Sleep Disturbances in Mental Illness and Sleep Practices for Mental Wellness

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Only 5 – 10% of students have diagnosable sleep disorders, but 30 – 50% have significant sleep problems.
CASE STUDY

• “John” – 20 year old junior well known to Health Services staff.
• Went to 8:15 class, Professor noted he was distressed and referred him to Health Services.
• Reported waking up after drifting off feeling that someone had put glue on him (Hair, mouth, fingers, back and feet)
• Up all night. Drank two 5 hour energy drinks. Felt that someone was watching him.
• PMH – Sleep disturbance (averages 2-3 hours of sleep per night), ADD, Anxiety, Depression
• Meds – Adderall, Fluoxetine
• Alcohol / pot use

58% of energy drink-related ED visits involve energy drinks only, and not other drug combos.

http://www.samhsa.gov/data/2k13/DAWN126/sr126-energy-drinks-use.htm
<table>
<thead>
<tr>
<th>Report #</th>
<th>Received Date</th>
<th>Brand/Product Name</th>
<th>Symptoms</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>12956</td>
<td>6/14/10</td>
<td>5 HOUR ENERGY</td>
<td>CONVULSION</td>
<td>VISITED AN ER (OTHER SERIOUS IMPORTANT MEDICAL EVENTS)</td>
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<tr>
<td>129525</td>
<td>7/26/10</td>
<td>5 HOUR ENERGY</td>
<td>DIZZINESS, DEMENTIA, HEADACHE, CEREBROVASCULAR ACCIDENT, VISUAL ACUITY REDUCED</td>
<td>DISABILITY, OTHER SERIOUS (IMPORTANT MEDICAL EVENTS), HOSPITALIZATION</td>
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<tr>
<td>129681</td>
<td>7/26/10</td>
<td>5 HOUR ENERGY</td>
<td>CONVULSION, SOMNOLENCE</td>
<td>HOSPITALIZATION</td>
</tr>
<tr>
<td>3/19/11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>129661</td>
<td>6/13/10</td>
<td>5 HOUR ENERGY 5</td>
<td>CARDIAC ARREST, LOSS OF CONSCIOUSNESS, PNEUMONIA, CONVULSION, ACUTE RESPIRATORY FAILURE, ANGIC ENCEPHALOPATHY</td>
<td>HOSPITALIZATION, DEATH</td>
</tr>
<tr>
<td>129307</td>
<td>6/20/10</td>
<td>5 HOUR ENERGY</td>
<td>PALPITATIONS, HYPERTENSION</td>
<td>HOSPITALIZATION</td>
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<tr>
<td>129372</td>
<td>6/20/10</td>
<td>5 HOUR ENERGY</td>
<td>DEATH</td>
<td>DEATH</td>
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<tr>
<td>131892</td>
<td>9/28/10</td>
<td>5 HOUR ENERGY</td>
<td>SOMNOLENCE</td>
<td>DEATH</td>
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<tr>
<td>131805</td>
<td>9/28/10</td>
<td>LEMON LIME</td>
<td>DEHYDRATION, RASH, TACHYCARDIA, TACHYCARDIA &amp; MUSCLE CONTRACTIONS INVOLUNTARY, BLOOD POTASSIUM DECREASED, BLOOD CAFFEINE INCREASED</td>
<td>VISITED AN ER, LIFE-THREATENING</td>
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<td>131820</td>
<td>9/28/10</td>
<td>EXTRA STRENGTH</td>
<td></td>
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</table>

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**ADHD primary**
ADHD symptoms lead to sleep disturbances or disorders

**Interaction and complexity**
Reciprocal causation or common etiology

**Sleep problem primary**
Sleep disorders or disturbances cause or mimic ADHD

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ADHD

<table>
<thead>
<tr>
<th>Neural- behavioural mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comorbidity (depression, anxiety)</td>
</tr>
</tbody>
</table>

Sleep problem

ADHD or ADHD-like symptoms

<table>
<thead>
<tr>
<th>Common underlying pathophysiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep problem</td>
</tr>
</tbody>
</table>

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Hvelby, Atlen Delic

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**ADHD**

Sleep problem

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**ADHD**

Sleep problem

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Treat ADHD may alleviate sleep problem

Integrated treatment approach

Treating sleep disorder may alleviate ADHD

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Sleep and Mental Health relationships are bidirectional.

Sleep Disruption is part of diagnostic criteria for...

- Depression
- Mania
- PTSD
- GAD

• 35 – 50% of people with chronic sleep problems have mood disorders.

• Most patients with mood disorders experience disrupted sleep.

• Most psychotherapeutic drugs alter sleep.

A Person with inadequate sleep is...

• 9x more likely to have depressive symptoms
• 17x more likely to have anxiety symptoms

Sleep disruption is predictive of (precedes)

• 50% of depression episodes
• 75% of mania episode
• 90% of suicide attempts

Peterson & Benca (2006), Winokur 2015

Taylor et al. (2005)
In Clinic Assessment

Tell me about sleep.

Do you feel your sleep is restorative?

What time do you go to bed? Get up? Days per week?

Do you have difficulty falling asleep – staying asleep?

Do you take naps? How often – for how long?

How much caffeine do you consume – at what times?

Do you use sleep aids, AOD?

Electronic device use – What time do you turn it off?

TAKE HOME MESSAGE

MOOD DISORDERS ARE EXACERBATED BY POOR SLEEP, AND POOR SLEEP PRECEDES THE EXPRESSION OF DISTURBED MOOD.
Hypnograms reveal sleep architecture.

Sleep is controlled by **homeostatic** and **circadian** factors, and is modified by **zeitgebers** and **drugs**.
The Sleep Cycle app tracks sleep patterns and the alarm function increases the probability of waking while in REM sleep.
Normal Night

Alcohol induced REM suppression

Hypograms reveal distinct changes in sleep with mood disorders.

Figure 2. Evolution of slow-wave activity over the night in a normal subject (upper) and a depressed patient (lower). In the normal subject the amount of slow-wave activity is high in the first non-REM period, then diminishes over the night. In the depressed patient, the highest activity is in the second non-REM period.

Nutt et al. 2008
Circadian rhythms are flattened in most college students.
Circadian Temperature Rhythms in Structured vs. Unstructured Schedules

BN temperature rhythm over 6 days

BF temperature rhythm over 10 days

LE temperature rhythm over 10 days

SM temperature rhythm over 9 days

Prichard, ACHA 2013 presentation
Between 3% to 10% fraction of the transcriptome is under circadian regulation.

711 genes were expressed differently when people were sleep-deprived; inflammatory response proteins were turned up, and cell growth and repair were turned down.

Möller-Levet C S et al. PNAS 2013;110:E1132-E1141

Sleep timing & maintenance problems (z-score) estimated from the ACHA data are consistent with published reports on the demographics of poor sleep.
Psychiatric Diagnosis

Sleep Problems: Most → Least

- Insomnia
- Other Sleep Disorder
- Substance Abuse
- Schizophrenia
- Bipolar
- Anorexia
- Depression
- Anxiety
- Panic Attacks
- ADHD

Adolescents with greater mental toughness show higher sleep efficiency, more deep sleep and fewer awakenings after sleep onset.

Adolescents reporting higher MT also had objectively better sleep. A bidirectional association between MT and sleep seems likely; therefore, among adolescence, improving sleep should increase MT...
Sleep Drives Metabolite Clearance from the Adult Brain. Xie et al. (2013) *Science*

Sleep deprivation is (literally) like being drunk.

Dawson, D.; Reid, K. 1997
TAKE HOME MESSAGE 2:
SLEEP IS A LIFE-SUSTAINING, 
HOMEOSTATICALLY REGULATED 
PRODUCT OF MULTIPLE BRAIN 
REGIONS AND CHEMICALS.
Why I started studying sleep and wellbeing in college students...

The viscous cycle of poor sleep.
Sleep deprivation

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgement
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impaired immune system
- Risk of diabetes Type 2
- Increased heart rate variability
- Risk of heart disease
- Decreased reaction time and accuracy
- Tremors
- Aches

Other:
- Growth suppression
- Risk of obesity
- Decreased temperature

Challenges of College Sleep

- Reduced parental supervision
- Social Pressure To stay up late
- Noisy environments
- Roommates
- Pressure To get up early
- Caffeinated drinks in PM
- Late night meetings /workouts
- Irregular Schedules
- Depression
- Alcohol
- Poor time management
- Technology In the Bedroom
- Rx MEDS
- Delayed Phase Syndrome
Large Study on Mood and Sleep in College Students

- 1125 respondents (18% response rate)
- Survey included:
  - Profile of Mood States
  - Epworth Sleepiness Scale
  - Subjective Units of Distress Scale
  - Horne-Ostberg MEQ
  - Pittsburgh Sleep Quality Index
  - Questions about Drug/Alcohol use
  - Sleep Hygiene

RESULTS: Evidence of chronic, restricted sleep

- Mean total sleep time was 7.02 hours
- Only 11.6% got >8hrs sleep a night on average
- 20% pulled all-nighters at least once in the last month
- 35% stayed up until 3AM at least once a week
- 25% excessive daytime sleepiness (Epworth Sleepiness Score >10)
- 15% fell asleep in class >1x/week

Only 37% of male students and 33% of female students met the criteria for healthy sleep on the Pittsburgh Sleep Quality Index.
### Mood

<table>
<thead>
<tr>
<th>Mood</th>
<th>(d.f.)</th>
<th>F</th>
<th>p</th>
<th>Post hoc</th>
<th>Optimal &gt;6</th>
<th>Border line 6-7</th>
<th>Poor 7&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>2,897</td>
<td>66.8</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>7.48</td>
<td>9</td>
<td>10.61</td>
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<tr>
<td>Confusion</td>
<td>2,897</td>
<td>32.2</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>8.6</td>
<td>9.56</td>
<td>10.31</td>
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<tr>
<td>Depression</td>
<td>2,897</td>
<td>71.2</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>7.01</td>
<td>8.76</td>
<td>10.66</td>
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<tr>
<td>Fatigue</td>
<td>2,897</td>
<td>146.2</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>9.44</td>
<td>12.09</td>
<td>14.92</td>
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<tr>
<td>Tension</td>
<td>2,897</td>
<td>81.1</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>8.29</td>
<td>9.96</td>
<td>11.82</td>
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<tr>
<td>Vigor</td>
<td>2,897</td>
<td>28.4</td>
<td>&lt;.001</td>
<td>O&gt;B&gt;P</td>
<td>14.29</td>
<td>13.38</td>
<td>12.09</td>
</tr>
<tr>
<td>Distress (SUDS)</td>
<td>2,916</td>
<td>72.4</td>
<td>&lt;.001</td>
<td>O&lt;B&lt;P</td>
<td>49.9</td>
<td>59.9</td>
<td>70.7</td>
</tr>
</tbody>
</table>

**Those with poor sleep quality had worse moods.**

PSQI Score

![PSQI Score Chart]

**R Sq Linear = 0.272**

Prichard, ACHA 2012 presentation
Sleep timing & maintenance problems correlate more with academic problems \((r = .456)\) than alcohol, stress, depression, colds and flu do.

Reducing the number of days a student experiences a sleep problem by just one night a week reduces the probability that a freshman drops a course by 15%.

Hartmann & Prichard, 2014
Experimental studies show that cardiovascular reactivity to acute psychological stress increases following sleep deprivation.

**X-axis:** How many of the last 7 days did you…

- Exercise to **strengthen** muscles for at least 8 – 12 repetitions?
- Engage in **vigorous exercise** for at least 20 minutes?
- Get enough **sleep** to feel rested?
Y-axis: Have you ever felt…

- Overwhelming anger
- Overwhelming anxiety
- That things were hopeless
- So depressed it was difficult to function
- Like seriously considering suicide

1 = no, never
2 = not in the last 12 months
3 = yes, in the last 12 months
4 = yes, in the last 30 days
5 = yes, in the last 2 weeks

Felt Overwhelming Anger

- Strength Training
- CV Exercise
- Sleep

N=103,233 NCHA-II Spring 2011 Cohort
Felt Overwhelming Anxiety

Felt like Things Were Hopeless

N=103,233  NCHA-II Spring 2011 Cohort
Felt So Depressed it's Difficult to Function

Seriously Considered Suicide

N=103,233 NCHA-II Spring 2011 Cohort

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TAKE HOME MESSAGE 3:

SLEEP DEPRIVATION ENHANCES THE COGNITIVE AND HORMONAL STRESS RESPONSE AND DECREASES MOOD.

SLEEP IS A MODIFIABLE RISK FACTOR

Opportunities of Sleep Health Promotion:

Creating Conversations & Culture Change
What are students stressed about?

![Bar chart showing stress levels in different categories for UST and National.](chart.png)

### Sleep Squad Intervention Program

- Large group presentation targeted to your audience
- 15 minute small group meetings & intervention instructions based on surveys & sleep diaries.
- (E.g., insomnia group, schedule regularity group, improving sleep environment group, stress management group)

#### Example Intervention tools

Sleep diary apps, ear plugs, eye masks, stress relieving downloads, lavender linen spray, white noise generators, progressive muscle relaxation, bright light therapy, medical referral
Mentoring Women for Success: Life Skills

Program Objectives:

- Improve the **intellectual, physical, emotional and spiritual formation** of females students, especially those with mental health challenges.

- To promote **leadership development** of female students by providing opportunities outside traditional leadership experiences.

- To provide female students with new skills and tools to assist in **achieving academic success** and **personal enrichment**.

Data Outcomes

- Significant decrease in the depression inventory scale, PHQ9

- Significant decrease in the anxiety inventory scale, GAD7

- Significant decrease in the tiredness, College Sleep Questionnaire

- Significant increased readiness to change problematic sleep behaviors, College Sleep Questionnaire
What new information or skills have you learned in this program and how will you apply them?

“I’ll apply these things by managing my time better, trying to stick to a strict sleep schedule, keeping a monthly budget, and using my electronics less and encouraging face–to-face interaction with my friends and family (i.e. less cell phone, laptop usage except when absolutely necessary)”
• Freely available tool for residential colleges and universities to use to analyze how institutional policy, programming, and structures contribute to or impede healthy sleep

• Provides important formative data for universities to consider when evaluating how to make institution-wide changes to address poor sleep, one of the top five impediments to academic success

• Participating institutions receive evidence-based annotated bibliography and yearly aggregate report

www.stthomas.edu/collegesleep

Get more ZZZ’s to Get more A’s

21 Day Challenge

• Track their sleep via app
• Received sleep aids
• Morning breakfasts
• Sign up for sleep chats
• Weekly emails
Sleep Challenge Fall 2016

• Average increase of 20 min of sleep per night
• Overall improvement of 23% on their rating of total sleep quality
• 73% of students reported waking up at the same time for five or more days after the challenge
• 94% of students decreased the amount of reported time it took them to fall asleep
• 48% students said they are likely to continue using the sleep app

National Sleep Awareness Week Snapstory

• Used a UST Sleep Week Geofilter
• More than 2000 views from students, parents, faculty, staff, and alumni
• Increased awareness on the importance of sleep in college
Sleep fact #1: exercising regularly makes it easier to fall asleep and contributes to better sleep. Exercising at night can make it harder to fall asleep.

Sleep fact #2: Sleep plays a major role in mental illnesses such as depression & anxiety. Active Minds Club combats the stigma against mental illness and raise awareness.

Sleep fact #3: Use of computers and phones at night suppresses melatonin release in your brain. Trick your brain into thinking it’s daytime - you feel more awake and have a hard time falling asleep.

Sleep fact #5: Caffeine has been shown to reduce REM sleep necessary for adequate brain function and growth. Caffeine can negatively affect sleep when consumed any time after lunch.

Good night Tommies! Be sure to rest up during National Sleep Awareness Week in preparation for daylight savings on Saturday, when we lose an hour of sleep!
Mindfulness Based Stress Reduction

CASE STUDY

• “Jenny” is an 18 year old freshman who presents with feeling anxious, sad, tearful, worried, decreased enjoyment in activities, difficulty concentrating, ruminating thoughts, difficulty falling asleep and staying asleep.

• PMH – Unremarkable
• Meds – None
• AOD – None
• Sleep – 5-6 hours per night
• Academics – 4.0 in HS