

Sleep Deficiency in Women

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What is Sleep Deficiency

Sleep deficiency can occur if you have partial or total sleep deprivation (not getting enough sleep or not getting any sleep at all), do not sleep well, sleep at irregular times, or have a sleep disorder that prevents adequate sleep duration or sleep quality²⁰. For young adults (ages 18 to 25) and adults (ages 26-64) the recommended range of sleep duration is 7-9 hours, while for teens (ages 14 to 17) the recommended range is higher at 8-10 hours¹². However, sleep duration alone does not necessarily equate to sufficient sleep. Having poor quality sleep can result in sleep deficiency even if your quantity of sleep was within your recommended range. For example, if you slept from 9:00p.m. to 5:00 a.m., but had frequent awakenings during your sleep this could affect your quality of sleep.

Young Adults and Particularly Women are at substantial risk of experiencing sleep deficiency

Young adults and particularly women of color are at higher risks for experiencing sleep deficiency. According to the Spring 2019 Undergraduate National College Health Assessment, 37% of students reported experiencing sleep difficulties that were traumatic or very difficult to handle¹⁹. Only about 38% of students reported getting enough sleep to feel rested at least 4 out of the past 7 days¹⁹. It is also important to note that negative sleep patterns begin before students even attend college and is particularly worrisome for women in the state of NC. According to the 2019 Youth Risk Behavior Surveillance Data, North Carolina ranks 2nd in the US among high school female students who did not get the recommended amount of sleep on a school night²³.

As shown in Table 1 & 2 the prevalence of sleep deficiency is higher among females compared to males nationally & in North Carolina²³. This risk is also much higher in North Carolina compared to the national rates. Though sleep disturbances and insomnia are widespread within the general population, research has shown both tend to occur more frequently in women, specifically during times of hormonal fluctuation in women¹⁸. Sleep and circadian rhythms are impacted by hormonal fluctuation effects of menses, pregnancy / lactation, perimenopause, menopause, and post menopause. This can lead to sleep disturbances or sleep disorders during these phases, which may help explain the higher rates of risk among females in high school^{1,17, 23}. For example, about 1/3 of women experienced sleep disturbances during the premenstrual week or during menses, and attribute symptoms such as cramps, bloating, and headaches as reasons for this disrupted sleep¹⁷. These sleep disturbances are genetically unique to women and may further explain higher risks of sleep deficiency experienced by women. Additionally, data suggests that the prevalence of short sleep is highest among black female workers (US-born and Non US-born) compared to white and latino women¹⁴. As black women's occupation role increased from (laborers, support, to professional) so did short sleep prevalence¹⁴. Conversely, the prevalence of short sleep in white women decreased as their occupational role increased. The high prevalence rates for black women and the prevalence trends due to occupation may be attributed to limited professional/social networks, greater exposure to discrimination and home stress, lower prioritization of sleep and stress¹⁴. Factors

such as social class, racism and culture can also influence sleep quantity and quality on multiple levels¹⁴.

Table 1. Prevalence of Sleep Deficiency Nationally²³

	(8h+) of sleep on avg. school night
National rate females	79.7%
National rate males	76.2%

Table 2. Prevalence of Sleep Deficiency in North Carolina²³

	(8h+) of sleep on avg. school night
North Carolina rate females	84%
North Carolina rate males	81.5%

Roughly 76% of students reported never receiving information on sleep difficulties from their college/university and 66% reported they'd be interested in receiving information on this issue¹⁹. This data suggests sleep health education is lacking among many undergraduates across the country and is sorely needed. Sleep education programs and resources targeted towards women, and women of color in particular, may be the start of addressing these higher risks of sleep difficulties and short sleep duration⁵.

Barriers to sleep

Modifiable behavioral factors that can lead to sleep deficiency include the consumption of caffeine and alcohol, tobacco exposure or smoking, and work scheduling^{1,4,6-8,15}.

- **Work scheduling** can contribute to sleep deficiency. Women who work multiple jobs or work during the night may also have difficulties getting the proper amount of sleep. Shift work (working outside the times of 7am-6pm) is known to induce circadian disruption⁶ and can also increase menstrual cycle irregularities and painful menstruation in women. More menstrual irregularities and health problems are associated with working rotating or night shifts than working other shifts¹. In a study of sleep behaviors in female nurses, those reporting changes in menstrual function also observed more sleep disturbances along with a higher incidence of shift work disorder¹.
- **Caffeine** is commonly used as a fatigue countermeasure, headache relief, and performance enhancement, and may interfere with sleep quality and sleep duration if consumed late in the afternoon or evening^{7,8}. Studies have shown caffeine generally increases sleep latency (how long it takes a person to fall asleep), reduces total sleep time and sleep efficiency and worsens perceived sleep quality⁷. According to a survey on college students, those who habitually slept for (<6h) drink caffeine 3 times more each day than those who sleep (>8h)⁷. The subjective sleep quality of this sample was also worse among heavy consumers (>8 cups/d) compared to light (0-1 cup/d). Caffeine consumption may be masking the symptoms of habitual short sleep such as fatigue and drowsiness and contributing to a cycle of poor sleep quality and reduced sleep duration.
- **Alcohol** use is known to reduce sleep latency, which could encourage misuse of the drug as a sedative. In a study of 1039 undergraduates, 11.36% of alcohol users reported using alcohol as a sleep aid in the past week¹⁵. Alcohol induced sleep is associated with

deficient fragmented sleep, resulting in less sleep time and poor sleep quality. In another study on college students, those reporting poor sleep quality were found to drink more frequently and excessively¹⁵. This suggests there may be a bidirectional relationship between alcohol use and quality of sleep. Students may experience fragmented and poor sleep quality resulting in the use of alcohol as a sedative. Or the use of alcohol is contributing to fragmented and poor sleep quality in students.

- **Smoking** or exposure to tobacco may significantly increase sleep quality problems in females. Using data from the Canadian Health Measures Survey (2007-2013), it was found that the association of increased urinary cotinine levels (metabolization of nicotine) and increased number of sleep problems was stronger among females compared to males⁴. Studies suggest there may be sex-differences in the metabolization of cotinine. Females were found to have higher levels of cotinine, suggesting faster cotinine metabolization rates in females compared to males⁴. Sex differences in sensitivity and metabolization rate of nicotine help explain the stronger association between tobacco smoke exposure and poor sleep quality of females compared to males.

Sleep deficiency effect on chronic disease risk

Continuous sleep deficiency has been associated with many health problems and diseases such as cardiovascular disease, diabetes, obesity, immunodeficiency, and pain^{2, 9-11, 21}.

- **Cardiovascular diseases:** Studies have found strong associations between sleep deficiency and cardiovascular problems including high blood pressure, coronary heart disease, heart attack, and stroke. In a 12-year study of 20,432 healthy men and women, those who were sleep deprived (slept ≤ 6 hours) had a 15% higher risk of CVD incidence and a 23% higher risk of CHD incidence compared to people who slept 7-8 hours⁹. However, when sleep quality was added as a factor, individuals with short sleep duration and poor sleep quality had a 63% higher risk of CVD and 79% higher risk of CHD than those with normal sleep duration and good sleep quality⁹.
- **Diabetes:** Sleep deprivation can alter glucose homeostasis in the body, which could lead to insulin resistance and risk of developing diabetes. Studies have shown that habitual sleep deprivation is associated with a 30-50% increased incidence of diabetes²¹. Increasing sleep duration in restricted sleepers may lessen this relationship by improving glucose intolerance.
- **Weight Management / Obesity:** Reduction of sleep duration down regulates leptin, the satiety hormone, and up-regulates ghrelin, the appetite-stimulating hormone, which increases hunger and appetite²¹. Research has found there is a significant increase in appetitive desire for high-calorie versus low-calorie food items following sleep loss¹⁰. These are just some of the ways sleep deficiency may be associated with obesity and problems maintaining a healthy weight.
- **Immunodeficiency:** Sleep and immune system function are known to be bi-directionally associated. Immune system activation can alter our sleep and sleep also affects various immune parameters². Adequate sleep duration has been associated with reduced infection risk and improved infection outcome and vaccination response².
- **Pain and sleep** also have a bidirectional relationship. Both acute, and in particular chronic pain, can certainly be a factor that disrupts sleep and results in sleep deficiency¹¹. Sleep deficiency can also lower pain thresholds and increase spontaneous pain, such as muscle pains or headaches¹¹.

Tips for Improving Sleep Health in Women

Changing your sleeping environment is an easy preventative method of poor-quality sleep:

- Reducing excess noise and light disruption can improve overall sleep quality by reducing sleep interruptions¹³. Using blackout curtains or sleeping masks can reduce light disruption during sleep. Fans and white noise machines can block out excessive noise, earplugs or headphones can also help with drowning out noises.
- Calming scents such as lavender essential oil can provide a soothing smell for your bedroom, which can help with improving sleep onset and quality¹⁶.

To make sure you are getting enough sleep each night, budget in how much sleep time you will need:

- Set a fixed wake time then work backwards to identify a target bedtime.
- If you have an iPhone, Apple has a great resource that will help with developing your sleep routine. On the Health App you can find this under the Sleep tab. With this you can create a sleep schedule, monitor how long you are asleep, and factor in winding down time before bed with shortcuts to music playlists, podcasts, yoga and stretching apps.
- If you do not have access to this resource, just try to wind down 30 mins before your set bedtime. This will give yourself time to prepare for bed mentally and physically.
- While winding down into bedtime, avoid bright lighting and disconnect from tablets, cell phones and laptops. This artificial lighting can suppress the hormone production of melatonin, making it harder to fall asleep¹¹. As you wind down you can also read a book or journal, as long as it is not on an electronic device.

Avoid potential barriers of sleep:

- Caffeine, alcohol, and tobacco can affect sleep quality and duration, it is best to avoid consumption/usage before bedtime. Caffeine studies have shown that consumption even 6 hours before bedtime can reduce sleep more than an hour⁸. Ideally tobacco and alcohol should be avoided altogether. However, it is best to avoid alcohol consumption 4 hours before bedtime²² and tobacco exposure at least 2 hours before bedtime³.

Recommended Resources:

[CDC Basics About Sleep](#)

[Sleep Foundation](#)

[National Sleep Foundation](#)

[Sleep Health Foundation](#)

[Sleep Diary](#)

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