


Improving Teen Sleep to Prevent Suicide: Promising Strategy or Impossible Dream?



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Disclosures

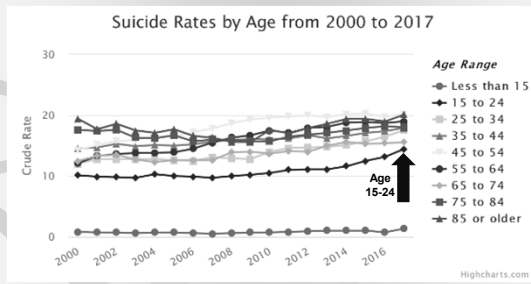
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The American Foundation for Suicide Prevention			X
The Brain and Behavior Foundation			X
The Clinical and Translational Science Institute at the University of Pittsburgh			X
University of Pittsburgh		X	

- ### Agenda
1. Update on Adolescent Suicide
 2. Why Sleep?
 3. The Sleep-Suicide Association
 4. Implications for:
 - Assessment
 - Treatment

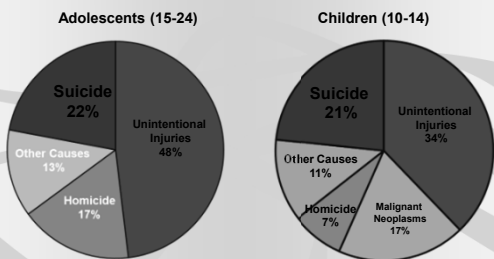
Agenda

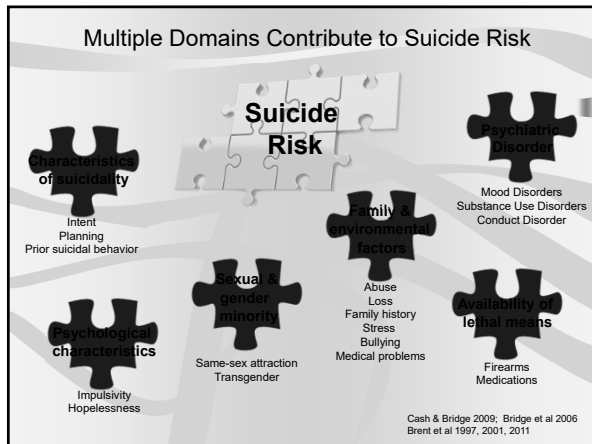
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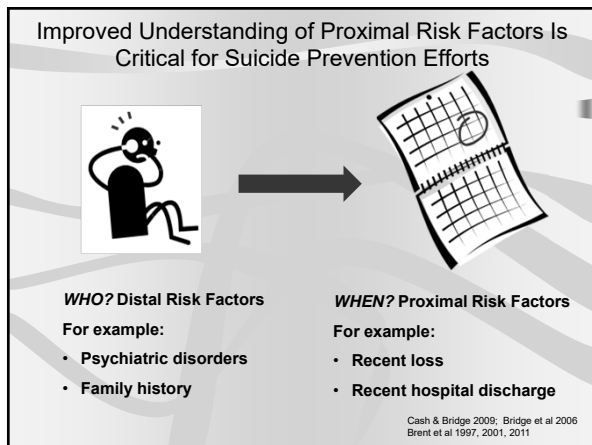
Suicide Rates Among Youth Are Steadily Increasing

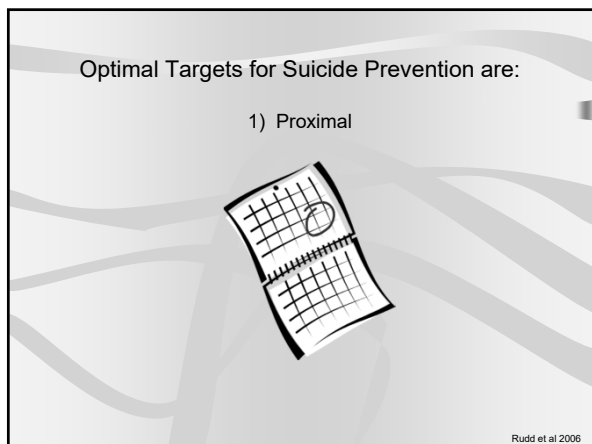


Suicide is Currently the 2nd Leading Cause Of Death Among Youth In The US



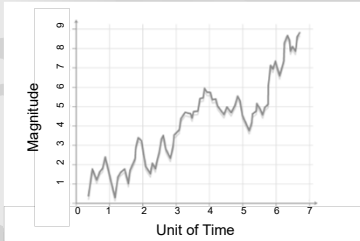






Optimal Targets for Suicide Prevention are:

- 1) Proximal
- 2) Dynamic



Rudd et al 2006

Optimal Targets for Suicide Prevention are:

- 1) Proximal
- 2) Dynamic
- 3) Modifiable

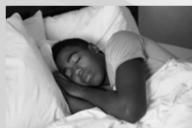


Rudd et al 2006

Optimal Targets for Suicide Prevention are:

- 1) Proximal
- 2) Dynamic
- 3) Modifiable

...LIKE SLEEP?!



Rudd et al 2006

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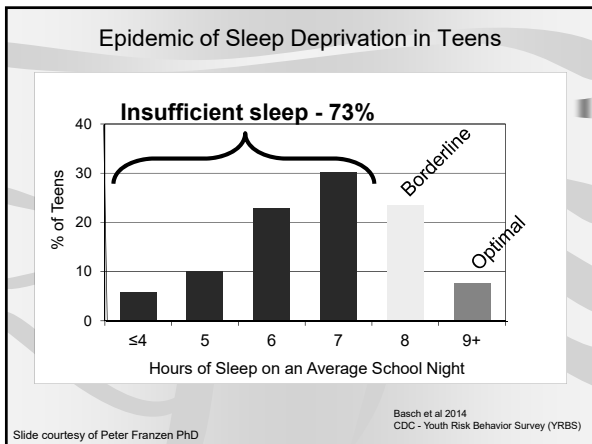
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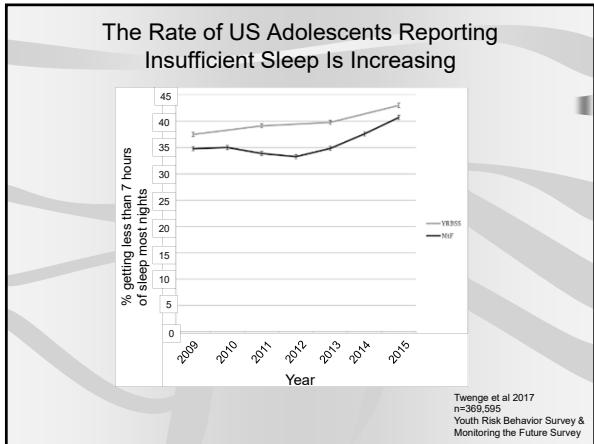
Pediatric Sleep Guidelines

American Academy of Sleep Medicine

Age	Recommended Sleep Hours per 24 hour period
Infants: 4-12 months	12 to 16 hours (including naps)
Toddlers: 1-2 years	11 to 14 hours (including naps)
Preschoolers: 3-5 years	10 to 13 hours (including naps)
Grade-schoolers: 6 to 12 years	9 to 12 hours
Teens: 13-18 years	8 to 10 hours

Paruthi et al 2016





Why is Short Sleep So Common In Teens?

Biological Changes In Sleep at Puberty

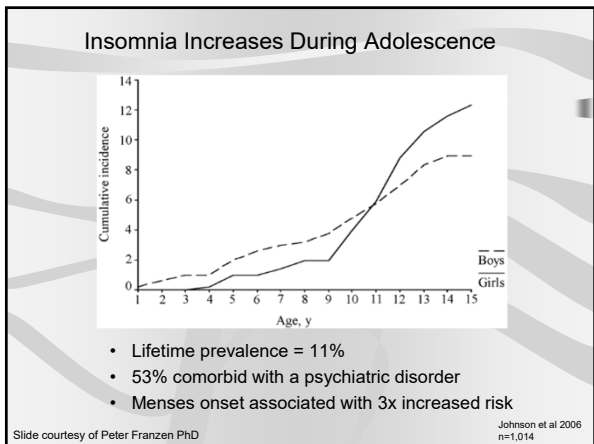
Sleep becomes lighter

Sleepiness increases

Circadian rhythms shift later (delayed melatonin onset, DLMO) prefer later bed and wake times

- DLMO: Preschool ~ 7:30 PM
- DLMO: Prepubertal ~8:30 PM
- DLMO: Mature adolescents ~9:30 PM


Keyes et al 2015; Johnson et al 2016; Roenneberg et al 2004




Why is Short Sleep So Common In Teens?

Social & Environmental Changes in Sleep at Puberty


Decrease in parental control




Homework & after school activities



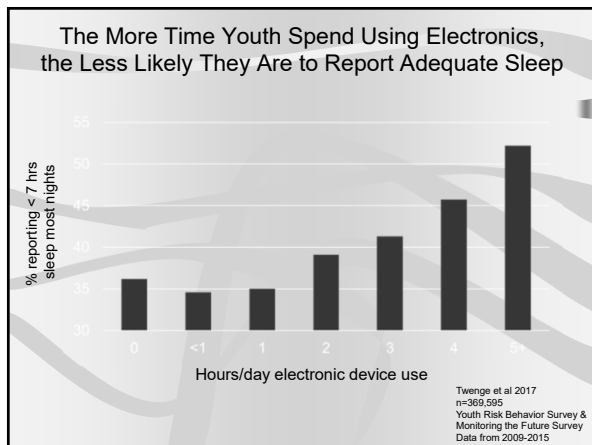
Use of social media (& exposure to light)



Early school start times



Keyes et al 2015; Johnson et al 2016; Roenneberg et al 2004



Biological + Social Influences During Adolescence = Chronic Sleep Deprivation

- Biological: Circadian and preferred sleep timing shift later in adolescence
- Social/Environmental: Early school start times, after school activities, homework, etc...

Monday												
Tuesday												
Wednesday												
Thursday												
Friday												
Saturday												
Sunday												

School nights:

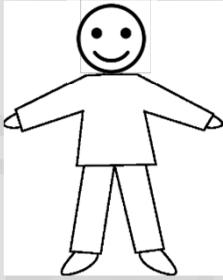
- Circadian misalignment
- Sleep loss

Weekend nights:

- Preferred sleep/wake timing
- Better alignment
- Weekend "catch up" sleep

Slide courtesy of Brant Hasler PhD

Consequences of Insufficient Sleep in Adolescents



This is your teen...

This is Your Teen on Insufficient Sleep...

Cognitive

- lower grades & achievement test scores
- concentration
- judgment
- problem-solving

Emotional

- more depressive symptoms
- emotional reactivity
- more negative/less positive affect
- difficulty regulating emotions

Behavioral

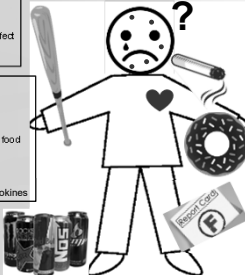
- impulsivity
- violence
- risky sexual activities
- delinquent behavior
- substance use

Physical

- weight gain/obesity
- diabetes
- preference high-fat, high-carb food
- acne
- perceived as less attractive
- elevated pro-inflammatory cytokines

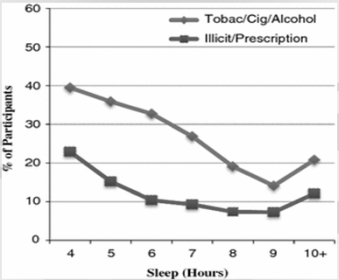
Neurobiological

- Impaired prefrontal cortical functioning
- Amygdala activation
- Diminished brain connectivity (frontal/limbic)
- Blunted neural reward circuitry (striatum)
- Decreased serotonin activity
- HPA axis alterations



Perlis et al 2016; Kohyama 2009; Roman et al 2005; Yoo et al 2007, 2011; Hanson et al 2015; Hasler et al 2012; Carskadon 2004; Fallone et al 2005; O'Brien & Mindell 2005; Kogiore et al 2009; Taltol et al 2010; Fortier-Brochu et al 2012; Pasch et al 2011; Roberts & Duong 2014; Zohar et al 2009; Plicher et al 2015; Palmer et al 2018; Baum et al 2014; McMakin et al 2016; Andersen & Platten 2011; Owens et al 2017; Pasch & Galbreth 2013; Altran et al 2012; Baker 2008; Hublin 2009; Spiegel et al 1999; Sundelin et al 2017; Nedeltcheva et al 2009; Pigeon et al 2012; McKinight-Eily et al 2011; Hasler et al 2017; Terry-McElrath et al 2017

Less Sleep = Greater Risk for Teen Substance Use



Sleep (Hours)	Tobac/Cig/Alcohol (%)	Illicit/Prescription (%)
4	38	22
5	35	15
6	32	10
7	28	10
8	20	8
9	15	8
10+	20	12

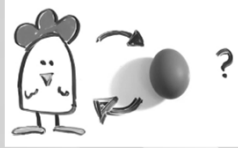
Note: Each hour less of sleep is associated with a significant increase in odds of use

Winsler et al 2015
N=27,939

Sleep and Youth Psychiatric Disorders

Sleep is disturbed in youth with psychiatric disorders

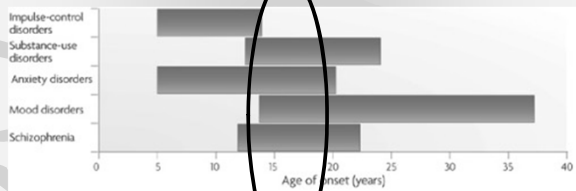
- depression
- anxiety
- ADHD
- substance use disorders



Sleep problems are:

- a risk factor for developing psychiatric disorders
- symptoms of psychiatric disorders
- associated with worse outcomes in patients with psychiatric disorders

Adolescence: A period of vulnerability to psychiatric disorders that may be further exacerbated by sleep loss

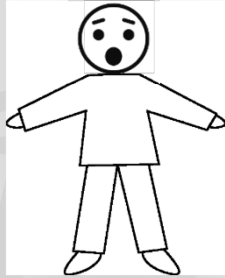


Slide courtesy of Peter Franzen PhD

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This is Your Teen's Suicide Risk on Insufficient Sleep...



The Sleep-Suicide Association: What Do We Know?

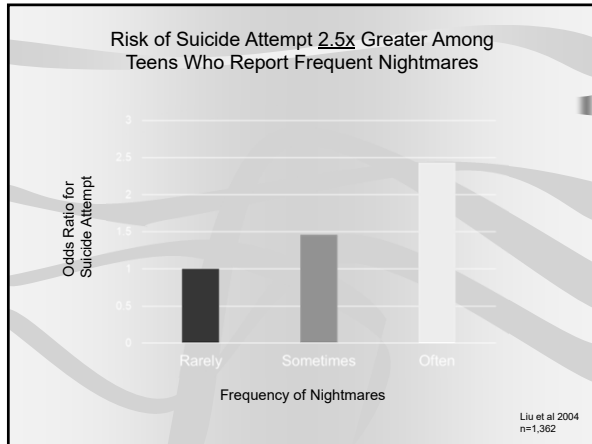
	Death by suicide	Suicide attempt	Suicidal ideation	Non suicidal self-injury
Insomnia	X	X	X	X
Nightmares	X	X	X	X
Poor sleep quality	X	X	X	X
Short sleep	X	X	X	
Long sleep	X		X	
Sleep variability/Weekend "catch up" sleep		X	X	X
Hypersomnia		X	X	
Eveningness		X	X	
Sleep apnea			X	
Daytime sleepiness			X	
Circadian reversal		X		
Regular sleeping pill use	X			

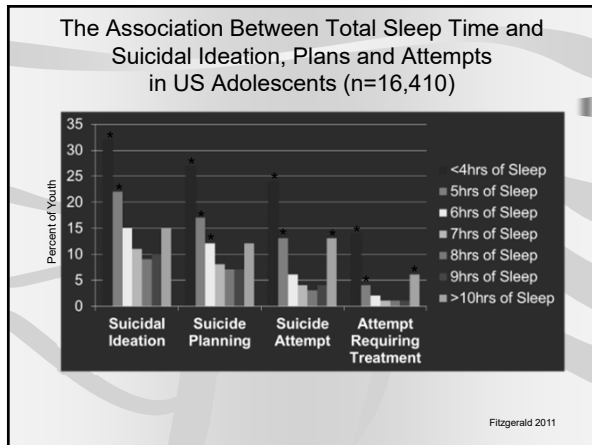
For reviews, please see: Liu et al 2005; Pigeon et al 2012; Winsper & Tang, 2014; Chiu et al 2018; Rumble 2018; Liu et al 2019

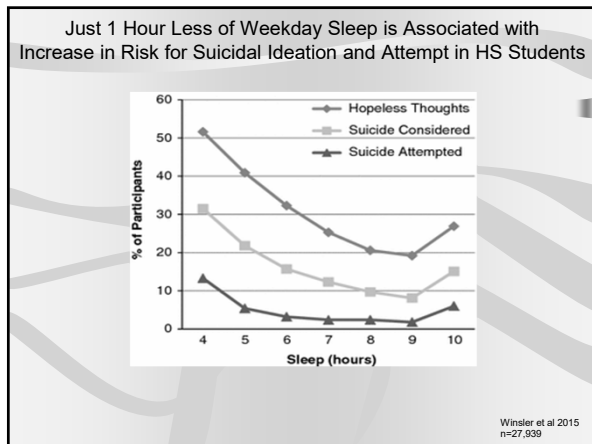
Risk of Suicide Attempt Nearly 3x Greater Among Teens Who Sleep Less than 8 Hours/Night



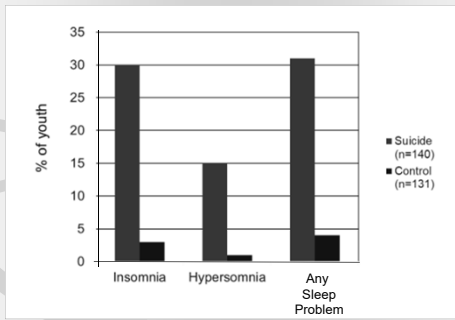
Liu et al 2004
n=1,362





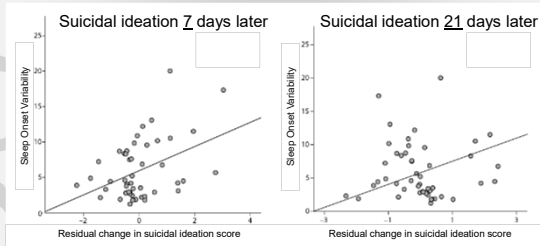


Greater Rates of Sleep Disturbance in the Preceding Week Among Youth who Died by Suicide vs. Controls

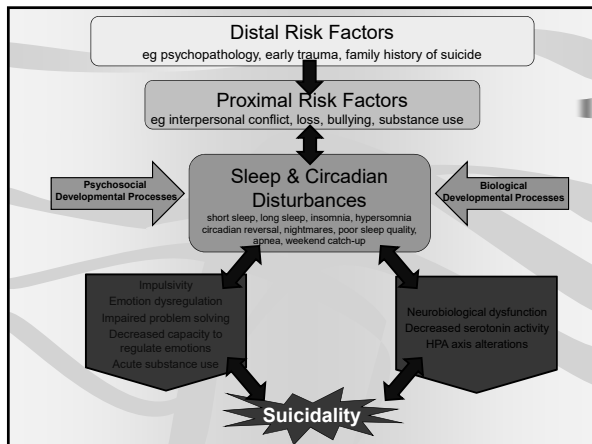


Goldstein et al 2008

Sleep Onset Variability Predicts Subsequent Increases in Suicidal Ideation



Bernert et al 2017
n=50



The Sleep-Suicide Association: What Else Do We Need to Know to Prevent Teen Suicide?

Understanding of specific sleep disturbances

- objective & subjective measures

Temporal associations

- prospective studies with high risk samples

Developmental differences?

Identification of underlying mechanisms

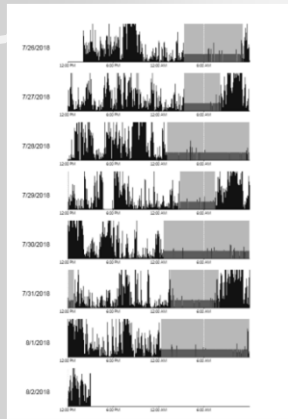
- psychological
- neurobiological

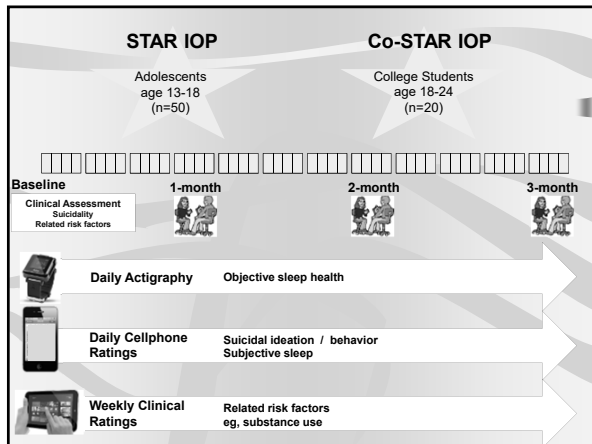
Liu & Buysse 2005
Pigeon et al 2012

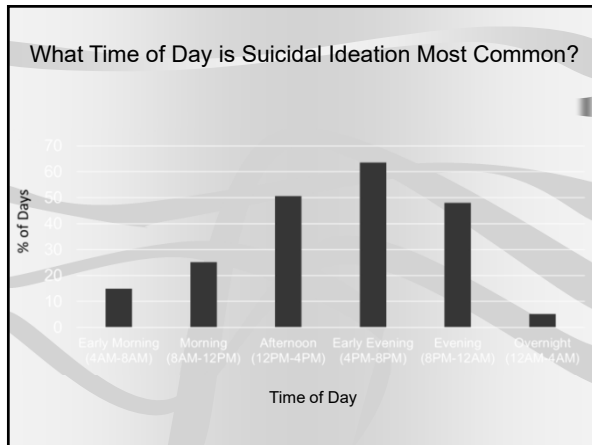
Examining the prospective association
between sleep health and suicidality in
adolescents and college students
at ultra-high risk for suicide

S.P.O.T. Study
Sleep Predicting Outcomes in Teens



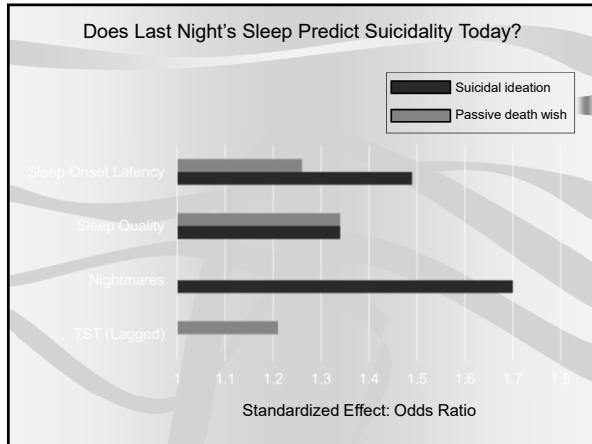


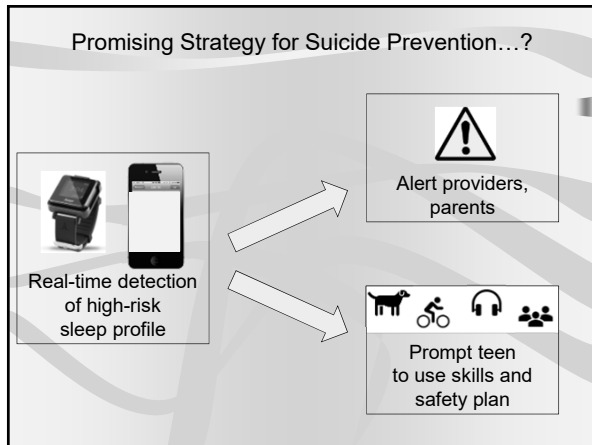


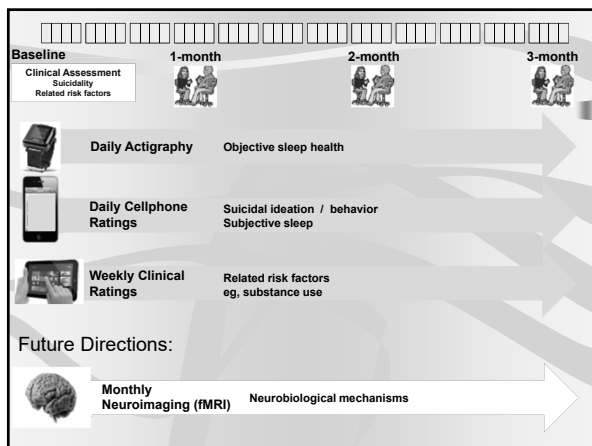


How Are the Youth in SPOT Sleeping?

- Total sleep time (hours) = 7.0 (Range 5.5–8.7)
- Sleep efficiency (%) = 82% (Range 69%–96%)
- Sleep onset latency (minutes) = 18 (Range 6–60)
- Nightmares = 38% (Range 3–100%)
- Sleep quality (1-100 scale) = 51 (Range 21 – 70)








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Implications For Assessment

Include assessment of sleep problems
in standard suicide risk assessment




How to Assess for Sleep Problems in Teens

Ask about a "recent typical night"

- Be specific
- Get overview of preceding day
- Wind down period
- Pre-sleep period: from 'in bed' to 'lights out'
- Identify thoughts, feelings, behaviors

Look for:

- Regularity of bedtime and waketime
- Time to fall asleep
- Nighttime awakenings
- Nightmares



Harvey & Buysse 2017

The Utility of a Sleep Diary

- Clarifies patterns
- Informs intervention/goals
- Monitor progress

Things to consider tracking:

- sleep timing
- awakenings
- nightmares
- caffeine
- sleep quality
- sleep quantity
- physical activity
- daytime sleepiness

Free downloadable sleep diary templates:
American Academy of Sleep Medicine: www.yoursleep.aasmnet.org
National Sleep Foundation: www.sleepfoundation.org

Free apps to track sleep:
For a review see Grigsby-Toussaint et al 2017
Sleep Ninja
Sleep Better
Sleep Tracker + Mood Diary

Cognitive Behavioral Therapy for Insomnia (CBT-I)

Associated with improvements in sleep, functioning and substance use in adolescents

Suicidal ideation in adults


Components:

- Psychoeducation
- Sleep hygiene
- Restriction of time in bed
- Stimulus control
- Cognitive therapy
- Relaxation techniques

Tested in group and online

Bootzin & Stevens 2005; de Bruin et al 2015

Evidence-Based Treatment for Nightmares



Psychosocial: Evidence supports nightmare-specific CBT
eg, Image Rehearsal Therapy (IRT)

- Brief (3-4 sessions)
- "Nightmare rescripting" Learn ways to re-write the dream
- Practice imagining the new dream during the daytime

Pharmacological: Prazosin has most support; RCTS needed

Lancee et al 2018; Akinsanya et al 2017; Aurora et al 2010

Transdiagnostic Intervention for Sleep and Circadian Dysfunction (Trans-C)

Cross-Cutting Modules		Common Transdiagnostic Sleep-Circadian Problems	Treatment Module
Case Formulation Education Behavior Change & Motivation Goal Setting		Establishing regular sleep-wake times	Core Module 1
		Learning a wind-down routine	Core Module 1
		Learning a wake-up routine	Core Module 1
		Improving daytime functioning	Core Module 2
		Correcting unhelpful sleep-related beliefs	Core Module 3
		Improving sleep efficiency	Optional Module 1
		Reducing time in bed	Optional Module 2
		Dealing with delayed or advanced phase	Optional Module 3
		Reducing sleep-related worry/vigilance	Optional Module 4
		Maintenance of behavior change	Core Module 4

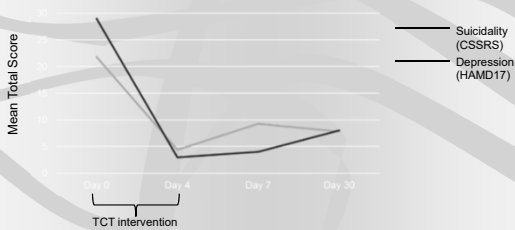
Harvey & Buysse 2017

Preliminary support:

- Youth age 10-18 (n = 176; Harvey et al in press)
- Adults with serious mental illness in community settings (n = 92; Harvey et al 2016)

Triple Chronotherapy

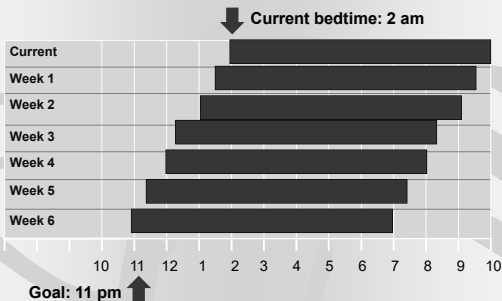
- 1) Total sleep deprivation
 - 2) Sleep phase advancement
 - 3) Bright light therapy
- Effective for depression
 - Preliminary data in adults for suicidality
 - Needs further study



Hurd et al 2019
n=29

Delayed Sleep Phase

Shift bedtime earlier 30 minutes per week




Harvey & Buysse 2017

The case for later school start times

Later school start times associated with improved:

- Attendance
- Tardiness
- Drop-out rates
- Standardized test scores
- Grades



- No impact on bedtimes
- Increase in sleep time: 25 – 77 mins/weekday, ~5 hrs per week
- Extracurricular activity involvement remains the same or increases

For reviews see: Wheaton et al 2016; Minges & Redeker 2016

Organizations increasingly recommend school start time 8:30 or later!

<ul style="list-style-type: none"> American Academy of Pediatrics (AAP) American Medical Association (AMA) Centers for Disease Control (CDC) The Sleep Research Society (SRS) 	<ul style="list-style-type: none"> The National Association of School Nurses Society for Behavioral Sleep Medicine (SBSM) The National Education Association (NEA) National Parent Teacher Association (PTS)
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General Guidelines for Improving Sleep in Teens

- Minimal fluctuation in the sleep-wake schedule across the week:
Bedtime + 1 hour; Waketime + 2 hours
- "Wind-down" period (30-60 mins) same time every night:
Relaxing activities
Reduce light (esp from technology)
- Wake-Up:
Make it brisk
No snoozing
Get sunlight
Get moving
- Bed is only for sleeping
- Avoid naps

Harvey & Buysse 2017

General Guidelines for Improving Sleep in Teens

Build commitment

Small changes

- Even 1 more hour of sleep can make a big difference!
(Winsler et al 2015)

Engage parents as developmentally appropriate (Gangwhitsch et al 2010)

Problem solve all that gets in the way...

- Time management
- Technology
- "Catch-up" sleep

Harvey & Buysse 2017

Conclusions

- Adolescence is a period of increased vulnerability that may be further exacerbated by sleep changes and difficulties
- Strong association between teen sleep and suicidality
- Promising strategy for teen suicide prevention
- More to come...!

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