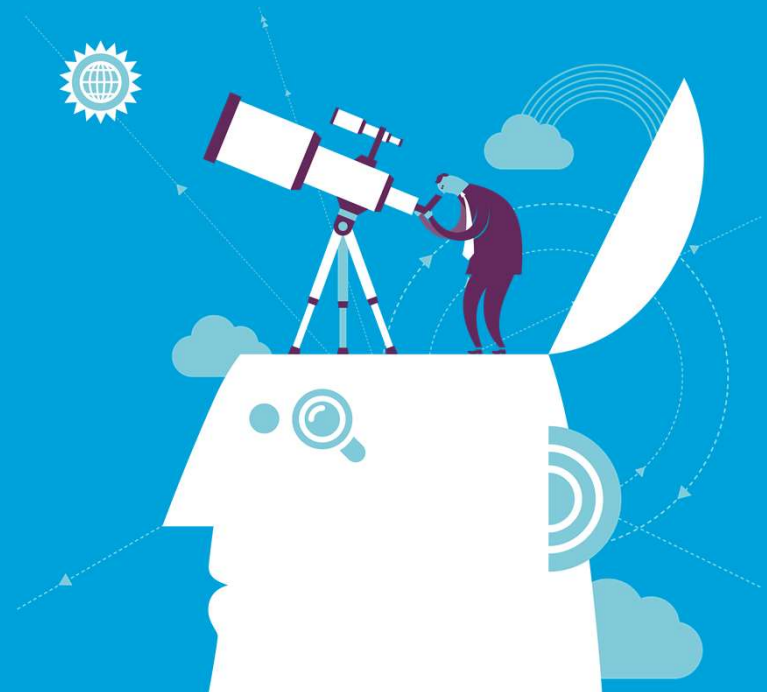


Patterns and Determinants of Sleep in Adolescent Students of a United World College: A Mixed Methods Case Study

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My background



- Educator
- Residential Mentor
- Researcher
 - THESIS - Patterns and Determinants of Sleep in Adolescent Students of a United World College: A Mixed Methods Case Study



The Health Problem

- Sleep deprivation and other sleep related problems
 - prevalent in adolescents

Table 1
Sleep patterns reported by adolescent school children: National Sleep Foundation 2006 Sleep in America Poll

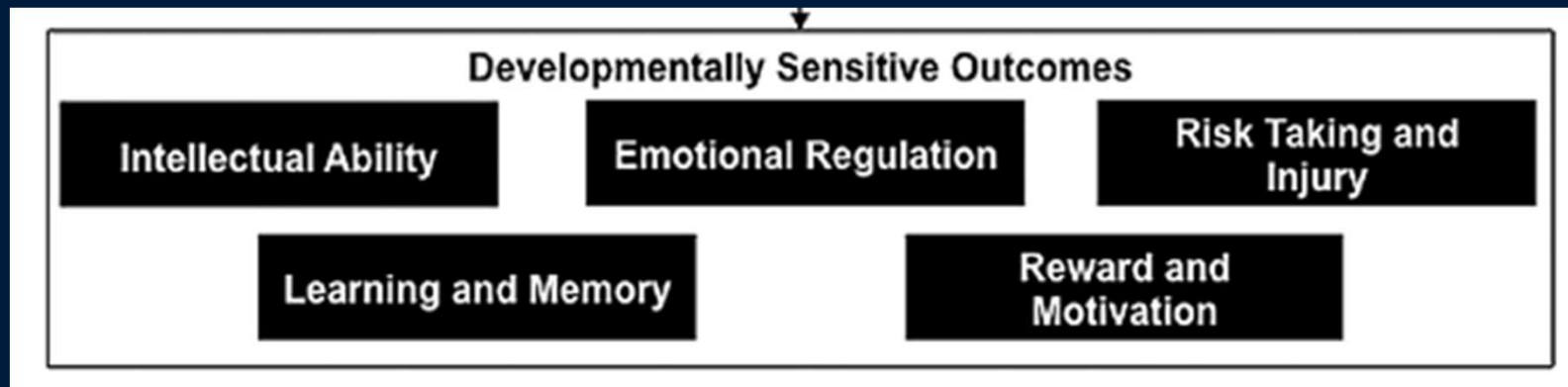
Sleep Variable	Grade in School						
	6th	7th	8th	9th	10th	11th	12th
School Nights							
Bedtime (24-h)	2124	2152	2153	2215	2232	2251	2302
Rise Time (24-h)	0642	0635	0636	0628	0623	0623	0631
Average Sleep (Hours)	8.4	8.1	8.1	7.6	7.3	7.0	6.9
Weekend Nights							
Bedtime (24-h)	2231	2305	2326	2353	0003	0025	0045
Rise Time (24-h)	0853	0912	0921	0954	0954	1006	0951
Average Sleep (Hours)	9.2	8.9	9.0	8.8	8.9	8.8	8.4
School Night- Weekend Hours Slept Difference	0.8	0.8	0.9	1.2	1.6	1.9	1.5

Data from National Sleep Foundation. 2006 Sleep in America Poll Summary Findings. Available at: http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2419037/k.1466/2006_Sleep_in_America_Poll.htm. Accessed February 14, 2007.

The most recent national poll shows that more than 87 percent of U.S. high school students get far less than the recommended eight to 10 hours of sleep each night.

Consequences of Insufficient Sleep

- Physical health impacts
 - Decreased immune function
 - Increased inflammation
 - Disturbed endocrine function
 - Increase in obesity
 - Increase risk of injury
- Emotional impacts – heightens stress, increases anxiety/depression
- Some impacts developmentally sensitive – adolescents



How is sleep measured?

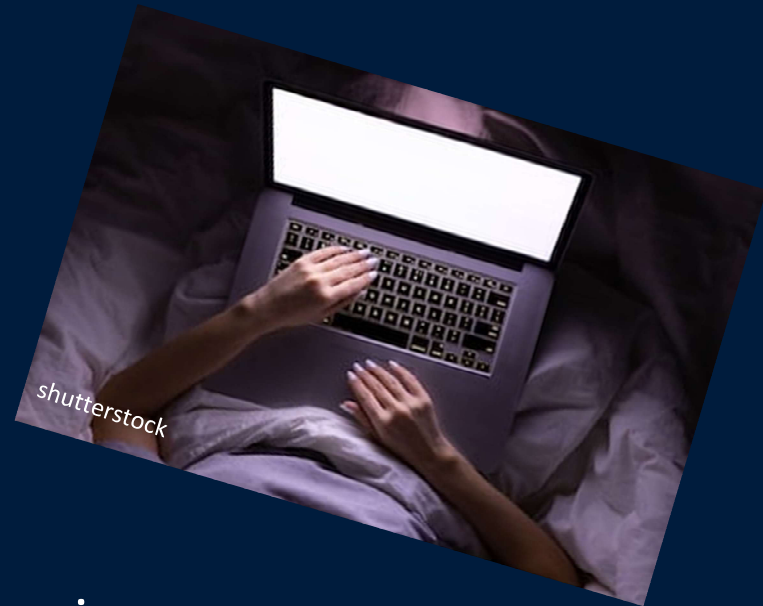
Table 1

Sleep-Related Parameter Definitions

<u>Construct/Term</u>	<u>Definition</u>
Chronic sleep deficiency	Maintained insufficient or poorly timed sleep, measuring through self-reported sleep diaries assessing current average nightly sleep (Luyster et al., 2012)
Total Sleep Time (TST)	Nighttime sleep duration, measured through self-reported questionnaires; maybe calculated from bedtime/wake time values (Bartel, Gradisar, & Williamson, 2015)
Time in Bed (TIB)	Total amount of time spent in bed sleeping or attempting to sleep between bedtime and wake time (Rigney et al., 2015)
Perceived Sleep Quality (PSQ)	Subjective and varied measure of sleep, most often consisting of perceived "restfulness," degree of sleep latency, and number of sleep interruptions; measured through self-reported scales (Buysse et al., 1989; Krystal & Edinger, 2008)
Sleep (Onset) Latency (SOL)	Amount of time taken to fall asleep after going to bed, assessed through sleep reported sleep diaries, or actigraphy technology (Gradisar et al., 2011; Storfer-Isser, Lebourgeois, Harsh, Tompsett, & Redline, 2013)
Intraindividual Variability (IIV)	Degree of change in sleep patterns [total sleep time, wake time, and/or bedtime] between different nights for a single individual, often between weekdays and weekends (Becker et al., 2016)
Daytime Sleepiness	Degree of desire to have more sleep, daytime naps, objectively measured alertness, and/or general daytime function; measured through self-reported surveys and reaction times tests (Bonnet & Arand, 1995; Gradisar et al., 2011)

Determinants of sleep-related behaviors

- Sleep hygiene behaviors
 - Technology use
 - Caffeine, tobacco, alcohol use
 - Parental rules around sleep
 - Sleep-related attitudes/knowledge
 - Cultural norms
 - Etc.
-
- And the UWC context is particularly unique
 - Students away from home for the first time (ages 16-18)
 - Intentionally very diverse population
 - School has a philosophy of student responsibility and self-regulation



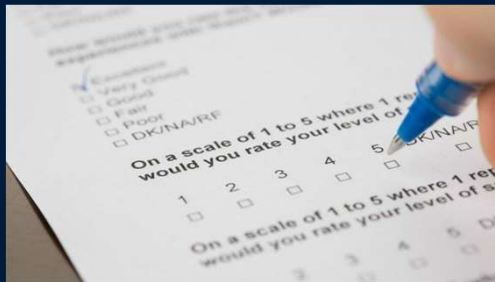
Research Objectives

- What are the sleep patterns of students of the age 15-20 at the preselected school?
- What is the perceived sleep quality of these students, and what sleep-related problems/concerns can be identified within the student population?
 - Are there variations among subgroups of the student population?
- What is the prevalence of sleep hygiene-related practices?
- What are the physical environmental and social cognitive determinants of sleep and sleep quality measures?

The Methods

Focus Group Interviews (n = 15)

- Exploratory
- nVivo used to code and analyze the resulting qualitative data
- Used to develop . . .



Picture from: <https://www.reference.com/education/write-simple-questionnaire-159f6f5c817ea05>



Picture from: <https://www.networks.nhs.uk/nhs-networks/post-stroke-adjustment-training/blogs/paast-blog/first-focus-group>

Quantitative Questionnaire (n = 106)

- Descriptive statistics
- Correlations and regressions
- T-tests for subgroup comparisons

Sample of Focus Group

1. First, could you each introduce yourself with your name, year group, and your nationality. Also share with us how you would describe your standard sleep schedule?

2. How does your sleep schedule compare on weekdays versus weekends?

5. Tell me about your evening routines. How do you prepare for going to sleep? Is there anything that you regularly do to ensure a good night's sleep?

7. How important is getting enough sleep to you? Why is that?

9. What do you see as the most significant barriers to getting enough sleep while attending UWC? What are the best facilitators for good sleep?

Themes Emerging from Focus Groups

Table 3

Determinants of Sleep and Sleep Hygiene Behaviors: Factors from focus group interviews

Physical Factors within the Environment

- Noises
- Lights
- Smells
- Comfort of the beds
- Temperature

Social Influences

- Peer behavior
- Pressure to have the "UWC Experience"
- Importance of sleep as suggested by:
 - Tutors
 - Residence mentors
 - Teachers
- Floor duties/ meetings

Individual Attitudes/Beliefs/ Personal Factors

- Stress
- Academic pressure
- Limited time management skills
- Influence of family members' habits
- Sleep as a priority / beliefs about the importance of sleep

Questionnaire

- Demographics/student characteristics
- Prevalence / Behaviors
 - Total sleep duration
 - Weekends and weekdays
 - Bed times/rise times
 - Sleep latency
 - Sleep hygiene practices
- Determinants for sleep-related behaviors
 - Cognitive determinants (TPB constructs)
 - Attitudes regarding sleep, self-efficacy & control beliefs, subjective norms
 - Environmental determinants
 - Noise/light exposure, start times, homework/extracurricular activity load



Results – Patterns of Sleep Behavior

Table 5

Patterns of Sleep Behavior / hours (n = 106)

Sleep Behavior Measures

	<u>M (SD)</u>	<u>Min</u>	<u>Max</u>
TIB (Weekday)	7.11 (0.96)	4.33	9.50
Weekday BV	3.52 (1.68)	0.50	9.00
TIB (Weekend)	8.90 (1.29)	6.00	11.50
Estimated TST (Weekday)	6.87 (0.96)	4.16	9.08
Estimated TST (Weekend)	8.67 (1.26)	5.83	11.33
IIV	1.80 (1.11)	-0.42	6.17

Frequencies of NSF Sleep Recommendations Categorizations

	Weekdays	Weekends
	<u>n (%)</u>	<u>n (%)</u>
Recommended Amount	32 (30.2)	62 (58.5)
Amount may be appropriate for some people	34 (32.1)	38 (35.8)
Amount not recommended	40 (37.7)	6 (5.7)

Results – Sleep Problems and Sleep Hygiene-Related Behaviors

- More than one-third of students rated their perceived sleep quality as "very bad" or "(fairly) bad"
- Sub-group analysis showed little variation
- Common sleep hygiene-related behaviors
 - Using the bed for activities other than sleeping
 - Thinking, planning, and worrying in bed
 - Electronic device use
 - 56.6% reporting using screen was the last thing they do prior to going to falling asleep
- Regular bedtime routes were NOT common

Results – Sleep Problems and Associations

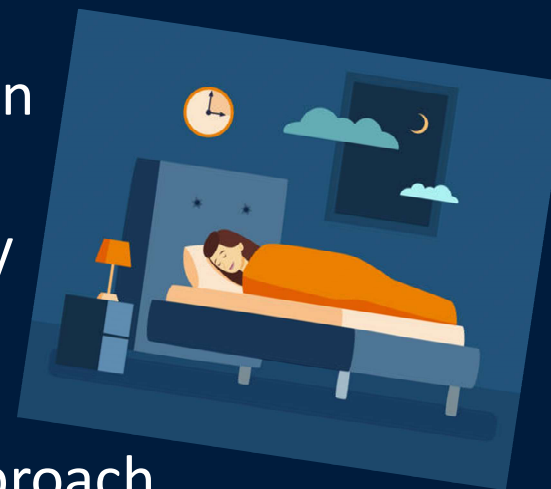
- Regression model showed that weekday TST:
 - increases with **prioritization of sleep** ($\beta = 0.322$; $p = 0.001$)
 - decreases with age ($\beta = -0.344$; $p = 0.001$), **perceived academic pressure** ($\beta = -0.210$; $p = 0.031$), and **perceptions of peers' sleep** ($\beta = -0.271$; $p = 0.006$)
- Every sleep quality/problem measure became more problematic with an increase of **negative cognitive/emotional sleep practices**
- **Problematic napping behavior** was associated with worse PSQ ($\beta = 0.197$; $p = 0.041$), higher daytime sleepiness ($\beta = 0.230$; $p = 0.008$), and IIV ($\beta = 0.201$; $p = 0.041$)
- **Self-efficacy** was associated with PSQ ($\beta = -0.290$; $p = 0.004$)

Limitations

- Only self-reported data
- Risk of selection bias and social desirability bias
- Cross-sectional data did not allow for causal inferences

Conclusions and Recommendations for Practice

- Chronic sleep deprivation is an urgent concern
- All adolescent students should be targeted by interventions
- Interventions should utilize an integrated approach, targeting more than sleep knowledge (not a significant predictor of sleep measures)
 - Specific behaviors should be emphasized, as well as self-efficacy and prioritizing sleep
 - Some students with more extreme sleep concerns may benefit from individual support
 - Harness the student role models of good sleep in the school



Thank you! Any questions?



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