

Measuring Sleepiness with the Epworth Sleepiness Scale (ESS)

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Introduction: Webinar Hosts



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Introduction: Webinar Hosts



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More than one meaning of the word 'Sleepiness'

1. **Drowsiness**: the transitional behavioural state between alert wakefulness and sleep
2. **Sleep propensity**: the likelihood of making the transition from alert wakefulness to sleep under a given set of circumstances

Sleep Propensity Measured Under Different Circumstances

- **Instantaneous Sleep Propensity (ISP)**
SP at some particular time, whatever the person is doing
- **Situational Sleep Propensity (SSP)**
usual SP when engaged in some particular activity under similar circumstances
- **Average Sleep Propensity (ASP)**
average SP in daily life, across the whole range of activities

The Epworth Sleepiness Scale

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How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times.

Even if you have not done some of these things recently, try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation.

- 0 = no chance of dozing
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

**** It is important that you answer each question as best you can***

The Epworth Sleepiness Scale

© MW Johns, 1990-97

Situation	Chance of Dozing
1. Sitting and reading	
2. Watching TV	
3. Sitting inactive in a public place (e.g. theatre or meeting)	
4. As a passenger in a car for an hour without a break	
5. Lying down to rest in the afternoon when circumstances permit	
6. Sitting and talking to someone	
7. Sitting quietly after a lunch without alcohol	
8. In a car, while stopped for a few minutes in traffic	

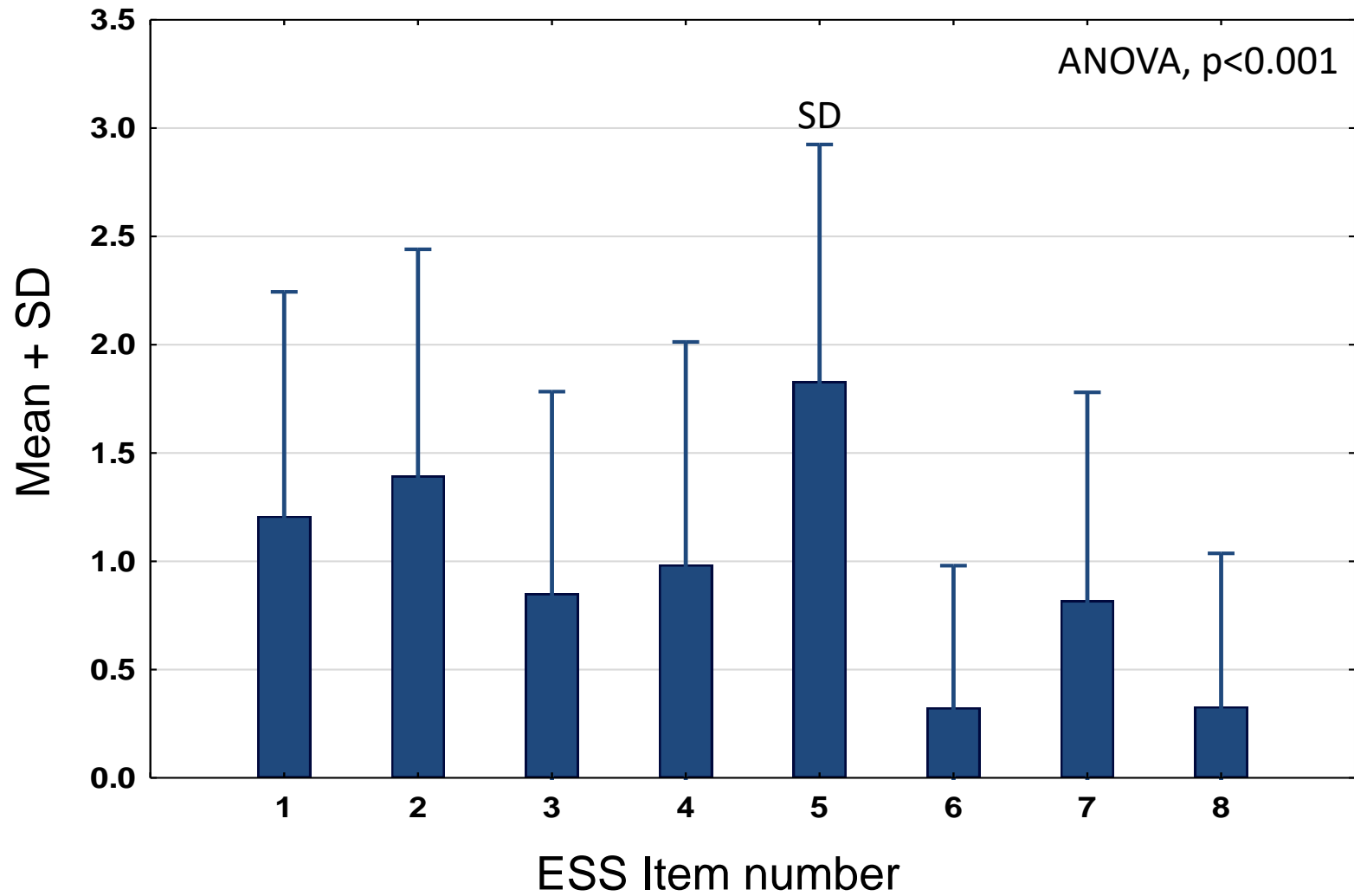
Reference Range of Total ESS Scores

Normal range 0-10

Excessive daytime sleepiness (EDS) >10

Mild EDS	11-12
Moderate EDS	13-15
Severe EDS	16-24

ESS Item-scores for 992 Australian adults



Analysis of ESS Item-scores

(992 Australian adults, aged 18-77 yr.)

- **All 28 correlation coefficients between the eight ESS item-scores within subjects were highly significant ($p < 0.001$)**

mean $r = 0.46$

range = 0.27 – 0.59

- **Cronbach's alpha = 0.86**
- **Factor analysis: one factor**
- **Rasch analysis**

- The characteristic of a posture, activity and situation (both physical and mental) that reflects its capacity to facilitate sleep-onset in the majority of people
- Somnificity is mediated by all inputs to the sensory nervous system, both entero-ceptive and extero-ceptive (Process-A)
- Somnificity is not a characteristic of individual people or of particular sleep disorders

Johns MW, J Sleep Res, **11**: 61-67, 2002

Johns MW, J Sleep Biol Rhythm, **8**: 170-179, 2010

Somnificity of ESS situations/activities

2802 adults, 23 groups, 6 countries

ESS Item No.	Situation	Somnificity	
		Mean	SD
5	Lying down to rest in the afternoon when circumstances permit	8.0	0.1
2	Watching TV	6.4	1.1
1	Sitting and reading	5.8	0.8
4	As a passenger in a car for an hour without a break	5.1	1.0
7	Sitting quietly after a lunch without alcohol	4.2	1.1
3	Sitting, inactive in a public place	3.6	0.6
6	Sitting and talking to someone	1.7	0.5
8	In a car, while stopped for a few minutes in the traffic	1.3	0.5

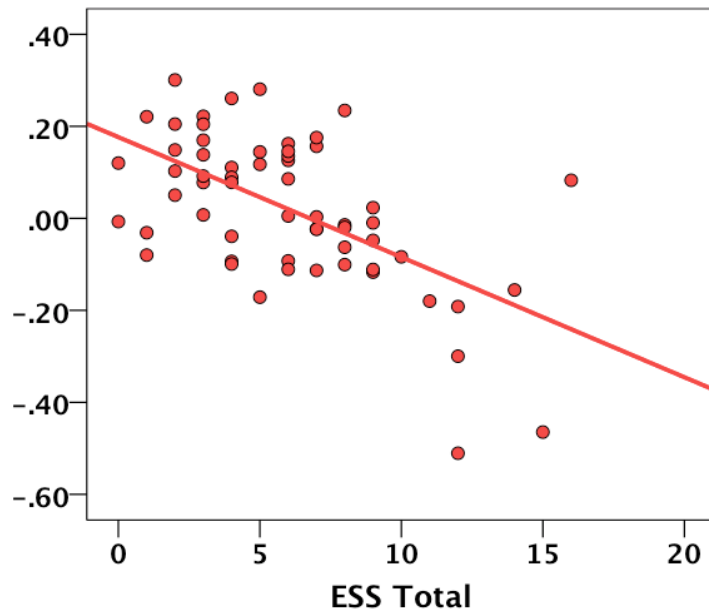
Activities	Chance of falling asleep (0 – 3)
Sitting and reading _____	<input type="text"/>
Sitting and watching TV or a video _____	<input type="text"/>
Sitting in a classroom at school during the morning _____	<input type="text"/>
Sitting and riding in a car or bus for about half an hour _____	<input type="text"/>
Lying down to rest or nap in the afternoon _____	<input type="text"/>
Sitting and talking to someone _____	<input type="text"/>
Sitting quietly by yourself after lunch _____	<input type="text"/>
Sitting and eating a meal _____	<input type="text"/>

Thank you

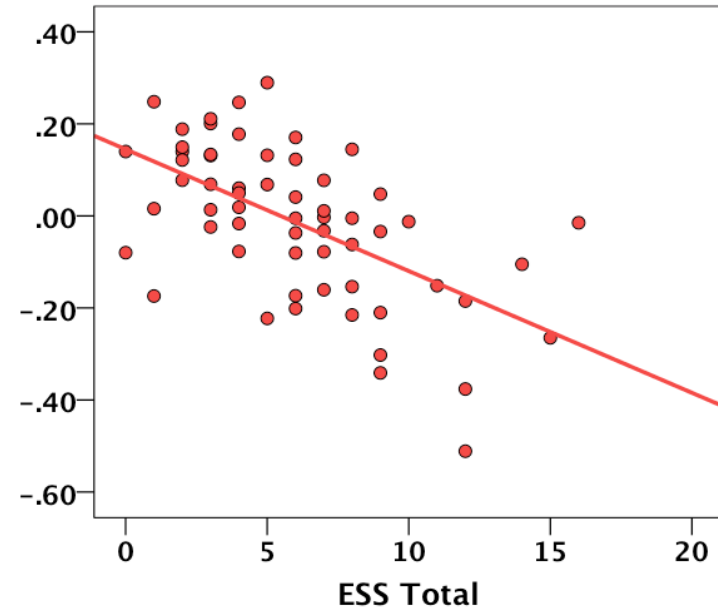
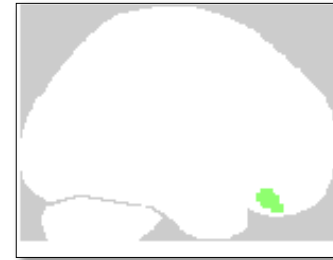
ESS scores are related to resting levels of connectivity between the thalamus and cerebral cortex

(Killgore WDS, et al. *NeuroReport*, 2015; **26**: 779-784)

L sensory-motor cortex



Ventro-medial prefrontal cortex



Cuestionario de Epworth sobre somnolencia

Situación

Probabilidad de cabecear (0-3)

Sentado(a) leyendo _____

Mirando televisión _____

Sentado(a) sin hacer nada en un lugar público (por ej. en un cine, un teatro o en una reunión) _

Como pasajero(a) en un auto o colectivo durante una hora sin hacer ninguna parada _____

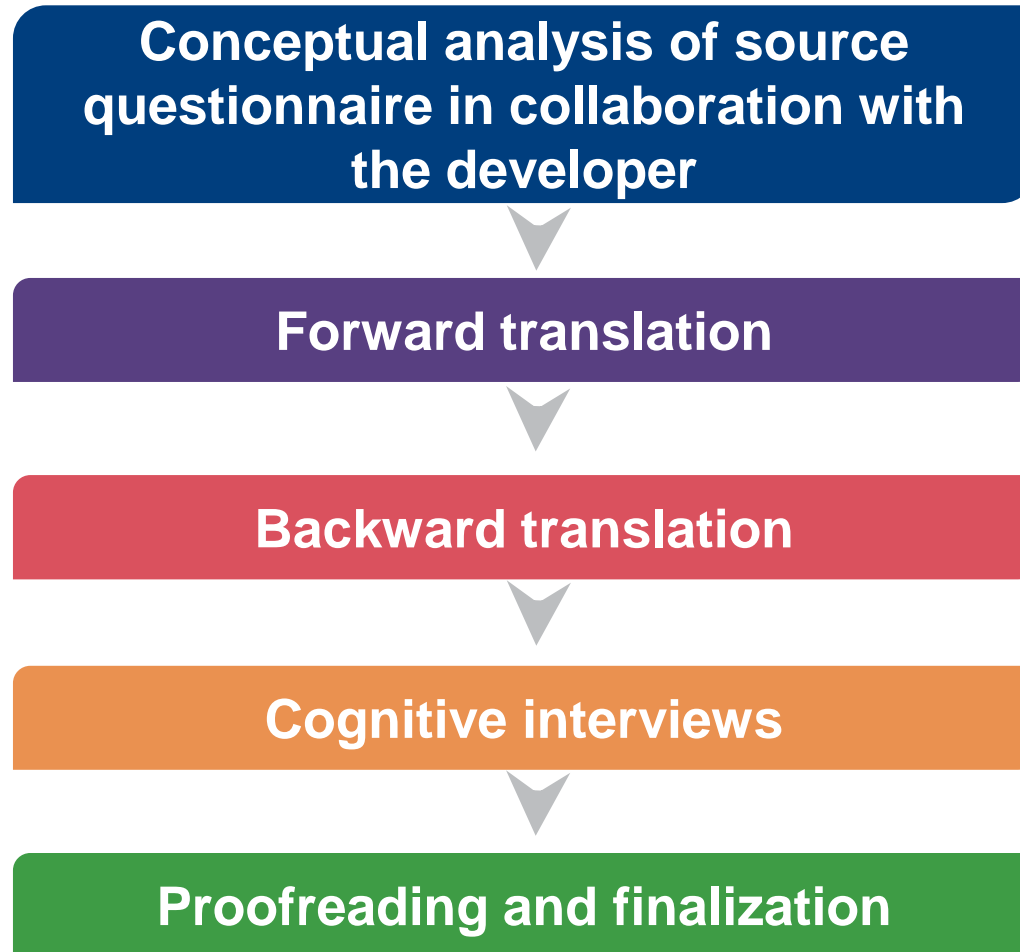
Extract from Spanish for Argentina version

66 ESS translations (Mapi translations)

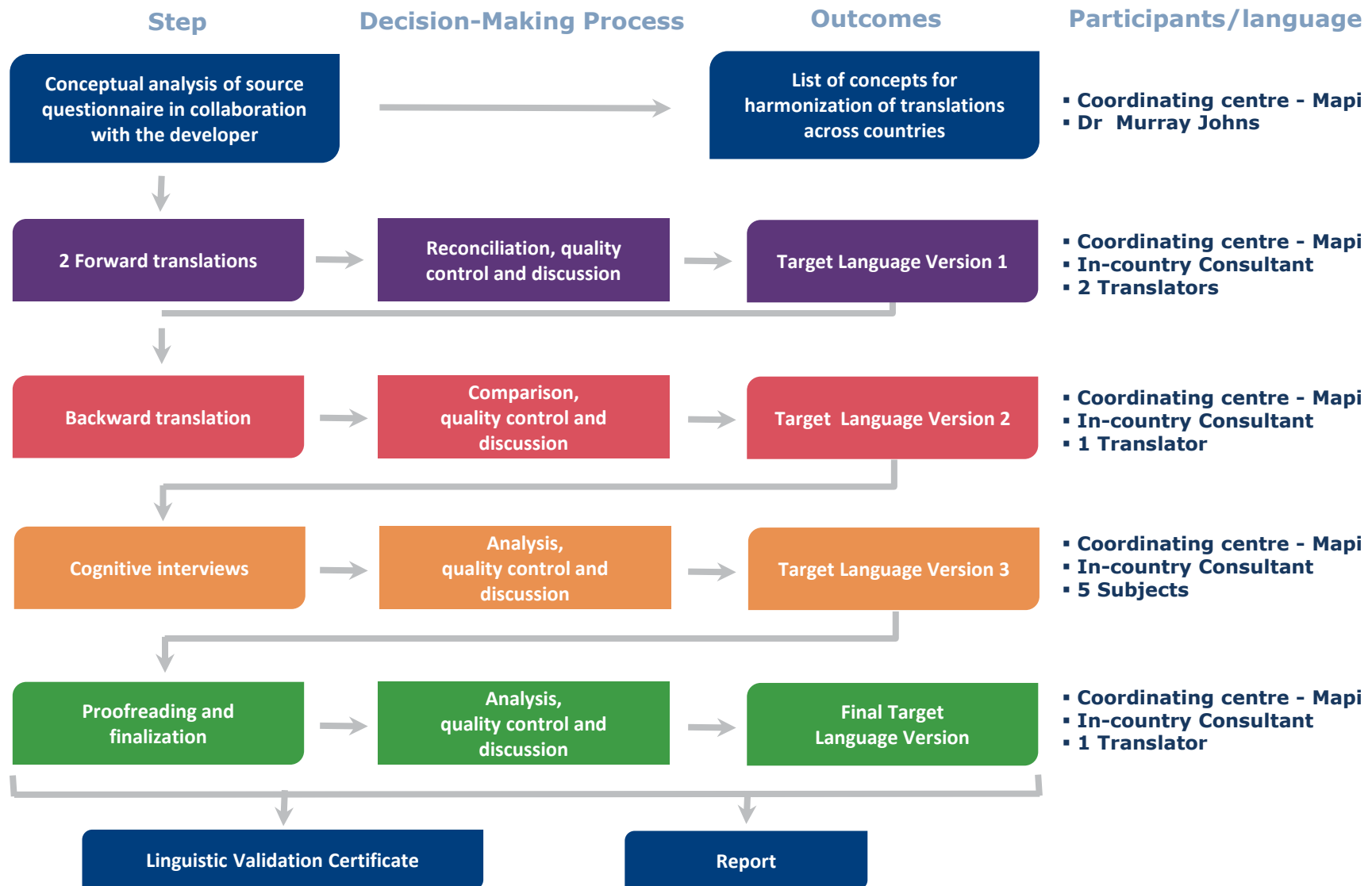
- Afrikaans (South Africa)
- Arabic (Israel)
- Bulgarian (Bulgaria)
- Cantonese (Hong Kong)
- Croatian (Croatia)
- Czech (Czech Republic)
- Danish (Denmark)
- Dutch (Belgium, The Netherlands)
- English (Canada, India, Israel, Malaysia, New Zealand, Singapore, South Africa, UK, USA)
- Filipino (Philippines)
- Finnish (Finland)
- French (Belgium, Canada, France, Switzerland)
- German (Austria, Germany, Switzerland)
- Greek (Greece)
- Gujarati (India)
- Hebrew (Israel)
- Hindi (India)
- Hungarian (Hungary)
- Italian (Italy)
- Japanese (Japan)
- Kannada (India)
- Korean (Korea)
- Latvian (Latvia)
- Malay (Malaysia)
- Malayalam (India)
- Mandarin (China, Malaysia, Singapore, Taiwan)
- Marathi (India)
- Polish (Poland)
- Portuguese (Brazil)
- Romanian (Romania)
- Russian (Israel, Russia, Ukraine)
- Serbian (Serbia)
- Slovak (Slovakia)
- Slovenian (Slovenia)
- Spanish (Argentina, Chile, Colombia, Mexico, Peru, Spain, USA)
- Swedish (Sweden)
- Tamil (India)
- Telugu (India)
- Turkish (Turkey)
- Ukrainian (Ukraine)
- Urdu (India)

Source: www.proqolid.org

Linguistic Validation Methodology



Linguistic Validation Methodology



Example

Item 7. Sitting quietly after a lunch without alcohol

- **Cultural issues**
 - **In Israel**, “without alcohol” put between brackets in Hebrew and Russian
 - Reason: alcohol consumption not customary at lunch
 - **In Italy**, “alcohol” is explicitly described as “wine, beer and other alcoholic beverages”
 - Reason: the term “alcohol” is strongly associated with “spirits”
- **Syntactic/Semantic issues**
 - **In Hong Kong**, “without alcohol” replaced by “(has not drunk alcohol during lunch)”
 - Reason: better syntax in Chinese
 - **In Serbia, Slovakia and Latvia**, “without alcohol” replaced by “without consuming alcohol” (Serbian), “without drinking alcohol” (Slovak), “without using alcohol” (Latvian)
 - Reason: addition of “consuming”, “drinking” or “using” to clarify meaning

Conclusion – Key messages

- **Aim:** Obtain high-quality ESS translations suitable for use in international clinical studies.
- **Means:** Standardized, internationally recognized linguistic validation process that fully meets the requirements of health authorities.
- **Outcome:** ESS Translations that are:
 - Conceptually equivalent to original instrument
 - Culturally relevant and acceptable to the target population within each country
 - Clear and easy to understand by the target population
 - Consistent and comparable across languages
- **Performing new ESS translations**
 - *Academic Translation:* Contact Mapi Research Trust to sign a translation agreement and to obtain Linguistic Validation Guidelines.
 - *Commercial Users:* Exclusive vendor for translation work for commercial users: Mapi Language Services

Conclusion – Key messages

- **The total ESS score** is a measure of the person's 'average sleep propensity in daily life' (ASP)
- **ESS item-scores** are retrospective subjective reports, with potential problems of bias
- **ASP** is a hypothetical construct for which we do not have a comparable objective measure as a gold standard

License to use the ESS

**The ESS is subject to copyright,
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- It was developed in English for Australia, but has been translated into many other languages.
- It is available free of charge to individual clinicians and researchers, but organizations require a license to use it.
- All license arrangements are made through Mapi Research Trust in France.

**For more information, contact:
PROinformation@mapi-trust.org**

Thank You!



Email any Additional Questions to our Webinar Hosts directly!

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