the original language. This is a process of validity checking to make sure that the translated version is reflecting the same item content as the original version, often magnifying unclear wording in the translations. However, agreement between the back translation and the original source version does not guarantee a satisfactory forward translation version (T-12), as it could be incorrect, but just get translated consistently (Leplege, 1994). Back translation is only one type of validity check, highlighting gross inconsistencies or conceptual errors in the translation.

Once again, two of these back-translations are considered a minimum. The back-translations (BT1 and BT2) are produced by two persons with the source language (English) as their mother tongue. The two translators should neither be aware nor be informed of the concepts explored, preferably without medical background. The main reasons are to avoid information bias, and to elicit unexpected meanings of the items in the translated questionnaire (T-12) (Guillemin, 1993, Leplege, 1994) thus increasing the likelihood of "highlighting the imperfections"(Leplege, 1994).

Stage IV: Expert committee:

The composition of this committee is crucial to achieve cross-cultural equivalence. The minimum composition comprises methodologists, health professionals, language professionals and translators (forward and backward translators). The original developers of the questionnaire are in close contact with the expert committee during this part of the process.

The expert committee's role is to consolidate all the versions of the questionnaire and develop what would be considered the pre-final version of the questionnaire for field testing. The committee

will therefore review all the translations and reach a consensus on any discrepancy. The material at the disposal to the committee includes the original questionnaire, and each translation (T1, T2, T12, BT1, BT2) together with corresponding written reports (which explain the rationale of each decision at earlier stages).

Critical decisions are being made by the expert committee so, again, full written documentation should be made of the issues and the rationale for coming to a decision about them.

Decisions will need to be made by this committee to achieve equivalence between the source and target version in four areas (Guillemin, 1993):

> **Semantic equivalence**: Do the words mean the same thing? Are their multiple meanings to a given item? Are there grammatical difficulties in the translation?
>
> **Idiomatic equivalence**: Colloquialisms, or idioms, are difficult to translate. The committee may have to formulate an equivalent expression in the target version. For example the term "feeling downhearted and blue" from the SF-36 has often been difficult to translate, and an item with similar meaning would have to be found by the committee.
>
> **Experiential equivalence**: Items are seeking to capture and experience of daily life, however; often in a different country or culture, a given task may simply not be experienced (even if it is translatable). The questionnaire item would need to be replaced by a similar item that is in fact experienced in the target culture. An example might be in an item worded: do you have difficulty eating with a fork? When that was not, the utensil used for eating in the target country.
>
> **Conceptual equivalence**: Often words hold different conceptual meaning between cultures (for instance the meaning seeing your family as much as you would like would differ between cultures with different concepts of what defines "family" - nuclear versus extended family).

The committee will have to examine the source and back-translated questionnaires for all of these types of equivalence. Consensus should be reached on the items, and if necessary, repetition of the translation/back translation process to clarify how another wording of an item would work. The advantage of having all translators present on the committee is obvious, as tasks such as that could be done immediately. Items, instructions and response options must be considered. They should also make sure that the final questionnaire would be understood by the equivalent of a 12-year-old (roughly a grade six level of reading) as is the general recommendation for questionnaires.

Stage V: Test of the pre-final version:

The final stage of adaptation process is the pretest. This field test of the new questionnaire seeks to use the pre-final version in subjects/patients from the target setting. Ideally between 30-40 persons should be tested.

Each subject completes the questionnaire, and is interviewed to probe about what they thought was meant by each questionnaire item and their response. Both the meaning of the items and responses would be explored. This ensures that the adapted version is still retaining its equivalence in an applied situation. The distribution of responses is examined to look for a high proportion of missing items or single responses.

The results of this stage are summarized and submitted to the AAOS committee for review.

It should be noted, that while this stage does provide some useful insight into how the person

interprets the items on the questionnaire, it does not address the construct validity, reliability or item response patterns which are also critical to describing a successful cross-cultural adaptation. The described process provides for some measure of quality in the content validity. Additional testing for the retention of the psychometric properties of the questionnaire is highly recommended, however not required for approval of the translated version of the questionnaire. This is in keeping with other guidelines for the translation and adaptation of other measures.

Stage VI: Submission of documentation to the AAOS Committee for Appraisal.

The final stage in the adaptation process is a submission of all the reports and forms to the AAOS committee who will be verifying that the recommended stages were followed, and the reports seem to be reflecting this process well. In effect it is a process audit, were all the steps followed and necessary reports followed. It will *not* be up to this committee to alter the content, it will be assumed that by following this process a reasonable translation has been achieved.

Once the appraisal is complete, the committee will render one of three decisions: approved, requires clarification, or not approved. In the case of the second response, the applicants will have the opportunity to resubmit their application with the needed revisions. If approved, the adapted version of the questionnaire will be considered the "authorized" translation and will be made available to others who might be able to make use of it.

Common Questions & Answers

Can I avoid the translation process by just working on cultural adaptation from a version already available in my language, but in a different culture/country?

The first thing to do is to see if the previously adapted version has cultural equivalency in your population. This can be done by pretesting the adapted version in a sample of your patients and then probing (speaking to the patients in detail) as to the meaning and relevance of the items. If there are any concerns (e.g., consistently missing items, or reported confusion over a given question) then a cross-cultural adaptation should be done. It would be recommended to start with the original US-English version of the questionnaire for this process in order to be as close to the original with the final product.

Why do I need to go through this extensive process?

Although this seems like a lot of work, it produces a questionnaire which should be close to the original questionnaire. Having a cross-culturally adapted health outcome measure means that one is closer to having equivalent "rulers" to measure health across different cultural groups. This would mean that multinational studies could use the same health status measure, or patients who speak different languages could still be contributing to the outcome database or case series review in a clinical practice. Exclusion of these patients because of their lack of ability to complete a questionnaire in English is a concern. They may not have the same results (ie, satisfaction with care) as others, and any quality improvement activities may exclude their perspective by necessity.

What about the reliability and validity of the new version?

Cross-cultural adaptation tries to ensure a consistency in the content, and face validity between source and target versions of a questionnaire. It should therefore follow that the resultant version should have sound reliability and validity if the original version did. However, this is not always the case perhaps because of subtle differences in the way things are done in different cultures that render that item more or less difficult than other items in the questionnaire. Changes such as that could alter the statistical or psychometric properties of an instrument.

It is highly recommended that after an adaptation process, investigators ensure that the new version has demonstrated the measurement properties needed for the intended application. Describing a group of patients with a given condition requires strong evidence of construct validity (is it measuring what it is supposed to be measuring?). Evaluating change over time requires not only construct validity but also test-retest reliability (do the score's stay the same when the patients have not changed?) and responsiveness (ability to detect change when it has occurred).

It is possible to work some of these tests of reliability and validity into the pretesting process (stage V of the adaptation). If that has been done, include the results of that analysis in your final report.

Why isn't the AAOS doing all the translations and adaptations?

The answer is quite simple, the AAOS would have no idea which to do first, and where to stop. By providing the guidelines, the market is taking the lead in terms of what adaptations

are priorities. This allows clinicians and researchers to move ahead with the adaptation process. It also makes the process easier in that the individual countries likely have access to the translators and back-translators in their communities more readily than the AAOS would be able to assemble such a committee.

What if I don't do the whole adaptation process, and/or don't submit my reports to the AAOS for appraisal?

Of course, the choice to follow these recommendations is up to you. However, the main implication is in the copyright. The final approval of the translated version (using the appraisal of the adaptation process described in these guidelines) is required for that version to be considered the "official" translation of the instrument for the language/culture. Only official, approved versions may use the name AAOS, or the specific name of the instrument such as the DASH. The names themselves are under copyright. We would ask that you respect that copyright and follow the guidelines for quality translation. However if you refuse to do so, we ask that you refrain from using the name DASH, AAOS or COMSS with an unapproved version, even if you call it "modified" (e.g. do not use the term Modified-DASH)

What about translations of the instruments (like the DASH) that are already in circulation?

The AAOS and the Institute for Work & Health have already been discussing the cross-cultural adaptation process with several researchers in various countries. It is also available in the literature in a slightly more detailed format (Guilleman, 1993). There are therefore versions that have pretty much followed these guidelines already, and others that have not. The already translated versions will be appraised in the same manner as is being suggested in these guidelines. Researchers will be asked to submit their translation process if they wish to use the name of the instrument or refer to the AAOS when describing their outcome measures in any way.

How do I get an "official" adapted version of a questionnaire?

The AAOS and the Institute for Work & Health (the latter for the DASH only) will be keeping an ongoing list of the approved versions of the questionnaire that are available in different languages of cultures. These will be made available for others to use in the same way that the outcome measures are currently made available.

References:

Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. *Journal of Clinical Epidemiology* 1993; 46: 1417-1432.

Hendricson, WD, Russel IJ, Jacobson JM, Rogan H, Bishop GD, Castill R. Development and initial validation of a dual language English-Spanish format for the Arthritis Impact Measurement Scales. Arthritis Rheum 1989;32:1153-1159.

Leplège A, Verdier A. The adaptation of health status measures. A discussion of certain methodological aspects of the translation procedure. *In*: Shumaker S, Berzon R, Ed. *The international assessment of health-related quality of life: Theory, translation, measurement and analysis*. Rapid communications of Oxford, Oxford, 1994.

Anderson RT, Aaronson NK and Wilkin D. Critical review of the international assessments of health -related quality of life generic instruments. *In*: Shumaker S, Berzon R, Ed. *The international assessment of health-related quality of life: Theory, translation, measurement and analysis*. Rapid communications of Oxford, Oxford, 1994.

Acknowledgements: This document was based in large part on the work of Guillemin et al, 1993. Readers are encouraged to review this article for more details on the development of this process, and the literature review conducted to do so.

Appendices:

The following appendices provide sample forms that could be used for the translation/adaptation process. These actual forms are optional, but might be considered useful in that they contain the information that will be needed in the final appraisal (see appendix G). Appendices B, C & D in this document were created using the DASH outcome measure, one of the many instruments in the Musculoskeletal Outcomes Research and Assessment database, as an example. Similar forms can be generated to document the item content, instructions and response options for any measure being adapted.

A: Sample form for submission of adapted version to the AAOS
- summary sheet, checklist

B: Translation form

C: Synthesis of translated versions

D: Back translation form

E: Expert committee report

F: Pilot testing report

G: AAOS appraisal of adaptation process

Appendix A: Report on the Cross-Cultural Adaptation of an AAOS/COMSS/IWH Outcome Measure

Name of applicant: _____

Date of Submission to AAOS: _____(dd/mm/year)

Date of Review by AAOS: _____(dd/mm/year)

Source Questionnaire:

Questionnaire being adapted: _____Version_____

Target group information:

Country where it will be used: _____

Culture: _____

Language: _____

Resources used and reports included in this package:

	Names	Report included? *Tick box if included*
Forward translators:	1.	❑
	2.	❑
Synthesis of translations	A/A	❑
Back-translators:	1.	❑
	2.	❑
Expert committee:	Methods:	❑
	Clinician:	
	Language expert:	
	All translators: ❑ T1 ❑T2 ❑ BT1 ❑ BT2	
Pretesting	Coordinator:	❑

AAOS Use Only:

Final Status: ❑ Approved as submitted. AAOS approval granted.
❑ Request resubmission with additional info (details in letter).
❑ Refused. Not an official version of questionnaire.

Signed: _____
(AAOS Committee Chair)

Appendix B. Forward Translation Into Target Language. Using the DASH questionnaire as an example.

Translator *(circle one)*: #1 #2
Name of translator: _____
Profile of translator *(circle one)*: Aware of health status concept Naive to concept

The DASH Questionnaire.

Original Version Item:	Forward Translated Version (T-1 or T-2)
Instructions: This questionnaire asks about your symptoms as well as your ability to perform certain activities.	
Please answer every question, based on your condition in the last week, by circling the appropriate number.	
If you did not have the opportunity to perform an activity in the past week, please make your best estimate on which response would be the most accurate.	
It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.	
Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.	
1. Open a tight or new jar.	
2. Write.	
3. Turn a key.	
4. Prepare a meal.	
5. Push open a heavy door.	
6. Place an object on a shelf above your head.	
7. Do heavy household chores (e.g., wash walls, wash floors).	
8. Garden or do yard work.	
9. Make a bed.	
10. Carry a shopping bag or briefcase.	
11. Carry a heavy object (over 10 lbs.).	

Original Version Item:	Forward Translated Version (T-1 or T-2)
12. Change a lightbulb overhead.	
13. Wash or blow dry your hair.	
14. Wash your back.	
15. Put on a pullover sweater.	
16. Use a knife to cut food.	
17. Recreational activities which require little effort (e.g., card playing, knitting etc.).	
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	
19. Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.).	
20. Manage transportation needs (getting from one place to another).	
21. Sexual activities.	
22. During the past week, to what extent has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	
23. During the past week, were you limited in your work or other daily activities as a result of your arm, shoulder or hand problem?	
24. Arm, shoulder or hand pain.	
25. Arm, shoulder or hand pain when you perform any specific activity.	
26. Tingling (pins and needles) in your arm, shoulder or hand.	
27. Weakness in your arm, shoulder or hand.	

Original Version Item:	Forward Translated Version (T-1 or T-2)
28. Stiffness in your arm, shoulder or hand.	
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand?	
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem.	
Work Module: The following questions ask about the impact of your arm, shoulder or hand problem on your ability to work (including homemaking if that is your main work role). Please indicate what your job/work is: I do not work. (You may skip this section)	
Please circle the number that best describes your physical ability in the past week. Did you have any difficulty:	
1. Using your usual technique for your work?	
2. Doing your usual work because of arm, shoulder or hand pain?	
3. Doing your work as well as you would like?	
4. Spending your usual amount of time doing your work?	
High performance sports/musicians The following questions relate to the impact of your arm, shoulder or hand problem on playing your musical instrument or sport or both. If you play more than one sport or instrument (or play both), please answer with respect to that activity which is most important to you. Please indicate the sport or instrument which is most important to you. I do not play a sport or an instrument (you may skip this section)	
1. Using your usual technique for	

Original Version Item:	Forward Translated Version (T-1 or T-2)
playing your instrument or sport?	
2. Playing your usual musical instrument or sport because of arm, shoulder or hand pain?	
3. Playing your usual musical instrument or sport as well as you would like?	
4. Spending your usual amount of time practicing or playing your instrument or sport?	
Translation of response categories	
No difficulty Mild difficulty Moderate difficulty Severe difficulty Unable So much difficulty that I can't sleep	
Not at all Slightly Moderately Quite a bit Extremely	
Not limited at all Slightly limited Moderately limited Very limited Unable	
None Mild Moderate Severe Extreme	
Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree	

Appendix C: Form summarizing the synthesis of the two forward translations (Version T-12)

** Submit notes on discrepancies and their resolution on separate form.

The DASH Questionnaire.

Original Version Item:	Final Translated Version (T-12)
Instructions: This questionnaire asks about your symptoms as well as your ability to perform certain activities.	
Please answer every question, based on your condition in the last week, by circling the appropriate number.	
If you did not have the opportunity to perform an activity in the past week, please make your best estimate on which response would be the most accurate.	
It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.	
Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.	
1. Open a tight or new jar.	
2. Write.	
3. Turn a key.	
4. Prepare a meal.	
5. Push open a heavy door.	
6. Place an object on a shelf above your head.	
7. Do heavy household chores (e.g., wash walls, wash floors).	
8. Garden or do yard work.	
9. Make a bed.	
10. Carry a shopping bag or briefcase.	
11. Carry a heavy object (over 10 lbs.).	
12. Change a lightbulb overhead.	
13. Wash or blow dry your hair.	
14. Wash your back.	

Original Version Item:	Final Translated Version (T-12)
15. Put on a pullover sweater.	
16. Use a knife to cut food.	
17. Recreational activities which require little effort (e.g., card playing, knitting etc.).	
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	
19. Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.).	
20. Manage transportation needs (getting from one place to another).	
21. Sexual activities.	
22. During the past week, to what extent has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	
23. During the past week, were you limited in your work or other daily activities as a result of your arm, shoulder or hand problem?	
24. Arm, shoulder or hand pain.	
25. Arm, shoulder or hand pain when you perform any specific activity.	
26. Tingling (pins and needles) in your arm, shoulder or hand.	
27. Weakness in your arm, shoulder or hand.	
28. Stiffness in your arm, shoulder or hand.	
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand?	
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem.	

Original Version Item:	Final Translated Version (T-12)
Work Module: The following questions ask about the impact of your arm, shoulder or hand problem on your ability to work (including homemaking if that is your main work role). Please indicate what your job/work is: I do not work. (You may skip this section)	
Please circle the number that best describes your physical ability in the past week. Did you have any difficulty:	
1. Using your usual technique for your work?	
2. Doing your usual work because of arm, shoulder or hand pain?	
3. Doing your work as well as you would like?	
4. Spending your usual amount of time doing your work?	
High performance sports/musicians The following questions relate to the impact of your arm, shoulder or hand problem on playing your musical instrument or sport or both. If you play more than one sport or instrument (or play both), please answer with respect to that activity which is most important to you. Please indicate the sport or instrument which is most important to you. I do not play a sport or an instrument (you may skip this section)	
1. Using your usual technique for playing your instrument or sport?	
2. Playing your usual musical instrument or sport because of arm, shoulder or hand pain?	
3. Playing your usual musical instrument or sport as well as you would like?	
4. Spending your usual amount of time practicing or playing your instrument or sport?	

Original Version Item:	Final Translated Version (T-12)
Translation of response categories	
No difficulty Mild difficulty Moderate difficulty Severe difficulty Unable So much difficulty that I can't sleep	
Not at all Slightly Moderately Quite a bit Extremely	
Not limited at all Slightly limited Moderately limited Very limited Unable	
None Mild Moderate Severe Extreme	
Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree	

Synthesis process report of discrepancies (dealt with in Stage II to create T-12):

Issue: (specify item # and describe issue)	**Resolution:**

Appendix D: Back-Translation Into English.

*** Back translation is done ***without looking*** at this form, or the original DASH. Results are then summarized on this form. It is important that the back translator is blind to the original instrument.

Translator *(circle one)*: #1 #2
Name of translator: _____
Country of origin (where was English spoken as first language): _____

The DASH Questionnaire.

Original Version Item:	Back-Translated Version (BT-1 or BT-2)
Instructions: This questionnaire asks about your symptoms as well as your ability to perform certain activities.	
Please answer every question, based on your condition in the last week, by circling the appropriate number.	
If you did not have the opportunity to perform an activity in the past week, please make your best estimate on which response would be the most accurate.	
It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.	
Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.	
1. Open a tight or new jar.	
2. Write.	
3. Turn a key.	
4. Prepare a meal.	
5. Push open a heavy door.	
6. Place an object on a shelf above your head.	
7. Do heavy household chores (e.g., wash walls, wash floors).	
8. Garden or do yard work.	
9. Make a bed.	
10. Carry a shopping bag or briefcase.	
11. Carry a heavy object (over 10 lbs.).	

Original Version Item:	Back-Translated Version (BT-1 or BT-2)
12. Change a lightbulb overhead.	
13. Wash or blow dry your hair.	
14. Wash your back.	
15. Put on a pullover sweater.	
16. Use a knife to cut food.	
17. Recreational activities which require little effort (e.g., card playing, knitting etc.).	
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	
19. Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.).	
20. Manage transportation needs (getting from one place to another).	
21. Sexual activities.	
22. During the past week, to what extent has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	
23. During the past week, were you limited in your work or other daily activities as a result of your arm, shoulder or hand problem?	
24. Arm, shoulder or hand pain.	
25. Arm, shoulder or hand pain when you perform any specific activity.	
26. Tingling (pins and needles) in your arm, shoulder or hand.	
27. Weakness in your arm, shoulder or hand.	
28. Stiffness in your arm, shoulder or hand.	
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm,	

Original Version Item:	Back-Translated Version (BT-1 or BT-2)
shoulder or hand?	
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem.	
Work Module: The following questions ask about the impact of your arm, shoulder or hand problem on your ability to work (including homemaking if that is your main work role). Please indicate what your job/work is: I do not work. (You may skip this section)	
Please circle the number that best describes your physical ability in the past week. Did you have any difficulty:	
1. Using your usual technique for your work?	
2. Doing your usual work because of arm, shoulder or hand pain?	
3. Doing your work as well as you would like?	
4. Spending your usual amount of time doing your work?	
High performance sports/musicians The following questions relate to the impact of your arm, shoulder or hand problem on playing your musical instrument or sport or both. If you play more than one sport or instrument (or play both), please answer with respect to that activity which is most important to you. Please indicate the sport or instrument which is most important to you. I do not play a sport or an instrument (you may skip this section)	
1. Using your usual technique for playing your instrument or sport?	
2. Playing your usual musical instrument or sport because of arm, shoulder or hand pain?	
3. Playing your usual musical instrument or sport as well as you	

Original Version Item:	Back-Translated Version (BT-1 or BT-2)
would like?	
4. Spending your usual amount of time practicing or playing your instrument or sport?	
Translation of response categories	
No difficulty Mild difficulty Moderate difficulty Severe difficulty Unable So much difficulty that I can't sleep	
Not at all Slightly Moderately Quite a bit Extremely	
Not limited at all Slightly limited Moderately limited Very limited Unable	
None Mild Moderate Severe Extreme	
Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree	

Appendix E: Expert committee report

Membership:

Role:	Name:
Methodologist:	
Clinician:	
Translator #1	
Translator #2	
Back translator #1	
Back translator #2	
Language specialist:	

Report of discrepancies and their resolution:

Issue: (specify item # and describe issue)	**Resolution:**

Appendix F: Pilot testing report.

Sample description

Sample Size: _____

Description: Disorder: _____

Age: (mean, std deviation) _____

Gender: # males = _____ # females = _____

Study description

Reliability: (internal consistency, test-retest reliability)

Please describe the methods used:

Please describe the results:

Validity:

Methods used (list constructs, how they were measured)

Summarize results for each construct:

Responsiveness:

Describe methods used:

Describe results:

Other psychometric testing (e.g. Rasch modelling)

Describe:

Describe results:

Appendix G: AAOS appraisal of the adaptation process.

** This evaluation is based on the guidelines given in Guillemin, 1993.

Name of instrument: _____ *(indicate name & version used)*

	Source (original)	Target
Language	_____	_____
Culture:	_____	_____
Country:	_____	_____

	Evaluation *(circle one)*	Score *(number of "yes" checks)*
1. Translation technique Used two or more translations? Translating into their mother tongue? Was only one translator aware of concept & condition of clients?	Yes No Yes No Yes No	_____/3
2. Synthesis of translated versions. Synthesis of translations done	Yes No	_____/1
3. Back translation Used two or more translations? Translating into their mother tongue? Both not aware of concepts/condition?	Yes No Yes No Yes No	_____/3
4. Expert committee Committee review done? Membership of committee appropriate? Details of decisions & issues provided?	Yes No Yes No Yes No	_____/3
5. Pretesting Probe technique used and reported on? Psychometrics reevaluated?	Yes No Yes No	_____/3