

The impact of sleep on learning in adolescence

Dr Jakke Tamminen

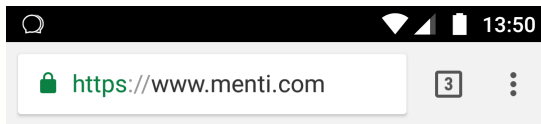


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Pre-talk questionnaire



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Please enter the code

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Pre-talk questionnaire



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13:53

<https://www.menti.com/c003e>

Mentimeter

Cause of late bedtimes

Are late bedtimes in adolescence more due to social factors (e.g. social media) or biological factors (e.g. difficulty to fall asleep)?

Skip

1 1 10

Social Biological

Submit

Using your smartphone or laptop, please go to

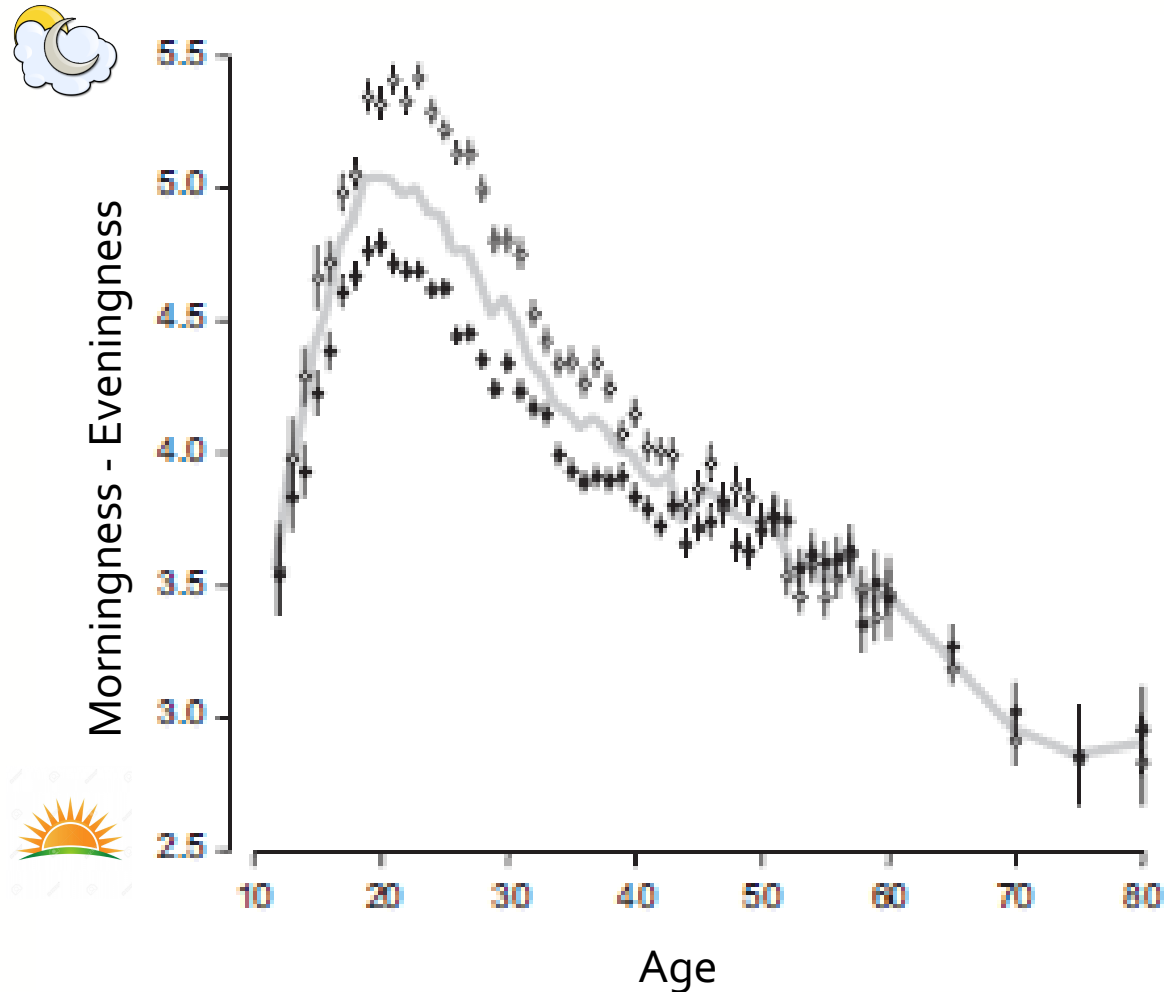
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From morning larks to evening owls (and back again!)



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Time-of-day preferences in adolescence

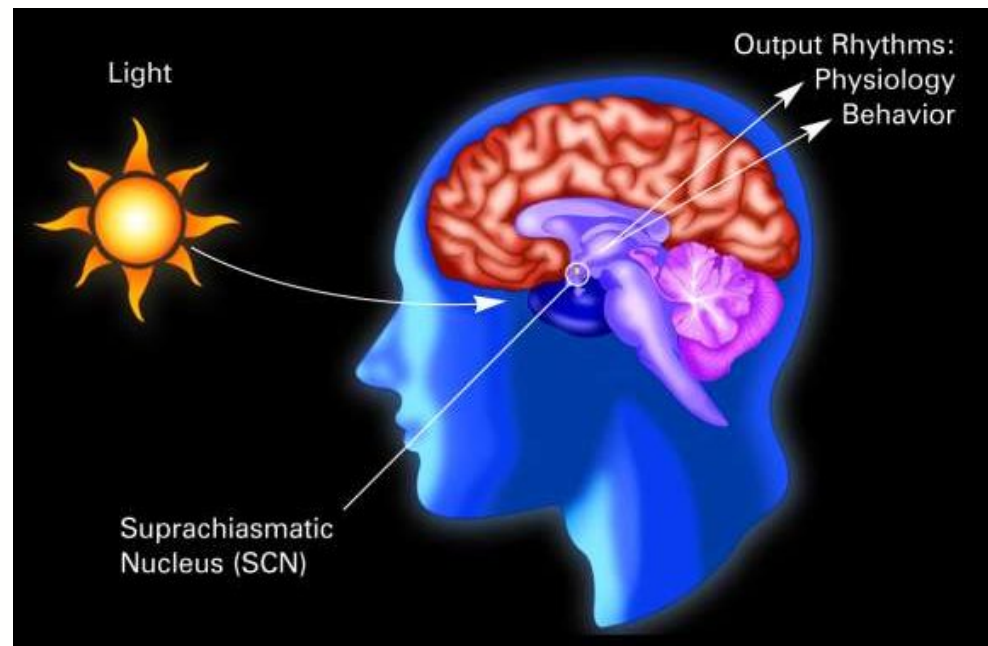


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Sleep-wake cycles are controlled by our biological clock, located in the suprachiasmatic nucleus.

The biological clock determines the timing of a “wake maintenance zone”

In adolescence the biological clock shifts forwards by 2-3 hours.

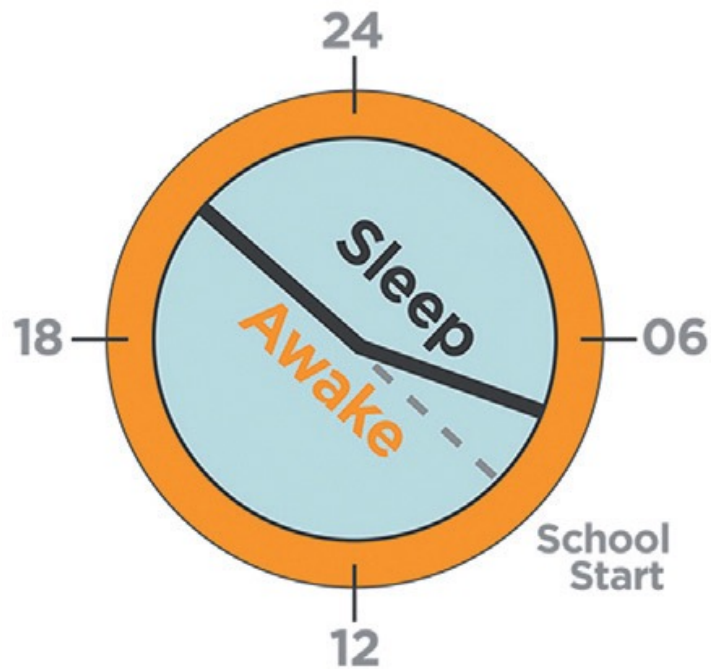


Changing sleep-wake patterns in adolescence



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PreAdolescent



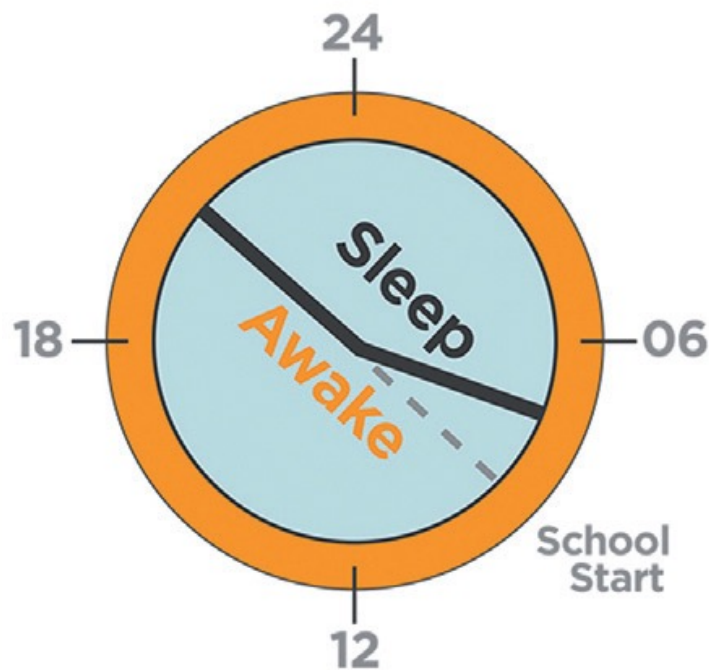
Avg = 10h sleep/night

Changing sleep-wake patterns in adolescence



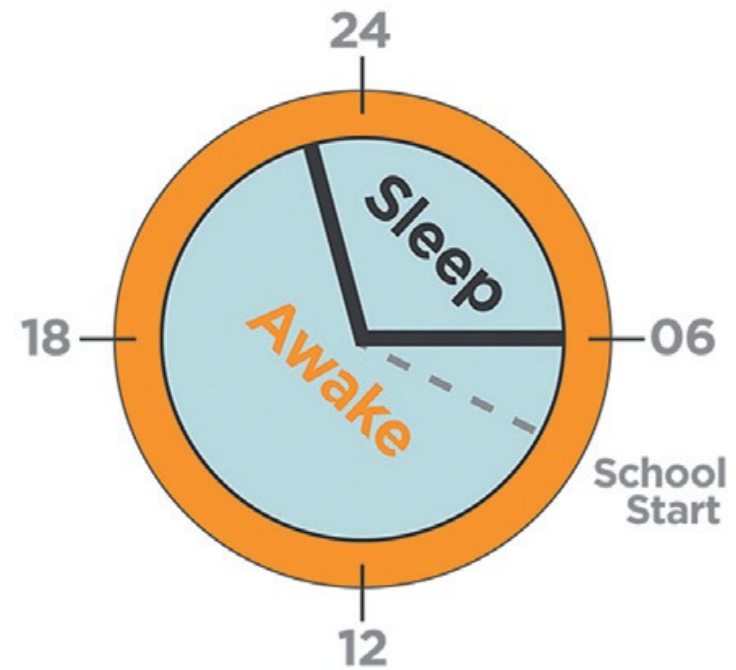
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PreAdolescent



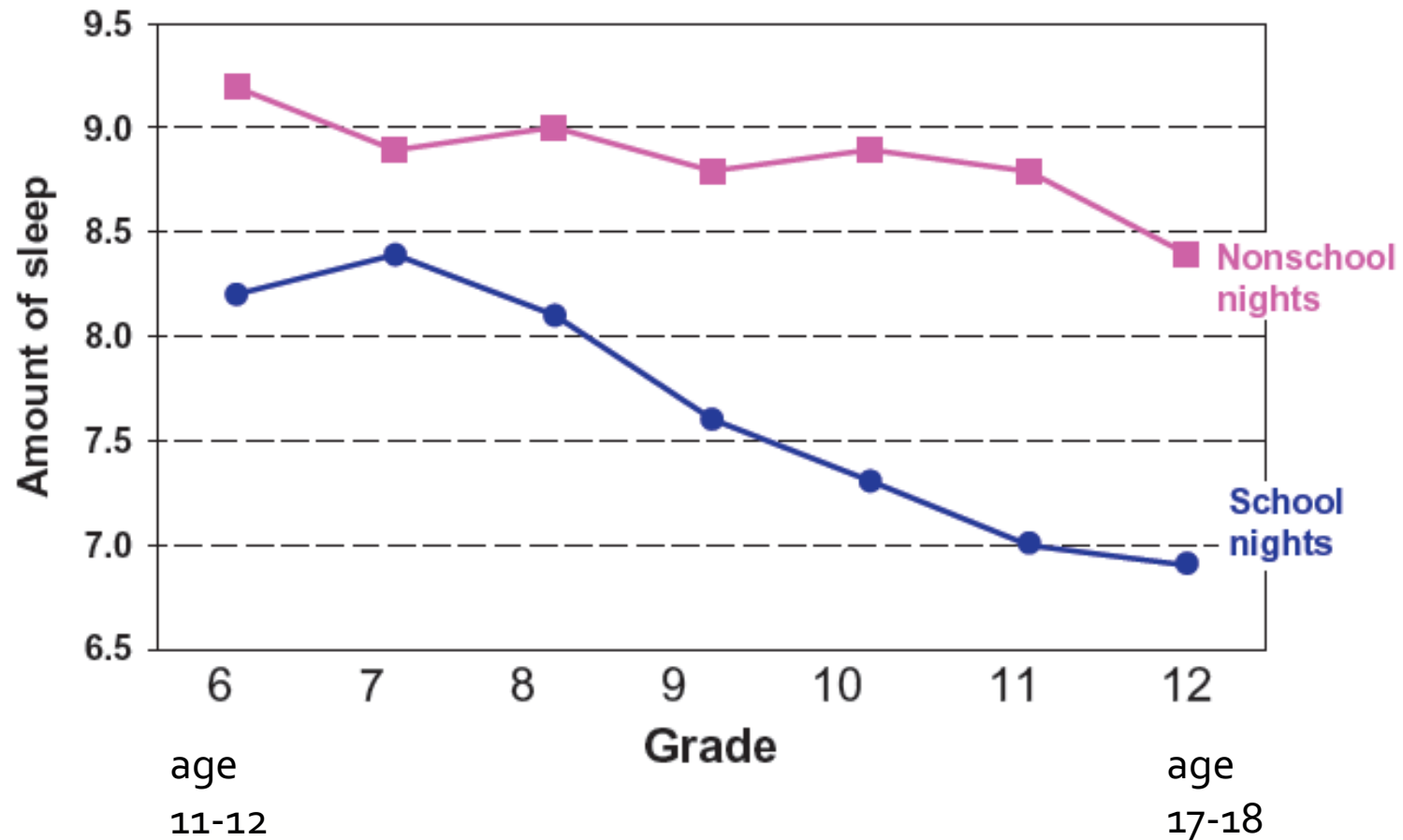
Avg = 10h sleep/night

Adolescent



Avg = 7.5h sleep/night

Adolescent sleep need vs. reality during school term



Lack of sleep in adolescents is associated with...

Lower academic achievement

Likelihood of car accidents

Poorer attention

Lower academic motivation

Impaired executive function

More risky behaviours

Higher truancy

Higher levels of depression

LEARNING AND MEMORY?

Lower immune function

Increased suicidal thinking

Lower psychomotor speed

Increased illness

Increased obesity

Poorer abstract thinking

Lower creativity

Decreased insulin sensitivity

Increased insulin resistance

Memory consolidation



Sleep group



Wake group

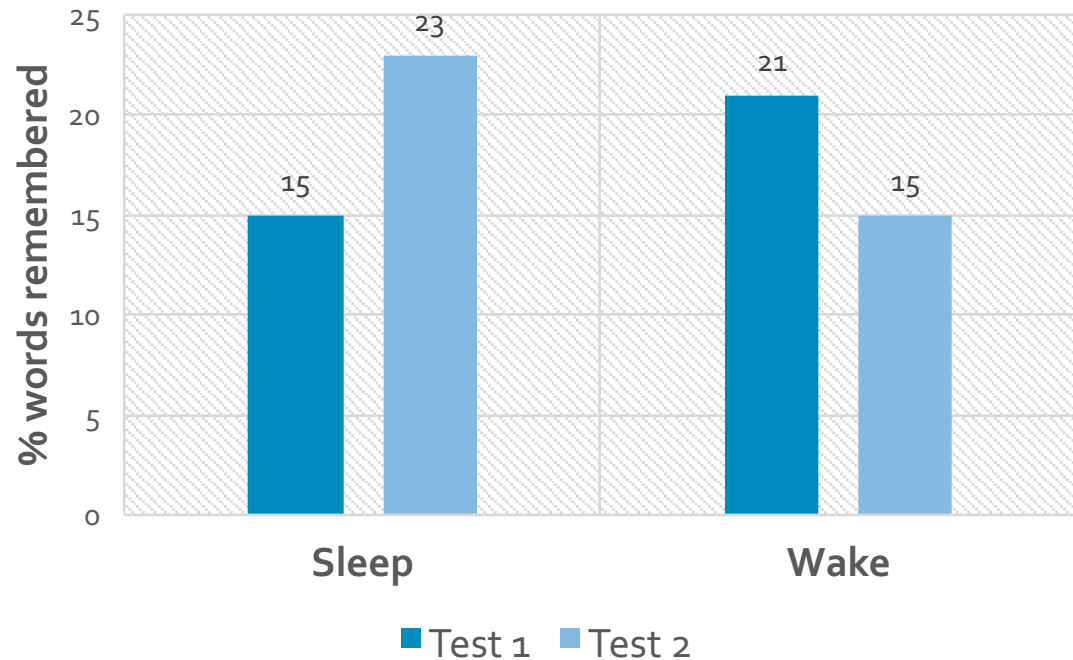


Study new words
and Test 1

Sleep or Wake
for 8 hours

Test 2

**Sleep strengthened
new memories. Wake
caused forgetting**
(Tamminen et al., 2010)



Memory consolidation



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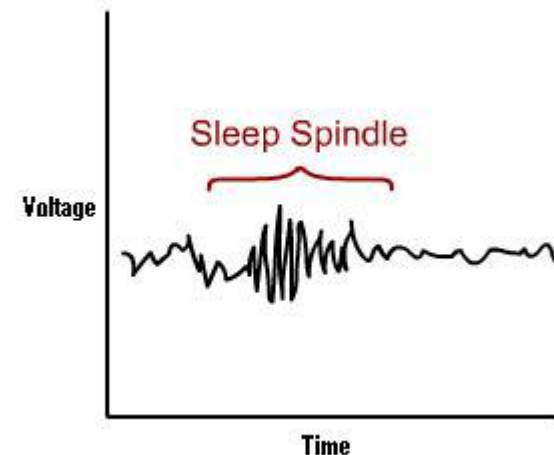
Impact of sleep on false memories

nurse, sick, medicine, hospital, health, dentist, physician, ill, lawyer, patient, office, stethoscope, surgeon, clinic, cure.

Doctor = false memory

Sleep spindles reduce false memories in adolescents.

(Kuula, Tamminen, Makkonen, Merikanto, Raikkonen & Pesonen, in preparation)





Does lack of sleep in adolescence make memory consolidation less efficient?

Do the brain mechanisms that consolidate memories change in adolescence to accommodate shorter sleep?

Do pre-adolescents learn best in the morning? Do adolescents learn best in the afternoon?

Are there individual differences that make some adolescents more or less susceptible to the detrimental effects of lack of sleep?



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