

The Assessment of Sleepiness in Children and Adolescents

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What is Sleepiness?

The word **sleepiness** has more than one meaning

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**

What is Fatigue?

- Fatigue is a behavioural state characterized by feelings of **weariness from exertion**, often with muscle aches and a disinclination to continue the task at hand
- Fatigue gets progressively worse with the duration and intensity of exertion
- Fatigue is often confused with sleepiness/drowsiness
- The term fatigue is sometimes also used to mean the **impairment of performance**, no matter what causes it

Fatigue vs Sleepiness(Drowsiness)

- Fatigue does not **fluctuate rapidly**, over a few seconds, but drowsiness does
- Intermittent episodes of **loss of awareness** of the here-and-now are a feature of drowsiness, not of fatigue
- Fatigue is relieved by **rest and inactivity**, but that makes drowsiness worse
- You don't have to be fatigued to become drowsy
- You can be both fatigued and drowsy at the same time

Measuring Sleepiness in Adults

Drowsiness:

Subjective measures: KSS, SSS, VAS

Objective measures: EEG, ocular dynamics

Sleep Propensity:

Subjective measures: ESS

Objective measures: MSLT, MWT

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

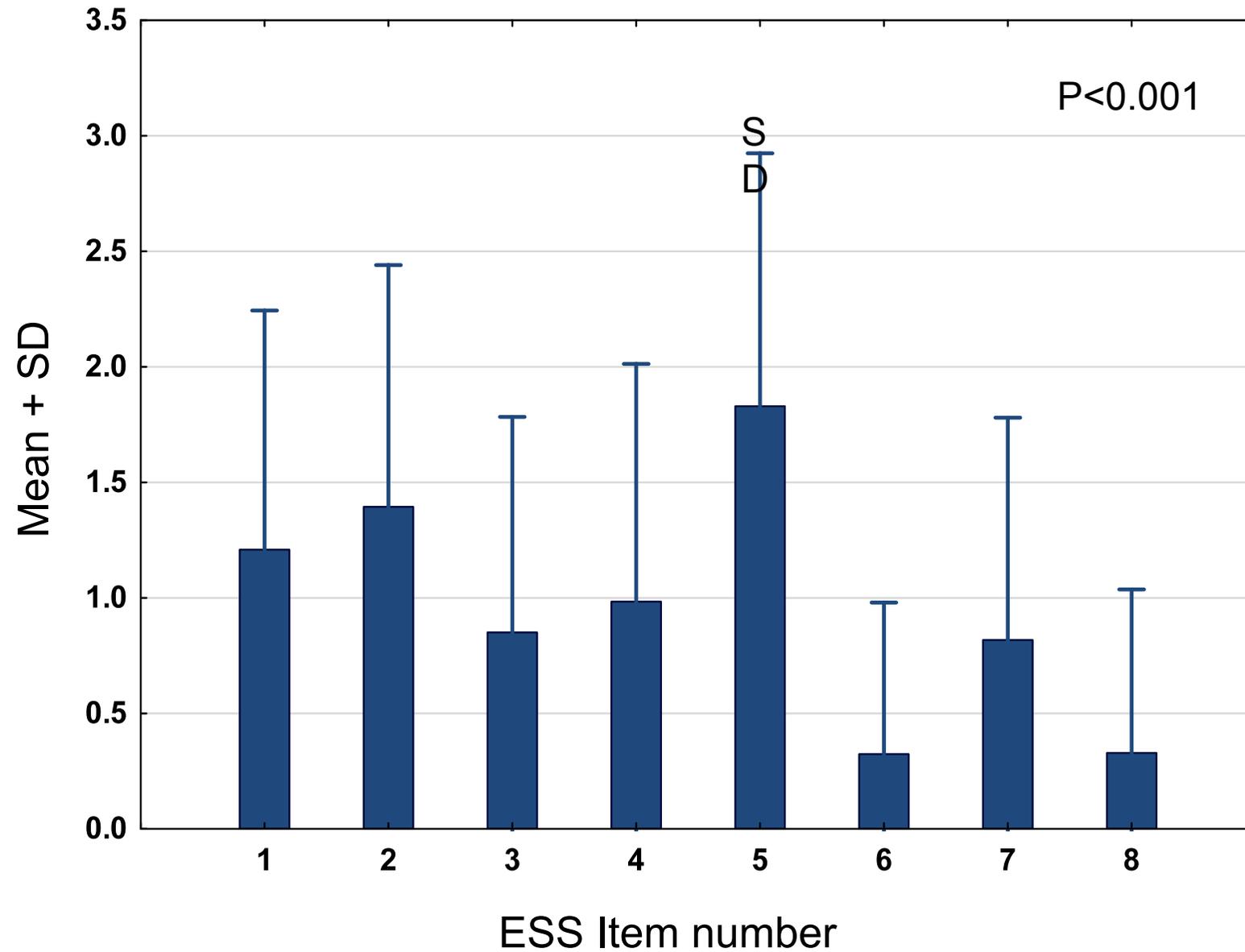
It is important that you answer each question as best you can

The Epworth Sleepiness Scale

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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	

ESS Item-scores for 992 subjects



Somnificity

- The general characteristic of a posture, activity and situation 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
- Somnificity is not a characteristic of individual people or of particular sleep disorders

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

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 with 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
The somnificity of ESS situations in 23 groups of adults			

(2802 adults in 6 countries)

Measuring Sleepiness (SP) in Children and Adolescents

Objective methods : MSLT, MWT

Subjective methods:

- Pediatric Daytime Sleepiness Scale (PDSS),
- Pediatric Sleep Questionnaire – Sleepiness Subscale (PSQ-SS)
- Cleveland Adolescent Sleepiness Questionnaire (CASQ)
- Adult ESS
- Modified Adult ESS
- ESS (CHAD)

Pediatric Daytime Sleepiness Scale (PDSS)

8 questions

1. How often do you fall asleep or get drowsy during class periods?
2. How often do you get sleepy or drowsy doing your homework?
3. Are you usually alert during the day?
4. How often are you ever tired and grumpy during the day?
5. How often do you have trouble getting out of bed in the morning?
6. How often do you fall back asleep after being awakened in the morning?
7. How often do you need someone to wake you in the morning?
8. How often do you think that you need more sleep?

Responses: “always”, frequently”, “sometimes”, “seldom”, “never”

455-458, 2003

Drake et al. *Sleep*, **26**:

Pediatric Sleep Questionnaire – Sleepiness
Subscale
PSQ-SS
(Answered by a parent)

1. Wake up feeling refreshed in the morning?
2. Have a problem with sleepiness during the day?
3. Appear sleepy during the day according to comments of a teacher or other supervisor?
4. Hard to wake up in the morning?

Responses: “yes”, “no”, “don’t know”

Chervin et al, *Sleep Medicine*,

1:21-32,2000

Cleveland Adolescent Sleepiness Questionnaire CASQ

16 questions

- eg. 1. I fall asleep during my morning classes
2. I go through the whole school day without feeling tired
7. I feel alert during my classes
8. I feel sleepy in the evening after school
14. I fall asleep when I ride in a bus, car or train

Responses:

“never”, “rarely”, “sometimes”, “often”, “almost every day”

Spilsbury et al, *J Clin Sleep Med*, 3:603-612, 2007

Adult ESS in Adolescents

“Sleep habits, excessive daytime sleepiness and school performance in high school students” Shin et al, 2003

(3871 high school students in Korea:
school performance related to ESS scores)

“Sleepiness is serious in adolescence: Two surveys of 3235 Canadian students” Gibson et al 2006

(ESS scores related to sleep habits and school performance)

“Sleep-Wake Patterns and Sleep Disturbance among Hong Kong Chinese Adolescents” Chung et al 2008

(1629 students aged 12 -19, EDS increased with age, worse in girls than boys)

Modifications to the Adult ESS

Alternative Item 3

(“Sitting inactive in a public place, eg. theatre or meeting”)

“Sitting inactive at school”, Joo et al 2005

Alternative Item 7

(“Sitting quietly after a lunch without alcohol”)

“Sitting quietly after lunch”, Snow et al 2002

Modifications to the Adult ESS

Alternatives to Item 8:

(“In a car, while stopped for a few minutes in the traffic”)

“As a passenger in a car, while stopped for a few minutes in the traffic”

Melendres et al, 2004; Chan et al 2009 ; Davis et al 2011

“Doing homework or taking a test”

Anderson et al, 2009; Moore et al, 2013; Storfer-Isser et al, 2013

“In class while the teacher is talking” Campbell et al 2007

“During class at school” Snow et al, 2002

“Playing video games” (Mid-Michigan sleep centre)

Epworth Sleepiness Scale for Children and Adolescents

ESS(CHAD)

Your name: _____ Today's date: _____

How old are you? _____ (years) Boy? (_____) or Girl? (_____) tick one space

Over the last month, how likely have you been to fall asleep while doing the things that are described below (activities)?

Even if you haven't done some of those things over the last month, try to imagine how they would have affected you.

Use the following scale to choose one number that best describes what has been happening to you during each activity over the last month. Write that number in the box below.

- 0 = would never fall asleep
- 1 = slight chance of falling asleep
- 2 = moderate chance of falling asleep
- 3 = high chance of falling asleep

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

Activities

Chance of falling asleep

(0 – 3)

Sitting and reading _____

Sitting and watching TV **or a video** _____

Sitting in a classroom at school during the morning _____

Sitting and riding in a car **or bus** for about **half an hour** _____

Lying down to rest **or nap** in the afternoon _____

Sitting and talking to someone _____

Sitting quietly by yourself after lunch _____

Sitting and eating a meal _____

Thank you

Conclusions

- **We should clarify what we mean by “sleepiness”**
- **There are too many different questionnaires for measuring “sleepiness” among children and adolescents**
- **The most commonly used questionnaires are non-standardised modifications of the adult ESS**
- **They show that most adolescents and children > 9 yr can answer such a questionnaire meaningfully, as can the parents of younger children**
- **The ESS-CHAD is proposed as a new, standardised questionnaire**
- **The ESS(CHAD) will have the same limitations as any**