- Sleep disorders

Insomnia

How chronic sleep problems can lead to a spiralling decline in mental health

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Most of us experience a bad night's sleep from time to time, but can usually get back on track within a night or two. People suffering from insomnia, by contrast, have sleep problems that last for months or years at a time, taking a major toll on their health and wellbeing.

Around a third of people will experience insomnia at some point in their life, with women and older people more often affected.

Nearly 40% of sufferers fail to recover within five years. People with insomnia have an increased risk of diabetes, high blood pressure and cardiovascular disease.

Insomnia is also a major risk factor for mental illness and often co-occurs with mood disorders such as depression and anxiety.

Many different life events can increase your chances of sustained sleep deprivation. Both the financial burden and confinement arising from the Covid-19 pandemic were associated with a greater risk of insomnia, which is in turn likely to have led to a rise in mental health problems.

And yet, very little is known about why and how a prolonged absence of sleep gives rise to mental illness.

A team at the University of York has pioneered research into whether sleep deprivation disrupts the brain's ability to suppress intrusive memories and distressing thoughts — classic symptoms of psychiatric disturbance.

It has also led us to ask whether it might one day be possible to treat mental illness while patients are sleeping.

WHY ARE SOME PEOPLE SO BADLY AFFECTED?

We can all sometimes encounter intrusive and unwanted thoughts, usually in response to reminders — for example, seeing a former partner and being reminded of an unpleasant breakup.

While unsettling, these thoughts are infrequent, short-lived, and, usually, quickly forgotten. This is in stark contrast to the highly lucid, distressing thoughts experienced by people with post-traumatic

stress disorder (PTSD).
Sufferers often engage in avoidant behaviour, such as not leaving home to reduce the likelihood of having to confront reminders of their trauma.
What if lack of sleep reduces our ability to suppress unwanted thoughts and memories?
This could lead to a downward spiral of more persistent and frightening intrusive thoughts, severe anxiety, and chronic sleeplessness, culminating in psychiatric disturbance.
Although a wealth of research has shown that sleep deprivation leads to psychological instability, this study was the first to examine how an inability to control intrusive thoughts might underpin this relationship.
HOW SLEEP DEPRIVATION AFFECTS THE BRAIN
Our group of young adults (aged 18– 25) was asked to memorise face-image pairs, comprising a male or female face with a neutral expression next to a unique scene.
They would memorise each pair over and over again, so that any face presented in isolation would serve as a powerful reminder of the scene it was paired with — in the same way a reminder of an unpleasant event in the real world can trigger a distressing thought.
The face-scene learning took place late in the evening after which half the participants went to sleep in our laboratory, and the other half stayed awake for the entire night.
They could eat and drink, but psychological stimulants such as caffeine were strictly prohibited. They were not forced to wake up if they nodded off. The next morning, all participants were shown the faces only, in random order, with the following instructions. If the face was inside a green frame, the participant should allow the associated scene to come into their mind. A red frame meant they should engage in memory suppression to block out the scene.
Our sleep-deprived participants reported having more "intrusions" (failed memory suppression attempts) than those who had slept normally. And only well-rested participants got better at suppressing the unwanted memories over time.
EMOTIONAL INTENSITY OF OUR MEMORIES
When we think back to a traumatic or painful life event, we get a sense of the unpleasant feelings, such as sadness or anger, that accompanied the original experience. However, the intensity of these feelings is usually much reduced, allowing us to draw on past events without being consumed by negative emotions.
Suppressing unwanted thoughts has been shown to weaken the memories that lead to them, meaning they are less likely to intrude into our consciousness in the future. This relates not only to the content of the memories (the "what, when and who") but also their emotional charge.
Conversely, failing to suppress an unwanted memory is likely to cause its emotional charge to linger, meaning that emotional responses to future reminders will remain intense.
We tested this by showing our participants scenes that were either emotionally negative (such as a car crash) or neutral (such as a forest).
Our findings were clear and corroborated by further tests using an objective index of emotional arousal, skin conductance responses.
In the context of psychiatric mood disorders that co-occur with chronic sleep disturbance, failure to suppress memories of emotionally disturbing events, together with an inability to reduce the unpleasant feelings within those memories, could contribute to a strong tendency of mood-disordered individuals to focus on negative interpretations of the past.
IMPORTANCE OF FORGETTING
Generally, forgetting is thought of as "bad". But far from being a problem, this is how memory is supposed to work. Sometimes, we want to just forget information that isn't relevant to our daily lives, to prevent it from interfering with our goals.

The “adaptive” nature of forgetting allows us to get rid of irrelevant memories, making sure the memories that remain are as relevant to future decisions as possible.

While forgetting is a catch-all term we use for the loss of a memory, it isn’t a single process in the brain.

Memories can be forgotten via active processes, such as memory suppression. But this can also happen via passive processes including “decay”, where the physical trace of a memory in the brain breaks down over time.

That forgetting is likely to occur during sleep has been under-appreciated by psychologists, because research on sleep has largely focused on the role it plays in strengthening memories. But we and other researchers have recently reasoned that if forgetting is a fundamental part of a functioning memory system, then sleep should play as much of a role in forgetting as it does in retention.

Previous research, including our own, has shown that the presentation of specific sounds during sleep can boost memory. This selective boosting of a specific memory during sleep is called “targeted memory reactivation”.

CHRONIC SLEEPLESSNESS

Chronic sleeplessness often reduces patients’ engagement with psychological therapies (due to their sleeping in the day or lacking motivation), lengthening their admission and recovery time.

New digital technologies can give a clear indication of patient welfare without the need for the noise and disruption providing an environment that is more conducive to healthy sleep. Achieving this goal is not only contingent on more research but also on the capacity to carry out scientific studies at scale.

Although there is much work still to do, sleep research is at an exciting juncture between bench and bedside, and offers a viable solution to the growing global burden of mental illness. —