Adolescent Depression and Sleep
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Bi-Directional Mutual Maintenance

Mood Regulation Difficulty
(e.g., depression, anxiety)

Sleep Disturbance

Simple powerful strategies to improve sleep
Mental Illness & Sleep in Youth

- 30% of the US population over a 12-month period are diagnosed with a mental illness (Kessler et al., 1994; Regier et al., 1998).
- Half of all lifetime mental illness starts by 14 years of age (Kessler et al., 2008).
- Sleep problems in teens predict worse mental health (Frederikson et al. 2004; Roberts et al., 2002).
- To what extent is sleep disturbance an important, yet understudied, contributor to the cause/maintenance of mental illness/emotion dysregulation among teens?

Temporal Gap in Brain Development

Adapted from Somerville et al., 2009
Thanks to Zdena Op de Macks

<table>
<thead>
<tr>
<th>Development</th>
<th>Age</th>
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<tbody>
<tr>
<td>Subcortical regions</td>
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<tr>
<td>Prefrontal regions</td>
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Adolescence

Emotion, reward seeking etc

Behavior regulation and cognitive control
**Depression in Teens**

- 20% of adolescents will have had a depressive episode by age 18 (Lewinsohn, 1993)
- 75% relapse within 5 years (Kovacs, 1984)

**Depressing Outcomes**

- Meta-analyses and reviews: modest effects for Cognitive Behavioral Therapy (CBT) and antidepressants
  
  

**Insomnia: Indirect improvement?**

- Insomnia and depression *co-occur* (e.g., Brunello et al., 2000; Goetz et al., 1987; Lui et al., 2007)
- Insomnia is an independent *risk factor* for first and recurrent episodes of depression (e.g., Johnson et al., 1999; 2006; Gasquet & Choquet, 1994; Roberts et al., 2002)
- Insomnia is an independent predictor of *suicidal behavior* in depressed patients (Dumais et al., 2005; McCall & Blocker, 2010)
- Emerging *adult* depression & bipolar disorder RCT results

Adults with Depression

Antidepressant + Insomnia Treatment (Cognitive Behavioral Therapy-Insomnia [CBT-I]) = 61.5%
Antidepressant + No Insomnia Treatment = 33.3%

Rates of full remission from depression

Adults with Bipolar Disorder: Relapse

![Chart showing relapse rates for adults with bipolar disorder.](chart)

Youth 12-18 with Depression

With Dr. Greg Clarke, Kaiser, Oregon

Cognitive Behavioral Therapy for Depression + Insomnia Treatment (CBT-I)

versus

Cognitive Behavioral Therapy for Depression + No Insomnia Treatment
Preliminary Sleep Outcomes

Total Sleep Time (TST)

- Cognitive Behavioral Therapy-Insomnia (CBT-I) arm:
  Baseline mean = 365.7 mins
  Wk 12 mean = 465.1 mins
  *Increase of 99.4 min*

- No insomnia treatment arm:
  Baseline mean = 407.5 mins
  Wk 12 mean = 389.6 mins
  *Decline of 17.9 min*

Preliminary Depression Outcomes

- Clinical Global Impression, Improvement
  - Trend favoring CBT-I arm, medium-large effects

- Diagnostic Recovery (survival analysis)
  - Trend favoring CBT-I arm, large effect
  - Evident from ~Wk 16 onward
‘Night Owls’ …

- More active later in the day
- Going to sleep later and getting up later (Horne & Ostberg, 1976)
- Children’s Morningness-Eveningness Scale (Carskadon et al., 1993)

‘Night-Owls’

- More depression and anxiety symptoms (Chelminski et al., 1999; Gaspar-Barba et al., 2009; Gau et al., 2007)
- Greater emotional instability (Di Milia & Bohle, 2009; Kerkhof, 1985; Tankova et al., 1994; Tonetti et al., 2009)
- Suicidality (Gau et al., 2007)
- Aggressive and antisocial behavior, and rule-breaking (Goldstein et al., 2007; Susman et al., 2007)
- Poor self-regulation (Negriff et al., 2001)
- Greater use of alcohol and nicotine (Adan, 1994; Giannotti et al., 2002)
- Greater tendency for impulsivity (Adan, 1994)
- Some non-replications (Giampietro et al., 2007; Roberts et al., 1999)
‘Night-Owl’ at 11-18 yrs …

<table>
<thead>
<tr>
<th>Predicts negative outcomes</th>
<th>Predates negative outcomes*</th>
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<tr>
<td></td>
<td>OR</td>
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<tr>
<td>Emotional distress/depression</td>
<td>1.37</td>
</tr>
<tr>
<td>Suicidal thoughts/attempts</td>
<td>1.24</td>
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<tr>
<td>Criminal activity</td>
<td>1.40</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>1.80</td>
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<tr>
<td>Drug use</td>
<td>1.92</td>
</tr>
<tr>
<td>Unsafe sexual activity</td>
<td>1.06</td>
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… at 18-24 yrs

McGlinchey, Asarnow, Harvey, submitted

Current Research
– ‘Night-Owls’ who are 10-18 years old

- Hypothesis: A 6-session intervention to reduce eveningness will improve sleep and reduce risk across five health-relevant domains
  - emotional (e.g., Mental illness)
  - physical
  - social
  - behavioral
  - cognitive
Session 6
Top 5 Sleep Tips for Teens (P18_11 yr F)

1. Light stops melatonin from being released, melatonin makes you sleepy. I need to be in dim light to get sleepy
2. Circadian rhythm is important because it is the body's natural rhythm for sleep. Respect the rhythm
3. Wake up at the same time everyday
4. Naps after school make sleep pressure go down, because your sleep pressure has to start all over again after a nap
5. Conditioning: don't do anything in bed, but sleep. Don't worry in bed
6. Worry and excitement keep you awake
7. If you can't get to sleep, get out of bed and read with a flashlight
8. Staying up later and waking up later on weekends gives you jet lag every single week

Zolpidem (Ambien) and Sleep-Dependent Cortical Plasticity

- Kittens (28-41 days postnatal)
- Medication to “increase/improve” sleep vs. placebo

Zolpidem:
- *Increased* NREM sleep 27%
- *Increased* total sleep over the 8 hour period
- *Reduced* cortical plasticity by 50%

- Hypnotics that produce more “physiological” sleep based on EEG may actually impair critical sleep-dependent brain-processes during development

A Little about the Approach

• ‘Sleep coaches’ not ‘therapists’

• Intrinsic motivation
  – Youth identifies value of behavior change.
  – Motivation emanates from one’s self because of importance for his/her goals
  – Feels motivated

• Extrinsic motivation
  – Behavior change motivated by compliance to gain approval and security.
  – Feels anxiety and pressure

Self-Determination Theory (Deci & Ryan, 1985; 1991)

A Little about the Approach

• Youth as budding sleep scientist
  – ‘The only way I can get my homework done is to nap when I get home’
  – Prediction: ‘After a nap I am better able to do my homework and the nap has nothing to do with my nighttime sleep’

  – Experiment
    • 2 days do as you usually do (nap)
    • 2 days do the opposite (brainstorm what: exercise, sunlight, visit with a friend etc)
  – Text: feelings after nap, homework and sleep
Role of Parent/Carer

12-year-old boy
Leaves for school at 7.15am
Mom 3 x attempts to wake up over 1.5 hours
(starts earlier because it takes so long)

Result:
Tornado dressing
Donuts and Vitamin water in the car
Stressed, anxious, angry

Parent

• Parents are our clients too: ‘gate keepers’ to youth accessing treatment
• Invite parents at the end of the session – depending on the age and dynamics of the family
• Or 2-3 phone calls across the treatment
  ◆ Hand their son/daughter full responsibility for his/her sleep
  ◆ Teen may request practical and/or emotional support for their home practice exercises
**Individualized Practice Exercises**
(rather than 'homework')

- Go to bed earlier by 20-30 minutes each week
- Reduce the gap between weekday and weekend bed and wake times

- Why might doing XX be helpful?
  - Make sure the rationale is collaboratively crafted and understood
- Are there any downsides to doing XX? Obstacles?
  - Trouble shoot

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**Balance & Emphasis**
**Flexible!**

Valuing sleep
But NOT getting anxious about sleep
Next Steps? Go into School!
With Dr. Emily Ozer (Co-PIs; R34; NIDA)

- Adolescent substance use is prevalent
- Insufficient sleep in youth predates and predicts substance use
- Caffeine, tobacco and other stimulants used to manage daytime sleepiness
- Alcohol and marijuana used to induce sleep
- Goal: Develop & evaluate a school based prevention program to improve sleep and thereby prevent onset of teen substance related problems … & Youth as Co-Is

Conclusions

- Sleep disturbance is an important contributor to emotional dysfunction and mental illness
Bi-Directional Mutual Maintenance

Mood Regulation Difficulty
(e.g., depression, anxiety)

Sleep Disturbance

Conclusions

• Sleep disturbance is an important contributor to emotional dysfunction and mental illness

• Treating sleep disturbance, given high prevalence, may have wide reaching public health implications:
  • Improving sleep improve the functioning and quality of life
  • A sleep treatment may also reduce symptoms and processes of comorbid psychiatric disorders

• Likely applications to other mental illness (ADHD, etc.)
• Simple powerful approaches
• Need more research and more researchers to help!