

**Sleep Health and Why we Should be Focusing on it in This Decade**  
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Professor of Medicine  
Mayo Clinic

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**Financial Disclosures**  
• None

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**Overview**  
I. Defining Sleep Health  
II. Sleep is Essential to Physical Health  
III. Sleep is Essential to Mental & Emotional Health  
IV. Sleep is Essential to Safety  
V. Sleep is Essential to Public Health

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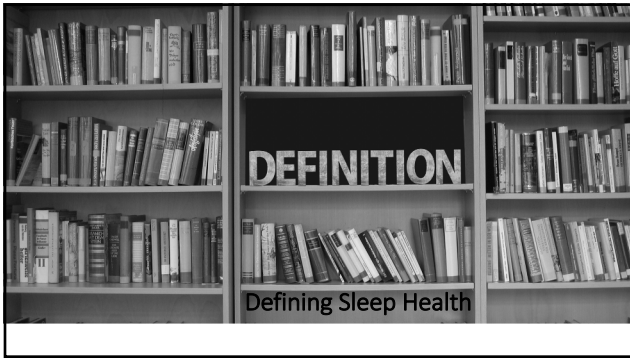
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**What is health?**

- the condition of being sound in body, mind, or spirit
- *especially*: freedom from physical disease or pain
- the general condition of the body
- a condition in which someone or something is thriving or doing well: well-being

• Merriam-Webster.com

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**What is healing?**

**Mayo Clinic Value Statements**

***Healing***

Inspire hope and nurture the well-being of the whole person, respecting physical, emotional and spiritual needs.

MayoClinic.org



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**What is healthy sleep?**

“Sleep health is a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being. Good sleep health is characterized by subjective **satisfaction**, appropriate **timing**, adequate **duration**, high **efficiency**, and sustained **alertness** during waking hours.”

*Buysse DJ. Sleep health: can we define it? Does it matter? Sleep. 2014 Jan 1;37(1):9-17*

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**What is healthy sleep?**

“Healthy sleep requires adequate **duration**, good **quality**, appropriate **timing** and **regularity**, and the **absence of sleep disturbances or disorders**.

*Watson NF, Badr MS, Belenky G, et al. Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. J Clin Sleep Med 2015;11(6):591-592.*

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**What is “adequate duration”?**

“Adults [aged 18 to 60 years] should sleep **7 or more hours** per night on a regular basis to promote optimal health.”

*Watson NF, Badr MS, Belenky G, et al. Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. J Clin Sleep Med 2015;11(6):591-592.*

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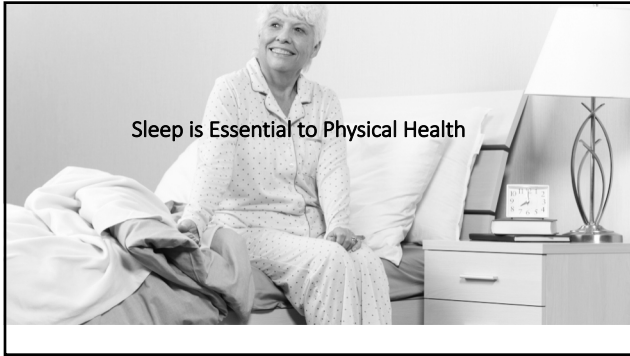
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Sleep is Essential to Physical Health

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**Chronic Health Conditions by Sleep Duration**

Chronic condition	Short sleep (<7 hours)		Sufficient sleep (≥7 hours)	
	%	95% CI	%	95% CI
Heart attack	4.8	(4.6-5.0)	3.4	(3.3-3.5)
Coronary heart disease	4.7	(4.5-4.9)	3.4	(3.3-3.5)
Stroke	3.6	(3.4-3.8)	2.4	(2.3-2.5)
Asthma	16.5	(16.1-16.9)	11.8	(11.5-12.0)
COPD (chronic obstructive pulmonary disease)	8.6	(8.3-8.9)	4.7	(4.6-4.8)
Cancer	10.2	(10.0-10.5)	9.8	(9.7-10.0)
Arthritis	28.8	(28.4-29.2)	20.9	(20.2-20.7)
Depression	22.9	(22.5-23.3)	14.6	(14.3-14.8)
Chronic kidney disease	3.3	(3.1-3.5)	2.2	(2.1-2.3)
Diabetes	11.1	(10.8-11.4)	8.6	(8.4-8.8)

CDC. Sleep. Data and statistics. [https://www.cdc.gov/sleep/data\\_statistics.html](https://www.cdc.gov/sleep/data_statistics.html)

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**Sleep and Cardiometabolic Health**

## Circulation

**Sleep Duration and Quality: Impact on Lifestyle Behaviors and Cardiometabolic Health: A Scientific Statement From the American Heart Association**

Sleep duration, mostly short sleep, and sleep disorders have emerged as being related to adverse cardiometabolic risk, including **obesity, hypertension, type 2 diabetes mellitus, and cardiovascular disease.**

St-Onge MP, Grandner MA, Brown D, et al. *Circulation*. 2016 Nov 1;134(18):e367-e386.

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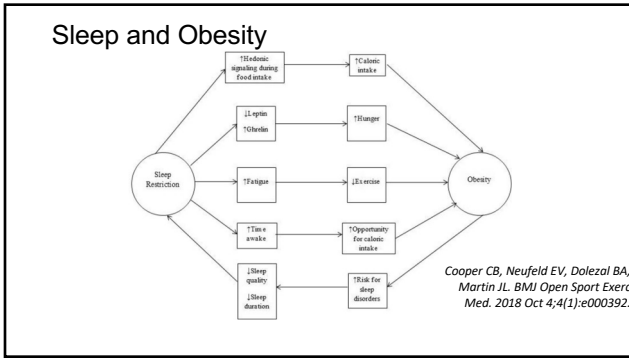
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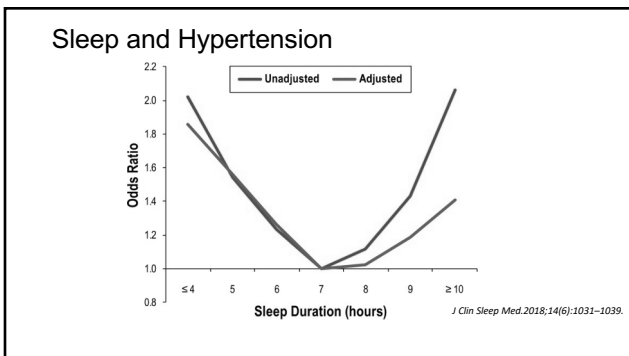
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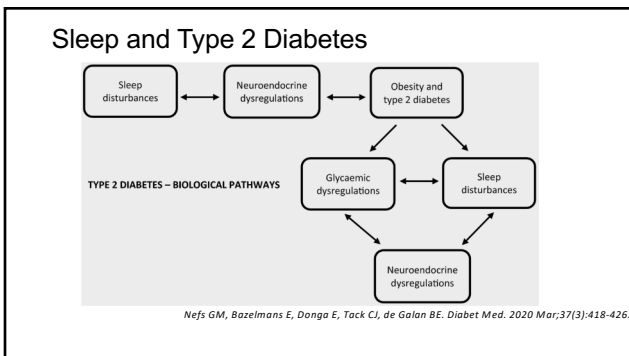
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### Sleep and Cardiovascular Disease

**Table 2**  
Association Between Sleep Duration and All-Cause Mortality, Total CVD, CHD and Stroke From Non-Linear Dose-Response Analysis

Sleep Duration	All-Cause Mortality (p=40 <sup>a</sup> )	Total CVD (p=26 <sup>a</sup> )	CHD (p=20 <sup>a</sup> )	Stroke (p=17 <sup>b</sup> )
7h	1.12 (1.10-1.14)	1.14 (1.09-1.19)	...	...
4h	1.08 (1.06-1.09)	1.09 (1.06-1.13)	1.18 (1.09-1.23)	1.05 (0.96-1.15)
5h	1.04 (1.03-1.05)	1.05 (1.03-1.08)	1.11 (1.06-1.16)	1.02 (0.96-1.08)
6h	1.01 (1.00-1.01)	1.02 (1.00-1.03)	1.05 (1.01-1.09)	0.99 (0.96-1.03)
7h	1.00	1.00	1.00	1.00
8h	1.04 (1.04-1.05)	1.03 (1.02-1.05)	1.01 (0.99-1.03)	1.08 (1.06-1.11)
9h	1.15 (1.14-1.16)	1.16 (1.13-1.19)	1.14 (1.08-1.20)	1.30 (1.24-1.37)
10h	1.32 (1.30-1.33)	1.37 (1.28-1.45)	1.34 (1.20-1.50)	1.64 (1.47-1.82)
11h	1.33 (1.47-1.59)	...	...	...

CVD indicates coronary heart disease; CHD, cardiovascular disease.  
<sup>a</sup> % denotes number of risk estimates.

*J Am Heart Assoc. 2017 Sep 9;6(9):e005947.*

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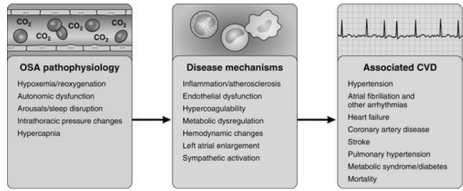
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### Sleep Apnea and Cardiovascular Disease

**Obstructive Sleep Apnea and Cardiovascular Disease: A Scientific Statement From the American Heart Association**



*Yeghiazarians Y, Ineid H, Tietjens JR, et al. Circulation. 2021 Jul 20;144(3):e56-e67.*

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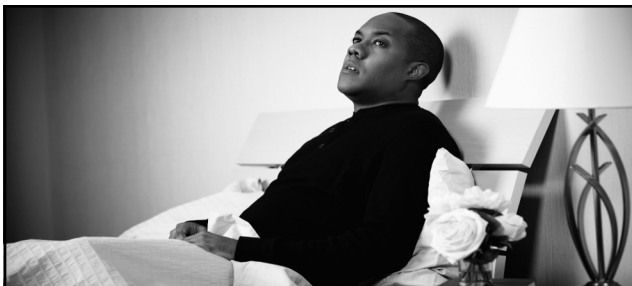
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Sleep is Essential to Mental & Emotional Health

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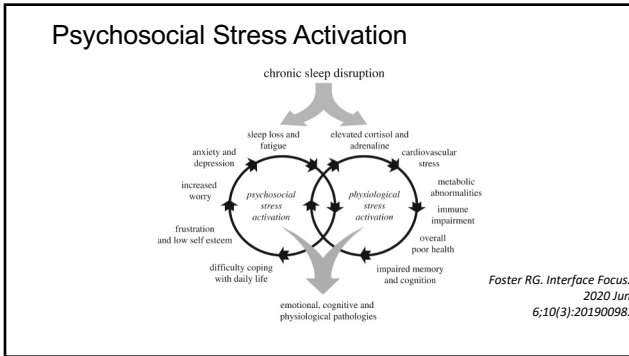
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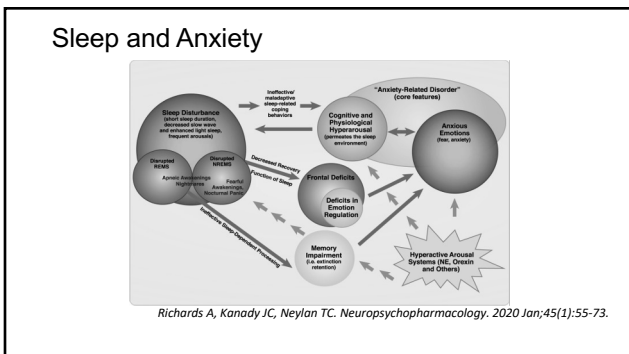
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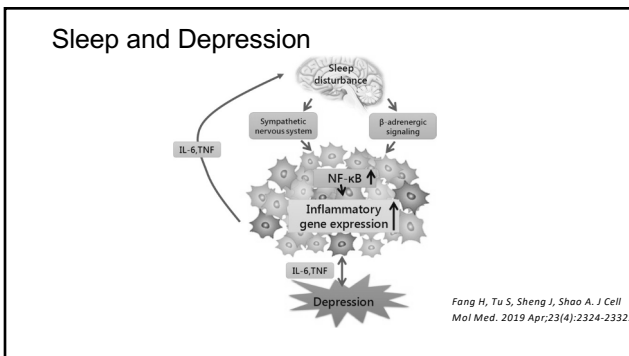
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### Sleep and Suicide

HR with 95% CI of Suicide among Subjects with Different Combinations of Insomnia and Short Sleep

Insomnia*	Short sleep <sup>†</sup>	N	Person years	Deaths (%)	HR (95% CI) <sup>‡</sup>	HR (95% CI) <sup>§</sup>
No	No	24,490	470,917	37 (0.15)	1.0 (reference)	1.0 (reference)
No	Yes	9,013	172,399	14 (0.16)	0.94 (0.51-1.75)	0.96 (0.52-1.78)
Yes	No	2,023	38,503	4 (0.20)	1.33 (0.48-3.77)	1.26 (0.45-3.54)
Yes	Yes	3,260	61,024	11 (0.34)	<b>2.36 (1.20-4.63)</b>	<b>2.26 (1.15-4.44)</b>

Significant HRs are in bold.

\*Insomnia was defined as often or always experiencing at least one nocturnal insomnia symptoms in combination with sometimes, often or always experiencing at least one symptom of non-restorative sleep.

<sup>†</sup>Short sleep was defined as sleeping 6 h night or less.

<sup>‡</sup>Adjusted for gender.

<sup>§</sup>Adjusted for gender, occupational status, working hours, educational status, smoking, physical activity, coffee consumption, cardiovascular disease, and cancer.

Sleep. 2021 Apr 9;44(4):2500-2505.

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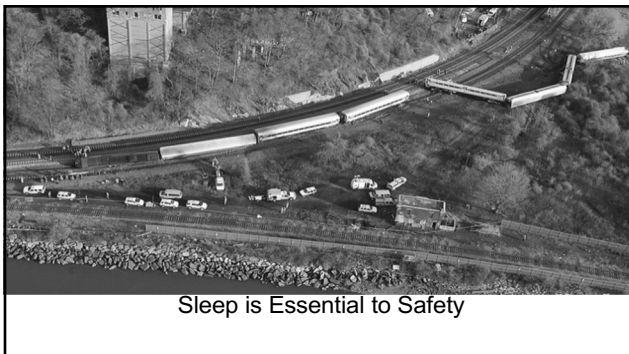
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### Fatigue-Related Accidents

Date	Mode	Location
Nov. 27, 1996	Rail	Secaucus, NJ
Feb. 12, 2009	Aviation	Clarence Center, NY
May 31, 2011	Highway	Doswell, VA
Dec. 7, 2011	Aviation	Las Vegas, NV
June 24, 2012	Rail	Goodwell, OK
Aug. 14, 2013	Aviation	Birmingham, AL
Dec. 1, 2013	Rail	Bronx, NY
June 7, 2014	Highway	Cranbury, NJ
Sept. 23, 2014	Marine	Virgin Passage, Caribbean Sea, PR
Dec. 5, 2014	Marine	Jetty A, off Cape Disappointment, Ilwaco, WA
Feb. 15, 2015	Marine	Long Island, AK

NTSB. Most Wanted List 2017-2018. Reduce fatigue-related accidents.

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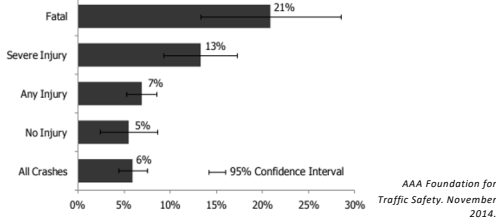
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### Drowsy Driving

Proportion of crashes that involved a drowsy driver, overall and by maximum injury severity in crash, United States, 2009 – 2013.



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### Workplace Accidents

- A prospective study examined whether sleep disturbances predicted occupational injuries in a large population of more than 48,000 public sector employees in Finland.
- The adjusted odds ratio for occupational injury was:
  - **1.38** for **men** with experiences of **disturbed sleep**
  - **1.69** for **women** with **difficulties initiating sleep**

*Salminen S, Oksanen T, Vahtera J, et al. J Sleep Res. 2010 Mar;19(1 Pt 2):207-13.*

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Sleep is Essential to Public Health

Photo: Unknown Author is licensed under CC BY-SA

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### Impact of Sleep & Circadian Rhythm Disruption

emotional	cognitive	physiology and health
<b>increased</b>	<b>impaired</b>	<b>increased risk</b>
fluctuations in mood	cognitive performance	day time sleepiness
irritability	ability to multi-task	micro-sleeps
anxiety	memory	cardiovascular disease
loss of empathy	attention	altered stress response
frustration	concentration	altered sensory thresholds
risk-taking and impulsivity	communication	infection, lowered immunity
negative salience	decision-making	cancer
stimulant use (caffeine)	creativity and productivity	metabolic abnormalities
sedative use (alcohol)	motor performance	diabetes II
illegal drug use	dissociation detachment	depression and psychosis

Foster RG. *Interface Focus*. 2020 Jun 6;10(3):20190098.

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### Preventing Heart Disease

The MORGEN study examined sleep & these traditional healthy lifestyle factors:

- Sufficient physical activity
- Healthy diet
- Moderate alcohol consumption
- Non-smoking



**4 healthy factors**

57% lower risk of CVD

67% lower risk of fatal CVD

**4 healthy factors + sleep**

65% lower risk of CVD

83% lower risk of fatal CVD

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### AHA Life's Simple 7 (or Great 8)



1. Smoking status
2. Physical activity
3. Weight
4. Diet
5. Blood glucose
6. Cholesterol
7. Blood pressure

**8. Sleep**

Makarem N, Castro-Diehl C, St-Onge MP, et al. *Circulation*. 2020;141:A36.

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### Preventing Chronic Diseases and Death

A study examined relationships between 10 self-reported healthy lifestyle behaviors and health outcomes.

Behaviors that most significantly affected future outcomes were **low-fat diet, aerobic exercise, non-smoking, and adequate sleep.**

Low-fat diet and adequate sleep were more significant than commonly promoted healthy behaviors, such as eating a daily breakfast.

*Byrne DW, Rolando LA, Aliyu MH, et al. Am J Prev Med. 2016 Dec;51(6):1027-1037.*

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### Preventing Mental Health Problems

- Cross-sectional survey of 1,000+ young adults (18-25 years)
- Assessed sleep, physical activity, and dietary factors
- The strongest predictors of depressive symptoms and well-being were:

1. Sleep quality
2. Sleep quantity
3. Physical activity



*Wickham SR, Amarasekara NA, Bartonicek A, Conner TS. Front Psychol. 2020 Dec 10;11:579205.*

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### Healthy People 2030

Goal: Improve health, productivity, well-being, quality of life, and safety by helping people get enough sleep.



10-year, measurable public health objectives

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### Healthy People 2030: Sleep Objectives

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Increase the proportion of adults with sleep apnea symptoms who get evaluated by a health care provider

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Increase the proportion of adults, high school students, and children who get enough sleep

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Reduce the rate of motor vehicle crashes due to drowsy driving

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Increase the proportion of infants who are put to sleep on their backs

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Increase the proportion of infants who are put to sleep in a safe sleep environment (Developmental)

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Increase the proportion of secondary schools with a start time of 8:30 AM or later (Research)

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<https://health.gov/healthypeople>

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### Healthy People 2030: Sleep Objective Status

**Objective Status**

- 0 Target met or exceeded
- 0 Improving
- 2 Little or no detectable change
- 1 Getting worse
- 3 Baseline only
- 1 Developmental
- 1 Research

<https://health.gov/healthypeople>

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### Areas for Greater Sleep Health Emphasis

- K-12 Health Education
- College Health Education
- Medical School & Graduate Medical Education
- Primary Care
- Specialty Care
- Health Professionals Education
- Hospitals & Long-Term Care Facilities
- Public Health Promotion Programs
- Workplaces

Ramar K, Mathotra RK, Corden KA, et al. Sleep is essential to health: an American Academy of Sleep Medicine position statement. J Clin Sleep Med. 2021 Jun 21.

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### AASM Public Awareness Initiatives

Developing lesson plans about sleep for use in the classroom

- Collaboration with Young Minds Inspired
- <https://ymiclassroom.com/lesson-plans/sleep/>

Developing a multi-year, national public awareness campaign

- Supports the AASM vision that, "Sleep is recognized as essential to health"
- Launching in 2022

Awarded a 3-year contract by the CDC

- Obstructive Sleep Apnea (OSA) Awareness Program
- Begins Sept. 30, 2021

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## THE THREE PILLARS OF HEALTH



**NUTRITION**



**SLEEP**



**EXERCISE**

Sleep is a basic human need and is crucial to our overall health and well-being.

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