

# Sleep: Impacts of age and gender

This research paper investigates how age and gender influence sleep quality, and identifies factors that may increase poor sleep, so we can understand what factors make you have a good night's rest. This paper is divided into two sections: the theoretical part and the practical part.

The theoretical research focuses on understanding which parts of the brain are involved in sleep, what occurs during the sleep process, the anatomy of sleep - including the role of neurotransmitters - and the factors that influence sleep quality, both positively and negatively.

The practical part focuses on data collected through questionnaires distributed to individuals of different ages and genders. They were asked about their daily activities and habits to find patterns connecting different age groups and genders to specific sleep problems. The results of the questionnaire highlight how stress, lifestyle, and biological differences influence sleep. For instance, teenagers often suffer from sleep deprivation due to academic and social pressures, while older adults experience disrupted sleep patterns related to aging.

Ashley Larby  
Tutor: Ruth Zamora

## WHAT HAPPENS WHEN YOUR BRAIN DOESN'T SLEEP?

**LOST MEMORIES** ●  
The **hippocampus**, a moon-shaped structure in the temporal lobe, exhibits a distinct pattern of neural activity when the waking mind encodes (learns) new information. Scientists believe our brain later "replays" the same activity pattern while we're sleeping to help the info stick. Lose sleep, lose long-term memories.

**FALSE MEMORIES** ●●●  
The sleep-starved brain may fail to encode memories successfully in the first place, thanks to altered function in the **hippocampus**, as well as **prefrontal cortex** and **parietal lobe** regions. One study found that people are more likely to incorporate misinformation into memories of events observed after a night without sleep.

**ANGER** ●●  
Sleep loss primes us to focus on negative experiences, misinterpret facial expressions and pick fights. Emotional volatility may partly be a product of interrupted communication between brain regions. fMRI of the well-rested brain shows connectivity between the **amygdala**, a limbic system structure critical to emotional processing, and the **medial prefrontal cortex**, which helps regulate feelings (i.e., tells us to chill). Sleep deprivation cuts this connection, letting your revved-up amygdala (and your mood) run wild.

**CEREBRAL SHRINKAGE** ●●●●  
Healthy adults getting poor sleep lose volume in the **frontal**, **temporal** and **parietal lobes**, one study showed. Researchers don't yet understand if sleep loss causes shrinkage or vice versa.

**SLOURED SPEECH** ●  
The **temporal lobe**, the brain region associated with language processing, is highly active in well-rested people but inactive in their exhausted and enunciation-challenged counterparts.

**IMPAIRED WIT** ●  
When you skimp on sleep, the clever commentary may not flow so easily. Sleep loss affects cognitive processes like divergent thinking, which helps us switch topics nimbly during conversation. Scientists found that activity in the **inferior frontal gyrus** increases when sleep-deprived people tried to list uses for different objects, suggesting the brain draws on divergent thinking to compensate for strained cognitive functioning.

**CRAVUT DINGES** ●●  
Sleep loss corresponds with decreased activity in the **ventral striatum**, which controls decision-making, and more activity in the **amygdala**, a key player in fear detection. Together, these neural changes create a brain mechanism that dulls judgment and ratchets up desire — the ideal mind-state for scarfing down fatfuls of bacon.

**HALLUCINATIONS** ●  
The well-rested brain filters stimuli (noise, light, smell, etc.) to separate what matters from what doesn't and prevent sensory overload. When the brain can't filter the information coming in, chaos ensues. After pulling an all-nighter, people may begin to anticipate things that aren't there, including objects.

**IRISY DECISIONS** ●●●  
When sleep-deprived people prepare to make economic decisions, the brain's reward center in the **prefrontal cortex** lights up, suggesting they expect to win (e.g., make money). But when risky choices don't pan out, people's brain activity decreases in the region related to punishment and aversion (the **anterior insula**), suggesting they don't care about losing money as much as they would on a good night's sleep.

**HEAD IN THE CLOUDS** ●  
We all lose focus now and then, but brain activity linked to attention lapses changes when people sacrifice sleep. After a good night's rest, these lapses correspond to altered thalamus function and less-active frontal and parietal networks, which basically means we tune out when we're bored. But when sleep-deprived people space out, they also exhibit impaired visual sensory processing, suggesting a whole other level of disengagement with the world. In short: Losing sleep turns you into Phoebe from Friends.

**BRAIN DAMAGE** ●  
Add all-nighters to the list of things that kill brain cells — in this case, in the **brain stem**. The damage may be irreparable, making "catching up on lost sleep" a poor excuse for snoozing till noon on the weekends.