

Research gives insight into importance of sleep on cognitive performance and emotional well-being

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Research gives insight into importance of sleep on cognitive performance and emotional well-being to those who find themselves under stress. Credit: Creative and Brand Services, University of Ottawa

Politicians, military generals and first responders are just some high-stress positions which should avoid taking important decisions after a

night without sleep, new research from the University of Ottawa indicates.

We all understand the power of sleep and the vital role it plays in [human health](#), cognitive performance and in regulating our emotional well-being. Numerous studies into a lack of sleep have shown drops in neurocognitive functions, particularly vigilant attention, motor responses, inhibition control, and working memory. Despite this, [sleep loss](#) continues to challenge public health and affect people of all ages.

Sleep and risky decision-making

With little insight into the impact of a [lack of sleep](#) on risky decision-making at the neuroimaging level, researchers from the University of Ottawa and the University of Pennsylvania found a 24-hour period of sleep deprivation significantly impacted individuals' decision-making processes by dampening neural responses to the outcomes of their choices.

In other words, people tend to exhibit reduced [positive emotions](#) in response to winning outcomes and diminished negative emotions when faced with losses after pulling an all-nighter compared to their well-rested baseline condition.

"Common sense does dictate if people incur sleep loss, sleep disturbance or a sleep disorder that their cognitive function will be impacted, their attention and efficiency will decrease. But there is an [emotional impact](#), too," says Zhuo Fang, a Data Scientist in the Department of Psychology at the Faculty of Social Sciences.

"If you experience even just one night of sleep deprivation, there will be an impact, even on a neural level. So, we wanted to combine brain imaging and behavior to see that impact," adds Fang, who is affiliated

with uOttawa's Brain and Mind Research Institute and The Royal.

A study, which evaluated the impact of one night of total sleep deprivation on 56 healthy adults, and published in *Psychophysiology* found:

- A single night of total sleep loss significantly decreased the brain activation to win and loss outcomes, suggesting that acute sleep loss can have a dampening effect on neural responses to decision outcomes during risk-taking.
- Total sleep deprivation had the [detrimental effect](#) by disrupting the relationship between neural response and individual's risk-taking behavior, which might be related to the altered perception for risk-taking.

While numerous studies have previously illustrated the wide-ranging effects of sleep deprivation on various brain and cognitive functions, including attention processing, [memory consolidation](#), and learning, this study addresses the specific impact of sleep loss on decision-making.

"These results underscore the importance of maintaining adequate sleep and how individuals should refrain from making [important decisions](#) when experiencing chronic or acute sleep deprivation," says Fang, who co-first authored the study with Tianxin Mao of the University of Pennsylvania alongside corresponding author Hengyi Rao.

"In specific professions where decision-makers are required to operate under accumulated [sleep](#) loss, specialized training or fatigue risk management might be necessary to enable them to handle such situations effectively."

More information: Tianxin Mao et al, Sleep deprivation attenuates neural responses to outcomes from risky decision-making,

Psychophysiology (2023). [DOI: 10.1111/psyp.14465](https://doi.org/10.1111/psyp.14465)

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