Treating Sleep to Improve Emotional Health and Functioning in Teens

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Agenda

• Sleep in adolescence
• Correlates and consequences of insufficient sleep
• Sleep as it relates to emotion regulation in adolescence
• How to intervene: Case examples
• Conclusions
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Why do we sleep?

- Is it a waste of time?
  - All species do it
  - It varies across development
  - Rats will die if sleep deprived

- Sleep is restorative

- But sleep is also an *active* process; sleep and wake are part of one continuous arousal system
  - Synaptic strengthening and pruning
  - Learning

- 5 stages of sleep—we don’t know the functions of each but the patterning is reliable and we are learning more and more about the value of different stages (e.g. REM sleep versus NREM sleep)
Hot topics in sleep: Learning and memory

- Memory consolidation
- Animal research
  - Rats show same pattern of activation when learning track-running task and sleeping
  - Zebra finches “replay” songs in brain during sleep
- Procedural learning
  - Motor task: keyboard sequence with testing 12 hrs later, with or without sleep in the meantime
- fMRI of reprocessing
  - Circuits activated during learning are reactivated during sleep → neural mechanism for sleep effect
- To study or to sleep?
  - Less sleep ≠ more time
Are teens sleep-deprived?

• Need for sleep remains constant, about 9 hrs (Carskadon & Acebo, 2002)

• Average teen gets 7.5 hrs of sleep per night (National Sleep Foundation, 2006)
  – Ranges from 8.4 hrs for 6\textsuperscript{th} grade to 6.9 hrs for 12\textsuperscript{th} grade

• Percentage of teens getting <7 hrs of sleep increases with age
  – 57.7\% in 9\textsuperscript{th} grade versus 78.2\% for 12\textsuperscript{th} grade (Eaton et al., 2010)
School start times

- Wolfson et al., 2007: middle school start times study
  - 2 schools: early-starting (7.15 am) and late-starting (8.37 am)
  - Sample of 205 7th and 8th graders
  - Compared sleep habits between both groups
Why are teens sleep-deprived? (1)

- Psychosocial factors
  - Decreased parental monitoring
  - Academic demands
  - Other activities: social, extracurricular, employment
Why are teens sleep-deprived? (2)

• Puberty impacts sleep regulation?
  – Onset of puberty triggers a preference for eveningness (Carskadon et al., 1993)
  – Daytime sleepiness?

• Consider this pattern in history versus contemporary society...
SUMMARY:
A small biological change at puberty can lead to a spiral of negative effects

- Late night/erratic schedules ⇒ Sleep Deprivation
  ⇒ erodes mood and motivation
  ⇒ greater stress and affective problems
  ⇒ interferes further with sleep/arousal regulation
  ⇒ greater difficulty falling asleep

- Social context that amplifies the biologic change ⇒ a torrential spiral?
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Correlates of insufficient sleep (1)

• Behavioral
  – Daytime sleepiness (National Sleep Foundation, 2006)
    • 50% teens report feeling too tired/sleepy
    • Over 20% teens report falling asleep in school/while doing HW at least 1x/wk
  – More caffeine consumption (National Sleep Foundation, 2006)
  – Greater likelihood of non-alcoholic drug use (Roberts et al., 2009)
Correlates of insufficient sleep (2)

• Psychosocial
  – Lower self-esteem & life satisfaction, more interpersonal problems, decreased sense of control
  – Sleep disturbance in clinically depressed or anxious teens
  – More depressive symptoms in non-clinical populations
    • Longitudinal study showed that reduced sleep predicted depressive symptoms (Roberts et al., 2009)
Correlates of insufficient sleep (3)

- Academic
  - Lower grades—perhaps related to behavioral and psychosocial correlates of insufficient sleep?
Consequences of insufficient sleep?

- Most data is correlational
- Some longitudinal data
- Very little experimental data
  - Notable exception includes recent work from a study led by Dr. Peter Franzen (McMakin, Cousins, Dahl, Forbes, Silk, and Franzen, In preparation) demonstrating that experimentally manipulating sleep among healthy adolescents causally impacts emotional functioning, particularly in peer contexts
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Sleep and Emotion
Some Youth May Be More Vulnerable to Effects of Sleep Deprivation

Mean Peak Pupil Dilation to Negative Sounds (mm)

- Sleep Restriction
  - $r^2 = 0.42, p < 0.02$
- Sleep Extension
  - $r^2 = 0.01, p = 0.73$

Some Youth May Be More Vulnerable to Effects of Sleep Deprivation
Vulnerable youth: Mood and Anxiety Disorders

- caused by sleep problems?
- preceded by insomnia
- bidirectional association
- insomnia as link between anxiety and depression?
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Sleep Assessment

• Common sleep problems:
  – Trouble going to bed
  – Trouble falling asleep
  – Night-time waking
  – Trouble with morning wake-up
  – Irritable, sleepy during the day
  – Erratic sleep schedules
  – (sleep walking, enuresis, nightmares)

• Onset, triggers, intensity, frequency, duration, distress, impairment, protective factors

• Family, developmental, environmental information
Case Conceptualization: Domains

1. Hypervigilance and difficulty self-soothing

2. Difficulty disengaging from social reward

3. Daytime lifestyle, habits, schedule
Framework

• Intrinsic motivation

• Developmental considerations: Balancing Autonomy and Dependency

• Family considerations: Role of parent/caregiver
Menu of Strategies

- Stimulus Control
- Targeting sleep-interfering media use
- Daytime habits (e.g. caffeine, physical activity, naps)
- Light/dark cues
- Regularizing schedule
- Brisk Wake-Up
- Savoring and switching
- Cognitive Challenges
Strategies: Stimulus Control

- Dick Bootzin, U. Arizona
  - Go to bed when sleepy
  - Bed is for sleeping only
  - Get out of bed after 20 minutes
  - Return to bed only when sleepy
Strategies: Targeting Sleep-Interfering Media Use

- TV in bed
- Cell phones
- Text Messages
- Internet / Facebook / Twitter

...but WHY?? (e.g., social contact versus soothing and cues of safety?)
Strategies: Daytime Habits

- Naps
- Caffeine
- Physical Activity
- Time for worry?
Strategies: Regularizing Schedule

- Less than 2 hours difference between the weekday wakeup/sleep time relative to the weekend wakeup/sleep time
- Bring bedtime forward by 20-30 minutes per week
- Fix wake-up time (easiest to control)
- Collaboratively set realistic adjustments each week, sleep diary to monitor change, praise/reward when change is implemented, problem solving
‘Even moderate light intensities, similar to indoor intensities, are able to cause substantial suppression of melatonin production’

• A powerful cue

• Triggers a cascade of biology that will help you fall asleep

• Consider *not* turning on major lights if you get up in the night (eg. to use the restroom).
‘Lights out’ Cue

• Involves selecting a particular time prior to the targeted bedtime when the young person alters the light to which they are exposed to facilitate the transition to bedtime.

• Turn down the lights

• Refrain from the use of computers, text messaging, cell phones etc
Strategies: Light-Dark Cues

- Sun: The strongest source of light (more than 10,000 lux) even on a cloudy day
- Exposure to light helps to reduce sleepiness/fatigue in the day
- On waking exposure to light helps to reduce sleep inertia
Strategies: Brisk wake-up routine

• Sleep is like a dimmer, it’s not a lightswitch (it takes time to wake up)

• ‘Sleep inertia’ is the feeling of grogginess occurring for the first hour upon waking

• These feelings are normal. They indicate the transition from sleep to wake.

• They do not necessarily indicate you didn’t get enough sleep!! Everyone experiences sleep inertia almost every morning!
The **WAKE UP** Routine

- Wash face and hands with cold water
- Avoid snoozing
- Keep active for the first hour
- Expose yourself to sunlight
- Upbeat music
- Phone a friend
Are there any downsides to getting up at the same time everyday?

What are the obstacles to implementing the brisk wakeup?
Fred Bryant (2003, 2006): Savoring is the ability to attend to, appreciate and enhance positive experiences in our lives through...

– Anticipation
– Engagement
– Reminiscing

– A mirror-image (positive version) to the process of rumination?
Worry and rumination at bedtime: common problem in individuals with difficulties going to sleep

Ruminative worries at bedtime tend to activate threat/vigilance/arousal: incompatible with sleep

Savoring positive experiences may displace ruminations: activation of positive thoughts and feelings (may lower vigilance and threat)

- Mental Television
Sleep Problems

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Thank you!
We welcome referrals to our ongoing intervention studies...

The Child Anxiety Treatment Study and Sleeping TIGERS:
Investigators: Neal Ryan, Ron Dahl, Jennifer Silk, Cecile Ladouceur, Erika Forbes, Greg Siegle, Dana McMakin
Clinicians: Melissa Milbert, Laura Trubnick, Dana McMakin
Who: Youth with anxiety, ages 9-14
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The PASS Study for Teen Depression
Investigators: Dana McMakin (mentors: Ron Dahl, David Brent, Jon Fincham)
Clinicians: Melissa Milbert, Kara Colaizzi, Dana McMakin
Who: Youth with depression, ages 12-16
Contact: Candice Croft 412-383-5190