

# Validation and adaptation of Motion Sickness Susceptibility Questionnaire – short form to the Portuguese language and population

Portuguese Association of Otoneurology

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## Abstract

Cinetosis or motion sickness is a normal physiological response associated with the organism's exposure to motion or movement in the visual environment. The susceptibility and severity of this symptom can be assessed using the Motion Sickness Susceptibility Questionnaire–Short Form, a widely used instrument for measuring susceptibility to motion sickness, translated and validated in several languages. The present work aims to validate and adapt this questionnaire for the Portuguese language and population of Portugal. The methodology used in this paper was based on the principles of good practice for the process of translation and cultural adaptation of self-assessment instruments, resulting in the version of the Motion Sickness Susceptibility Questionnaire – Short Form in Portuguese from Portugal.

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## Introduction

Kinetosis, also known as motion sickness (MS), is a normal physiological response when the body is exposed to motion. With the advent of visual technologies such as video games, 3D films, and virtual reality, this condition has been expanded to include motion perceived in the visual environment, referred to as visually-induced motion sickness (VIMS).<sup>1,2</sup> The Classification Oversight Committee of the Bárány Society (COSC-BS)<sup>1</sup> has recently published diagnostic criteria for both MS and VIMS, described in Table 1.

The most common signs and symptoms of MS that occur during exposure to motion include nausea, vomiting, fatigue, sweating,

pallor, dizziness, vertigo, headache, and ocular strain.<sup>12</sup> Susceptibility to MS and its severity can be assessed using tools, such as the Motion Sickness Susceptibility Questionnaire - Short Form (MSSQ-Short).

This study aimed to validate the MSSQ-Short in European Portuguese, specifically for the Portuguese population.

## Materials and methods

### Motion Sickness Susceptibility Questionnaire - Short Form

The MSSQ-Short is a widely recognized tool for assessing susceptibility to MS. It has been translated and validated in multiple languages and is designed to evaluate an individual's exposure to nauseogenic situations, such as riding in cars, boats, or roller coasters. The questionnaire can be used to evaluate symptoms of motion sensitivity in children and adults.<sup>3-9</sup>

The questionnaire was originally developed in 1968<sup>10</sup>, and has undergone several modifications, revisions, and revalidations over time.<sup>11</sup> The most recent revision simplified

the questionnaire from 54 to 18 items while retaining a strong correlation with the MSSQ-Long ( $r = 0.93$ ).<sup>7</sup>

### Translation and cultural adaptation of the self-assessment instrument

The MSSQ-Short translation and cultural adaptation followed the principles of good practice for the translation and cultural adaptation of self-assessment instruments (Graph 1).<sup>12</sup>

#### 1 - Preparation

The process began on November 18, 2019 when the project manager contacted J.F. Golding, the creator of the questionnaire, to request permission for its use and collaboration for clarifying any potential ambiguities. This step was taken to minimize the risk of misinterpretations. The response was prompt and positive, with the creator assuring full availability throughout the process.

At this stage, the project team engaged in a series of discussions about some concepts

**Table 1**

Diagnostic criteria for MS and VIMS according to the COSC-BS

**A.** Physical motion of the person or visual motion elicits sign(s) and/or symptom(s) in at least one of the following categories, experienced at greater-than-minimum severity:

1. Nausea and/or gastrointestinal disturbance
2. Thermoregulatory disruption
3. Attention/concentration changes
4. Dizziness and/or vertigo
5. Headache and/or ocular strai

**B.** Signs and/or symptoms appear during motion and intensify with prolonged exposure

**C.** Signs and/or symptoms eventually stop after cessation of motion

**D.** Signs and/or symptoms cannot be better explained by another disease or disorder

MS, motion sickness; VIMS, visually induced motion sickness; COSC-BS, Classification Oversight Committee of the Bárány Society

**Graph 1**

Schematic representation of the principles of good practice for the translation and cultural adaptation of self-assessment instruments



present in the instrument, including “motion sensitivity” and “motion sickness,” which form the foundation of the questionnaire. These discussions helped in ensuring conceptual equivalence of the translation and were particularly useful for the translators. The team also analyzed the existing translations of the MSSQ-Short and their applications, as well as research conducted by the author of the questionnaire and others on this instrument. The project manager recruited a key Portuguese-speaking collaborator with extensive expertise in the field to work closely with the team throughout the translation and adaptation process.

## 2- Translation

Three independent translations were performed, exceeding the recommended minimum standard of two, by three native Portuguese-speaking translators residing in Portugal. All the translators were women from diverse professional backgrounds in the field of health, including a 39-year-old behavioral psychologist, 63-year-old physician, and 45-year-old biologist.

To ensure conceptual equivalence rather than literal translation, the key collaborator provided the translators with clear explanations of the questionnaire’s concepts. The translations were completed between April 9, 2020 and May 15, 2020.

## 3- Consensus translation and reconciliation

The three translations were reconciled into a single version by resolving discrepancies and language preferences. This process involved discussions among the translators and key collaborator, with input from the project manager. The process was straightforward, and alternative translations or input from another independent translator were not required.

## 4- Back translation

The consensus translation was back translated into English to ensure the quality and confirm that no conceptual information was lost

during the process.

Two independent back translations were performed by two native English-speaking translators residing in Portugal. Both back translators were women, each from a different professional background; a 50-year-old journalist and 45-year-old English teacher.

The back translators were also instructed to prioritize conceptual translation over literal translation.

## 5- Back translation review

The back translations were reviewed to produce a consensus version and compared with the original instrument to ensure conceptual equivalence. The review process was conducted collaboratively by the project manager and key collaborator to refine the translation.

Finally, the consensus back translation was sent to the MSSQ author. Discussions were held on the meaning of the terms, “movement” versus “motion” and “kindergarten” versus “children’s playground.” Apart from these grammatical aspects, the MSSQ author deemed the back translation to be of high quality and confirmed that it preserved the meaning and interpretation of the original version.

## 6- Harmonization

Harmonization was conducted between the consensus translation and the original text. This additional quality assurance step involved team discussions and reflections, incorporating the author’s feedback to ensure conceptual equivalence.

## 7- Cognitive interview

The final version of the translated MSSQ-Short was presented to 15 Portuguese individuals, including five health professionals from different areas, all women, between 38–64 years of age; and 10 users of the otorhinolaryngology (ORL) -vertigo service, two men aged 57–63 years and eight women aged 20–68 years.

This step aimed to assess the comprehensibility of the instrument, identify any potentially confusing elements, and determine the need

for further conceptual adaptations. The key collaborator oversaw this process.

#### **8- Review and reflection on the cognitive interview results and finalization**

This step was led by the project manager. No modifications or reorganizations of the questionnaire items were required, as none of the participants reported any difficulty or confusion pertaining to the phrasing or wording used.

#### **9- Proofreading**

The final version of the questionnaire was then reviewed to identify any typographical or spelling mistakes. Additionally, the graphical presentation of the questionnaire was evaluated.

#### **10- Final report**

##### **Elaboration of this final article.**

### **Results**

The reconciliation of the three translations led to the final version of the MSSQ-Short in European Portuguese, which is provided in Annex 1. Figures 1 and 2 display the content analysis grid of the three translations, three back translations, consensus translation, and consensus back translation.

### **Discussion and Conclusion**

The European Portuguese version of the MSSQ-Short was developed in accordance with the principles of good practice for the translation and cultural adaptation of self-assessment instruments. The cognitive interview ensured the instrument's comprehensibility and confirmed that no items were confusing or unclear.

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#### **Conflict of Interests**

The authors declare that they have no conflict of interest regarding this article.

#### **Data Confidentiality**

The authors declare that they followed the protocols of their work in publishing patient data.

#### **Human and animal protection**

The authors declare that the procedures followed are in accordance with the regulations established by the directors of the Commission for Clinical Research and Ethics and in accordance with the Declaration of Helsinki of the World Medical Association.

#### **Privacy policy, informed consent and Ethics committee authorization**

The authors declare that they have obtained signed consent from the participants and that they have local ethical approval to carry out this work.

#### **Financial support**

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#### **Scientific data availability**

There are no publicly available datasets related to this work.

**Figura 1****Questionário de Suscetibilidade ao Enjoo de Movimento – versão reduzida (MSSQ-Short)**

1. Por favor, preencha a seguinte informação:

Idade:  (anos) Sexo: Feminino  Masculino  Prefiro não responder

Este questionário foi elaborado para identificar qual a sua suscetibilidade ao enjoo de movimento e quais os tipos de movimento lhe que provocam mais enjoo.

Por “enjoo” entenda-se sentir-se nauseado, mareado, ou até mesmo, chegar a vomitar.

2. Reportando-se apenas à sua experiência enquanto criança (antes dos 12 anos), para cada um dos seguintes meios de transporte ou entretenimento, por favor indique com que regularidade se sentiu enjoado(a), assinalando com X

	Não aplicável Nunca viajei	Nunca senti enjoo	Raramente senti enjoo	Por vezes senti enjoo	Frequentemente senti enjoo
Automóvel					
Autocarros					
Comboios					
Aviões					
Pequenos barcos					
Navios, Ferryboats / Balsas					
Baloços					
Carrosséis (jardim infantil)					
Montanha-russa, Carrosséis (parque diversão)					
	<b>t</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>

3. Reportando-se à sua experiência nos últimos 10 anos, para cada um dos seguintes meios de transporte ou entretenimento, por favor indique com que regularidade se sentiu enjoado(a), assinalando com X

	Não aplicável Nunca viajei	Nunca senti enjoo	Raramente senti enjoo	Por vezes senti enjoo	Frequentemente senti enjoo
Automóvel					
Autocarros					
Comboios					
Aviões					
Pequenos barcos					
Navios, Ferryboats / Balsas					
Baloços					
Carrosséis (jardim infantil)					
Montanha-russa, Carrosséis (parque diversão)					
	<b>t</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>

Data: \_\_\_/\_\_\_/\_\_\_

## Figura 2

Pontuação do questionário de susceptibilidade ao enjoo de movimento (MSSQ)– versão reduzida

### Secção A (criança)

- Somar o número de meios de transporte ou entretenimento sem experiência, assinalados na coluna “t”, sendo o máximo 9;
- Somar a pontuação de sintomas para cada meio de transporte ou entretenimento, em cada uma das colunas, utilizando a chave 0-3 (coluna “t” com valor “zero”)

$$\text{MSSQ A} = \frac{\text{Pontuação total sintomas infância} \times 9}{9 - \text{N}^\circ \text{ de meios de transporte ou entretenimento sem experiência}}$$

Nota 1: Quando o sujeito não teve experiência em nenhum meio de transporte ou entretenimento, ocorre erro na divisão por zero – não é possível calcular suscetibilidade ao enjoo de movimento de um sujeito na ausência de exposição.

### Secção B (adulto)

- Realizar cálculo igual ao referido na secção A, mas com dados obtidos na secção B.

$$\text{MSSQ B} = \frac{\text{Pontuação total sintomas adulto} \times 9}{9 - \text{N}^\circ \text{ de meios de transporte ou entretenimento sem experiência nos últimos 10 anos}}$$

### Resultado em bruto da MSSQ-versão reduzida:

- Soma MSSQ A + MSSQ B  
(0 a 54, sendo máximo muito pouco provável)

Nota 2: A pontuação da secção A poderá ser usada com indicador pré morbidade de suscetibilidade ao enjoo de movimento em utentes com patologia vestibular.

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