Translation and language validation of the Epworth sleepiness scale for children and adolescents (ESS-CHAD) into Brazilian Portuguese

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ABSTRACT

Objective: This study aimed to translate the Epworth sleepiness scale for children and adolescents (ESS-CHAD) into Brazilian Portuguese. Material and Methods: The translation and language validation processes were carried out through translation, back translation, technical review, assessment of verbal comprehension/clarity of the scale by experts (four pediatric neurologists). After they have reached a final version of the ESS-HAD a sample of asymptomatic children and adolescents that were participants in another sleep project were invited to read and complete the questionnaire to evaluate comprehension by the aimed population. Results: Two independent researchers made the forward translation and it has around 90% of concordance. Minor disagreements were related to the position of adjectives in the sentence. No major difficulties were reported by the 3rd researcher that performed the back translation. After a consensus meeting with the four participants, we have reached a final version of the questionnaire. In the cognitive interviews, the scale was reportedly easy to understand to the 23 respondents. One adolescent suggested clarifying whether question 2 (likelihood of falling asleep watching TV or a video), referred to daytime or nighttime. The total ESS-CHAD score in this asymptomatic sample varied from 0-17, a mean score of 7.08±5.65. Discussion: The final version of the ESS-CHAD in Brazilian Portuguese was approved by the copyright owners and was well understandable by caregivers and adolescents. More studies are now necessary to use this questionnaire in a larger target population to verify its validity and internal consistency.

Keywords: Children; Adolescents; Sleepiness; Sleep; Validation.
INTRODUCTION

The term excessive daytime sleepiness (EDS) refers to unintended daytime sleep episodes. It is defined as “the tendency to fall asleep at times and under circumstances when the intention and expectation is to remain awake” and is truly different from naps that occur after lying down purposefully. EDS should also be distinguished from other tendencies or aspects of sleep habits, such as being hard to wake in the morning. For the adult population, a variety of laboratory-based methods are available to measure sleepiness and EDS such as the multiple sleep latency test (MSLT) and the maintenance of wakefulness’ test (MWT). Whilst for children there is no methods are available to measure sleepiness and EDS such as “the pediatric daytime sleepiness scale (PDSS)”

In 1991, Johns proposed a new method for measuring daytime sleepiness, the Epworth sleepiness scale (ESS) and this brief, easy to apply questionnaire, became a tool of worldwide use to evaluate EDS not only on clinical scenarios but also in research. The ESS is an 8-item self-report questionnaire assessing the likelihood of falling asleep in specific everyday situations, thus evaluating an individual’s level of daytime sleepiness. The responses are done on a four-point Likert scale (0-3). The original scale has been translated to Brazilian Portuguese by Bertolazi et al. (2009) and showed good equivalence with the English version in detecting daytime sleepiness.

The adult ESS is not suitable for young children and even for adolescents. As an example, it should be implied that sleepiness during traveling in a car refers to them as passengers rather than drivers and alcohol questioning is probably not useful for the majority of responders. Although the ESS is subject to copyright (©MW Johns, 1990-1997), many non-authorized adaptations are available, some of which involved minimal changes but others suffered substantial modifications. Under the auspices of copywriter, owners Wang et al. have adapted the ESS for children and adolescents. They have launched the official version of “Epworth sleepiness scale for children and adolescents” (ESS-CHAD) on 2017. The original options not useful for adolescents, using a tool that is widely accepted worldwide for the adult population, was in agreement with the methodology proposed the copyright owner (Mapi Research Trust) and followed the steps suggested by Acquadro et al. (2004). Those steps include forward translation, backward translation, review by clinicians, cognitive interviews and international harmonization. Four pediatric neurologists with different expertise on sleep medicine participated in the process, two of them performed the forward translation, the third did the back translation and the 4th coordinated the whole process and solved minor disagreements. In order to verify if the final version was easily understandable by adolescents and caregivers, we have invited participants of another ongoing study to answer the scale, independently. The last step is used only if more than one language is involved, which was not the case of our proposal.

Agreement and authorization – Ethical aspects

A user license agreement special terms (number 34385) was issued between Mapi Research Trust, the author MLN and the Pontifical Catholic University of Rio Grande do Sul. On April 20th, 2021 a permission to start the translation process was issued. On July 19th, 2021, through the request 2104360 to ePROVIDE™ the authors were allowed to submit the translation process as an article.

Responders of the cognitive interview were participants of the project “Sleep quality among parents and their children during COVID-19 pandemic”, approved by the institutional ethical committee and registered on Plataforma Brasil under the number 30748320.5.0000.5336.

RESULTS

The complete translation process is detailed on Table 2.

1. Forward translation: two pediatric neurologists fluent in English made the forward translation. Subsequently, both translations were discussed between the authors until agreement on the most adequate Portuguese version. The translations had around 90% of concordance and minor disagreements were related to position of adjectives in the sentence. In this step a senior pediatric neurologist conducted the discussion and decided in case of disagreement the for the best version.
2. Backward translation: the back translation was performed by a Brazilian Pediatric Neurologist fluent in English. According to the ratings proposed by Acquaro et al. (2004)18 to describe the difficulty of translating the wording of the source document, the level of difficult found by the translator was scored as 1 (no difficulty: no problems expected in developing a rendering that faithfully captures a concept that is equivalent to the source text).

2.1. Review by clinicians: all authors have independently reviewed the final Portuguese version. Finally, in a consensus meeting, the most accurate translation was chosen, considering the best conceptual, semantic, and cultural equivalences.

2.2. Cognitive interviews: to evaluate comprehension by the aimed population 23 asymptomatic children and adolescents were asked to read and complete the questionnaire. In one case, the mother of a four-year-old child completed the scale. The scale was reported easily to understand. One adolescent suggested to clarify whether question 2 (likelihood of falling asleep watching TV or a video), referred to daytime or nighttime. Table 3 shows the results of the questionnaires answered for the cognitive interviews. Participants’ age varied from 4 to 15 years, mean age of boys was 10 years (median 11-12 years) and for girls 11 years (median 11 years). There was a predominance of girls responders’ (65.2%). In all situations proposed the chance of falling asleep varied from 0 to 3, except on the last one (chance of falling asleep while eating a meal) where all responders answered never. The mean score for each situation was: sitting and reading = 1, sitting and watching TV or a video = 1.08, sitting in a classroom at school during the morning = 0.78, sitting and riding in a car or bus for about half an hour = 1.73, lying down to rest or nap in the afternoon = 1.5, sitting and talking to someone = 0.04, sitting quietly by yourself after lunch = 1.03, sitting and eating a meal = 0. The total ESS-CHAD score varied from 0–17, mean score 7.08±5.65.

### Table 2. Translation and Back translation process.

| Translation | Original | Translation 1 | Translation 2 | Back translation |
|-------------|---------|---------------|---------------|------------------|
| Epworth sleepiness scale for children and adolescents ESS-CHAD | Escola Epworth de sono e sono de crianças e adolescentes (ESS-CRAD) | Escola Epworth de sono e sono de crianças e adolescentes | Escola Epworth de sono e sono de crianças e adolescentes | Escola Epworth de sono e sono de crianças e adolescentes |
| Your name | Nome | Nome | Nome | Nome |
| Today’s date | Data de hoje | Data de hoje | Data de hoje | Data de hoje |
| How old are you? | Qual sua idade? (anos) | Quantos anos você tem? (anos) | Quantos anos você tem? (anos) | Quantos anos você tem? (anos) |
| Boy? Or Girl? | Menino? ( ) ou Menina? ( ) | Menino? ( ) ou Menina? ( ) | Menino? ( ) ou Menina? ( ) | Menino? ( ) ou Menina? ( ) |
| Use a clear phrase to describe the difficulty of translating the wording of the source document to the back translation | Mesmo que você não tenha tido algumas dessas coisas no último mês, tente imaginar como elas afetariam você. | Use a seguinte escala para escolher um número que melhor descreva o que tem acontecido com você durante cada atividade no último mês. | Use a seguinte escala para escolher um número que melhor descreva o que tem acontecido com você durante cada atividade no último mês. | Use a seguinte escala para escolher um número que melhor descreva o que tem acontecido com você durante cada atividade no último mês. |
| Write the number in the box below. | Escreva esse número na caixa abaixo. | Escreva esse número na caixa abaixo. | Escreva esse número na caixa abaixo. | Escreva esse número na caixa abaixo. |
| 0 = never fall asleep | 0 = nunca iria dormir | 0 = nunca iria dormir | 0 = nunca iria dormir | 0 = nunca iria dormir |
| 1 = slight chance of falling asleep | 1 = chance pequena de dormir | 1 = chance leve de adormecer | 1 = chance leve de adormecer | 1 = chance leve de adormecer |
| 2 = moderate chance of falling asleep | 2 = chance média de dormir | 2 = chance moderada de adormecer | 2 = chance moderada de adormecer | 2 = chance moderada de adormecer |
| 3 = high chance of falling asleep | 3 = chance grande de dormir | 3 = chance alta de adormecer | 3 = chance alta de adormecer | 3 = chance grande de adormecer |
| It is important that you answer each question as well as you can. | É importante que você responda a cada pergunta com o melhor que puder. | É importante que você responda a cada pergunta com o melhor que puder. | É importante que você responda a cada pergunta com o melhor que puder. | É importante que você responda a cada pergunta com o melhor que puder. |
| Activities | Atividades | Atividades | Atividades | Atividades |
| Chance of falling asleep (0–3) | Chance de dormir | Chance de adormecer | Chance de adormecer | Chance de adormecer |
| Sitting and reading | Deitado para descansar ou lendo | Deitado para descansar ou cochilar | Deitado para descansar ou cochilar | Deitado para descansar ou cochilar |
| Sitting and watching TV or a video | Deitado para descansar ou assistindo TV ou vídeo | Deitado para descansar ou assistir à televisão | Deitado para descansar ou assistir à televisão | Deitado para descansar ou assistir à televisão |
| Sitting in a classroom at school during the morning | Deitado para descansar ou assistir à televisão | Deitado para descansar ou assistir à televisão | Deitado para descansar ou assistir à televisão | Deitado para descansar ou assistir à televisão |
| Sitting and riding in a car or bus for about half an hour | Sentado em uma sala de aula durante a manhã. | Sentado em uma sala de aula durante a manhã. | Sentado em uma sala de aula durante a manhã. | Sentado em uma sala de aula durante a manhã. |
| Lying down to rest or nap in the afternoon | Deitado para descansar ou cochilar à tarde | Deitado para descansar ou cochilar à tarde | Deitado para descansar ou cochilar à tarde | Deitado para descansar ou cochilar à tarde |
| Sitting and talking to someone | Sentado e conversando com alguém | Sentado e conversando com alguém | Sentado e conversando com alguém | Sentado e conversando com alguém |
| Sitting quietly by yourself after lunch | Obrigado(a) | Obrigado(a) | Obrigado(a) | Obrigado(a) |
| Sitting and eating a meal | Obrigado(a) | Obrigado(a) | Obrigado(a) | Obrigado(a) |

Legends: 100% concordance of translation among the 2 Portuguese versions; 100% concordance among original English version and back translation; In bold sparse words in disagreement between the English version and Back translation.

Notes: *The adult version of Epworth scale was translated to Brazilian Portuguese as: “Escala de Sonolência de Epworth em português do Brasil” (ESE-BR).
The final version of the ESS CHAD scale translated to Brazilian Portuguese was sent to Mapi Research Trust, was approved and can be obtained at (https://eprovide.mapi-trust.org/instruments/epworth-sleepiness-scale-child-adolescent). The psychometric analysis of the ESS-CHAD was previously described by Janssen et al. (2017). They found that this scale is a reliable and internally valid measure of daytime sleepiness for adolescents with an age range between 12-18 years old. During the COVID-19 pandemic, many studies had evaluated sleep in children/adolescents. Brunì et al. (2021) found a big delay in the sleep-wake schedule in all age groups as well as an increase of sleep disturbances, in a large cohort of Italian children and adolescents. A similar study developed in southern Brazil including dyads of parents and children observed excessive daytime somnolence in almost 10% of the group with 4-12 years of age. The increase in sleep disorders during the pandemics was observed worldwide and instruments to screen the pediatric population are very useful to establish an adequate clinical approach during the follow up.

Table 3. Description of results of the Cognitive interview.

| Age (y) | Sex | Sitting and reading | Sitting and Watching TV/video | Sitting in classroom at school during the morning | Sitting and riding car/bus for about half an hour | Lying down to rest or nap in the afternoon | Sitting and talking to someone | Sitting quietly after lunch | Sitting and eating a meal | EES-CHAD total score | Daytime sleepiness |
|---------|-----|---------------------|-----------------------------|-------------------------------------------------|------------------------------------------------|-------------------------------------|-----------------------------|--------------------------|---------------------|------------------|------------------|
| 7       | M   | 1                   | 2                           | 2                                               | 3                                               | 3                                                  | 0                           | 1                        | 0                   | 10               | HNDS            |
| 13      | F   | 1                   | 1                           | 2                                               | 3                                               | 0                                                  | 1                           | 0                        | 0                   | 9                | HNDS            |
| 9       | F   | 1                   | 0                           | 3                                               | 2                                               | 3                                                  | 0                           | 2                        | 0                   | 11               | MEDS            |
| 8       | F   | 2                   | 0                           | 1                                               | 3                                               | 3                                                  | 0                           | 3                        | 0                   | 12               | MEDS            |
| 10      | F   | 1                   | 1                           | 0                                               | 0                                               | 0                                                  | 0                           | 0                        | 0                   | 2                | LNDS            |
| 14      | M   | 0                   | 1                           | 1                                               | 2                                               | 3                                                  | 0                           | 2                        | 0                   | 9                | HNDS            |
| 15      | F   | 0                   | 2                           | 1                                               | 2                                               | 3                                                  | 0                           | 1                        | 0                   | 9                | HNDS            |
| 16      | M   | 1                   | 1                           | 0                                               | 3                                               | 1                                                  | 0                           | 1                        | 0                   | 7                | HNDS            |
| 8       | F   | 0                   | 3                           | 0                                               | 2                                               | 0                                                  | 0                           | 0                        | 0                   | 5                | LNDS            |
| 15      | F   | 1                   | 3                           | 1                                               | 3                                               | 3                                                  | 0                           | 3                        | 0                   | 14               | MOEDS           |
| 15      | F   | 3                   | 1                           | 1                                               | 2                                               | 0                                                  | 0                           | 2                        | 0                   | 9                | HNDS            |
| 4       | M   | 1                   | 0                           | 1                                               | 3                                               | 0                                                  | 0                           | 0                        | 0                   | 5                | LNDS            |
| 15      | F   | 1                   | 3                           | 0                                               | 0                                               | 2                                                  | 0                           | 1                        | 0                   | 7                | HNDS            |
| 7       | M   | 1                   | 0                           | 2                                               | 0                                               | 0                                                  | 0                           | 0                        | 0                   | 3                | LNDS            |
| 13      | F   | 2                   | 1                           | 0                                               | 3                                               | 3                                                  | 0                           | 1                        | 0                   | 10               | HNDS            |
| 11      | F   | 1                   | 1                           | 0                                               | 2                                               | 0                                                  | 0                           | 0                        | 0                   | 4                | LNDS            |
| 14      | F   | 2                   | 1                           | 0                                               | 1                                               | 3                                                  | 0                           | 1                        | 0                   | 8                | HNDS            |
| 13      | M   | 0                   | 1                           | 0                                               | 0                                               | 1                                                  | 0                           | 0                        | 0                   | 2                | LNDS            |
| 12      | M   | 1                   | 0                           | 0                                               | 1                                               | 1                                                  | 0                           | 1                        | 0                   | 4                | LNDS            |
| 15      | M   | 3                   | 2                           | 3                                               | 3                                               | 3                                                  | 1                           | 2                        | 0                   | 17               | SEDS            |
| 11      | F   | 0                   | 0                           | 0                                               | 0                                               | 0                                                  | 0                           | 0                        | 0                   | 0                | LNDS            |
| 7       | F   | 0                   | 1                           | 1                                               | 2                                               | 0                                                  | 0                           | 0                        | 0                   | 4                | LNDS            |
| 10      | F   | 0                   | 0                           | 0                                               | 1                                               | 0                                                  | 0                           | 1                        | 0                   | 2                | LNDS            |

Notes: *The questionnaire was answered by the mother; LNDS = Lower normal daytime sleepiness; HNDS = Higher normal daytime sleepiness; MEDS = Mild excessive daytime sleepiness; MOEDS = Moderate excessive daytime sleepiness; SEDS = Severe excessive daytime sleepiness.

DISCUSSION

In this study, we have translated to Brazilian Portuguese the official version of the ESS-CHAD. All steps recommended by Mapi Research Trust (copyright owners) were followed. It is worthy to have a Brazilian Portuguese version of this instrument as this questionnaire is based in the well-established and well-validated adult ESS. It is fairly known that many questionnaires are available to evaluate sleep in pediatric ages. However, this modified version, with questions very similar to those of the adult ESS, might be useful not only to screen patients but also for clinical research.

An objective way to measure excessive sleepiness during the day is useful as previous studies have pointed to an increase of sleep disorders in adolescents, where a sleep phase delay is characteristic and this symptom could indicate a shorter sleep duration or unfavorable sleep quality. In children and adolescents, it might be associated, as consequences, with learning and behavioral problems and attention disorders. Further, sleepiness can also be a pathway linking race and socioeconomic status with worse academic and cognitive outcomes in middle childhood.

One advantage of the ESS-CHAD over the PDSS is the fact that the first has a cutoff point that differentiates normal daytime somnolence to abnormal, whilst PDSS shows a measure of association, being higher scores related to more diurnal somnolence.

The psychometric analysis of the ESS-CHAD was found that this scale is a reliable and internally valid measure of daytime sleepiness for adolescents with an age range between 12-18 years old.

During the COVID-19 pandemic, many studies had evaluated sleep in children/adolescents. They found that this delay in the sleep-wake schedule in all age groups as well as an increase of sleep disturbances, in a large cohort of Italian children and adolescents. A similar study developed in southern Brazil including dyads of parents and children observed excessive daytime somnolence in almost 10% of the group with 4-12 years of age. The increase in sleep disorders during the pandemics was observed worldwide and instruments to screen the pediatric population are very useful to establish an adequate clinical approach during the follow up.

The final version of the ESS-CHAD in Brazilian Portuguese was approved by the copyright owners and was well understandable by caregivers and adolescents that participated in this project. More studies are now necessary to use this questionnaire in a larger target population to verify its validity and internal consistency.

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