

# Introduction

All of us want to have a happy, healthy, and long life. We want to love and be loved, to feel that we have achieved our goals and reached our potential in life, and that we, to some extent, even if in a small way, have contributed to a better society. How can we experience a sense of wellbeing throughout our lives? We live in a complex, ever-changing, global environment, which while bringing great excitement and facilitating the development of new ideas, may also be highly competitive and stressful at times. Many of us travel around the globe, or work outside the typical hours of 9 to 5. It is important to keep our bodies fit to ensure good physical health and longevity. But it is also perhaps even more important to keep our brains and minds fit. Good brain health, cognition, and wellbeing are essential for us to experience success and enjoyment within our work lives and socially with our friends and families.

## **Why Should We Care about Brain Health, Cognition, and Wellbeing?**

In our modern focus on physical health, we often neglect the equally vital aspect of brain health, cognition, and wellbeing. Yet, if we aspire to live a fuller life and promote overall wellbeing throughout our lives, it's imperative to give mental health the same importance as physical health. Neglecting mental health and adopting poor lifestyle habits not only

deprives us of a fuller life, but also increases the risk of physical, cognitive, and mental health issues.

In our own quest to understand how we could improve ourselves and others, we have carried out a number of large studies, aimed at understanding exactly what a healthy lifestyle is and how we might motivate everyone to adopt it. We also realised that after the COVID-19 pandemic lockdowns many of us had poor wellbeing, but didn't know how to turn things around. Much of this work has been picked up by the media in radio, podcasts, newspapers, and magazines, and made us realise how important it is to provide accessible guidance in this area. Despite a wealth of resources geared towards older adults, there remains a noticeable gap in information tailored for younger people and across the life course. To bridge this gap, this book will explore the components of a healthy lifestyle and strategies to motivate widespread adoption.

We will cover the evidence-base for a number of important lifestyle factors that can improve our brain health, cognition, and wellbeing, helping us to lead a fuller life. But, two important ways of reducing mental and physical health disparities that we will be mentioning throughout the book are improving both our cognitive reserve and our resilience. The concept of cognitive reserve is that better cognitive function acts as a protective factor against dementia and the consequences of head injury. It arose due to the fact that the extent of the damage in the brain was not always related to the severity of the outcome for that individual (1). Factors such as intelligence and education level influence this outcome and it is called cognitive reserve. More recently, it has been found that cognitive reserve can help improve daily function

for people with mental health disorders (2). Resilience is our ability to successfully adapt and function in the face of stress or trauma. Psychological resilience is relatively stable and allows us to bounce back from stress or adversity and gain control over difficult situations (3). We wrote this book for ourselves and others who are keen to improve their brain health, cognition, and wellbeing. This will ultimately enable us to enhance our lives and contribute to a flourishing society.

### **Where Did Wellbeing All Begin?**

One of the authors, Barbara, was invited to be the Neuroscience lead, where she introduced the term ‘wellbeing’ into the UK Government Foresight Project on Mental Capital and Wellbeing (4). This project was a government initiative to enhance cognition and wellbeing for all individuals, which would promote a flourishing society and ensure that the UK was competitive globally. The project specifically aimed to encourage and enable everyone to realise their potential throughout their lives. This project was viewed as necessary, since we are expected to prosper and thrive in our changing society and in an increasingly interconnected and competitive world.

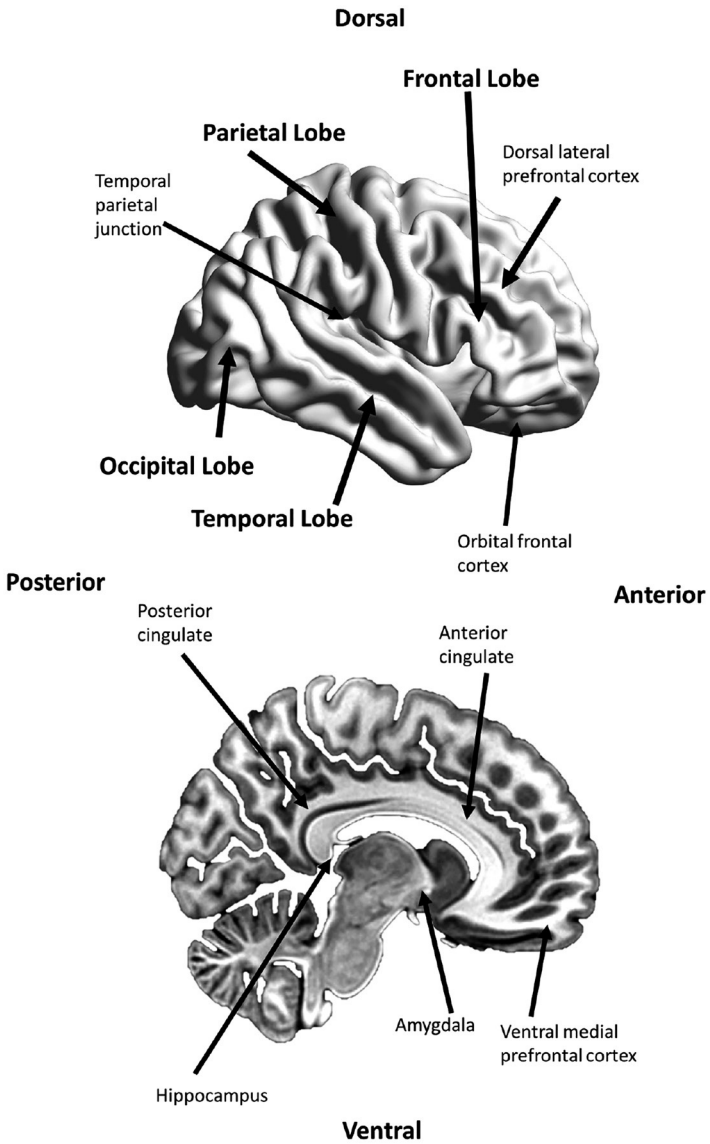
The Project began in 2006 and the term ‘wellbeing’ rarely featured in any publications or policies at that time. After the launch of this project in 2008, the term ‘wellbeing’ took off astronomically and programmes in workplaces and universities began, as well as people’s wellbeing being taken into account in policy decisions, such as the UK Medical Research Council (MRC) report on behalf of the Office for

Strategic Coordination of Health Research (5). A further example is ‘Wellbeing and mental health: Applying All Our Health’, from the Office for Health Improvement and Disparities (6). The impact of this project has been enormous in terms of promoting wellbeing, not only within the UK, but also globally. It provided a precedent for the worldwide key mental health project Grand Challenges in Global Mental Health (7). These projects have initiated a global focus on wellbeing, such that in 2021, the World Health Organization (WHO) Global Conference on Health Promotion recommended how governments can use health promotion to advance wellbeing. This demonstrates the importance of wellbeing for humanity and enabling societies and communities to flourish. In addition, they show how vital our cognition, wellbeing, and resilience really are, not only for ourselves, but also for improving the world we live in.

### **What Is Cognition?**

Positive feelings about ourselves, others, and the world around us and a sense of wellbeing are, of course, in the mind or brain. In the past, less effort has been made to emphasise the importance of good brain health and cognition. It is known that there is a relationship between cognition and wellbeing and those with better cognition tend to have better wellbeing (8). But what is cognition? Cognition is essentially our thinking, and it includes both ‘cold’ cognition and ‘hot’ cognition, which we use in the workplace and when communicating socially with others. ‘Cold’ cognition is rational, non-emotional cognition and involves domains such as attention, memory, and

executive function, for example planning, problem-solving, and cognitive flexibility. An example of cold cognition would be remembering where you left your house keys the night before or learning how to use a new mobile phone. 'Hot' cognition is social and emotional cognition and involves emotion recognition, moral judgements, and theory of mind, as well as cooperative behaviour. An example of hot cognition is where you notice someone with a push chair struggling to get on the bus so you offer to help, another might be when buying an item at an online or in-person auction, you may set a budget for an item, but if it exceeds your budget you need to make a fast decision about whether to bid more, this is often based on emotion and liking of the item. Both these forms of cognition are required to flourish in society. An example of the contrast between 'hot' and 'cold' cognition can be seen in the UK BBC1 TV programme 'Dragons' Den' or the USA ABC TV programme 'Shark Tank', and other similar series worldwide. The formation of business plans mainly utilises 'cold' cognitive processes, such as calculating who to sell a product to, where to manufacture a product, and what the profit margin will be. In contrast, when the investors have to decide whose product to select, the interview will give them a 'gut-reaction' and their 'hot' cognition will inform them who understands the process of entrepreneurial activity well, and who is likely to succeed. Cognition is vital in our everyday lives: it enables us to learn new things in the classroom and at work, it helps us to better interact socially with people, but it is also involved when making decisions, or simply remembering where you parked your car after grocery shopping. Our cognition is supported by our brain structures (see Figure 0.1) and their functional connections.



**Figure 0.1** Key brain regions discussed in the book. We present here a brief schematic of the human brain, to better

Another cognitive domain that is of importance is cognitive flexibility. Cognitive flexibility is our ability to adapt our behaviour to achieve goals in novel or changing environments. It is essentially about learning to learn and being able to be flexible about the way in which we learn. This includes changing strategies for optimal decision-making. For example, in one of our studies, we have discovered that entrepreneurs who have created multiple companies are more cognitively flexible than people who are in senior management, of a similar age and IQ (9). When the entrepreneurs are problem-solving, if the strategy doesn't seem to be working, they quickly switch to a different strategy to solve the problem successfully. Cognitive flexibility provides us with this ability to see that what we are doing is not leading to success and to make the appropriate changes to achieve it. More flexible people adapt to unexpected events better and are more creative problem-solvers.

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**Figure 0.1** (cont.) illustrate some of the brain regions covered in this book. The top image presents a lateral view of the brain and shows the four main lobes in the brain: Frontal, Parietal, Occipital, and Temporal. It also shows the dorsal lateral prefrontal cortex, which is involved in cognitive control; the temporal parietal junction, which is involved in social cognition; and the orbital frontal cortex, which is involved in emotion regulation and in the evaluation of reward. The bottom image presents a medial view of the brain and shows the posterior cingulate cortex, which is involved in spatial navigation; the anterior cingulate cortex, involved in attention and regulation of mood and emotion; the ventral medial prefrontal cortex, which is involved in emotion regulation and 'hot' – emotional – decision-making; the hippocampus, crucial for learning and memory; and the amygdala, which is critical for emotion processing.

Therefore, the ability to think flexibly is key to creativity – in other words, the ability to think of new ideas, make novel connections between ideas, and make new inventions. It also supports academic and work skills, such as problem-solving, and is important in science and innovation.

Interestingly, it seems that some forms of both ‘hot’ and ‘cold’ cognition give us an advantage over artificial intelligence (AI). While the use of technology and AI has provided many positive and unique opportunities, it has also been the source of additional stress, particularly on individuals in the workplace. Indeed, with recent advancements in AI, many people imagine that AI can and will outperform humans and that this will lead to job losses in all areas of work. However, at present, at least in certain situations, this is not the case. For example, evidence strongly suggests that humans are currently ahead of AI in terms of decisions in financial investment management (10). This may be partly because of the fact that humans are cognitively flexible and can make rapid decisions under uncertainty, which involves ‘hot’ cognitive processes (9). Furthermore, AI could learn something from the human brain; for example, we can improve our driving by using our ‘hot’ cognition, in particular theory of mind, which AI has not yet mastered (11, 12). This is likely due to the fact that AI currently encompasses mainly forms of ‘cold’ cognition.

### **What Is Mental Health and Why Is It Important?**

Mental health refers to our emotional, psychological, and social wellbeing. It is crucial to prioritise mental health



because it affects every aspect of our daily functioning. It encompasses how we think, feel, and behave in various situations, as well as how we cope with stress, relate to others, and make decisions. Mental health is vital for overall wellness and quality of life. Good mental health enables us to handle the challenges of life effectively, build and maintain relationships, and contribute meaningfully to society. Conversely, poor mental health can lead to various issues such as depression, anxiety, substance abuse, and other mental health disorders. Furthermore, mental health influences physical health outcomes, including immune system functioning, cardiovascular health, and longevity. Neglecting mental health can have detrimental effects on personal, professional, and social aspects of life. There is also a strong link between cognition and mental health (8).

With the rise of mental health problems globally, it is even more important to consider good brain health and wellbeing (7). There is a great need to have methods for early detection of mental health problems, so that these can be treated rapidly and effectively (13). This will enhance the outcomes and recovery to ensure the best functioning at work, as well as good quality of life and wellbeing. As individuals, we need to adopt a two-stage process for our mental health. First, we need to monitor our own brain health and wellbeing to ensure brain fitness and good cognition. Second, if chronic stress and negative thoughts about ourselves and the future start to negatively impact our mental health and wellbeing, there are methods we can use to improve the way we feel by reducing stress and restoring positive thinking. Thinking positively about ourselves, our community, and our future

is a key component of resilience and good mental health. Those of us who have never experienced depression will be more likely to see positive aspects of the world, whereas those who have suffered with depression might first see the negative. For example, studies have shown that people who have never been depressed are much better at responding to happy information, including words and faces, than people with depression. Indeed, those with depression are just the opposite, as they focus more on sad words and faces (14). Prioritising mental health fosters resilience, self-awareness, and the ability to navigate life's ups and downs with greater ease and stability.

### **But How Do We Achieve This Happier Life?**

The aim of this book is to provide evidence-based methods for enhancing brain health, cognition, and wellbeing so that we maintain our peak performance and are able to enjoy life to the fullest. In addition, these strategies should promote living a happy, healthy, and longer life. The hope is that you will adopt these methods and benefit from them on a daily basis. In addition, resilience and cognitive reserve, promoted by these strategies, should help in times of chronic stress to minimise the possibility of developing anxiety and depression, which are the two most common mental health disorders. Based on our extensive experience, including our own research studies, we provide a number of lifestyle methods that will enhance your brain health, cognition, and wellbeing, which will help you to live a fuller, happier life.