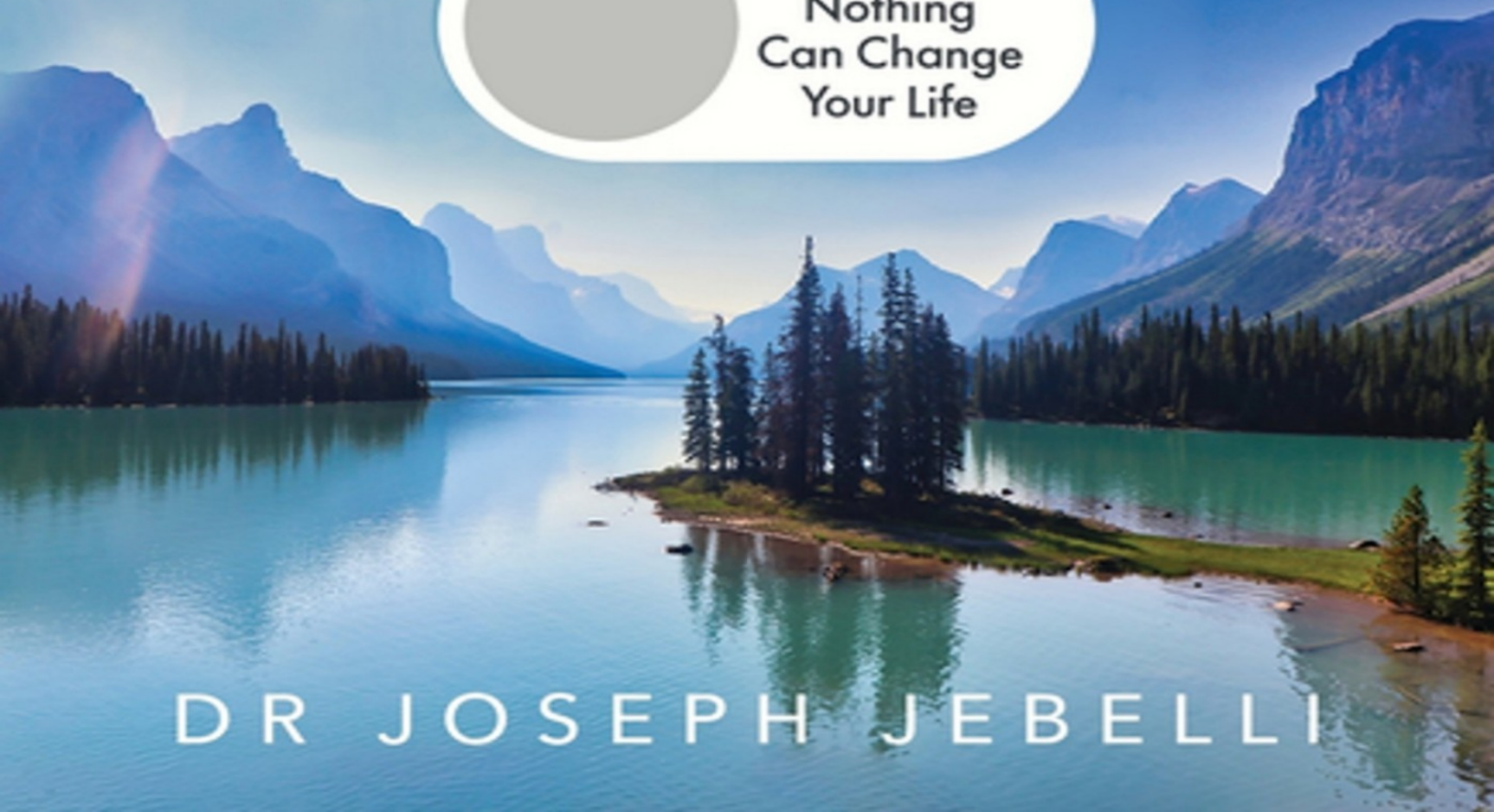
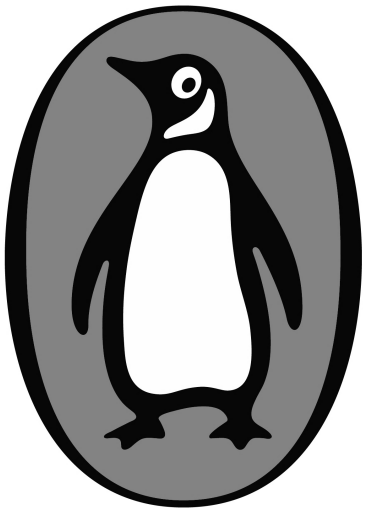
'This excellent book is precisely what we need to stop, reset, and rest' Johann Hari

THE BRAIN AT REST

Why Doing Nothing Can Change Your Life



DR JOSEPH JEBELLI



About the Author

Dr Joseph Jebelli received a PhD in neuroscience from University College London, then worked as a postdoctoral research fellow at the University of Washington. He has written two books, *How the Mind Changed* and *In Pursuit of Memory,* which was shortlisted for the Royal Society Trivedi Science Book Prize and longlisted for the Wellcome Book Prize. He lives in London.

Dr Joseph Jebelli

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Introduction: The Resting Brain

What your brain is up to when you think you're doing nothing

Abolfazl was six years old when he first understood *kār*, Farsi for 'work'.

Standing beside his mother under the domed arches of Tehran's Grand Bazaar, he sensed it was important. Something noble.

'*Kār tāj ast*,' his mother would say ('Work is a crown').

Around them, merchants worked tirelessly to sell everything from fruits and nuts to hand-made leather shoes, delicious spices, wooden abacuses and exquisite hand-woven Persian rugs. Old men sat cross-legged on cushioned corners, sipping tea through cubes of sugar and sharing stories of Persian kings and poets.

Later, when he was a bit older, Abolfazl heard his father snoring through a long midday nap and felt compelled to wake him. He approached the bedroom door and reached for the handle, only to be met with a hand blocking his way. His mother gazed at him with an intensity he remembers to this day.

'*Esterāhat kherad ast*,' she said firmly ('Rest is wisdom').

Fifteen years later, Abolfazl is sitting in a small office cubicle in a high-rise tower on the outskirts of Bristol, England. The 1980s had swept him, like many of his compatriots, into a vast Iranian diaspora. With a mind for mathematics, he secured a job in computer programming, got married, had two children and set out to make his family in Iran proud.

His days were long, punctuated by tapping keyboards, shuffling papers and an unmistakable feeling of being watched. Interactions were minimal, often limited to terse emails and brief, impersonal meetings. The storytelling tea breaks he'd witnessed in Iran were replaced with lone trips to a vending machine or quick chats by a kettle in a cramped kitchen. This new world was efficient, yes, but desolate.

Time passed slowly, weeks blending into months, months into years. Before long, the soul-crushing monotony and exhausting tasks began to erode his mental health. What was meant to be a dream of a better life in England gradually morphed into a waking nightmare of stress and burnout.

The breaking point came one ordinary afternoon, two decades into his career, when Abolfazl, my father, came home early from another gruelling day at the office. I was just fourteen at the time and could sense something amiss the moment he walked through the door. His usual tired smile was gone, replaced with a look of panic and overwhelming sorrow.

What happened next is a blur, but I do remember a shouting I had never heard before. Frantic, confused and gravely depressed, he unleashed his frustrations on my mother, who, struggling with her own work burnout, tried to calm him down.

'You just need to rest, Ab,' I remember her saying through tears.

'I don't even know *how* to rest any more,' he hurled back.

A smashing sound erupted.

I'm ashamed to admit it now, but I was so scared I grabbed my bike and fled.

The next day, my father quit work and never went back. The doctor diagnosed him with major depressive disorder, likely caused by overwork and burnout, handed him some pills and told him to find time to rest – truly rest. Now he sleeps through most mornings, says very little, does very little and tries to manage his condition one day at a time.

All because he couldn't heed his mother's advice: to lay down the crown and rest.

It took me a long time to realize the importance of rest.

When I was a research scientist at the University of Washington, I would spend my days conducting lab experiments, writing papers and mentoring students – finishing at 7 p.m., only to head straight to a nearby coffee shop and work on grants and my first book until ten or eleven. It was exhausting, with my goals always seeming just out of reach. I often felt totally wiped out.

Looking back, I can see I was forcing myself to take on such a heavy workload because I felt an immense, self-imposed pressure to achieve. It was making me pretty miserable. But I was in that phase of my life when all the old formulas seemed so relevant. You think that the faster you run, the better you're going to do; that if you work harder and harder, you'll succeed.

Unsurprisingly, this way of life took its toll on my mental and physical health. My memory, focus, creativity and cognitive abilities faded, making it increasingly hard to think about the problems I was hired to solve. My anxiety skyrocketed, making it difficult to concentrate on tasks and causing sleepless nights filled with racing thoughts. My energy levels plummeted, leaving me fatigued and grouchy, and my immune system weakened, causing frequent colds and headaches.

On paper I was excelling; in reality, I was a mess.

As the years went by, it became clear that I couldn't sustain this pace indefinitely. Like my father, I was heading towards burnout and a serious mental-health condition.

My brain was sending urgent signals, and it was about time I listened.

So I started to ease off work. I stopped staying late just to be seen. I stopped working while ill just to prove my dedication. I stopped going the extra mile just to look good when, in truth, no one really noticed or cared. Gradually, I began to let go of the pressure of presenteeism and the constant need to achieve. Eventually, I decided to leave academia and pursue writing full-time.

With a more relaxed attitude to work, my health has improved dramatically. I sleep better, my energy has returned and I am ill far less often. What's more, my ability to focus, solve problems, be creative and write

fluidly has soared. Incredibly, I'm now more productive and efficient than ever before.

Rest, I have realized, is the key to my health and productivity.

But why and how is this the case? What lies behind the wisdom of rest that my grandmother encouraged all those years ago? Guided by my knowledge as a neuroscientist and driven by my family's toxic relationship with work, I started to explore the neuroscience of rest – and what I discovered was extraordinary.

Throughout history people have extolled the benefits of rest. Charles Darwin spent considerable time fishing and taking breaks alongside his studying and writing. Maya Angelou championed 'a day away' for long baths, leisurely strolls and time spent on park benches ('observing the mysterious world of ants and the canopy of treetops'). Karl Marx worked extensively, yet believed that rest would lead to a blossoming of universal creativity. Jane Austen, Virginia Woolf and Georgia O'Keeffe valued relaxation and downtime. Leonardo da Vinci was a contemplative genius, reportedly staring at *The Last Supper* for hours before adding a single brushstroke[1] and walking away.

For a long time we have been taught that such inertia is the opposite of success – an indulgent, unprincipled, even irresponsible way of behaving. But what if I told you that people often succeed in life not despite their inactivity but *because* of it? What if I told you that, far from being indulgent and unproductive, rest is actually the key to human flourishing?

In this book I want to show you how doing nothing has profound benefits for your brain, and that when you disengage from a task your brain activates a network vital for your mental and physical health. We call this network the *default network*: a circuit of neurons (brain cells that communicate through electrical and chemical signals) that enables us to daydream, mind wander, think reflectively and imagine the future. It fans out across the brain, occupying the frontal, parietal and temporal lobes. Crucially, the default

network is only active when we are not focused on an exerting task; when the brain is cycling through thoughts not associated with our immediate environment; when, in short, our minds simply roam free.

Activating the default network can enhance your intelligence, creativity, social empathy and long-term productivity. It can improve your health and help stave off neurological disease. It is your brain's hidden superpower, recharging and rehabilitating your overworked mind. This astonishing new understanding of the brain is changing the way we work for the better, and redefining what it means to 'think'.

To see the default network in action, consider a group of eighty people who were asked to pick the best car from a set of four, based on a variety of mechanical specifications. Half of the people were given five minutes to concentrate on the task, while the other half were told to chill out, take a break, and think about unrelated things. Following the break, researchers from the University of Amsterdam found that the latter group scored far higher on the task, working through the problem[2] in a more efficient way. Another example comes from observing fifty-two doctors and nurses working a twelve-hour night shift. Half of the team were told to take a forty-minute nap, while their colleagues worked continuously.[3] Researchers at Stanford University found that the group that rested performed better on tests of attention and simulated medical tests, including inserting a catheter into a virtual patient. By doing nothing, they got better at doing everything.

While the time needed to tap into the benefits of the default network is still unclear, we know that people given twenty minutes' rest during a so-called consequence test, where people are asked to list[4] as many consequences as they can for a possible scenario, perform much better than people who do not rest. People even perform better with only ten minutes' rest. (An example of a consequence test is asking people: 'What would the results be if people no longer needed to sleep?' Possible answers include: get more done, eliminate tiredness, make alarms unnecessary, etc.) In addition, tasks

involving problem-solving, spatial insight[5] and verbal reasoning all benefit from thirty minutes' rest. Such tasks can be anything from calculating percentage increases to naming as many words as possible beginning with the letter 'K'.

But arguably the greatest affirmation for rest comes from a recent meta-analysis – an overview of dozens or hundreds of studies – which revealed that 73 per cent of all studies[6] in the field of problem-solving report positive effects following not just thirty minutes' rest, but often after longer periods of between four and twenty-four hours. As a general rule, the more time you spend doing nothing, the better it is for your brain.

The groundwork for this extraordinary discovery was laid in the early twentieth century by the French polymath Henri Poincaré. Frustrated by the seemingly unsolvable equations he was working on, he would often spend time away from his desk to clear his head, walking through the woods or strolling along the beach on a sunny day, aimlessly letting his mind wander. A philosophical man by nature, Poincaré was forever curious about the way his mind worked, and would often talk to friends and colleagues about how he arrived at certain conclusions. When he wasn't absorbed in one of the many subjects he studied – physics, mathematics, electromagnetism, astronomy, geology, to name a few – he would indulge in contemplation, freeing his mind to explore new ideas.

Poincaré soon came to realize that whenever he rested, the solutions to his equations would suddenly appear, unbidden and seemingly out of nowhere. Amazed and eager to discover more, he spent time aimlessly sitting on buses, wandering along country lanes and sometimes just staring blankly at the forest outside his window. He documented the episodes in his journal, vividly recounting one such revelation while trying to solve an equation: 'Disgusted with my failure, I went to spend a few days at the seaside, and thought of something else. One morning, walking on the bluff, the idea came to me, with the same characteristics of brevity, suddenness and immediate

certainty.'[7] Whatever this mysterious process was, Poincaré suspected that it was somehow connected to a kind of unconscious processing in the brain. Enthused, he decided to share his discovery with colleagues at the 4th assembly of the Psychological Society of Paris on 8 June 1908. He believed the phenomenon was vital not only for mathematics but for all disciplines. He called it 'sudden illumination'.

In nineteenth-century France, Poincaré had little ability to study the phenomenon scientifically; his evidence amounted to self-reports, intuition and guesswork. Science is only ever as good as the techniques of the time, and Poincaré's contemporaries were guided by rationalism, a philosophical tradition that emphasizes logic, reason and, most importantly, empirical evidence. So Poincaré's findings were met with scepticism.

Nevertheless, it was only a matter of time before scientists realized the significance of Poincaré's discovery. Among them was the German psychiatrist Hans Berger, who in 1929 showed that the brain is constantly busy,[8] even when a person is resting. He achieved this by inventing a technique still used by neuroscientists today: the electroencephalogram (EEG), a set of sensors placed on the scalp that record brain activity. Berger found that whenever he used an EEG on a person, their brain activity, measured in electrical signals, did not decrease when they stopped performing a task. To neurologists of the day this seemed impossible, and so Berger's findings, like Poincaré's, were treated with caution.

By the 1950s, researchers realized that they could no longer ignore this budding new field. Louis Sokoloff, an American neuroscientist, found that brain metabolism (the chemical reactions that provide us with energy) stayed the same when a person transitioned from rest to solving maths problems, providing more evidence that the brain is just as active[9] during rest. Then, in the 1970s, the Swedish neuroscientist David Ingvar made a shocking discovery that we have been trying to understand ever since. Ingvar showed that blood flow in the frontal lobe[10] – responsible for nearly all our higher faculties including intelligence, memory and attention – is actually at

its highest not when a person is working but when they are resting. This contradicted not just prevailing science but basic common sense. How could doing nothing require *more* energy than doing something?

My own interest in the default network stems from when I was a PhD student at University College London. My fellow researchers and I held a weekly meeting called Journal Club, huddling for two hours to critique a scientific paper. It was a sacrosanct occasion where we could all launch our most valiant defence of science: if the data we scrutinized resisted our attempts to fault it, we knew it was good science.

At one Journal Club, my professor showed us a study from the world of neuroimaging. It used fMRI (functional magnetic resonance imaging) to look at brain activity when a person is engaged in a task – in this case, a test of verbal memory – versus not engaged in a task. As with all neuroimaging studies of this kind, the results showed parts of the brain lighting up like a city at night when engaged in a task.

But there's a problem. The signals in these neuroimaging studies are generated after subtracting the background signal. Without doing this, it would be virtually impossible to detect specific brain activity. This doesn't mean that fMRI studies are bad science, but it does suggest that many are somewhat misleading. For the brain's 'background noise', which we now know includes the default network, may hold clues to the deepest mysteries of the mind.

I remember raising this point with my professor and asking if she agreed, and if so, what this meant about our fundamental understanding of the brain. True to Journal Club form, she turned the question back on me: 'What do you think it says about our fundamental understanding of the brain?' she asked.

Feeling tested and a little nervous, I remember saying that the way we scrutinize the brain is problematic: by constantly searching for what 'lights up', we can produce eye-catching data and maybe even some interesting observations, but not a deep understanding of how the mind works. The

resolution of our imaging was 1–2 millimetres. That's too low – there are hundreds of thousands of neurons in that space. It's like flying over a city, spotting an area with some lights on, and trying to guess what the people in those homes are doing, and whether they're on the phone to people in the city centre. What we really need to know is what the brain is doing when it *isn't* doing anything. What the background noise is. Then we'd have a better understanding of how the brain works.

My professor smiled, satisfied that I'd nailed my intellectual colours to the mast; Journal Club was a confidence-boosting activity as well as an academic one. 'Well, those are all good points,' she said. 'It's hard to interpret what these studies show, which is why they're one tool among many. And we certainly need to understand the brain's background noise and what it means.'

Her words stayed with me; in no small part they helped set me on my journey to discover more about what this background noise really is, and how time for reflection is sometimes vital for new insights. I had no idea then just how much this insight would revolutionize my life.

A memory: it's 2009, ten years since my father's mental-health crisis. I step into my parents' house in Bristol, greeted by the familiar scent of Persian spices and the lilies my mother always keeps in the hallway. The afternoon sun shines through the kitchen window, casting a soft glow over my father, who is curled on the sofa, legs tucked up, resembling a fragile child. He sleeps deeply and excessively, his hypersomnia offering a temporary reprieve from the depression that now consumes most of his days.

Quietly, I put my bag down and boil the kettle. Making tea is sometimes the only thing you can do.

I sit at the kitchen table, sip the warm liquid and watch him. His eyelids flutter open, and he grunts softly.

'How are you, Dad?', I ask, my voice barely above a whisper.

'Oh hello, Joseph … Yeah, I'm OK.' His voice is raspy and weak.

'Do you want some tea?'

‘OK.’ Like a turtle emerging from its shell, he stretches out and shuffles to the counter to take his meds (antidepressants with a low dose of antipsychotics). Each movement is deliberate and slow, as if the weight of his condition presses down on every joint.

We exchange a few words about Iran and the family – or rather, I do. He nods and smiles faintly, his eyes glazed with the effort of keeping up with even this simple conversation. I can see he’s struggling, so I tell him I’m off to tidy the house and leave him to drift back to sleep.

As I move through the familiar rooms, memories flood back of the man he once was. In his prime he was a vibrant, charismatic figure, full of opinions and insights. He had a gift for articulating perspectives on England and the West that others missed entirely. I remember car rides when he’d blare out Persian music and sing along in Farsi, rolling a cigarette on his knees with one hand. I remember Persian New Year parties when he would dance for hours. He enjoyed his life in Bristol and might have been OK were it not for his gruelling work demands.

After tidying up, I return to the kitchen, sit opposite him, and read. I glance at him occasionally, at the rise and fall of his chest. It’s hard to reconcile the man before me with the father I grew up admiring. For a long time, I resented his early retirement and the burden it placed on my mother, who continued to work hard to support the family. But, as I’ve come to learn, some people need more rest than others.

Part One

WORK

These days, it's hard to do nothing. Our culture doesn't encourage rest, and technology only makes things worse; smartphones in particular make it almost impossible to truly disconnect. But despite this undeniable truth, I decided at the start of working on this book that I was going to try harder at doing nothing. Life is short, and as you will see it's terrifying to discover how overwork can hamper your intellect, creativity and health. In our exhausting cult of short-term productivity, to rest is now an act of emancipation: a coveted release from the shackles of work.

I'm not saying you should abandon your ambitions, or neglect critical issues like climate action and social justice. I am not anti-productivity. Instead, I want to show you the scientific benefits of rest, of engaging your brain's default network, which, paradoxically, empowers you to be more effective and more productive than ever before. In the following pages, I'll guide you through understanding why taking a moment to pause isn't a luxury but a necessity. It's in these quiet moments that clarity emerges,

problems are solved, and we find the strength and wisdom to make meaningful changes, not just in our own lives but in the world.

As a recovering workaholic, I don't often allow myself time to do nothing, but as I started to work on this book I promised myself that I would practise what I preach. I'll start by ditching my smartphone. It's full of apps I don't actually need, and the stress of constantly checking my email is quietly driving me mad. I functioned perfectly well before having this lurid computer in my pocket. When I need to check my emails and the news, I'll do what pre-smartphone Joe did: use an actual computer at designated times of the day. Frankly, I can't wait to be free of the constant news updates; being plugged into world affairs matters, but not 24/7, and certainly not when I'm about to try and sleep. Not many people will be able to go cold turkey, but I'll be providing practical tips that anyone can incorporate in their own journey.

Next, I'll set aside parts of my day for doing absolutely nothing. I have only just started, and already I am finding that I love it. I love gazing up at the clouds, indulging in meandering thoughts; I love walking through the woods, serene in the joy of nature; I even love staring into space, contemplating nothing in particular. So I'll do just that, exploring as many ways as I can for my brain to truly rest.

Time-wise, I'll start with an extra thirty minutes' break a day. Then I'll raise it to an hour. I'll try to go even further while I write this book, but let's take things one step at a time. The quest to engage my default network will no doubt be a challenge – but I know my brain is going to thank me.

It may be hard to believe that doing nothing is so vital to our lives. Yet you only have to look at society's toxic obsession with short-term productivity – and the resulting burnout, anxiety and stress-related disorders – to see the urgent need for this emerging science. Of all the discoveries about the brain, the default network is not just the most surprising, mysterious and counter-intuitive; it also offers the most potential for improving our brain health and our ability to think.

The message from science, and the harsh reality faced by people like my father, is clear: we've all been working too hard, and it is high time we redress the balance. And so let us begin by understanding the greatest threat to the default network: overwork.

1

How Overwork Is Literally Killing Us

And why your brain's default network is the antidote

'Burnout is not the price we have to pay for success.'

— ARIANNA HUFFINGTON

On Christmas Day 2022, a German doctor named Jens Foell was walking along the Welsh coast with his family, admiring the beautiful castles, woodlands and sea cliffs of the Menai Strait, when he slipped on a stone and broke his leg. Immediately, a splitting pain burst through his body and he passed out.

When he opened his eyes, his wife and daughter were standing over him, frantically trying to help. The fall had torn the muscles in his thigh, fractured his bones and dislocated his ankle. Stunned and bewildered, he was slowly lifted and taken to hospital.

His recovery would take at least six months, the doctors said – time that would be spent purely on physical therapy and rest. For someone who loved helping his patients and being active, the news was devastating.

During his recovery, Jens had plenty of time to think. He thought about how overworked he had been in the months leading up to the injury, and