Results and Lessons of the “Get More Sleep!” Campaign
A Campus-Wide Intervention to Change the Sleeping Habits of College Students

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A special thanks to Kathy Kelleher, RN, Tricia Leahy, Ph.D, Joseph Fava, Ph.D., and Kathryn Middleton, Ph.D.

Q: How big an issue is sleep for college students?

- Fall 2012 National College Health Assessment of 28,237 undergraduates...
  - 24.9% reported difficulty handling sleeping issues
  - 19.7% reported sleep as a factor that affected their academic performance in some way
  - 73.4% reported that their college/university did not provide them with any information on sleeping difficulties

(American College Health Association, 2012).

Health Impediments to Academic Performance
Reduce the proportion of students who report that their academic performance was adversely affected by sleep difficulties in the past 12 months.

Baseline: 20.0 percent of students reported that sleep difficulties adversely affected their academic performance in the past 12 months in spring 2010
Target: 18.0 percent

“Health-Related Variables and Academic Performance Among First-Year College Students: Implications for Sleep and Other Behaviors”
Mickey T. Trockel, et al.
JACH; Volume 49, Issue 3, 2000

Our findings are relevant for counselors, administrators, health programs, and health promotion personnel who serve college student populations. Of particular interest is the significant relationship between sleep habits and 1st-year college GPA. The work of Davidhizar and colleagues suggests clear recommendations for sleep interventions for college students.

“Sleep and Academic Performance”
103 studies reviewed by Curcio, Ferrera and Gennaro.
- Sleep loss/learning capacity/academic performance- Elem.ed-university
- Sleep loss negatively correlated with academic performance
- Sleep loss led to daytime sleepiness which also correlated with academic performance

“The Prevalence of Sleep Disorders in College Students: Impact on Academic Performance”
JACA,
Jane F. Goodnight Volume 50, Issue 2, 2010
- EDS= excessive daytime sleepiness
- Older adolescents with adolescent physiology
- Many college students are at risk for sleep disorders
- At risk for academic failure
• Risk for a sleep disorder predicted GPA

• GPA predicts student’s persistence in college

• Identifying and successfully resolving sleep problems at the college level could increase retention and graduation rates

“The Relationship between Sleep Length and Grade Point Average Among College Students”

(Kelly et al. 2001)

147 college students
3 groups:
• <6 hours/night
• 7-8/night
• >9hrs/night

Mean GPA of short sleepers = 0.5 points lower than long sleepers

“Symptoms of sleep disorders and objective academic performance”

(Bizari and de Carvalho et al. 2013)

With/without symptoms of sleep disorders
5400 questionnaires to elementary schools in São Paulo, Brazil age 7-10

academic grades in 2384 children
breathing sleep disorders = increased risk for poor academic performance

The State of Sleep Among College Students at a Large Public University

(Orzech, et al, 2011)

• Poor sleep interacted with academics and mental health
• Education campaign positively affected student sleep
• Sleep may be gateway topic for health care professionals to address sensitive health issues such as depression

“The interplay between sleep and mood in predicting academic functioning, physical health and psychological health: a longitudinal study.”

(Lee, Wan, Cheung, Hsu, Mok, 2013)

• Sleep duration and quality have direct and indirect (via mood) effects on college students’:
  • academic function
  • physical
  • and psychological health.
• Findings underscore the importance of healthy sleep patterns for better adjustment in college years

Poorer sleep quality is associated with lower emotion –regulation

Iris Mauss, Allison Troy, Cognition and Emotion, 2013
Sleep Problems:
- Deficits in attention
- Deficits in academic performance
- Drowsy driving
- Risk taking behavior
- Depression
- Impaired social relationships
- Poorer health

Sleep deprivation = loss of sleep
- Total sleep deprivation
- Partial sleep deprivation
- Sleep fragmentation

Sleep quality....
- feeling rested on waking
- level of daytime sleepiness
- number of awakenings throughout the night

“Social Jetlag Negatively Correlates with Academic Performance in Undergraduates”

Socially enforced sleep times on weekends adversely affected academic performance

Sleep and College Students
- Students wake up about 2 hours LATER on weekends, on average (Lund et al, 2010)

Social jet lag- The discrepancy between social and biological time, between work and free days (Wittmann et al, 2006)

Biological and social factors contribute to sleep deprivation: How to address?

Simpler approach than convincing students to adopt better sleep hygiene?
“Causes and Consequences of Sleepiness Among College Students”


50% college students reported daytime sleepiness
70% reported insufficient sleep

Interventions:
• Sleep education classes
• Online programs
• Encouragement of naps
• Adjustment of class time

The Importance of Sleep

• Sleep quality impacts physical and mental health (Tanaka, et al, 2002; Lund, et al, 2010)

• Sleep deprivation increases likelihood of developing diseases such as...
  stroke, heart attack, hypertension, depression, obesity and diabetes (Gupta et al, 2002; Colten and Altevogt, 2006).

Working against our endogenous circadian clock: Breast cancer and electric lighting in the modern world

Breast cancer incidence increases rapidly as societies industrialize. Many changes occur during the industrialization process, one of which is a dramatic alteration in the lighted environment from a sun-based system to an electricity-based system. Increasingly, the natural dark period at night is being seriously eroded for the bulk of humanity. Based on the fact that light during the night can suppress melatonin, and also disrupt the circadian rhythm, it was proposed in 1987 that increasing use of electricity to light the night accounts in part for the rising risk of breast cancer globally. Predictions from the theory include: non-day shift work increases risk, blindness lowers risk, long sleep duration lowers risk, and population level community nighttime light level co-distributes with breast cancer incidence.

Poor Sleep, Poor HF Outcomes: Routinely Test Sleep Quality?

Nighttime sleep that's routinely poor quality was a significant predictor of cardiac events.

“Sleep and obesity”

Becutia and Pannaina, 2011

“...Epidemiological and laboratory evidence confirm an association between sleep loss and increased risk of obesity.

Obesity could represent a ‘chronobiological disease'
Behavioral sleep curtailment endemic in modern times
- 24/7 society
- more evening and night-time work and leisure activities
- sacrifice hours available for sleep.

Major impact:
- duration of dark exposure
- disrupted organization of circadian rhythm

... exposure to artificial light after sunset and often before sunrise

Impact:
- Later bedtimes
- Reduced total sleep time
- Opportunity to be active and ingest food during the natural night

Feeding represents a major synchronizer of peripheral circadian clocks
- found in virtually all tissues
- prolonged night-time wakefulness leads to desynchrony between central circadian and peripheral clocks

Sleep is an important modulator of neuroendocrine function and glucose metabolism

Sleep loss results in metabolic and endocrine alterations:
- decreased glucose tolerance
- decreased insulin sensitivity
- increased evening concentrations of cortisol
- increased levels of ghrelin/decreased levels of leptin
- increased hunger and appetite

The relationship between sleep and obesity mediated by multiple pathways:
- Orexin neurons + changes in appetite-regulating hormones
  - affects food intake
- Ghrelin (promotes hunger) increases with sleep restriction
- Leptin (contributing to satiety) decreases

Sleep regulates our appetite and fullness

<table>
<thead>
<tr>
<th>HOURS OF SLEEP</th>
<th>BODY MASS INDEX</th>
<th>LEPTIN</th>
<th>GHRELIN</th>
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<tbody>
<tr>
<td>8</td>
<td>Increases 3.6%</td>
<td>Increases 14.9%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Decreases 13.5%</td>
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</table>
Sleep Deprivation Impact: “perfect storm”

- Hunger
- Decision making:
  - shopping/food purchasing

Eating behavior after sleep deprivation

- Increased caloric intake and hunger after 4 h of night sleep in 12 normal weight young adults (Brondel et al.)
- 10 healthy young adults reported a 14% increase in caloric intake, particularly for carbohydrate-rich nutrients, during buffet, after four nights of 4.5 h in bed, compared with 8.5 h (Tasali et al.)

Sleepy people make poor food choices

“A sleep Discontinuity on the Development of Obesity”  (Nordin and Kaplan)
-30 years/7000 middle-age adults.

- Sleep quality assessed by the question:
  - “how often do you have any trouble getting to sleep or staying asleep?”

- What was the risk of transition to and from obesity?
  - Consistent sleep discontinuity was associated with 70% risk of conversion to obesity

- Sleep discontinuity and impaired sleep continuity increased the risk of staying obese.

A sex difference in the association between poor-sleep quality and obesity risk

- In women, sleep problems (difficulty initiating and maintaining sleep) predicted weight gain after 5–7 years.
Sleep is the ‘most sedentary activity’, yet may be the only one that protects from weight gain.

Sleep ‘is a restorative process of the brain, by the brain, and for the brain’

Sleep is important for health of the entire body.

A National Institute of Health (NIH)-funded randomized control trial:

- enroll 150 US short sleeper adults (<6.5 h per night) and restore 7.5 h of sleep per night for 3 years
- examine the effect of sleep extension on energy homeostasis and body weight

Current evidence supports recommending:

1. Sufficient amounts of habitual sleep and
2. good sleep hygiene

How Do We Effectively Deliver This Information?

Sleep Education Programs

Ideas:

- Snooze Letter
- GO TO BED Posters
- Sleep education information in school newspaper
- 2 credit course with discussion, lecture, diary
- Nap map
- “Flash nap”
- 30 minute oral presentation with res life
- Stall Street Journal Sleep-Extra credit online pre-test/ self education program
- Faculty meeting presentation
- Sleep masks/ear plugs in student health center
- The list goes on!
An idea was born!

Data was collected spring of 2013

We found that ...

Results: Sleep Knowledge

- High % of students answered following 3 q's incorrectly:
  
  - ‘Does drinking coffee cure drowsiness?’
    (47% agreed... but the answer is NO)
  
  - ‘Does driving makes you sleepy?’
    (56% agreed... but the answer is NO)
  
  - ‘Is sleep time for the body and brain to shut down for rest?’
    (84% agreed... but the answer is NO).

Results: All-Nighter Culture

Q: What was the average earliest time in the past 2 weeks students had gone to bed?
A: 11:35 PM (SD of 1 hour and 7 minutes)

Q: What was the average latest time in the past 2 weeks students had gone to bed?
A: 2:35 AM (SD of 1 hour and 27 minutes)

- 6% of respondents reporting 4:30 am as their latest bedtime in 2 weeks

Results: The Body Clock

- Average amount of time between alarm clock wake up and when one would naturally wake up:
  - 1 hour and 33 minutes (SD of 77 mins)

- Average hours of sleep students think they'd feel their best:
  - 9 hours and 35 minutes, (SD 96 minutes)
  - Avg bedtime was 12:40 am

- The average time one ‘starts feeling tired at’:
  - 10:05 PM (SD of 116 mins)

- Discrepancy between avg weekday bedtime and avg time one starts feeling tired:
  - 2 hours and 35 minutes
**Our observations from survey**

- **Sleep knowledge**: there are still things students don’t know about sleep
- **Sleep hygiene**: Many students reported blowing off sleep in order to study… counterproductive?
- **Body clock**: students don’t seem to be listening to them

**Take away goals from 2013:**

1. Informing students about the importance of sleep
2. Aiming to help students practice healthy sleep behaviors
   - E.g.: sleeping for ~8 hours a night
3. And in doing so, increasing dialogue and chipping away at the all-nighter culture on campus

**Our Sleep Awareness Campaign**

- Received a grant from NECHA in 2013 to institute a campus-wide infographic sleep intervention
- 2 parts:
  - Fall 2013: Pilot study with selected dorms as “practice” and to gather input from students to better inform Sleep Week
  - Spring 2014: Week-long, campus-wide sleep campaign that occurred March 31st-April 4th

**Start with objectives**

- Taking into account our time and resources, what did we hope to achieve?
  - **Primary goal: education**
    - What are ‘healthy’ sleep habits?
    - What are negative effects of ‘unhealthy’ sleep habits?
  - **Secondary goal: behavior change**
    - Allowing student to make informed choices about sleep

**Sleep Week Phase 1: Pilot Study**

- Picked 4 random traditional dorms (2 male, 2 female)
  - 2 dorms received posters for one week (‘experimental’ group), the other 2 did not (‘control’ group)
- Residents were sent a survey to complete before and after display of posters
  - Asked about demographics, sleep quality, and for input on sleep questions

**Sleep Week Phase 1: Pilot Study**

- Helped us get a sense of whether posters could be effective
- Feedback from students helped tailor/inform our Sleep Week content
- Further confirmed that sleep continues to be an issue for PC students
A word about “The System”

- Working with campus administrators/organizations
  - You have to learn the rules and learn to work within them
  - Be pleasant, but triple check things, and don’t assume anything!

Examples of dorm pilot posters: repetition is key!

TROUBLE SLEEPING? TRY THIS:

REDUCE STRESS BY MAKING A TO-DO LIST FOR THE NEXT DAY BEFORE YOU GO TO BED

OTHER SLEEP TIPS:
- Get regular exercise: it can help you fall asleep faster if it’s done several hours before bedtime
- Only use your bed for sleep: it’s best take your homework, computer, and phone somewhere else
- Nap Early—Or Not At All: If you must, try to do it before 3 pm and for less than 30 minutes
- Don’t drink or eat caffeine (e.g. coffee, tea, soda, chocolate) 4 to 6 hours before bedtime

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- Reduce stress by making a to-do list for the next day before you go to bed

Fact:

When we are sleep deprived, our focus and attention drifts making it harder to study or to concentrate to that Civ lecture

Feed your body right. Sleep 8 hours a night.

Pilot Demographics

- N= 200
- Class year:
  - 75.4% freshmen
  - 14.7% sophomore
  - 4.3% upper classmen
- Gender:
  - 10.6% male
  - 89.4% female
- Mean BMI: 22.85
- Mean GPA: 3.36
- Mean # of roommates: 3
- Mean bedtime: 12:48 am
- Mean waketime: 8:06 am
- Average time in bed per night: 7 hrs and 17 mins
Pilot Results

The Pittsburgh Sleep Quality Index is a validated measure of just that... sleep quality!

A score of 5 and under = good sleep quality
Score over 5 = bad sleep quality
Average baseline score: 7.95
- 64% of student’s scores were associated with bad sleep quality!

Pilot Results

- Lit shows GPA is linked with earlier bed and wake times....
- We found the opposite
- Higher GPA was actually linked with a later bedtime

Results from qualitative data

- Q: “What do you think stops YOU from getting the sleep you need?”
  - 36/65 entries (55%) mentioned schoolwork or “procrastinating” as a barrier to sleep
  - 18/65 entries (28%) mentioned roommates and/or noise
  - 13/65 (20%) mentioned stress/anxiety of some kind

Quotes in response to: “What do you think stops YOU from getting the sleep you need?”

- “My roommate plays video games every night until 2am”
- “The fact that I procrastinate too much”
- “Floor hall being way too loud, anxiety, insomnia, stress, overthinking not being able to sleep”

Quotes in response to: “What do you think would help PC students get better quality sleep?”

- Many answers (25%) mentioned something about noise!
  - “If they didn’t do landscaping so early in the morning”
  - “…If one person decides to blast music it affects everyone in the dorm”
  - “enforce quiet hours”

Quotes in response to: “How would YOU improve the delivery of sleep information to PC students?”

- Surprising number of “hopeless” responses.
  - 7/52 responses said words to the effect of “I don’t think there is a better way”
  - “I think it’s something students learn the hard way... Knowing that something is wrong by nature doesn’t usually stop it from my experience.”
  - “…For those of us up doing homework, telling someone to get more sleep doesn’t fix the problem...”
The makings of PC’s first ever SLEEP WEEK

PC Sleep Week: Preparation

- Meetings at the end of Fall semester and start of Spring semester:
  - Recruited interested students
  - Brainstormed...
    - Ways to convince students to change behavior
    - Events and ideas for spreading info
  - More frequent unofficial meetings and visits to campus as the “week” approached

PC Sleep Week: Preparation

- Common them from brainstorming with students: costs and benefits
  - Academics
  - Social
  - Compiling info into cohesive message in campaign

PC Sleep Week: Preparation

- Working with various campus clubs, orgs, and Res Life to:
  - Ask for additional funds
  - Coordinate rollout of intervention pieces
  - Reserve space for events
  - Co-sponsor events
    - E.g. Petition club members at meetings to join in “flash nap”
    - Etc., etc., etc.!

- There is A LOT of planning involved and many hurdles to jump!!!

PC Sleep Week: working with the group

- Help from Student Health, and a small band of students
  - Organization: designating roles, tasks, and reinforcing deadlines
  - Being in consistent contact with students
  - Working with Student Health Center to manage budget
Budgeting

- Tried to push for clubs and orgs to pay for event-related expenses
  - E.g., food, craft materials, prizes
- Used much of NECHA budget on paper content and bulk items
  - Giant posters
  - 100’s of snoozeletters
  - Posters for dorms
  - Incentives and bulk eye masks and ear plugs

PC Sleep Week: Information placement

- Tried putting information in many high traffic areas (dorms, cafeteria, student center, library)
- Infographics on kiosks around campus
- Distribution of “Snoozeletter”
- Posters with info, tips, and sleep hacks
- Additional handouts tailored to each event
- Advertisements for all events (on kiosks and TVs)

*SLEEP HACK #1

Take a warm shower at night to fall asleep faster.

Once you get out, your body temp drops, signaling to your body it’s time to sleep.

You’ll be snoring in no time.

Find more tips on Twitter and Instagram: @PC_Sleep_Week

Source: National Sleep Foundation: http://sleepfoundation.org/sleep-topics/teens-and-sleep
PC Sleep Week

- Monday:
  - "Flash nap" in the Student Center

- Tuesday:
  - Sleep info booth in student center
  - Gave away a memory foam pillow, fact sheets, and our Snoozeletter, along with other sleep goodies

- Wednesday:
  - Relaxation Night: make your own room spray / sleep inducing foods!
  - Yoga flow for good night's sleep

- Thursday:
  - Decorate your own sleep masks

- All week: Posters with facts, snoozeletters, and info flyers all around campus

The Student Health Center presents…

Sleep Week 2014
If you DON'T snooze, you lose!

March 31 - April 4

- Monday, 3/31: Watch out for something sleepy on campus today…
- Tuesday, 4/1: Sleep Info Booth in Slavin (1-2:30 pm)
- Wednesday, 4/2: Relaxation Night: Sleep Edition in McPhails (7:30-8:30 pm)
  A Yoga Flow for a Good Night’s Sleep in Davis Hall Lounge (8:30-9:45 pm)
- Thursday, 4/3: Decorate Your Own Sleep Masks in Slavin (11:30-1:30 pm)

Programs co-sponsored by… BOP, Simply Healthy, Sociology Club, and Rec Sports
Follow us on Twitter and Instagram @PC_Sleep_Week

Monday

Flash nap on campus!

- Recruited students at club meetings all week taking down emails of interested students
- Ended up raining, so we did flash nap in student center
- Got campus club, PCTV involved
- "Flash nap" in the Student Center
Tuesday

Giveaways:
- ear plugs
- snoozeletter
- sleep masks
- Tip cards
- Memory foam pillow raffle!

Interactive: students sticked large boards to tell us how much sleep they got.

Learned to be aggressive: directed students to table!

Wednesday

Yoga for Sleep

Wednesday, 4/2
Davis Lounge 8:30-9:45pm

Sponsored by:
The Student Health Center and Rec Sports

Relaxation Night: *Sleep edition*

Wednesday, 4/2 in McPhails
7:30-8:30pm

- Get some stress-busting tips
- Eat some sleep-boosting food
- And make your own relaxing room/pillow spray!

Count More Sheep, Get More Sleep.

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**Cherries**

- Recent research suggests that cherries are a natural source of melatonin—a chemical that helps to control our body’s internal clock (Paredes et al, 2009).
- Another small study showed that drinking cherry juice enhanced sleep quantity and quality in insomniacs.

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**Pretzels**

- Researchers theorize that foods with a high glycemic index, like jasmine rice and pretzels, may help to promote sleepiness by boosting tryptophan levels.
- As a recent study from the American Journal of Clinical Nutrition states, eating this food 4 hours before bedtime might just do the trick (Afagh, O’Connor, & Chow, 2007).

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**How cheese and crackers can help you sleep!**

A light amount of carbs (~30g)

Tryptophan—found in meat, peas, and dairy products

Carbohydrates allow for the uptake of tryptophan at the blood brain barrier...

...and its conversion into...

Serotonin

Melatonin...

Which signals sleepiness to the body at increased levels!

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**Thursday**
Decorate Your Own Sleep Mask

Make a one-of-a-kind sleep mask!

Thursday April 3rd 11:30am-1:30pm
Where: Slavin (next to Things for Thursday)

Sponsored by The Student Health Center, Simply Healthy, and Friars Club

#PCsleepweek

Information Table in Cafeteria
- Had students give away remaining materials during lunch time
- Another memory foam pillow give-away!

#PCsleepweek

How to figure out if PCSW made an impact?
- In order to assess the effectiveness of the campaign, a survey similar to pilot was administered

Survey consisted of:
- Demographics
- PSQI (sleep quality)
- Beliefs and Attitudes about Sleep Scale (BASS)
Random sample of PC students were asked to participate both before and after Sleep Week.

- Higher incentive for completing survey BOTH before and after PCSW (in order to get the most accurate before & after reading)
- Post-sleep week survey included direct questions about Sleep Week itself

99 completed “pre sleep week” survey
- 74 completed “post-sleep week” survey
- n=25 completed both surveys

Class year:
- Freshmen: 25%
- Sophomore: 29%
- Junior: 17%
- Senior: 28%

Gender:
- Male: 20%
- Female: 80%

PC Sleep Week: Demographics
Mean BMI: 22.7
Mean GPA: 3.3
Mean # of roommates: 3.7
Mean bedtime: 12:35 am
Mean waketime: 8:15 am
- Average time in bed per night: 7 hrs 40 mins (mean self report was lower)

Results
- Average PSQI score before sleep week:
- Average PSQI score after sleep week:
- 36% of students strongly agreed that they would drink caffeine if they were feeling sleepy during the day
  - Only 3% agreed that they “never felt sleepy”

Results
- Before PCSW, sleep quality was negatively associated with GPA (p=.02)
  - As student sleep quality worsened, so did GPA!
- No significant relationship between:
  - BMI and time in bed
  - BMI and sleep quality

20% increase in seeing info in SHC after PC Sleep Week
130% increase in seeing pamphlets on sleep
92% increase in seeing info around campus
PC Sleep Week: Results

- 16% of respondents agreed that the sleep materials helped them to sleep better
- 71% thought the sleep materials were easy to read
- 57% said they learned something new from the sleep materials
- 57% of those surveyed saw at least 2 of the following around campus:
  - Eye masks
  - Ear plugs
  - Snoozeliter
  - Large blue sleep facts
  - Sleep info in dorms
  - Sleep info in library
  - Sleep tip handouts
- Most common was 'sleep info in dorms' (50%)
- 24% participated in at least one of the sleep week events

Limitations

- Small sample size
  - Restrictions on survey
- Mostly female
  - Rethinking incentives
- Spread of info
  - We could've gotten even more areas of campus involved
- Length of health intervention
  - Would have been great to do a whole month!

Things We Learned

- Sleep continues to evade college students
- It also continues to be something they like to talk about
- It's hard to get the message out, but do so through all available pathways

Organizing your campaign

- State your objectives
- Think of ways to achieve those objectives
- Consult students on ways to achieve objectives
- Develop content
- Helpful to do a trial run if your not familiar with event planning processes at university
- Recruit motivated students to help
- Assign tasks and complete them
- Show time!

Helpful Tips

- Stay organized
- Plan further in advance than you think is required
- Get as many departments and organizations on board to help spread to word to the furthest corners of campus
- Having motivated students makes all the difference!
THANK YOU!