

The Sleep & Nutrition Connection
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An undergrad often stays up past 2 am in order to get work done or to go out with friends.

A student works a late shift, where vending machines and take-out foods are available.

A grad student awakens to work every night from 2 am to 4 am, because the equipment needed for research is available then.

A swim athlete arises before 6 am every morning in order to make it to early practice at 7 am.

Have you ever noticed that you feel hungrier on nights when you stay up late, or on the following day when you are overtired? A common theme in the lifestyles described above is insufficient sleep at the expense of changes in appetite and nutrition. The first three students have been missing zzz's and gaining weight by relying on fast food, snacks, or an extra meal to help them stay up; the athlete skimps on breakfast but gets very hungry to the point of overeating at night.

Americans now sleep less than people in any other industrialized country, and this could be part of the reason why the incidence of overweight has risen in the US (1). Research on sleep and appetite reveals a consistent link between a lower amount of sleep and a higher body mass index (BMI), a ratio of weight-to-height that indicates overweight. For instance, in the large Wisconsin Sleep Cohort Study, those who slept less than eight hours a night were more likely to be overweight (2).

Human and animal studies to determine a mechanism for this weight gain have found that insufficient sleep alters the levels of leptin and ghrelin, two hormones involved in the regulation of appetite and body fat. Leptin, released by fat cells, signals the brain to feel satiety. Ghrelin, produced in the stomach, signals hunger. In the Wisconsin cohort study, participants who slept only five hours vs. eight hours a night had lower leptin as well as higher ghrelin levels.

In another study, temporarily sleep-deprived young men experienced similar hormonal changes along with greater cravings for sweet and fatty foods (3). A further reason for their cravings might be related to the stress hormone cortisol, which can rise with sleep deprivation and contribute to hunger (4). In addition to altered hormone levels, people who stay awake longer have more opportunity to eat, and late-night eating often includes high-caloric foods.

Weight gain is only one of the many side effects of insufficient sleep, but it can lead to long-term health problems, including diabetes. Although more sleep will not automatically result in weight loss, sufficient sleep and a regular sleep schedule are critical in controlling appetite and promoting a healthy eating pattern.

For everyone, especially those with night shifts and unusual schedules, a little planning can greatly improve food selection and meal timing. Foods that are lower in calories can be purchased or prepared in advance. Also, regular breaks throughout the evening to relax,

exercise, and/or refresh can help take the place of excessive eating. A nutrition professional can help provide suggestions for meal and snack planning as well as other weight management strategies.

Physical and/or psychological problems are sometimes responsible for sleep loss. These problems, which can be serious but treatable, include sleep apnea, anxiety, and bipolar disorder. Anyone with chronic insufficient sleep, unusual tiredness, or a sleep disturbance should consult a medical professional and/or psychotherapist, who can help diagnose the underlying cause and recommend treatment.

Weight gain is a complex individual and societal phenomenon, and lack of sleep alone is not responsible for what is sometimes called an “obesity epidemic.” Food availability, personal food choices, and individual activity patterns all play an important role in weight maintenance. However, getting sufficient sleep is one necessary step we could each try to take towards attaining better nutrition, improved health, and perhaps even greater longevity.

References

1. Schardt, D. “Perchance to Eat: How sleep affects your weight.” *Nutrition Action Healthletter*. 2005; July-August: 10-11.
2. Taheri, S *et al.* “Short sleep duration is associated with reduced leptin, elevated ghrelin, and increased body mass index.” *PLoS Med.* 2004; Vol. 1, No. 3, e62.
3. Spiegel, K *et al.* “Brief communication: Sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite.” *Ann Intern. Med.* 2004; 141:846-850.
4. Flier, J and Elmquist, JK. “A good night’s sleep: future antidote to the obesity epidemic?” *Ann Int Med.* 2004; 141:885-6.

More information on sleep, appetite, and weight gain can be found online at the National Sleep Foundation—www.sleepfoundation.org.

This article originally appeared in “The Student Body” publication of the Student Health Alliance at Cornell (SHAC), Spring 2008.