

Translation and cultural adaptation of the Standardized Tool for the Assessment of Bruxism (STAB) and the Bruxism Screener (BruxScreen): A 12-step guideline

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Abstract

Background: Recently, the Standardized Tool for the Assessment of Bruxism (STAB) and the bruxism screener (BruxScreen) have been developed for use in research and clinical settings.

Objective: As to ascertain high-quality use of both instruments worldwide, it was our aim to develop a guideline for the translation and cultural adaptation of the STAB and the BruxScreen.

Methods and Results: This paper describes a 12-step guideline for the translation and cultural adaptation of the STAB and the BruxScreen. A format of a translation log is provided as well. Besides, a website has been created for the guidance of translation teams.

Conclusion: Following the 12 steps, new language versions of the STAB and the BruxScreen will be ready for further testing (reliability, validity, responsiveness and interpretability) and, ultimately, application in research and clinics around the world.

KEYWORDS

assessment, bruxism, cultural adaptation, translation

1 | INTRODUCTION

Bruxism, defined as a jaw-muscle activity that can occur while awake (awake bruxism) or during sleep (sleep bruxism),^{1,2} has so far been assessed for research and clinical purposes using a variety of tools. Not only were different assessment tools used (viz., a variety of self-report questionnaires, oral history techniques, clinical inspection strategies, and/or different instrumental assessment tools based on electromyography [EMG] or polysomnography [PSG]); the different tools also yielded sometimes highly divergent outcomes, which complicated the interpretation of the findings.³ Thus, the need

became apparent to standardize the assessment of bruxism, so that research groups and clinics would start using the same strategies for the assessment of bruxism. To that end, our team developed the Standardized Tool for the Assessment of Bruxism (STAB).⁴ The STAB consists of 14 domains with a total of 66 items that together constitute two axes dedicated to the evaluation of bruxism status and its consequences (Axis A) and of bruxism's risk factors, etiological factors, and comorbid conditions (Axis B). Besides the tool itself, Manfredini et al.⁴ also provide a user's guide and a ToolKit. The ToolKit includes a list with links to sources of the full versions of instruments that are partially or fully included in the STAB, as well

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as a list with links to instruments that might be used in addition to the STAB.

While the STAB allows a comprehensive assessment of bruxism, it does not meet the so-called A4 principle for assessment tools, that is, that the tool is Accurate (reliable and valid), Applicable (feasible), Affordable (cost-effective) and Accessible (suitable for everyday clinical use).² The comprehensiveness of the STAB prevents the tool from being routinely Applicable, Affordable, and Accessible, while its Accuracy still needs to be determined. For that reason, the bruxism screener (BruxScreen) has been developed.⁵ This instrument is meant for usage in large-scale epidemiological research projects as well as in general dental practices. The BruxScreen consists of two parts: a self-report questionnaire (BruxScreen-Q) to be completed by the patient, and a clinical assessment form (BruxScreen-C) to be completed by the dentist. The BruxScreen-Q consists of two items, focusing on the frequency of (1) the most common bruxism behaviours; and (2) common jaw symptoms that may be associated with bruxism, like pain and unpleasantness in the jaw or disorders of the temporomandibular joint. The BruxScreen-C consists of three items: (1) extra-oral inspection focusing on masseter muscle hypertrophy; (2) intra-oral inspection of non-dental tissues focusing on signs of clenching and biting behaviour; and (3) intra-oral inspection of dental issues focusing on the presence and severity of tooth wear.

So far, the psychometric properties of the STAB and the BruxScreen have not been tested, although face validity, that is, the degree to which the instrument looks as though it is an adequate reflection of the construct to be measured,⁶ was achieved by collecting feedback of all authors of the papers in which the instruments were introduced.^{4,5} However, even though the presence of face validity yields a strong argument to use the STAB and the BruxScreen for their intended purposes, the validation process of both instruments is far from completed yet. Notwithstanding, the STAB as well as the BruxScreen are ready to be tested for their reliability, validity, responsiveness and interpretability.

The process of psychometric testing of the STAB and the BruxScreen requires a comprehensive approach, in which the various components of both instruments will be subjected to thorough testing in different samples drawn from clinical and general populations globally. Consequently, both instruments need to be translated from the source language, that is, English, into the target language, that is, the language used by the intended study sample. This can be achieved with the forward and back-translation approach, followed by a cultural adaptation of the obtained translation. The latter is necessary to make it culturally appropriate, accurate and understandable for the intended study participants. It was our aim to develop a guideline for the translation and cultural adaptation of the STAB and the BruxScreen. As this approach yields the highest possible quality of the translated versions of the STAB and the BruxScreen, we invite researchers and clinicians who do not have English as their mother tongue but would like to use one or both instruments for their intended purposes, to follow the suggested guideline.

2 | GUIDELINE FOR TRANSLATION AND CULTURAL ADAPTATION

Below, a suggested guideline for the translation and cultural adaptation of the STAB and/or the BruxScreen is described. The guideline was developed based on (1) a good-practice guideline for translating and adapting questionnaires for different languages and cultures;⁷ and (2) this group of authors' vast experience in translating and culturally adapting self-report questionnaires and related documentation.⁸⁻¹⁵ A glossary of the below-used terms is provided in Box 1.

The following 12 steps are suggested when translating and culturally adapting the STAB and/or the BruxScreen:

1. Create a translation team consisting of 12 people: three study coordinators (one of them takes on the role of team leader), two forward translators, two back-translators and five expert panellists (for details of these roles, see Table 1).
2. Suggest the target language as well as the team members to the STAB/BruxScreen project leaders on www.bruxism-project.com. The project leaders will approve the team if the criteria are met (see Table 1).
3. Perform two forward translations of the source document from English into the target language by two independent, bilingual translators with the target language as their mother tongue. One of them should be a bruxism expert; the other one should not have any specific knowledge on the topic of bruxism as to provide optimal generalizability for the typical user of the STAB and the BruxScreen.
4. Conduct a synthesis of the two forward translations. The first study coordinator (a bilingual bruxism expert) and both forward

BOX 1 Glossary of terms related to the 12-step translation and cultural adaptation guideline.

Back-translation: translation of the common forward translation into the source language.

Common back-translation: synthesis of the two back-translations.

Forward translation: translation of the source document into the target language.

Common forward translation: synthesis of the two forward translations.

Source document: the original document in the source language.

Source language: the language of the source document.

Target document: the document resulting from the forward translation.

Target language: the language of the target document.

TABLE 1 Overview of the translation team: member, criteria, roles and steps.

Member	Criteria	Role(s)	Step(s)
Project leader	One of the three coordinators of the STAB and BruxScreen projects	- Review and approval of translation teams - Review and approval of translation logs	2, 12
Team leader	- Proficient in English and the target language (mother tongue) - One of the three study coordinators	- Composition of translation team - Overall responsibility for the entire project	All steps
Study coordinator 1	- Proficient in English and the target language (mother tongue) - Bruxism expert, as evidenced by formal training in oro-facial pain and dysfunction and/or international peer-reviewed publications on bruxism as first, second and/or last author	Synthesis of the two forward translations, together with both forward translators	4, 8
Study coordinator 2	- Proficient in English and the target language (mother tongue) - Bruxism expert, as evidenced by formal training in oro-facial pain and dysfunction and/or international peer-reviewed publications on bruxism as first, second and/or last author	Synthesis of the two back-translations, together with both back-translators	6
Study coordinator 3	- Proficient in English and the target language (mother tongue) - Language expert, as evidenced by formal training	Identify discrepancies between the common back-translation and the source document	7
Forward translator 1	- Proficient in English and the target language (mother tongue) - Bruxism expert, as evidenced by formal training in oro-facial pain and dysfunction and/or international peer-reviewed publications on bruxism as first, second and/or last author	Translate the source document into the target language	3, 4, 8
Forward translator 2	- Proficient in English and the target language (mother tongue) - No specific knowledge on the topic of bruxism	Translate the source document into the target language	3, 4, 8
Back-translator 1	- Proficient in English (mother tongue or fluent) and the target language - Knowledgeable in medical/dental topics	Translate the common forward translation into the source language	5, 6, 8
Back-translator 2	- Proficient in English (mother tongue or fluent) and the target language - No specific medical/dental knowledge	Translate the common forward translation into the source language	5, 6, 8
Expert panellist 1	- Proficient in the target language (mother tongue) - Language expert, as evidenced by an academic degree in the target language and literature	Review the resulting translation, that is, the (revised) common forward translation, focusing on semantic, idiomatic, experiential, and conceptual equivalencies	9
Expert panellists 2, 3	- Proficient in the target language (mother tongue) - Bruxism expert, as evidenced by formal training in oro-facial pain and dysfunction and/or international peer-reviewed publications on bruxism as first, second and/or last author	Review the resulting translation, that is, the (revised) common forward translation, focusing on semantic, idiomatic, experiential and conceptual equivalencies	9
Expert panellists 4, 5	- Proficient in the target language (mother tongue) - Representative of the intended study sample	Review the resulting translation, that is, the (revised) common forward translation, focusing on semantic, idiomatic, experiential and conceptual equivalencies	9

translators produce a common forward translation for further usage, based on consensus.

- Perform two back-translations of the common forward translation into English by two independent, bilingual translators whose native language is English or who are fluent in English. One back-translator should have a medical/dental background, while the other one has no specific medical/dental knowledge.

- Conduct a synthesis of the two back-translations. The second study coordinator (a bilingual bruxism expert) and both back-translators produce a common back-translation for further usage, based on consensus.
- Review the common back-translation against the source document. The third study coordinator (a bilingual language expert) compares both documents and identifies discrepancies.

8. *In case of one or more discrepancies: Revise the common forward translation (see Step 4.) based on the identified discrepancies. Both forward translators perform this step, together with the first study coordinator, during a consensus meeting. The resulting revised common forward translation is then back-translated by both back-translators independently, after which the procedure restarts at Step 6.*
9. *In case of no (remaining) discrepancies: Review the resulting translation, that is, the (revised) common forward translation, focusing on semantic, idiomatic, experiential and conceptual equivalencies. The review is performed by an expert panel comprising a language expert, two bruxism experts and two individuals representing the intended study participants. None of the panellists have been part of the forward and back-translation procedure. When needed, the procedure restarts at Step 8, working from the expert panel's recommendations.*
10. *Perform a pretest in a clinical sample. The (revised) common forward translation is applied in approximately 10 individuals representative of the intended study sample. Subsequently, the participants are being interviewed in detail about the intended meaning of the questions/items and response options. When needed, the procedure restarts at Step 8, working from the issues encountered during the pretesting phase.*
11. *Create a translation log (see Appendix 1 for a format) that includes the identification of the instrument (Appendix 1, Table A1), the names and affiliations (when applicable) of the three study coordinators (also identify the team leader among the coordinators), the two forward translators, the two back-translators and the five expert panellists (Appendix 1, Table A2); the source document, both forward translations, the common forward translation, both back-translations and the common back-translation (Appendix 1, Table A3). When applicable, the translation log also includes the identified discrepancies between the source document and the common back-translation (Appendix 1, Table A4), the expert panel's recommendations (Appendix 1, Table A5), the issues that came up during the pretesting and the related iterations (Appendix 1, Table A6) and the final revised common forward translation (Appendix 1, Table A7). Please note that when restarts of the procedure are needed at Steps 8, 9 and/or 10, the appendix tables related to those restarts need to be completed again (named, e.g. Table A3b in case of a second Table A3, Table A3c in case of a third Table A3, etc.) and positioned in the translation log in a chronologically logical position. When no discrepancies are identified, the expert panel has no recommendations, and the pretesting yields no issues, the common forward translation of Step 4 serves as the final common forward translation, to be included in Appendix 1, Table A7.*
12. *Submit the translation log to the STAB/BruxScreen project leaders by uploading it on www.bruxisms-project.com. The project leaders will review the translation log and, when found complete and in order, the new language versions of the STAB and the BruxScreen will be posted on www.bruxisms-project.com, along with the translation log. All posted language versions will be free to use, for all researchers and clinicians.*

3 | DISCUSSION

The aim of this article was to develop a guideline to be used for the translation and cultural adaptation of the STAB and/or the BruxScreen. To that end, the forward and back-translation procedure was adopted using the good-practice guideline for translating and adapting questionnaires for different languages and cultures suggested by Hall et al.⁷ as our starting point. The guideline by Hall et al.⁷ was identified by searching PubMed (National Library of Medicine, US) with the query "Translating"[Mesh], which yielded ten guidelines, one of which (Hall et al.)⁷ actually dealt with the translation and cultural adaptation of self-report questionnaires. Hall et al.⁷ describe a detailed checklist in 22 steps, covering preparation, forward translation, back-translation, committee review, field testing and reviewing/finalizing the translation. The 12 steps of our suggested translation and cultural adaptation guideline fully cover all those aspects, while omitting details like creating template documents for recording the translation and adaptation process (which have already been provided by us for all future projects; see Appendix 1) and the briefing of the forward and back-translators (which is implicitly assumed in our guideline).

To further improve the good-practice guideline suggested by Hall et al.,⁷ we used our own vast experience with translation and cultural adaptation procedures.⁸⁻¹⁵ Most importantly, this resulted in the addition of a second back-translator because, based on our experience, the input of a translator knowledgeable in medical/dental topics as well as of a translator without such specific knowledge in both the forward translation phase and the back-translation phase is crucial for a high-quality new language version. Further, we have more clearly defined the criteria that need to be met by the translation team members. Finally, the suggested 12-step guideline is developed as to fit the logistics of our bruxism project.

Following the suggested 12-step guideline, the new language versions of the STAB and the BruxScreen are ready to be further tested for their reliability (i.e. test-retest reliability for the self-report and instrumental parts; intra- and interobserver reliability for the clinical parts), criterion validity (i.e. against gold standard, muscle work-based measures for awake and sleep bruxism), responsiveness to change and interpretability (i.e. which scores translate into which management strategies). Researchers are invited to proceed with these steps, that will ultimately yield two instruments that can be applied clinically as well as in all future bruxism research projects around the world.

AUTHOR CONTRIBUTIONS

FL, JA and DM contributed to the conception of this project. FL and MCV drafted the manuscript. All authors critically revised the manuscript and approved the final version. They are all responsible for all aspects of the work.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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REFERENCES

- Lobbezoo F, Ahlberg J, Glaros AG, et al. Bruxism defined and graded: an international consensus. *J Oral Rehabil*. 2013;40:2-4.
- Lobbezoo F, Ahlberg J, Raphael KG, et al. International consensus on the assessment of bruxism: report of a work in progress. *J Oral Rehabil*. 2018;45:837-844.
- Lobbezoo F, Aarab G, Koyano K, Manfredini D. Assessment of sleep bruxism. In: Kryger M, Roth T, Goldstein CA, Dement WC, eds. *Principles and Practice of Sleep Medicine*. 7th ed. Elsevier; 2022:1636-1644.
- Manfredini D, Ahlberg J, Aarab G, et al. Standardized Tool for the Assessment of Bruxism. *J Oral Rehabil*. 2023; (Online ahead of print).
- Lobbezoo F, Ahlberg J, Verhoeff MC, et al. The bruxism screener (BruxScreen): development, pilot testing, and face validity. *J Oral Rehabil*. 2023; (Online ahead of print).
- de Vet HCW, Terwee CB, Mokkink LB, Knol DL. *Measurement in Medicine*. Cambridge University Press; 2011.
- Hall DA, Zaragoza Domingo S, Hamdache LZ, et al. A good practice guide for translating and adapting hearing-related questionnaires for different languages and cultures. *Int J Audiol*. 2018;57:161-175.
- Lobbezoo F, van Selms MK, John MT, et al. Use of the research diagnostic criteria for temporomandibular disorders for multinational research: translation efforts and reliability assessments in The Netherlands. *J Orofac Pain*. 2005;19:301-308.
- van der Meulen MJ, John MT, Naeije M, Lobbezoo F. The Dutch version of the Oral Health Impact Profile (OHIP-NL): translation, reliability and construct validity. *BMC Oral Health*. 2008;8:11.
- van der Meulen MJ, John MT, Naeije M, Lobbezoo F. Developing abbreviated OHIP versions for use with TMD patients. *J Oral Rehabil*. 2012;39:18-27.
- Ohrbach R, Björner J, Jezewski M, John MT, Lobbezoo F. *Guidelines for Establishing Cultural Equivalency of Instruments*. University at Buffalo; 2013.
- van der Meulen MJ, Lobbezoo F, Aartman IH, Naeije M. Validity of the Oral Behaviours Checklist: correlations between OBC scores and intensity of facial pain. *J Oral Rehabil*. 2014;41:115-121.
- Wetselaar P, Koutris M, Visscher CM, Larsson P, John MT, Lobbezoo F. Psychometric properties of the Dutch version of the Orofacial Esthetic Scale (OES-NL) in dental patients with and without self-reported tooth wear. *J Oral Rehabil*. 2015;42:803-809.
- Osiewicz MA, Lobbezoo F, Bracci A, Ahlberg J, Pytko-Polaczyk J, Manfredini D. Ecological momentary assessment and intervention principles for the study of awake bruxism behaviors, part 2: development of a smartphone application for a multicenter investigation and chronological translation for the polish version. *Front Neurol*. 2019;10:170.
- Ho BV, van de Rijdt LJM, Weijnenberg RAF, van der Maarel-Wierink CD, Lobbezoo F. Oral Health Assessment Tool (OHAT) deputized to informal caregivers: go or no go? *Clin Exp Dent Res*. 2022;8:76-83.

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APPENDIX 1

TRANSLATION LOG FOR THE TRANSLATION AND CULTURAL ADAPTATION OF STAB AND/OR BRUXSCREEN

TABLE A1 Instrument information.

Source Instrument Name	Version and Date	Source Language
Target Country	Target Language	Target Groups for Translated Instrument

TABLE A2 Translation team information.

Team leader/Study coordinator 1		
Name, Title(s)	Address, City, ZIP, Country	Email
Phone	Affiliation	Description of meeting the criteria as an expert (Table 1)
Study coordinator 2		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)

(Continues)

TABLE A2 (Continued)

Study coordinator 3		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Forward translator 1		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Forward translator 2		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Back-translator 1		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Back-translator 2		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Expert panellist 1		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Expert panellist 2		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Expert panellist 3		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Expert panellist 4		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)
Expert panellist 5		
Name, Title(s)	Affiliation	Description of meeting the criteria as an expert (Table 1)

TABLE A3 Translations.

Source document
Drag and drop file or select file
Forward translation 1
Drag and drop file or select file
Forward translation 2
Drag and drop file or select file
Common forward translation
Drag and drop file or select file
Back-translation 1
Drag and drop file or select file
Back-translation 2
Drag and drop file or select file
Common back-translation
Drag and drop file or select file

TABLE A4 Discrepancies between source document and common back-translation (when applicable).*

Item(s) as in source document	Item(s) as in common back-translation	Revision(s)
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*Please copy cells as many as revised items.

TABLE A5 Expert panel recommendations (when applicable).*

Item(s) as in common forward translation	Recommendation(s) by expert panel
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*Please copy cells as many as revised items.

TABLE A6 Issues during pretesting and iterations (when applicable).*

Issue(s) during pretesting	Iteration(s)
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*Please copy cells as many as revised items.

TABLE A7 Final revised common forward translation.

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