Physical Activity and Sleep

Most adults sleep between seven and eight hours a night. In a typical night, they go through four to six NREM-REM cycles of about 90 minutes each. In rapid-eye-movement sleep (REM), the brain is highly active, the eyes move rapidly back and forth, and dreams occur frequently. In non-REM sleep (NREM), there is less brain activity and no eye movements. The deepest sleep, which occurs during the NREM period, is called slow-wave sleep. Most slow-wave sleep occurs during the first three NREM cycles, whereas REM sleep predominates during the final third of the night.

This delicate cycle is unfortunately subject to disturbances. About one in ten people suffer from insomnia—defined as having trouble falling asleep, staying asleep, or waking up too early. Sleep disturbances are strongly related to mental illness. In a large American study, 40% of insomniacs also reported a psychiatric disorder, mainly anxiety and depression. Because exercise has definite emotional benefits, it is possible that mental health gains associated with exercise may also improve sleep.

A few other studies suggest that physical activity may have a useful role in the prevention and treatment of sleep problems:

- In a 1985 survey of 1600 Finns, 33% of men and 30% of women rated exercise as the most important sleep-promoting factor. As many as 43% of those who increased their exercise over the previous three months reported improved sleep, whereas 30% of those who decreased their exercise over the same period reported worsened sleep. Sedentary respondents also reported a higher rate of excessive daytime tiredness (a symptom of inadequate sleep at night) than did regularly active respondents.

- In 1985, Trinder et al. reported that the type of physical training can influence both sleep onset and the amount of slow-wave sleep. Aerobic training was associated with an increase in slow-wave sleep. In contrast, power training or a combination of aerobic and power training both led to decreases in slow-wave sleep.

- Vitello et al. (1995) randomly assigned healthy but sedentary elders with normal sleep patterns to participate in six months of either aerobic exercise or stretching and flexibility training. Both groups reported sleeping better at the end of the program. Only the aerobic exercise group showed a statistically significant increase in slow-wave sleep, however.

The Lull of a Hot Bath
To test how exercise might influence sleep, Horne et al. (1983) compared high-intensity exercise and soaking in warm water. They knew that a high rate of energy expenditure during exercise had a greater effect on slow-wave sleep than the total amount of energy expended. They hypothesized that the distinctive element was the increase in core body temperature. Their experiment supported this, as both the vigorous exercise and the soaking in warm water resulted in a significant increase in slow-wave sleep.

Better Studies Needed
Most research on the effect of physical activity on sleep has serious flaws. Studies often ignore the activity history and fitness level of participants, do not document the sleep history of subjects, are limited almost exclusively to good sleepers (the effects for insomniacs may therefore be even larger), and fail to control for other factors that can affect sleep, such as medication, caffeine, concerns over job or other important responsibilities, and exposure to sunlight. Carefully designed sleep studies are therefore needed before we fully understand the influence of exercise on sleep.

For More Info...