

YOUR COUNTRY NEEDS YOU — TO SLEEP

The neuroscientist behind a huge new survey tells *Roger Highfield* how a lack of shut-eye ravages our IQ

The world's biggest sleep experiment was launched last week. In the first day or so, the neuroscientist Adrian Owen recruited more than 50,000 people for online tests to answer one of today's most pressing questions: if I am not getting enough sleep, is it making me dumber?

Such has been the media interest in his study, led from his laboratory at Western University in Ontario, Canada, that by the time I catch up with the 51-year-old Brit, he is complaining about exhaustion: "I look terrible: a sleep-deprived neuroscientist talking about sleep deprivation."

The author of more than 250 scientific papers – and a wannabe rock star, who plays in a band called Untidy Naked Dilemma – Owen may be on the verge of cracking the secrets of sleep. Early indications from an unpublished brain scan study by his team give new insights into why, when we are most sleep-deprived, we can struggle to realise that we are performing badly.

Owen made his name 20 years ago by showing how brain scanners could be used for "mind reading" – to communicate with patients who had a serious brain injury. It was the first evidence of awareness in a supposedly vegetative patient.

Since then he has continued to explore consciousness. He was wooed to Canada in 2011 with a C\$10m award (the equivalent of £6m today) and the opportunity to set up his own group. The Canadian government is so impressed that he has just received a further C\$66m investment.

Why we give up so much time to sleep is a matter of debate. It is as vital for life as water; some call it the third pillar of health. Sleep deprivation can impair driving abilities as much as alcohol. Rats deprived of sleep die within a month.

Adrian Owen, below, is using brain scans to discover why sleeping badly affects our performance

Sleep is not all it seems, however. "We think we are cut off from the world, but the brain remains very responsive,"

Owen says. "Even when you go into the grey zone, your brain doesn't. There is more going on in the brain when we are asleep than anybody realises."

Owen was prompted to study sleep deprivation partly for personal reasons. With his wife and fellow neuroscientist Jessica Grahn, Owen had his first child, Jackson, in 2013. The sleepless nights caused havoc.

"I was trying to write a book, trying to run a lab with 34 people in it and flying around the world trying to be a big-shot neuroscientist. I



was expected to stand up at international conferences to answer questions about the brain, and I was finding myself incapable of doing that. I did start to wonder if I should look at these things.”

He figured out a way to investigate sleep by building on a 2010 experiment that gave online tests to 110,000 people. The results suggested that intelligence rests on three factors: short-term memory, reasoning and a verbal component.

In his new study, participants track their sleep and performance. The hope is that the investigation will chart the impact of lack of sleep, a global problem that Owen says saps billions of dollars of productivity from the world economy.

In a pilot study of 35 people he revealed a link to “spindles”, or bursts of activity in the thalamus, deep in the brain, which connects to parts that play a key role in memory, awareness, language and consciousness. Studies have linked

spindles to IQ. “Spindles are the only biological marker of intelligence, reasoning and decision-making. These weird little squiggles in the sleeping brain predict how well you do when wide awake on a decision-making task,” Owen says.

The new work by his lab links these “pops” of electrical activity during light sleep with problem-solving skills. The fewer spindles you have during the night, the worse you will perform in intelligence tests the next day.

The sleep study will enable Owen’s team to see if some people cope better with sleep deprivation – as with Margaret Thatcher, who reportedly thrived on four hours a night as prime minister. “Perhaps you don’t need reasoning skills to run a country,” Owen jokes.

“Already, some of the people who logged on during testing revealed they are getting by on just three or four hours a night and tell us they are an engineer or something – it is incredible.”

Owen’s data will be sifted to tackle a much bigger question: whether we can use sleep to optimise the way our brains work. “Can you do the equivalent of going to the gym to boost your spindles?”

There are also smart drugs that boost attention and memory: it would be interesting to see if they affect spindles and thus reasoning, he says. Later this year, at the Manchester Science Festival, Owen will lay bare the findings of his study. The secrets of slumber could tumble forth.

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To take part in the sleep experiment, go to tinyurl.com/snooze-study