THE SCIENCE OF HEALTHY LIVING

LIFESTYLE AS MEDICINE

Edited by

ALEXANDER THOMAS
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Juris Press

Praise for
Lifestyle As Medicine

In the Armed Forces, it is essential to have a healthy mind in a healthy body. This is the bedrock of morale and operational efficiency. The guidance offered in this book is indispensable for enhancing well-being and embracing healthier choices. It is a must-read for those who prioritise health.

Lt. General Sadhna S. Nair,
Director General Medical Services (Army)

This book on Lifestyle Medicine is a gem that resonated deeply with me as a musician and health enthusiast. The principles shared here have not only improved my physical well-being but also enriched my creative journey. Highly recommended.

Dr. Ricky Kej, Three-time Grammy® Award Winner
and United Nations Goodwill Ambassador

I am excited to endorse this pathbreaking book on Lifestyle Medicine. As a Professor at the Indian Institute of Science and the Convenor of the Longevity India Initiative, I am dedicated to exploring ways to enhance human health and lifespan. This book provides wonderful insights into the connection between lifestyle choices and well-being, and also offers practical strategies for achieving optimal health. I highly recommend this book to anyone looking to transform their health and unlock the secrets to a longer, healthier life.

Prof. Deepak Saini, Professor of Developmental Biology and Genetics/
Bioengineering, Indian Institute of Science, and Convenor,
Longevity India Initiative

This exceptional book on Lifestyle Medicine has left a lasting impression on me as a Principal striving to instil healthy habits in my school community. The practical tips and evidence-based recommendations within these pages are invaluable for anyone seeking to improve their overall well-being. This is a book for individuals embarking on a journey towards a healthier lifestyle.

Mrs. Sunitha S. Rao, Sr. Principal, Delhi Public School, Nacharam, and
Director, Research and Resource Centre, DPS and Pallavi Group of Schools

I am pleased to recommend this enlightening book on Lifestyle Medicine. It provides practical advice for adopting lifestyle changes that significantly improve health outcomes. This is a must-read for those who want to take charge of their health and live a vibrant, fulfilling life.

Dr. Rabbanie Tariq, President,
Indian Society of Lifestyle Medicine

As a proponent of holistic healthcare, I strongly recommend this book for its practical strategies on preventing and managing chronic diseases through lifestyle modifications. It is essential reading for anyone committed to prioritising their health and well-being.

Prof. [Dr.] M. Srinivas, Director,
All India Institute of Medical Sciences (AIIMS), Delhi

It is an honour to endorse this book on Lifestyle Medicine as it aligns with the mission to promote health awareness. It is a valuable evidence-based resource for individuals seeking to improve their health through lifestyle changes. I recommend this book wholeheartedly.

Mr. K. N. Shanth Kumar, Director,
The Printers (Mysore) Pvt. Ltd.

This book is a remarkable contribution to the field of Lifestyle Medicine and an invaluable addition to our educational resources. Each section is enriched with case studies and real-life examples, which not only enhance understanding but also demonstrate the tangible benefits of implementing lifestyle medicine principles. I believe this book will play a pivotal role in nurturing a generation of healthcare professionals who prioritise holistic well-being in their practice. It is a must-read to improve healthcare outcomes through a holistic and patient-centred approach, and I sincerely endorse it.

Dr. Abhijat Sheth, President,
National Board of Examinations in Medical Sciences

This comprehensive book on Lifestyle Medicine delivers crucial insights and actionable strategies to empower both adults and children to make informed and healthy choices for their well-being. I appreciate the vision and effort of the experts and strongly recommend readers to follow its instructions and share it with others for a healthier and happier India.

Dr. Solomon Sathishkumar, Principal,
Christian Medical College (CMC), Vellore

Lifestyle As Medicine

The Science of Healthy Living

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Alexander Thomas, Samuel Hansdak,
Divya Alexander and Herbert Giebel



Juris Press

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FOREWORD

As someone who was deeply immersed in the world of track and field, a sport that demands not just physical prowess but also mental fortitude, I have come to appreciate the profound impact of lifestyle on health and performance. I am pleased to write the foreword to this enlightening book on lifestyle medicine – a discipline that, much like athletics, requires a blend of strategy, discipline, and adaptability based on evidence of what works.

In the realm of athletics, every competition is a testament to the cumulative effect of lifestyle choices on an athlete's ability to perform. From rigorous training schedules to dietary plans, from mental health strategies to recovery protocols, every aspect of our lives is geared towards optimising our performance on the track. This book explores the science of lifestyle medicine, revealing how informed, intentional choices can significantly enhance our health and well-being.

What strikes me most about lifestyle medicine is its emphasis on prevention over cure. In my chosen sport of athletics, preventing injuries through proper nutrition, exercise, and rest is akin to the preventive approach that lifestyle medicine advocates for warding off chronic diseases. This book expertly navigates the evidence-based practices that can prevent, treat, and often reverse chronic illnesses through lifestyle interventions. It is a powerful reminder that we all have more control over our health than we might think.

The parallels between the discipline required in sports and the application of lifestyle medicine are evident. Just as an athlete adapts to various track conditions, we must adapt our lifestyles to the needs of our bodies and minds. This book is a guide to making those adjustments, offering practical advice that ranges from nutritional strategies to physical activities, and mental health practices that are as beneficial to a seasoned athlete as they are to anyone seeking a healthier, more vibrant life.

In my journey, I have witnessed firsthand the transformational power of lifestyle choices – not just in my performance, but in my overall quality of life. This book extends that wisdom to its readers, backed by scientific research and real-world applications, making it an invaluable resource for anyone looking to take charge of their health. Lifestyle medicine offers a path to not just

survive but thrive – a concept that resonates deeply with athletes and non-athletes alike.

Reflecting on my own path in becoming an international athlete, I recognise the intense effort, dedication, and sacrifice it demanded. Yet, the beauty of lifestyle medicine is that its benefits can be reaped for a fraction of that effort. Simple, consistent changes in your daily habits can profoundly impact your health and well-being.

The principles laid out in this book are not just guidelines for better health; they can become the blueprint for a life lived with purpose, vitality, and joy. As you dive into these pages, I hope you find inspiration, motivation, and, above all, a deep sense of empowerment to make choices that elevate your life in every aspect. Let this book be your guide to lifestyle as medicine, and a healthier, happier you.

Anju Bobby George
Two-time Olympian
India's first athlete to win at the World Championship in Athletics
Senior Vice-President, Athletics Federation of India
Member, Mission Olympic Cell, Ministry of Youth Affairs
and Sports, Govt. of India

ABOUT THE ASSOCIATION OF HEALTHCARE PROVIDERS – INDIA (AHPI)

www.ahpi.in

The Association of Healthcare Providers – India (AHPI) was registered under the Society Registration Act of 1860 as a not-for-profit organisation in December 2012. It represents the vast majority of healthcare providers in India. AHPI works with all stakeholders in order to establish a national system where all can avail of assured universal access to basic health services, while facilitating its members and partnering bodies in carrying out health improvements to serve the community effectively and efficiently.

AHPI is governed by a governing body consisting of eight founding members and the presidents of 20 state and regional chapters across India. Each chapter is managed by an executive committee comprising the chapter president, secretary, and executive committee members. AHPI's governance is further supported by a robust network of individual members through the AHPI Leadership Forum.

AHPI educates its members and simultaneously advocates with the government, regulatory bodies, and other stakeholders on issues that impact its member organisations' ability to deliver universal health coverage to the community. The advocacy issues include national health policy, medical, nursing and allied health education, and health sector regulations on taxation, tariffs, costing, and reimbursement, among others.

AHPI has focused on building capacity within the Indian healthcare system, emphasising patient safety and the affordability of healthcare services. These initiatives are facilitated through the AHPI Academy, which offers innovative and value-added education and training programs to its member organisations on quality improvement, patient safety, risk assessment and management, patient-centric care, and improving operational and financial efficiency. The organisation has made significant contributions through numerous impactful publications and papers.

ABOUT THE CHRISTIAN MEDICAL COLLEGE AND HOSPITAL, VELLORE

www.cmch-vellore.edu

The Christian Medical College and Hospital is a premier teaching hospital located in Vellore, Tamil Nadu. It was founded in 1900 by American missionary Dr. Ida Sophia Scudder. Witnessing three women die in childbirth, Dr. Scudder began CMC as a one-bed clinic with a vision to train women to care for women. With an initial focus on nursing, CMC gradually expanded into medicine and allied health, and has since grown into a 3,000-bed hospital spread across six campuses.

Today, CMC is one of India's top institutions in clinical care, training, and research. The academic curriculum is carefully crafted to promote critical thinking, the value of service, ethical practice, and a comprehensive understanding of healthcare challenges. Clinically, CMC houses state-of-the-art hospitals and healthcare facilities, promoting a patient-centred approach. The culture of inquiry and scientific exploration fostered at the institution has led to groundbreaking research initiatives that contribute to both national and global medical knowledge.

In response to the national epidemic of chronic disease, the CMC Medicine Unit 4 established the Department of Lifestyle Medicine in 2013, dedicated to service, training, and research in lifestyle medicine. The department founded the Asian Society of Lifestyle Medicine as well as the Indian Society of Lifestyle Medicine. In 2023, the department launched the first blended learning program – the Postgraduate Diploma in Lifestyle Medicine. The department collaborates with partner organisations to provide educational materials that further CMC's mission to improve health outcomes in India.

For more details, see the story in 12 minutes: Youtube: Our Stories, Our History - Christian Medical College, CMC, Vellore

https://youtu.be/wmtjXSmPxbE?list=PLFQGBXq8SkR6pa8TT7kRWg-NCSrJEuKlT

ABOUT THE INDIAN SOCIETY OF LIFESTYLE MEDICINE (ISLM)

www.islm.org.in

The Indian Society of Lifestyle Medicine (ISLM) is a professional organisation for allopathic medical doctors. They are eventually certified as Lifestyle Medical Physicians by the International Board of Lifestyle Medicine (IBLM). Members include general practitioners, specialists, and super-specialists who integrate lifestyle medicine into their clinical practice.

Recognising the interest of the public and professionals from other fields in lifestyle medicine, ISLM offers Affiliate Memberships. This opportunity allows individuals to deepen their understanding of lifestyle medicine and connect with like-minded peers, fostering transformative changes in society and among their clients.

As an independent non-profit organisation, ISLM is committed to its mission of promoting optimal health through evidence-based allopathic medicine lifestyle interventions.

The organisation advocates for healthy lifestyle choices and socio-environmental health determinants, offering education, training, and support to its members and stakeholders.

ISLM emphasises evidence-based lifestyle management as the primary strategy for preventing and treating lifestyle-related diseases. Its recommendations encompass various domains, including toxin and pollutant exposure, physical activity and exercise, sunlight exposure, food, nutrition and hydration, sleep and rest, stress management, social connectedness, and environmental hygiene and sustainability.

ISLM maintains no religious or political affiliations and is a proud member of the Lifestyle Medicine Global Alliance and the World Lifestyle Medicine Organisation, advocating for lifestyle modifications worldwide.

ABOUT LONGEVITY INDIA

An Initiative by the Indian Institute of Science (IISc), Bangalore

longevity.iisc.ac.in

The rapidly growing ageing population in India is expected to reach 347 million by 2050. This growth presents significant challenges, including increased healthcare costs, a higher prevalence of age-related diseases, and a greater need for supportive care. Current healthcare systems are not adequately equipped to address these challenges, resulting in a substantial burden on families and society.

Longevity India, an initiative by the Indian Institute of Science (IISc), Bangalore, aims to tackle these issues through comprehensive research and technological innovation. Research done here will encompass both fundamental and applied aspects of ageing, focusing on critical areas such as metabolic disorders, cancers, chronic inflammation, and more.

Ongoing projects utilise advanced techniques to discover specific markers that indicate ageing and age-related diseases, allowing for personalised healthcare strategies, identification of potential intervention points, testing of therapeutic compounds to mitigate the effects of ageing and improving overall health outcomes, and developing new technologies and tools for early detection, monitoring, and intervention in age-related conditions. This includes creating innovative diagnostic devices, wearables for continuous health monitoring, and platforms for personalised medicine.

The long-term vision is to democratise healthcare through preventive approaches, which will help keep older adults out of hospitals. The mission is to understand the mechanisms of ageing and develop intervention strategies to enhance health span and promote longevity.

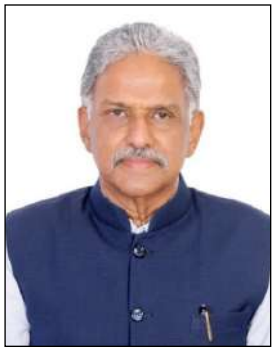
ABOUT THE CENTRE OF ALLIANCE FOR COLLABORATIVE HEALTH (COACH)

The Centre of Alliance for Collaborative Health (COACH) is a groundbreaking initiative that brings together three pillars of healthcare excellence in India: the Association of National Board Accredited Institutions (ANBAI), the Association of Healthcare Providers – India (AHPI), and the Consortium of Accredited Healthcare Organisations (CAHO). Launched in 2024, COACH embodies a decade of shared vision and collaborative success in the healthcare sector.

ANBAI was formed to unite National Board-accredited teaching hospitals across India to develop better teaching programs and encourage innovative ideas in post-graduate medical education. AHPI was founded to advocate for hospitals and promote quality healthcare delivery, influencing policy changes at the grassroots levels. CAHO was created to support the National Accreditation Board for Hospitals and Healthcare Providers (NABH), with a strong emphasis on patient safety and quality enhancement. Each of these organisations has made significant contributions to their fields: ANBAI collaborates with the National Board of Examinations in Medical Sciences (NBEMS), AHPI represents the foremost voice for hospitals across India, and CAHO has made a global impact on patient safety and healthcare quality.

COACH formalises this collaboration, driving continuous innovation in healthcare delivery, advancing patient safety, enhancing quality standards, and shaping robust regulatory practices. This dynamic alliance, combining the energy of emerging leaders with the wisdom of the founding leaders, is poised to drive meaningful change in the evolving healthcare landscape of India.

ABOUT THE EDITORS



Dr. Alexander Thomas is a distinguished leader in the healthcare sector with over four decades of impactful service. Throughout his career, Dr. Thomas has driven significant policy changes at the national and state level. He is the Founder and Patron of the Association of Healthcare Providers - India (AHPI), the Association of National Board Accredited Institutions (ANBAI), the Consortium of Accredited Healthcare Organisations (CAHO), and Vayah Vikas. He has made influential contributions to literature on critical issues affecting the health sector. He has served on committees set up by the Union Health Ministry, the Government of Karnataka, CII, FICCI, UNESCO, NBE, QCI, NABH, HSSC and PHFI, among others. His commitment to improving healthcare standards has earned him numerous accolades, including the Waterfalls Global Award (2022) from the UAE government, the Dr. M. G. Garg All Time Achievement Award (2022) from the Indian Medical Association, and the ASLI Founders Excellence Award (2023).



Dr. Samuel Hansdak is Professor and Head of the Department of Internal Medicine at the Christian Medical College and Hospital, Vellore. He completed his undergraduate and postgraduate studies in Internal Medicine from the All India Institute of Medical Sciences (AIIMS), New Delhi. He has received specialised training in Medical Education (FAIMER) and in Lifestyle Medicine (DipIBLM). He established the Asian Society of Lifestyle Medicine and the Indian Society of Lifestyle Medicine, and was a member of the American College of Lifestyle Medicine. He incorporated the principles of lifestyle medicine into undergraduate and postgraduate teaching, and initiated the first blended learning course in lifestyle medicine in collaboration with the Department of Distance Education at CMC Vellore. He is actively engaged in various research initiatives focusing on the impact of lifestyle on different disease conditions. He has authored two book chapters and has over 40 publications in national and international peer-reviewed journals.



Ms. Divya Alexander MSt (*Oxon.*) is an independent consultant with over 15 years of expertise in health and public policy research, having drawn up policy recommendations and legislation through her work with AHPI, UNFPA, and Amnesty International USA. She serves on the Times Group's Global Sustainability Alliance Leadership Council, the Government of Karnataka's Committee for SDG Goal 3 (Health), and was on expert committees formulating recommendations for the safe reopening of various sectors during the pandemic. She has contributed to the Karnataka State Public Health Policy; conducted projects for the World Bank, UNDP, and UN Women; co-edited six books and numerous publications for the health sector on policy issues; and co-authored a health education resource manual, which has reached over 450,000 students in India today. She read for her Master's degree at the University of Oxford as a Commonwealth Scholar and is a gold medallist from Bangalore University (Mount Carmel College).



Dr. Herbert Giebel currently serves as a consultant in lifestyle medicine in the Department of Medicine at the Christian Medical College and Hospital, Vellore. A graduate of the Loma Linda University School of Medicine, he has postgraduate and specialty training in Family Medicine, General Preventive Medicine, and Lifestyle Medicine. He spent 16 years in Nigeria serving as director of a family medicine residency and consultant for a hospital-based lifestyle medicine unit. He is involved in research in the field of lifestyle medicine. At CMC Vellore, he developed an eight-week curriculum for postgraduate and undergraduate education in lifestyle medicine. He helped create the first blended-learning lifestyle medicine course with the Department of Distance Education, and spearheaded the development of a tobacco- and paan-cessation program in partnership with the Department of Dental and Oral Surgery. Passionate about motivating people to improve their health, he has created impactful educational resources to support this goal.

PREFACE

In our fast-paced world, where technological advancements abound and the pressures of modern life can be overwhelming, the quest for true wellness becomes increasingly vital. Lifestyle medicine offers a holistic approach, emphasising the interconnectedness of our choices and their profound impact on our health and happiness. In an age of rampant misinformation, *Lifestyle As Medicine: The Science of Healthy Living* serves as an evidence-based guide to reclaiming and nurturing your well-being.

Endorsed by prominent associations and institutions across the country, this book is crafted for a diverse audience in India, encompassing individuals from all walks of life who are keen to enhance their well-being and vitality through informed lifestyle choices. If you are a health-conscious reader seeking practical strategies to optimise your health, this book offers valuable insights and actionable advice. It bridges the gap between scientific research and everyday application, providing evidence-based information in a digestible format, with case studies drawn from real life and key takeaways at the end of each chapter. It also tackles prevalent myths head-on, eliminating misconceptions to provide readers with factual insights for informed decision-making.

The distinguished contributors to this compilation are leading authorities in their respective fields, generously contributing their time, knowledge, and effort *pro bono* for the betterment of our citizens' health. It has been an honour to collaborate with and learn from each one of them. In the spirit of inclusivity, the entire book will be available online to download free of cost. Royalties generated from the sale of printed copies will go to CMC and AHPI programs generating awareness of lifestyle medicine.

By exploring the interconnectedness of lifestyle choices and health outcomes, *Lifestyle As Medicine* promotes a holistic approach to health – one that not only enhances individual quality of life but also contributes positively to broader societal and environmental goals. The chapters of the book are described below.

Introduction: Setting the Stage for Health lays the foundation for your journey towards holistic health by explaining the principles and benefits of lifestyle medicine. *Meaning and Purpose: Finding Fulfilment in Life* unearths how finding

meaning and purpose in everyday life can profoundly enhance your overall health and well-being.

Mental Health: Nurturing the Mind presents strategies to nurture mental resilience and emotional well-being, fostering a balanced and healthy mindset. *Building Healthy Relationships: Cultivating Connections* analyses the importance of developing meaningful relationships and how they contribute to your overall health and happiness. *Positive Behaviour Change: Embracing Healthy Habits* imparts ways to unlock the power of habit formation and sustainable behaviour change to support a thriving lifestyle.

Nutrition: Nourishing the Body for Optimal Health looks into the science of nutrition and offers practical ways to fuel your body for strength and longevity in India. *Exercise: Moving Towards Vitality* describes the transformative benefits of regular physical activity and why it is necessary to find enjoyable ways to integrate movement into your daily life. *Sleep: Rejuvenating the Mind and Body* underscores the crucial role of quality sleep in maintaining optimal health and outlines some strategies for improving your sleep hygiene. *Addiction: Breaking Free from Harmful Habits* provides insight into overcoming addictive behaviours and building a life free from harmful substances.

Environmental Sustainability: Balancing Personal and Planetary Health explores how personal choices intersect with environmental sustainability, promoting health not only for ourselves but also for our planet. *Lifestyle-Related Diseases: Understanding and Preventing Chronic Conditions* examines the impact of lifestyle on chronic diseases and provides preventive measures to safeguard your long-term health. *Conclusion: Empowering Your Journey to Wellness* wraps up your journey with actionable steps and a renewed sense of empowerment to integrate lifestyle medicine principles into your daily life.

At the end of the book, a QR code and link provide direct access to the references in the text, listed by chapter. Simply point your phone camera at the QR code or click on the link to browse the references and resources.

Join us on this transformative journey towards a healthier, happier life. We hope that *Lifestyle As Medicine* serves as your companion, providing the knowledge, encouragement, and motivation needed to embrace a lifestyle filled with vitality, resilience, and lasting well-being.

Dr. Alexander Thomas

Chief Editor

ACKNOWLEDGEMENTS

On behalf of my co-editors, I wish to express our profound appreciation and heartfelt thanks to all those who generously volunteered their time and efforts to support the development of this book.

The eloquent foreword by **Smt. Anju Bobby George**, two-time Olympian and India's first athlete to win at the World Championships in Athletics, is deeply appreciated for its profound and inspiring message.

Special thanks are due to the esteemed members of the editorial advisory board – **Dr. Glory Alexander, Dr. Sunil Khetarpal, and Ms. Shayna Chandrakant Parekh** – for their invaluable feedback on every aspect of the manuscript.

I extend my deepest gratitude to every one of the **distinguished contributors** who dedicated their time and expertise to create this guide; a complete list of contributors is presented in the following pages, with their brief profiles available at the end of the book.

I am also grateful to the **domain experts** who reviewed the chapters within their areas of expertise; a complete list of reviewers is presented in the following pages, and their profiles are available at the end of the book.

I extend my heartfelt gratitude to those who participated in the **focus group** discussions prior to the writing of this book. Their time, insights, and thoughtful contributions were invaluable in shaping a resource that we hope will truly benefit our intended audience.

The production of this book was sponsored by **Microlabs** and **Ashraya Hastha Trust**, enabling its availability on an open-access platform – my heartfelt gratitude for their support. Credit is due to **Krithi Technologies** for designing the cover.

The Association of Healthcare Providers, India (AHPI) and the Department of Lifestyle Medicine at CMC, Vellore, worked together to bring out this publication. I would like to express my gratitude to my co-editors **Dr. Samuel Hansdak, Ms. Divya Alexander, and Dr. Herbert Giebel** for their foundational roles in developing the manuscript and their invaluable contributions to its content, particularly acknowledging Divya as

the cornerstone of this project. Their dedication and expertise have truly enriched every aspect of our collaborative effort. I am also thankful to my colleagues at the **AHPI Bangalore Secretariat,** especially **Mr. Jerald James**, for their dedicated efforts in managing this project.

Finally, my sincere gratitude to our capable colleagues at **Southshore Innovations Pvt. Ltd.**, whose partnership and commitment to excellence have been instrumental in ensuring the accessibility of this book to a wide audience.

Dr. Alexander Thomas

Chief Editor

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Chapter 1

INTRODUCTION: SETTING THE STAGE FOR HEALTH

Alexander Thomas and Srividhya Raghavendran

In a village nestled near Vellore, in Tamil Nadu, a 45-year-old man named Ravi found himself facing unexpected health challenges. Having lived in the village since birth, Ravi had always enjoyed a relatively healthy life. His parents and grandparents had never experienced lifestyle diseases, so it came as a shock when Ravi was diagnosed with hypertension and diabetes three months ago. Ravi paid a visit to his trusted family physician, Dr. Priya, hoping to unravel the mystery behind his sudden health issues. Dr. Priya, too, was taken aback by Ravi's conditions, considering his family's medical history, and asked about any recent changes in his lifestyle. Ravi revealed that his lifestyle had taken a drastic turn about four years ago, when he had sold a portion of his property at a good price. With the newfound wealth, he had acquired a car, which soon became his preferred mode of transportation. He found himself conveniently avoiding walking or cycling, relying solely on the car for his mobility needs. Additionally, he started hiring workers to tend to his farmland, reducing his physical activity even further. Over the course of just a few years, Ravi's sedentary lifestyle, additional weight, and lack of exercise began to take a toll on his health. The past two years had been challenging due to the drought, resulting in financial difficulties for Ravi. This led to more stress and less sleep. Ravi's story is a reflection of the sweeping changes occurring in our country, as urbanisation and the allure of a modern lifestyle pave the way for a surge in lifestyle disorders. It serves as a cautionary tale, reminding us to be mindful of the consequences that accompany rapid changes in our routines and habits, and serves as a wake-up call for others who find themselves caught in the whirlwind of urbanisation and its associated lifestyle changes.

What is Lifestyle Medicine?

Lifestyle medicine is a branch of medicine that focuses on the use of evidence-based lifestyle interventions to prevent, treat, and manage chronic diseases. It recognises that many chronic diseases, such as heart disease, hypertension, diabetes, obesity, mental health disorders and certain types of cancer, are largely

influenced by modifiable lifestyle factors, including diet, physical activity, stress management, sleep, substance use, and social connection. The principles of lifestyle medicine involve promoting healthy behaviours and empowering individuals to take an active role in their own health. It emphasises the importance of adopting healthy habits and making practical sustainable lifestyle changes to prevent the onset of chronic diseases and improve overall well-being.

The 21st century witnessed a rapid advancement in technology, simplifying our lives and reducing physical exertion. This progress, however, has come at a cost. Sedentary lifestyles and unhealthy dietary choices have become the norm, leading to a surge in non-communicable diseases (NCDs). These lifestyle disorders have become particularly prevalent during the rapid urbanisation of relatively underdeveloped regions, exposing traditional communities to modern health challenges.[1]

Amidst this backdrop, lifestyle medicine emerges as an important field with the potential to bring about transformative changes for public health and the practice of clinical medicine. Lifestyle medicine is a medical specialty that uses therapeutic lifestyle interventions as the primary modality to treat chronic conditions including, but not limited to, cardiovascular diseases, Type-2 diabetes, hypertension, mental health disorders, and obesity. By focusing on the impact of lifestyle choices, this discipline seeks to address the root causes of chronic diseases and promote healthier habits, thereby reducing the risk of NCDs and long-term medications. It also recognises the potential of lifestyle changes to reverse the progression of disease.

Though different lifestyle medicine societies use different terminologies, the American College of Lifestyle Medicine (ACLM) and the British Society of Lifestyle Medicine (BSLM) mainly focus on six pillars: a whole food plant-predominant eating pattern, physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection (Figure 1.1).[2]

The Indian Society of Lifestyle Medicine (ISLM) promotes lifestyle management or lifestyle optimisation, which includes, but is not limited to, recommendations in the following domains:[3]

a. Exposure to toxins/pollutants
b. Physical activity/exercise
c. Exposure to sunlight
d. Food, nutrition, and hydration
e. Sleep and rest
f. Stress management
g. Social connectedness
h. Environmental hygiene and sustainability



Figure 1.1. The six pillars of lifestyle medicine as described by ACLM

In this chapter, we discuss the significance of healthy lifestyles for individuals across different communities. We explore the epidemiology and disease burden associated with lifestyle-related diseases, emphasising the urgent need for action. We also highlight the risks of an unhealthy lifestyle, while showcasing the myriad benefits that come with adopting healthy habits. Prevention plays a crucial role in maintaining good health, with measures such as immunisation, cancer screening, and self-testing available for monitoring and safeguarding one's well-being. Drawing inspiration from the world's healthiest communities, known as "blue zones," we look at valuable lessons from their practices and how to apply them to our own lives.

We also examine the initiatives and policies implemented by the Indian government to promote healthier lifestyles. By understanding the collective efforts being made, we gain insight into the larger context of public health and the steps being taken to improve the well-being of the population. By embracing sustainable practices and incorporating the lessons learnt from both the world's healthiest communities and government initiatives, we can pave the way towards a future that prioritises well-rounded and sustainable lifestyles. Lifestyle medicine offers the key to a healthier and more vibrant society, and the time to act is now.

In our country, the prevalence of lifestyle diseases is concerning, with relatively high rates of diabetes (Figure 1.2), hypertension (Figure 1.3), obesity, mental health disorders, and cancer. Public health efforts, such as the Indian Council of Medical Research's diabetes study and the National Cancer Registry Program, provide valuable insights into disease trends and inform targeted interventions.

The 2023 ICMR-INDIAB study is one of many that has highlighted the enormous burden of non-communicable diseases. The statistics in Box 1.1[4,5,6] are sobering.

The ICMR-INDIAB study also highlighted the increased incidence of these diseases in rural India as well as urban India over the last two decades.

Box 1.1. The Burden of NCDs in India

- 1 in 3 Indians have high blood pressure.
- 1 in 4 Indians have diabetes mellitus or pre-DM.
- 2 in 5 Indians have extra weight (BMI over 23 for Asian Indians).
- 1 in 2 Indians have central obesity (BMI over 25 for Asian Indians).
- 4 in 5 Indians have dyslipidemia or elevated cholesterol or triglycerides.

By recognising the impact of lifestyle factors on the risk of developing lifestyle-related diseases, individuals and communities can make informed choices to reduce their risk. Embracing healthier habits, such as regular physical activity, a whole food plant-based diet, adequate timely sleep, regular interactions with friends and family, and avoiding tobacco and excessive alcohol use, can significantly improve health outcomes.[7] Ultimately, lifestyle medicine offers a powerful tool to combat the rising burden of non-communicable diseases and improve the well-being of individuals and communities. By prioritising prevention and adopting sustainable lifestyle practices, we can create a healthier future for all.

Unravelling the Origin and Development of Diseases

To understand the impact of lifestyle choices on health, it is important to understand the process of development of lifestyle-related diseases. These diseases develop as a result of complex interactions between various factors, including genetic susceptibility; exposure to various chemicals, pollutants, and preservatives; and lifestyle choices. By understanding the underlying mechanisms involved, we can gain insight into how our choices can influence disease development and progression.

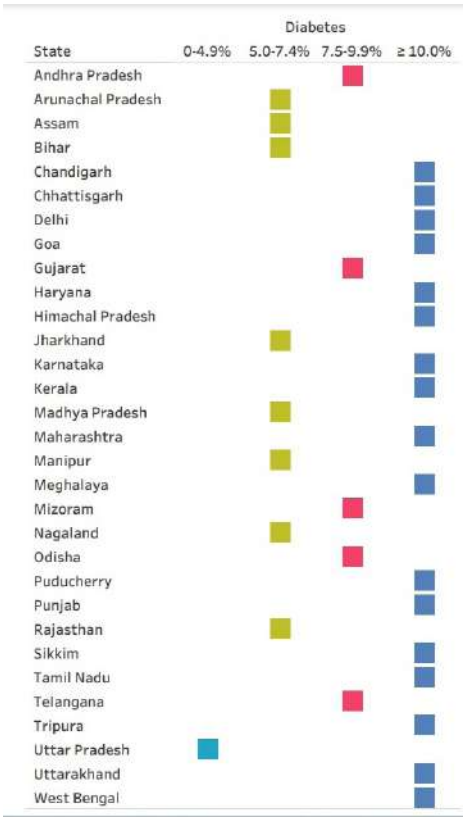


Figure 1.2. State-wide prevalence of diabetes



Figure 1.3. State-wide prevalence of hypertension

One of the key mechanisms linking lifestyle choices to disease is chronic inflammation. Unhealthy diets, physical inactivity, and other lifestyle factors can trigger low-grade systemic inflammation, which plays a crucial role in the development of cardiovascular diseases, hypertension, diabetes, and certain cancers (Figure 1.4). Chronic ongoing inflammation can contribute to the accumulation of plaque in blood vessels, reduced response to insulin, and cell structure damage, leading to the development and progression of these diseases.

Free radical damage is another important mechanism that links lifestyle to disease. Free radicals, also known as reactive oxygen species (ROS), are unstable molecules produced by the body in response to environmental factors and other stressors (Figure 1.5), including the digestion of food

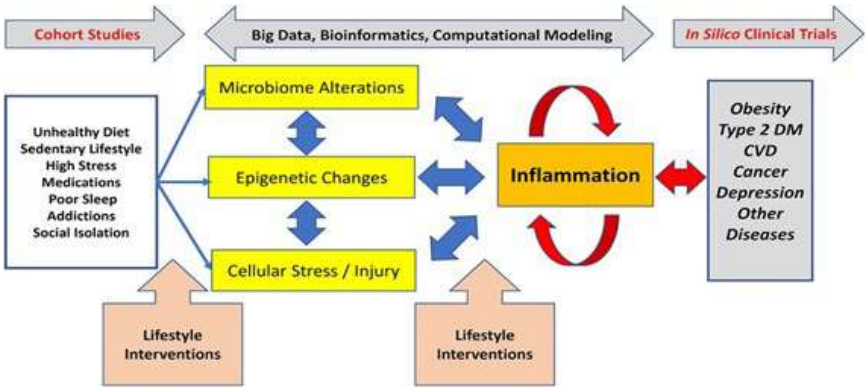


Figure 1.4. Factors that can trigger chronic inflammation
Source: Reproduced with permission from Vodovotz, Y., Barnard, N., Hu, F. B., Jakicic, J., Lianov, L., Loveland, D., Buysse, D., Szigethy, E., Finkel, T., Sowa, G., Verschure, P., Williams, K., Sanchez, E., Dysinger, W., Maizes, V., Junker, C., Phillips, E., Katz, D., Drant, S., Jackson, R. J., … Parkinson, M. D. (2020). Prioritized research for the prevention, treatment, and reversal of chronic disease: Recommendations from the lifestyle medicine research summit. *Frontiers in Medicine*, *7*, 585744. https://doi.org/10.3389/fmed.2020.585744

and exposure to toxins. Unhealthy diets, sedentary lifestyles, smoking, and excessive alcohol consumption can increase the production of reactive oxygen species, overwhelming the body's natural defence mechanisms. This increase in the level of free radicals can damage cells, DNA, and lipids, contributing to the development of various diseases, including cardiovascular diseases, neurodegenerative diseases, and cancer.[8] Phytonutrients and antioxidants play an important role in the detoxification of free radicals and thereby reduce the risk of damage. A whole food plant-based diet including plenty of fruit, vegetables, whole grains, nuts, and seeds provides an excellent array of antioxidants and phytonutrients such as vitamin E, beta-carotene, vitamin C, and lipoic acid.

Insulin resistance, or a reduced response to the insulin hormone, is a hallmark of lifestyle-related diseases such as obesity and Type-2 diabetes (Figure 1.6). Sedentary lifestyles and unhealthy diets can lead to excess body fat, particularly visceral fat, which releases pro-inflammatory molecules and disrupts insulin signalling. This leads to elevated blood sugar levels and a reduced response to insulin, increasing the risk of diabetes and other metabolic disorders.

Furthermore, lifestyle choices can influence the gut bacterial flora, which plays a crucial role in maintaining overall health. Unhealthy diets that are low in fibre and high in processed foods can negatively impact the diversity and

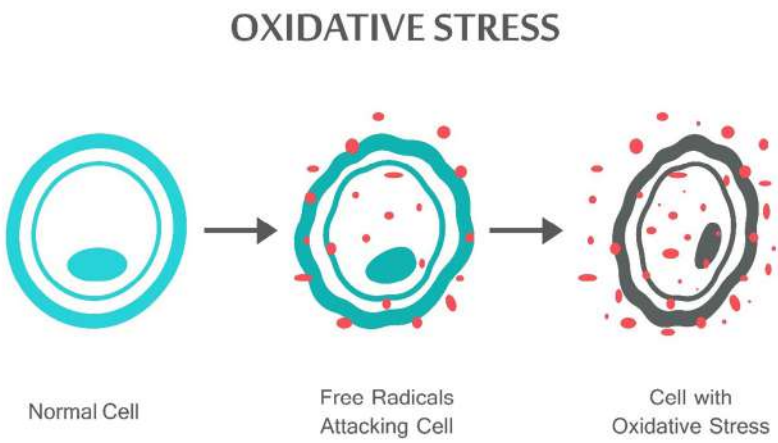


Figure 1.5. Oxidative stress

Source: iStock.com/fancytapis

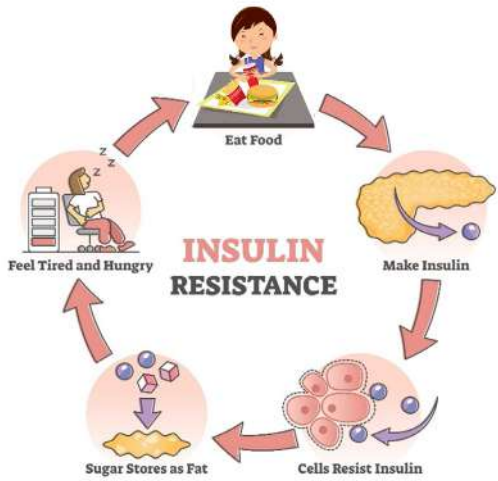


Figure 1.6. The cycle of insulin resistance

Source: iStock.com/vectormine

composition of bacteria in the gut, leading to dysbiosis. Dysbiosis primarily involves the disruption of beneficial bacterial flora, changes in bacterial diversity, and a potential increase in harmful bacteria within the gut. These changes resulting from lifestyle factors have been associated with several

lifestyle-related diseases, including obesity, inflammatory bowel disease, and metabolic disorders.

Understanding these underlying mechanisms helps us recognise that our lifestyle choices have a direct impact on the development of chronic diseases. By making informed decisions and adopting healthier habits, we can mitigate the risk factors and promote better health outcomes.

The Dangers of an Unhealthy Lifestyle

An unhealthy lifestyle comes with significant risks and dangers that can have profound implications on our health. As mentioned above, chronic conditions such as heart disease, hypertension, diabetes, obesity, mental health disorders, and certain types of cancer are closely linked to our lifestyle choices. By examining the consequences of an unhealthy lifestyle, we can better comprehend the urgency of making positive changes.

Heart disease, including conditions such as coronary artery disease and heart attacks, is one of the leading causes of death in India and worldwide. Unhealthy lifestyle choices, such as a diet high in saturated and trans fats, physical inactivity, smoking, and excessive alcohol consumption significantly contribute to the development of heart disease. These factors can lead to high blood pressure, elevated cholesterol levels, and the accumulation of plaque in the arteries, increasing the risk of heart attacks and strokes.

Type-2 diabetes is another chronic condition closely tied to an unhealthy lifestyle. Poor dietary choices, particularly diets high in refined sugars and fats, along with physical inactivity and excess body weight, can lead to insulin resistance and the development of Type-2 diabetes. Diabetes, if uncontrolled, can lead to serious complications such as cardiovascular diseases, kidney disease, nerve damage, and vision loss.[9]

Obesity is a growing global health concern, with significant implications on overall health and well-being. Diets high in calories, sugar, salt and fats, combined with sedentary lifestyles, contribute to weight gain and obesity. Obesity increases the risk of various chronic diseases, including heart disease, diabetes, certain types of cancer, sleep apnoea, and musculoskeletal disorders. It also has psychological and social consequences, leading to low self-esteem, depression, and social stigma.[10]

Over the last two decades, the number of patients with **high blood pressure** has increased significantly. It is one of the leading risk factors for stroke and heart attacks. Diets high in calories, fats and salt, and physical inactivity are the most common causes for high blood pressure.

Certain types of cancer, such as **colorectal, oral and lung cancer**, are strongly influenced by lifestyle factors. Habits such as smoking, alcohol consumption, poor diet, and lack of physical activity contribute to an increased risk of developing these cancers. Adopting a healthy lifestyle, including quitting smoking, maintaining a healthy weight, engaging in regular physical activity, regularly meeting family and friends, and following a whole food plant-based diet, can significantly reduce the risk of developing these cancers.

The consequences of an unhealthy lifestyle go beyond individual health, impacting families, communities, and healthcare systems. By adopting healthier habits such as a plant-based diet, good sleep hygiene, regular physical activity, strong relationships with friends and family, completely stopping cigarettes and alcohol, and promoting a culture of prevention, we can mitigate chronic inflammation, improve insulin function in tissues, reduce free radical damage, and consequently reverse the disease process, leading to disease remission, thereby decreasing the burden of chronic diseases and improving our overall well-being. Chapter 11 of this book examines lifestyle-related diseases in detail.

Embracing a Healthy Lifestyle

A healthy lifestyle offers numerous benefits. By making conscious choices to prioritise our health, we can experience improvements in physical fitness, mental well-being, longevity, and quality of life.

Regular physical activity is a cornerstone of a healthy lifestyle and offers a multitude of benefits. Engaging in exercise and staying physically active improves cardiovascular health, strengthens muscles and bones, enhances flexibility and balance, aids in weight management, reduces the risk of chronic diseases such as heart disease, diabetes, and certain types of cancer, and improves mood and mental health. Regular exercise not only boosts energy levels but also promotes better sleep and overall vitality.[11] This is discussed in detail in Chapter 7.

Adopting a **healthy diet** is an essential component of a healthy lifestyle. Consuming a whole food plant-based diet rich in fruits, vegetables, whole grains, pulses, nuts and seeds provides the necessary nutrients for optimal bodily functions. Such a diet can help maintain a healthy weight, reduce the risk of chronic diseases, improve digestion, and enhance overall energy levels. Additionally, a nutritious diet supports brain health and cognitive function, promoting mental well-being. Chapter 6 provides in-depth information on nutrition for a healthy lifestyle.

Prioritising mental well-being is crucial for a healthy lifestyle. Engaging in stress-reducing activities using relaxation techniques can help manage stress levels and improve mental health. Adequate sleep is also vital for mental well-being, as it allows for proper restoration and rejuvenation of the mind. By incorporating strategies to promote mental well-being into our daily lives, we can experience increased resilience, improved mood, and better overall psychological health. Chapter 3 offers ways to safeguard our mental health and well-being.

Social connection has powerful influences on health and longevity; a lack of social connection qualifies as a risk factor for premature mortality. Growing evidence also points to its short-term effects on biomarkers of health and health relevant behaviours, which helps us understand how social connection influences physical health and the ways in which this influence can inform potential intervention strategies. Chapter 4 suggests ways in which one can develop social connections and build healthy relationships.

Embracing a healthy lifestyle can also contribute to increased longevity and enhanced quality of life. Individuals who adopt healthy habits, such as maintaining a healthy weight, engaging in regular physical activity, and following a whole plant diet, tend to live longer. Additionally, by reducing the risk of chronic diseases, healthy lifestyle choices can help prevent the onset of debilitating conditions, and thus maintain independence and vitality in later years. Improved physical fitness, enhanced mental well-being, increased longevity, and enhanced quality of life are just a few of the advantages that come with adopting a healthy lifestyle. By embracing these positive aspects, we can motivate ourselves to make informed decisions and prioritise our well-being.

Harnessing Technology for Health

The integration of technology has transformed the landscape of health and wellness, offering innovative tools to support and promote healthy lifestyles. From wearable devices that track our activity levels to health apps that provide personalised guidance, technology has the potential to empower individuals in their pursuit of well-being.

Wearable devices such as fitness trackers, smartwatches, and other wearable gadgets can monitor various aspects of our health, such as our heart rate, sleep patterns, steps taken, and calories burned. These devices provide real-time feedback and motivation, allowing individuals to set goals, track progress, and make adjustments to their daily routines. By promoting

awareness and accountability, wearable technology can inspire individuals to adopt healthier habits and increase their physical activity levels.[12]

Health apps have also become increasingly popular tools for promoting healthy lifestyles. These apps offer a range of features, including activity tracking, meal planning, and sleep analysis. They provide users with personalised recommendations, reminders, and educational resources to help them make informed decisions about their health. Health apps can be particularly beneficial for those seeking guidance and support in managing chronic conditions, weight loss, or stress reduction.

Telemedicine, or remote healthcare, is another significant advancement in health technology. Through video conferencing, phone calls, or secure messaging platforms, individuals can consult healthcare professionals from the comfort of their homes. Telemedicine offers convenience, accessibility, and cost-effective healthcare options, enabling individuals to receive timely medical advice, monitor chronic conditions, and access preventive care. This technology has become particularly valuable in situations where in-person visits may be challenging or unavailable.

Social media platforms have also played a role in promoting healthy lifestyles. Online communities and support groups provide individuals with a network of like-minded individuals who share similar goals and challenges. These platforms offer a space for knowledge-sharing, motivation, and encouragement, fostering a sense of belonging and support. Additionally, reputable health organisations and professionals utilise social media to disseminate evidence-based information, raise awareness, and provide educational resources. Access to Google, ChatGPT and other bots can provide quick access to a vast repository of information, but it is important to evaluate the credibility of the information retrieved.

While technology offers numerous benefits, it should be used mindfully and responsibly. It is crucial to **prioritise privacy** and safeguard personal information when using health apps, wearable devices, or telemedicine services. It is also important to remember that technology should complement, rather than replace, human interaction and professional guidance. Building a balanced approach to utilising technology in our health journey can help maximise its benefits while maintaining a holistic perspective.

By harnessing technology, individuals have access to a wide range of tools and resources that can support and promote healthy lifestyles. They offer opportunities for self-monitoring, personalised guidance, remote healthcare, and community support. Embracing these technological advancements can

empower individuals to take charge of their health and make informed decisions on their path to well-being.

Best Practices for Different Populations

When it comes to promoting healthy lifestyles, it is important to consider the unique needs and considerations of different age groups. Older adults and children have specific requirements that may require tailored approaches. By understanding these considerations and implementing age-appropriate recommendations, we can ensure holistic well-being for individuals of all ages.

Older Adults

1. Engage in regular physical activity: Older adults should aim for at least 150 minutes of moderate-intensity aerobic activity per week, along with muscle-strengthening activities on two or more days. It is important to consider any existing health conditions or limitations while choosing activities that are suitable for their fitness level.[13]
2. Focus on balance and flexibility: Falls are a major concern for older adults. Incorporating exercises that improve balance and flexibility can reduce the risk of falls and maintain mobility.
3. Consume a nutrient-rich diet: Older adults have specific nutrient requirements, including the consumption of adequate protein, calcium, vitamin D, B12, and fibre. A whole food plant-based diet includes a variety of fruits, vegetables, whole grains, legumes, nuts, and seeds that can support overall health and prevent age-related diseases.[14]
4. Stay socially connected: Loneliness and social isolation can have detrimental effects on the health and well-being of older adults. Encouraging social interactions, participating in community activities, and maintaining strong relationships can promote mental well-being and overall quality of life.[15]
5. Sleep: Older adults are recommended to get seven to eight hours of restorative sleep every night. The quantity and quality of sleep are crucial.

Children

1. Encourage regular physical activity: Children should engage in at least 60 minutes of moderate to vigorous physical activity every day. Encourage a variety of activities that promote cardiovascular fitness, muscle strength, and bone health.

2. Promote a whole food plant-based diet: As a general rule, provide children with a variety of nutrient-dense foods, including fruits, vegetables, whole grains and pulses, seeds and nuts (warning: whole nuts are a choking hazard for children under five years). Limit the consumption of processed snacks and fast food. Encourage family meals and involve children in meal planning and preparation.[16]
3. Limit sedentary activities: Screen time and sedentary behaviours can negatively impact children's health. Set limits on screen time (avoid it entirely for children under two years), encourage outdoor play, and provide opportunities for non-screen activities, such as reading, arts, and sports.
4. Foster a positive body image and self-esteem: Help children develop a healthy relationship with their bodies by promoting a positive body image, emphasising self-acceptance, and encouraging a focus on health rather than appearance. Teach them about the importance of self-care, self-compassion, and respecting their bodies.
5. Sleep: Good quality and quantity of sleep are crucial, especially for children. It is recommended that children between 6 and 12 years of age go to bed early and get a minimum of 9–12 hours at night, while children between 13–18 years of age aim for a minimum of 8–10 hours. Infants and toddlers require even more sleep, with a minimum of 12–14 hours at night. Adequate sleep promotes good concentration and focus, and supports the physical and mental well-being of a child.

It is important to remember that individual needs may vary within these age groups, and healthcare professionals or registered dietitians can provide personalised guidance. By considering the unique requirements of older adults and children, we can ensure that lifestyle recommendations are age-appropriate and contribute to optimal health and well-being.

Sustainability: A Holistic Approach

By encouraging sustainable dietary choices, regular physical activity, and effective stress management techniques, lifestyle medicine offers a holistic approach to well-being. Sustainability lies at the core of lifestyle medicine, ensuring enduring health outcomes while preserving the environment for future generations. These sustainable practices not only contribute to reducing healthcare costs but also address disparities in access to health resources. They foster community resilience and social equity by creating health-promoting environments. Embracing sustainability in lifestyle medicine aligns with global

efforts to achieve the Sustainable Development Goals and combat climate change, empowering individuals to make choices that benefit both personal health and the planet. This is discussed in greater detail in Chapter 10.

Learning from the World's Healthiest Communities

The concept of "blue zones" refers to regions around the world where individuals live exceptionally long and healthy lives. Examples of blue zones include Loma Linda, California, Okinawa Prefecture, Japan; Nuoro Province, Sardinia, Italy; the Nicoya Peninsula, Costa Rica; and Icaria, Greece. These communities have been the subject of extensive research, uncovering lifestyle patterns and cultural practices that contribute to their residents' well-being. By examining and drawing inspiration from these communities, we can gain valuable insights and apply them to our own lives.[17]

1. Prioritising plant-based diets: In many blue zones, plant-based diets rich in whole grains, fruits, vegetables, legumes, and nuts are common. These diets are known for their high nutrient content, low levels of processed foods, and minimal reliance on meat and dairy products. Research suggests that plant-based diets support overall health and contribute to reduced risks of chronic diseases. Incorporating more plant-based meals into our diets can have significant health benefits and reduce our environmental impact.
2. Engaging in regular physical activity: Physical activity is a fundamental aspect of daily life in blue zones. Rather than structured exercise regimens, individuals in these communities engage in regular, low-intensity physical activities as part of their daily routines. Walking, gardening, and manual labour are common examples. Incorporating movement into our daily lives, such as taking regular walks, using stairs instead of elevators, and participating in active hobbies, can contribute to improved health and longevity.
3. Emphasising social connections: Strong social networks and a sense of community are prevalent characteristics in blue zones. Regular social interactions, support systems, and a sense of belonging contribute to improved mental well-being and overall health. Cultivating meaningful relationships, participating in community activities, and prioritising quality time with loved ones can enhance our own well-being.
4. Practicing stress reduction techniques: Blue zone communities often have cultural practices that help manage stress and promote relaxation. Techniques such as meditation, prayer, napping, and regular time for

reflection and solitude are common. Incorporating stress reduction practices into our lives, such as mindfulness exercises, deep breathing, and finding moments of calm, can help improve mental health and overall well-being.

5. Maintaining a sense of purpose: A sense of purpose and a strong connection to something greater than oneself are evident in blue zone communities. Having a reason to get up in the morning and feeling a sense of fulfilment and meaning in life are associated with better health outcomes. By identifying and pursuing our passions, setting meaningful goals, and contributing to our communities, we can cultivate a sense of purpose in our own lives.

The lifestyle patterns observed in blue zones are influenced by a combination of factors, including genetics, environment, and culture. While we may not be able to replicate these communities entirely, we can draw inspiration from their practices and adapt them to our own contexts. By incorporating elements such as plant-based diets, regular physical activity, strong social connections, stress reduction techniques, and a sense of purpose into our lives, we can enhance our overall health and well-being. Learning from the world's healthiest communities reminds us of the power of simple, sustainable lifestyle choices in promoting longevity and quality of life.

Efforts and Policies by the Indian Government

The Indian government has taken significant steps to promote healthier lifestyles and improve public health across the country. Through various initiatives, programs, campaigns, and policy interventions, the government aims to address the diverse health challenges faced by its population. By understanding these efforts, we can gain a comprehensive view of the collective actions being taken to promote healthier lifestyles in India.

1. National Health Mission (NHM): The NHM is a flagship program launched by the Indian government to provide accessible, affordable, and quality healthcare to all citizens. It focuses on improving primary healthcare services, strengthening health infrastructure, and promoting preventive and promotive healthcare. Under NHM, initiatives such as the National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM) aim to address the health needs of rural and urban populations respectively.[18]

2. National Nutrition Mission (Poshan Abhiyaan): Poshan Abhiyaan aims to address the issue of malnutrition and improve maternal and child health in India.
3. Swachh Bharat Abhiyan (Clean India Mission): Swachh Bharat Abhiyan is a nationwide cleanliness campaign that aims to achieve universal sanitation coverage and eliminate open defecation.
4. National Tobacco Control Program (NTCP): The NTCP focuses on tobacco control measures to reduce the prevalence of tobacco use and its associated health risks.
5. National Program for Health Care of the Elderly (NPHCE): The NPHCE focuses on addressing the healthcare needs of the older adult population in India. It aims to provide comprehensive and integrated healthcare services, promote healthy ageing, and create an age-friendly healthcare system.
6. National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS): This focuses on strengthening infrastructure, human resource development, health promotion, early diagnosis, management and referral.

These are just a few examples of the initiatives and policies implemented by the Indian government to create a healthier and more resilient population. The government's efforts are multidimensional, encompassing areas such as healthcare infrastructure, nutrition, sanitation, tobacco control, and health insurance. The success of these programs relies on effective implementation, monitoring, and continuous evaluation. Collaboration among various stakeholders, including government agencies, healthcare professionals, civil society organisations, and individuals, is vital in order to achieve the desired outcomes and create lasting positive change in public health.

MYTHS DEBUNKED

MYTH 1: Type-2 diabetes is a life sentence.

FACT: *A poor diet high in refined sugars, refined carbohydrates and fats, combined with a sedentary lifestyle, leads to weight gain and obesity. This can lead to insulin resistance, a condition where cells fail to respond effectively to insulin, causing excess sugar to be converted to fat, leading to elevated blood sugar levels. For most people, this process can be reversed by adopting a healthy diet and engaging in regular exercise, improving insulin sensitivity. As a result, blood sugar levels may normalise, and the need for medication may decrease. When the blood sugar levels eventually return to normal without the use of medication, it is referred to as diabetes remission.*[19]

This illustrates the profound influence of lifestyle adjustments, including dietary modifications, increased physical activity, adequate sleep, stress management, and strengthened relationships, on one's health.

MYTH 2: Going on a detox or cleanse is required in order to remove toxins from the body.

FACT: *The idea that the body needs external detoxification to remove toxins is not supported by scientific evidence. The human body has built-in mechanisms, primarily the liver and kidneys, which naturally detoxify and eliminate waste and toxins. Embracing a whole plant-based diet, staying hydrated, engaging in regular physical activity, and getting enough sleep are more effective ways to support the body's natural detoxification processes.*[20]

MYTH 3: Supplements can replace a healthy diet.

FACT: *While dietary supplements can play a role in meeting specific nutrient needs, they should not be seen as a substitute for a healthy diet.*[21] *Whole plant foods provide a wide range of essential nutrients, fibre, and other beneficial compounds that work synergistically to support overall health. It is best to focus on consuming a varied whole plant food diet that includes a variety of fruits, vegetables, whole grains, pulses, nuts, and seeds to ensure optimal nutrient intake.*

MYTH 4: You need to follow a strict diet in order to be healthy.

FACT: *Healthy eating does not have to be complicated. Instead, adopting a flexible and balanced approach to eating is advisable. This involves focusing on whole, minimally processed foods, listening to hunger and fullness cues, and allowing for occasional treats in moderation. Building a positive relationship with food and enjoying a variety of nutritious foods can contribute to long-term success in maintaining a healthy lifestyle.*

By debunking these common myths, we can empower individuals to make informed decisions about their health. It is important to rely on evidence-based information and consult with healthcare professionals or registered dietitians for personalised advice and guidance.

CONCLUSION AND KEY TAKEAWAYS

Over the past three decades, the rise of non-communicable diseases such as obesity, hypertension, diabetes, mental health disorders, cardiovascular diseases, and cancers has been fuelled by rapid urbanisation, leading to unhealthy dietary patterns and sedentary lifestyles. These changes have

induced chronic inflammation, increased free radical damage, and disrupted insulin response, resulting in elevated blood sugar and cholesterol levels. Fortunately, adopting a healthy lifestyle through dietary modifications, regular physical activity, adequate sleep, social connections, and avoidance of harmful substances can initiate the reversal of these disease processes, paving the way for a healthier life.

- Embracing a healthy lifestyle unlocks myriad benefits, enhancing physical, mental, and overall wellness.
- Lifestyle choices profoundly impact health outcomes – prioritise a balanced diet for optimal well-being.
- Beware of health myths – empower yourself with evidence-based choices for sustainable health.
- Leverage technology as a tool for better health – harness its potential for informed decision-making.
- Age should not deter lifestyle changes – tailor your habits to support lifelong well-being.
- Sustainable lifestyle choices benefit both personal health and the environment – make eco-conscious decisions.
- Learn from the world's healthiest communities – discover their secrets to longevity and vitality.
- Government initiatives play a pivotal role in fostering a healthier nation – explore supportive policies and programs.
- Your choices today shape your future health – prioritise healthy living for a vibrant tomorrow.

RESOURCES

Videos

1. Why Lifestyle is the BEST Medicine by Meagan L. Grega at TEDxLehighRiver [18.52]
2. A Healthy Diet, A Healthier World by the World Health Organisation [1.39]
3. Sleep is Your Superpower by Matt Walker at TED2019 [19:18]
4. Why Social Connections Matter to Your Health by the Texas A&M College of Education and Human Development [5:10]
5. What Happens Inside Your Body When You Exercise? by the British Heart Foundation [2:33]
6. Make Health Last by the Canadian Heart and Stroke Foundation [1:00]

Chapter 2

MEANING AND PURPOSE: FINDING FULFILMENT IN LIFE

Samuel Hansdak and Esther Inbarani

Mr. Arun, a 55-year-old textile tycoon based in Mumbai, enjoys a bustling family life with his charming wife and two children – a 12-year-old son and an 8-year-old daughter. His parents reside with them, and a team of devoted staff tends to their needs. His thriving business and continuous expansion efforts ensure that Mr. Arun's schedule is marked by relentless demands, filled with numerous meetings and frequent travel commitments. Struggling with significant weight gain and disrupted sleep patterns, likely attributable to his hectic lifestyle, Mr. Arun was recently diagnosed with high blood pressure and elevated blood sugar levels. Following consultations with his physician, he embarked on a treatment regimen encompassing medications, dietary modifications, and exercise recommendations.

Despite adhering to the prescribed treatments, Mr. Arun found himself plagued by persistent feelings of discomfort. Why had he developed diabetes and hypertension? Was this a consequence of some wrongdoing on his part? He thought he had been living a life of integrity. He sought the counsel of Dr. Aggarwal, a lifestyle medicine specialist, to probe into the deeper issues of life that were troubling him.

Dr. Aggarwal: *Good morning, Mr. Arun. What brings you to my office today?*

Mr. Arun: *Good morning, doctor. I was diagnosed with hypertension and diabetes not too long ago. I've started my medications, and my blood pressure and blood sugar levels are under control. But it has been a real challenge sticking to my diet and exercise routine. My schedule is jam-packed with constant travel and back-to-back meetings, making it tough to stay on track. Even though my blood pressure and blood sugar are in check, I still feel drained and unmotivated to tackle my daily tasks efficiently. I'm hoping you can shed some light on why I'm feeling this way and if there is anything more I should be doing.*

Dr. Aggarwal: *Let me ask you a few questions that will help me understand you better. How are things at home? Do you feel stressed? How is your sleep?*

Mr. Arun: *I'll be honest, I've been feeling quite stressed. I'm worried about my health, its impact on my life, and whether I'll be able to perform at my best at work. I seem to be losing my self-confidence. The fear of failure looms over me – if my business doesn't thrive, how will I provide for my family? My sleep has been severely disrupted; it takes me a long time to fall asleep once I'm in bed, and my mind is plagued by various thoughts. When I wake up, I don't feel rested at all, and by the end of the day, I'm utterly exhausted. To top it all off, my packed schedule leaves me with barely any time for my wife and kids. I know they miss having me around, but I've reassured them that everything I do, I do for them.*

Dr. Aggarwal: *I can understand what you're going through. What do you want to achieve in life?*

Mr. Arun: *Well, I aim to excel in my field and move up the ladder to make sure my family is taken care of. But why are you asking me all this, Doc? What does this have to do with my health issues and how I'm feeling?*

Dr. Aggarwal: *Trust me, these questions are important. The answers will help us understand how your lifestyle is impacting your health and overall well-being.*

INTRODUCTION

There is ample scientific evidence linking our diet, exercise habits, and stress levels to various chronic diseases such as obesity, diabetes, hypertension, heart disease, and cancer. These are all explored in depth in the other chapters of this book. Many of us already have the information, but we find it difficult to put into practice: this is why medication compliance rates range from only 20–50%[1] and behaviour change, only 40–70%.[2,3] What influences the daily choices we make?

One of the primary determinants shaping our decision-making is our worldview, which evolves over time. This worldview may also encompass spirituality, a topic we will examine in this chapter. Spirituality encompasses the beliefs, values, practices, and experiences related to the search for meaning, purpose, and connection to something greater than oneself.

Throughout history, spirituality has been closely linked with the health and well-being of the community. Priests treated various ailments and diseases using special rituals and herbal therapies in religious centres. They used practices such as meditation, prayer, and energy healing (such as acupuncture) to take care of people's overall health by focusing jointly on the mind, body, and spirit. As medical science advanced, our comprehension of bodily functions and disease mechanisms underwent tremendous growth. Breakthroughs in

medications and surgical techniques ensued. This led to the separation of medical treatment and spiritual practices. Disease was considered a physical ailment which was treated using physical modalities with no connection to the spiritual.

However, in 1948, the World Health Organisation revolutionised this perspective by asserting that health encompasses not only the absence of illness but also physical, mental, and social well-being. This paradigm shift prompted a re-evaluation of the other domains of health and well-being. Consequently, there has been a notable surge in research endeavours delving into the intricate nexus between mental, social, spiritual, and physical health. In this chapter, we embark on a journey to illuminate the profound connection between spirituality and health, offering insights into their symbiotic relationship.

The Connection between Spirituality and Health

Mr. Arun: *I can understand that diet, exercise, and stress can affect our health and lead to various chronic diseases. But what does spirituality have to do with my health issues? Why should I be interested in exploring my spirituality?*

Dr. Aggarwal: *The connection between health and spirituality is a very pertinent question.*

A Gallup Poll conducted among 1025 adult Americans revealed that 81% believe in God or a universal spirit, and that 58% consider religion to be of considerable importance.[4] Closer home, a survey in 2019 revealed that belief in God is nearly universal in India (97%), and roughly 8 out of 10 Indians (79%) say they believe in God with absolute certainty.[5]

In recent years, evidence has accumulated on the impact of spirituality and religiosity on various health outcomes related to longevity; this includes associations with decreased risk of mortality, cardiovascular disease (CVD), cancer, suicide, cognitive decline, and increased likelihood of healthy ageing that leads to healthy longevity.[6] Other research studies showed that people with regular spiritual practice have shown reduced deaths, depression, suicides, and cardiovascular mortalities.[7,8] Figure 2.1 shows the pathways linking spiritual practices and longevity.

Engaging in spiritual practices such as meditation, prayer, or mindfulness may help reduce stress and promote relaxation. It improves sleep quality, increases brain plasticity, and strengthens the ability to process and store data. Stress-relieving techniques have been shown to inhibit sympathetic

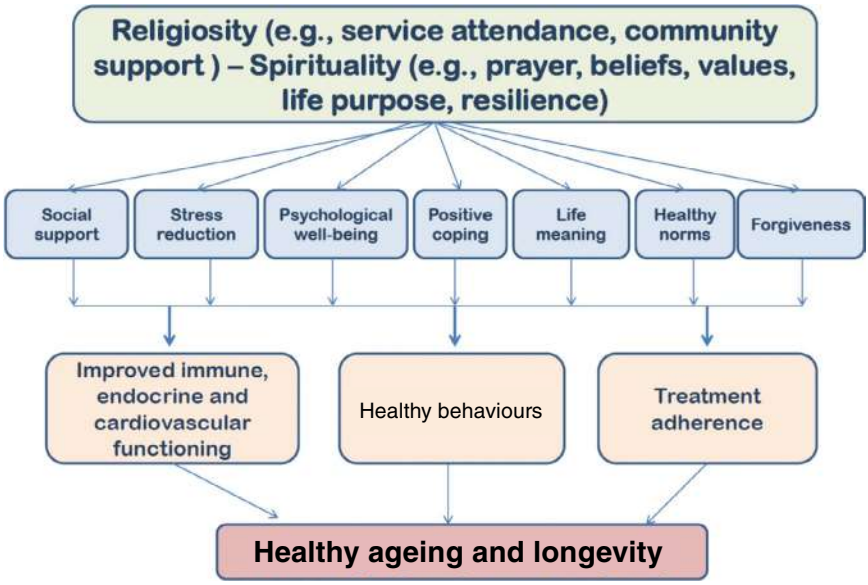


Figure 2.1. Pathways linking spiritual practices and longevity

Source: Reproduced from Dominguez, L. J., Veronese, N., & Barbagallo, M. (2024). The link between spirituality and longevity. *Aging Clinical and Experimental Research*, *36*(1), 32. https://doi.org/10.1007/s40520-023-02684-5; licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

system activity and activate the parasympathetic system, which may explain the reduction of stress; they are also associated with lower levels of anxiety and depression, as well as higher levels of self-esteem and satisfaction.[9] Figure 2.2 depicts the mechanisms explaining the link between spiritual/religious practices and longevity.

Understanding Spirituality

Mr. Arun: *You know, I get that spirituality and health are connected, but I'm a bit confused on what exactly things like worldview, spirituality, and religion really mean. Can you break it down for me?*

Dr. Aggarwal: *Sure, these terms can be confusing. Let's unpack those terms together and clear things up for you.*

Worldview refers to a comprehensive framework of beliefs, values, attitudes, and assumptions that an individual holds about the nature of reality,

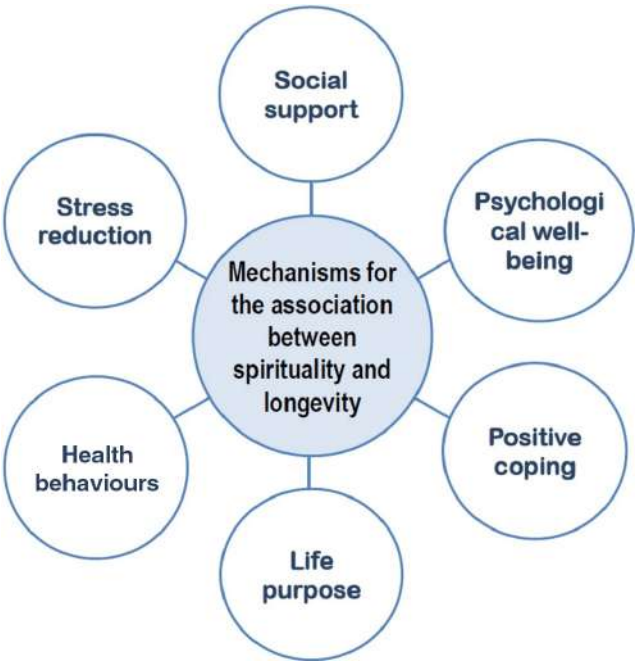


Figure 2.2. Mechanisms explaining the association between spiritual practices and longevity

Source: Reproduced from Dominguez, L. J., Veronese, N., & Barbagallo, M. (2024). The link between spirituality and longevity. *Aging Clinical and Experimental Research*, *36*(1), 32. https://doi.org/10.1007/s40520-023-02684-5; licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

the world, and their place in it. It is a broad term including, but not limited to, spiritual or religious aspects. In simple words, worldview determines how we interpret the world and make choices based on that interpretation.

Spirituality can be understood as a personal exploration of meaning, purpose, and connection to something greater than oneself. It may or may not invoke a divine being. When viewed this way, spirituality is an important component of quality of life (QOL) and may be a key factor in how people cope with illness,[10] experience healing, and achieve a sense of coherence.

Religion encompasses a set of beliefs, practices, rituals, and values centred around questions of ultimate meaning and the nature of existence. It involves a belief in a higher power, such as a deity or deities, and may include moral codes, sacred texts, rituals, and organised institutions.

Mr. Arun: *The definition of spirituality is broad and vague. How do I even know if I am a spiritual person? And if I'm not, how can I become one?*

Dr. Aggarwal*: I'm glad you're curious about spirituality and want to explore it further. It is important that everyone understands these importance perspectives of life.*

A **spiritual person** is one who has a sense of meaning and purpose in life and expresses inner peace, joy, compassion, self-awareness, open-mindedness, gratitude, humility, integrity, and a sense of service to the community.

Mr. Arun: *The portrayal seems almost too perfect. Can ordinary folks like me ever reach that level, or is it just reserved for priests and monks?*

Dr. Aggarwal*: I can't disagree with you – it does seem unrealistic, doesn't it? Your questions show a genuine desire to understand what spirituality really means. It's great to see your eagerness to delve deeper into this realm. Is it possible for an ordinary person to transform into a spiritual individual?*

Spiritual Development

It can be described as a…

journey of faith with transcendence through everyday life events.
journey of understanding the purpose and meaning of life.
journey of deepening intimacy with the transcendence.
journey of knowing the transcendence through a deeper connection.
journey of knowing oneself in relation to transcendence.
journey of complete surrender to the leading and guidance of transcendence.
journey of experiencing one's complete transformation by the transcendence.
journey of transforming lives through a transformed life.

It is a path marked by various spiritual practices that provides meaning and purpose in life and a path to a spiritual journey.

Mr. Arun: *The whole process and possibilities sound very promising and attractive. How do I begin this journey?*

Dr. Aggarwal*: Spiritual development occurs through three phases: spiritual transcendence, spiritual transformation, and spiritual translation.*

Mr. Arun: *How can we ever connect with transcendence?*

Dr. Aggarwal*: That is a very thought-provoking question. Let's attempt to explain it as we go along.*

Spiritual Transcendence

Since transcendence surpasses the created being, it is understood to be beyond our complete understanding. The journey begins by connecting with and understanding this transcendence, and ultimately, sharing this experience with others.

Mr. Arun: *How can we connect or interact with transcendence? Is there a specific format for doing so?*

Dr. Aggarwal*: Different people and religious communities approach transcendence in their own unique ways. I can share some general principles that guide this interaction, but the specific format ultimately depends on each person's preferences and beliefs.*

INTERACTING WITH THE TRANSCENDENCE

Engaging with transcendence involves interacting beyond the confines of the material or physical realm and transcending the limitations of ego or ordinary consciousness, fostering a deeper sense of connection, meaning, and purpose in life. This can be achieved through various activities, including the following:

1. Worship

Worship is a deeply reverential and spiritual practice that connects the worshipper with the transcendence in an intimate and transformative way that nourishes the soul, strengthens the spirit, and deepens the bond. It is a pathway to spiritual growth, enlightenment, and union with the transcendent aspects of existence. One can encounter it through music, prayer, meditation, and reflection.

Music and songs play a powerful and effective role in spiritual worship, serving as vehicles for expression and connection with the transcendence by worshippers across diverse faith traditions. Music and songs facilitate the connection with the transcendence in the following ways:

a. Creates a sacred **atmosphere** conducive to worship
b. Facilitates a spirit of **participation** among the worshippers
c. Promotes **expression** of devotion, adoration, and gratitude among devotees
d. Imparts spiritual **teachings** and facilitates remembrance
e. Generates a spiritual sense of awe, joy, tranquillity, and dedication
f. Provides a sense of healing, comfort, strength, and hope

2. Prayer

Prayer is a deeply personal spiritual practice involving communion with a higher power, deity, or divine presence. Each style of prayer is often shaped by personal spiritual backgrounds, yet they typically encompass elements such as praise and worship, expressions of gratitude, seeking forgiveness, making commitments, asking for guidance, and presenting requests or petitions.

Prayer can take various forms, including spoken words (spontaneous or recitation), silent contemplation, rituals, or meditative practices, and it is commonly practiced within religious or spiritual contexts as a means of connecting with the divine or tapping into a deeper sense of meaning and purpose.

3. Meditation

Meditation or reflection is a practice that prepares the mind for a transcendental experience. It can be described as a time to withdraw or disengage from the daily routines, quieten the chatter of the mind, cultivate awareness of the present moment, and prepare for one's connectedness with transcendence. There are different areas of focus one may choose to reflect on.

4. Contemplation

The purpose of contemplation is to gain insight, clarity, or understanding about oneself, life's mysteries, or spiritual truths. The methods of contemplation can be adapted and combined according to individual preferences and spiritual traditions. It can be a time of deep reflection and inquiry on specific topics of concern of everyday life, specific portions of scriptures and spiritual themes, or specific life events in one's life or the lives of others. Contemplative practices may include identification of themes, deep reflection on themes from a spiritual context, or journaling.

Mr. Arun: *This was an incredible experience, and I truly felt a profound connection to something beyond the ordinary. It was a stark contrast to relying solely on my own wisdom and strength, rather than seeking guidance from a higher power. How can this connection with transcendence change my life as a spiritual person?*

Dr. Aggarwal*: Connecting with transcendence is just the beginning of our spiritual journey. We need to understand and prepare ourselves for what lies ahead. In any learning process, we need both theoretical knowledge and practical application to succeed. Similarly, in our spiritual journey, we gain insights from scriptures and divine revelation, which we then apply to our daily lives. Embracing transcendence comes with its own set of challenges, guiding us to find solutions rooted in our faith and past experiences.*

Spiritual Transformation

Mr. Arun: *This has always been my struggle: How can I find out the true meaning and purpose of my life?*

Dr. Aggarwal*: This is really a universal question for humankind…*

MEANING AND PURPOSE

Discovering meaning and purpose in life is a deeply personal and continual spiritual journey, intertwined with our beliefs and values. It is most comprehensible in three stages:

1. Understanding transcendence and its overarching purpose
2. Understanding oneself within the framework of transcendence
3. Understanding meaning and purpose through everyday life experiences

Mr. Arun: *I always thought that beliefs and values meant the same thing… isn't that the case?*

Dr. Aggarwal*: At first glance, beliefs and values may appear synonymous. There is a small but distinct difference.*

Beliefs: A belief is a conviction or acceptance that something is true, often based on faith, personal experience, or evidence, for example, belief in the existence of a higher power or deity.

Values: Values are principles or standards of behaviour that are considered morally, ethically, or socially acceptable, and which guide our choices, priorities, and actions. Examples of values include honesty, integrity, compassion, empathy, justice, equality, freedom, loyalty, and respect for others.

While beliefs provide the foundation for our understanding of the world and our place in it, values serve as guiding principles that dictate how we live our lives and interact with others. Collectively, beliefs and values mould our identity, establish our moral direction, influence our attitudes, and guide our decisions and behaviour. A spiritual individual's beliefs and values are typically rooted in scriptures and personal spiritual encounters.

Mr. Arun: *Thanks for sharing your insights on belief and values. I'm really trying to figure out how to put all this into practice and become more spiritually grounded. But honestly, I struggle sometimes... How can I actually make progress in becoming a more spiritual person?*

Dr. Aggarwal*: I hear you. Your honesty and desire to grow spiritually are commendable. Let us begin the journey of spiritual discovery…*

There are some interesting phrases: "You are what you eat," and "you are what you think…" and "…in beholding, you are transformed…" The information we absorb through our senses influences both our conscious and subconscious minds, shaping our worldview in the process. The content we engage with – whether through screens, reading materials, our social interactions, or the environments we inhabit – plays a significant role in shaping our perspective on the world.

We can systematically experience spirituality by incorporating structured practices and rituals into our daily lives. This can involve the following:

1. **Setting a SMART spiritual goal.** A SMART goal is one that is Specific, Measurable, Achievable, Relevant, and Time-bound. This is discussed further in Chapters 5 and 12. Here is an example of a SMART spiritual goal:
    - *Specific:* I will deepen my spiritual practice by incorporating daily meditation into my routine.
    - *Measurable:* I will meditate for at least 20 minutes each day.
    - *Achievable:* I will start with 5 minutes of meditation each day and gradually increase the duration.
    - *Relevant:* Meditation aligns with my desire to cultivate inner peace and spiritual growth.
    - *Time-bound:* I will achieve this goal within the next three months by meditating consistently each day.
2. **Writing a spiritual journal.** This could consist of a written portion of scripture and your reflections on them, documenting significant daily events with your thoughts, or making a spiritual commitment.
3. **Integrating spirituality into daily life.** Other ways to methodically engage with spirituality are to establish a routine, reflect on experiences, practice mindfulness, identify a spiritual mentor, identify a spiritual mentee, engage in community service, and maintain balance in one's physical, mental, and social life.

Mr. Arun: *Thank you for this organised approach to spirituality. I think it will be very helpful for my own journey. But you know – I've made resolutions to resist temptation before, yet I still find myself giving in easily. How can I actually beat these temptations?*

Dr. Aggarwal*: You're definitely not alone in facing this struggle. But as we keep walking this spiritual path, we'll figure out how to overcome this challenge as well.*

Our mind comprises both conscious and subconscious components. It is the dynamic interaction between these two that governs our decisions and actions. The subconscious mind houses our beliefs and values, which exert a significant influence on our behaviour and choices. Meanwhile, the conscious mind contends with a barrage of thoughts, desires, and temptations. Ultimately, it is the interplay between these two aspects of the mind that shapes our final decisions.

NURTURING ONE'S THOUGHTS

The way we nurture our thoughts holds the utmost importance as it shapes our beliefs and values in our subconscious mind. Thoughts wield significant influence over emotions, behaviours, and overall well-being. Cultivating positive and constructive thinking patterns is pivotal in nurturing your thought life.

a. Be aware of your thoughts.
b. Reflect and contemplate based on your belief system.
c. Affirm positive thoughts and align them with your goals and values.
d. Challenge negative or distorted thoughts.
e. Identify alternative and more positive perspectives.
f. Practice gratitude.

Mr. Arun: *This viewpoint is eye-opening. Thanks for sharing it with me. But tell me this – how can I find it within myself to forgive someone who has hurt me deeply?*

Dr. Aggarwal*: Forgiving someone who has deeply hurt us can be a challenging process, but it is possible with time, effort, and self-reflection. Here are some steps that may help in the forgiveness journey.*

1. Acknowledge your feelings and reflect on their impact on you.
2. Empathise with the possible motivations and circumstances for the action.
3. Establish healthy boundaries to protect yourself from further harm.
4. Practice letting go of bitterness and resentment towards the person who hurt you.
5. Release the desire for revenge and embrace inner peace and healing.
6. Seek spiritual support from trusted friends, family members, or a spiritual person.
7. Focus on healing by engaging in activities such as exercise,[11] hobbies, and spiritual practices.

Spiritual Translation

Mr. Arun: *Thanks, Doc, for breaking down how connecting with something bigger can change me. But you know how it is – I'm in business, dealing with all sorts of people, and not every interaction is pleasant, you understand ... Do you think I can actually use these spiritual concepts to improve my relationships with family and the community? It sounds tough, because dealing with people isn't always easy.*

Dr. Aggarwal*: I fully agree with you – applying spiritual principles to real-life interactions is probably the toughest part. Let's explore some spiritual perspectives on connecting with others.*

CONNECTING WITH PEOPLE

Spirituality plays a significant role in connecting with people on various levels, fostering deeper relationships and a sense of community. Here are some key aspects of how spirituality contributes to connection with others:

1. Shared values and beliefs
2. Compassion and empathy
3. A sense of belonging
4. Shared practices and rituals
5. Mutual growth and support
6. Transcendence of differences
7. Love and forgiveness

Overall, spirituality serves as a powerful catalyst for connecting with people, promoting understanding, compassion, and unity among individuals and communities. It provides a framework for meaningful interactions and relationships grounded in shared values, empathy, and mutual respect.

The Rabbit Effect refers to a phenomenon observed in a scientific study conducted by Dr. Robert Nerem, a cardiovascular physiologist. The study involved rabbits and the impact of kindness and community on their health outcomes. In the experiment, two groups of rabbits were fed a high-cholesterol diet to induce atherosclerosis (hardening of the arteries). Surprisingly, the rabbits in one group showed significantly less atherosclerosis compared to the other group, despite both groups consuming the same diet. This unexpected result was due to the fact that the group of rabbits with far healthier blood vessels was under the care of an especially kind post-doctoral student who treated the animals with love and patience when handling them. This experiment led to the term the "Rabbit Effect" to describe the profound idea that both

rabbits and humans thrive in community, and that health is "bolstered by love, connection, and purpose."[12] This experiment demonstrated the positive impact of social connections and community on health outcomes.

The implications of the rabbit effect extend beyond the realm of cardiovascular health and have sparked further research into the importance of social connections in human health and well-being.[13,14] Studies have shown that strong social support networks and a sense of community are associated with various positive health outcomes,[15] including lower rates of depression,[16] anxiety, and mortality. This concept underscores the importance of fostering social connections and building supportive communities as essential aspects of promoting overall health and resilience in both rabbits and humans alike.

The Use of Technology for Spiritual Development

Various technologies can be employed in spiritual care to enhance support and guidance for individuals seeking spiritual fulfilment or coping with spiritual concerns. Some examples include:

a. Online resources – reading materials, podcasts, videos, and so on
b. Online courses and workshops – spiritual development and practices
c. Online communities – spiritual support systems
d. Mobile apps – tools for spiritual practices
e. Teleconferencing and video calls – one-on-one or group sessions
f. Virtual reality (VR) – to create immersive environments for spiritual practice
g. Artificial intelligence (AI) chatbots – for spiritual queries and practices

These technologies can complement traditional forms of spiritual care and support, expanding access to resources, guidance, and community for individuals seeking to explore and nurture their spiritual well-being.

Best Practices for Children

1. Conduct regular family gatherings for communal reflection and worship.
2. Encourage curiosity and questions.
3. Model spiritual values.
4. Promote connection with nature.
5. Foster empathy and service.
6. Promote a sense of purpose and meaning.

Best Practices for Older Adults

1. Daily spiritual time (songs, readings from holy scriptures, reflection, and prayers)
2. Connecting with nature (gardens and pets)
3. Religious services
4. Community service
5. Creative expression (arts, music, writing, *etc*.)
6. Connection with others (friends and family members)
7. End-of-life preparation (finances, property, funeral and legacy projects)
8. Forgiveness and healing
9. Celebrating life's milestones

By integrating these spiritual practices into the lives of children and older adults, caregivers can support their holistic well-being and help them find meaning, comfort, and connection.

Mr. Arun: *Wow, this has been an insightful discussion, doctor. I can see now how my whole outlook on life and my connection to something bigger have shaped the way I live and even affected my health choices. It makes sense to me now that there are deeper issues in my life that need attention.*

MYTHS DEBUNKED

MYTH 1: Spirituality is the same as religion.

FACT: *While spirituality can be a component of religious practice, it is not synonymous with religion. Spirituality is often more personal and can exist outside the confines of organised religion.*

MYTH 2: Spiritual people are always peaceful and serene.

FACT: *While spiritual practices like meditation can promote inner peace, spiritual people are not immune to experiencing other emotions like anger, sadness, or frustration like anyone else.*

MYTH 3: Spiritual people possess supernatural powers.

FACT: *Contrary to popular belief, spirituality does not inherently grant individuals supernatural abilities. While some spiritual practices may involve exploring*

intuitive or psychic abilities, these experiences are often subjective and not universally applicable.

MYTH 4: Material wealth is incompatible with spirituality.

FACT: *While some spiritual teachings advocate for simplicity and detachment from material possessions, this doesn't mean spiritual people cannot be wealthy. It pertains to one's relationship with wealth and how it is used, rather than the possession of wealth itself.*

MYTH 5: Spiritual people are immune to suffering or illness.

FACT: *Spiritual practice can offer tools for coping with suffering and illness, but it doesn't guarantee immunity. Spiritual growth often involves grappling with life's challenges, including illness and suffering.*

MYTH 6: A spiritual person is an escapist or detached from reality.

FACT: *While spiritual practice can involve transcendence or seeking a deeper reality, it also emphasises presence and engagement with the world. Many spiritual teachings emphasise the importance of being grounded in the present moment and actively participating in life.*

MYTH 7: Spirituality is anti-science.

FACT: *While some spiritual beliefs may conflict with certain scientific theories, spirituality and science are not inherently opposed. Many people integrate both into their understanding of the world, finding harmony between scientific exploration and spiritual inquiry.*

CONCLUSION AND KEY TAKEAWAYS

The link between spirituality and health has gained attention over the past decades, with scientific researchers grappling with the topic in various domains of healthcare, trying to define the boundaries of spirituality and provide mathematical evidence. It is a complex multifaceted process requiring an in-depth examination of one's life.

It is important to delve into the underlying causes of such conditions, which in Arun's case may stem from a stressful lifestyle, poor dietary habits, lack of physical activity, disrupted sleep patterns, and more. By addressing these factors, we can prevent and effectively treat these ailments. To tackle these issues, we must examine what drives individuals to make such choices

that disrupt their life rhythms, and explore their motives, purpose, worldview, and so on. This introspection leads us to the core of one's being, which encompasses spirituality. It is worth noting that scientific evidence in this area is still evolving. Although there is ample evidence strongly supporting the positive impact of spirituality on health, there is a need for more structured systematic studies to help the global medical community to appreciate the impact of spirituality on holistic health.

- Spirituality is a personal journey of finding meaning and purpose in life.
- Spirituality is a journey of transcending beyond the material world into the divine.
- Spiritual development refers to the process of growth and deepening of an individual's spiritual beliefs, experiences, and practices over time.
- Spiritual practice involves connecting with the transcendence, finding meaning and purpose, developing beliefs and values, experiencing well-being, and developing meaningful connection with our social environment.
- It results in a better world where humans value each other.

RESOURCES

Videos

1. What Makes a Good Life? Lessons from the Longest Study on Happiness by Robert Waldinger at TEDxBeaconStreet [12:37]
2. The Power of Forgiveness by Immaculee Ilibagiza @LEAD [29:02]
3. The Gift and Power of Emotional Courage by Susan David at TEDWomen2017 [16.38]
4. The Mathematics of Love by Hannah Fry at TEDxBinghamtonUniversity [16.52]

Chapter 3

MENTAL HEALTH: NURTURING THE MIND

Pratima Murthy and Seema Mehrotra

Rohini, a 30-year-old married woman, has a strong interest in volunteering for various social causes. However, over the past two years, she has felt overwhelmed by the demands of her new job. She notices that there are significant workplace politics affecting how work responsibilities are assigned, leaving her feeling disheartened. She is troubled as her attempts to find another job are unfruitful. Rohini finds solace in spending time with her family at home and teaching neighbourhood children on weekends. She worries about finding a job with a better work environment and experiences occasional sleep disturbances. Additionally, she sometimes feels guilty about leaving her previous job for her current position. She does her best to manage her current workload but is unsure of how long she can sustain it.

INTRODUCTION

What might be happening here? Are these understandable and normal "ups and downs" in life, or is it something more than that? What are your thoughts on Rohini's mental health and well-being? Could she do something to help herself or should she seek professional help for her mental health? We will touch upon some of these aspects below. In this chapter, we will explore the importance of recognising and addressing mental health concerns, as well as providing guidance on seeking appropriate support and resources for individuals like Rohini who may be struggling with their mental well-being.

According to the World Health Organisation (WHO), "Mental health is a state of well-being in which an individual realises his or her abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community."[1] This positive definition of mental health sets it apart from merely equating health with the absence of disease. It brings it on par with the concepts of psychological and social well-being by highlighting not just feelings of well-being, but also the aspects of coping and functioning well, and contributing to society.

The Determinants of Mental Health

In the continuum of mental health ranging from illness and poor functioning to flourishing and optimal functioning, each person's position is dynamic. Many factors influence where a person may find themselves at different points in time. These may include individual-level factors such as genetic vulnerability, temperament, personality traits (*e.g.*, anxiety, emotional stability), lifestyle behaviours, and psychological skills (such as emotional regulation, problem-solving, and coping). Our external circumstances (*e.g.*, social environment, safety, and sense of community), social inequalities, financial resources, and access to social support also shape our mental health. Significant events in our lives (whether positive or negative) can affect our mental well-being. The impact of such events depends on their nature, severity, timing, and duration, as well as their interplay with our vulnerabilities and protective factors, including coping strategies and resilience.[2]

Mental Health: A Life Span Perspective

Risk and protective factors can affect us throughout our entire lifespan, but certain stages in life and the timing of life events may increase our vulnerability to mental health problems. These include experiences of physical or sexual abuse, bullying, maltreatment, chronic neglect, exposure to violence, or being caught in a humanitarian crisis during the early years. One or more of these situations can have significant long-term mental health consequences.[3] For example, exposure to at least four adverse childhood experiences was found to be strongly associated with sexual risk-taking, mental health conditions, alcohol abuse, problematic drug use, and interpersonal and self-directed violence.[4]

Adolescence offers numerous occasions for positive shifts in the trajectory of youth development when there are positive relationships with supportive adults, positive experiences, access to opportunities, and guidance on how to apply one's strengths and deal wisely with one's weaknesses. However, it is also a phase of vulnerability, with a majority of mental health problems emerging during this period.[5] The State of the World's Children 2021 Report by UNICEF highlighted that globally, 1 in 7 adolescents aged 10-19 is estimated to live with a diagnosed mental disorder, and anxiety and depression comprise about 40% of these conditions; in India, about 14% of those aged 15–24 (1 in 7) reported often feeling depressed or having little interest in doing things; and for adolescent boys and girls aged 15-19, suicide is the fourth most common cause of death.[6]

Youth is a period during which susceptibility to peer influences may be particularly high. Peer norms and direct and indirect peer pressures can

increase the risk of engaging in behaviours that have health consequences, such as initiation into alcohol, drug use, and risky sexual behaviours. Young people who are exposed to family conflicts, experience rejection, have a high sensitivity to rejection, and face low levels of family support are more vulnerable to peer pressure and its effects on mental health. Similarly, those with a strong need for peer approval who struggle with assertiveness may be at higher risk of adverse impact of peer pressures.

Digital technology and social media use in modern societies has emerged as another factor with high relevance for mental health. Though it comes with benefits in terms of diversity of exposure, awareness, and social connections, the review of evidence suggests that higher levels of screen time may be associated with a variety of adverse health effects for children and youth. These range from attentional difficulties, speech delays, unhealthy diets, sleep problems, and depressive and anxiety symptoms, to overall poor quality of life. Some of these adverse consequences are likely to be influenced by the impact of excessive screen use on physical activity, sleep, and social interactions.[7]

Pregnancy and the transition to parenthood poses significant challenges and is associated with an increased risk of both depressive and anxiety symptoms. For mothers, the perinatal period from the beginning of pregnancy until one year after childbirth is marked by significant biological and psychosocial changes that can lead to mental health problems. These range from post-partum blues, anxiety, and depression to postpartum psychosis. A history of mental health problems including depression, domestic violence, stressful life events, marital disharmony, and lack of social support all increase the risk of experiencing mental health problems during pregnancy and in the postpartum period.[8] New fathers may also experience significant mental health challenges during this period. In addition to the mother's suffering, perinatal mental health conditions can pose significant risks to the infant's health and development. The role of physiological processes notwithstanding, supportive relationships (particularly with the spouse) can play a significant role in protecting mental health and in aiding recovery from mental health problems.[9]

Another life transition relevant to mental health is the older adulthood phase. The World Health Organisation defines healthy ageing as "developing and maintaining the functional ability that enables well-being in older age."[10] A recent systematic review of research highlighted ten determinants of healthy ageing.[11] These include physical activity, diet, self-awareness, outlook/attitude, life-long learning, faith, social support, financial security, community engagement, and independence. Transitioning to older adulthood brings potential challenges related to physical health, social connectedness, isolation,

and loneliness. These challenges can be exacerbated or mitigated based on the individual's resources and opportunities for continued engagement in meaningful activities and finding newer roles and opportunities. While social isolation is the objective state of having a limited network of family-based and non-family relationships and relatively infrequent interactions, loneliness is to do with the subjective feeling that arises from a mismatch between desired and actual social connections. The available research indicates that social isolation and loneliness in older adulthood may increase the risk of a variety of adverse health and well-being outcomes (*e.g.*, cardiovascular disease, stroke, diabetes, cognitive decline, depression, anxiety, and overall quality of life).[12] The United Nations has declared 2021-2030 as the Decade of Healthy Ageing to promote the health of over a billion people aged 60 and older, by scaling up effective interventions to reduce social isolation and loneliness.

The Magnitude of Mental Health Conditions

The National Mental Health Survey 2015–2016,[13] which sampled more than 30,000 Indian adults across 12 states, revealed that roughly 150 million adults suffer from some form of diagnosable mental health condition; common mental disorders (CMDs), including depression, anxiety disorders, and substance use disorders, were found to be a huge burden, affecting nearly 10% of the population; about 1 in 20 adults in India are estimated to be suffering from depression; and substance use disorders (including alcohol use disorder and moderate to severe use of tobacco) were prevalent in 25.5% of the adult population, where individuals in the age group of 30–49 years were noted to be the most affected, indicating that mental disorders contribute to greater morbidity in the economically productive population.

A rise in the prevalence of mental disorders in the past decade, including an increase in mood disorders and suicidal thoughts and behaviours, particularly in adolescents and young adults, has been noted in research from a few countries including India.[14,15] Possible explanations for such an increase could be better recognition and reporting of mental health problems, higher use of social media, academic pressures, income inequalities, and hardship associated with the COVID-19 pandemic, among others.

The National Mental Health Survey also revealed that a large proportion of those experiencing a mental health condition do not seek or receive the necessary mental healthcare. The treatment gap for overall mental morbidity was noted to be as high as 84.5% in this survey.[16] Lack of awareness, lack of easy access to affordable professional care, and stigma are some of the factors that contribute to this treatment gap. In addition, there are severalfold

more persons who experience transient psychological disturbances, distress, or subthreshold symptoms that adversely affect functioning and require attention. Along similar lines, the UNICEF report pointed out that only 41% of Indian youth between 15 and 24 years of age opined that it was better to get support for mental health problems, in contrast to an average of 83% of youth in 21 other countries, indicating the urgent need for efforts in India to break barriers in seeking help.[17]

The Need for an Optimal Mix of Services

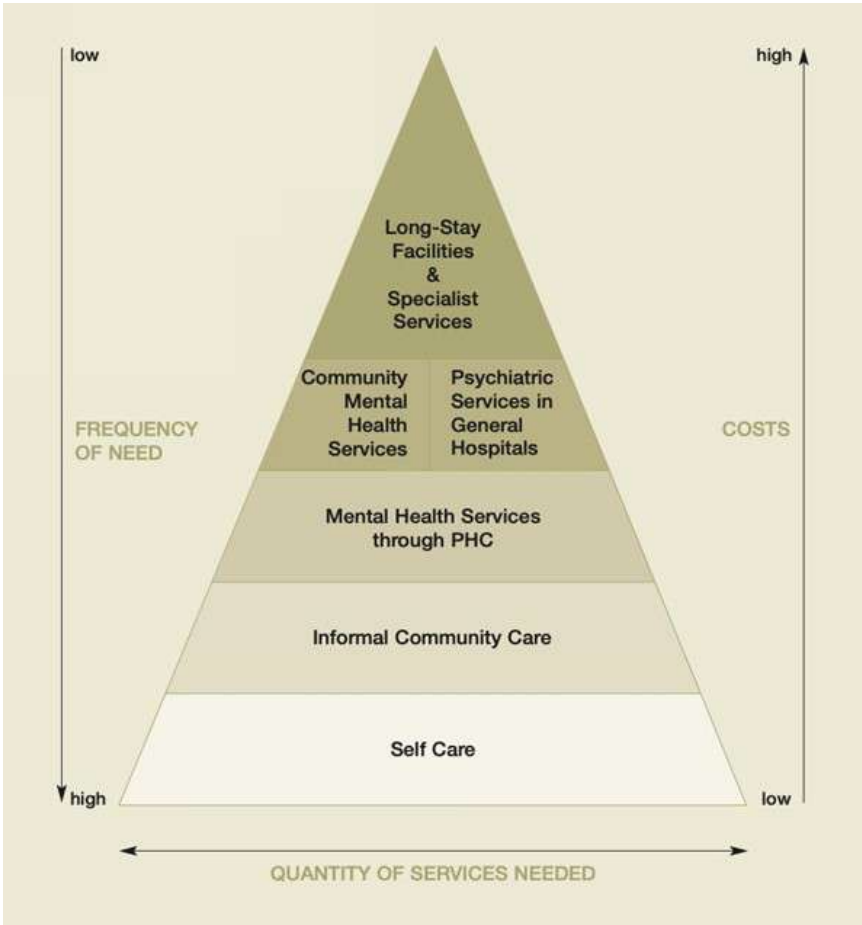


Figure 3.1. Pyramid for an optimal mix of mental health services

Source: Reproduced with permission from World Health Organisation. (2003). *Organisation of services for mental health* [Mental Health Policy and Service Guidance Package]. p34. https://iris.who.int/bitstream/handle/10665/333104/9241545925-eng.pdf?sequence=1&isAllowed=y

Figure 3.1 depicts the WHO pyramid of optimal mix of services, which highlights that the majority of individuals in any given population experience mild conditions that can be effectively managed with lower-intensity interventions such as self-help and peer- and community-based support. However, globally, attention has instead been disproportionately focused on developing specialist psychiatric facilities that are required by a smaller proportion of individuals dealing with mental health challenges. The WHO pyramid of the optimal mix of services emphasises the need for a systematic investment of efforts to improve mental health literacy, develop easy-to-access self-care and peer support intervention strategies, train non-specialist healthcare providers, and develop community-based programs that could cater to the unmet mental health needs of the larger segment of population dealing with mild severity of conditions.

Self-Care for Mental Health

Just like physical healthcare, mental healthcare is relevant for everyone, and not just for those experiencing challenges. Caring for mental health means being aware of and addressing one's mental health needs. It involves doing things that maintain or promote well-being, and seeking timely help for mental health difficulties from different sources, including professional help when required. Mental healthcare needs to be prioritised, and not just because it affects how we feel. Just as workplace well-being boosts the performance of employees and organisations, mental health affects almost all domains of our lives such as overall health, relationships, productivity, and functioning.

Tips and Tools

1. Caring for health in general and adopting a healthy lifestyle

As mentioned earlier, physical health and mental health are closely linked. Taking care of one's physical health *via* regular consumption of a healthy diet, adequate sleep, optimal exercise, sufficient hydration, and exposure to green spaces and sunshine can positively affect mental health in several ways. Similarly, caring for one's mental health can influence outcomes of physical illness.

Managing sleep: Mental health difficulties can lead to sleep-related problems. However, poor sleep can also contribute to the onset, recurrence,

and maintenance of mental health difficulties. Individual needs for sleep vary based on age, health conditions, and other factors. A Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society (2015) recommends seven hours or more of sleep per night for healthy adults.[18] However, good sleep is not merely about the duration. Factors such as sleep quality, timing, and regularity are equally important. Sleep hygiene, also called sleep preparation, refers to a set of behaviours that can influence sleep quality and duration. However, for managing sleep-related problems, the practice of sleep hygiene often needs to be combined with other therapeutic approaches. Sleep hygiene is discussed in further detail in Chapter 8, and includes addressing the following:

- Behavioural factors, such as engaging in regular exercise but avoiding strenuous workouts and heavy meals close to bedtime
- Cognitive factors, such as avoiding worrying and planning during bedtime
- Environmental factors, such as managing room temperature and turning off electronic devices
- Sleeping patterns, such as a regular sleep schedule and bedtime routine
- Substance use, such as avoiding alcohol and stimulants such as caffeine and nicotine, close to bedtime; in fact, tobacco use is associated with several adverse health consequences in general, and choosing to completely quit may be an important step towards a healthier life for tobacco users.

Managing screen time: The Indian Academy of Paediatrics Guidelines on Screen Time and Digital Wellness in Infants, Children and Adolescents (2021)[19] say that children below two years of age should not be exposed to any type of screen. It recommends that exposure be limited to a maximum of one hour of supervised screen time per day for children aged 24–59 months, and less than two hours per day for children aged 5–10 years. Screen time should not replace other activities such as outdoor physical activities, sleep, family and peer interaction, studies, and skill development. Moreover, parents need to monitor screen use to ensure that the content is non-violent, educational, and age appropriate.

Although a clear global level consensus on a cut-off for excess screentime exposure for adults is yet to emerge, it is helpful to monitor the extent to which screentime may be interfering with the optimum level of physical activities, exercise, sleep, and time with family and friends. Research suggests that avoiding screen use within an hour of bedtime, ensuring a protected number of hours daily without screen-use, and limiting social media use to 30–60 minutes a day may reduce the adverse consequences of excessive screen use.[20]

Optimum physical activity: Physical activity is linked to various mental health benefits that range from brain health and reduced risk for anxiety and depression to improved overall quality of life. For children between 5 and 17 years, physical activity is associated with benefits in the cognitive, behavioural, and mental health domains. Hence, for children in this age group, the World Health Organisation recommends limiting time spent in sedentary behaviours and engaging in an average of at least 60 minutes/day of moderate physical activity (primarily aerobic); for adults aged 18–64 years, at least 150–300 min per week of moderate-intensity aerobic physical activity is recommended; older adults and persons with chronic conditions should stay as physically active as their functional ability and condition permits.[21] More information on physical activity can be found in Chapter 7.

Healthy diet: Proper nutrition is similarly essential for both physical and mental health. Available research, discussed in Chapter 6, suggests that healthy diet patterns (for example, adequate consumption of fruits, vegetables, whole grains, pulses, nuts, and seeds) may play a protective role against mental health problems such as depression. Moreover, our food choices, mood, and mental health can influence each other to varying extents, and it helps to stay self-aware about how these may be playing a role in our lives at any given point of time.

2. Regulating negative emotions such as sadness, anxiety, and anger

Challenges in managing negative emotions are seen across several mental health conditions. Improving emotional regulation can help build resilience to stress and improve coping abilities.[22] Regulating emotions does not entail suppressing them nor expressing them in an uncontrolled manner. Instead, it involves consciously responding to emotions with awareness, rather than impulsively reacting to them. Emotional regulation can be achieved through the flexible use of various strategies that suit the context. These could include thinking strategies (such as using pleasant imagery to increase a sense of calmness or trying to think of the given situation from a different perspective) as well as behavioural strategies (such as engaging in physical exercise to reduce the intensity of anger or reaching out to someone to brainstorm solutions). When emotions are intense, strategies that temporarily reduce their intensity are helpful. Thinking strategies are easier to apply when the intensity of emotions decreases. However, we need to be wary of using quick relief methods that can be harmful or unhealthy in the long run (*e.g.*, turning to smoking tobacco or reaching out to eat something unhealthy every time

one feels anxious or low). There are several self-help methods as well as therapy approaches and promotive intervention programs that can help in strengthening emotion-regulation skills.

3. Cultivating positive emotions

Maintaining mental health and well-being is not merely about managing negative emotions, but also about cultivating positive emotions. Frequent and regular experiences of positive emotions are linked to several beneficial health and other outcomes over time. Positive emotions are valuable resources in day-to-day life and in successfully dealing with major life situations. Again, an emphasis on cultivating positive emotions should not imply that negative emotions must not be experienced. Actions that can help cultivate positive emotions include those mentioned below such as meaningful engagement, setting goals, and self-compassion, among others.

4. The role of meaningful engagement

Regular engagement in personally meaningful activities can help in maintaining well-being and recovering from illness. Different kinds of activities may be meaningful for different people. A solid body of research evidence links engagement in meaningful activities to the experience of positive emotions, meaning in life, and life satisfaction.[23]

5. Goals and happiness

The available research suggests that having goals is linked to well-being. Goals challenge us and motivate us to garner resources and skills. The pursuit of goals can help in strengthening a sense of self-confidence. However, a constant pursuit of materialistic goals as an end in itself, setting up conditions for feeling happy ("I will be happy only if I achieve this"), pursuing goals rigidly or pursuing goals that are driven by a sense of social compulsion/imposition rather than a sense of ownership, a constant focus on what remains to be achieved rather than appreciating efforts and micro-gains, are all factors that can adversely influence well-being.[24]

6. Letting go and being flexible

Letting go involves releasing thoughts, feelings, or actions that no longer serve a purpose. This could mean dropping unrealistic or unhelpful thoughts (rather than brooding) and shifting perspectives on goals. Perseverance is

often essential for progressing on a path of action, ensuring consistent efforts towards our goals and not giving up prematurely, despite the inevitable ups and downs. However, at times, when we find ourselves stuck for an extended period, it is helpful to take a pause and reflect on whether there is a need to change the goal or change our approach to the goal in some way.

Another process linked to letting go is forgiveness. It has been described as a voluntary internal process of releasing feelings and thoughts of resentment, bitterness, grudges, or anger toward someone. It does not mean condoning wrongdoing, neglecting justice, or reconciliation with the person in question. From a psychological perspective, forgiveness is an internal process involving letting go, understanding, and making peace within oneself. The practice of forgiveness in day-to-day life has been linked to mental health outcomes such as reduced stress, anxiety, and depression.[25]

Psychological flexibility in thinking, feeling, and behaving to adapt to changing situations is an important marker of mental health and well-being.[26] Cultivating an attitude of openness that allows us to make wise choices depending on the given context and the practice of mindfulness can help develop flexibility. Mindfulness involves being aware of all the thoughts, emotions, and sensations as they are experienced moment to moment, without judging, filtering, or clinging to them. Mindfulness-based approaches have been extensively explored for their therapeutic utility in the management of common mental health conditions.

7. Being a good friend to yourself: cultivating self-compassion

Remaining objective about our behaviours and recognising our mistakes is an essential aspect of learning and growth in any sphere of life. However, it is important not to conflate our mistakes and failures within a specific context or set of circumstances with our sense of self-worth. For example, the transition from the thought "I did not do well in the last few interviews" to the self-perception "I am a failure" is not merely unwarranted but can also negatively affect our mental health when these patterns of self-criticality persist. Research shows that self-criticality is one of the important factors underlying depression and anxiety disorders.[27] Enhancing self-acceptance and self-compassion are some of the key goals in various psychotherapy approaches.[28] Self-compassion is mistakenly equated with self-pity. Self-pity implies a sense of victimhood and a sense of personal suffering in isolation from others. On the other hand, self-compassion means acknowledging our mistakes or external challenges but seeing them as part and parcel of human existence. It involves looking at our challenges from the perspective of a

good friend who is compassionate, understanding, and encouraging. Various exercises and practices have been developed and researched to cultivate self-compassion and examine its role in maintaining well-being and promoting resilience.

8. Giving and reaching out for help

Access to supportive interactions and the perception that support is available are some of the most examined protective factors for mental health and facilitators of recovery from mental health problems.[29] Receiving the support we need at any given time can serve multiple purposes. It can provide emotional comfort and a different perspective to examine a problem, help brainstorm potential solutions, and enhance a sense of connectedness and hope.

Apart from receiving support, offering support to those in need also has its advantages for the giver. It can strengthen a sense of meaningfulness and connectedness. Sustained engagement in volunteering is positively linked to well-being. Beyond engagement in formal volunteering, day-to-day acts of kindness can also boost well-being by reducing stress, improving mood and self-esteem, and enhancing a sense of connectedness and fulfilment.

9. Self-help, informal help, and professional help

All of us need to engage in the practice of self-care and learn to utilise various methods of self-help to deal with minor day-to-day concerns and mild severity of common mental health problems. Self-help for mental health is analogous to first aid for minor physical symptoms or injuries. It can serve as the first line of support, help us bounce back or prevent aggravation of the problem, and boost our sense of confidence. However, self-help may sometimes be difficult to use, may not work, or may be insufficient due to the nature and severity of the problem. Seeking professional help to recover and restore well-being becomes critical in such instances.

Unfortunately, the majority of individuals who may benefit from mental health professionals do not seek or receive such help.[30] This is not merely due to the scarcity of trained professionals but also due to various mental and social barriers surrounding help-seeking. These range from a tendency toward normalising distress even when it is causing significant disturbances in our functioning, treating it as "just a passing phase," ignorance about the effectiveness of treatments of mental health conditions, social stigma, the need to rely exclusively on self-help and informal sources of support, to apprehensions that seeking professional help might mean not being "strong" enough to handle one's problems, and so on.[31]

The notion that "if I have support from family/friends, it should be enough; I don't need professional help" is a common fallacy. Informal help and professional help are not substitutes for each other but can supplement each other. Both may be required in some instances. It helps to know when to step up from depending solely on self-help and informal support and reach out for professional help and support.

Technologies for Mental Health

There are a variety of self-help tools available in various formats (*e.g.*, websites, e-books, apps, self-help programs, *etc.*) that one can judiciously choose according to need. A few web-based resources on mental health are mentioned at the end of this chapter. There is a plethora of mental health apps available to the public, which makes it easy to access and use self-care tools. However, these can also cause confusion for end-users who need to discern what may be useful for their individual needs at any given point of time. They also need to account for factors such as credibility, privacy, and security issues. NIMHANS has been making strides in the use of digital technology for mental health to train professionals and empower communities (for example, NIMHANS Digital Academy, Addiction Rx app for physicians, MindNotes from NIMHANS, PUSH-D, to name a few) and has issued guidelines for the practice of tele-mental health. Tele Manas is a comprehensive technology-enabled mental health service launched by the Government of India and includes a 24/7 toll-free number for the public to reach out to a tele-counsellor (toll free number: 14416).

Knowing When to Step Up and Breaking Barriers to Seeking Help

We need to consider reaching out for professional help when self-help methods are insufficient, when we are not able to utilise self-help methods due to the severity of the problem, or when, despite using self-help methods and our informal support systems, the severity of the problem remains the same or worsens to the point where it is significantly interfering with our day-to-day functioning.

Accessing professional help and utilising appropriate mental health treatment modalities (such as medications, psychotherapy, or a combination of the same) alongside the use of self-help methods can go a long way in managing mental health concerns and leading a meaningful and productive life.

MYTHS DEBUNKED

MYTH 1: In order to stay mentally healthy, we should not have any negative thoughts or feelings.

FACT: *It is a misconception that maintaining mental health requires the absence of negative thoughts or feelings. Constant attention to the occurrence of certain thoughts, attaching negative meaning to them, and trying to suppress them can lead to stress and contribute to conditions such as anxiety and depression. Many psychological interventions involve acknowledging such thoughts without attaching undue significance to them, and allowing them to pass, rather than attempting to control or suppress them. The key is to learn constructive ways to respond to negative feelings and thoughts rather than reacting to them in ways that are not helpful in the long run.*

MYTH 2: A mentally healthy person always feels happy.

FACT: *Positive and negative emotions are both a natural part of life. For example, negative emotions such as anger or anxiety serve a purpose – they might motivate us to address injustices or be prepared for challenges. Positive emotions broaden our focus and encourage exploration, leading to enhanced learning and social connectedness. Hence, both kinds of emotions have their value. Of course, if certain emotional states are prolonged and start to interfere with functioning, it should be a cause for concern. Although positive mental health is characterised by a relative predominance of positive emotions over negative ones, it is not just about feeling good. It also involves effective psychological and social functioning.*

MYTH 3: Mental health is automatically addressed when physical health is prioritised.

FACT: *Mental and physical health are intimately interlinked and affect each other in numerous ways. Poor mental health can increase the risk of physical health problems or worsen pre-existing physical conditions due to its adverse impact on healthy lifestyle behaviours and reduced adherence to treatment regimes. Similarly, physical health conditions and low engagement in healthy lifestyle behaviours can impact mental health through increased stress, disturbed moods, and so forth. Although physical and mental health are interrelated, taking care of one is not sufficient to take care of the other. We need to actively engage in self-care activities to maintain physical and mental health.*[32]

MYTH 4: People with mental health problems can "snap out of it" using their willpower.

FACT: *It is a common misconception that individuals with mental health problems such as depression or substance use disorders can overcome them through sheer willpower. This belief often stems from misinterpreting symptoms such as decreased interest or low energy as laziness. In substance use disorders, this misconception arises from lack of awareness on the biological basis of addiction and views dependence as a mere habit rather than an illness.*

MYTH 5: Medications used for the treatment of mental health problems make people dull and dependent on them.

FACT: *Medications prescribed for different types of mental illnesses reduce the symptoms and also play a role in preventing the return of mental health problems (relapse). Mental health medications, just like those for physical ailments, can have side effects such as dullness or drowsiness, but these often diminish over time. While some, like benzodiazepines, can be habit-forming, most are not. Medications with potential for dependence are judiciously prescribed for a short period and need to be taken strictly as per medical instructions on dosage and duration. On the other hand, it may be necessary to take some medications for an extended period, under supervision, to prevent relapse.*

MYTH 6: Psychological treatment for common mental health problems (such as depression or anxiety) is just getting advice from a counsellor or therapist, which we can anyway get from our loved ones.

FACT: *Psychological treatments or therapies are often mistaken for mere advice or suggestions. These are evidence-based treatments rooted in psychological principles and involve processes and techniques used by trained psychotherapists to help address different kinds of mental health problems and facilitate recovery. For some problems, psychotherapies may be used as the only modality of treatment, and for others, these may be used in combination with medical management.*

CONCLUSION AND KEY TAKEAWAYS

Going back to the story at the beginning of this chapter, it is likely that Rohini is going through a state of heightened psychological stress. Her self-care behaviours such as spending time with family, engaging in meaningful activities such as volunteering, and efforts at problem-solving are helping her to cope, protecting her mental health. Managing worries and feelings of guilt and self-criticality, as well as practicing sleep hygiene and mobilising support

from family and friends, might be additionally helpful self-help methods she could try. If the mood state and sleep disturbance worsen and start affecting her day-to-day functioning despite using self-help methods, then it might be time for her to reach out for professional help.

The key takeaway points for this chapter are as follows:

- Mental health is an integral aspect of overall health and impacts various domains of life. Mental healthcare needs as much attention as physical health, though these share a reciprocal relationship.
- Mental health problems are common. We can empower ourselves to take charge of our mental health.
- It is important to develop public awareness of mental health and common mental health problems.
- Engaging in day-to-day self-care practices and strengthening skills can maintain and improve well-being.
- Early recognition of mental health problems can enable us to reach out for professional help as and when appropriate.

RESOURCES

Articles and Websites

1. Mental Health Myths and Facts from the Substance Abuse and Mental Health Services Administration (SAMHSA.gov)
2. Information about Mental Health (available in different Indian languages) by the White Swan Foundation
3. Educational Leaflets on Different Mental Health Concerns by NIMHANS, Bengaluru
4. Preventing Harmful Drinking and Alcohol Addiction by NIMHANS, Bengaluru
5. UNICEF Report: The Mental Health Impact of COVID-19 on Children and Young People
6. Mental Health Issues in Adolescents: Guidelines for Parents by the Indian Academy of Pediatrics
7. Normal Psychosocial Development in Adolescents: Guidelines for Parents by the Indian Academy of Pediatrics
8. Screen Time Guidelines for Parents by the Indian Academy of Pediatrics
9. All About Positive Parenting by UNICEF India
10. What Does Too Much Screen Time Do to Kids' Brains? By Health Matters

Chapter 4

BUILDING HEALTHY RELATIONSHIPS: CULTIVATING CONNECTIONS

Shyam Bhat and Vandana Shetty

Mrs. Damini, a 70-year-old widow residing in Mumbai, finds herself in a solitary environment, surrounded by busy neighbours she rarely interacts with. With her two children living in the U.S. and the recent death of her best friend, she grapples with feelings of loneliness and isolation, compounded by worsening arthritis and high blood pressure. In an effort to alleviate her loneliness, she decides to pursue an old hobby and enrols in a baking class. She enjoys her time baking and connecting with fellow baking enthusiasts, forging new friendships. As she immerses herself in the joy of baking and socialising, Mrs. Damini's loneliness diminishes, and she experiences significant improvements in both her mood and physical well-being.

Harsha, a 23-year-old college graduate from a Tier-II city, embarked on a new chapter by relocating to Bangalore for work. Initially enthralled by the prospects of big city life, he soon encountered cultural differences that left him feeling isolated and detached. Accustomed to the close-knit community back home where he knew everyone, he struggled to find his place in the anonymity of the bustling city. Determined to overcome his sense of alienation, he focused on building his confidence and embracing self-acceptance. Gradually, he forged meaningful connections with a group of friends who shared his interests and values. With time, he cultivated a sense of belonging and nurtured healthy relationships, fostering a renewed sense of fulfilment and contentment in his life.

Alekhya, a married software engineer with two children, has many friends and a good relationship with her husband. However, lately, their demanding work schedules leave little time for family or social activities. The few moments she does have are often spent on social media or zoning out in front of the television. The stress of work has taken a toll on their relationship, leading to irritability and impatience between Alekhya and her husband, and their interactions are neither pleasant nor supportive. Despite her active social circle, she begins to feel a yearning for deeper connections and realises the importance of prioritising relationships. Re-evaluating her life, she shifts her focus towards nurturing meaningful connections, resulting in a newfound sense of peace and happiness in her life.

INTRODUCTION

Loneliness and the deficiency of healthy nurturing relationships is an epidemic of our times. In previous decades, it was usually older adults who were vulnerable to loneliness, but now people of all age groups are at risk.

Loneliness is an emotional response that occurs when people have social connections that do not match their emotional needs, whereas social isolation is the physical absence or lack of access to social connections altogether. Loneliness and social isolation not only impact mental health, leading to conditions like stress, anxiety, and depression,[1] but also contribute to physical illnesses such as high blood pressure, diabetes, and heart disease.[2,3]

We in India have a long history of strong social and community connections, and we need them more than ever in today's world. In this chapter, we explore the challenges and solutions to creating healthy relationships that are so vital to a good life.

The Rise of Loneliness

> *"There was a wall around him, but that was an external thing. The real wall was around his mind. It was high and it was impenetrable."*
>
> *– Isaac Asimov, The Naked Sun, 1956.*

In his prescient book, Isaac Asimov describes a world where human beings live on large estates, relying on technological innovations and robots for their everyday needs. As a result, people do not interact in person with each other, and they abhor personal contact. They prefer to communicate and interact only virtually, through the use of holograms. Despite being more connected through technology than ever before, they are ironically even more isolated and lonely, a situation that is eerily coming true in today's world.

As humans, we are social creatures: our biology is hardwired to seek connection. This was, no doubt, an evolutionary necessity – the human being, who is physically weaker than many other animals, finds strength in numbers, in a tribe. But while our brains have largely remained the same, rapid changes in society, culture, and technology are threatening the fabric of our social connectedness.

Today, people are finding it harder to build and sustain good relationships. Schopenhauer's famous porcupine dilemma describes the predicament of many. When a group of porcupines try to move closer together for warmth during winter, their prickly thorns hurt each other and so they have to move apart again. In Schopenhauer's words, "In the same way, the need of society drives the human porcupines together, only to be mutually repelled by the

many prickly and disagreeable qualities of their nature." This increasingly seems to be the situation nowadays. People lack the ability to navigate the "thorns" of each other's personalities and are finding it more difficult to build and commit to relationships, particularly intimate ones.

There are a few major forces that are creating an epidemic of loneliness.

- The rise of technology and social media
- The heightened pursuit of material success
- Increased "individualism" (as opposed to "collectivism")
- Rapid change and ambiguity of culture and social norms

Our inherent need for social connections was once fulfilled through close-knit communities, but it now faces unprecedented challenges in the digital age. Technology has facilitated global connectivity, but has created shallower, less fulfilling interactions.

Relationships and real conversations take patience, time, and skill, and these are developed through repeated interactions in the real world. Now that these interactions are being replaced by virtual communications, we run the risk of forgetting the essential skills required for relating to each other. The younger generations especially are finding it more challenging to deal with the emotions that are an integral part of real human interactions.

Materialism is another big barrier to having healthy relationships. When people are in relentless pursuit of greater wealth and power, they lack the time and energy required to nurture deep relationships. While in the past we may have valued qualities such as humility, patience, and kindness, society now seems to value what you own, how much you earn, and the way you look: society validates superficiality over depth. In such a world, we can easily overlook what truly matters – caring for others and building healthy meaningful relationships.

Contemporary culture also amplifies the cycle of desire and dissatisfaction, and emphasises immediate personal gratification rather than patience and compromise. People find it easier to call off one relationship and pursue another one, rather than work through the frustrations that are inherent to any intimate human relationship.

As societies develop and become more industrialised, people become more "individualistic." Individualism, a defining trait of today's world, is a culture that emphasises the worth of the individual over the collective group. It glorifies the independence and self-reliance of individuals over tradition or society. While this can make a person feel a sense of liberation and freedom, and may help with innovation and creativity, it also amplifies a sense of isolation and a sense of disconnection from others, heightening comparison

and competition over affiliation and cooperation. Until recent times, India has traditionally been collectivist, and this shift towards a more individualistic lifestyle has disrupted our social fabric and increased the sense of loneliness. Hence, the irony is that we live amidst a multitude of people in crowded cities, in an era of unprecedented connectivity, yet, people are lonelier than they have ever been.

Another factor is our rapidly changing world and evolving social norms. As traditional guidelines become weaker, individuals are freer than ever before to choose their way of life. However, this freedom and ambiguity can lead to people feeling confused about their identity and becoming disconnected from others. This in turn can lead to social withdrawal, intensifying feelings of loneliness. The quick pace of cultural change has also widened the gap between generations, disrupting ties within families and communities.

The rates of loneliness across age-groups have increased around the world. Based on surveys, an average of 30% of the older adult population reports being lonely.[4] Among younger adults, the rates range from 12% to 40% and are increasing annually; and among adolescents, between 5% and 15% experience loneliness.[5] While the rates have been consistent among older adults, the incidence of loneliness in the adult and adolescent population has greatly increased over the years. The World Health Organisation recently declared loneliness to be a global health threat and set up a Commission on Social Connection,[6] and the US Surgeon General has flagged loneliness as a public health crisis.[7]

Unfortunately, these disruptions in our social fabric have a profoundly negative effect on our health, since connections are an essential part of human nature. Evolutionarily and historically, being part of a group was essential not just for safety and reproduction, but also for access to essential resources like food, water, and shelter.[8] The tribe was the fundamental bedrock of existence – it offered a sense of identity, community, and safety. The ultimate punishment was ostracism, to be cast out of the tribe or village.

Even though our modern environment has removed many immediate threats, and we may not need the support of a tribe in the same way that we did in our historical and evolutionary past, the brain remains unchanged, and the need for meaningful relationships remains deeply ingrained in our physiology.

For a long time, science did not fully acknowledge the critical role of human contact in well-being. It was assumed that basic needs like food, water, and shelter were sufficient. However, what humans instinctively understood about the necessity of connection was eventually recognised by science. In the 1950s, the work of René Spitz highlighted this truth.[9] His studies on "anaclitic depression" in infants revealed a stark reality: infants who received minimal skin-to-skin contact and lacked bonding opportunities with caregivers suffered

from failure to thrive. This condition occurred despite their basic physical needs being met. These findings showed that a lack of emotional and physical connection is detrimental to health, even leading to death. This research confirmed our fundamental need for close personal contact and emotional bonding. Food and water are essential but not sufficient for life; we also need love and connection. We now know beyond a doubt that healthy relationships are vital for physical and mental health.

Research shows that good relationships help the immune system, lowers blood pressure, and reduces the risk of heart disease.[10] Healthy relationships can also encourage better lifestyles: people with positive social networks are less likely to adopt harmful habits such as alcohol consumption.[11] Connections also provide support and care during difficult times in life, and this benefits one's mental and emotional well-being.

Multiple studies have found that people surrounded by healthy and nurturing connections have less anxiety and depression,[12] and better physical health outcomes. People with strong social connections have a 50% increased likelihood of survival compared to people without.[13] The lack of meaningful relationships can bring about health risks that surpass those of obesity or physical inactivity, and are comparable to the risks associated with cigarette smoking.[14,15]

The importance of nurturing and maintaining healthy relationships, therefore, is vital for health but has become more challenging than ever before.

So, what does it take to cultivate healthy relationships in the modern world? First, let's explore what truly defines a healthy relationship.

The Building Blocks of Healthy Relationships

To build healthy relationships, it is important to recognise what shapes them. Let's break it down into three easy-to-understand components:

The framework of your social world: Think about your current situation—Are you living alone, with your nuclear family, or in a joint family setup? Consider your marital status and how big or small your social circle is.

The role relationships play: What role do the people in your life play? In what way do your friends and family offer support when you need it? Is there a sense of sharing and helping each other out during tough times?

The quality of relationships: Quality is better than quantity when it comes to relationships. Consider the depth or superficiality of your relationships. Healthy relationships have love, care, shared laughter, and mutual support. Unhealthy ones have more misunderstandings, conflicts, jealousy, and criticism, and do not offer emotional support.

Evaluate Your Existing Connections

By using something called social network mapping,[16] you can evaluate your existing connections, which is your real-life social network.

Picture your social circle as a vibrant, interconnected map, where you are at the centre or the "node." Every person you connect with is a "tie." In this way, if we map the network of each person within a community or across communities, we find that there is a lot of overlap between different nodes and ties, forming a vast web of interconnected individuals. Some people in this web may be key figures in bridging otherwise unconnected individuals; they are called bridges. This network builds pathways of communication, trust, and support, which in turn shapes how communities function. We observe that each individual has different levels of social connections, depending on socio-cultural factors. Figure 4.1 is a diagrammatic representation of the

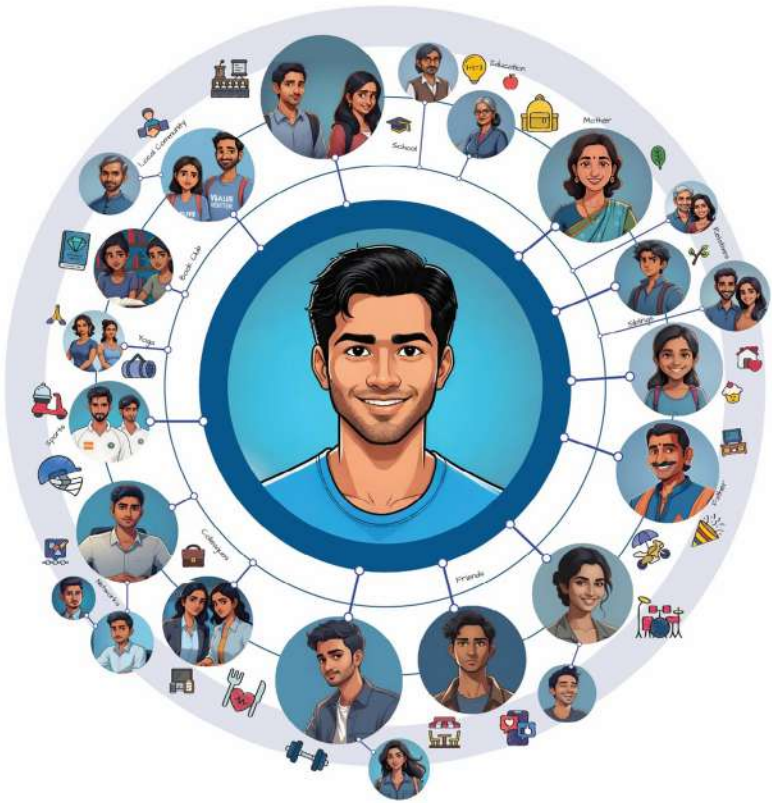


Figure 4.1. The social network map of 25-year-old Aarav

complex network of the social connections of Aarav, a 25-year-old man. Some connections are stronger than others and are represented as bigger circles. As you can see, there are some overlapping areas where Aarav's work and hobby networks intersect, illustrating the complexity and interconnectedness of social networks.

> Task: Sketch out your social map, drawing connections between you and the people you know or have bonded with over a lifetime. Reflect: Who would you place closest to yourself and how would you cluster people?

The Key Elements that Shape Our Relationships

Our social connections are influenced by a variety of factors, each adding a unique dimension to how we interact and bond with others. Age, gender, health, socio-economic status, and life experiences are some of the factors that play a role in shaping our relationships.

- Age: Younger individuals often enjoy larger social circles but may face challenges in forming deep connections, particularly in today's digital-centric world. Older adults might experience isolation due to life changes such as retirement or health issues. However, they can offer a wealth of experience and wisdom, creating opportunities for meaningful intergenerational exchanges.
- Gender: Women are generally more affiliative and empathetic, which aids in forming and maintaining relationships, while men, on the other hand, may be less affiliative and more competitive, both biologically and due to societal expectations of independence and stoicism, which can make them more prone to isolation.
- Health status: Those with chronic illnesses or disabilities may face isolation, not just due to physical barriers but also because of societal attitudes and lack of understanding. Individuals in good health often have more social engagement opportunities, allowing for a broader range of relationships.
- Socio-economic status: Socio-economic factors can create distinct social experiences. People from wealthier backgrounds might have more access to resources, but they might feel an increased sense of isolation, whereas those from less affluent backgrounds may have the support of the community but encounter barriers to social opportunities, affecting their ability to build and maintain diverse relationships.

- Life experiences: Personal experiences shape relationship-building skills and preferences. For instance, someone who has migrated may naturally connect with others who share similar experiences but might also find challenges in navigating relationships in a new cultural setting.
- Intrinsic qualities: Traits such as kindness and empathy naturally draw people together. They are like magnets in the social world, attracting deeper and more meaningful connections.
- Prosocial behaviours:[17] Acts of generosity, volunteering, or simple kindnesses are not just good deeds – they are building blocks for strong emotional bonds. People who regularly engage in these behaviours often find themselves at the centre of a supportive social network.
- The power of empathy: Understanding and sharing others' feelings is a superpower in the realm of relationships. It is partly wired in our biology and partly nurtured through our environment. Empathy bridges gaps and fosters a deeper understanding between individuals.
- Self-compassion:[18] Being kind to ourselves, especially during tough times, is not just self-care, but a foundation for healthier interactions with others.
- The shadow of negative experiences: Childhood trauma or negative experiences can cast a long shadow, often leading to challenges in forming trusting relationships. Understanding this can be key to healing and building healthier connections. Adverse childhood experiences including unstable family environments, parental absence, abuse, neglect, perceived or real rejection, can all increase the chances of persistent loneliness and isolation. A dose-response relationship has been found between adverse childhood experiences and health risks, such that the longer the duration of exposure to risk factors, the higher the cardiovascular health risk factors in young adulthood (26 years old), including elevated blood pressure and elevated levels of total peripheral resistance.[19]
- Well-being perspectives:[20] Our approach to happiness matters. While the hedonic model seeks pleasure, the eudaimonic approach – focusing on meaning and self-realisation – is more closely linked to forming lasting, fulfilling relationships.

Each of these elements intertwine to shape our social landscape. By understanding and acknowledging them, we can use this awareness to create richer, more fulfilling connections.

The Role of Society and Culture

Our social behaviour is deeply influenced by the cultural environment we live in, shaped by the practices of our times and the communities we belong

to. Cross-cultural research highlights the significant role of what are called "individualistic" and "collectivist" orientations in societies.[21] These strongly affect the nature of our relationships. Individualistic societies predominant in industrialised, urban western countries, tend to focus on individual goals and achievements, and emphasise personal autonomy and self-expression. Relationships may be diverse but can sometimes lack depth due to the emphasis on individual pursuits. Collectivist societies are common in many eastern countries. They prioritise group goals and harmony over individual desires, and encourage strong family ties and community involvement. They typically feature more integrated and supportive social networks.

In collectivist cultures, there is a concerted effort to maintain in-group harmony. This often involves regulating personal emotions for the group's well-being. The concept of self is deeply intertwined with the community, and prevalent social norms heavily influence individual choices. People in these societies often display higher emotional intelligence, are more integrated into social networks, and participate more actively in community activities. The culture fosters a sense of responsibility towards others, encouraging people to look out for each other, even extending kindness to strangers. This leads to stronger social bonds and also better mental health outcomes.

In contrast, individualistic cultures champion personal freedom and self-reliance, which can sometimes lead to less emphasis on community and familial bonds. People are encouraged to follow their individual paths, which can create diverse and dynamic social experiences and give the individual a sense of freedom, but it also increases the risk of loneliness, disconnection, and isolation.

Understanding these cultural nuances is key to appreciating how culture and different societies affect and shape how you see yourself, the world, and relationships. These differences can be quite profound and wide-ranging, and subtly influence everything from language to behaviour. For example, it is common in Arab countries for the entire family to eat from the same plate. In India, we always offer food to others first before we eat it ourselves, and our food is prepared such that it is shared by those at the table. However, in many western countries, the meals are prepared and plated in a way that is usually for one person and not shared. In this way, we see how individualism or collectivism permeates many interactions, our attitudes, and our behaviour in relationships.

Although India comes from a collectivist past, we are now witnessing a shift towards individualistic lifestyles and mindsets, especially in urban settings. As societies become more and more hyper-individualised, there will be a constant battle between the need to protect your personal liberty, space, and privacy, versus the need for connectedness. A very high degree of individual

freedom, where the self is the primary point of reference, brings with it a sense of narcissism and entitlement, where every other individual becomes a functional object meant to satisfy your individual needs. Interpersonal relationships can be very hard to satisfy with such dynamics, and a constant sense of dissatisfaction emerges due to high expectations and unmet needs. This dissatisfaction bleeds into the jobs we select, the lifestyle choices we make, and even the kind of relationships we develop. The growing rate of divorce can be explained on the basis of two highly individualised partners who prioritise their individual needs to the point where they feel threatened about losing their personal space and are therefore unable to make emotional space for their partners and accept each other as they are.

The Shifting Social Dynamics in India

"Water, water, everywhere, and not a drop to drink!"

India has surpassed China to become the most populous country in the world with more than 1.42 billion people. The most recent estimate of population density in India is 473 persons per square kilometre. Being surrounded by so many people at any given time should mean that we have constant access to healthy social ties. But far from it: there has been a very rapid rise in rates of loneliness and social isolation even in India, and this is true for all age groups older than teenagers.

India has historically been a collectivist society with a very high value placed on developing and maintaining social ties. Despite the diverse range of religious and ethnic groups in India, there is a unifying socio-cultural ethos common to the entire subcontinent. Our family structures were traditionally intergenerational, with every individual having their unique roles and responsibilities. This allowed family members to share their financial, emotional, and social responsibilities and created a strong support system for each member. While the adults would provide the means and take care of the responsibilities for the household, the older members would form the pillars of support, give advice, and teach the children about various life virtues. Thus, family members of all ages had a sense of purpose and self-esteem. Older adults with greater opportunities for intergenerational bonding have better health outcomes – both physical as well as mental.[22] They have lower rates of morbidity from chronic illnesses, lower rates of dementia, and slower progression of dementia.[23]

Each family unit would also be deeply entwined with the larger community. Through different religious, charitable, and cultural activities, individuals of all age groups found a means to connect with each other in a meaningful

way. The weaker and more dependent members were never left behind, as there is a level of communal care created naturally in this ecosystem. The community forms the centre of this ecosystem, and the resultant identity of each individual is defined by the interconnectedness and the collective identity of the community. The painting in Figure 4.2 depicts the tribal life of Bastar – village scenes with figures of men and women, birds, animals, trees, and huts, alongside activities like hunting, worship at a shrine, a Dussehra procession, devotees carrying different types of mobile shrines (Doli, Anga, Laat, Kanta Khurchi), dancing groups, drummers, hunting traps, and so on.

Religion has played a major role in shaping cultures and social practices across the world. India is a melting pot of many different religions co-existing together. The common factor across religions has been the creation of implicit trust in a force superior to us, and the amplification of value and meaning attached to relationships. Religion forms an anchoring force in an otherwise confusing world. Through its various principles, rituals, and practices,



Figure 4.2. Painting on canvas by Meheru Muria

religions promote unity, charity, service, acceptance of self and all others, gratitude, living by the right values – virtues that promote stronger emotional ties and make people more tolerant. Religious gatherings have also been a way of bringing the community together. Each religion has its own practices to promote gathering, whether it be the community prayers offered in mosques on Fridays, or Sunday Mass in churches, or the periodic *satsangs* organised by communities, where men and women of all ages come together to sing songs and pray. The Sikh practice of *langar* is a community charity activity for the less fortunate members of the community, similar to the practices of donation and charity for less able members in other religions. While these practices may be religiously motivated, they have built and strengthened the social and emotional fabric of our society.[24]

Individuals who are deeply invested in spirituality and religion have also found it easier to cope with existential questions such as life and death, and the purpose of our existence. Community religious discourses bring a sense of oneness among people against the common unknown, and people at different stages of life have found support in finding answers to difficult questions, or accepting the reality of things as they are. Over the last 150 years, this fabric has slowly disintegrated, especially in urban settings, and this trend becomes even more prominent as people move up the socioeconomic ladder.

The Role of Social Media in Social Relationships

Over the last 20 years, the way in which we communicate with each other has changed radically through technology. In today's world, people use social media and various apps for communication, and virtual communication is fast replacing real in-person interactions.

Based on data from January 2024,[25] the average global internet use per day for all purposes among people aged 16–64 years was about 6 hours and 40 minutes per day, and the daily social media use of global internet users was 2 hours and 23 minutes. The most popular apps among today's youth are Instagram, Tiktok, and Snapchat. India has the highest number of Instagram users in the world at 230 million users. In an online survey in India in 2022, it was found that teenagers between the ages of 13–19 years make up 31% of social media users in India, and the majority of teenagers spend a minimum of one hour per day on social media or online gaming apps.[26]

While social media facilitates communication, it can disrupt real social connections, and can also expose people to toxic interactions. This is especially true for teenagers and young adults.[27]

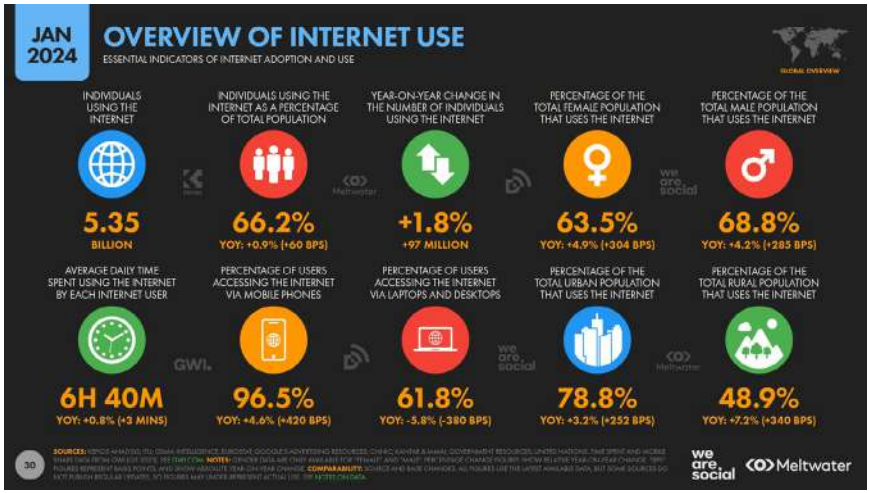


Figure 4.3. Overview of internet use

Source: We are Social & Meltwater. (2024). *Digital 2024 global overview report*. https://datareportal.com/reports/digital-2024-global-overview-report

Social media apps are designed to engage the reward systems of the brain, which makes it very addictive, so people feel compelled to keep using this technology even though it is damaging.

Social media portrays near-perfect lives of others, and in vulnerable people, this can create a negative self-image and constant need to compare themselves with others. Images of perfect vacations, impossibly chiselled bodies, and luxurious lifestyles cause unrealistic expectations, especially in teenagers. Studies show that the rates of teen suicides have increased significantly since the introduction of smartphones and there are a growing number of teenagers with body image issues, poor self-esteem, eating disorders, anxiety, and depression; teenagers with depression are twice as likely to spend longer hours on social media.[28] Paradoxically, the longer they spend online on social media apps, the more isolated they are in their real worlds. This creates a vicious cycle of isolation and negativity.

As people interact more through virtual connections, they can feel empty as they lack the affection, real care, and the physical contact that are available in real-world connections. While the virtual world provides a bridge for certain groups who may not have better alternatives, especially for older adults or people who are isolated due to physical or mental illnesses, it cannot replace real-world connections. We need to learn how to integrate technology into our lives without allowing it to replace the genuine human connections that are essential to our well-being.

How Loneliness Hurts

Loneliness and social isolation are inherently stressful for human beings, who have evolved to thrive in connection with others. When people experience isolation, it can trigger a sense of heightened vigilance known as "hypervigilance," where they are more attuned to potential threats in their environment. This, in turn, makes people more socially conscious and anxious, which decreases positive social interactions, which then creates a vicious cycle where the person becomes even more hostile or guarded, and thus falls into a spiral of loneliness and low self-esteem.

Loneliness also leads to poorer self-care and worse lifestyle choices: lower amounts of physical activity, poor eating habits, increased substance use, decreased sleep quality, and daytime fatigue despite a normal duration of sleep.[29]

Adversities faced in childhood years are closely linked to feelings of persistent loneliness and isolation. When children are exposed to negative life experiences such as neglect, lack of strong role models due to absence of prominent caregivers, or being victims of abuse, bullying, or violence, they are not able to form secure trusting relationships, which leads to avoidant social behaviours.

Increasing the presence of virtual media (including entertainment channels, social media, and gaming apps) has both a cause-and-effect relationship on loneliness. While multiple studies show that people who are lonely tend to spend longer hours on screens, the addictive nature of social media and gaming apps can worsen the isolation and promote anti-social behaviours, which compounds the problem.[30]

What sustainable changes can we make in our day-to-day lives to foster better social connections?

Engaging in group activities within the community, whether by participating in health practices like exercise, leisure activities such as art or dancing, or volunteering for community service, can build strong bonds. When we participate together, we are more likely to build strong ties with the people around us, be consistent with habits, and find a positive role-model to adopt healthier life choices. Collaborative problem-solving becomes easier in group settings, leading to faster and more effective solutions. Celebrating achievements together fosters motivation and reinforces positive behaviours. Additionally, our social networks provide emotional support during challenging times, promoting resilience and reducing stress through shared experiences.

Cultivating Healthy Relationships: Practical Tips

It is clear that healthy relationships are vital for our own health and well-being, as well as for a happy and healthy society. So, how can we cultivate better relationships? Here are a few top tips to help you create healthy relationships:

1. Active listening and communication: Listening is an underrated and underutilised skill that is also becoming scarcer in a busy world. Active listening means truly listening and paying attention when the other person is speaking. With multiple distractions, including the omnipresent phone, we need to learn how to truly be mentally present during a conversation, because listening is a fundamental ingredient of good communication and healthy relationships.
2. Developing empathy: The ability to understand and see the world from the other person's perspective and point of view is a very important skill for good relationships. during interactions, try to understand what the other person is feeling and why. This builds better ties and communication.
3. Respect for differences: relationships thrive in the warmth of acceptance. When we accept and respect each other's differences without judgement, the relationship can become a source of great support and healing. It is important to be open-minded, and to allow and respect differences in opinions and perspectives.
4. Participation in shared activities: Participating in sports, community service, events, hobbies, and other shared experiences creates and builds healthy relationships. We often interact with people at work in a transactional sense, and therefore it is helpful to engage in activities with others that foster enjoyment and camaraderie.
5. Setting boundaries: healthy relationships require respect for each other's boundaries and personal space. Practise assertive communication and state your needs clearly so that you can set appropriate boundaries. This creates balance and mutual respect, which helps the relationship to flourish.
6. Creating space for relationships: In the quest for success and other goals, people often relegate relationships. But now that you understand their importance and relevance to your health, prioritise relationships to ensure that you have the necessary time, energy, and space for healthy connections.
7. Learning conflict resolution: Disagreements are natural in any relationship. The key is to address conflicts constructively without hurting the other person. This can be learned and practised for better relationships.

8. Self-awareness and reflection: In order to have a healthy relationship with another person we need to first have a healthy relationship with ourselves. Therefore, self-awareness is an important quality to develop: understanding yourself, your feelings, and your characteristics. Life is a journey of growth and learning, and staying open to self-discovery and growth contributes to better relationships with others.

MYTHS DEBUNKED

MYTH 1: The more the merrier.

FACT: *The quality of our social relationships holds greater significance than the sheer number of connections.*

MYTH 2: Healthy relationships never have conflicts.

FACT: *Conflicts or disagreements are inevitable in all relationships. Learning to resolve them constructively makes bonds stronger.*

MYTH 3: If you have strong family ties, you don't need friends, and vice versa.

FACT: *A diverse social network that includes family, friends, intimate partner relationships, and other social ties contribute to overall well-being. Each type of relationship serves a unique purpose.*

MYTH 4: As we grow up and become independent, we no longer need other people.

FACT: *Irrespective of our age and level of independence, a sense of community fosters personal growth and well-being.*

CONCLUSION AND KEY TAKEAWAYS

Healthy relationships are vital for the health of mind and body as well as for social and collective health. This is especially true in a time where culture and a fast-paced life have made healthy relationships even more difficult. Strong, positive connections with others contribute to our emotional resilience, mental health, and sense of belonging. Building better relationships allows us to experience greater fulfilment, support, and understanding in our lives, enriching both our personal and professional spheres.

- Develop life skills such as tolerance and acceptance of differences to foster better social connections.
- Engage in various social activities with different age groups.
- Participate in community and religious activities outside of work to expand social networks and cultivate meaningful relationships.
- Make positive use of social media platforms to enhance social connections and support networks.
- Recognise the detrimental effects of loneliness and isolation on physical and mental health as motivation to actively build and nurture relationships.

When we recognise the importance of healthy relationships in our lives and make it a priority, we can live a life of balance, greater health, and joy.

RESOURCES

Videos

1. The Need for Human Connection and Why it Starts with Ourselves by Molly Carroll TEDxManhattanBeach [10.27]
2. How do Social Relationships Evolve? by Science Animated [3.31]
3. Daniel Goleman Introduces Emotional Intelligence by Big Think [5.31]
4. How Culture Drives Behaviours by Julien S. Bourrelle at TEDxTrondheim [12.07]
5. Social Media is Making Us Unsocial by Kristin Gallucci at TEDxBocaRaton[8.48]
6. Everything You Think You Know about Addiction is Wrong by Johann Hari at TED2015[14.42]

Chapter 5

POSITIVE BEHAVIOUR CHANGE: EMBRACING HEALTHY HABITS

Sangeeta Goswami and Joydeep Das

Sabita, a 24-year-old girl, moved to the city to provide financial support to her family. To help boost her income, she started working two jobs, working late hours as a result. Unfortunately, this left her with little time for her studies, which could have improved her job prospects. Her irregular schedule led to skipped meals, overeating, and occasionally, stress-eating. To relax and unwind, she scrolled through media late into the night, resulting in inadequate sleep. She began to notice weight gain and constant fatigue. During a particularly severe episode of stomach pain at work, she sought medical attention and was diagnosed with gastritis. The doctor also warned her about the heightened risk of diabetes due to her family history. She advised Sabita to change her diet and lifestyle to help reverse her health trajectory. Sabita knew this would be very challenging, given her schedule. What should she do?

INTRODUCTION

"Change is the only constant." This statement portrays everything about transformation and learning in life. Change allows us to try new things and learn from our mistakes, helping us to adapt to new situations, embrace them and excel. Enjoying the results of small changes motivates us to move on to bigger changes in our lives. Small changes have a ripple effect, setting into motion the wave of personal transformation.

In the tapestry of human experience, behaviour forms the intricate threads that weave our daily lives and shape our futures. From the smallest routines to profound transformations, the quest for positive behaviour change is a journey of discovery and growth. This chapter explores the profound impact of behaviour on personal well-being, examining the underlying determinants of behaviour formation and habits, the interplay of intrinsic and extrinsic motivations, and the evolving nature of positive behaviour change from childhood through to old age. It offers a toolkit grounded in self-regulation, self-reinforcement, self-efficacy, and self-compassion, guiding readers on a path towards sustainable, transformative change.

Behaviour Formation and Its Determinants

Stephen R. Covey, in his book *The 7 Habits of Highly Effective People*, tells us that to create a sustainable, long-term, effective lifestyle, one should balance and renew one's resources, energy, and health.[1] Personal growth and development are outcomes of behaviour change. To understand behaviour change, let us examine some theories and determinants of behaviour formation.

The goal of behavioural change is to alter habits and behaviours over time. Our general health is greatly influenced by our lifestyle decisions and practices. Even small adjustments can result in significant increases in people's health and life expectancy.[2] For instance, quitting smoking, reducing binge drinking, improving dietary habits, and engaging in regular light exercise can all contribute to good health.

People's behaviour is influenced by genetics, environmental factors, and their personality type. Any alteration in an individual's behaviour from their prior behaviour, whether temporary or permanent, is referred to as a **behavioural change**. Interactions, feelings, and thought processes are often the places where this shift is most noticeable. The changes may lead to either positive or negative effects on the behaviour being changed. **Positive behaviour changes** often need considerably more effort to achieve than negative behaviour changes. Individuals tend to gravitate towards unhealthy behaviours due to various factors such as societal influences, quick mimicry of others' behaviours, and the formation of habits over time. This tendency to emphasise negative occurrences over positive ones is a common phenomenon observed in various aspects of human behaviour, particularly among young people engaging in risk-taking behaviours.

Why Do People Find It Difficult to Change Behaviour?

There are certain behavioural barriers that prevent or hinder individuals from taking desired actions or making optimal decisions. These barriers can arise from various factors, including cognitive or thinking biases, social influences, emotional reactions, and lack of choice or capacity to make changes. One of the most common barriers is lack of awareness regarding the negative impact of the behaviour on the person, for example, not knowing the appropriate diet to manage diabetes. Sometimes, there is ambivalence with regard to change: a person may simultaneously feel two ways about changing one's behaviour, for example, wanting to make a change while also being reluctant to do so due to the effort required.

Some other barriers that are commonly seen are lack of time, deriving pleasure from the negative behaviour, possessing limited skills to change

the behaviour, or holding the belief that no behaviour can be successfully changed. This last barrier may arise from an exaggerated or irrational thought pattern that fixates on the negative aspects of a situation. It can also arise from a fatalistic viewpoint of life where one believes that all events are inevitable, and that their choices and actions will not make any difference to the situation.

An increasing body of research supports the idea of "nudges" and changing one's environment to make behaviour modification easier; these modification techniques can improve health through lifestyle changes and other small behavioural shifts.[3] Lifestyle factors such as nutrition, exercise, smoking, and alcohol use have all been targeted in intervention studies.

Behaviour change can be achieved when three elements occur simultaneously. These elements are *motivation, ability,* and the *trigger*. How they are used depends on how a person's environment shapes both their behaviour and the development of their personal traits, and how the person perceives their health situation. Beginning with small tasks makes it easier to stay motivated, especially when there is a trigger, fostering a sense of self-efficacy,[4] which is crucial for successful behaviour change. It refers to the belief in one's ability to accomplish an activity or task, such as learning a new skill or behaviour. Self-efficacy is not a behavioural change theory in and of itself, but it is believed to be predictive of the amount of effort an individual will put forth in initiating and maintaining behavioural change.

Thus, for any behavioural change, motivation is required to initiate the process of change. **Motivation** is derived from the word "motive," which is defined as an active form of desire, craving, or need that must be satisfied. It is often rooted in rational and long-term outcomes; for instance, losing weight for aesthetic and physical health reasons. Motivation is of two types: intrinsic and extrinsic motivation. **Intrinsic motivation** means that the individual's motivation is from within the self. The person has the desire to perform a specific task, because its results are in accordance with his or her belief system and is personally meaningful or fulfils a desire. **Extrinsic motivation** means that the individual's motivation is from outside the self, and that the desire to perform a task is controlled by an outside source. Examples are the pursuit of money (benefit packages, bonuses, *etc.*), or the approval of others. Intrinsic motivation is considered to be more desirable and is thought to result in longer-lasting outcomes than extrinsic motivation. According to humanistic psychologist Abraham Maslow, our actions are motivated by certain needs. Maslow (1943) introduced his concept of the hierarchy of needs, where people are motivated to fulfil basic needs such as food, shelter, and clothing before moving on to other more advanced needs such as one's sense of worth, competence, and independence.[5]

Habits are behaviours that are set in motion by a particular situation or event and are formed through repetitive actions of the same nature. It is said to take 66 days on average (with a range of 18 to 254 days) for a behaviour to attain its maximal level of automaticity[6] and become second nature to a person. Automaticity is the capacity to carry out tasks without having to focus on the minute details, enabling them to develop into automatic thought patterns or habits. Usually, this can develop through learning, practice, and repetition. Muscle memory is a familiar form of automaticity where the body learns how to perform an action without conscious thought, such as walking, speaking, bicycle-riding, working in an assembly line, and so on.

According to Charles Duhigg, who wrote *The Power of Habit*, habits form in three stages:[7]

- Cue: A trigger that starts the habit
- Routine: The action itself
- Reward: The benefit gained from performing the behaviour

The reward satisfies the craving that is prompted by the cue. This is called the "habit loop," which can be seen in Figure 5.1. These three elements are key to understanding why people do what they do.

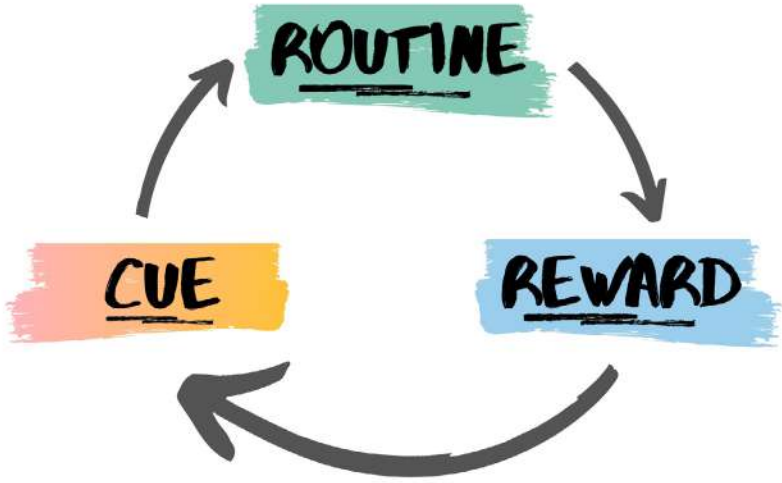


Figure 5.1. The habit loop

Why Invest in Positive Behaviour?

Well-being encompasses multiple dimensions, including intrinsic and extrinsic factors that are heavily influenced by motivation. The extrinsic dimension encompasses aspects such as physical, financial, social, and environmental well-being. Conversely, the intrinsic dimension centres on individuals' emotional states, such as happiness or sadness, as well as their resilience and self-efficacy levels.

Health professionals stand out as one of the most credible sources for promoting lifestyle and behavioural change. However, many health professionals shy away from giving advice on modifying behaviour because they find traditional behaviour change strategies time-consuming to explain and difficult for the patient to implement. Brief advice often involves recommending specific changes and their benefits, such as reducing saturated fat intake to lower the risk of heart disease. Psychologically, such advice is typically short-lived because both motivation and attention wane over time. Positive behaviour management, on the other hand, emphasises prevention, support, and skill development to integrate health and well-being effectively. If a person is able to stick to the behaviour that science has recommended for a considerable amount of time while experiencing benefits in their holistic health, regardless of external or internal challenges, then they are said to have succeeded in positive behaviour management.

Box 5.1. How to Motivate Others

- **Give due recognition**: Acknowledge and appreciate others' efforts publicly to reinforce positive behaviour.
- **Make work interesting**: Engage others in decision-making processes to foster commitment and interest in their tasks.
- **Listen actively**: Demonstrate genuine interest by listening attentively, which encourages others to share and feel valued.
- **Cultivate pride**: Encourage a sense of fulfilment and pride in their contributions and accomplishments.
- **Reward performance**: Recognise and reward achievements to inspire continuous improvement and motivation.
- **Set clear goals**: Establish specific and challenging goals that align with personal values, ensuring they are regularly reviewed and adjusted.

Behaviour change can be challenging. There is no one-size-fits-all solution, as it can vary from person to person. Behaviour that interferes with a person's ability to function in everyday life can include anything from social isolation, self-harm, aggression, or excessive use of tobacco to a deficiency in positive lifestyle habits.

However, positive behaviour change is indeed achievable. Long-held beliefs once suggested that humans were born with an abundance of neural connections that diminish over time. However, recent discoveries in neuroscience have shown this to be untrue. We now understand that our brains possess a remarkable ability known as neuroplasticity. This means that we can actively form and reorganise connections within our brain throughout our lives, allowing for continuous development and rewiring. The following methods are suggested by Dr. Marsha Chinichian, a Los Angeles-based clinical psychotherapist, to rewire cognitive pathways for enhanced self-regulation.[8]

1. Incorporate brain-boosting foods like almonds, strawberries, and walnuts into your diet.
2. Take short naps lasting around 20 minutes to facilitate the growth of dendritic spines, which are essential connectors between neurons in the brain.
3. Challenge yourself to learn a new word daily to stimulate the development of new neural pathways, both visual and auditory.
4. Use your non-dominant hand for tasks like brushing your teeth to create new neural pathways and strengthen connections between existing neurons.
5. Engage in activities such as playing chess, learning to juggle, practicing mathematical formulas, or reciting rhymes to enhance connectivity in the prefrontal parietal network, fostering the formation of new positive pathways in the brain.
6. Embrace meditation as a powerful tool for promoting positive brain rewiring. Meditation is a practice that involves focusing your mind using mental and/or physical techniques. When we meditate, we focus our attention on an anchor, such as one's breathing. Doing this repeatedly strengthens the neural pathways associated with focus and concentration, meaning that we can focus better on all aspects of our lives.

Positive Behaviour Changes from Childhood to the Advanced Stages of Life

Health promotion is the process of enabling people to increase control over their health and improve it by developing resources to maintain well-being. Behavioural and lifestyle variables have a significant influence on

health throughout one's lifespan. Recent trends show unhealthy lifestyles among children and adolescents characterised by physical inactivity, frequent skipping of breakfast, low intake of fruits and vegetables, and high intake of fast food, sweets, and sugary beverages. These may lead to increased risk of juvenile diabetes, anaemia, asthma and chronic lung diseases, obesity, anxiety, depression, and substance use disorders. A balanced diet that supplies all the essential nutrients in the required amounts and proportions is crucial. This can be achieved by adopting a whole plant food–dominant dietary pattern, which is effective across the lifespan.

The majority of habits and behaviours developed during childhood and adolescence persist into adulthood and old age. Hence, it is important to develop healthy habits early in life. Here are some generic ways that parents can promote behavioural changes in children and adolescents:

- Use effective discipline strategies to encourage positive behaviour. Lead by example and model the kind of positive behaviour you hope to see in them, such as maintaining regular mealtimes, or eating fruits and vegetables.
- Encourage them to discover and engage in physical activities they enjoy.
- Have open conversations with them about their choices and the potential health consequences, while also allowing flexibility for occasional indulgences in preferred foods.
- Reinforce positive behaviour with praise and appreciation.
- Help them identify common triggers for challenging behaviour, such as binge eating when upset, and explore new coping mechanisms for managing negative emotions.

On the other side of the spectrum are the senior citizens. According to the United Nations Population Fund, the older adult population in India will nearly double to touch 192 million by 2030; by 2050, every fifth Indian will be an older adult.[9] The five pillars of healthy ageing are good nutrition, physical activity, social engagement, mental stimulation (puzzles, reading aloud, art, daily chores), and meaningful relationships. To foster positive behavioural changes among older adults, caregivers play a crucial role in creating a supportive environment. Early detection and prompt treatment of any health issues are essential components of this process.

A Toolkit for Positive Behaviour Change

A consistent positive approach increases intrinsic motivation, which builds confidence and boosts self-esteem. Positive behaviour support aims to improve

the quality of life and encourage the development of personal growth, thus reducing the likelihood of challenging behaviours. It focuses on prevention, support, and skill development. You can create your own positive behaviour support plan. Some of the components given in the toolkit below can be used to develop your individual plan.

1. The 21/90 rule[10]

In the 1960s, Maxwell Maltz wrote a self-help book introducing the 21/90 rule: the theory is that if you do something for 21 days straight, it will become a habit, and if you maintain it for 90 days, it can become a permanent habit. However, we have seen above that on average, it can take as many as 66 days for the habit to become truly ingrained. The main takeaway from here is that the key to creating a habit is repetition.

Box 5.2. Give Yourself a 21-day Self-Growth Challenge

- Set a new goal and break it down into steps.
- Dedicate an hour each day to learn something new.
- Get rid of one item every day.
- Pick up a book and read one chapter each day.
- Write in your journal.
- Exercise for 30 minutes each day.
- Create a new morning routine.

2. Self-regulation

To turn instances of positive behaviour into second nature, self-regulation is required. Self-regulation refers to the ability to control and manage one's thoughts, emotions, and behaviours in various situations. Self-regulation theories focus on the role played by individuals in directing the course of their development by selecting and pursuing goals, and modifying goal pursuit based on opportunities and challenges. These theories acknowledge the individual as an active agent in the process of assessing health threats drawing on current information and past experience, and in using problem-solving strategies to address them. Self-regulation aids in recovery from setbacks and aligning one's actions with personal goals. It is one of the five key components of emotional intelligence proposed by Daniel Goleman (1998), the other four components being empathy, social skills, self-awareness, and motivation.[11]

Some strategies for self-regulation are given below:

- Prioritise: Identify which change you want to focus on, and focus on that first, rather than trying to tackle multiple changes simultaneously.
- Plan your time carefully: Set deadlines and schedules to avoid procrastination. For instance, commit to working out for one hour every day to improve physical fitness.
- Write down your goals: Keep track of your goals and regularly assess your progress. Develop SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound), discussed further below, to ensure clarity and effectiveness in goal setting.
- Take regular breaks: Avoid burnout by incorporating regular breaks into your routine. For example, if you're working out to lose weight, exercise six days a week and take one day off for rest and recovery. Just be sure not to use breaks as an excuse to procrastinate.
- Practice positive self-talk: Self-talk refers to internal dialogue or conversation that people have with themselves. Positive self-talk can encourage one to think optimistically and stay motivated, especially during challenging times. During the Covid-19 pandemic, positive self-talk helped many to cope with anxiety.

3. SMART goals

Self-regulation and self-reinforcement can be achieved by setting SMART goals. It was George T. Doran (1981) who coined the SMART acronym[12] and its accompanying goal framework, which was initially used mostly in business management. SMART goals help us to be realistic in setting our goals, identify our motivators, and move on with the required changes. It lays the groundwork to achieve personal desires and professional development milestones. SMART goals may either be outcome goals or behavioural goals that lead to outcome goals. As it is usually easier to measure behavioural goals on a regular/daily basis, for behaviour change, many prefer behavioural goals that will help one lead to the desired outcome goal(s).

Example of a SMART goal

In our case study earlier, Sabita was worried about what the doctor had said about her health. She was concerned about her weight gain and the possibility of diabetes. She understood the need to change her lifestyle and decided to make some positive behavioural changes to improve her health. First, she visited her physician and underwent baseline investigations to assess her

blood profile including blood sugar, lipid levels (cholesterol and triglycerides), thyroid function, vitamins D and B12, and a BMI composition test. Her doctor advised her to lose at least six kg in the next three months, at which time they would repeat the investigations. Sabita made some SMART lifestyle goals to help reverse her health trajectory. To achieve her outcome of SMART goal of losing six kg in three months, she decided to start walking back from her workplaces and to eat regular small meals. She implemented some daily behavioural goals that she could track diligently to ensure her best chance of success.

To do this, one has to start with a goal statement. For example, Sabita's statement was:

"I will lose six kg of weight in the next three months. I will start by walking for 30 minutes and eat healthy food daily, only eating fast food once in fifteen days. I will substitute unhealthy snacks with fruit, and drink sufficient water every day."

Let us see if this is a SMART goal:

Specific: Is the statement specific? Yes, as it states when and how Sabita will reduce weight.

Measurable: Is it measurable? Yes, as Sabita can track her progress by seeing her food intake and how many minutes she walked.

Achievable: Is it achievable? Yes, as Sabita is gradually implementing her exercise and diet plan, and has set a realistic goal.

Relevant: Is it relevant? Yes, as it is about Sabita's overall health and well-being.

Time-based: Is there a specific time period to achieve the goal? Yes, Sabita has set a specific deadline of three months to achieve her goal.

For effective outcomes with the SMART goal method, it is better to concentrate on one SMART goal at a time.

4. Spirituality

When discussing positive behavioural change, the significance of spirituality in overall well-being cannot be overlooked. The pursuit of happiness and a purposeful life is not a recent concept in the context of Indian philosophy. It has existed ever since humans had the ability to think critically about the nature of existence and its meaning and purpose.

Spirituality is defined as "a more general, unstructured, personalised, and naturally occurring phenomenon, where a person seeks closeness and/or connectedness between himself/herself and a higher power or purpose."[13] It is a path to both internal (self-realisation, self-improvement, personal growth) and external (outside) transcendence. Religion on the other hand is more closely associated with certain rituals, institutional dependencies, and social ties and can be mostly seen as a societal phenomenon.[14] This is discussed in further detail in Chapter 2 of this book.

Intrinsic spirituality can be an important motivator in a person's life for positive behavioural change by offering individuals a sense of purpose and direction in their pursuits. It is seen that spirituality is an "intrinsic phenomenon, a personal, experiential connectedness with transcendence or ultimate reality that is expressed in one's beliefs and behaviours."[15] Those with higher levels of intrinsic spirituality are better at coping with stressful situations. It has a protective influence against depression from poor physical health and is predictive of positive psychological functioning. Moreover, it is associated with better mental health, lower levels of anxiety, and enhanced self-regulation skills. Intrinsic spirituality correlates with an improved quality of life, even when faced with poor clinical outcomes. Those with intrinsic spirituality report "a subjective feeling of well-being, a meaning and purpose in life, and healthy acceptance of prevailing conditions."[16]

Close to spirituality and religion lie meditation, with one of its effective practices being mindfulness. This involves various techniques such as breathing methods and guided imagery, aimed at relaxing the body and mind to alleviate stress. The practice of mindfulness serves as a catalyst for individuals to foster positive behavioural changes, promoting holistic well-being in their lives.

Box 5.3. Commonly Used Mindfulness Practices

- **Walking meditation:** Focus on your breath and sensations while walking. This can be done anywhere at any time.
- **Mindful breathing:** Focus on your inhalations and exhalations. This can calm and clear your mind.
- **Mindful eating:** Increase awareness of your thoughts, feelings, and physical sensations in the present moment.
- **Body scan:** Analyse your body, paying close attention to any physical sensations or feelings of pain and releasing them.

5. PERMA-H

In his 2012 book *Flourish*, Dr. Martin E.P. Seligman defined five pillars of a well-being model that he calls PERMA, an acronym for positive emotion, engagement, relationships, meaning, and accomplishment.[17] The concept of PERMA emerges from the discipline of positive psychology, which studies positive emotion (*i.e.,* happiness, joy, hedonia, subjective well-being, *etc.*), engagement (*i.e.,* flow, vitality, eudaimonia, psychological well-being, a life with autonomy and actualisation), and meaning (*i.e.,* transcendence, purpose, life with connections). Individuals have the potential to attain and experience well-being through various pathways, which connotes the multidimensional nature of well-being.

PERMA fosters better relationships, a deeper sense of meaning in life, increased engagement, and greater positive emotion, thus helping combat depression, anxiety, anger, and other negative emotions. These actions thereby motivate the will for interventions that will bring in positive behaviour change in an individual. Seligman describes these as interventions that build the enabling conditions of life, not just interventions that decrease misery. A recent addition to PERMA is the 'H', which stands for health. The PERMA+H brings in the concept of mindful eating, physical movement, and restorative activities, covering all domains of well-being. In short, this tool helps us explore ways to enhance learned optimism, "happiness," and meaning and purpose in life, which in turn can bring about positive behavioural change in an individual.

Studies have shown that spirituality has a positive effect on both mental and physical health as well as other positive health outcomes such as subjective well-being, health-related quality of life, coping skills, or recovering from emotional difficulties.[18] In this regard, spirituality can act as a motivator to move from unhealthy behaviour to healthy ones. Personal faith and the environment of a faith community can serve as a catalyst to social connectivity and sense of collective support for positive behavioural change.

6. Self-compassion

Self-compassion is the ability and choice to give oneself the compassion and kindness that would be offered to someone else in a comparable situation.[19] Self-compassion was found to be related to decreased levels of anger, tension, and emotional pain among individuals with chronic pain.[20] It is interesting to note that one study found that men demonstrate slightly higher levels of self-compassion than women.[21] This, in the Indian context, may also depict the patriarchal perception of women by society, as well as women's perception

of themselves. Regardless of this, self-compassion is an important quality to cultivate for promoting positive health behaviours.

Below are some examples of self-care activities. Pick one from each area and do it every day until it becomes a habit.

Physical self-care	**Emotional Self-Care**
• Exercise (walking, running, sports) • Drink more water • Go to bed early	• Schedule "me time" in a day • Allow yourself to make mistakes • Appreciate yourself
Social self-care	**Spiritual self-care**
• Avoid people who pull you down emotionally • Choose who you spend your time with • Join a support group for people who are going through what you are going through	• Make time for meditation/mindful exercises • Do something nice for someone in secret • Find an opportunity to use your potential

As we come to the end of the chapter, let us revisit Sabita and her efforts to build positive behavioural changes. She worked hard to adhere to her agreed-upon goals. By the end of the first week, she noted that she was feeling a bit lighter and had more energy, which continued to improve till the end of the month. At the end of the first month, she was surprised and delighted to see that she had lost 1½ kg. Her circumference measurements had also decreased a little! At the end of the second month, she had lost two additional kg. By the end of the third month, she had lost a total of five kg. Although her initial goal was to lose 6 kg, she came close to achieving it, which was a well-planned SMART goal.

Her doctor reassured her that her body was adjusting to the weight loss and becoming more efficient, and that her exercise regimen was contributing to muscle growth, which may have slowed down the rate of weight loss she expected. She was pleased to see the circumference measurements around her body decreasing. She decided to enhance her diet by focusing on whole plant foods and reducing her eating window to eight hours daily. She maintained regular follow-up visits with her physician.

Changing her lifestyle was challenging, but Sabita believed it was worthwhile. She feels positive about progressing towards her ultimate weight loss goal and is looking forward to seeing the results of her repeat laboratory investigations.

MYTHS DEBUNKED

MYTH 1: Behaviours can change overnight.

FACT: *Persistent efforts are needed to change behaviour, so it can be time-consuming.*

MYTH 2: Behaviour change becomes less likely the older you get.

FACT: *While behaviour change may become more challenging with age, older adults do still have the capacity to learn, albeit at a slower pace due to age-related cognitive changes.*

MYTH 3: Changing your attitude will change your behaviour.

FACT: *Attitude alone cannot change behaviour. It is important to set behavioural expectations and connect them to values that the individual believes in.*

MYTH 4: Education will help change behaviour.

FACT: *Many believe that mere awareness of an issue will induce change. However, awareness alone isn't sufficient; providing information along with compelling reasons is crucial.*

MYTH 5: We cannot change because our brain becomes hardwired early in life.

FACT: *Our brains have plasticity, meaning we can continue learning new things throughout our lives.*

CONCLUSION AND KEY TAKEAWAYS

The journey of positive behaviour change is both deeply personal and universally transformative. As individuals navigate the challenges and triumphs of altering ingrained habits and embracing new perspectives, they not only enhance their own well-being but also contribute positively to their communities and beyond. With dedication, resilience, and a commitment to growth, each step towards positive behaviour change becomes a testament to the enduring power of human potential and the boundless possibilities for a more fulfilling and impactful life.

- Any change, whether positive or negative, temporary or permanent, in an individual's behaviour from their prior behaviour is considered a behavioural change. People's behaviour is influenced by genetics, environmental influences, and their personality type.
- Motivation is derived from the word "motive," which is defined as an active form of desire, craving, or need that must be satisfied. Motives are central to the initiation and maintenance of behaviour changes.
- The lifelong capacity of the brain to form and reorganise connections through new learning and experiences is called neuroplasticity.

- Positive behaviour support is a framework to improve one's quality of life, reduce the likelihood of challenging behaviours, and develop a consistent positive behaviour change approach.
- Self-efficacy is the belief and confidence that one has in one's capacity to perform and achieve a desired goal.
- Self-regulation is linked to self-efficacy. It is the ability of an individual to manage disruptive thoughts and impulsive behaviour in order to achieve a particular goal.
- SMART goals enable us to set realistic goals, identify our motivators, and move on with the required changes. It lays the groundwork to achieve personal desires and professional development milestones.
- Religion involves rituals, institutions, and social ties within society. Spirituality, on the other hand, focuses on an individual's personal perception and connection to what is beyond our immediate experience, acknowledging something greater than oneself.
- Practicing mindfulness involves breathing methods, guided imagery, and other practices to relax the body and mind and help reduce stress.
- Self-compassion is the ability to be kind and compassionate to oneself. It can reduce health anxiety and self-criticism, increase internal motivation, and promote positive behaviour changes.

RESOURCES

Videos

1. Individuals Must Change Habits for Better Health by BJ Fogg at the Standford GSB Healthcare Summit [24.26]
2. Behaviour Change by Design by TARG Bristol [2.38]
3. The Science of Making & Breaking Habits by Andrew Huberman [1.50.38]
4. Three Myths of Behavior Change – What You Think You Know That You Don't by Jeni Cross at TEDxCSU [18.30]
5. SMART Goals in Behavioural Health by the National Council for Mental Wellbeing [7.08]

Additional Reading

1. Schwarzer, R., & Luszczynska, A. (2008). How to overcome health-compromising behaviors: The health action process approach. *European Psychologist, 13*(2), 141–151.

2. Verplanken, B., & Aarts, H. (2011). Habit, attitude, and planned behaviour: Is habit an empty construct or an interesting case of automaticity? *European Review of Social Psychology, 22*(1), 101–134.
3. Phillips, W. (2018). Past to future: Self-compassion can change our vision. *Journal of Positive Psychology and Wellbeing, 2*(1), 1-10.
4. Fergie, L., Campbell, K. A., Coleman-Haynes, T., Ussher, M., Cooper, S., & Coleman, T. (2019). Identifying effective behavior change techniques for alcohol and illicit substance use during pregnancy: A systematic review. *Annals of Behavioral Medicine*, *53*(8), 769–781.
5. Adedeji, A., Olonisakin, T. T., Buchcik, J., & et al. (2023). The multicultural conceptualisation of well-being. *BMC Public Health, 23*, 2041.

Chapter 6

NUTRITION: NOURISHING THE BODY FOR OPTIMAL HEALTH

Sheela Krishnaswamy and Dharini Krishnan

Deepika, a 30-year-old woman, 5'8" (172.5 cm) tall, sought consultation to lose weight. At the outset, her blood pressure was high at 160/100 mmHg, and her lipid profile showed elevated levels: total cholesterol 240 mg/dl, triglycerides 266 mg/dl, HDL cholesterol 20 mg/dl and LDL cholesterol 150 mg/dl. Over the following six months, she made dietary changes and embraced a healthier lifestyle, incorporating regular exercise, yoga, and meditation for stress relief. Without needing medications, her health markers significantly improved as indicated in the table below:

Weight in kg	*100*	*77.9*
Body fat	*47%*	*30%*
HbA1c	*5.9%*	*5.5%*
Blood pressure in mmHg	*160/100*	*120/80*
Triglyceride in mg/dl	*266*	*130.1*
Total cholesterol in mg/dl	*240*	*208*
LDL cholesterol in mg/dl	*150*	*100*

The above example demonstrates that adopting a healthy lifestyle, including consuming wholesome and nutritious foods, can improve blood parameters and reduce the risk of disease. This is why it is important to eat a variety of foods in appropriate quantities, otherwise known as a balanced diet.

INTRODUCTION

A balanced diet, primarily plant-based, encompasses various food groups in proportions that provide sufficient nutrients essential for growth and overall well-being. The World Health Organisation (WHO) says, "The exact make-up

of a diversified, balanced and healthy diet will vary depending on individual characteristics (*e.g.,* age, gender, lifestyle, and degree of physical activity), cultural context, locally available foods, and dietary customs. However, the basic principles of what constitutes a healthy diet remain the same."[1]

This chapter examines the significance of food groups, macro- and micronutrients, and the connection between diet and well-being. Through the lens of holistic nutrition, it explores the traditional classifications of foods and the emerging prominence of a whole foods plant-based (WFPB) diet, the vital role it plays in fostering vitality and longevity, and the importance of nutrition in combating chronic disease. The chapter also looks at how we engage with food and nourishment, including meal patterns, portion control, and fad diets, navigating through the vast amounts of misinformation that prevent many from developing a healthy relationship with food.

Food Groups

The ICMR's National Institute of Nutrition in India has categorised foods into energy-rich, body-building, and protective categories. Recently, the whole foods plant-based (WFPB) diet has garnered significant attention. This diet promotes the consumption of whole grains, pulses, seeds, nuts, vegetables, and fruits. It advocates for minimal use of processed foods and cooking oils, while avoiding animal products and dairy. Table 6.1 below features predominantly plant-based foods, aligning with the principles of the WFPB dietary pattern.

Table 6.1. Predominantly plant-based food sources of major nutrients

	Major nutrients	**Food sources**
Energy-rich foods	Carbohydrates and fats	Whole grain cereals, millets, pulses, dals, nuts, seeds
Body-building foods	Proteins	Whole grains, pulses, dals, nuts, seeds, and others
Protective foods	Vitamins and minerals	Vegetables, fruits, dairy foods, and others

In addition to macronutrients (carbohydrates, protein, and fats) and micronutrients (vitamins and minerals), these foods are also rich sources of dietary fibre and antioxidants (Table 6.2). Incorporating a variety of plant-based foods with diverse natural colours onto your plate regularly can contribute to the intake of essential nutrients.

Table 6.2. A comparison of plant and animal foods

	Plant foods	**Animal foods**
Dietary fibre	Present	Absent
Cholesterol	Absent	Present
Phytonutrients	Present	Absent
Saturated fat	Low	High

When selecting foods, calorie content should not be the sole focus. Another critical factor to consider is the nutrient density of foods. For instance, while a diet soda may boast zero calories, it offers no nutritional value either. Conversely, a fistful of almonds, though providing around 150 calories, delivers a plethora of nutrients including protein, magnesium, vitamin E, zinc, fibre, and more.

Nutrients and Their Functions

Carbohydrates, or carbs as they are commonly referred to, are complex sugar molecules. They are a major and vital source of energy in the diet, as they break down to form glucose in the body. Glucose is either used immediately or stored in the liver and muscle for later use. Cells, tissues, and organs derive their energy mainly from carbohydrates. The quantity and quality of carbs are important to maintain health as they impact non-communicable diseases.[2] For example, refined sugar contains only carbohydrates and is devoid of fibre and other nutrients. Similarly, white rice and maida are stripped of many important vitamins during the refining process. It is best to use unrefined food sources for carbohydrates such as whole grains, millets, pulses, dals, starchy vegetables, and fruits, as these foods also contain fibre, antioxidants, and some essential micronutrients.

Proteins, as vital macronutrients, play a crucial role in building, maintaining, and repairing cells and tissues throughout the body. They are essential for the structural integrity of various bodily components such as bones, muscles, skin, and organs. Additionally, proteins form enzymes and hormones that are vital for numerous bodily functions including digestion, growth, reproduction, sleep, metabolism, and glucose regulation, among others. Dietary proteins provide nine essential amino acids out of the total 20 required for tissue synthesis,[3] with the remaining 11 being synthesised within the body. Foods such as dals, pulses, nuts, seeds, and grains offer protein in varying quantities. Vegetarians and vegans can ensure adequate

protein intake by combining cereals with sufficient pulses or dals (rice with sambar or chapati with dal).

Dietary **fats** provide energy and essential fatty acids, and aid in the absorption of fat-soluble vitamins.[4] Fats are the most calorie-dense macronutrient, with nine calories per gram compared to four calories each per gram for both carbohydrates and protein. Incorporating fats in small quantities enhances the flavour and texture of dishes while promoting satiety during meals. Fats are metabolised into fatty acids, which are categorised into saturated (SFA) or unsaturated fatty acids. Unsaturated fatty acids are further divided into monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA), with the latter being classified into two groups (n3 and n6) based on their structure. The ratio of n6 to n3 (ideally 5:1 or lower) is crucial for health, but current diets often provide an imbalance with more n6 and less n3 than recommended. To improve this balance, reduce the use of cooking oils and incorporate a handful of nuts and seeds into one's daily dietary intake, thus providing beneficial fats (MUFA, PUFA, including n3) that are essential for health.

Vitamins are classified into water-soluble (such as vitamins B and C) and fat-soluble (including vitamins A, D, E, and K), each serving a multitude of functions to uphold optimal health. Since water-soluble vitamins cannot be stored in the body, regular intake through foods is essential. Many B vitamins act as co-enzymes to facilitate energy release from food, while vitamin C is instrumental for collagen synthesis, immune function, wound healing, iron absorption, and acting as an antioxidant.[5] Water-soluble vitamins are abundant in various vegetables, whole grains, pulses, millets, and fruits such as guava, citrus, berries, and Indian gooseberry. Fat-soluble vitamins play a key role in vision, bone health, blood clotting, and immunity, and are found in dairy products, nuts, and as precursors in leafy greens, as well as orange and yellow vegetables.

Of particular concern are vitamin B12 and vitamin D deficiencies, which are prevalent in India despite its tropical climate.[6,7] Vitamin B12, primarily synthesised by bacteria, is exclusively found in animal-derived foods and products fortified with B12. Those who follow vegan or plant-based diets require supplementation unless they consume adequate animal products (including dairy) or foods fortified with vitamin B12. Insufficient exposure to sunlight due to factors such as indoor work environments, limited outdoor activity, use of sunscreen, and fully covered clothing without skin exposure all contribute to vitamin D deficiency. Optimal exposure to direct sunlight between 11 AM and 3 PM in all seasons can effectively improve vitamin D levels. Plant sources of vitamin D include microalgae and mushrooms grown

in sunlight. However, fortified foods or supplementation may be necessary in the absence of these dietary sources or in cases of moderate to severe deficiency.

Minerals play essential roles in numerous bodily functions, including bone health, muscle function, heart health, brain function, and the production of enzymes and hormones. They comprise a diverse array of nutrients, including calcium, phosphorus, magnesium, sodium, potassium, chloride, iron, manganese, zinc, iodine, copper, and selenium, among others. Most foods contain minerals in varying quantities, so a balanced diet rich in plant-based foods will provide adequate mineral intake for overall health.

Dietary fibre, found in all whole plant foods, constitutes the edible part of plants that cannot be digested in the small intestine but undergoes digestion and fermentation by beneficial bacteria in the large intestine. Classified as soluble and insoluble, dietary fibre encompasses polysaccharides, oligosaccharides, lignin, cellulose, and other plant substances. Excellent sources of dietary fibre include whole grains, pulses, vegetables, fruits, nuts, and seeds. Consuming 40 grams of fibre daily offers numerous benefits, including promoting satiety (aiding in weight management), enhancing gastrointestinal health, preventing constipation, diverticulitis and haemorrhoids, controlling cholesterol and blood glucose levels, and improving mood and brain health. Fibre also acts as a prebiotic (food for gut bacteria that promotes health) and plays a major role in maintaining the gut microbiome, which is now viewed as the "second brain." A healthy gut microbiome promotes health in multiple ways, such as increasing antioxidant production, reducing inflammation, optimising lipid metabolism, increasing insulin sensitivity, and decreasing body fat deposition, among many others.[8]

Antioxidants are natural substances that prevent or delay cell damage by reducing the impact of free radicals generated during physiological or pathological processes. In the absence of antioxidants, free radicals could cause extensive harm to the body. Antioxidants can be categorised as nutrients (such as vitamin E, vitamin C, beta carotene, and selenium), phytonutrients (including plant phenols, flavonoids, isothiocyanates, and ellagic acid), or enzymes (such as superoxide dismutase, catalase, and glutathione peroxidase).[9] Food sources rich in antioxidants include vegetables, fruits, legumes, herbs, spices, and certain beverages like tea.

Hydration, though not classified as a nutrient, is as crucial as food intake for maintaining adequate bodily function. Fluids, including beverages, play an important role in hydration, along with high-moisture foods such as gourd vegetables, melons, tomatoes, and salad greens. Plain water stands out as the optimal source for hydration. Ensuring a sufficient daily water intake,

approximately 30 to 60 millilitres per kilogram of body weight, depending on factors such as climate and activity level, is essential for overall health.[10] Water is indispensable for numerous metabolic activities, including the transportation of nutrients and oxygen to cells, regulation of body temperature, maintenance of blood volume and acid-base balance, elimination of toxins, lubrication and elasticity of tissues, functioning of the digestive system, hydration of cells, and cognitive function and mood enhancement.

Nutrient requirements differ across various demographic groups, including children,[11] adults, pregnant women, and older adults.[12] Therefore, it is essential to tailor dietary plans according to the specific needs of each age group. For instance, backyard gardens can be a valuable resource for lower socio-economic groups, providing access to fresh produce such as green leafy vegetables and mushrooms. This can help bridge nutritional gaps and improve overall health outcomes for these communities.

Processed Foods

"Processed foods" is a term that is often misunderstood. It doesn't simply refer to basic food preparation steps like husking paddy, cooking pulses, or grinding whole wheat into flour. In fact, cooking itself is a form of food processing aimed at enhancing edibility and taste. However, not all forms of food processing are beneficial for nutrition. For instance, refining whole foods to remove essential nutrients is unnecessary for a balanced diet. Examples include white rice and refined wheat flour, which lack the bran and germ of the original grains.

Highly processed or ultra-processed foods, typically high in saturated fat, sodium, and sugar, and calorie-dense, have no place in the daily diet. These include products made with refined wheat flour (maida) such as biscuits, cookies, bakery items, noodles, pizza, buns, rolls, desserts, sweets, juices, soft drinks, aerated beverages, fried items like chips, fries, pooris, and so on. Replacing minimally processed foods with ultra-processed ones reduces nutrient density and increases energy density, thereby elevating the risk of non-communicable diseases such as obesity, Type-2 diabetes, and heart disease.

Meal Patterns

Beyond the foods we consume, other aspects of mealtime habits contribute to maintaining health.

Portion control, which refers to controlling the amount of food on our plate, is crucial for managing body weight. Here are some tips:

a. Opt for smaller plates to naturally reduce portion sizes.
b. When reducing portions, minimise starchy foods, especially refined ones like maida and white rice, and replace them with vegetables, dals, and pulses.
c. Chew food thoroughly and eat slowly to aid digestion and give your body time to recognise fullness.
d. Wait for at least 20 minutes before considering a second helping to allow your body to register satiety.

Mindful and **intuitive eating** involves engaging all the senses while eating – seeing, smelling, touching, listening, and tasting the food. It has little to do with calories, carbohydrates, fats, protein, or micronutrients, but is more about being present and aware during the eating experience. The goal isn't necessarily weight loss but rather being attuned to internal cues of hunger and fullness, leading to reduced food intake.[13] Research conducted across eight countries has shown a direct correlation between intuitive eating and higher levels of body satisfaction, higher self-esteem, and lower body mass index (BMI) among participants.[14]

Meal timings are intricately linked with the body's circadian clock, and the timing of meals plays a crucial role in appetite control and metabolic regulation. It is essential to align eating and fasting periods, sleep-wake cycles, and endocrine rhythms with the body's internal clock to maintain optimal health. For instance, if you have breakfast at 8 AM, aim for lunch approximately 4 to 5 hours later, followed by dinner another 4 to 5 hours after lunch. If hunger strikes between meals, a small snack such as a handful of nuts or a piece of fruit can help stave off hunger until the next meal. Disrupting the eating schedule can alter the circadian rhythm and impact how the body utilises nutrients as shown in Figure 6.1. Skipping breakfast, inconsistent meal timings, and eating late at night are some factors that can disrupt the circadian rhythm and potentially affect health.

Fad diets, often endorsed by celebrities and embraced by many seeking rapid weight loss, are essentially trendy or crash diets. They usually involve extreme restrictions on certain food groups, leading fad dieters to consume either too little or too much of specific foods. These diets are often nutritionally imbalanced and can cause deficiencies and subsequent health issues. Owing to their unsustainable nature, fad diets frequently result in disappointment when the lost weight is regained once normal eating habits resume. Overall, fad diets for weight loss come at the expense of long-term health and well-being.

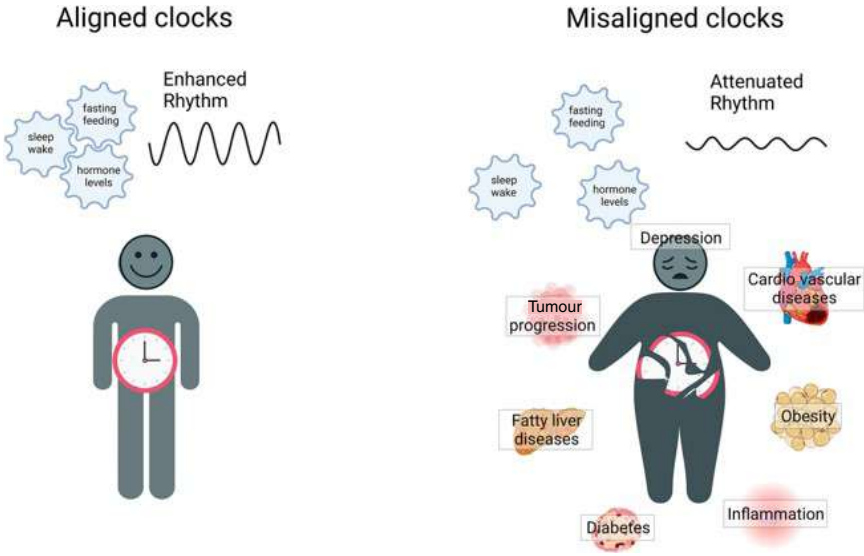


Figure 6.1. Crucial synchronisation of body clocks

Source: Reproduced from Chamorro, R., Jouffe, C., Oster, H., Uhlenhaut, N. H., & Meyhöfer, S. M. (2023). When should I eat: A circadian view on food intake and metabolic regulation. *Acta Physiologica, 229*(2), e13936. https://doi.org/10.1111/apha.13936; licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

Food Labels

Food labels on packaged foods provide valuable information, including the ingredients used, key nutrient values, shelf life, and manufacturing details. Understanding and reading these labels empower consumers to make informed choices about their food purchases. The Food Safety and Standards Authority of India (FSSAI) has established guidelines for labelling packaged foods, ensuring consistency and accuracy. Standardised logos for vegetarian, non-vegetarian, organic, fortified, and other types of foods help consumers easily identify products that meet their preferences or dietary requirements. Ingredients on packaged foods are always listed from the highest to the lowest quantities. If sugar, fat, or sodium is listed among the first five ingredients, it's best to be cautious about consuming such products. Additionally, food labels may include information about allergy-causing ingredients, food additives, health claims, and cooking or storage instructions. Being aware of these details can help consumers make choices that align with their health goals and dietary needs.

Nutrition labels provide information on calories, carbohydrates, sugars, protein, total fat, saturated fat, trans fat, fibre, and some micronutrients. When reading these labels, keep the following in mind:

- Trans-fats should ideally be zero.
- Saturated fat, cholesterol, sugars, added sugars, and sodium should be kept to a minimum – the lower, the better. Aim for a sodium to calorie ratio of around 1:1.
- Protein, fibre, and MUFA can be beneficial, so the higher the better. However, try to keep the total fat intake below 30% of the total daily calories.
- Fat-free does not mean calorie-free. Lower-fat items may have as many calories as full-fat items, so opt for healthier choices.
- Beware of sugars that may be listed under different names like sucrose, fructose, glucose, dextrose, corn syrup, maltose, brown sugar, cane sugar, caramel, inverted sugar syrup, maple syrup, palm sugar, and others.

Serving size is a crucial aspect of interpreting nutrition labels as it helps consumers calculate nutrient intake for a given quantity. The Nutrition Facts Label information is generally based on one serving per 100 g or 100 ml. However, many packages may contain more than one serving or quantities exceeding 100 g or 100 ml. It is important to determine how many servings, grams, or millilitres you are actually consuming. For example, if there are two servings in one packet and you eat the entire packet, you have consumed double the calories and nutrients mentioned on the nutrition label. The daily value percentage (DV%) is based on a 2000-calorie diet. It indicates the proportion of a particular nutrient in that food relative to the recommended daily intake. If a nutrient's DV% is listed as 20%, that means it meets 20% of the total amount of that nutrient you need per day for proper functioning. This is a helpful way to assess whether the food is high or low in a nutrient value. A DV of 5% or less means the food item is low in that nutrient and 20% or more means it is high in that nutrient. In 2022, FSSAI stated that whole wheat bread should contain at least 75% whole wheat flour, brown bread should contain at least 50% whole wheat flour, and multi-grain bread should contain at least 20% grains other than wheat.[15]

Nutrition in Chronic Diseases

Nutrition plays a critical role in managing chronic diseases and preventing or delaying the onset of associated complications. Undernutrition or nutrition deficiencies can lead to changes in immune response and fatigue.[16] A whole

foods plant-based diet can help manage obesity, regulate blood glucose levels, control or prevent dyslipidaemia (cholesterol problems), and prevent nutrient deficiencies, thereby reducing fatigue and enhancing immunity. A suitable diet planned with whole foods that are primarily plant-based can also aid in the reversal of certain diseases. Chronic diseases related to obesity, especially prediabetes, can be reversed with a well-planned diet rich in whole foods, particularly plant-based options.

Keeping blood sugar levels within a healthy range is a very important aspect in maintaining health and preventing disease. Normal fasting glucose values fall between 70 mg/dl and 100 mg/dl, a range regulated by insulin. If the blood sugar levels exceed this range, lifestyle changes, including dietary modifications, must be made under the guidance of healthcare professionals. Failure to control blood glucose levels can lead to several problems like heart disease, stroke, kidney problems, eye issues, and nerve complications in the hands and feet.

In chronic diseases like diabetes, carbohydrates should be limited to one-quarter of the plate in each of the three major meals, and at least 50% of these carbohydrates should come from whole grains to ensure adequate intake of dietary fibre.[17] This translates to replacing polished grains with whole grains. Whole grains have more protein, dietary fibre, and micronutrients such as magnesium, selenium, B complex and zinc, to name a few. They also contain bioactive compounds that contribute to improved cardiac health by providing antioxidant and anti-inflammatory benefits.[18] Table 6.3 gives an overview of grains in descending order of nutritional benefit.

Table 6.3. Nutritional hierarchy of grains

Nutritional hierarchy of grains (in descending order)	**Examples**
Intact/unrefined whole grains	Whole millets, unpolished/hand-pounded/ brown rice, whole wheat, corn (maize)
Broken whole grains	Dhalia (broken wheat), broken brown rice, broken corn
Puffed/beaten whole grains	Puffed whole wheat, puffed brown rice, brown rice poha (beaten brown rice), puffed corn/plain popcorn
Refined grains	Polished millets, polished white rice
Refined grain flour	Maida (refined flour/white flour), white rice flour, refined millet flour, corn flour
Ultra-processed grains with added fat/sugar/salt	White bread, bun, naan, roomali roti, luchi, cakes, pastries, sweets, noodles

Sugars are best avoided. The protein recommendation is about one-quarter of the plate in each meal.[19] Adequate protein in at least two meals daily is important to achieve this goal. A cup of cooked dal, soy products (soy granules or soybeans), whole pulses, or mushrooms in the diet can help increase the quantity of protein. Adding a handful of nuts and seeds to the daily diet enhances protein, fibre, and micronutrient intake, while supporting heart health and weight management, among other benefits. Generous consumption of vegetables is necessary on a daily basis; this should be double the quantity of grains that is consumed or half of the meal plate, as illustrated below in Figure 6.2.

High fibre vegetables like green leafy vegetables, banana stem, banana flower, beans, lady's finger, and gourds are preferable. Fat intake should be limited to less than 30% of the total calories. Saturated fat should be 10% for those with normal lipid levels and less than 7% for those with high triglyceride levels.[20] Natural sources of good fats are seeds such as chia or flax, nuts, nut butters, avocado, and so on. Make sure that your diet has these foods for a healthy balance of the right fats. A handful of nuts and seeds can provide not only good fats but also protein and other essential nutrients.

An increasing number of people across the globe are turning to WFPB diets or vegetarian diets as part of a healthy lifestyle. A well-planned WFPB diet can provide all the necessary nutrients and fibre, removing the need for unnecessary supplements.

Along with a healthy diet, a minimum of 45 minutes of daily physical activity is necessary in order to maintain a healthy body. It helps in weight management, reduces the risk of disease, bolsters mental well-being and fortifies bone and muscle health. This is discussed in detail in Chapter 7.

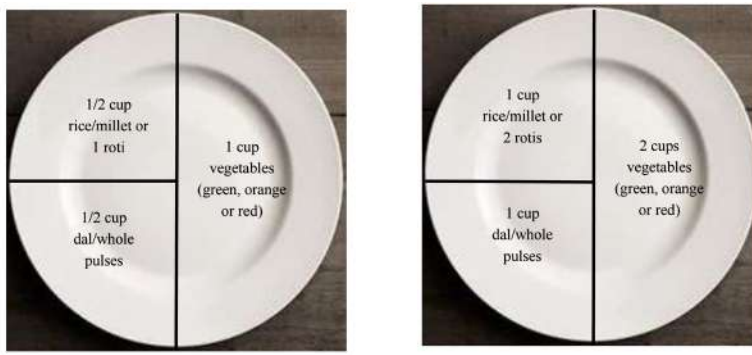


Figure 6.2. Food group proportions on a healthy plate

Intermittent Fasting

Fasting refers to abstaining from food for specific periods of time, and is a practice rooted in history. Intermittent fasting entails periods of abstaining from eating for a given period each day or at specific times in a week. Starvation, on the other hand, occurs when calorie intake falls below the body's energy requirements for sustenance. Prolonged starvation can lead to organ failure and even death.

Some common practices of intermittent fasting are:

a. 16 hours of fasting followed by an eight-hour eating window
b. Alternate-day fasting, which alternates the normal diet with fasting days; on fasting days, the individual could opt for either a complete fast or a very small meal of 500 calories

Some researchers advise 16-hour fasting to allow the body fat to be used for energy. After 10–12 hours of fasting, the body transitions from relying on glucose from the liver to utilising ketones generated from the breakdown of fat for energy. This is an important factor in the health-promoting effects of intermittent fasting.

Intermittent fasting stimulates autophagy (self-destruction) of damaged molecules or cellular constituents, thus preventing damage that they could cause. Intermittent fasting helps in losing weight, eliminating toxins, and reducing inflammation. The consequent result is a reduction in the risk of non-communicable diseases such as arthritis, adult diabetes, cardiac diseases, and some cancers related to obesity. In Alzheimer's disease, characterised by local inflammation in the brain, intermittent fasting promotes the production of nerve cell growth factors and enhances the stress resistance of nerve cells.

Mark Mattson highlights intermittent fasting as a means to reduce free radicals in the body, which in turn benefits muscle cells. In brain cells, changes induced by intermittent fasting can aid in managing obesity.[21] When practiced in conjunction with a diet rich in nutrient-dense foods, time-restricted eating has been shown to reduce mood swings, enhance focus, improve sleep and hence positively impact mental health too. When starting intermittent fasting, it is important to progressively narrow the eating window in a gradual manner as it takes time for the body to adapt to the restricted feeding schedule.

Intermittent fasting is **not** recommended for those who are under 18 years of age, those who are underweight, those with eating disorders, pregnant or breastfeeding women, those with acidity issues, or older adults with low body weight.

The Impact of Our Diet on the Environment

The food choices we make can significantly impact the environment. Clearing land for farming and raising livestock can contribute to climate change due to deforestation and greenhouse gas emissions. The transportation of food from its origin to distribution points also adds greenhouse gases to the atmosphere, further exacerbating climate change. Choosing local foods that require minimal packaging and transportation, as well as reducing plastic usage, can help mitigate these environmental effects. This topic is discussed in detail in Chapter 10.

Including more whole foods that are plant-based in our diet can address three of our global health crises:

a. The chronic non-communicable diseases epidemic: By prioritising these foods in their daily diet, people can lower their risk of these diseases.
b. Climate change: WFPB diets generally have a lower environmental footprint compared to those high in animal products.
c. Emerging infections: Shifting to plant-based diets will decrease the demand for animal products and the associated risks of zoonotic disease transmission.

Eating Patterns: The Mental Link

When we talk about well-being, happiness, and wellness, the most important aspect is mental health. Adequate sleep and regular exercise play an important role in mental health. Mental health intertwines with every facet of our physical health; as the American Heart Association's *Life's Essential 8* says, a healthy heart hinges on a healthy mind.

The intricate connection between the human gut and the brain is an emerging science. Factors such as an unhealthy diet, the consumption of ultra-processed foods, a sedentary lifestyle, high stress levels, poor sleep quality, and so on, can lead to obesity, Type-2 diabetes, cardiovascular diseases, cancer, and depression. Furthermore, alterations in the gut microbiome (beneficial bacteria in the gut), epigenetic changes, and cellular stress or injury can create inflammation and lead to health issues.[22] Dysbiosis, or derangement of these beneficial bacteria, stems from an unhealthy diet, increased intake of ultra-processed foods (with high sugar, salt, or fat) or intake of antibiotics. Comfort foods high in sugar and calories, sought during periods of stress, can lead to inflammation anywhere in the body, including the brain, thereby contributing to mood disorders, anxiety, and depression. Stress hormones, specifically

cortisol, can also disrupt body processes, which can exacerbate anxiety or depression.

Some psychiatric conditions show inflammatory signs arising from free radicals that lead to oxidative stress. Disorders such as ADHD (attention deficit hyperactivity disorder), autism, and schizophrenia are related to mitochondrial dysfunction. Psychiatric and mood disorders such as anxiety, depression, autism spectrum disorder, bipolar disorder, substance abuse disorders, schizophrenia, and even dementia are some of the mental health problems related to dysbiosis of gut microbiota (Table 6.4). There is a direct connection from the gut to the brain through the vagus nerve as well as pathways through the endocrine and immune systems as shown in Figure 6.3.

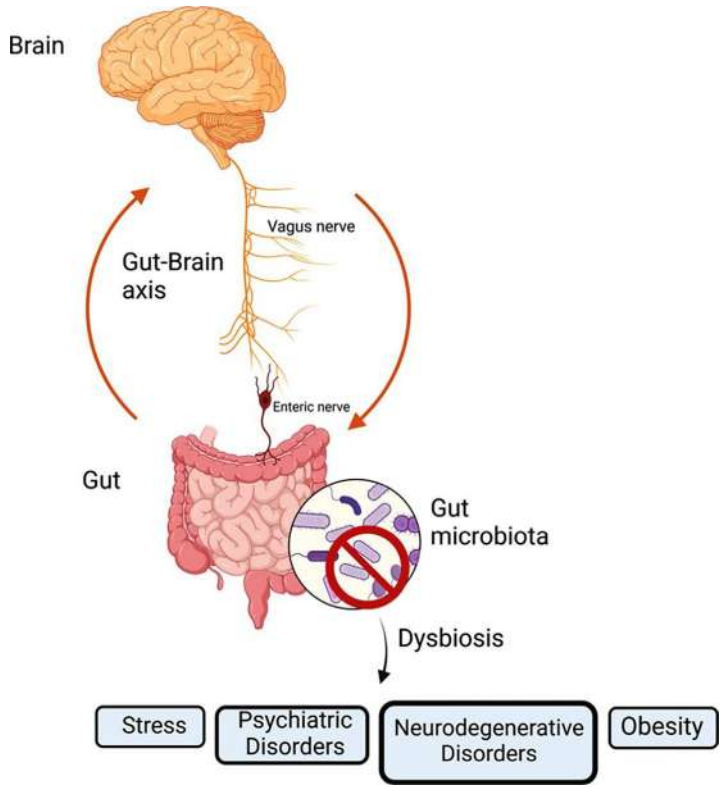


Figure 6.3. The gut-brain axis

Source: Reproduced from Singh, H., Chopra, C., Singh, H., Malgotra, V., Wani, A. K., Dhanjal, D. S., Sharma, I., Nepovimova, E., Alomar, S., Singh, R., Sharma, V., & Kuca, K. (2024). Gut-brain axis and Alzheimer's disease: Therapeutic interventions and strategies. *Journal of Functional Foods, 112*, 105915. https://doi.org/10.1016/j.jff.2023.105915; licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

Lifestyle interventions can prevent gut microbiome alterations and genetic changes by reducing inflammation. Adding dietary fibre, resistance starch (present in some fruits, whole grains, and vegetables), and probiotics can reverse the dysbiosis and create a balance or homeostasis in the gut by producing short-chain fatty acids. The only way to get fibre in the diet is to eat whole foods that are plant-based (whole grains, pulses, dals, vegetables, fruits, nuts, and seeds). There is no fibre in animal foods like egg, chicken, fish, dairy foods, and meats. Therefore, the more plant foods you eat, the better your gut health will be.

Secondly, serotonin, a neurotransmitter that promotes a sense of well-being, is produced by the brain using an amino acid called tryptophan. The dietary intake of tryptophan comes from plant-based foods and whole grains. Tryptophan is found in plant-based sources such as green leafy vegetables, sunflower seeds, soybeans, pumpkin seeds, broccoli, mushrooms, and peas. Serotonin is very important for the regulation of sleep, appetite, pain sensitivity, and mood. Thirdly, exercise helps to promote mental health by stimulating the production of endorphins or "feel-good" hormones.

Table 6.4. Beneficial and adverse foods for mental health conditions

Condition	**Beneficial foods**[23, 24, 25]	**Adverse foods**[24,25,26]
Depression	Fermented foods, nuts, turmeric, saffron, lavender, passion fruit, omega-3, quinoa	Sugary foods, high intake of animal fat, margarine, fried foods, white bread, processed meat, sugar substitutes
Anxiety	Green leafy vegetables, lavender, grains, turmeric, fermented foods	Ultra-processed foods such as pasta, pizza, burgers, alcohol, caffeinated beverages
ADHD	Berries, eggplant, onions, green tea, green leafy vegetables	Dairy foods, ultra-processed foods, sugary foods, food colouring, soda

Maintaining the circadian rhythm is crucial for regulating the brain's energy supply, which in turn helps prevent mood swings. Personalised nutrition (tailored nutrition plans made according to preferences and need) can be as beneficial for mental health as they are for general health and well-being. The best way to overcome the barriers to healthy eating for better mental health is to follow what works for the individual and take small but firm steps towards the goal.

Nutritional Reductionism vs. Holistic Eating

Holistic eating refers to eating healthy foods that are as close to the natural form as possible, that is, unrefined, unprocessed, and locally grown whole

foods. Hippocrates stated the concept of holistic eating through his profound words, "Let food be thy medicine and medicine be thy food."

In contrast, nutritional reductionism focuses on specific nutrients such as protein, vitamins, and minerals while overlooking the broader context of whole foods, food groups, and dietary patterns, which relate to food habits, meal patterns, food combinations, and their relationship to health. Specific nutrient studies are useful for understanding physiological functions, but in practice, it is more useful and beneficial to include the nutrients through a proper balanced diet with natural foods.

Furthermore, dietary supplements, if recommended, should not be consumed in excess, as they can create multiple health problems. For example, an overdose of minerals such as magnesium and phosphorous can cause gastrointestinal issues like diarrhoea. Always consult your physician and take supplements under medical advice in prescribed doses, if required.

MYTHS DEBUNKED

MYTH 1: Vegetarians do not get adequate protein.

FACT: *A combination of cereals and pulses (rice and sambar, roti and dal) provides good quality protein for vegetarians. Additionally, nuts and seeds also provide good amounts of protein.*

MYTH 2: Rice, banana, and potato can make you fat.

FACT: *None of these foods are high in fat in their original form. When cooked and served as fries, chips, fritters, biryani, fried rice, and so on, the fat content in them increases manifold, contributing to weight gain. Consuming large quantities of these foods without adequate physical activity can cause weight gain and increase triglyceride levels. A healthy diet plan minimises the intake of fried and fatty foods.*

MYTH 3: Nuts contain cholesterol.

FACT: *Cholesterol is not found in plant foods like nuts. Only animal-derived foods contain cholesterol.*

MYTH 4: Ragi makes your skin dark.

FACT: *Ragi is a millet that has multiple beneficial nutrients. It does not contain any substance that can change the skin colour.*

MYTH 5: Fat-free and sugar-free foods are always healthy.

FACT: *Fat-free foods may contain excess sugar or sodium, and sugar-free foods may contain excess fat to make them more palatable. Check the ingredients and nutrition labels to ensure that you are choosing nutrient-dense foods.*

MYTH 6: It is necessary to eat meat for bodybuilding.

FACT: *Plant foods provide adequate protein, so there is no need to depend on meat for bodybuilding.*

CONCLUSION AND KEY TAKEAWAYS

The general guidelines given below work well for the general population, but specific meal plans need to be developed after taking into consideration multiple factors such as body measurements, blood parameters, family history of diseases, personal medical and food history, and so on. Some general nutritional guidelines for good health are:

- Eat a wide variety of foods, with a focus on whole plant sources.
- Include 400 to 600 grams of fresh vegetables and fruits in your diet every day.
- Consume whole grains, pulses, dals, nuts, and seeds in your daily diet.
- Avoid snacking. However, if required, snack on fruits, nuts, seeds, or sprouts.
- Eat till you are about 75% full. Do not overload your digestive system with excess food.
- Drink sufficient water.
- Restrict the use of salt and high-sodium foods.
- Avoid added sugar, high-fat foods, fried foods, desserts, sugar alternatives, and refined foods such as maida, white rice, sugary beverages, and so on.
- Eat mindfully and maintain consistent meal timings.
- Read food labels carefully when you buy packaged foods.
- Stay physically active throughout the day.
- Get adequate rest, recreation, and sleep.

In conclusion, eating whole plant foods and following diet plans that are tailored to individual requirements (personalised nutrition) and crafted by qualified dietitians, is the way forward to prevent and control the burden of non-communicable diseases that is rapidly rising in our country. “If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have the safest way to health.” – Hippocrates

RESOURCES

Videos

1. The Intermittent Fasting Revolution by Mark Mattson [59.44]
2. Health and Nutrition Videos by NutritionFacts.Org
3. Forks Over Knives, a documentary on the benefits of whole food plant-based nutrition

Websites

1. Building a Healthful India: The Power of Nutrition by the Physicians Committee for Reponsible Medicine
2. Whole Foods Plant-Based Menus and Recipes by the T. Colin Campbell Centre for Nutrition Studies
3. Healthy and Wholesome Recipes by Sharan India

Additional Reading

1. Cagigas, M. L., Twigg, S. M., & Fontana, L. (2024). Ten tips for promoting cardiometabolic health and slowing cardiovascular aging. *European Heart Journal*.
2. Landry, M. J., Ward, C. P., Cunanan, K. M., Durand, L. R., Perelman, D., Robinson, J. L., ... Gardner, C. D. (2023). Cardiometabolic effects of omnivorous vs vegan diets in identical twins: A randomized clinical trial. *JAMA Network Open, 6*(11), e2344457.

Chapter 7

EXERCISE: MOVING TOWARDS VITALITY

Herbert Giebel and Lenny Vasanthan

Seventy years ago, a study[1] was published revealing that bus drivers experienced a higher incidence of more severe heart attacks at a younger age as compared to bus conductors, who were consistently on their feet collecting fares and issuing tickets. Interestingly, the weight of the conductors – whether slim, of normal weight, or overweight – did not affect this trend, although the drivers tended to have larger waist circumferences than the conductors. Despite these findings, the study was dismissed due to the prevailing belief at the time that individuals who engaged in athletic activities or regular exercise would die at a younger age. The study was then repeated with civil servants and postal workers, comparing those who delivered mail door-to-door with postal clerks who remained sedentary behind counters. Comparable results emerged, reinforcing the earlier findings. Today, it is well-known that those who are active have a lower risk of heart attacks, and that lack of exercise is a major contributor to many of our chronic diseases and premature deaths.

INTRODUCTION

As we explore the concept of exercise as medicine, we will follow Rudyard Kipling's six questions:

I keep six honest serving men; they taught me all I know.
Their names are What and Why and When and How and Where and Who.

Why Exercise?

Life has changed a lot since the 1950s, when being active was a regular part of a person's daily life. Life has become more convenient, yet our lifestyles have become more sedentary. Many of us are sitting for longer periods of time than we could have imagined. This lack of activity has contributed to various health conditions that regular physical activity can prevent, delay, improve. and even treat, as shown in Table 7.1.[2,3,4,5,6,7]

Table 7.1. Conditions that can be improved by regular physical activity

	Condition	**Domains that can be influenced by physical activity/exercise**
1	General conditions	• Pain • Ageing and longevity • Premature death • Sleep • Resilience
2	Musculoskeletal health	• Arthritis (osteo) • Flexibility • Lower back pain • Weak bones (osteoporosis) • Falls and broken bones • Muscle loss • Balance control } Of special concern in older adults
3	Brain health (includes emotional and mental health)	• Stroke • Stress (control) • Mood • Emotional well-being (sense of confidence and self-image) • Cognition throughout the lifespan (mental processes involved in thinking, problem-solving, attention, language, learning, memory, and perception – important for academic performance) • Emotion regulation (self-discipline) and motivation • Substance use • Addictions – alcohol and tobacco (decreases withdrawal symptoms, cravings, and risk of relapse) • Anxiety (as stand-alone or adjunctive treatment) • Depression (mild, moderate, and major/severe; as stand-alone or adjunctive treatment) • Attention deficit hyperactivity disorder (ADHD) • Neurodegenerative diseases (Alzheimer's and related dementias)
4	Heart health circulatory system	• Cardiovascular (heart) fitness • High blood pressure • Heart attacks • Heart failure • High cholesterol • Blood vessel lining (endothelium) dysfunction • Blood clots

	Condition	**Domains that can be influenced by physical activity/exercise**
5	Metabolic health	• Type-2 diabetes • Prediabetes • Insulin resistance • Weight (excess weight and obesity) • Metabolic syndrome
6	Gastrointestinal health	• Constipation • Inflamed outpouchings in the colon (diverticulitis) • Gall bladder diseases • Fatty liver disease (non-alcoholic)
7	Respiratory and immune health	• Chronic respiratory disease (obstructive) • Infectious disease (COVID-19 and other respiratory infections)
8	Autoimmune health	• Rheumatoid arthritis
9	Cancer	• Breast, endometrial, ovarian • Colon, oesophageal, stomach • Prostate • Kidney, bladder • Lung • Multiple sclerosis • Fewer side-effects from chemotherapy during cancer treatment
10	Additional women's health	• Pregnancy-related diabetes • Pregnancy-related high blood pressure • Pregnancy*-related outcomes for mother and baby (vaginal delivery, preterm, and low birth weight) • Perinatal depression • Polycystic ovary syndrome (fertility) • Fertility • Endometriosis (in infertile women) ***Warning signs** for discontinuing exercise while pregnant: vaginal bleeding, abdominal pain, uterine contractions, leaking fluid, shortness of breath before exercise, dizziness, headache, chest pain, muscle weakness affecting balance, calf (lower leg) pain or swelling.
11	Additional men's health	Erectile dysfunction Fertility (sperm/semen quality)

According to the Physical Activity India 2022 Country Profile, sedentary lifestyles are resulting in an annual healthcare cost in excess of USD 32 crore; people with sedentary lifestyles have a 30% greater chance of dying compared to active people in any given year. In India, nearly 75% of adolescents, over 30% of adults and 40% of older adults are inactive; and at least six out of the top ten leading causes of death, most prevalent chronic conditions, and most expensive medical conditions are positively influenced by regular physical activity.[8]

Men who went from low to high cardiorespiratory fitness reduced their risk of death by 50%.[9] For men, exercise capacity is a stronger predictor of survival than any risk factor for heart disease.[10] In fact, physical inactivity contributes to about 70% of all deaths.[11]

Today, we are spending an average of 8–9 hours per day sitting.[12] The more one sits, the greater the risk of high blood pressure, increased waist circumference, diabetes, and dying from any other cause. One study has shown that more time spent sedentary was associated with a higher risk of mortality, with every 60-minute period of continuous sitting per day correlating with a 19% increase in risk for individuals with prediabetes and a 25% increase in risk for those with diabetes.[13] For a person with diabetes who sits 14 hours per day – this translates into a 3–4 times increased risk for early mortality.

As Figure 7.1 illustrates, there is no "minimum exercise" one needs to do before experiencing the benefits. Doing some physical activity is better than doing none as every little bit counts. The more one does, the more benefits accrue. Short bursts can have important benefits. Even a single episode of moderate to vigorous exercise can have immediate benefits such as an increased sense of well-being, decreased anxiety and depression, enhanced mood and brain function, improved outlook for handling stress, and better sleep. Research shows that South Asians may need 200–250 minutes of exercise per week to get the same cardiovascular benefit that Europeans get with 150 minutes per week.[14]

Our challenge is not getting too much exercise, but rather not getting enough, often not even meeting the minimum recommendations.

Since every minute of activity counts, taking short breaks from sitting, or engaging in brief bouts (2-3 minutes) of exercise every 20–30 minutes, can be beneficial, leading to lower blood sugar levels. These brief exercise sessions might involve doing exercises like squats at your desk, taking a short walk, climbing stairs, or simply alternating between standing and sitting at your workstation.



Figure 7.1. The dose-response curve for physical activity

Source: Reproduced from World Health Organisation. (2020). *WHO guidelines on physical activity and sedentary behaviour*. World Health Organisation. License: CC BY-NC-SA 3.0 IGO.

What are the Terms Related to Exercise?

Here are simple definitions related to exercise:

1. Physical activity – Any movement powered by the muscles of our body.
2. Leisure time physical activity – All physical activity engaged in during time that is not related to employment or meeting the needs of daily living.
3. Exercise – Any physical activity intentionally performed to make one more fit. There are two groups of exercise:
    a. Dynamic exercise: Here, one or more joints move during exercise. This applies to most exercises. Walking and skipping rope (aerobic exercises) as well as push-ups and sit-ups (strengthening or resistance exercises) are all examples of dynamic exercise.
    b. Static exercises: This refers to strengthening exercises where no joint is moved. The plank and wall sit are examples of static exercises.
4. Inactivity or insufficient activity – Not being physically active for at least 150 minutes per week or an average of about 30 minutes per day where the heartbeat and breathing are faster than when one is resting.
5. Physical activity intensity – There are several ways to define low, moderate, or vigorous levels of intensity of exercise as shown in Table 7.2. The simplest is the "talk test." Some use the Borg Rating of Perceived Exertion, and others use the metabolic equivalent of a task (MET).

METs – the metabolic equivalent of a task is a standardised way of measuring the intensity of an activity based on the individual doing the activity. It is a ratio of one's working metabolic rate compared to the resting metabolic rate. One MET is the amount of energy used while sitting quietly. This is approximately 1 kcal/kg/hour, which is 3.5 ml oxygen consumed per kilo per minute. A 4-MET brisk walk consumes four times the metabolic energy used by the body while sitting at rest, as measured in a lab. Figure 7.2 below illustrates activities of different intensities with their MET equivalent.

6. Heart rate reserve – This is the most accepted measure of exercise intensity. The formula to calculate this is given in Table 7.2.
7. Maximum heart rate – The formula for a simple way to estimate the maximum heart rate (especially for younger people) is given in Table 7.2.

At times, we may use the terms "exercise" and "physical activity" interchangeably. The key is for us to focus on getting as much activity/movement as possible integrated into the way we live – just like the bus conductors who moved back and forth on the bus and experienced better health than the bus drivers who sat all day. When we realise that every 1 MET increase in exercise capacity results in a 12% increase in survival,[15] those of us who don't get enough activity integrated into our daily routines will need to "supplement" our lives with extra exercise for the benefits.

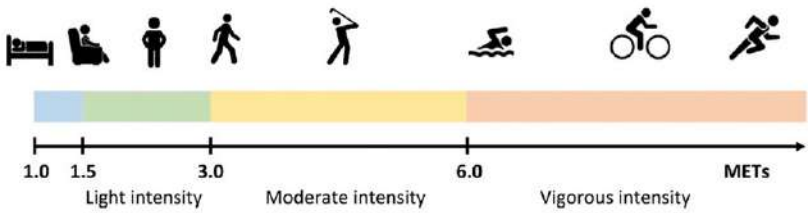


Figure 7.2. Intensities of different activities based on the metabolic equivalent of a task (METs)

Source: Reproduced with permission from Franklin, B. A., Eijsvogels, T. M. H., Pandey, A., Quindry, J., & Toth, P. P. (2022). Physical activity, cardiorespiratory fitness, and cardiovascular health: A clinical practice statement of the ASPC Part I: Bioenergetics, contemporary physical activity recommendations, benefits, risks, extreme exercise regimens, potential maladaptations. *American Journal of Preventive Cardiology, 12*,1.

Table 7.2. A comparison of exercise intensity using various methods of measurement

Exercise Intensity	**METS**	**Heart Rate (HR)**	**Borg Rating** of Perceived Exertion (RPE; 6-20 scale)#	**Talk Test** Subjective Experience	**Examples**
Sedentary	<1.5		0–6	Awake, reclining, lying or sitting	Watching TV while sitting or lying in bed Sitting at desk or commuting
Light (Low)	2.0-2.9	30–39% HR reserve 57–63% max HR	9–11	**Able to talk and sing:** Movement that does not cause adults to sweat or breathe harder	Walking slowly: 2.0 METs Housework while standing: 2.0–2.5 METs
Moderate	3.0-5.9	40–59% HR reserve 64–76% max HR	12–13	**Can talk, but not sing:** Causes some sweating and shortness of breath	Brisk walk/walking 3-5 kmph: 5.0 METs Slow stair climbing: 4.6 METs Cycling 10-15 kmph: 5.5–6.0 METs
Vigorous	> 6.0	60–89% HR reserve 77–93% max HR	14–17	**Can only speak 1-2 words:** Causes considerable sweating and shortness of breath	Swimming (leisurely): 6.0 METs Jogging (~7 km/h): 6.0 METs Stair climbing: 6.8 METs Running (~10 km/h): 9.5–10 METs Skipping rope: 9.0– 11.0 METs

HR reserve = (maximum HR* – resting HR) x (desired exercise intensity) + (resting HR) = training HR

*maximum HR is usually determined by the formula 220 minus age.

This formula is not accurate in older adults and should not be used if the person is on beta-blocker medication.

#**RPE**: A person's RPE usually correlates with the pulse rate when the RPE is multiplied by 10.

Adapted from Mussawar, M., Balsom, A. A., Totosy de Zepetnek, J. O., Gordon, J. L. (2023). The effect of physical activity on fertility: A mini-review. *Fertility and Sterility Reports, 4*(2), 150–158.

For additional details of MET values, see the 2024 Adult Compendium of Physical Activities website.

How Does One Create an Exercise Program?

Physical Activity Recommendations

The current WHO guidelines provide recommendations for children and adolescents, adults, older adults, those with chronic disease, the differently abled, and pregnant and lactating women. The WHO guidelines meet the recommendations for each category of exercise. The guidelines for adults are outlined in Table 7.3, and for the remaining groups in Table 7.4 later on in the chapter.

In the Indian context, because of our higher tendency for earlier and more severe heart disease, diabetes, and visceral adiposity (central obesity), it is recommended that we accumulate at least 60–90 minutes of exercise per day. This should ideally include both aerobic and strengthening exercises. This is in line with the FIT India program, which underscores >300 minutes per week of moderate-intensity exercise, which would give us the optimum physical activity defined as >5 hours per week of moderate-intensity activity, which is equivalent to >15 MET hours per week.

Table 7.3. WHO guidelines on physical activity and sedentary behaviour (2020) for adults

Category	**Aerobic activity**	**Muscle-strengthening**	**Other activities**
18–64 years	At least **150–300 minutes per week** at moderate intensity OR At least **75–150 minutes per week** at vigorous intensity OR An equivalent combination **Do more** for added benefits.	At least **2 days per week** for major muscle groups	**Limit sedentary activity** Replacing sedentary time with physical activity of *any* intensity provides benefits.
Doing **some** physical activity is **better** than doing none. Encourage activities that are **enjoyable**, offer **variety**, and are **appropriate** for age and ability. Overall, across all age groups, **benefits outweigh harms**. Musculo-skeletal injuries appear **uncommon at 150 minutes** of moderate-intensity activity. To decrease the risk of musculoskeletal injury, begin exercising at moderate intensity and gradually progress to higher levels**.**			

Creating an Exercise Program

(Note: Addressing the needs and interests of recreational athletes and people who would like to compete or engage in extreme physical activities like marathons, bodybuilding competitions, or CrossFit is beyond the scope of this chapter.)

The ideal exercise program meets the health and physical fitness goals of a person in the situation he/she is in. The best exercise or physical activity is one which can be incorporated into a person's normal routine. Some may find it more satisfying if it is also a productive activity such as working in the garden, manual labour, or some other project or hobby.

WARNING: Please consult a doctor before starting an exercise program if you have a pre-existing condition such as diabetes or a known heart/kidney problem. If you have a medical condition, and you can freely walk at your current pace, you may continue to do so until you obtain medical clearance for other forms of moderate to vigorous exercise. This is because it is safer to move and be active than to be sedentary. If you continue to do activities at your current pace, over time, you will slowly and gradually be able to improve.

Importance of a Daily Routine

While starting any activity, a daily routine cannot be over-emphasised. The routine can be planned and repeated on a weekly or monthly basis, with different sets of activities and rest days incorporated.

FITT-VP Prescription

The six components of an exercise routine prescription are summarised with the FITT-VP acronym:

F for Frequency – number of days per week

I for Intensity – light, moderate, or vigorous

T for Time (duration) – number of minutes per session

T for Type of exercise – aerobic, strengthening, balance, and flexibility

V for Volume – total amount of training load per week: the recommendation is to achieve 500–1000 MET minutes per week. If one is using an app to count steps, increase steps by 1,000–2,000 per day gradually to at least 8,000-10,000 steps per day if you are less than 60 years old and 6,000-8,000 steps if you are over 60 years of age.[16] Each increment of 500 steps results in a 7% reduction in dying from heart disease and each increment of 1,000 steps translates into a 15% reduction in dying from any cause.[17] Any volume of exercise more than the routine level of activity is beneficial compared to sedentary behaviour.

P for Progression – advancement or increase in exercise – either in intensity, frequency, duration, or combining types of exercise. This should be slow and gradual to reduce injuries, enhance adherence, and make the activity more enjoyable.

Phases of an Exercise Program

There are four phases of an exercise program:

A. Warm-up phase: This phase lasts at least 5–10 minutes and enables the body to transition from being at rest to meeting the needs of the intended activity. This is usually a dynamic activity at a lower intensity of the anticipated activity that will also delay the onset of fatigue. It minimises the chance of injury and improves flexibility.
B. Conditioning phase: This is where the anticipated exercise is performed: aerobic, strengthening, stretching and/or balance. The intensity and duration are dependent on the conditioning level of the person.
C. Cool down phase: This phase follows the conditioning phase and is intended to allow a gradual recovery of the heart rate and blood pressure to pre-exercise levels to prevent a sudden fall in blood pressure that could make one feel sick and even pass out. It also aids in the removal of metabolic waste products, such as lactic acid, to prevent muscle cramps.
D. Stretching phase (optional): This can be done separately or as part of the cool-down phase. When it follows active conditioning, flexibility and muscle strength are improved and the risk of injury is reduced.

A comprehensive exercise program should consider the following components:

1. Aerobic (cardiorespiratory/endurance) exercise

This is a rhythmic activity using the larger muscle groups.

Examples: walking, running, skipping rope, swimming, and cycling.

2. Strengthening (resistance) exercise

This type of exercise uses weights – either your body weight or external weights. To make the muscle stronger, one needs to make the muscle work above its usual workload (overload). To prevent injuries, it is crucial to use the correct form to minimise the use of accessory muscles.

Examples of using one's body weight:

Dynamic strengthening exercises – push-ups and sit-to-stand exercises
Static strengthening exercises – planks and holding a mid-sit-up

Intensity refers to how heavy the weight is; it is based on the percentage of one repetition maximum (1RM), which is the maximum weight that a person can lift only once. Those who are starting strength training will begin at 40–50% of 1RM. Intermediate trainees will work at 60–70% of 1RM (which is considered moderate to vigorous intensity), and experienced strength trainees will work at 80% or more of 1RM to improve their strength. A volume of 8–12 repetitions per muscle or muscle group per set is recommended to improve power and strength. A gradual workload progression may be considered every two weeks.

3. Stretching (flexibility) exercises

The aim of stretching is to improve joint flexibility and muscle extensibility. Stretch the muscle for 10–30 seconds without bouncing. Do a volume of 60–120 seconds per muscle group to improve the range of motion. Post-stretching soreness may occur when starting a new stretching exercise. This may be due to some micro-trauma within the muscle. This may last 1–3 days and shouldn't prevent normal activity.

4. Balance exercises

This a part of functional or neuromotor exercise. A combination of balance, coordination, proprioceptive and agility training is called functional training. It involves training the individual to improve their balance, increase their functional aspects, and reduce episodes of falls in older adults. For example: alternate standing on one leg for 30 seconds, first with eyes open, then with eyes closed.

Including all these four elements of aerobic, strengthening, stretching, and balancing exercises will help in improving or maintaining one's overall fitness and health. When you exercise, ensure that you perform it at an adequate intensity and duration for optimal health benefits. If you are restarting exercise after a long break, start at a lower intensity and gradually build up from

there. If there are time or resource constraints, do whatever you can to stay active – it all helps!

Footwear

Well-fitting footwear is essential, especially for those with diabetes or early knee arthritis. Some find that buying shoes a half-size larger and inserting a silicone insole or microcellular rubber (MCR) gives them more cushioning to absorb the pounding effect of running or walking.

Hydration

Water is the best fluid for hydrating, and water alone is sufficient as a fluid replacement for exercise lasting less than 90 minutes. As a rule, one should plan on drinking about a litre per hour of exercise. You can lose 2–3 litres of sweat in an hour with vigorous exercise when it is hot, so it is important to drink more if it is hot or if you sweat a lot. Some drink this water before exercising, and some carry it with them. Others only drink when they feel thirsty, although their performance may already be waning by that point. Hydration for exercising should be in addition to what is usually needed, which is approximately 1 litre/20 kg. Adequate hydration will improve your endurance. Do not wait until you have a headache from dehydration to drink.

Technology

Technology offers various tools to help people exercise. Smartphone apps are useful in tracking and encouraging physical activity. Accelerometers and pedometers provide valuable feedback on activity levels. Social groups using technology and apps motivate people to exercise, though their long-term effectiveness is yet to be established. The gamification of exercise through augmented and virtual reality is gaining new ground with the advancement of technology. Its effectiveness over time requires further investigation.

When Should One Exercise?

Timing

The best time to exercise is the time you can find to do it and do it consistently, whether it is in the morning, afternoon, or evening. For most people, evening exercise will not interfere with sleep unless it is vigorous exercise occurring within an hour of sleep. "Weekend warriors" save all their exercise for the weekend as they find it difficult to do it during the week. This may not be ideal, but remember, any exercise is helpful.

Interrupt Sitting

If those with prolonged occupational sitting can interrupt their sitting more frequently, alternate sitting with standing, utilise standing desks, and increase their exercise by 15–30 minutes above the recommendation or for a total of 60–75 minutes per day, they will be able to attenuate the harmful effects of prolonged sitting, which include increased risk of heart disease, waist circumference, diabetes, cancer, and death from any cause.[18]

Stairs

Take the stairs instead of the elevator, or climb a flight for a short work break or "exercise snack." Climbing as few as 6–10 flights of stairs (10 stairs per flight) each day may help prevent high blood pressure, a heart attack, heart failure, chronic obstructive respiratory disease, dementia, and diabetes.[19]

Weather

Be cautious about exercising when it is hot, especially in the middle of the day. See Ariel's Checklist for temperatures of concern with corresponding humidity and need for hydration and rest for potential heat stress categories at https://arielschecklist.com/wbgt-chart/.

Who Should Exercise?

Everyone needs adequate physical activity, and most of us need to supplement it with exercise, including "exercise snacks." Studies show that exercise capacity is consistently a stronger indicator of risk for heart disease and dying from any cause than high blood pressure, smoking, high cholesterol, diabetes, and obesity. Just 15 minutes a day of low-volume activity can result in a 14% reduction in dying from any cause. Each additional 15 minutes daily of exercise confers an additional drop of 4%. This translates to a 35% reduced death rate for up to 100 minutes of daily low-volume activity.[20]

When we use an adequate dose of exercise as medicine, we discover that our need for pharmaceuticals may decrease as shown before in Table 7.1. Additionally, exercise has also been compared to some medications:

1. Exercise is more effective than metformin in reducing heart disease risk in diabetes.[21] In pre-diabetes (early diabetes), metformin does not reduce blood sugars any more than exercise alone does.[22]

2. Establishing a consistent exercise habit may offer heart protection comparable to that of statins, along with superior outcomes in reducing overall mortality and enhancing quality of life.[23] Those who combined exercises *with* statins had a lower death rate.[24]
3. Across nearly 400 trials, medications lowered systolic blood pressure an average of 4 mmHg more than exercise. However, in persons with high blood pressure, there was no detectable difference in the effect of common blood pressure medications (ACE inhibitors, ARBs, beta-blockers, and diuretics) compared with endurance or dynamic strengthening exercises.[25]
4. From an analysis combining 218 unique randomised control studies, exercise appears to be superior to antidepressant medications and is comparable to psychotherapy (cognitive behavioural therapy) in effectiveness. The more intense the exercise, the more effective it is. Various exercise modalities at different intensities are also effective. When exercise is combined with medications, the effect of the antidepressant improves.[26]

Vulnerable Groups

Table 7.4. WHO guidelines on physical activity and sedentary behaviour (2020) for vulnerable groups

Category	**Aerobic activity**	**Muscle-strengthening**	**Other activities**
5–17 years Children who are differently abled	At least **60 minutes or more per day** at moderate to vigorous intensity **Do more** than 60 minutes for added benefits	Vigorous intensity can be incorporated with muscle and bone strengthening **3 or more days per week**	**Limit sedentary activity** Replacing sedentary time with physical activity of any intensity provides benefits
65+ years People with chronic disease and those who are differently abled	**Same** as for ages 18–64 years If unable to do above, be **as active** as abilities and condition allow	**Same** as for ages 18–64 years If unable to do above, be **as active** as abilities and condition allow	Physical activity at least **3 days per week** to enhance function, improve balance, and prevent falls **Limit sedentary activity** Replacing sedentary time with physical activity of *any* intensity provides benefits.

Category	Aerobic activity	Muscle-strengthening	Other activities
Pregnant and lactating women	At least **150 minutes per week** at moderate intensity; if engaged in more vigorous exercise routine pre-pregnancy, they may continue with their previous routine	Encourage the incorporation of a variety of aerobic and muscle-strengthening exercises	Gentle stretching may be helpful **Limit sedentary activity** Replacing sedentary time with physical activity of any intensity provides benefits
Doing **some** physical activity is **better** than doing none. Encourage activities that are **enjoyable**, offer **variety**, and are **appropriate** for age and ability. Overall, across all age groups, **benefits outweigh harms**. Musculo-skeletal injuries appear **uncommon at 150 minutes** of moderate-intensity activity. To decrease the risk of musculoskeletal injury, begin exercising at moderate intensity and gradually progress to higher levels**.**			

Children and Adolescents

Exercise benefits for children and adolescents include improved mental health, bone health, physical fitness, cardiometabolic health (blood pressure, cholesterol, blood sugar, and insulin resistance), cognitive function (which helps their academic performance), reduced risk of excess weight and obesity, and improved attention span in children with attention deficit hyperactivity disorder (ADHD). Our children and adolescents must benefit by getting their exercise for maximum performance and health.

Older Adults

It is never too late to begin to exercise. Our muscle mass declines by about 8% for every decade that we age. This results in a reduced exercise capacity for older adults, which then increases their risk of losing function and independence. With strengthening and aerobic training, older adults may be able to put a halt to this decline and significantly improve their quality of life and functionality as shown in Figure 7.3. The populations living in the "blue zones," where people live longer than average, have shown us that part of

the secret to maintaining mobility and functionality is incorporating activity into their daily lives and not spending much time being sedentary. If an older person has been sedentary, it is not too late to begin reaping benefits from an exercise program as outlined in the WHO recommendations (Table 7.4).

Individuals with Diabetes

In addition to accumulating 60–90 minutes of daily activity/exercise, for better blood sugar control, studies suggest that walking immediately after meals can help dampen the post-meal blood sugar spike.[27] Many find that walking for 15 or more minutes immediately after meals significantly brings their blood sugar levels down.

It is also necessary to add regular strength training into one's exercise routine, especially if one is lean but with a waist-to-hip ratio greater than one (the specific recommended ratio is <0.9 in men and <0.8 in women). South Asians generally have proportionately more fat and less muscle mass compared to Europeans and some other ethnic groups, which is believed to put them at higher risk for more severe diabetes at a younger age. Strength training along with aerobic activity can increase muscle mass and improve blood sugar control. (The rest of the lifestyle principles regarding diabetes in South Asians are effective and still apply: a whole food plant-based diet,

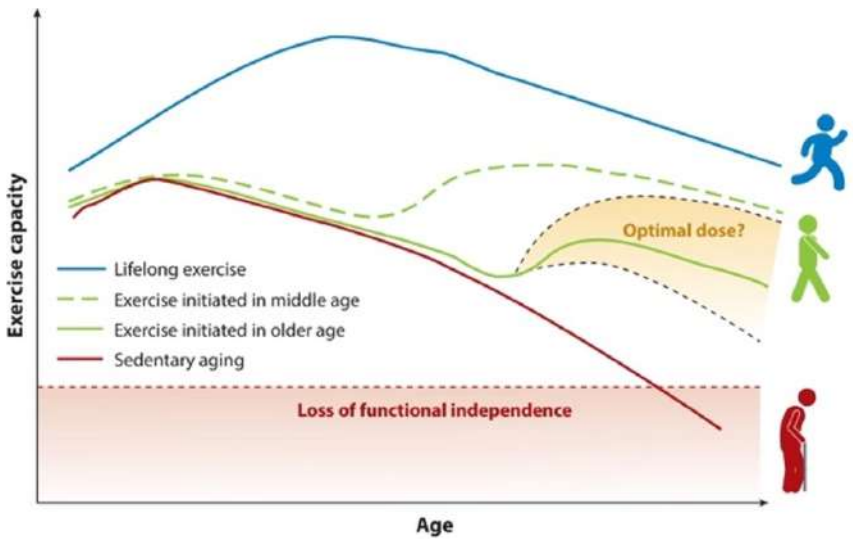


Figure 7.3. The effect of starting exercise and change in exercise capacity with age

Source: Reproduced with permission from Carrick-Ranson, G., Howden, E. J., & Levine, B. D. (2022). Exercise in octogenarians: How much is too little? *Annual Review of Medicine*, *73*, 377–391.

regular breakfast, early dinner, avoiding snacks; regularity, sleeping 7–9 hours, adequate sunshine and hydration, and living free from tobacco and alcohol.)

Remember, if the individual with diabetes has any neuropathy or numbness of their feet, they need to take extra precautions, make sure they have appropriate footwear, and faithfully examine their feet every day.

Individuals with Excess Weight and Obesity

Walking early in the morning or six hours after your last meal may help with weight loss. Exercise alone is not an efficient way to lose weight, but an exercise program with a diet program, such as a whole food, plant-based dietary pattern, often works well. Most of us have not appreciated the healing and health-promoting power of exercise and being physically active. It is easy to see why it has been said that "Exercise provides too many benefits to fit into a single pill."[28] It affects the whole body, and all organs are impacted positively.

Steve Blair, the scientific editor for the first US Surgeon General's Report on Physical Activity, said, "Physical inactivity is the biggest public health problem of the twenty-first century." This has become true around the world, including India. Now is the time to reverse this disease-causing phenomenon. Exercise is powerful! But when it is a part of a complete "lifestyle package," which also includes a whole plant-food nutrient-dense dietary pattern, eating early to achieve a 12–14 hour gap between the evening meal and breakfast, sufficient sleep, being adequately hydrated, not smoking or using other risky substances, maintaining a healthy weight, being at peace, and having trusting relationships, the results are even more profound.[29,30]

The Barriers to Exercise

Lack of intrinsic motivation is probably one of the largest barriers to starting an exercise program. It is common to feel unmotivated or feel too tired to exercise on a given day. Many find that when they think about how much better they feel after they exercise, they are motivated to begin. Getting started is often the toughest part, but as the saying goes, "Just do it!"

Air pollution, comprising both gases and particulate matter, is a growing concern in India and globally. Among these pollutants, PM2.5 is the most hazardous, causing 70–80% of health issues when inhaled into the lungs. The second-most dangerous parameter is ozone, which aggravates lung disease. When the air quality index (AQI) is above 100, the pollutant concentrations may affect sensitive people with lung or heart problems. In this case, one may consider limiting prolonged or heavy outdoor activity and possibly exercising indoors if the indoor air is better than the outdoor air quality. For

healthy individuals, it is recommended they avoid exercising outside when the AQI is above 150. Studies have shown that the benefits of exercising in low-pollution conditions outweigh the risks; the inflammation and oxidative stress that accompanies exercise quickly dissipates even in the presence of air pollution, but without the exercise, the oxidative stress and inflammation remain elevated.[31,32]

The level at which exercising at a particular AQI is no longer beneficial remains unclear. One study of older adults with preexisting obstructive lung disease or ischemic heart disease found that the beneficial effects were lost after a two-hour walk in a polluted environment.[33] Some have suggested wearing a mask, which will help keep out the particulate matter, but not the gases. It is advisable to steer clear of roads and tall buildings where air pollution accumulates. Avoiding exercise during rush hour is also advantageous. Monitor the air quality in your area using www.aqicn.org so that you can make an informed decision.

Here are some tips on how to become physically active:

1. Look for ways to be more active at home and at work. Limit sitting anywhere and everywhere. Some prefer going to a specific location or a gym.
2. Venturing outdoors into green spaces or natural settings where there are trees, plants, birds, and flowers offers greater benefits than indoor exercise.[34,35] Additionally, the presence of sunlight while exercising outdoors enables the body to produce vitamin D.
3. Make a short-term (say one month) renewable exercise SMART goal. (SMART goals are discussed in detail in Chapters 5 and 12.)
4. Use more leg or arm-powered transport – walk or cycle when possible and take the stairs instead of the elevator. Walk to the second bus stop or get off one stop early. Park your car or two-wheeler where you walk further to reach it. (This will also help to decrease your greenhouse gas environmental footprint.)
5. Track your progress. A great way to do this is with a digital tool, your mobile, or a wearable device. There are many apps and customised programs to choose from.
6. Get an exercise buddy. Make your exercise activity a social or family affair for a triple benefit: exercising, socialising and stress-busting! Or get a dog that will go exercising with you.
7. Limit screen time as much as you can.
8. Where possible, convert appointments to walking appointments and meetings to standing meetings. Consider doing this for virtual meetings as well as for extended phone conversations. However, be cautious if you are walking while talking on the road.

9. Support community projects to develop and make accessible local parks, greenways, walking paths, and cycling lanes.
10. As you experience the benefits of a more active lifestyle, become an "exercise ambassador" and inspire others to join you or to develop their own exercise program. Keep each other accountable and encourage each other.

MYTHS DEBUNKED

MYTH 1: I need to work out only in the morning.

FACT: *Workouts can be effective at any time of day. Exercising in the morning may offer physiological advantages, as the body is in a state of fasting, potentially enhancing weight loss. Nevertheless, the body adapts to exercise, and it will yield results regardless of the time of day.*

MYTH 2: Women should not do resistance training

FACT: *A common misconception among women is that resistance training will cause them to "bulk up," leading to a fear of lifting weights. However, bulking up is not caused solely by resistance training; it is influenced by diet and the use of steroids and supplements. Incorporating weights into workouts is essential to developing muscle strength and improving bone resilience and has numerous other physiological and psychological benefits.*

MYTH 3: Walking after consuming food is not good

FACT: *The traditional belief discourages exercise after eating to ensure that blood remains directed to the abdomen for digestion. However, recent research indicates that walking after meals aids in digestion and can actually lower blood glucose levels.*

MYTH 4: Sports drinks are essential for a proper workout

FACT: *Adequate hydration with water is sufficient for workouts that do not exceed 60–90 minutes, as water is one of the best energy drinks for stamina and performance.*

MYTH 5: I don't have time for exercise

FACT: *Finding time to exercise may seem challenging, but we need to prioritise and allocate time for exercising or leading an active lifestyle if we want to experience the benefits.*

CONCLUSION AND KEY TAKEAWAYS

In this chapter we have seen the importance and power of physical activity and exercise as medicine. Despite its immense benefits, it is largely overlooked by many, resulting in missed opportunities for better health. Being more physically active is an intervention for chronic disease – it can prevent, treat, and even reverse chronic disease processes. We need to find ways to integrate activity into our daily lives, and supplement it with planned exercise where necessary. We have reviewed different types of exercise, emphasised the importance of creating a routine, and discussed strategies for overcoming barriers. The question that remains is, "What will you and I do with this information?" Will we embrace the concept of exercise as medicine and take proactive steps to improve our health and well-being?

- Sit less, move more.
- Every minute of exercise or movement counts.
- Aim for at least 150–300 minutes of weekly aerobic exercise as well as strength training.
- Starting an exercise routine at ANY age has benefits.
- Exercise is one of the best stress busters and mood enhancers.
- Walking immediately after meals reduces blood sugar levels.
- South Asians may need more exercise than Caucasians for the same benefits.
- Inadequate exercise contributes to up to 70% of all deaths.
- Exercise is a medicine for chronic disease.
- Health benefits of exercise have their greatest potential when they are part of a healthy "lifestyle package."

RESOURCES

Videos

1. This is What Happens to Your Body When You Walk 5, 30 and 60 Minutes by the Body Hub [4.40]
2. Sitting Disease by the Knowledge Center [6.35]
3. 23½ Hours by Doc Mike Evans [9.18]
4. The Benefits of Exercise by Dr. Ashish Contractor at TEDxYouth@DAIS [16.32]
5. What Happens When You Get Heat Stroke by TED-Ed [3.53]

Article

1. Heat Stroke Prevention by the Korey Stringer Institute, University of Connecticut

Chapter 8

SLEEP: REJUVENATING THE MIND AND BODY

Randeep Guleria and Hirennappa Udnur

Mr. Kabir, a 48-year-old IT professional at a multinational company, presented to the Pulmonary Medicine Outpatient Department with complaints of lethargy, frequent nighttime awakenings, excessive daytime sleepiness, and early morning headaches over the past year. Recently diagnosed with diabetes mellitus, hypertension, and hypothyroidism, he reported increased sleepiness during work hours affecting his productivity, and his wife complained of disturbed sleep due to his loud snoring. Evaluation revealed that he was overweight (95 kg), and blood gas analysis showed elevated carbon dioxide levels, indicative of respiratory system inefficiency in exhaling carbon dioxide. His sleep study results suggested severe obstructive sleep apnoea (OSA). He was advised to lose weight through diet modification and regular exercise. At nights, he started using a continuous positive airway pressure (CPAP) machine, a medical device that keeps the airways open with mild air pressure during sleep.

During the follow-up after three months, Mr. Kabir reported improved sleep quality, increased productivity at work, and feeling refreshed throughout the day. He also noted a weight reduction of 4.5 kg and improvement in blood sugar levels, leading his endocrinologist to reduce his oral hypoglycaemic and anti-hypertensive medications.

INTRODUCTION

Sleep plays a vital role in our overall health and well-being. We spend an estimated one-third of our lives asleep. It is a critical physiological state vital for life, facilitating physical and mental restoration, memory consolidation, and the regulation of metabolic, immune, and temperature functions.

In this chapter, we delve into the significance of sleep as a cornerstone of healthy living and explore its profound impact on various aspects of our physical and mental health. From the regulation of metabolic processes to cognitive function and emotional resilience, the quality and quantity of sleep we get each night profoundly influences our daily functioning and long-term

health outcomes. By understanding the importance of sleep hygiene and implementing evidence-based strategies to improve sleep habits, we can harness the power of sleep as a therapeutic tool in the practice of lifestyle medicine. Let us uncover the science behind sleep and its pivotal role in optimising health and wellness.

The Physiology of Sleep

Sleep architecture

Environmental cues such as light during the day and darkness at night help regulate our circadian rhythm, also known as our biological clock, which closely mirrors the 24-hour cycle of nature. Sleep architecture refers to the structure of sleep, including its continuity, intensity, composition, and cycling. Sleep occurs in cycles lasting approximately 1.5 hours each, about 4–6 times per night. These cycles take us from light to deep sleep and back again. Upon closing our eyes, it typically takes 3–15 minutes to enter stage one of sleep. Throughout the night, we cycle between two phases: NREM sleep (non-rapid eye movement or light sleep) and REM sleep (rapid eye movement or deep sleep).[1] Table 8.1 shows the percentage of total sleep time for each stage.[2]

Table 8.1. Sleep architecture

Sleep stage	**Percentage of total sleep time (TST)**
NREM 1	Light sleep – 5%
NREM 2	Deeper sleep – 45%
NREM 3	Deepest non-REM sleep – 25%
REM	25%

According to electroencephalogram (EEG) findings, NREM sleep is classified into stages 1 through 3, also known as slow wave sleep, which is considered the most restorative phase. The initial one-third of sleep consists primarily of NREM N3 sleep. REM sleep occurs after NREM sleep, occurring in either stage 1, stage 2, or stage 3. REM sleep, often referred to as "paradoxical sleep" due to its EEG resembling an awake pattern, is crucial for creativity. The final one-third of sleep primarily comprises REM sleep. A pictorial representation can be seen in the hypnogram in Figure 8.1.

The duration and composition of sleep vary significantly with age. Newborns require the most sleep, around 16 hours per day. This gradually

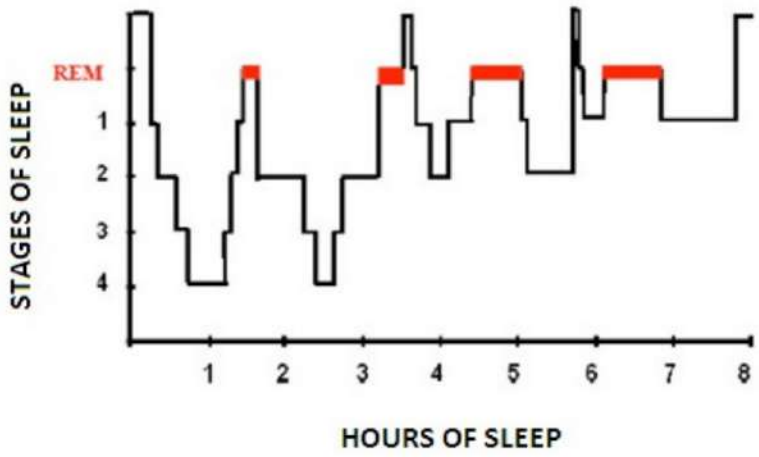


Figure 8.1. Hypnogram of the sleep cycle in a healthy young adult. This hypnogram shows four stages of NREM sleep, but the nomenclature adopted today is three phases (where phase N3 combines stages 3 and 4) as described in the text.

Source: Reproduced with written permission from Perrotta, G. (2019). Sleep–Wake Disorders: Definition, Contexts and Neural Correlations. *Journal of Neurology and Psychology*, 7(1). https://www.researchgate.net/figure/Hypnogram-Source_fig1_344425939

decreases throughout childhood. During adolescence, the recommended sleep duration is approximately 9 hours, while adults typically need 7 to 8 hours of sleep each night.

Trends, epidemiology, and economic implications

Sleep plays a crucial role in public health. High rates of insufficient sleep contribute to various health issues, including Type-2 diabetes, cardiovascular diseases, and mental health disorders. A recent study from India reported that the pooled prevalence of obstructive sleep apnoea (OSA) was 11% overall (13% in males and 5% in females); based on these findings, approximately 104 million Indians of working age suffer from OSA, of whom 47 million have moderate-to-severe OSA.[3] A self-reporting survey (where participants typically over-estimate sleep) was conducted among 4,500 rural older Indian adults who had 7.1 hours of sleep on average,[4] with about 30% of these individuals reporting 6 or fewer hours a night.[5]

Insufficient sleep also leads to increased unproductivity in the workplace. One of the most neglected effects of insufficient sleep is the cumulative impact

on the nation's economy due to the dip in productivity of its workforce. An analysis performed by RAND (a non-profit organisation that works to improve policy and decision-making through research and analysis) concluded that countries are prone to lose anywhere between 1.02% and 2.92% of their GDP due to insufficient sleep,[6] besides the expenses of healthcare resources utilised for treating sleep-related disorders and comorbidities associated with it. In a developing country like India, a loss of GDP will have a huge impact on the nation's growth. Therefore, it is imperative to create awareness about sleep disorders among the general public and primary care physicians.

The Neurobiology of Sleep

Sleep is considered a physiological necessity. However, the molecular mechanisms involved in sleep have not been fully elucidated. The brain areas involved in sleep and wakefulness have been identified: the brain centres involved in wakefulness include brainstem areas (the ascending reticular activating system or ARAS) and hypothalamic areas; the sleep-promoting areas of the brain contain the inhibitory neurotransmitter named gamma aminobutyric acid (GABA).

Functions of Sleep

1. **Energy conservation:** There is minimal oxygen consumption and energy expenditure during sleep; it is crucial for total body growth as it releases essential hormones such as growth hormone.
2. **Enhanced memory and immune function**: Sound sleep plays a pivotal role in bolstering the body's response to vaccinations and infections. Adequate sleep enhances vaccination effectiveness, while sleep deprivation heightens susceptibility to illness and exacerbates symptoms upon infection.[7]
3. **Glymphatic function during sleep:** Sleep promotes an enhanced flow from the brain for circulation, facilitating the flushing of soluble neurotoxic materials such as β-amyloids and others from the brain.
4. **Sleep and repair:** During sleep, the body undergoes crucial repair and replenishment of cellular components necessary for biological functions depleted throughout wakefulness. This repair process occurs throughout the body during sleep by increasing cellular division, growth hormone levels, and protein production essential for proper functioning. Figure 8.2 depicts the benefits of healthy sleep.



Figure 8.2. The benefits of healthy sleep

Common Sleep Disturbances and Solutions

Good quality sleep should be of adequate duration and depth, and continuous without fragmentation. If the duration of sleep is not adequate for it to be restorative, it leads to a situation of sleep deprivation. If sleep is punctuated with recurrent arousals, it results in a situation of sleep disruption. Sleep deprivation and sleep disruption are both causes of sleep restriction or insufficient sleep.

Sleep deprivation is a common problem and is increasing in prevalence over time due to our 24/7 modern lifestyle. Acute total sleep deprivation (no sleep or a reduction in the usual total sleep time, usually lasting for one or two days) is associated with adverse events including increased objective sleepiness, decreased psychomotor performance, and mood disturbances. Decreased psychomotor performance after sleep deprivation manifests as lapses in attention, longer reaction times, poor short-term memory, and poor performance. After being awake for 15–19 hours straight, cognitive function and reaction time can be impaired to a level comparable to having a blood

alcohol concentration of 0.05%.[8] Hence, sleep-deprived individuals may be prone to workplace and motor vehicle accidents. Sleep disruption causes symptoms akin to sleep deprivation.

Chronic partial sleep deprivation (sleep duration of less than 6–7 hours per night) is associated with increased risk of motor vehicle accidents, cardiovascular disease, metabolic dysregulation, immunosuppression, and all-cause mortality**,** and sleeping less than six hours per night increases the risk of motor vehicle accidents by 33%.[9,10] Sleep deprivation is associated with increased levels of ghrelin (the hunger hormone) and reduced levels of leptin (the satiety hormone), leading to increased food intake and obesity. Sleep deprivation leads to increased sympathetic nervous activity and increased cortisol levels, thereby predisposing one to diabetes mellitus, metabolic syndrome, and systemic hypertension. Sleeping for less than five hours per night has been consistently shown to increase risk of systemic hypertension, ischemic heart disease, acute myocardial infarction, impaired glucose tolerance, and diabetes mellitus.[11] Sleep duration and mortality are suggested to have a "U-shaped association" such that both short sleep (<6 hours) and long sleep (>9 hours) have been found to increase the risk of all-cause mortality.[12]

Major Sleep Disorders

1. Insomnia

Insomnia may present as difficulty in falling asleep and/or staying asleep. Patients with insomnia report taking 30 minutes or more to fall asleep (for those with sleep initiation difficulties) or spending 30 minutes or more awake during the night (for those with sleep maintenance difficulties). It is one of the most common medical complaints, affecting nearly one-third of the adult population globally. The diagnosis of insomnia also requires the presence of compromised daytime function, which includes one or more symptoms such as fatigue, daytime sleepiness, poor attention, increased accidents, aggression, reduced motivation, or low energy. It is higher among women (17.6%) than among men (10.1%).[13] Insomnia can often be a persistent or recurrent condition with exacerbations connected to medical, psychiatric, and psychosocial stressors.

2. Sleep Disordered Breathing (SDB)

Obstructive sleep apnoea (OSA) is a common sleep-related breathing disorder. Over the past few decades, there has been a growing recognition of OSA as a major public health challenge. OSA is associated with excessive daytime sleepiness, cognitive impairment, and reduced quality of life.[14]

3. Central Disorder of Hypersomnia

Patients with hypersomnia complain of excessive daytime sleepiness. They find it difficult to maintain alertness during waking hours with sleep occurring unintentionally or at inappropriate times, interfering with the daily routine. In addition, in idiopathic hypersomnia, there has been an association between excessive sleepiness and depressive symptoms and low quality of life. Fatigue can present in a broad range of sleep disorders and can be confused with sleepiness. Idiopathic hypersomnia has distinctive clinical features in addition to the severity of hypersomnia such as prolonged nighttime sleep (more than 10 hours) and sleep inertia.[15] Narcolepsy is a chronic neurological disorder due to the brain's inability to control sleep and wakefulness. Patients with narcolepsy complain of excessive chronic daytime sleepiness with transient loss of muscle tone in response to intense emotion such as laughter, experiencing hallucinations while falling asleep or while waking, and encountering sleep paralysis (inability to move immediately after awakening).

4. Restless Leg Syndrome (RLS)

It is a neurological condition characterised by uncomfortable sensations in the legs and an irresistible urge to move them. Symptoms usually worsen during the evening and at nighttime, disrupting sleep either by causing difficulty in falling asleep or in returning to sleep after waking up. Moving the legs or walking can alleviate discomfort temporarily, but the sensations often return once the movement ceases. RLS affects both males and females, with a higher prevalence among females.

5. Unusual Sleep-Related Behaviours

Features of specific behaviour before, during, or after sleep can provide essential clues to certain sleep disorders such as movement disorders, eating disorders, or parasomnia.

- Sexsomnia refers to abnormal sexual behaviours without recollection, including sexual intercourse with a bed partner, masturbation, or sexual vocalisations.
- Nightmares and night terrors differ in how the person responds upon awakening. During a nightmare, one can become fully alert, often recalling the distressing events. However, in night terrors, the individual may remain disoriented and confused upon waking, with little or no memory of the episode.

- Complex sleep behaviours, such as sleepwalking, are associated with non-rapid eye movement (NREM) sleep and can pose serious risks, especially among older individuals with chronic insomnia. While these behaviours are typically harmless to others, there is a slight chance that a partner may need to intervene to prevent self-harm or injury to others, albeit rarely.

The symptoms associated with sleep disorders are commonly exacerbated by sleep deprivation, physical or emotional stress, traumatic events, and the use and abuse of substances or medications. Some of the medicines that are commonly linked to unusual sleep-related behaviours are antipsychotics and psychotropic medications (*e.g.*, anticholinergics), sedatives, and hypnotic agents, particularly benzodiazepine receptor agonists (*e.g.*, zolpidem and eszopiclone), which now have a black box warning from the US Food and Drug Administration (FDA) due to increased risk of complex sleep behaviours.

Lifestyle Factors that Affect Sleep

Various lifestyle factors can significantly influence the quality and quantity of sleep that individuals obtain. From daily habits to environmental influences, lifestyle choices play a crucial role in shaping sleep patterns. Understanding these factors and their impact is essential for promoting better sleep hygiene and addressing sleep-related issues. This section explores key lifestyle factors that affect sleep, ranging from bedtime routines and dietary habits to technology usage and environmental considerations. By recognising the interconnectedness of lifestyle and sleep, individuals can make informed decisions to optimise their sleep health and overall quality of life.

Sleep Hygiene

Sleep hygiene refers to a set of practices and habits that are conducive to promoting good sleep quality and quantity. These practices aim to create an optimal sleep environment and promote healthy sleep patterns. Some common aspects of sleep hygiene include the following (Figure 8.3):

1. Consistent sleep schedule

Going to bed and waking up at the same time every day, even on weekends, helps regulate your body's internal clock and promotes better sleep quality.

2. Creating a relaxing bedtime routine

Engaging in calming activities before bed, such as reading, taking a warm bath, or practicing relaxation techniques like deep breathing, can signal to your body that it is time to wind down and prepare for sleep. Minimise exposure to screens from electronic devices like smartphones, tablets, and computers before bedtime; limiting blue light (which influences our circadian rhythms) at night can help mitigate its effect on sleep. Practicing stress-reduction techniques such as mindfulness meditation, yoga, or journaling can help alleviate stress and anxiety, which are common barriers to good sleep. Light music before bed may decrease the time it takes to fall asleep and improve sleep quality. Music has been shown to decrease levels of a stress hormone called cortisol.[16]

3. Optimising the sleep environment

Make sure your bedroom is conducive to sleep by keeping it cool, dark, and quiet. Investing in a comfortable mattress and pillows, and minimising noise and light disruptions can help improve sleep quality. Thermoregulation during sleep is a crucial factor affecting sleep quality. Your body's temperature naturally drops as you sleep, so a cooler room makes it easier to fall and stay asleep. Optimise your bedroom by reducing heat build-up during the day, turning down the thermostat at night, and investing in cooling bedding materials. The temperature of your bedroom can make a significant difference to your sleep quality. The best room temperature for sleep is approximately 65 degrees Fahrenheit (18.3 degrees Celsius) – this may vary by a few degrees from person to person, but most doctors recommend keeping the thermostat set between 60 to 68 degrees Fahrenheit (15.6 to 20 degrees Celsius) for the most comfortable sleep.[17]

Additional Lifestyle Factors

1. Diet

As a general rule, a whole plant-food dietary pattern, made up largely of a variety of vegetables and fruits, is able to provide a broad range of vitamins and minerals, contributing to better sleep while promoting a healthy weight. It is best to avoid eating within three hours of bedtime because of circadian disequilibrium, which negatively impacts the metabolic system. This is one reason why individuals who eat late at night have a tendency to gain more weight than by eating the same food early in the day.[18] As sleep and nutrition are extremely complex and involve multiple



Figure 8.3. Guidelines for healthy sleep hygiene

Source: iStock.com/RamCreativ

interconnected systems of the body, it is challenging to conduct research studies that conclusively demonstrate a single diet that is best for sleep. Instead, what seems most important is that a person gets adequate nutrition without overconsuming unhealthy foods.

2. Regular exercise

Regular exercise can help healthy adults sleep better. While acute physical activity can have a small effect on sleep quality and duration, regular and moderate exercise can extend sleep duration, improve sleep quality, and decrease sleep onset, or the time it takes to fall asleep. A good rule of thumb is to avoid strenuous exercise within three hours of your scheduled bedtime. Working out late in the day can raise your body temperature, which in turn may impact sleep onset and how well you sleep. Some studies have even concluded that high-intensity workouts within an hour of bedtime can negatively affect sleep time and sleep efficiency.[19]

3. Limiting stimulants before bed

Avoiding alcohol, nicotine, and caffeine close to bedtime can help signal to your body that it is time to sleep. **Alcohol** has a profound impact on sleep, with effects dependent on acute versus chronic use and dependence. While alcohol is initially sedating, this effect disappears after a few hours, resulting in fragmented and disturbed sleep in the second half of the night. Sustained use of alcohol in chronic alcoholism is associated with major sleep problems. Ongoing sleep and circadian disruption are features of alcohol drinking binges. When abstinent, sleep issues persist, with insomnia and vivid dreams being common complaints; this can be a factor leading to relapse.[20]

Tobacco products, vapes, and even occasional use of **nicotine** can negatively affect sleep. In fact, studies suggest that smokers are almost 50% more likely to experience sleep troubles than non-smokers.[21] People who smoke, vape, or use other tobacco products tend to take longer to fall asleep, wake up more often during the night, and sleep fewer hours. Tobacco users tend to spend more time in the lighter stages of sleep, leading to more nighttime awakenings, and less time in the deep and restorative stage of sleep; they are at increased risk of several sleep problems, including snoring and sleep disorders such as obstructive sleep apnoea and certain parasomnias.[22] **Caffeine** (tea or coffee) is now shown to disrupt sleep if it is ingested about nine hours prior to bedtime.[23]

4. Limiting daytime naps

While short naps can be beneficial for some people, especially those who may be sleep deprived, it is important to avoid long or irregular naps, as these can disrupt nighttime sleep. Shorter powernaps are generally considered good for health**.** A full sleep cycle typically lasts about 90 minutes. A power nap that lasts 20 to 30 minutes is usually ideal, being long enough to give you all the benefits of sleep without leaving you feeling groggy when you wake up. A short afternoon nap can help you feel less sleepy and lead to improvements in mood, alertness, reaction time, short-term memory, focus, and concentration. Longer naps have the downside of producing more sleep inertia – which is that drowsy feeling you experience when you wake up.[24]

Relaxation Techniques

Relaxation techniques such as meditation, breathing exercises, and progressive muscle relaxation are some ways to induce relaxation and sleep. **Progressive muscle relaxation (PMR)** is a relaxation technique that involves tensing and then relaxing different muscle groups in the body systematically. The goal of PMR is to release physical tension and promote relaxation throughout the body. Typically practiced in a quiet and comfortable environment, PMR sessions are guided by audio recordings or scripts that lead individuals through the process.

During a PMR session, participants are instructed to tense specific muscle groups, typically starting from the feet and moving upward through the body, holding the tension for a few seconds, and then gradually releasing it while focusing on the sensation of relaxation. By deliberately tensing and then relaxing muscles, individuals become more aware of bodily sensations and can learn to recognise and release tension more effectively. In addition to improving sleep quality, PMR has been shown to be effective in reducing stress, anxiety, and depression.[25]

Cognitive Behavioural Therapy (CBT)

Cognitive behavioural therapy for insomnia (CBT-I) includes a set of psychological and behavioural techniques specific to treating insomnia. In CBT-I, individuals learn to identify and challenge negative thoughts and beliefs about sleep, develop relaxation techniques to reduce arousal at bedtime, and implement behavioural strategies to improve sleep habits. These may include sleep hygiene education, stimulus control techniques, sleep restriction therapy (SRT), and cognitive restructuring.

Sleep Restriction Therapy (SRT)

SRT limits the total time allowed in bed to increase the drive to sleep. Restricting the time spent in bed to match the individual's actual sleep time improves sleep efficiency and consolidates sleep. By spending less time in bed, individuals develop a stronger association between the bed and sleep, reducing the time spent awake in bed and improving sleep quality.

Stimulus Control Therapy (SCT)

SCT is aimed at re-establishing the association between the bed and sleep. This therapy involves specific guidelines to help individuals with insomnia develop healthier sleep habits and overcome conditioned arousal in the bedroom, by using the bed only for sleep, avoiding activities such as watching TV or working in bed, going to bed only when sleepy and getting out of bed if unable to fall asleep within a short period, and establishing a consistent wake-up time every morning, regardless of the previous night's sleep.

Pharmacological Treatment

Pharmacological interventions play a crucial role in addressing various sleep-related issues. The diverse pharmacological options cater to different sleep disorders, emphasising a tailored approach to enhance overall sleep quality.

Drugs such as chlorpheniramine and diphenhydramine are commonly utilised for their sedative effects in managing difficult sleep. Benzodiazepines are frequently employed to treat insomnia. Non-benzodiazepine hypnotics like zolpidem and zaleplon are effective for acute and short-term insomnia. Melatonin receptor agonists, the melatonin receptors MT1 and MT2, are implicated in regulating sleepiness and the sleep-wake cycle. These drugs are used in circadian rhythm sleep disorders, jet lag, and delayed sleep–wake phase disorder (insomnia with difficulty in sleep onset). Others, like suvorexant, counteract the wakefulness-promoting effects of orexin, aiding in sleep.

Mechanical positive airway therapy and lifestyle changes are the primary treatments for obstructive sleep apnoea, while the drug modafinil stands as a first-line therapy for narcolepsy, a chronic neurological disorder that affects the brain's ability to control sleep-wake cycles.

Light-phase shift therapy can assist in regulating the body's production of melatonin, which can aid in adjusting sleep and wake times, reduce daytime sleepiness, and normalise sleep schedules in circadian rhythm abnormalities. Gabapentin enacarbil proves beneficial in alleviating restless leg syndrome and associated sleep disturbances.

Tips for Restful Sleep

Behaviour during the day and especially before bedtime can have a major impact on sleep. They can promote healthy sleep or contribute to sleeplessness. Daily routines such as one's eating and drinking habits, medications, and activities of the day can significantly impact quality of sleep. Even a few slight adjustments in some cases mean the difference between sound sleep and a restless night. The following habits can help improve sleep health:[26]

- Keeping a consistent sleep schedule by getting up at the same time every day, even on weekends or during vacations
- Setting a bedtime that is early enough to get at least 7–8 hours of sleep
- Going to bed only when you feel genuinely sleepy
- Leaving the bed if you haven't fallen asleep within 20 minutes, and engaging in a quiet, dimly lit activity (avoid using electronic devices)
- Establishing a calming bedtime routine to signal to your body that it is time to wind down
- Reserving your bed solely for sleep and intimacy
- Creating a peaceful sleep environment by keeping your bedroom quiet, cool, and comfortable
- Minimising exposure to bright lights in the evening
- Powering down electronic devices at least 30 minutes before bedtime
- Refraining from eating heavy meals before bed, opting for a light, nutritious snack if hungry
- Maintaining a regular exercise routine and eating a whole plant food diet
- Limiting caffeine consumption in the afternoon and evening
- Not drinking alcohol before bedtime
- Drinking less of all liquids before bedtime
- Using sleep aids such as sleep trackers, sleep masks, white noise machines, weighted blankets, and so on.

Tips for Shift Workers

Shift work encompasses any work schedules occurring outside the conventional hours of 7.00 AM – 6.00 PM. These schedules can include fixed hours, rotating or split shifts, or irregular work times.

Shift work can be demanding when it comes to getting a good night's sleep, especially for those who work night, early morning, or rotating shifts. Over time, individuals working non-traditional shifts may experience symptoms such as difficulty falling asleep and heightened fatigue during work hours. This condition, known as shift work disorder, not only leads to cognitive and physical challenges but also impacts job performance, increasing the risk of errors and accidents in the workplace.

How to Set a Night Work Sleep Schedule

Maintaining a consistent sleep schedule is crucial for employees on night shifts. If you typically wake up at 5.00 PM for your night shift and go to sleep at 8.00 AM after returning home from work, it's important to stick to this routine even on your days off. Sleeping during the day may be challenging due to exposure to light and noise.

Instead of going straight to bed upon returning home, some shift workers opt to stay awake for a few hours to align their sleep schedule with their upcoming night shift. Prior to bedtime, it is beneficial to engage in relaxation techniques such as taking a hot shower or bath, practicing meditation, or participating in other calming activities. Some shift workers take melatonin supplements to fall asleep during the day.

Tips for Employees with Rotating Shifts

While fixed shift work presents its own set of sleep challenges for employees, rotating shifts with varying start and end times throughout a week or month can intensify these difficulties.[27] Shift workers with rotating schedules should anticipate shift changes by modifying their sleep patterns accordingly. For example, if an employee is transitioning from a day shift to a night shift the following week, it is beneficial to gradually shift bedtime by one or two hours each night in the days leading up to the night shift. This gradual adjustment helps ensure adequate rest and minimises sudden changes.

Evaluation of Sleep Disorders

To assess sleep issues thoroughly, a range of information is necessary. This includes conducting a comprehensive medical history review, examining medication usage, and performing a physical assessment. Utilising various clinical and investigative methods refines the diagnostic process and pinpoints the specific type of sleep disorder present. Table 8.2 describes some clinical tools for the evaluation of sleep disorders.[28]

Table 8.2. Clinical tools for evaluating sleep disorders

1.	**Epworth sleepiness scale (ESS)**	Eight-item self-administered questionnaire gauging excessive daytime sleepiness presence and severity
2.	**Fatigue severity scale (FSS)**	Nine-item tool distinguishing between sleepiness and fatigue, estimating fatigue severity
3.	**Insomnia severity index (ISI)**	Widely accepted clinical tool aiding in identifying and tracking insomnia severity, complementing sleep diary

4.	**Sleep diary**	Personal log detailing sleep and wakefulness patterns over weeks to months, including bedtime, sleep onset duration, awakenings, and nap times.
5.	**Sleep studies**	Objective measures obtained via sleep studies like home sleep apnoea test (HSAT) or polysomnography (PSG), with PSG considered the gold standard for diagnosing sleep disorders, including OSA

Laboratory Studies for the Evaluation of Sleep Disorders[29]

The recommended laboratory investigations for individuals with sleep disorders include arterial blood gases (ABG), thyroid function tests, screening for drug and alcohol toxicity, and iron studies and assessment of ferritin levels. Additional diagnostic procedures include actigraphy, which involves the use of a wearable device to record movement or lack thereof during sleep over extended periods, providing an objective assessment of insomnia, and multiple sleep latency testing (MSLT) or nap study (Figure 8.4), which gauges daytime sleepiness levels. Administered the day following an overnight polysomnography (PSG) study, the patient takes four or five naps within 8-10 hours. MSLT helps pinpoint the underlying causes of excessive daytime sleepiness, which may stem from conditions such as sleep apnoea, hypersomnia, or narcolepsy.

Specific Health Implications

1. The metabolic consequences of sleep

Diminished sleep duration and quality seem to be widespread in contemporary society. Slow wave sleep (SWS) is widely regarded as the most restorative sleep phase. Slow wave activity occurs during the first two sleep cycles (approximately the first three hours of sleep). The total amount of SWS per night drastically reduces with age. Sleep plays a significant role in hormone release, glucose regulation, and cardiovascular function. Many individuals believe that reducing the time spent in bed to the minimum tolerable level is both efficient and harmless.

During SWS, growth hormone is released, while the stress hormone cortisol is suppressed. SWS is further linked to a reduction in brain glucose metabolism and has a modulatory effect on hormone release. Specifically, the release of growth hormone (GH) and prolactin is heightened during SWS. Both GH and cortisol play crucial roles in glucose metabolism. Sleep appears to play an important role in regulating blood glucose levels, and recurrent partial sleep deprivation has been shown to adversely affect carbohydrate metabolism, potentially leading to diabetes mellitus.[30]

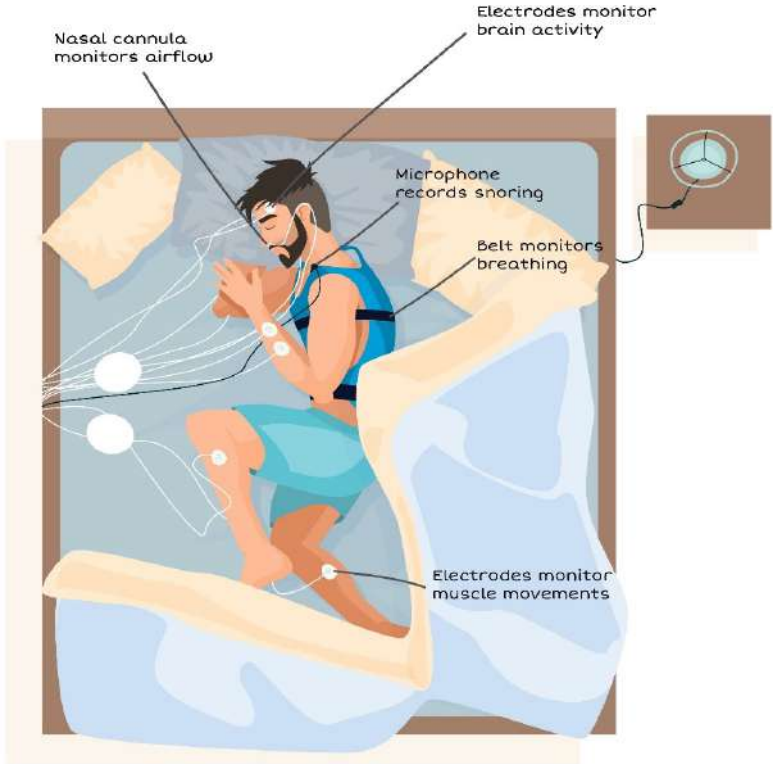


Figure 8.4. A sleep study in a laboratory setting

A study among healthy young people showed that suppression of SWS without any reduction in total sleep time resulted in decreased insulin sensitivity, reduced glucose tolerance, and increased risk of Type-2 diabetes, suggesting that a reduction in SWS independent of the overall duration of sleep may be particularly important for normal glucose metabolism.[31] In recent years, laboratory and epidemiologic studies have converged to indicate that sleep loss may be a novel risk factor for obesity and Type-2 diabetes.

2. Sleep and appetite

The neuroendocrine system governs food intake under the regulation of the central nervous system. Long-term regulators of food intake such as insulin and leptin are released in accordance with body fat levels. Conversely, ghrelin, an appetite-stimulating hormone, originates from cells in the stomach. In a healthy state, ghrelin levels surge before meals and decline swiftly after eating. Ghrelin and leptin are components of the orexin system, which coordinates feeding, wakefulness, and energy expenditure through receptors in the brain's appetite center.[32] Sleep duration plays an important role in the regulation of

leptin and ghrelin levels in humans. Studies have shown that recurrent partial sleep deprivation and chronic short sleep are associated with a significant decrease in levels of leptin and increase in levels of ghrelin, leading to hunger.[33]

3. Sleep and obesity

In the last four decades, obesity rates have surged rapidly, a trend not solely attributed to reduced physical activity and altered dietary habits, according to experts. Coinciding with this rise, there has been a noticeable decline in reported sleep duration, hinting at a potential correlation between the two phenomena. A recent systematic review of various studies, including both cross-sectional and longitudinal ones, found that short sleep duration is independently linked to weight gain, especially among younger age cohorts.[34]

A recent meta-analysis of 30 cross-sectional studies investigated the relationship between sleep duration and obesity or BMI in adults and children around the world. The risk of obesity was increased with short sleep duration in children and in adults.[35] Obesity leads to increased risk of other non-communicable diseases such as diabetes mellitus, hypertension, dyslipidaemia, and other cardiovascular diseases (acute coronary syndrome, myocardial infarction).

Practical Applications

Understanding the optimal amount of sleep needed at various stages of life is crucial for maintaining overall health and well-being. As we have seen in this chapter, sleep plays a vital role in physical growth, cognitive development, and emotional regulation. Here are some guidelines for the recommended amount of sleep across different age groups (Table 8.3), acknowledging that sleep needs change as we age.[36]

Table 8.3. The recommended amount of sleep across different age groups

Age group		**Recommended hours of sleep**
Newborn	0–3 months	14–17 hours (National Sleep Foundation) No recommendation (American Academy of sleep)
Infant	4–12 months	12–16 hours per 24 hours (including naps)
Toddler	1–2 years	11–14 hours per 24 hours (including naps)
Preschool	3–5 years	10–13 hours per 24 hours (including naps)
School Age	6–12 years	9–12 hours per 24 hours
Teen	13–18 years	8–10 hours per 24 hours
Adult	18–60 years	7 or more hours per night
	61–64 years	7–9 hours
	65 years and older	7–8 hours

MYTHS DEBUNKED

MYTH 1: Operating well with minimal sleep can boost productivity at work.

FACT: *Quality sleep enhances daytime performance and productivity.*

MYTH 2: Loud snoring is a normal occurrence.

FACT: *It could signal an underlying medical issue or sleep disorder.*

MYTH 3: If you struggle to fall asleep, it is best to remain in bed.

FACT: *Beds should be reserved solely for sleeping and sexual activities.*

MYTH 4: The more sleep you get, the better your health will be.

FACT*: Sleep requirements vary across different age groups.*

MYTH 5: Lost sleep can be made up over the weekend.

FACT: *The cumulative effects of sleep debt take longer to resolve.*

MYTH 6: Alcohol aids in achieving restful sleep.

FACT: *Alcohol disrupts normal sleep architecture, leading to more complications.*

CONCLUSION AND KEY TAKEAWAYS

Sleep is an important aspect of human health, deeply intertwined with our daily lives. Exploring its intricacies reveals a dynamic mix of behaviours and bodily processes that profoundly affect our well-being. Despite its importance, modern life often disrupts our ability to get enough quality sleep. Issues such as insomnia and sleep disorders hinder our quest for good health. This underscores the need for strategies promoting healthy sleep habits. This chapter has examined the various aspects of sleep and advocated for better sleep practices, aiming for improved vitality and well-being for individuals and communities alike.

- Sleep is a critical aspect of health, contributing significantly to overall well-being and quality of life.
- Defined behaviourally, sleep is characterised by unconsciousness, supine posture, closed eyes, and increased arousal threshold.
- Humans spend approximately one-third of their lives sleeping, highlighting its importance.
- Adequate sleep duration, typically 7–9 hours, is recommended for optimal health, varying by age.

- Sleep plays a crucial role in neurological development, mental health, immunity, metabolic functions, and overall productivity.
- The sleep architecture involves cycles of NREM and REM sleep, with an average cycle length of 1.5 hours.
- Insomnia and sleep-related breathing disorders are common factors affecting sleep quality, with significant prevalence and impact on health-related quality of life.
- Insomnia, in particular, is a major health concern contributing to increased morbidity, decreased immunity, and potential mortality risks, as well as a considerable socio-economic impact.
- Promoting sleep hygiene is crucial, especially in the modern era dominated by corporate life and social media.
- Creating awareness about the importance of sleep and implementing strategies to improve sleep hygiene are essential for public health and well-being.

RESOURCES

Videos

1. Science of Sleep by Dr. Michelle Olaithe at TEDxMandurah [13.51]
2. Stories from the Sleep Clinic by Dr. Kirstie Anderson at TEDxNewcastleCollege [15.01]
3. Methods to Practice Good Sleep Hygiene by MEDSimplified [10.21]
4. How Lack of Sleep Affects Health and Tips for a Good Night's Rest by CBS Mornings [5.50]

Additional Reading

1. Ramar, K., Malhotra, R. K., Carden, K. A., & et al. (2021). Sleep is essential to health: An American Academy of Sleep Medicine position statement. *Journal of Clinical Sleep Medicine, 17*(10), 2115–2119.
2. Mukherjee, S., Patel, S. R., Kales, S. N., Ayas, N. T., Strohl, K. P., Gozal, D., & Malhotra, A. (2015). The importance of healthy sleep. Recommendations and future priorities. *American Journal of Respiratory and Critical Care Medicine, 191*(12), 1450–1458.

Chapter 9

ADDICTION: BREAKING FREE FROM HARMFUL HABITS

Johnson-Pradeep R. and Shawn Serrao

Aditya is a 20-year-old college student working towards his bachelor's degree. He is generally anxious and shy, keeps to himself, and has very few friends. Much of his time is spent gaming on his phone, where he has found a sense of camaraderie with online friends. He spends almost 8–10 hours a day on this pursuit, and over time, this habit has started to disrupt his sleep, eating habits, and academic performance.

At parties, Aditya finds himself tempted by the smoking and drinking habits of his peers. Though initially hesitant, he eventually gives in to trying them out. Surprised by the pleasant sensations these substances offer, he gradually increases his intake, progressing from occasional use to dependence, despite his family's objections. His experimentation extends to marijuana, and as his daily consumption rises, so do his concerning symptoms. He begins experiencing auditory hallucinations and growing paranoia, which take a toll on his mental and physical well-being. He becomes very aggressive. Recognising the need for intervention, Aditya's family takes him to a local hospital for treatment. Although there is a period of improvement, Aditya struggles with relapse, highlighting the complexities of addiction and the challenges of maintaining recovery.

INTRODUCTION

It is not unusual for individuals like Aditya to need to stay vigilant throughout their lives as part of their recovery journey. They may face the risk of relapse during moments of overconfidence or when confronted with stressful events.

Addiction is a disorder of the brain characterised by a transition from experimental or recreational use to compulsive and harmful use, interspersed with cycles of abstinence, withdrawal, craving, and relapse. Addictive disorders can be classified into substance-related addictions (SRA) and non-substance-related addictions (NSRA).

SRA substances include alcohol, tobacco, cannabis, stimulants, hallucinogens, inhalants, and caffeine. Substance-related addictions can be further categorised into substance use disorders (SUD) and substance-induced disorders (SID). Substance use disorder is a cluster of cognitive, behavioural, and physiological symptoms due to the individual's problematic use of the substance despite significant substance-related problems. Substance-induced disorders (SID) are psychiatric disorders caused by the direct effects of the substance. These include substance-induced delirium, psychotic disorder, mood disorder, and anxiety disorder.

Non-substance-related addictions or behavioural addiction or process addiction is a form of addiction that involves a compulsion to engage in a rewarding non-substance-related behaviour, sometimes called a natural reward. These include addictions to gambling, sex, digital games, exercise, internet, food, work, and shopping.

Epidemiology

Substance addiction is found to be more common than behavioural addiction, both globally and in India. About 2.2% of the world's population suffers from some form of substance abuse or dependence.[1]

The magnitude of individual substances used in India is explained in detail below.

Alcohol: A 2019 report by the Ministry of Social Justice and Empowerment revealed that 14.6% of India's population between the ages of 10 to 75 years consume alcohol, with 2.7% of the population experiencing alcohol addiction.[2] The report says that over the past decade, there has been a notable increase of 10–15% in alcohol consumption; the usage of alcohol is higher among men than women, that is, approximately 17 men consume alcohol for every woman who does. Among the Indians who consume alcohol, 1 in every 5 men and 1 in every 16 women go on to develop alcohol dependence (addiction), and 48% of them engage in episodic heavy drinking, defined as consuming more than four drinks in a single sitting.[3]

Tobacco: India is reported to be the third-largest producer and second-largest consumer of tobacco worldwide. The GATS-2 study says that 28.6% of Indians (42% of Indian men and 14% of Indian women) above the age of 15 use tobacco in some form or the other (Table 9.1); over the last ten years, the daily use and occasional use of tobacco have reduced by 4% and 1% respectively; and a 10% rise has been reported in people who are planning to make or have already made attempts to quit over the last 10 years.[4]

Table 9.1. Different forms of tobacco

Different forms of tobacco[5]	
Smoked tobacco	Smokeless tobacco
• Most used: Beedis (an average of 15 beedis per day) • Second-most used: Cigarettes (an average of 6 cigarettes per day) • 19% of men in India and 2% of women in India smoke tobacco.	• Most used: Khaini • Second-most used: Gutka • 29% of men in India and 12% of women in India use smokeless tobacco.

Cannabis: According to the World Health Organisation, 2.5% of the world's population consumes cannabis.[6] Apart from tobacco, cannabis and opioids are the second and third most consumed substances in India. 2.8% of people in India reported having used it at least once, of whom 0.25% suffer from cannabis addiction; it is either consumed as bhang, which is the legal form, or as ganja or charas.[7] A study at government de-addiction centres over seven years reported that men are the largest consumers of cannabis products, and the majority of those who use cannabis use it along with other psychoactive substances (84%).[8] The study report also said there has been a decreasing trend in the age of starting cannabis use; however, this has not been reflected in the numbers seeking treatment.

Other substances: After opioids, the next most consumed substance by Indians are sedatives (1.08%), followed by inhalants (0.7%), stimulants (0.18%), hallucinogens (0.18%) and cocaine (0.10%).[9] Table 9.2 provides a fuller picture of the prevalence of substance use and addiction.

Table 9.2. The prevalence of substance use and dependence (addiction) in India

Prevalence of substance use and dependence (addiction)[10]	
Tobacco	The prevalence of tobacco use among adults in India is 28.6%, with a significant gender disparity of 42.4% in males vs. 14% in females. The prevalence of bidi smoking is at 9.7%, cigarette smoking at 5.9% and smokeless tobacco (SLT) at 21.4%
Alcohol	The prevalence of alcohol use among those aged 10–75 years is 14.6% of which 2.7% exhibit patterns indicative of dependence. The gender ratio is 17:1 with predominance in men.

Prevalence of substance use and dependence (addiction)[10]	
Opioids	Opioid use affects at least 16 million people worldwide with 2% of the Indian population using it. Within India, heroin use is the most prevalent, followed by pharmaceutical opioids and then opium.
Sedatives and hypnotics	In India, 1.8% of the population are current users of sedatives and hypnotics, with 0.1% exhibiting a pattern of dependence.
Inhalants	In India, 0.5% of adults and 1% of children utilise inhalants, making it the sole drug category with higher usage among children and adolescents compared to adults.
Cocaine	Among the users of cocaine in India, 0.18% are male and 0.01% are female. Of those who use cocaine, 0.03% have an addiction.
Amphetamine and stimulants	These are used by 0.1% of the general population of India.
Hallucinogens	Among the 0.12% of Indians who use this drug, 0.03% use it more frequently or have an addiction.
Injectable drugs	Approximately 8.5 lakh people in India use injectable drugs. Heroin, pharmaceutical opioids followed by other sedatives, ketamine, and amphetamines are used (listed in decreasing frequency). Close to 27% of them report sharing needles.
Caffeine	A recent survey done among adolescents in an urban city shows that 97% of them use approximately 98 grams of caffeine in a day. This is significantly more than their peers in the USA and UK. There is a lack of adequate research on caffeine addiction.[11]

Non-Substance-Related Addiction

Globally and in India, little research has been done in the field of addictive behaviours in non-substance-related addiction. Addiction to gambling is among the more commonly studied disorders, and it is seen to affect about 1–2% of Indians.[12] When other behavioural addictions were studied in an Indian community,[13] it was found that participants had addictions to internet use (1.3%), shopping (4%), cell phone use (4.1%), eating (1.6%), television (2.9%), work (9.7%), and sex (0.2%); and among those who exercised regularly, 5% were found to have an exercise addiction. These addictions affected their overall functioning and were found to be closely related to the person's occupational status and marital status.

The Biology of Addiction

Sex differences in addiction disorders

Addiction disorders affect both sexes, but they differ in the way they manifest, progress, and respond to treatment. It has long been noticed that men are more likely than women to use, misuse, and become dependent on substances, but of late, a shift in the general trend has been observed. In many parts of the world, the number of women abusing alcohol, cocaine, and opioids is increasing; and although women start using substances later in life, the rate at which they increase their usage and develop complications (both physical and psychological) is faster than men.[14] This phenomenon is called "telescoping." Among behavioural addictions, women were more likely to suffer from internet and shopping addictions. Women gamble less than men, but they become addicted to it sooner than men, just like in substance addiction.[15]

The human brain

The human brain, a complex organ responsible for how we think, feel, behave, interpret, and respond to our surroundings, has three specific regions that play a crucial role in the development of addictive behaviours.[16] These are marked in Figure 9.1.

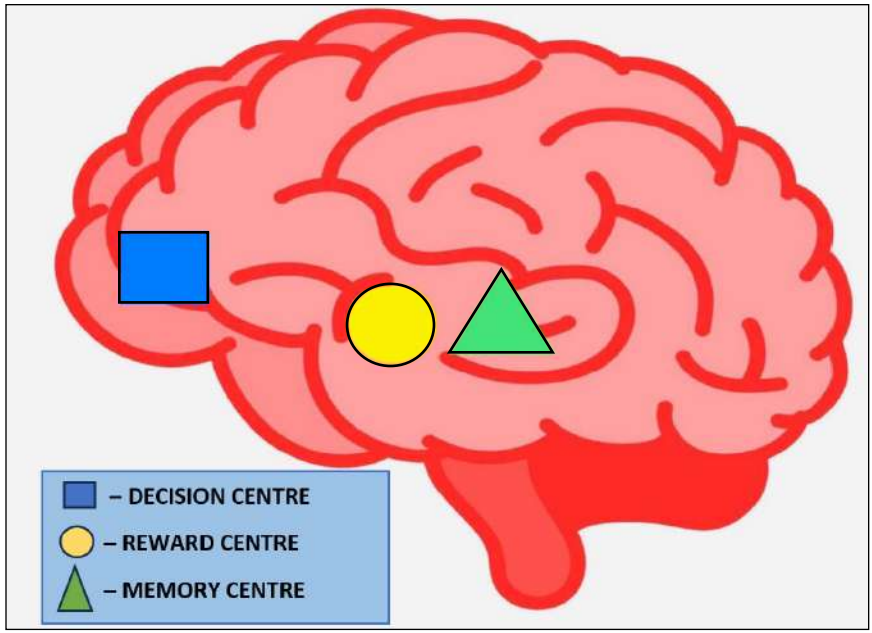


Figure 9.1. The brain centres and addiction

a. **Reward centre (circle):** Anatomically known as the *nucleus accumbens,* this area releases a chemical called dopamine when the individual is involved in a pleasurable action such as enjoying a delicious meal, going for a run, or engaging in sexual activity. This encourages the person to engage in the activity once more.
b. **Memory centre (triangle)**: Also known as the limbic system, this centre helps in creating a memory of the rewarding or pleasurable activity.
c. **Decision centre (square):** The foremost region of the brain, the prefrontal cortex, plays an important role in thinking, planning, decision-making, and self-control. The development of the prefrontal cortex continues until the age of 25, which explains why adolescents and young adults make impulsive decisions.[17]

The Addiction Cycle

It is divided into three phases as described in Figure 9.2.

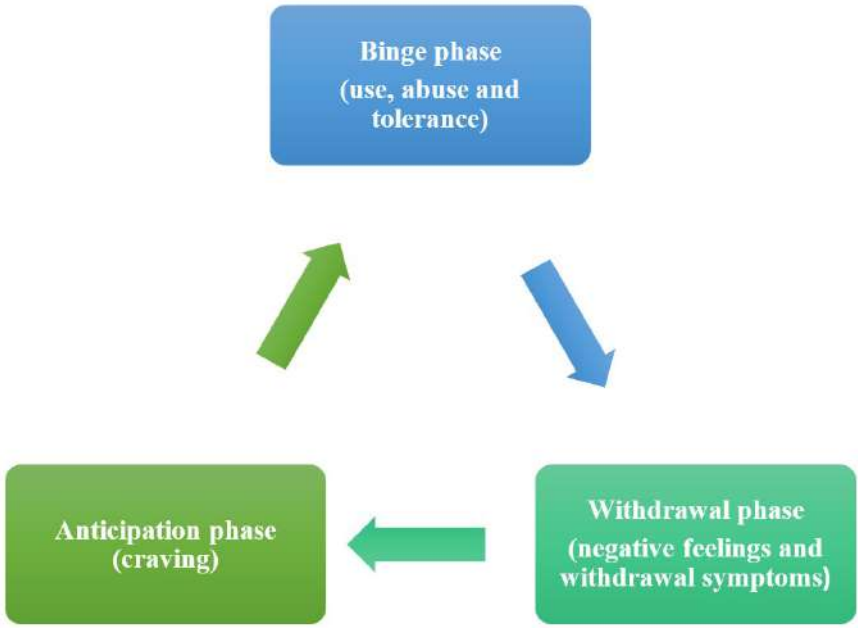


Figure 9.2. The addiction cycle

a. **Binge phase**: The brain's reward system releases dopamine, the "feel-good" chemical, when someone repeatedly engages in substance abuse or addictive behaviours, which results in a pleasurable feeling. However, with each subsequent engagement, this pleasurable feeling diminishes to some extent. As a result, they engage in the activity more frequently and strongly because they want to experience this "good feeling" more often. This pattern leads to the development of tolerance and habit formation.
b. **Withdrawal phase**: The reward circuit is deactivated when one is not engaging in addictive behaviours. Instead, the "stress circuit" is triggered, the person experiences unpleasant feelings and withdrawal symptoms, and is therefore pushed to partake in the addictive behaviours to prevent or minimise these discomforts.
c. **Anticipation phase**: During this phase, the addicted person is actively seeking the substance at any expense. This behaviour stems from impaired decision-making and self-control.

Why Some People Develop Addiction

Many people partake in activities on a recreational basis, but certain factors predispose some individuals to addiction. These factors act independently and influence one another to collectively heighten the risk of an individual developing an addiction. These factors can be broadly categorised into the following:

a. **Genetic risk factors:** Like other medical conditions, addiction is largely influenced by genetics. If a close family member already suffers from an addiction, the probability of developing it oneself is also inherited through the DNA, with the risk ranging between 40 and 60%. Furthermore, the risk escalates with the number of family members suffering an addiction and the specific type of addiction.[18]
b. **Biological risk factors**: Personality characteristics, medical ailments, and mental health conditions are examples of biological influences. Everybody has characteristics or qualities that make up their personality. We may see them as strengths or weaknesses. In comparison to the general population, several personality traits, such as being impulsive, risk-taking, or thrill-seeking, predispose a person to develop an addiction at a younger age. Long-term medical issues that cause pain, discomfort, and sleep deprivation might put a person at risk for addiction to alcohol, pain medication, and hypnotic drugs. The existence of mental health conditions may encourage someone to begin abusing drugs or engaging in addictive behaviours to ease their symptoms or lessen their intensity.

These include problems linked to anxiety and stress, ADHD, depression, bipolar disorder, sleep difficulties, and so on. In certain cases, addictive behaviours can present as a symptom of these conditions.

c. **Environmental and social risk factors**: Several environmental and societal factors influence an individual's propensity to develop an addiction, including a history of childhood trauma or abuse, the presence of a dysfunctional family, poverty and unemployment, loneliness and a lack of interests, easy availability of substances, poor peer support, and certain anti-social behaviours like stealing and gang activities.[19]

d. **Protective Factors**: It may be unsettling to learn about the potential risk factors, but merely having risk factors does not mean that someone will become addicted. The probability of developing an addiction while resorting to drug usage increases as risk factors begin to outweigh protective factors. These are listed out in Table 9.3.

Table 9.3. Protective factors against addiction

Protective factors against addiction[20]		
	Adolescents/young adults	**Older adults**
Family relationships	• Healthy family relationships • A sense of trust • Good family support • Family activities not involving use of substances	
School/college/work environment	• Structured routine at school or college • Appreciation of scholastic work • Opportunities for and participation in extra-curricular activities • Care and support provided by the teachers and staff	• Healthy and structured working environment • Presence of supportive colleagues • Allocated time for personal well-being and provision of well-being activities
Peer relationships	• Presence of a few close friends and supportive peers in times of need • Presence of peers who do not use substances • Association with peers involved in religion, school, college, and other organised activities	
Community	• Opportunities to partake in community activities • Reducing the accessibility of substances and increasing taxation on them • Use of media to disseminate anti-addictive behaviours • Stricter laws and more stringent rules and regulations by the government	

Overview of Substance-Related Addiction (SRA)

Alcohol: The chemical name of alcohol is ethanol. It has a depressant action on the brain and is found in fermented drinks such as beer, wine, and distilled spirits (hard liquor). It is one of the oldest and most commonly consumed recreational drugs, causing the characteristic effects of alcohol intoxication (drunkenness), poor decision-making and associated regret, domestic violence, road traffic accidents, and risk-taking behaviour. Long-term use can affect the brain cells, leading to problems with memory and other functions of the brain. Harmful alcohol use is associated with liver problems (leading to cirrhosis or liver failure), digestive system problems, high blood pressure, irregular heartbeat (arrhythmias), enlargement of the heart muscles (cardiomyopathy), bleeding or blocked arteries in the brain (stroke), kidney damage, breathing difficulties, sexual dysfunction, and bone weakness leading to fractures.

Tobacco: Tobacco is the general term for any product prepared from the cured leaves of tobacco plants. It contains a highly addictive stimulant alkaloid called nicotine. It is associated with many chronic diseases which affect the heart (heart attacks), brain (stroke), liver, bones (weakness) and lungs (chronic breathing difficulty, lung cancers).

Cannabis: Cannabis (marijuana) is a psychoactive drug from the cannabis plant. Its primary component is tetrahydrocannabinol (THC). It can be consumed orally, as an extract, or by smoking and vaporising. It induces euphoria, alters states of mind and perception of time, impairs concentration and short-term memory, affects body movement (balance and fine psychomotor control), and may cause poor judgement and sexual disinhibition.

Stimulants: These are psychoactive drugs that increase the activity of the central nervous system and the body. Common stimulants include amphetamines, caffeine, ephedrine, methylenedioxymethamphetamine (MDMA, ecstasy, or molly), and cocaine. Their harmful effects include seizures at high doses, brain damage affecting memory and executive functions, abnormal experiences of the brain such as hallucinations and delusions, agitation, and sexual disinhibition.

Hallucinogens: These are psychoactive drugs that produce altered states of consciousness characterised by major changes in thought, mood, perception, and memory. Some hallucinogens are ketamine, methoxetamine (MXE), phencyclidine (PCP), dextromethorphan (DXM), and nitrous oxide. Their effects include visual illusions, out-of-body experiences, feeling unreal, being able to observe one's actions but not actively take control of them, complex flowing geometric visual patterning in the visual field, disinhibition, anxiety, and hallucinations.

Inhalants: These include household and industrial chemicals whose volatile vapours or pressurised gases can be concentrated and breathed in through the nose or mouth to produce intoxication. Effects include alcohol-like intoxication, intense euphoria, and vivid hallucinations, and can be fatal due to lack of oxygen, lung infections, heart failure, heart attack, and aspiration of vomit. Chronic use can cause impaired motor skills such as slurred speech, inability to concentrate, depression, irritation, anxiety, and damage to the parts of the brain that control the senses.

Caffeine: Caffeine addiction is the excessive and harmful use of caffeine over time, which can have detrimental effects on health, mental well-being, and social interactions. It can result in physical dependence, altering chemical processes in the brain. Daily consumption can quickly lead to addiction, which is characterised by cravings and withdrawal symptoms if intake is reduced or stopped. Caffeine causes increased blood pressure, heart rhythm changes, gastrointestinal disturbances, and increased risk of osteoporosis; in women, it can cause early menopause.[21]

Overview of Non-Substance-Related Addictions (NSRA)

Gambling disorder (GD): Pathological gambling or gambling disorder consists of frequent, repeated episodes of gambling that dominate a person's life to the detriment of social, occupational, material, and family values and commitments.[22] Those affected often feel compelled to gamble increasing amounts of money to achieve the desired excitement, become restless when attempting to cut down or stop gambling, are often preoccupied with gambling, return to gambling even after losing money, and begin to rely on others to provide money.

Hypersexuality or compulsive sexual behaviour disorder (CSBD): There is no consistent terminology for sexual addiction. The proposed definition of CSBD is "a persistent pattern of failure to control intense, repetitive sexual impulses or urges that involves preoccupation, unsuccessful attempts to control sexual behaviours, and sexual engagement despite adverse consequences, for a period of at least six months, and which generates significant distress or impairment in major areas of life functioning."[23]

Exercise addiction (EA): Exercise addiction is defined as a dysfunctional behaviour characterised by excessive training, loss of control over exercise behaviour, and negative life consequences that could be physical, psychological or social, or a combination of the three.[24] It also has the features of addiction and falls within the spectrum of obsessive-compulsive and impulsive

behavioural patterns. It is also associated with social, medical, and financial problems.

Internet addiction (IA): Internet addiction is defined as a chronic or cyclical state of obsession resulting from repetitive internet use. This leads to an irresistible desire to continue using the internet, while at the same time creating tensions and tolerances that increase time spent online, involving psychological and physical dependence. As a result of this excessive use, internet addiction can eventually lead to the individual's social and psychological damage, accompanied by somatic symptoms.[25] IA can be categorised into six types: (1) online game addiction, (2) cyber-relational addiction, (3) cyber-sexual addiction, (4) information overload, (5) cyber-impulse act, and (6) computer-technology addiction.[26]

Smartphone addiction (SA): Smartphone addiction is defined as a behavioural addiction marked by various features such as mood tolerance, salience, withdrawal, modification, conflict, and relapse. It has been linked to neurological issues as well as physical and mental health concerns.[27]

Gaming disorder (GaD): Gaming disorder or online or offline GaD or digital gaming or video-gaming is defined as a pattern of gaming behaviour characterised by impaired control over gaming, increasingly prioritising gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences.[28]

Food addiction (FA): Most foods with addictive qualities are processed foods that are energy-dense (high in calories), often high in added salt, oil/fat, and sugar ("SOS" – the international symbol of danger or crisis) and may have additives to enhance appeal and foster cravings. The ingredients are often cheap sources of protein, starches, sugars, and fats, which would not be edible by themselves and have very little, if any, nutritious whole food in them. As these foods are usually highly palatable, it is hard to stop eating after just one piece. This includes most fast foods and junk foods – so-called because they are low in nutritional value. In high-income countries, these processed foods often make up over half the calories consumed. When one tries to decrease or stop consuming these foods, it is not uncommon to have 2–3 days of withdrawal symptoms.[29,30,31]

FA is a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high pleasure, energy or excitement, or to relieve negative emotional or physical states.[32] While food addiction and eating disorders share some similarities, there are significant differences between them. In binge

eating disorder (BED), individuals often have heightened concerns regarding shape or weight, which are not typically present in FA. Binge eating episodes in bulimia nervosa and BED occur during discrete periods of time, unlike FA where there may not be distinct episodes. FA exhibits typical symptoms of addiction, which are not characteristic of eating disorders. The function of eating in BED is often to alleviate mental tension related to embarrassment about shape and weight or eating restraint, whereas in FA, eating is used to induce pleasant psychological and physiological sensations. Moreover, individuals with FA may have excessive or normal body mass compared to those with BED.

Work addiction (WA): Work addiction is a state of being overly concerned about work, driven by uncontrollable work motivation, and investing time and effort into work that leads to negative consequences.[33] Work becomes so central to a person's life that everything else becomes unimportant to them. They use work to manage their emotional states, escalate their work output to achieve the same level of satisfaction, experience withdrawal symptoms when unable to work, face internal and interpersonal conflict due to overwork, and struggle with reducing their workload. WA has been linked to excessive anxiety, occupational and personal stress, and depression.

Compulsive buying-shopping disorder (CBSD): CBSD is known by different names – shopping addiction, oniomania, and compulsive buying disorder and is characterised by maladaptive purchasing behaviours. It involves frequent impulses or compulsions to buy items, leading to significant distress in social, personal, occupational, and financial domains. Diagnostic features of CBSD include diminished control over shopping impulses, prioritising buying activities to the extent that they interfere with other interests, leisure pursuits, professional obligations, and daily responsibilities. Additionally, individuals with CBSD experience harmful consequences of their excessive shopping behaviour and may exhibit impairment in various areas of functioning, including personal, family, social, educational, and occupational realms.[34]

Interventions in Addictive Disorders

The concept of motivation

Motivation in the context of AD includes clients' internal desires, needs, and values, as well as the external pressures, demands, and reinforcers (positive and negative) that influence clients and their perceptions about the risks and

benefits of engaging in substance use behaviours. It is very important in the context of treatment of addictive disorders.

A widely used and empirically supported model for behaviour change in addictive disorders is the transtheoretical model of stages of change proposed by Prochaska and DiClemente in 1984. They theorised that the change process is a journey through stages in which people typically first think about behaviour change, then initiate behaviour change, and work to maintain new behaviours; these are depicted in Figure 9.3.[35]

(i) **Precontemplation:** People who use substances are not considering change and do not intend to change in the foreseeable future.
(ii) **Contemplation:** As the person becomes aware that a problem exists, they begin to perceive that there may be cause for concern and reasons to change. Typically, they are ambivalent, simultaneously seeing reasons to change as well as reasons not to change.
(iii) **Preparation:** When the person realises that the envisioned advantages of change and adverse consequences of continued substance use outweigh the benefits of maintaining the status quo, the decisional balance tips in favour of change.
(iv) **Action:** In this stage, the person chooses a strategy for change and begins to pursue it, becoming actively engaged in changing substance use behaviours.
(v) **Maintenance:** This stage entails efforts to sustain gains made during the "action" stage and to prevent recurrence.
(vi) **Relapse:** This stage is an unofficial sixth stage of change and can take place at any stage of the SOC model. In this stage, the person returns to using drugs or alcohol after a period of sobriety. Although termination or completion is the ultimate goal of DiClemente and Prochaska's stages of change model, relapses are common in the process of making lifelong changes.

Based on the above model, a counselling method called motivational interviewing (MI) was developed to help people resolve ambivalent feelings and insecurities to find the internal motivation that they require to change their behaviour.

Interventions in SRA

The key components of the management of substance use disorders are:

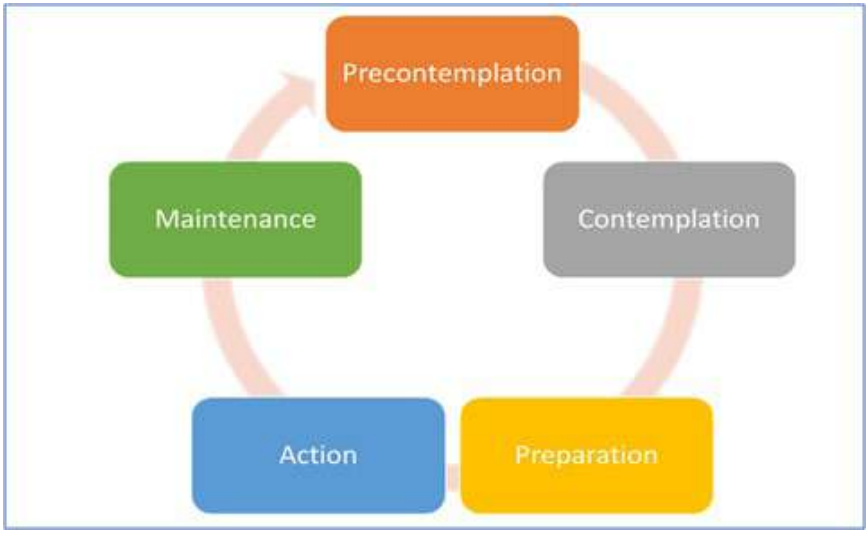


Figure 9.3. The stages of change model

(i) Education
(ii) Acceptance and engagement
(iii) Management of withdrawal syndrome and other complications
(iv) Pharmacological treatment
(v) Psychological therapies
(vi) Self-help support groups (such as the Alcoholics Anonymous 12-step programme)
(vii) Involvement of family
(viii) Spirituality
(ix) Rehabilitation

Medical interventions: These include short-term and long-term strategies. Short-term strategies include management of substance use–related intoxication, overdose, management of withdrawal syndrome, other complications, and medical co-morbidities. Long-term strategies include medications to reduce cravings (*e.g.,* Baclofen), medications that act pharmacologically like the substance but are not addictive (*e.g.*, Naltrexone), and medications that cause unpleasant sensations when the substance is taken (deterrent agents *e.g.,* Disulfiram).

Brain stimulation: Repetitive transcranial magnetic stimulation (rTMS), transcranial direct current stimulation (tDCS), and deep brain stimulation

(DBS) have shown promise for SUD treatment. rTMS, tDCS, and DBS demonstrated decreases in drug craving and consumption. Stimulation targeted at the dorsolateral prefrontal cortex (DLPFC) area of the brain have shown encouraging results.[36]

Interventions in NSRA

Medication: There is no single standard method of treatment for NSRA; a combination of medications and psychological therapies have been useful. Medication such as Naltrexone has been used for the treatment of pathological gambling and kleptomania; Topiramate was shown to be effective in pathological gambling, compulsive buying, and compulsive skin picking; N-acetylcysteine was found to reduce pathological gambling.

Brain stimulation: Certain behavioural and neurophysiological similarities exist between substance-related addictions and non-substance-related addictions such as impulsivity and cravings. Insights gained from studying SRA suggest that tailoring non-invasive brain stimulation protocols to target specific risk factors linked to each NSRA could improve treatment strategies for behavioural addictions.[37]

Psychosocial Interventions in Addiction Disorders (Table 9.4)

Table 9.4. An overview of psychosocial interventions used in addiction disorders

An overview of psychosocial interventions used in addiction disorders	
Brief interventions	• This employs motivational interviewing techniques, but in a shorter time frame, based on the 5As of the WHO Model: ◦ *assessing* the patient's level of behaviour, beliefs, and motivation; ◦ *advising* the patient based upon personal health risks; ◦ *agreeing* with the patient on a realistic set of goals; ◦ *assisting* in anticipating barriers and developing a specific action plan; and ◦ *arranging* follow-up support.

An overview of psychosocial interventions used in addiction disorders	
Motivational interviewing	• This is a patient-centred approach that aims to help people change problematic behaviours and enhance intrinsic motivation for change by first exploring and resolving ambivalence, and then strengthening a person's motivation and commitment to change.
Cognitive behavioural therapy	• It involves identifying and modifying irrational thoughts, managing negative moods, and intervening after return to substance abuse. • A resource for assessing cognitive distortions/ irrational thoughts is available at https:// positivepsychology.com/cognitive-distortions/
Relapse prevention	• It is a CBT-based strategy with the goal of identifying and addressing high-risk situations for relapse and assisting individuals in maintaining desired behavioural changes. • It aims to prevent an initial lapse, maintain abstinence or harm reduction treatment goals, and manage relapse.
Contingency management (Voucher-based therapy)	• It employs incentives and rewards to encourage abstinence from substance use.
Addiction counselling (based on 12-step program Alcoholics Anonymous)	• It is widely used in both individual and group formats. • It typically includes education and elements of CBT and insight-oriented psychotherapies.
Cue-exposure treatment	• It aims to reduce cue-induced cravings by repeatedly exposing individuals with substance use disorders to relevant substance-related cues and hindering their habitual drinking response.
Marital and family therapy	• These therapies help to improve family connections and relationships, and in reducing substance use.
Residential rehabilitation programs	• They are long-term programs where people live and work in a community of other substance users, ex-users, and professional staff. • It aims to help people develop the skills and attitudes to make long-term changes toward a substance-free lifestyle.

Lifestyle Approaches for Addiction Disorders[38]

Exercise

There is a growing body of literature that supports exercise as part of treatment for addictions. Engaging in moderate-to-high-intensity aerobic exercise has been found to increase abstinence rates and reduce withdrawal symptoms in patients with opioid, alcohol, and tobacco use disorder or multiple drug use disorder. Adding on exercise to regular treatment significantly reduced weekly consumption of alcohol but not binge drinking. Many people also report having more days abstinent and experiencing fewer cravings when they participate in exercise, both in in-patient and out-patient settings.

Sleep

Poor quality and quantity of sleep in people with SRA increases the severity of SRA, decreases quality of life, worsens comorbid psychiatric conditions, and increases suicidal behaviours and psychosocial problems. Cognitive behavioural therapy for insomnia (CBTi) for people with alcohol use disorder has been shown to lead to improvements in sleep quality and daytime function as well as decreasing usage of sedative medication to aid sleep.

Nutrition

Those with SRA have nutritional deficiencies, and poor nutritional status may affect the ability of people with SUD to resist substance use. Patient education and individualised dietary and nutritional plans are all linked to sustained improvement in nutrition among people with SRA. Adequate nutritional supplements, especially multivitamins and minerals, can prevent complications of alcohol-induced memory problems (*e.g.,* thiamine for Wernicke–Korsakoff syndrome). A minimum of two to three litres of water per day, emphasis on plant proteins from beans, nuts, seeds, whole grains (oats, farro, quinoa, barley, *etc.*), and natural fibres are recommended. An anti-inflammatory diet rich in antioxidant vitamins A, C, E, selenium, iron, and omega-3 from natural sources is additionally recommended.

Stress management and coping skills

Those with addiction disorders have higher rates of mental health illness, maladaptive coping styles, and emotional dysregulation. Stress management

and learning new coping strategies will help in prevention and abstinence, and reduce the chances of a relapse. SRA can break down social structures and relationships because of aberrant behaviour, stigma, social isolation, or the addiction taking primacy over other social obligations. It is important to reintegrate back into a supportive community such as Alcoholics Anonymous or manualised 12-step framework interventions.

Relationships

People with SRA suffer from social isolation (69%) and loneliness (79%), and loneliness is linked with increased rates of substance use.[39] People with SRA in a committed social relationship and within a community have an increased likelihood of survival compared to those who are socially isolated. Hence, reintegrating people with AD back into supportive communities such as Alcoholics Anonymous, Narcotics Anonymous, peer recovery support services, or manualised 12-step framework interventions is important for recovery. People with SRA also reported that peer recognition and a caring and supportive relationship with a service provider were the most important factors in achieving and maintaining abstinence and improved abstinence-specific self-efficacy.

Specific Interventions for Common Addiction Disorders

1. Alcohol dependence syndrome (ADS)

It involves three steps: detoxification, maintenance, and rehabilitation.

(1) **Detoxification interventions for withdrawal symptoms: The alcohol use disorders identification test consumption (AUDIT-C)** three-item alcohol screen developed by the World Health Organisation, which reliably identifies people with hazardous drinking or active alcohol use disorders, is shown in Table 9.5.

People with alcohol use disorder (AUD) who are motivated to quit drinking, whether by reducing their alcohol intake or stopping altogether, may encounter withdrawal symptoms. These symptoms can range from mild to severe and may include anxiety, sleep disturbances, nausea, occasional hallucinations, and, in more serious cases, seizures and confusional states (delirium). Hence, medications that have similar effects to alcohol (such as benzodiazepines) are initially prescribed, in conjunction with multivitamins and adequate fluids, to prevent

Table 9.5. The WHO AUDIT-C screening method for drinking

Questions	Scoring system					Your score
	0	1	2	3	4	
How often do you have a drink containing alcohol?	Never	Monthly or less	2 to 4 times per month	2 to 3 times per week	4 or more times per week	
How many units of alcohol do you drink on a typical day when you are drinking?	0 to 2	3 to 4	5 to 6	7 to 9	10 or more	
How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	

AUDIT C score	

Scoring:

A total of 5 or more is a positive screen

- 0 to 4 indicates low risk
- 5 to 7 indicates increasing risk
- 8 to 10 indicates higher risk
- 11 to 12 indicates possible dependence

dehydration and to reduce the withdrawal symptoms. Treatment in a hospital setting may be required.

(2) **Maintenance therapy:** After detoxification, people with ADS typically experience improved physical and mental health. This phase focuses on sustaining their progress. Psychological interventions such as motivational interviewing and CBT, as well as anti-craving medications, can be introduced during this phase.

(3) **Rehabilitation:** After treatment, individuals with ADS face a high risk of relapse, particularly in the immediate post-treatment period. Therefore, it is crucial to maintain an environment free of alcohol and other drugs. If someone experiences multiple relapses or struggles to maintain abstinence, admission to a rehabilitation home for a period of three to six months can be beneficial for a longer duration of abstinence. Lifestyle changes, social connections such as Alcoholics Anonymous or peer recovery support services, manualised 12-step framework interventions, vocational training, and reintegration into the community are important in this phase.

2. Nicotine dependence syndrome (NDS) (smoked and smokeless)

NDS treatment is less aggressive than ADS treatment, and most of the interventions can be given in out-patient settings. The **STAR** method can be used:

S – Set a quit date (usually within two weeks). Many people find motivation to quit smoking as a gift to their spouse or child on their birthday or other special date. The emotional connection can strengthen resolve and increase chances of success.

T – Tell others about the resolution to quit tobacco products and request their understanding and support.

A – Anticipate challenges to the upcoming attempt to quit and prepare for these in advance.

R – Remove tobacco products from the environment and make the home smoke-free.

Lifestyle changes that can support NDS treatment include increased hydration, more fresh fruit and vegetables, less salt, daily exercise and deep breathing, among others.

3. Internet/gaming addictions

Treatment for this disorder typically occurs in outpatient settings. Once the age of the patient is ascertained, it is important to identify co-morbid psychiatry disorders associated with these addictions. The Young Internet Addiction Scale may be used to assess the severity of the internet or gaming addictions. A score over 50 indicates moderate to severe addiction, and further management is required. Psychological interventions are the main mode of treatment, although a combination of psychological and medication therapies may be necessary for specific populations. In adolescents with major depressive disorder, combined cognitive behavioural therapy and bupropion has been found to be beneficial for problematic online gaming. Atomoxetine and methylphenidate have been found to be effective in adolescents with ADHD and problematic online gaming.

Case Study Continued

Disappointed after Aditya's relapse, his parents admitted him to a hospital where he underwent detoxification for seven days, improving physically and mentally. He was advised to keep to

a regular schedule with adequate sleep for 7–9 hours with an early bedtime, regular daily physical activity, and a nutrient-dense diet rich in whole plant foods such as whole grains, pulses, fruits, vegetables, nuts, and seeds to obtain phytonutrients, antioxidants, fibre, and omega-3 fatty acids. He also attended Alcoholics Anonymous meetings near his home and received psychosocial treatment alongside anti-craving medications. Aditya understood the health consequences of drug abuse and told his doctors that he was committed to abstaining from drugs. He did well on his recovery journey for one month. After this, he received a phone call from an old friend asking how he was. Aditya started chatting to him regularly, and then progressed to meeting him occasionally, and soon started using drugs again. He tried resisting many times but found himself unable to stop. His parents re-admitted him to the hospital for treatment, where doctors recommended a three-month stay in a residential rehabilitation centre. Though initially resistant, Aditya agreed to it and participated in a structured program, learning skills to prevent relapse and manage triggers. His energy improved, he was able to do all the activities of daily living, and he regained his motivation to quit drugs – and this time he was confident he could stop entirely. After discharge, Aditya embarked on a new journey in his life.

This case study illustrates the journey of an individual struggling with substance-related disorders (SRA) and non-substance-related addictions (NSRA), showcasing the treatment process. Early detection could have prevented these complications. The next section will outline what steps to take for yourself or your friends if you face similar issues.

Advice on When to Refer Oneself or a Friend to Professionals

Individuals with behavioural addictions may vary in their understanding and motivation regarding substance use. Some may deny the problem entirely, while others may be willing to seek help. One effective approach is to provide evidence of the harmful effects of substance-related addictions or non-substance-related addictions in various aspects of their lives, such as health, family, social relationships, or the workplace. This can include conducting blood tests such as liver function tests, blood sugar assessments, and pancreatic enzyme tests, as well as imaging studies such as chest X-rays or abdominal scans to evaluate organ health (liver, pancreas and spleen). Depending on symptom presentation, additional scans such as heart or brain scans may also be recommended to assess the severity of physical and neurological issues. These objective measures can help individuals recognise the impact of their addiction and motivate them to seek appropriate help and support. Discussing the strain that addiction places on family relationships, illustrating its impact on social connections and demonstrating how addiction can impair performance and jeopardise employment, can motivate individuals to seek treatment.

When discussing concerns about behavioural addiction with a friend or family member, it's crucial to approach them when they are sober or not under the influence of substances. This increases the likelihood of them listening and being receptive to your advice. However, be prepared for a range of reactions, from sadness to anger. Respond calmly and empathetically to each reaction and have a plan in place for exiting the situation if it becomes too difficult to handle.

Encouraging early help-seeking is key. Advising in the early and mid-stages of addiction can be more effective in preventing further complications. If the individual struggles to stop on their own, it is advisable to seek professional help sooner rather than later. In the late stages of addiction, professional intervention is often necessary, as counselling or advice may not be sufficient to address the severity of the issue.

Familiarise yourself with local resources for counselling or admission. This includes knowledge about self-help groups such as Alcoholics Anonymous (AA) or Narcotics Anonymous, which can provide valuable support and guidance for those seeking to overcome addiction.

Additionally, governmental organisations and NGOs often offer primary prevention efforts aimed at educating school children and adolescents about the risks of substance-related and non-substance-related addictions. These initiatives play a crucial role in raising awareness and promoting healthy behaviours from a young age.

School Curriculum in India

The Indian government includes substance-use preventive programmes incorporated into the Rashtriya Kishor Swasthya Karyakram (National Adolescent Health Policy) and the Scheme of Prevention of Alcoholism and Substance (Drugs) Abuse (SPASA). The "Empowering Communities for the Prevention of Drugs and HIV in India" project was supported by the Government of India and the United Nations Office on Drugs and Crime (UNODC). Initiatives by private NGOs have also helped in the adolescent health education space. One of them is the Adolescent Health Education Project developed by ASHA Foundation (www.ashaf.org) and disseminated across the nation. The techniques used in preventive educational programmes include enhancing self-esteem, adaptive coping strategies for managing stress and anxiety, decision-making and problem-solving skills, assertiveness skills, increasing personal control, teaching students to recognise high-risk situations, increasing the awareness of media influences, refusal skills training, information about the prevalence of drug use from national or local surveys, self-management, and social skills.

MYTHS DEBUNKED

MYTH 1: Addiction is an incurable disease.

FACT: *Addictive disorders are treatable disorders similar to chronic medical illnesses such as diabetes mellitus and hypertension. Relapses can occur and the addiction can be brought under control with professional help.*

MYTH 2: People with addiction cannot function normally.

FACT: *Many people with addictive disorders are able to maintain normal lives and function adequately at work, in relationships, and at home. They can do so as long as they can control the addiction.*

MYTH 3: Alcohol is safer than hard drugs like cocaine or heroin.

FACT: *Alcohol is one of the most dangerous and deadly substances that affects not just the person with SUD but the entire family. Alcohol use can increase the risk of severe chronic health conditions and can be fatal.*

MYTH 4: A relapse signifies that treatment did not work or was not effective.

FACT: *Relapse is not a sign of weakness or limitation; rather, it reflects the natural human struggle to overcome addiction. By understanding the factors causing relapse and seeking support, one can foster hope and pave the way to recovery.*

MYTH 5: Friends and family members cannot help addicts get better.

FACT: *Friends and family members are vital in the treatment process of people who have addictive disorders. They can counsel them and also provide support to access healthcare for the complications of the addiction.*

CONCLUSION AND KEY TAKEAWAYS

Substance-related addictions and non-substance-related addictions are highly prevalent in our communities. Both are associated with physical and mental health complications. Early intervention or prevention of substance use and behavioural addiction in adolescents can help avoid increased complications of physical and mental disorders in young adulthood and beyond. Educational activities in school and colleges can lead to awareness and primary prevention. The combined therapies of medications and psychosocial interventions should be considered for interventions.

- Addictive disorders are chronic and relapsing conditions. They are treatable but not curable.
- They can be categorised into substance-related and non-substance-related disorders.
- Not everyone who uses substances becomes addicted or dependent; only a small proportion require comprehensive support.
- Motivation is crucial for abstaining from addictive disorders, and motivational interviewing (psychological therapy) can play a major role in this process.
- Currently, there are medications, psychosocial therapies, and self-help groups available to provide assistance.

RESOURCES

Videos

1. Recognising Behavioural Addiction by NJ Spotlight News [2.57]
2. Exploring the 5 Types of Behavioural Addictions: Symptoms and Treatment Options by Solace Asia [1.00]
3. Mechanism of Drug Action in the Brain by Alila Medical Media [4.15]
4. How Addiction Affects the Brain by the Dana Foundation [2.28]

Websites

1. Alcoholics Anonymous - India
2. Narcotics Anonymous - India
3. Understanding Drug Use and Addiction by the National Institute on Drug Abuse
4. Substance Use Disorders: Types, Symptoms, and Treatments by Very Well Health
5. Drug Addiction in India — A Rising Problem by Rehabs.in
6. Substance Abuse in India by the National Centre for Drug Abuse Prevention

Additional Reading

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2. Zou, Z., Wang, H., d'Oleire Uquillas, F., Wang, X., Ding, J., & Chen, H. (2017). Definition of substance and non-substance addiction. *Advances in Experimental Medicine and Biology 1010,* 21–41.
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Chapter 10

ENVIRONMENTAL SUSTAINABILITY: BALANCING PERSONAL AND PLANETARY HEALTH

Divya Alexander and Karan Thakur

Meenakumari, a software engineer, has just joined a new company where she is becoming increasingly aware of the importance of sustainability. Her office discourages the use of single-use plastics and leads community drives to clean up the neighbourhood. Many of her colleagues are adopting more intentional and conscious approaches to daily living. She becomes motivated to make a difference herself and starts to implement changes in her life, such as packing lunch from home instead of buying it every day, switching from a shower to a bucket for bathing, learning how to compost, and reusing water in her garden. She now uses a sulphate-free shampoo with sustainable packaging, and cruelty-free makeup with eco-friendly ingredients. She has decreased her consumption of meat, increased her intake of plant-based foods, and uses sustainable menstrual products. She organised a clothing swap amongst her friends, which was such a great success that it is now a quarterly event. Eventually, Meenakumari became a content creator to share tips on her journey to sustainable living, inspiring many others to make mindful choices too.

INTRODUCTION

As the complex dance between human well-being and the environment takes centre stage, this chapter explores the aspects of environmental health within the context of lifestyle medicine. The first part of the chapter provides an overview of the different aspects of environmental health such as air quality, water quality, soil quality, noise pollution, and climate change, and how they affect human health. Beyond individual health, it examines the enduring consequences of early-life environmental exposures and explores the unique vulnerabilities of pregnant women and older adults.

Advocating for a sustainable way of life, the latter part of the chapter weaves together elements of sustainable food systems, mindful consumption, waste reduction, sustainable transport, and green buildings. It culminates in a

synopsis of the Indian government program, Mission LiFE. In a world where the tapestry of environmental health intricately aligns with personal well-being, this chapter serves as a guiding compass toward a healthier and more sustainable future for all Indians.

ENVIRONMENTAL HEALTH

Air Quality

This relates to the cleanliness and chemical composition of the air we breathe. Air pollution is the contamination of the indoor or outdoor environment by any chemical, physical, or biological agent that modifies the natural characteristics of the atmosphere. Poor air quality and air pollution have become a significant public health concern. The major contributors to air pollution are industrial emissions, burning of fossil fuels, indoor air pollutants, wildfires, microbial decaying processes, transportation, the open burning of garbage waste, construction and demolition, agricultural activities, and the use of chemical and synthetic products. Household combustion devices, motor vehicles, industrial facilities, and forest fires are common sources of air pollution. Pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide, and sulphur dioxide. Websites such as waqi.info and aqicn.org provide real-time information about the air quality index based on hourly readings in different cities around the world.

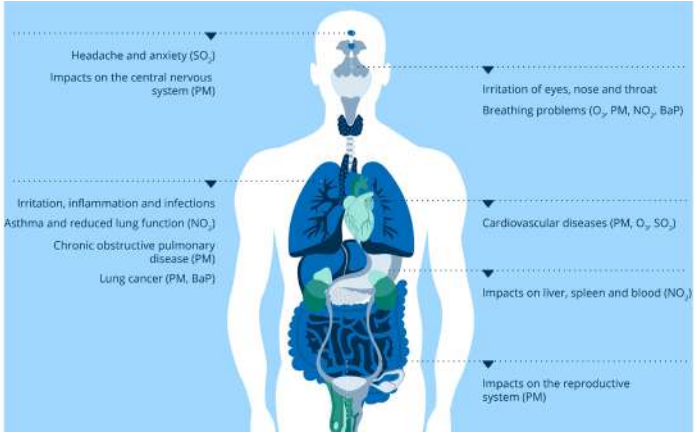


Figure 10.1. The health impacts of air pollution

Source: European Environment Agency (EEA). (2019). *Healthy environments, healthy lives: How the environment influences health and well-being in Europe.* EEA. https://www.eea.europa.eu/en/topics/in-depth/air-pollution/eow-it-affects-our-health

Air pollution and the particulates that form it impact nearly every body and organ system. Both short-term and long-term exposure can have significant and permanent impact on the human body. Data from the WHO 2023 factsheet on air pollution shows that almost all of the global population (99%) breathes air that exceeds WHO guideline limits and contains high levels of pollutants, with low- and middle-income countries suffering from the highest exposures.[1] The combined effects of ambient air pollution and household air pollution have numerous health impacts (see Figure 10.1) and are associated with 6.7 million premature deaths annually.

Water Quality

Water sustains every lifeform on the planet. Water quality refers to the purity and safety of water for drinking, agriculture, and industry, and is critical for public health. Contamination by chemicals, pathogens, and waste can lead to waterborne diseases and have long-term health effects. In 2020, 26% of the world's population (about 2 billion people) did not have access to safely managed drinking water services and 46% (3.6 billion people) lacked safely managed sanitation services.[2] The growth of the human population puts extra pressure on water supplies. Deforestation, driven by livestock farming and population growth, also contributes to water degradation and reduced supply. The pollution of water sources with chemical, radiation, microbial, and other contaminants can make water unusable.

As the human population continues to grow and the global clean water supply is reduced by consumption, contamination, and climate change, water issues will only increase in complexity and importance. Waterborne diseases have an economic burden of approximately US$600 million a year in India.[3] Water-related illnesses such as diarrhoea, giardiasis, dysentery, typhoid fever, *E. coli* infection, and salmonellosis can be caused by extreme rainfall or flooding that releases industrial and agricultural runoff into bodies of water. Adverse health effects can include pain in the gastrointestinal, reproductive, and neurological systems. Diarrhoea kills one million people every year, mostly from impoverished communities and in low-income countries; hepatitis is also caused by contaminated water and infects the liver, causing symptoms such as jaundice, loss of appetite, fatigue, discomfort, and high fever.[4]

Soil Quality

This refers to the health and fertility of the soil, which is crucial for growing food, and therefore a critical component of the ecosystem that sustains plants, animals, and humans. Good soil quality depends on its nutrient content, its

soil structure allowing for proper water infiltration, drainage, and retention, its pH level, its organic content, microbial activity, biodiversity, and absence of contaminants. Practices such as crop rotation and organic farming can improve soil quality by increasing organic matter content and preventing soil erosion.

Soil quality can be adversely affected by contaminants such as heavy metals, pesticides, microplastics, and excess salts. This can be detrimental to plant growth, wildlife, and human health. **Biomagnification** refers to the phenomenon where certain substances become increasingly concentrated in the tissues of organisms as they move up the food chain. It begins with the release of toxic substances into the environment via industrial or agricultural activities. These substances are then absorbed by plants or other organisms at the lowest level of the food chain. As these organisms are consumed by primary consumers, and subsequently by secondary consumers, the concentration of the toxin intensifies at each level, leading to potential ecological and health risks. Humans are exposed to these toxins by consuming animal products that are contaminated, which can lead to reproductive, developmental, and metabolic issues.

A 2023 study, led by the Indian Council of Agricultural Research (ICAR) and published by Down to Earth magazine, examined the nutritional value of the high-yielding rice and wheat varieties that were introduced in the last 50 years to achieve food security in India. These varieties have lost up to 45% of their food value and are accumulating toxins: the concentration of zinc has decreased (by 33% in rice and by 30% in wheat), the concentration of iron has decreased (by 27% in rice and 19% in wheat), and the amount of arsenic in rice has increased by 1493%.[5] The study highlights the decrease in grain mineral diet quality for both rice and wheat, saying that foodgrains will become so impoverished by 2040 that India's NCD burden will worsen.[6] The council's biofortification project has resulted in rice and wheat varieties that are rich in iron, zinc, and even protein. But these varieties need to be popularised and adopted by farmers on a large scale before they can have an impact on our population.

Noise Pollution

Noise pollution refers to harmful or annoying levels of noise in the environment; it is a stressor that affects the well-being of humans and animals. Noise is regarded as a pollutant in India.[7] Community noise (also called environmental noise, residential noise, or domestic noise) is noise emitted from all sources except noise at the industrial workplace. With rapid urbanisation,

industrialisation, loss of green cover, and increased traffic and congestion, noise pollution has witnessed an increasing trend.

The WHO recommends community noise less than 30 A-weighted decibels (dB[A]) in bedrooms during the night for good-quality sleep and less than 35 dB(A) in classrooms to allow good teaching and learning conditions.[8] In addition to causing annoyance and sleep disturbances, long-term exposure to noise can cause a variety of health effects including hearing impairment, tinnitus, earache, and noise-induced hearing loss. Beyond these, noise pollution has demonstrated negative effects on the cardiovascular and metabolic system as well as cognitive impairment in children.[9]

Climate Change

The impact of climate change on human health

Climate change refers to significant and lasting changes in the planet's weather patterns and temperatures over time. Primarily driven by human activities, especially the emission of greenhouse gases, it leads to global warming, melting ice caps, rising sea levels, and extreme weather events. This has resulted in several changes that impact human health. Changes in climate can affect food production and water availability, leading to food and water insecurity. Extreme weather events (heatwaves, flooding, droughts, storms, *etc.*) can lead to displacement of populations, loss of life, and physical and mental health issues. Changes in temperature and precipitation can increase the spread of infectious diseases by expanding the habitats of vectors (mosquitoes, ticks, *etc.*)

This section will focus on four specific impacts: the increased incidences of heat waves, the increased transmission of vector-borne diseases, the increased impact on mental health, and the increased impact on cardiometabolic health.

The health impacts of heat

In 2015 alone, 175 million additional people were exposed to heat waves compared to average years.[10] The Lancet reported that the annual number of heat-related deaths in people older than 65 years increased by 68% from 2000–2004 to 2017–2021.[11] The negative health impacts of heat disproportionately affect vulnerable populations such as older adults, infants and children, pregnant women, marginalised sections, outdoor and manual workers, and those already suffering from chronic illnesses. The direct and indirect impacts of heat (see Figure 10.2) are largely preventable with specific public health actions.

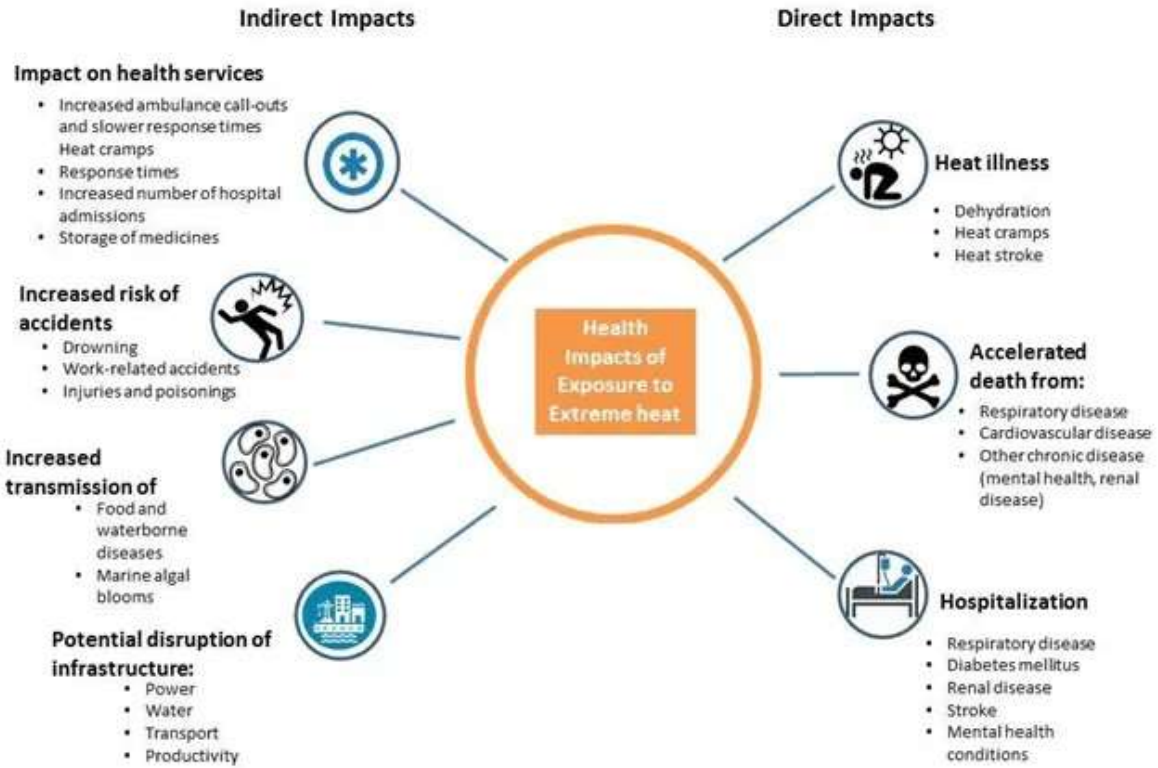


Figure 10.2. The health impacts of exposure to extreme heat

Source: World Economic Forum. (2019). *3 tips to handle a heatwave.* WEF. https://www.weforum.org/agenda/2019/07/heat-keep-cool-world-health-organization-tips/

Heat increases illness and death by compromising the body's ability to regulate its temperature. This loss of temperature control can result in a cascade of illnesses, including heat cramps, heat exhaustion, heat stroke, and hyperthermia. In cities with high temperatures, the "urban heat island" effect can increase temperatures over the less developed areas around them. Urban heat islands, combined with an ageing population, poor air quality, and growing urbanisation, are projected to increase the vulnerability of people to heat-related health impacts in the future. It is important to recognise the impact of heat on our bodies by identifying dizziness, fainting, headache, muscle cramps, nausea or vomiting, or body weakness. Heat can have multiple effects and conditions that include heat stroke, heat exhaustion, heat syncope, heat cramps, and heat rash, among others. Adequate hydration is crucial for maintaining thermoregulation and preventing heat-related illnesses.

Vector-borne diseases

Vector-borne diseases (VBDs) are illnesses caused by parasites, viruses, or bacteria that are transmitted by a vector such as mosquitoes, ticks, sandflies, triatomine bugs, tsetse flies, fleas, black flies, aquatic snails, and lice.[12] Common VBDs include malaria, dengue, schistosomiasis, human African trypanosomiasis, leishmaniasis, Chagas disease, yellow fever, Japanese encephalitis, and onchocerciasis. Vector-borne diseases account for more than 17% of all infectious diseases, causing more than 700,000 deaths annually.[13] Climate affects the transmission dynamics, geographic spread, and re-emergence of vector-borne diseases through multiple pathways, including direct effects on the pathogen, the vector, non-human hosts, and humans.

Mental health

The link between mental health and the environment is multifaceted and involves various factors such as physical surroundings, access to green spaces, exposure to pollution, and the impact of climate change. These elements can significantly influence an individual's mental well-being. Extreme weather events, such as floods and droughts, can lead to displacement, loss of livelihoods, and food insecurity, all of which can contribute to heightened stress, anxiety, and depression. Communities that struggle with inadequate access to clean water may face additional mental stress. Rapid urbanisation in India has led to lack of access to nature and greenery. Studies suggest a link between air pollution and mental health issues such as anxiety and depression.[14]

Incorporating green spaces in urban planning and design can provide avenues for stress reduction, physical activity, and social cohesion. Fostering a connection with nature through gardening or outdoor activities can promote mindfulness, alleviate symptoms of anxiety and depression, and improve overall psychological well-being.

Cardiometabolic health

The escalating convergence of pollution and climate change poses a substantial risk to global cardiometabolic health, with evidence suggesting a direct correlation between increased exposure to air pollutants and heightened incidence of cardiometabolic diseases. A study published in the Journal of the American College of Cardiology indicates that long-term exposure to particulate matter (PM2.5) and nitrogen dioxide (NO2), common air pollutants, is associated with an increased risk of developing cardiovascular diseases by as much as 10% for every 10 μg/m3 increase in pollutant concentration.[15] Furthermore, climate-driven alterations in air quality and the proliferation of vector-borne diseases further complicate the cardiometabolic health landscape, indicating an urgent need for integrated health and environmental policy responses to mitigate these escalating risks.

Vulnerable Groups

Early life environmental exposures can have lasting effects on human health. Exposure to environmental toxins during critical developmental stages may increase the risk of chronic diseases later in life. Studies have linked prenatal exposure to air pollutants and heavy metals with adverse birth outcomes, neurodevelopmental disorders, and respiratory ailments.[16,17] Additionally, early exposure to endocrine-disrupting chemicals, such as bisphenol A (BPA) and phthalates, can lead to hormonal imbalances and reproductive health complications. Children, with their developing organ systems and higher respiratory rates, are particularly vulnerable to the detrimental effects of air pollution, with associations observed in respiratory infections, impaired brain development and lung function, increased risk of obesity, asthma, ear infections (otitis media), various cancers, and elevated mortality rates.[18] Natural disasters, including floods and hurricanes, can disrupt access to essential healthcare services and potable water, consequently heightening the risk of infectious diseases and malnutrition among children.

Pregnant women are particularly susceptible to the deleterious effects of environmental pollutants, which can potentially traverse the placental barrier and interfere with foetal development, causing adverse birth outcomes as mentioned above. Elevated temperatures due to climate change can heighten the risk of heat stress, dehydration, and heat-related illnesses, posing a significant threat to the health and well-being of pregnant women. The 2023 EPA factsheet states that climate change impacts on food systems can lead to food-related illnesses, such as listeria and toxoplasma, which can be life-threatening and increase the risk of miscarriage, stillbirth, or premature delivery.[19] Pregnant women are at a higher risk of gastrointestinal illness if they come in contact with contaminated water, which can lead to pregnancy loss.

Older adults, too, are more vulnerable to environmental hazards, primarily due to age-related physiological changes and higher likelihood of chronic health conditions. They are at an elevated risk of respiratory ailments due to poor air quality, including exacerbations of chronic obstructive pulmonary disease (COPD) and asthma, leading to increased morbidity and mortality.

A SUSTAINABLE WAY OF LIFE

Sustainable Food Systems

Human eating patterns impact the environment in significant ways, and it is essential to develop sustainable food systems to mitigate these impacts. Livestock farming produces substantial amounts of methane, a potent greenhouse gas; large-scale agriculture for animal feed and grazing leads to deforestation and habitat loss; meat production requires large amounts of water (see Figure 10.3). At the global level, 40% of dietary protein and 45% of dietary fats are of animal origin.[20] It takes 9463 litres of water to produce one pound of beef, 2271 litres for one pound of chicken, 454 litres for one pound of eggs, and 3407 litres for one pound of cheese. These translate into astronomical numbers for meat-eaters. Per unit of food consumed, meat and dairy have 3 to 100 times the environmental impact of plant-based foods.[21]

A shift towards **whole food plant-based** diets can reduce environmental impacts since plants generally require fewer resources and produce fewer emissions compared to animal-based food. Buying local and seasonal products promotes biodiversity and reduces the carbon footprint associated with storage and transportation. A 2022 study concluded that vegetable protein sources are associated with better health outcomes on the cardiovascular system than animal-based product use.[22] A 2018 study that looked at how to eliminate

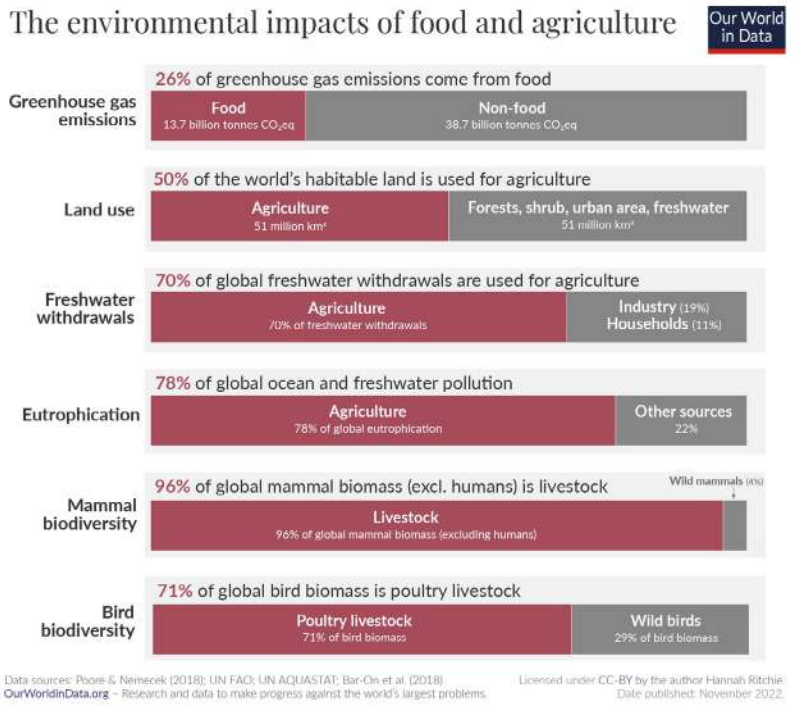


Figure 10.3. The environmental impacts of food and agriculture

Source: Ritchie, H. (2019). What are the environmental impacts of food and agriculture? OurWorldInData.org. https://ourworldindata.org/env-impacts-of-food

micronutrient deficiencies and undernourishment suggests that if households diversify their diets towards wheat and coarse cereals (instead of rice), pulses (instead of meat), and dark leafy vegetables, India's agricultural greenhouse gas emissions could be reduced by 25%.[23] Vegans have 25% of the dietary impact of high meat-eaters in terms of emissions, 46% for water use, 27% for water pollution, and 24% for biodiversity.[24]

At a seminar on healthy lifestyles that advocated for moving towards a sustainable diet, Venkat was shocked to find out that he could save more water by not eating one pound of beef than by skipping his daily shower for six months straight. For him, this nugget of information crystallised just how many resources were required for a meat-eater's diet. He couldn't imagine a life without his mother's delicious chicken biryani, the sublime lamb chops from the adda down the road, the prawn curry at his favourite seafood restaurant. So, when he heard about "Meatless Mondays," he decided to try it out, as giving up meat just one day of the week didn't seem like too much of a chore, especially since even this small change in lifestyle made a big difference to planetary health.

Mindful and Controlled Consumption

This involves an informed and thoughtful approach to purchasing, considering all the environmental, social, and ethical aspects, setting intentional limits and exercising discipline in acquiring goods. Here are five practical steps to cultivate these qualities:

1. **Educate yourself:** Learn about the environmental, social, and ethical impacts of products. Evaluate the life cycle of products, from production to disposal, and support sustainable brands that are transparent and practice ethical operations.
2. **Embrace sustainable and slow living:** Adopt slow fashion principles by prioritising quality and durability in clothing. Reduce reliance on single-use items by choosing reusable alternatives. Make conscious food choices by opting for locally sourced, organic, and sustainably produced options.
3. **Set limits and plan purchases:** Define clear consumption limits and plan your purchases with shopping lists and waiting periods to avoid excessive buying and impulsive decisions.
4. **Prioritise quality and durability:** Invest in high-quality products that are built to last, even if they may have a higher initial cost. This approach promotes sustainability and reduces the need for frequent replacements.
5. **Regularly declutter and reflect:** Periodically declutter your space to maintain organisation and consciously reflect on your possessions, thinking critically about your needs and wants.

Meet Aisha, an eco-conscious consumer in India who embraces mindful consumption, especially in her textile choices. She supports the Khadi movement for its reduced environmental impact, seeks out versatile pieces for her capsule wardrobe, and explores second-hand and vintage clothing markets to reduce waste and promote a circular fashion economy. Aisha actively participates in textile recycling programs, aligning her clothing disposal with eco-friendly practices. Her choices reflect a thoughtful commitment to environmental sustainability and ethical consumption.

Waste Reduction

Waste reduction involves minimising the generation of waste and managing it in a manner that mitigates environmental impacts and protects public health. Improper waste disposal can lead to pollution, contamination of water and

soil, and the release of harmful substances, all of which can adversely affect human health. Here are some sustainable waste management practices that promote a cleaner and more resilient environment:

1. **Waste segregation and recycling:** Encourage and enforce proper waste segregation at the source; recycle materials such as paper, glass, plastics, and metals; and promote the use of recycled materials to close the loop on resource consumption. Implement e-waste programs to handle the growing volume of electronic waste.
2. **Composting:** Promote composting of organic waste, including food scraps and yard waste. This reduces the amount of organic waste sent to landfills and produces nutrient-rich compost for soil enrichment.
3. **Reduce single-use plastics:** Enforce restrictions on single-use plastics and encourage the use of sustainable alternatives. Promote reusable items and eco-friendly packaging.
4. **Circular economy and green procurement practices:** Embrace circular economy principles, focusing on designing products for durability, repairability, and recyclability. Procure products with minimal and sustainable packaging, recyclable materials, and environment-friendly production processes.
5. **Zero-waste initiatives:** Implement zero-waste initiatives that aim to divert as much waste as possible from landfills through recycling, upcycling, reusing, composting, and other sustainable practices.

Indore, a rapidly growing city in India, has become a model for effective and sustainable waste management. Facing challenges such as mixed waste, inefficient collection, and open dumping, the city underwent a transformation through the Swachh Bharat campaign. Implementing mandatory waste segregation, door-to-door collection, and state-of-the-art processing facilities, Indore achieved remarkable results. Over 90% of households now segregate waste, and the city's processing facility manages 1,000 metric tons daily with a 95% recovery rate. Indore has consistently ranked as India's cleanest city since 2017, demonstrating the success of its waste management system, reducing vector-borne diseases by 60%, improving air quality, and enhancing overall quality of life.

Sustainable Transport

Transport accounts for about 64% of global oil consumption, 27% of all energy use, and 23% of the world's energy-related carbon dioxide emissions.[25] The need for reliable and sustainable transportation has been on the international agenda for the past 50 years. The United Nations describes sustainable

transport as the "provision of services and infrastructure for the mobility of people and goods – advancing economic and social development to benefit today's and future generations – in a manner that is safe, affordable, accessible, efficient, and resilient, while minimising carbon and other emissions and environmental impacts." Some steps that can be taken towards sustainable transport in India include the following:

1. **Bicycles and bike lanes**: Cycling is a form of sustainable transportation that helps conserve the planet while providing the owner with a good workout. The expansion of safe bike lanes is required for the adoption of this option.
2. **Carpooling, shared mobility, and safe and efficient public transport:** These are ways in which people can reduce the amount of traffic on the roads, particularly in built-up areas and urban areas. Shared mobility such as taxis and public transport are key to sustainable transportation and reducing city congestion.
3. **Congestion charges:** Managing congestion is a crucial part of implementing policies for sustainable transportation infrastructure. Charges are effective in bringing congestion down to more manageable levels.
4. **Investment in high-speed rail:** Investment in high-speed rail transport is likely to reduce global greenhouse gas emissions and can compete strongly with transportation by car, especially where traffic is dense enough and for journeys up to around 1,000 km, such as between major towns and cities.
5. **Electric vehicles:** Electric vehicles are environment-friendly (produce zero tailpipe emissions), are quieter, cheaper to run, and more energy efficient than internal combustion engines (see case study below[26]).

Narayana Health City in Bengaluru, Karnataka, uses a fleet of electric vehicles for their daily operations. ***One*** *electric vehicle uses Rs. 2028 worth of electricity per month as compared to Rs. 6000 worth of diesel consumption per month for the same operation. The total electricity consumption to date is Rs. 2,92,032 as compared to the total diesel consumption of Rs. 8,64,000, resulting in a savings of Rs 5.7 lakh from* ***just one vehicle.***

Built Environment and Green Buildings

The built environment, in the context of environmental health, refers to the human-made surroundings in which people live, work, and engage in various activities – buildings, infrastructure, transportation systems, land use patterns,

and public spaces such as parks and recreational areas. Green buildings and sustainable design practices in the built environment play a crucial role in mitigating environmental impact and promoting sustainability. The key aspects of green buildings are as follows:[27]

1. **Energy efficiency:** Green buildings prioritise energy efficiency by incorporating features such as solar panels, energy-efficient lighting, heating, ventilation, and air conditioning (HVAC) systems, and insulation. By reducing energy consumption, green buildings help decrease greenhouse gas emissions and combat climate change.
2. **Water conservation:** Sustainable buildings often integrate water-saving technologies such as low-flow fixtures, rainwater harvesting systems, and efficient irrigation practices. These measures help conserve water resources, especially in regions facing water scarcity.
3. **Locally sourced sustainable materials and resources:** Green buildings focus on using environment-friendly and sustainable construction materials. This includes recycled, reclaimed, or rapidly renewable materials that have a lower environmental impact, with efficient use of resources and waste reduction during construction and operation.
4. **Indoor air quality:** Green buildings prioritise indoor air quality by using low-emission materials, proper ventilation systems, and measures to reduce indoor pollutants.
5. **Site selection and land use:** Sustainable building practices extend beyond the building itself to consider site selection and land use. Preserving natural habitats, minimising disturbance to ecosystems, and incorporating green spaces are essential aspects of sustainable development.
6. **Renewable energy integration:** Green buildings often incorporate renewable energy sources such as solar, wind, or geothermal power to meet their energy needs. This reduces dependence on non-renewable resources and lowers the carbon footprint of the building.
7. **Waste management:** Green building practices focus on minimising construction and operational waste through recycling and proper waste management strategies. This contributes to a circular economy by reducing the environmental impact of waste disposal.

One prominent example of a green building in India is the Suzlon One Earth campus in Pune, Maharashtra. Suzlon One Earth is a LEED Platinum-certified sustainable and environment-conscious office complex designed to minimise its ecological footprint. The campus features several green building elements, including natural lighting, energy-efficient

HVAC systems, and the use of renewable energy sources such as wind and solar power; rainwater harvesting systems and wastewater treatment facilities to reduce water consumption and promote sustainable water practices; green roofs and extensive landscaping to enhance biodiversity, improve air quality, and provide insulation; and waste reduction and recycling practices, contributing to sustainable waste management.

Mission LiFE

The Government of India has taken noteworthy steps that recognise the impact of modern living on the environment and our own health (these have been explored in Chapter 1). It has integrated climate change and aspects of environment health into multiple governmental policies and programs. This section provides an overview of the Mission LiFE program.

Through a consolidated program called Mission LiFE, the Government aims to create a people-centric movement that recognises and acts upon human impact on our planet. It was introduced by India's Prime Minister at the 26th UN Climate Change Conference of Parties (COP26) summit in Glasgow in 2021, which called for a collaborative and community-led initiative that could help mitigate the impact of climate change globally. India is the first country to include Mission LiFE in its Nationally Determined Contributions (NDCs), a set of binding climate-focused deliverables that each country must adhere to as part of the Paris Agreement. It seeks to engage individuals and communities to move from the current consumption-led lifestyle to one that promotes circularity (which includes principles of reduce, reuse and recycle) and has identified the following themes: save water, save energy, reduce waste, reduce e-waste, adopt healthy lifestyles, say no to single-use plastic, and adopt sustainable food systems. For each component, a list of actions is available for individuals and communities, which are outlined in Table 10.1.

Table 10.1. Sustainable lifestyle practices for environmental health

ENERGY CONSUMPTION	• Use bamboo toothbrushes, neem combs
• Use LED bulbs/tube-lights	• Use menstrual cups, not sanitary napkins
• Use public transport wherever possible	• Use recycled plastic over virgin plastic
• Take the stairs instead of using elevators	• Use eco-friendly cutlery during events
• Switch off vehicle engines at red lights	• Use cloth bags instead of plastic bags
• Use bicycles for local or short commutes	SUSTAINABLE FOOD SYSTEMS
• Switch off irrigation pumps after use	• Include millets in your diet
• Buy CNG/EV vehicle over petrol/ diesel ones	• Compost food waste at home
• Carpool with friends and colleagues	• Create kitchen gardens/terrace gardens

• When driving, keep your foot off the clutch when not changing gears	• Use smaller plates for daily meals to save food wastage
• Install a solar water/cooker heater on rooftops	• Prepare organic manure from cowdung
• Use biogas for cooking and electricity needs	• Use locally available seasonal produce
• Switch off appliances when not in use	WASTE REDUCTION
• Keep AC temperatures at 24 degrees	• Set the printer to double-sided printing
• Use pressure cookers over other cookware	• Buy products made from recycled paper
• Use electronic devices in energy-saving mode	• Practice segregation of dry and wet waste
• Use smart switches for oft-used appliances	• Recycle and reuse old newspapers/books
• Use community earthen pots for cooling water	• Repair, reuse, and recycle old furniture
• Defrost fridges and freezers regularly	• Do not discard waste into water bodies
• Run outdoors instead of using treadmills	• Do not let pets defecate in public spaces
WATER CONSUMPTION	E-WASTE REDUCTION
• Use buckets instead of hosepipes for watering plants, washing vehicles, etc.	• Repair and reuse electronic devices instead of discarding them
• Use water-efficient taps, showerheads, toilets	• Use rechargeable lithium cells
• Fix leaks in pipes, taps and flushes	• Discard gadgets in e-recycling units
• Harvest rainwater in homes, schools and offices	• Use cloud storage over a pen/hard drive
• Turn off taps when not in use	HEALTHY LIFESTYLES
• Reuse water from washing vegetables and AC unit runoff for watering plants/washing cars	• Use millets, indigenous herbs and medicinal plants for nutrition and well-being
• Do not discard unused stored water	• Consume natural or organic products
• Invest in a water meter to measure water consumption regularly	• Do not purchase products made from animal skins, fur or tusks
SINGLE USE PLASTICS	• Plant more trees and medicinal plants
• Cut plastic packaging only partially to avoid plastic bits in biodegradable waste	• Volunteer at community food banks, clothes banks, and animal shelters
• Carry your own water bottle	• Initiate green clubs in your community
• Reuse plastic containers as storage boxes	• Participate in citywide clean-up drives

Best Practices for Children and Older Adults

Sustainability efforts can be undertaken by individuals of any age. Older adults may have more time and experience to devote to detailed projects like community gardening, comprehensive recycling, or volunteering for environmental causes. Children can participate in recycling, gardening, composting, crafting with reusable materials, and conservation activities such as switching off lights that are not in use, collecting rainwater for plants, and using reusable bottles and containers for drinks and snacks. Teaching children about environmental sustainability can help instil a sense of responsibility regarding their impact on the planet. Getting involved in local environmental sustainability projects such as tree planting events or clean-up days will not only educate children about environmental sustainability but also empower them to make a positive impact on the world around them. After all, children are the future stewards of our planet.

MYTHS DEBUNKED

MYTH 1: Sustainability is expensive.

FACT: *Sustainability, in essence, means using less of everything. It doesn't mean spending money to replace everything you own with more sustainable options. Instead, do what you can to reduce your carbon footprint with things you already own, and think critically about future purchases.*

MYTH 2: Sustainable products are not as effective.

FACT: *Some may think that products designed with sustainability in mind are somehow less effective than their non-sustainable counterparts. In reality, many sustainable products are engineered to be as, if not more, efficient and functional as traditional alternatives. Innovations in sustainable design prioritise resource efficiency, durability, and environmental impact without compromising performance.*

MYTH 3: Sustainability is an all-or-nothing endeavour.

FACT: *Believing that sustainable living requires major changes can hinder its adoption. A substantial number of people making imperfect efforts towards sustainable living can have a more significant positive impact on the planet than a select few striving for perfection.*

CONCLUSION AND KEY TAKEAWAYS

This chapter has examined the multidisciplinary nature of environmental health within the context of lifestyle medicine and provided sustainable living

practices for people living in a country like India. It is a call to action, urging individuals and societies to actively engage in preserving the planet and promoting well-being. The key takeaways from this chapter are as follows:

- An overview of environmental health that covers air quality, water quality, soil quality, noise pollution and their effects on human health
- The impact of climate change including heat waves, vector-borne diseases, mental health, and cardiometabolic health effects, underscoring the urgency for mitigation strategies
- The heightened risks faced by children, pregnant women, and older adults due to environmental exposures
- The consequence of human eating patterns, along with an emphasis on whole food plant-based diets as a prime example of a sustainable diet
- The components of sustainable living such as sustainable food systems, mindful consumption, waste reduction, sustainable transport, and green buildings
- The Mission LiFE program with seven elements emphasising controlled consumption, waste reduction, and sustainable systems.

RESOURCES

Websites

1. Waqi.info and Aqicn.org for Real-Time Updates on Air Pollution
2. MondayCampaigns.Org for Campaigns on Nutrition, Physical Activity, Stress Management and Addiction Cessation
3. Environmental Impacts of Food by Our World in Data
4. Mission LiFE by the Ministry of Environment, Forest and Climate Change, Govt. of India.

Chapter 11

LIFESTYLE-RELATED DISEASES: UNDERSTANDING AND PREVENTING CHRONIC CONDITIONS

Devi Prasad Shetty and Sonali Ray

I had 30-year-old Aman come into my OPD. He was obese and had stage-2 hypertension, with a blood pressure of 160/100 mmHg. He had come in for an evaluation of his hypertension. He worked in the information technology industry and had his share of irregular sleeping habits, fast food intake, chronic stress, fatigue, and no physical activity. As I was doing the clinical exam and reviewing his medical history, Aman said, "Doc, I feel like a zombie! Just two years back I felt healthy, played badminton thrice a week, and enjoyed swimming." Three years ago, he had married the woman he loved and had big dreams of amassing wealth and making it big in life. He found a well-paying job that came with a long list of responsibilities and work-related travel. Gradually, he began putting on the pounds, becoming irritable, and eating on the go, sustained mostly by food that tasted good and gave him quick energy bursts. With his work schedule and erratic sleep, he had no time for physical activities or social interactions, and this started leading to marital discord. During a health camp at his office, he had elevated blood pressure; when it continued to be high on repeat visits, he was diagnosed with hypertension and obesity. He started 10-minute counselling sessions with me during the next few follow-up visits to re-enforce lifestyle changes. His wife was also part of the sessions in order to provide support for the changes he wanted to make. It took almost six months for a significant turnaround in his physical and mental health, but it finally happened with time, determination, and a good support system.

INTRODUCTION

Rapid and relentless industrialisation, urbanisation, globalisation, and advancements in technology have undeniably propelled human development and economic progress. However, alongside these benefits, they have also ushered in significant health challenges. In today's rapidly evolving world, the prevalence of lifestyle-related diseases has reached alarming levels, posing

significant challenges to global public health. Non-communicable diseases (NCDs), often referred to as lifestyle diseases, encompass a broad spectrum of health conditions, including cardiovascular diseases (CVDs), diabetes, cancer, and respiratory diseases. These ailments are primarily linked to unhealthy lifestyle choices such as poor diet, physical inactivity, tobacco use, and excessive alcohol consumption. According to the World Health Organisation, NCDs are the leading cause of mortality worldwide, responsible for nearly 74% of all deaths globally.[1] This sobering statistic underscores the urgent need for heightened awareness and action to address the root causes of these diseases. By understanding the interconnectedness between lifestyle factors and health outcomes, individuals can make informed decisions to mitigate their risk and promote overall well-being.

Beyond the sheer magnitude of their impact on mortality rates, lifestyle-related diseases pose significant economic burdens on healthcare systems and societies at large. The treatment and management of NCDs require substantial financial resources, contributing to escalating healthcare costs and reducing productivity. Furthermore, the ripple effects extend beyond the individual level, affecting families, communities, and entire nations. Addressing the root causes of lifestyle-related diseases is therefore not only a matter of personal health but also a crucial component of sustainable development and societal well-being. This chapter aims to provide a comprehensive understanding of lifestyle-related diseases and effective prevention strategies, empowering readers to make informed choices and take proactive steps towards improving their health and well-being.

Prevalence in India

According to the WHO, cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.3 million), chronic respiratory diseases (4.1 million), and diabetes (2.0 million including kidney disease deaths caused by diabetes).[2] In India, as per the 2019 Global Burden of Disease estimates, NCDs contributed to 66% of the deaths and 57% of the disability-adjusted life years.[3] There are 77 million people living with diabetes and it is projected to be a staggering 134 million by 2045![4]

The ICMR India State-Level Disease Burden Study report titled India: Health of the Nation's States says the estimated proportion of all deaths due to NCDs has increased from 37.9% in 1990 to 61.8% in 2016.[5] National surveys of the adult population showed that overweight and obesity prevalence rates have increased over the past ten years, from 10.95% to 40.3% from 2017 data that shows obesity using Indian Asian BMI cut-offs.[6] If it is calculated using

the waist-hip ratio, then abdominal obesity in India is 57.7%.[7] In the National Family Health Survey (NFHS) 2015 conducted by the Indian Institute of Population Science (IIPS), Andhra Pradesh ranked highest in the prevalence of obesity with 36.04%, followed by Kerala with 30.6%, Tamil Nadu with 29.45%, Telangana with 26.95%, and Karnataka with 23.5% among the states from South India.[8] Obesity and being overweight are risk factors for several chronic medical conditions such as cancer, diabetes, and heart disease. The prevalence statistics of other diseases are as alarming: 81.2% for dyslipidaemia,[9] 35.5 for hypertension,[10] and 33.8% for diabetes mellitus (DM) and early DM combined.[11] This means that for the Indian population, approximately 1 in 4 are diabetic or pre-diabetic, over 1 in 2 are obese, 1 in 3 have high blood pressure (see Table 11.1), and 4 in 5 have dyslipidaemia. These alarming statistics underscore the critical situation in India.

Table 11.1. Normal and abnormal blood pressure values

BLOOD PRESSURE CATEGORY	SYSTOLIC mmHg (upper number)		DIASTOLIC mmHg (lower number)
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	140–159	and/or	90–99
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	Equal to or above 160	and/or	Equal to or above 100
HYPERTENSIVE CRISIS	HIGHER THAN 180	and/or	HIGHER THAN 120
As Per JNC 8 Guidelines			

The Global Burden of Disease study, initiated over 30 years ago, has tracked the evolving landscape of disease-related mortality and morbidity in recent decades. Over time, there has been a notable transition in the burden of health concerns, shifting from communicable, maternal, neonatal, and nutritional diseases to non-communicable diseases (NCDs) or lifestyle-related ailments. The four particular factors contributing to this appalling trend as outlined by the World Health Organisation are tobacco use, lack of adequate physical activity, unhealthy diet, and harmful use of alcohol.[12]

Common Pathways to Lifestyle-Related Diseases

The unified theory of lifestyle-related diseases posits that our behaviours and responses to various life situations have profound effects on multiple levels of

our physiology – our genes (epigenetics), cells (oxidative stress and cell injury), metabolism (glucose, lipids), and our gut microbiota – ultimately contributing to the development of diseases:

1. **Epigenetics**: Epigenetics refers to changes in gene expression that occur without alterations to the underlying DNA sequence. Its role in the development of chronic diseases is being researched, and the data shows that there is a connection between epigenetics and the risk factors mentioned in the development of many lifestyle-related diseases.[13] There is a belief among many that a genetic predisposition to chronic illnesses (indicated by family history of such diseases in first-degree relatives) means that they are destined to face the same health issues. However, these genes are not expressed if the person maintains a healthy lifestyle with a healthy mind and body.[14] On the contrary, unhealthy lifestyles and work-related exposures can cause genetic modifications that can then affect gene expression and disease onset. There is strong evidence that smoking, alcohol, and lack of physical activity cause epigenetic changes, and these accumulate over the years. Tobacco smoking has shown the maximum effect on epigenetic changes. Hence, though there could be a genetic predisposition, that doesn't mean one must feel helpless and do away with healthy habits that could turn off the genetic "switch" linked to disease expression.
2. **Oxidative stress and cell injury**: Oxidative stress occurs when there is an imbalance between the production of reactive oxygen species (ROS) and the body's ability to neutralise them with antioxidants. Lifestyle factors such as poor diet, smoking, alcohol consumption, and exposure to pollution can increase oxidative stress, leading to damage to cellular structures. This damage can contribute to the development of various diseases, including cardiovascular disease, cancer, and neurodegenerative disorders. This has been discussed further in Chapter 1.
3. **Metabolism**: Lifestyle choices such as diet, physical activity level, and stress can significantly impact metabolism, including the way our bodies process glucose and lipids. Poor dietary habits, sedentary behaviour, and chronic stress can lead to dysregulated metabolism, insulin resistance, and dyslipidaemia, increasing the risk of obesity, type-2 diabetes, and cardiovascular disease.
4. **Gut microbiota**: The gut microbiota, composed of trillions of microorganisms inhabiting the gastrointestinal tract, plays a crucial role in human health and disease. Lifestyle factors such as diet, medication use, and stress can influence the composition and function of the gut microbiota. Dysbiosis, or an imbalance in gut microbial communities, has

been associated with various health conditions, including inflammatory bowel disease, obesity, and metabolic syndrome. These microbiota also send signals causing epigenetic changes; depending on the composition of bacteria, the result could be beneficial or damaging.

Overall, the unified theory of lifestyle-related diseases highlights the intricate interplay between our behaviours, environmental exposures, and physiological processes, emphasising the importance of adopting healthy lifestyle habits to promote optimal health and prevent the onset of chronic diseases.

The next section provides a detailed yet simplified approach to the prevention of lifestyle diseases through modification of the most important risk factors.

Modifiable Risk Factors

I. Unhealthy diet

One of the most important modifiable risk factors is our daily diet. With liberalisation and urbanisation, global elements are now reflected in the Indian diet, with animal products and processed convenience foods and drinks commonly being consumed. Processed and ultra-processed foods have emerged as an increasingly popular food choice in contemporary urban societies. Processed foods are prepared by adding salt, sugar, oil, flavour enhancers, artificial flavours, and colours or other processed culinary ingredients to unprocessed or minimally processed foods, employing preservation techniques like canning and non-alcoholic fermentation. Biscuits, carbonated beverages, canned fish, ready-to-eat meals, powdered soups, and instant noodles are some typical examples of ultra-processed foods. The burgeoning popularity of these ultra-processed foods is attributed to their easy accessibility and availability, cheap price, convenience, hyper-palatability, and ubiquitous marketing. Owing to these attractive features, ultra-processed foods have gradually begun displacing home-cooked meals and fresh fruits and vegetables in traditional diets. It is crucial to recognise that the traditional Indian diet is not the healthiest to begin with, due to its emphasis on carbohydrates, particularly white rice or white wheat. It tends to be low in fibre, protein, and fresh fruits, while often including overcooked vegetables, fried accompaniments, and white cane sugar.

Reflect upon your dietary habits: what factors trigger your consumption of unhealthy foods and cravings for snacks between meals? Start with a three-day diet diary where you write down everything you eat and drink for a period of three days. Reviewing this diary can shed light on any unhealthy foods and diet

patterns that you may be unknowingly following. Consulting with a certified dietitian to review your diary can provide valuable insights on identifying problematic foods and understanding appropriate portion sizes for different food groups. A balanced diet is essential for overall health and well-being.

1. Limit salt, sugar, processed foods, unhealthy fats (fried food, ghee, butter, lard, saturated fats) and oil used for cooking.
2. Any salt used for cooking should always be fortified with iodine.
3. Avoid red meat (beef, goat, lamb and game meat) as far as possible.
4. Ensure that you consume 50–60 grams of fibre, keep portion sizes small, and drink adequate water.
5. Mindful eating is the key to preventing overindulgence: avoid standing and eating or watching TV while eating.
6. Chew your food thoroughly.
7. If you enjoy having a late afternoon snack or a dessert after your meal, make it a healthy choice like a fruit, a small salad, or unsweetened and unsalted nuts such as walnuts, almonds, or brazil nuts.

The "diabetic plate" method can be used as a general guideline for a healthy meal with vegetables (50%), protein (25%) and carbohydrates (25%).[15] Helpful dietary advice can be found in the resources at the end of the chapter.

While some may find it challenging to adhere to the low-calorie replacement diets mentioned in Box 11.1, alternative dietary approaches, such as whole-food plant-based diets and millet-based diets, have shown efficacy in both diabetes reversal and management for individuals unable to comply with strict regimens. These are described below.

Box 11.1. Diabetes Reversal

A diagnosis of type-2 diabetes once meant the beginning of a lifelong journey learning to live with a serious condition. But lately, there has been growing interest in the concept of '**diabetes reversal.'** Type-2 diabetes remission refers to "abatement or disappearance of the signs and symptoms,"[16] – in other words, when one's blood sugar levels are below the diabetes range and one no longer needs to take diabetic medication.

Ongoing research in the field of diabetes has yielded promising results. For instance, findings from the DIRECT (Diabetes Remission Clinical Trial) study in the United Kingdom suggest that a significant percentage of individuals with type-2 diabetes can achieve remission through weight

loss interventions; at 12 months, 46% experienced remission, with 36% maintaining it at 24 months, primarily through weight reduction.[17] Moreover, the study's extended phase indicates that some individuals can sustain type-2 diabetes remission for at least five years.[18] However, it is important to understand that this state is termed "remission," not a "cure," and requires intensive lifestyle modifications. The DIRECT study involved a period of total diet replacement with a 825–853 kcal/day formula diet for 3–5 months, followed by gradual food reintroduction and ongoing support for sustained weight loss, all under medical supervision. Recurrence of diabetes is possible with lapses in diet and exercise adherence, presence of comorbidities, or heightened stressors.

- **A whole food plant-based (WFPB) diet**

A whole food plant-based (WFPB) diet is a way of eating that focuses on plant foods in their natural state with minimum or no processing; it also avoids or minimises added sugars, salt, refined grains, oils, and fats. Plant-based or plant-forward eating patterns focus on foods primarily from plants. This includes not only fruits and vegetables, but also legumes/pulses, whole grains, nuts, and seeds. Plant-based diets have been linked to a number of health benefits, including weight control, improved blood sugar control, and reductions in cholesterol, blood pressure levels, risk of heart disease, obesity, diabetes, cognitive decline, and certain cancers. This diet is discussed in detail in Chapter 6. Figure 11.1 shows a visual representation of different WFPB food groups shaped like a pyramid to indicate that a person should eat more foods from the bottom and fewer from the top.

In contrast, processed animal products, including red meat, are associated with increased risks of cardiovascular diseases, cancer, and dementia.[19] The World Health Organisation classified processed meats as a Group 1 carcinogen and red meats as a Group 2 carcinogen.[20] It is important to look at the micro- and macro-nutrients of a plant-based diet, as some modern plant-based products are highly processed, sugary, and high in unhealthy fats.

- **The millet diet**

Millets, as an ancient grain, have earned the reputation of being a "diabetes warrior." There is significant public interest and confidence in the millet diet, highlighting its potential health benefits. Millets are an underutilised crop known for their low glycaemic index (GI), high fibre content, polyunsaturated

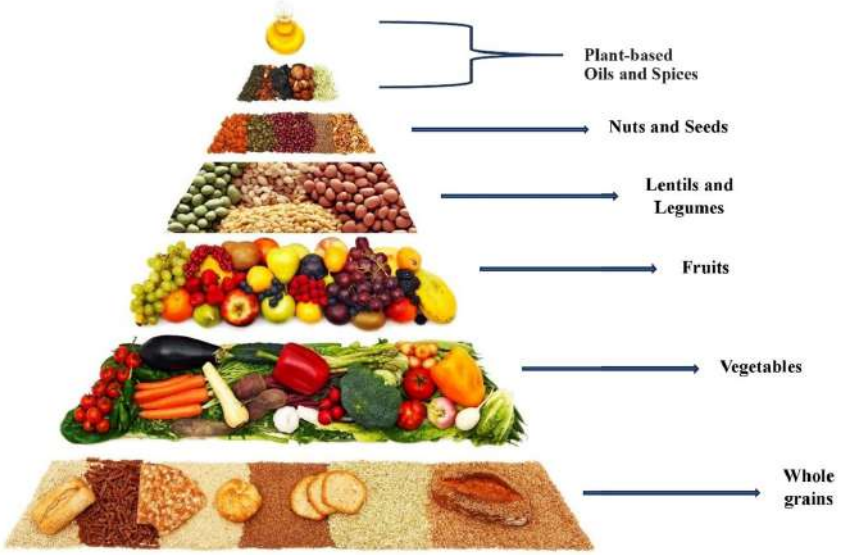


Figure 11.1. A whole foods plant-based diet pyramid

Source: iStock/aluxum

fatty acids (PUFA), non-acid-forming nature, and gluten-free properties. They are rich in vitamins, minerals, proteins, essential fatty acids, carbohydrates, plant chemicals, and non-glycaemic polysaccharides. Numerous studies have demonstrated that incorporating millets into diets can improve glycaemic control by reducing fasting and post-meal blood glucose levels, lowering insulin index and insulin resistance, and decreasing glycosylated haemoglobin (HbA1c) levels[21] as seen in Figure 11.2.

This observed effect on blood glucose levels is primarily attributed to millets' high fibre content, which increases food bulk and slows gastric emptying, resulting in a gradual release of glucose into the bloodstream. Additionally, the resistant starch found in millets delays starch hydrolysis, further contributing to delayed glucose absorption. Therefore, millets serve as an excellent alternative to rice, wheat, and other staple grains, offering substantial nutritional benefits that support diabetes management and overall health.

II. Sedentary lifestyle

Sedentary behaviour is defined as any waking behaviour characterised by an energy expenditure of 1.5 metabolic equivalent task (MET) or less, while in a sitting, reclining, or lying position.[22] This definition, proposed by the Sedentary Behaviour Research Network in 2012, is currently the most widely

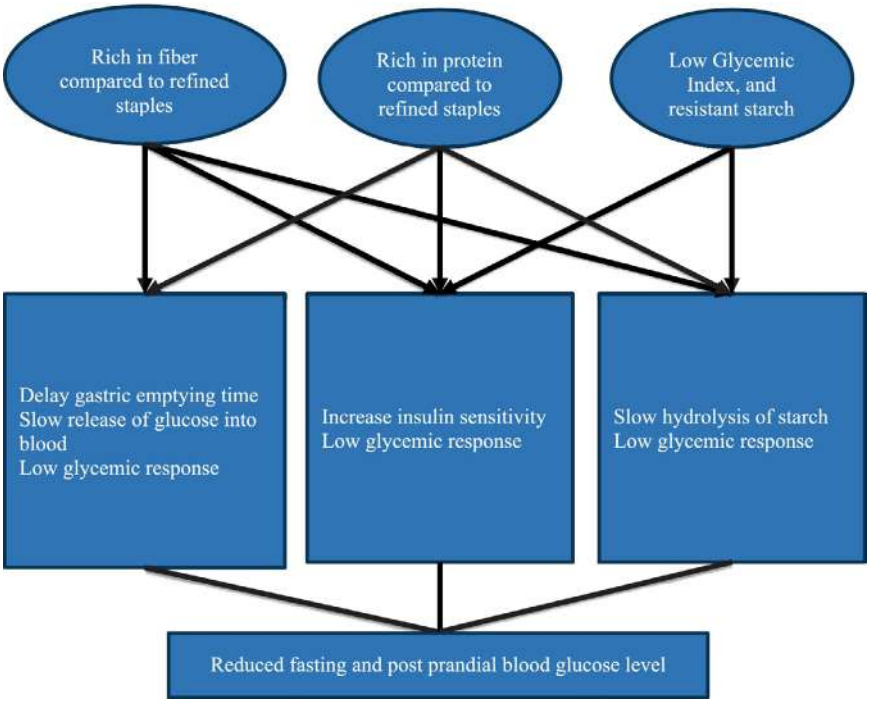


Figure 11.2. Mechanism of action of the various components of millet on blood glucose levels

Source: Reproduced from Anitha, S., Tsusaka, T. W., Botha, R., Givens, D. I., Rajendran, A., Parasannanavar, D. J., Subramaniam, K., Bhandari, R. K., & Kane-Potaka, J. (2024). Impact of regular consumption of millets on fasting and post-prandial blood glucose level: A systematic review and meta-analysis. *Frontiers in Sustainable Food Systems, 7*, Article 1226474. https://doi.org/10.3389/fsufs.2023.1226474; licensed under CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

used definition of sedentary behaviour. Examples of sedentary behaviour include television viewing, playing video games, using a computer, sitting at school or work, and sitting while commuting. This behaviour has become increasingly common due to long hours spent at desks, a preference for indoor entertainment, and widespread use of gadgets for gaming and socialising.

To meet minimum exercise recommendations, individuals should aim for 150 minutes per week of moderate-intensity exercise, which can be achieved with 30 minutes per day, five days a week. Physical activity is measured in metabolic equivalents (METs) (as described in chapter 7), where moderate exercise falls between 3 and 6 METs, elevating the heart rate to 50–60% above

the resting heart rate and inducing sweating. Examples include brisk walking, light bicycling, mopping floors, gardening, washing your car, and dancing.

When starting an exercise regimen, beginners should begin slowly, gradually increasing intensity and duration. Even short bursts of exercise multiple times a day can be effective. Aerobic exercises should be supplemented with resistance exercises to improve muscle strength, tone, and endurance; protect joints; reduce body fat; and increase lean muscle mass. Resistance exercises involve using resistance such as weights, bands, or body weight against gravity (*e.g.*, push-ups, squats, chin-ups) and are recommended at least two days a week. It is important to learn the right technique before doing these exercises to prevent injuries. Workout resources are available at the end of the chapter.

III. Obesity

The prevalence of abdominal obesity in the country was found to be 40% in women and 12% in men; 5-6 out of 10 women between the ages of 30-49 are abdominally obese; and the association of abdominal obesity in women is stronger with older age groups, urban residents, wealthier sections, and non-vegetarians.[23] The prevalence of obesity, and in particular abdominal obesity (belly fat), has rapidly increased in India largely due to sedentary lifestyles, sedentary activities, and unhealthy diets. The most basic and common method to assess body fat is the BMI (body mass index).

Although BMI is not perfectly correlated with body fat percentage, it remains a convenient method for data collection using only height and weight measurements (see Table 11.2 for BMI cut-offs for the Asian population). Abdominal obesity is associated with increased inflammation, insulin resistance, and cholesterol abnormalities, which significantly increase the risk

Table 11.2. The cutoffs for standard BMI and BMI for the Asian population

Weight status	**Standard BMI**	**BMI for Asian population**
Underweight	<18.5	<18.5
Normal	18.5–24.9	18.5–22.9
Overweight	25–29.9	23–24.9
Pre-Obese	–	25–29.9
Obese Type 1 [Obesity]	30–40	30–40
Obese Type 2 [Moderate obesity]	40.1–50	40.1–50
Obese Type 3 [Morbid Obesity]	>50	>50
This table indicates the cutoffs for the standard BMI and BMI specifically designed for the Asian Population		

of heart disease, diabetes, high blood pressure, stroke, and some cancers.[24] Genetically, Indians are predisposed to storing fat around the abdomen.

The Global Burden of Disease report shows that in India the predominance of overweight children aged 2 to 4 years was 11.5% in 2017; the occurrence of being overweight among children in India has increased from 1.6% (2006) to 3.8% (2021), increasing significantly between 2010 and 2017, and is projected to reach 17.5% by 2030.[25]

It is important to spread awareness about healthy lifestyle practices, including introducing mandatory physical activities in schools and colleges. Choosing healthier food options and reducing sedentary habits such as excessive screen time and recreational gadget use are crucial steps. Simple changes like taking the stairs instead of the elevator and walking short distances instead of driving can also promote physical activity. Following a regular exercise routine is essential for maintaining overall health. Encouraging children to engage in outdoor play and participate in school or local sports, dance, gymnastics, or yoga can instil healthy habits early on. Teach them about healthy eating, and limit their consumption of fast food, sugary drinks, fried foods, and processed foods.

Fad diets, which promise quick fixes for obesity but lack scientific evidence and nutritional adequacy, should be avoided. These diets often make exaggerated claims that do not align with basic principles of biochemistry and may have negative health consequences over the long term.

Additionally, chronic stress and depression can lead to "comfort eating," where individuals consume calorie-dense foods as a coping mechanism. Managing stress and seeking support for mental health can help in promoting healthier eating habits and overall well-being.

IV. Tobacco use

Tobacco use is the leading preventable risk factor for many chronic diseases, including cancer, lung disease, cardiovascular disease, and stroke; the risk of developing diabetes is 30–40% higher for active smokers than non-smokers, and tobacco smoking has been found to be one of the causes of rheumatoid arthritis and can cause infertility in both men and women.[26]

India is the second-largest consumer and producer of tobacco, and tobacco use is one of the major causes of death and disease in India, accounting for nearly 1.35 million deaths every year.[27] A variety of tobacco products are available at very low prices in the country. Nearly 267 million people (15 years and above) in India (29% of all adults) are users of tobacco, according to the Global Adult Tobacco Survey India, 2016–17.[28] The most prevalent forms of tobacco use in India are smokeless tobacco, including products like khaini, gutkha, betel quid with tobacco, and zarda, as well as smoking forms like

bidi, cigarette, and hookah. Commercial tobacco smoke contains over 7,000 chemicals, including hundreds of toxic ones and about 70 carcinogens.

Smoking tobacco is extremely detrimental to health, causing 9.5% of the total deaths in India annually; cardiovascular diseases account for 48% of these deaths, with an additional 23% from chronic respiratory diseases, and the remainder from conditions such as brain strokes and various cancers (lungs, mouth and throat, voice box, esophagus, stomach, pancreas, liver, kidneys, urinary bladder, cervix, colon, rectum and acute myeloid leukaemia).[29]

Additionally, there is collateral damage to people within close range of a smoker, known as second-hand and third-hand smoking. Second-hand smoking occurs when smoke from burning tobacco products, like cigarettes, cigars, hookahs, or pipes, is exhaled by smokers and inhaled by people around them. This exposure can lead to coronary heart disease, stroke, chronic kidney disease, and lung cancer in adults who do not smoke. Third-hand smoke consists of pollutants that settle indoors when tobacco is smoked, including chemicals like nicotine, formaldehyde, and naphthalene, which are known to cause cancer and other health issues. Third-hand smoke accumulates on surfaces over time and poses ongoing risks.

E-cigarettes, introduced in 2003 and banned in India since 2019, also pose health risks. E-cigarette use, or "vaping," produces harmful chemicals such as acetaldehyde, acrolein, and formaldehyde, leading to oxidative stress and damage to the lungs and heart.

How do we combat this deadly and preventable cause of many diseases? For non-smokers, efforts should be made to avoid areas where others are smoking. If exposure is unavoidable for an extended period, protective masks can reduce risk. Tobacco users should strive to quit entirely, as no level of smoking or chewing tobacco is safe. While some may be able to quit abruptly, nicotine addiction is challenging to overcome and often results in relapse, underscoring the importance of seeking professional help. Tobacco cessation programs offer counselling, biofeedback, and effective medications to support quitting. Additionally, regular oral health check-ups are crucial for tobacco chewers, which is rampant especially among women, to detect and address any oral lesions promptly. International guidelines recommend regular lung cancer screening for current and former smokers to detect and treat the disease early. A detailed discussion with a healthcare provider can establish a personalised screening schedule, often involving a low-dose CT scan of the lungs.

At the community level, raising awareness through posters, educational initiatives in schools and colleges, and increasing tobacco taxes can reduce tobacco use. Research shows that inquiring about smoking at every doctor visit and providing advice to quit each time significantly increases the likelihood of cessation among smokers.

V. Alcohol use

Alcohol consumption is one of the leading preventable causes of disease and death. According to the National Family Health Survey-5, 29% of men and 1% of women in India consume alcohol.[30] Alcohol consumption should be avoided or minimised as much as possible. No amount of alcohol is safe for the human body. However, if an adult chooses to consume alcohol, then they should restrict to one drink or less per day (for women) and two drinks or less per day (for men). A "standard" drink is 355 ml of regular beer that contains 5% alcohol, or 148 ml of table wine that contains 12% alcohol, or 44 ml of a distilled spirit (whisky/vodka/gin/rum/tequila) that contains 40% alcohol.

Alcohol damages the body, mind, and brain, and causes dependence, addiction, and premature death. It is classified as a Group 1 carcinogen by the WHO International Agency for Research on Cancer. Alcohol is associated with a wide array of short-term risks like injury, violence, alcohol poisoning, dangerous driving including road accidents, miscarriage, and stillbirth. Babies of alcoholic mothers can develop a serious disorder called foetal alcohol syndrome. The long-term effects of alcohol intake include liver disease (fatty liver, hepatitis, fibrosis, cirrhosis), heart disease (arrhythmias, cardiomyopathy, heart attack), high blood pressure, stroke, mental health issues, pancreatic disease and many cancers (liver, esophagus, head and neck, colon, breast). Drinking too much can weaken the immune system, making the body a much easier target for disease. The incidence of toxic effects of illegally and improperly distilled homemade alcohol containing many toxins has become a recurrent cause of blindness, multiorgan damage and death due to methanol poisoning, especially in rural and semi-urban areas.

A few practical tips to quit or reduce alcohol consumption are as follows: substitute non-alcoholic drinks for alcoholic drinks; don't keep alcohol at home; plan alcohol-free days during the week. Binge drinking should be avoided as it causes serious harm. The individual must be determined and support from family and friends is also required. If these measures fail, there are multiple professional resources that can effectively help in quitting alcohol. Plenty of useful information and guidance can be found in the following link: https://www.aa.org/

VI. Inadequate and disrupted sleep

Adequate sleep is as important for good health as diet and exercise. Good quality sleep improves your brain performance, mood, and health. Sleep plays a crucial role in the body's repair processes. During sleep, various organ systems undergo repair, clearing toxins and optimising the internal

environment. Regular insufficient quality sleep increases the risk of numerous diseases and disorders, including heart disease, stroke, obesity, and dementia. Healthy sleep encompasses three key components. Firstly, it involves ensuring an adequate duration of sleep. Secondly, it entails maintaining high-quality sleep, characterised by uninterrupted and refreshing rest. Lastly, it includes adhering to a consistent sleep schedule, promoting regularity in sleep patterns.

There are many things one can do to improve sleep. Sleep hygiene principles are discussed in detail in Chapter 8. They include having a consistent bedtime; avoiding heavy meals before bedtime; refraining from alcohol, nicotine and caffeine a few hours before bedtime; taking a 30-minute brisk walk or doing a short workout before dinner; creating a good sleeping environment by keeping the bedroom cool and dark; limiting the use of electronic gadgets and so on. Adults should sleep 7–9 hours per night regularly to promote optimal health.

VII. Chronic stress

Another crucial cause of lifestyle diseases is chronic stress. Today's life rhythms and demands are often challenging, and people respond to stressors in different ways. "Good stress" is short-term, and can inspire and motivate individuals, focusing their energy and enhancing performance. On the other hand, chronic stress is associated with increased biological ageing, suppression or abnormal regulation of immune function, impairment of brain structure and function, increased susceptibility to some types of infection, anxiety, sleep disturbances, and worsening of conditions like depression, heart disease, and some types of cancer.

A healthy diet, adequate exercise, good quality sleep, and being non-judgmental are important. Practicing mindfulness exercises, meditation, and the "attitude of gratitude" can be great stress busters, as is spending time with friends and loved ones. Having some "me-time" daily, even if it is only for 15–30 minutes, is refreshing and calming. Music, aromatherapy, art, tai chi, yoga exercises, deep breathing, and meditation are some suggestions to bring about positive changes. However, be open to seeking professional help if anxiety and stress become uncontrollable. The mind is a powerful tool of the body, and its well-being is paramount to overall health. When the mind is in a state of harmony and peace, the body feels good, heals better, and functions more efficiently.

Technology to Manage Lifestyle-Related Diseases

Advanced technology today enables the collection of diverse data from various parts of the body, allowing for the monitoring of daily habits to detect abnormal trends and practices. The advent of multiple healthcare apps, wearable devices,

and sensors has revolutionised personalised healthcare for the common individual. Doctors can now compare a patient's health data to identify risk factors, monitor response to treatment, and conduct consultations remotely. Telemonitoring technologies, such as continuous glucose monitors, wearable heart monitoring devices, and biosensors recording vital signs like temperature, respiration, and sleep, facilitate the remote observation of a patient's health.

Steps to Reverse Your Lifestyle-Related Disease

Work closely with your doctor if you decide to pursue lifestyle and dietary modifications. You can choose to pursue a comprehensive lifestyle transformation gradually or with a more intense approach. Consider implementing the comprehensive list provided below and commit to it for 30 days. Monitor your progress and observe any changes during this period!

1. Clearly articulate your reasons for pursuing self-improvement and write them down.
2. Ask a friend or family member to join you on a 30-day intensive lifestyle journey.
3. Elevate your attitude of gratitude and joy by smiling more, listing daily things you are thankful for, offering at least three genuine compliments daily, and cultivating a positive mindset.
4. Prioritise adequate rest by aiming to sleep early and ensuring that you get 7–9 hours of sleep per night.
5. Incorporate physical activity into your daily routine, aiming for a cumulative total of 60–90 minutes of exercise throughout the day. Track your steps and incorporate a 15-minute walk after each meal into your routine.
6. Seek support to quit tobacco and alcohol and challenge yourself to make this month caffeine-free.
7. Cultivate and nurture your social relationships to enhance your overall well-being.
8. Stay hydrated by drinking water and increase your intake if you are exposed to hot weather or sweating from exercise.
9. Aim for 20 minutes of mid-day sun exposure to boost your vitamin D levels into the normal range.
10. Embrace a whole food, plant-based diet exclusively for this 30-day adventure to maximise your chances of experiencing positive changes. Consider learning new recipes and cooking techniques to prepare nutritious meals. If you would like the change to be more gradual, you may choose to begin with one WFPB meal a day and increase your menu dishes by 2–3 per week.

If you are unable to fully complete any of the points, do the best you can. At the end of the 30-day period, evaluate any changes, noting when they occurred. Do you like the progress you are seeing?

REMEMBER: If you use lifestyle as medicine, the benefit is only present when the medicine is being taken.

MYTHS DEBUNKED

MYTH 1: Health checkups are only for sick people.

FACT: *Health checkups serve purposes beyond just diagnosing illnesses. They are an important part of preventive healthcare, designed to identify potential health risks and monitor ongoing conditions. By detecting potential health issues at an early stage, health checkups enable timely intervention, which typically leads to better treatment outcomes and can lower overall healthcare costs.*

MYTH 2: I am too young for regular health check-ups.

FACT: *All adults should attend regular health check-ups. In India, there is no set health screening schedule, so this is generally decided by the primary care doctor. The screening should be tailored to a person's age, gender, risk factors, and symptoms as elicited by the medical history and review of systems. Children should also undergo periodic assessments based on the paediatrician's advice.*

MYTH 3: Thin people are healthy as they cannot have heart disease and so they don't need any health check-ups.

FACT: *Skinny people and those of normal weight don't necessarily have good health. A significant percentage of them may have a high level of internal fat. Diseases are the result of multiple factors affecting the body. Hence "skinny" doesn't always mean "heart-healthy."*

MYTH 4: Diabetes is a disease of older adults; it does not affect children or young adults.

FACT: *While type-1 diabetes is commonly seen in children, the prevalence of type-2 diabetes is increasing at an alarming rate in adolescents and young adults. The prevalence of pre-diabetes/diabetes is 12.3% and 8.4% among adolescent boys and girls in India, respectively.*[31]

MYTH 5: My sugar levels have always been on the higher side for years but I must be fine since I don't have any symptoms.

FACT: *Diabetes unfortunately does not manifest with overt symptoms until it has progressed severely and reached an advanced stage in the course of the disease. Early diagnosis and management with lifestyle modifications and medications, when needed, prevent damage to the vital organs such as the heart, brain, retina, kidneys, and nerves.*

CONCLUSION AND KEY TAKEAWAYS

This chapter has aimed to provided valuable insights and knowledge to empower individuals to advocate for their own healthcare and well-being. A healthy lifestyle should be encouraged from childhood, but it's never too late to start positive healthy lifestyle changes to prevent lifestyle-related diseases. The chapter has discussed the importance of the following:

- A balanced diet with more whole (or minimally processed) plant foods – vegetables, fruit, legumes/pulses, whole grains (including millets), nuts, seeds, and mushrooms. These foods are nutrient-rich, fibre-strong, abundant in phytonutrients and antioxidants, lower in fats, healing, and health-promoting. Be mindful of portion sizes.
- Regular physical activity – aerobic exercises for at least 150 minutes (about two and a half hours) per week and toning exercises at least twice a week. Work with a physical trainer for a tailor-made exercise regimen.
- Quit tobacco, alcohol, e-cigarettes, and recreational drugs, and avoid exposure to second-hand and third-hand smoking.
- Obtain adequate sleep.
- Incorporate stress busters into your life.
- Participate in hobbies, community events, and volunteering activities to develop a healthy social network.
- Seek professional help for chronic anxiety, depression, and difficulty with sleep. The mind is a powerful tool; take care of it and nurture it.
- Attend regular and periodic health checkups even when there are no symptoms. Hypertension, diabetes, heart disease, cancers, and chronic kidney disease are called silent killers. These conditions often remain asymptomatic in their early stages, only manifesting symptoms when the disease has progressed significantly and already caused damage to other organs. Shockingly, a heart attack may be the first symptom of heart disease. Detecting these conditions early can significantly impact the course of the disease and improve quality of life. Evidence-based guidelines exist for screening common cancers, and it is crucial to discuss with your medical care provider the frequency of health checkups needed based on your medical history and other relevant factors.

RESOURCES

Videos

1. Plant-Wise, a documentary on the impact of lifestyle on NCDs, with subtitles in multiple languages, including Hindi [48.00]
2. Workout Routines by DanceWithDeepti [30.00], Lucy Windham [9.10] and Fit Tuber [20.24]

Websites

1. Stress Relief Breathing Techniques by WebMD
2. Healthy Eating Tips by the CDC

Chapter 12

CONCLUSION: EMPOWERING YOUR JOURNEY TO WELLNESS

Shayna Chandrakant Parekh and Alexander Thomas

After thoroughly reviewing Ravi's lifestyle, Dr. Priya acquired much-needed insight on Ravi's journey over the last four years. Asking detailed questions across the lifestyle medicine pillars of nutrition, sleep, stress, physical activity, toxic substances, social connections, and environment, Dr. Priya also sought to understand how Ravi's purpose in life might have been affected by these large life changes. Ravi's physical activity having been drastically reduced, his daily schedule and eating habits were now in flux. By giving up the hard work of farming, Ravi discovered that he greatly missed the simple joys in life: working with the soil, watching the fruits of his labour grow, being in the sun, and working with his team to develop the farm and plan for the seasons.

On hearing this, Dr. Priya knew that in addition to medication for hypertension, Ravi would also need to make lifestyle changes. She advised Ravi to rejoin the activities on the farm and adhere to a disciplined schedule of waking up, eating meals, being active, and getting 7–8 hours of sleep per night. A whole food plant-based diet was prescribed, with many more leafy greens, legumes (pulses, beans, dals), seeds, fruits, vegetables, little to no oil, no ultra-processed foods, no animal products, and no alcohol. Greater daily physical activity in the sun meant that Ravi's sleep patterns were also stabilised: he was tired when he went to bed!

Within four months, with regular follow-up visits to Dr. Priya, Ravi's weight dropped by nearly five kg, bringing him back into a normal healthy weight range. His hypertension was brought under control, and Dr. Priya was able to take Ravi off his medications. Ravi's HbA1c count of 5% revealed that he was back in the normal (non-diabetic) range. He reported greater energy and an overall sense of lightness. Most importantly, Ravi reported feeling much better equipped to handle the ups and downs of life.

What if the key to unlocking your true health potential lies not in pills or procedures, but in the simple everyday choices you make?

This is the powerful message you hold in your hands today. While we may have once believed that our health was determined by our genes, we have

come to realise that our lifestyle choices play an even greater role. Indeed, the latest research shows that even if genetics places you at a higher risk of an early death, just four lifestyle factors – not smoking, regular physical activity, adequate sleep, and a healthy diet – could offset that risk by 62%, and that those at higher genetic risk could prolong their lives by approximately 5.22 years of life expectancy at age 40 by simply adopting a healthier lifestyle.[1] As the well-respected lifestyle medicine physician and researcher Dr. Michael Gregor summarises in his book *How Not to Age*: "*...how* we live our lives may determine the bulk of our destiny."

Building on this powerful realisation, in this concluding chapter, we will:

1. **Review** the most important lessons from the book, including a summary of evidence-based lifestyle medicine recommendations for preventing, treating, and reversing the most common chronic diseases and their risk factors,
2. **Provide** you with tools to create a unique Personal Health Plan to put these recommendations into action, and
3. **Explore** ideas for how you may become a health ambassador to share the life-changing lessons of lifestyle medicine amongst your family, friends, community, and workplace.

I. Review of Overall Lessons

In the previous chapters, the country's leading experts have taken us on a brief though comprehensive survey of lifestyle medicine. Reviewing the latest scientific research, we have demonstrated how the medical specialty of **Lifestyle Medicine** uses evidence-based, therapeutic lifestyle interventions as a primary way to prevent, treat, and potentially reverse lifestyle diseases and their underlying risk factors.[2] Taking the example of **blue zones,** we have shown that regions where people live longer than average have a few critical lifestyle principles in common: daily natural movement, adequate sleep, strong family ties, strong community support, having purpose, and a diet that centres predominantly around plant-based foods.[3] It is clear that our lifestyle choices play a critical role in our health.

Review: Non-communicable Diseases

Chronic diseases are also known as **non-communicable diseases** (NCDs). Given the large role that lifestyle can play in their onset, NCDs are also

sometimes referred to as **lifestyle diseases**. NCDs are the most common causes of death in the world today, causing nearly three-quarters of all deaths in the world.[4] The most common NCDs are:

1. Cardiovascular diseases (which include heart attacks and stroke)
2. Cancers
3. Chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma)
4. Diabetes
5. Mental health conditions.[5]

The **most common risk factors**[6,7] for NCDs are presented in Table 12.1.

Review: Risk Factors

The comprehensive Global Burden of Disease Study, which studied 204 countries and territories, evaluated 87 risk factors for all deaths worldwide in 2019.[8] For both males and females, **the top risk factors for death were overwhelmingly lifestyle-related**, including factors such as high blood pressure, poor diet, high blood sugar, tobacco use, alcohol use, high body-mass index (BMI), and high LDL cholesterol.

As of the latest available data (2019), NCDs are estimated to have caused 66% of all deaths in India, with the leading cause of death being cardiovascular diseases (28%) followed by chronic respiratory diseases (12%), cancers (10%), and diabetes (4%).[9] Given the high prevalence of NCDs worldwide and in India specifically, the connection between NCDs and morbidity and mortality,

Table 12.1. The most common risk factors for non-communicable diseases (NCDs)

Most common risk factors for non-communicable diseases (NCDs)		
Behavioural	**Metabolic**	**Environmental**
Unhealthy diet Harmful use of alcohol Tobacco use Physical inactivity Inadequate stress responses Social isolation Poor social connections	High blood pressure Excess weight/obesity Raised blood glucose (hyperglycaemia) Raised blood cholesterol (hyperlipidaemia)	Household air pollution Outdoor air pollution Radiation Factors affecting air, water and soil quality Climate change

and the rising rates of NCD incidence, a solution is needed now more than ever before. The evidence-based interventions offered by lifestyle medicine are indeed promising.

Review: Lifestyle Medicine Recommendations

Drawing on conclusions from landmark scientific studies, we reviewed the evidence-based recommendations of lifestyle medicine for the prevention, treatment, and reversal of NCDs. These recommendations fall under eight pillars, which are depicted in Table 12.2.

Overall Summary

We began this book with an exploration of the profound ways in which **purpose, meaning, and values**, such as kindness, forgiveness, trust, and gratitude influence our health. We surveyed mental well-being, exploring the determinants of mental health, the effects of stress, and the importance of building **stress resilience** through proven practices such as meditation. The health effects of the worldwide epidemic of loneliness and social isolation were contrasted with the rich health benefits of **positive social connections** within circles of family, friends, and the workplace. The basics of comprehensive, **plant-based nutrition**, including its composition, patterns, timing and frequency, were explored in great detail, powerfully reminding us of the age-old wisdom of **food as medicine**. In our review of the ways in which **physical activity** impacts health, we learnt the intricacies

Table 12.2. The eight pillars of lifestyle medicine

Eight pillars of lifestyle medicine	
1	Purpose and meaning
2	Stress resilience
3	Social connections
4	Nutrition
5	Exercise
6	Sleep
7	Avoidance of toxic substances
8	Environment

of **exercise**, including type, duration, intensity, timing, and frequency. The heavily neglected, but crucially important lifestyle pillar of **sleep** was shown to be linked to health, and a research-based answer was provided to the perennial question: How much sleep should I get? A wide range of **addictions** was explored, both classic (tobacco, alcohol) and modern (gaming, social media), and the science behind **positive behaviour change** empowered us to move in the right direction. The beautifully complex ways in which the **environment** – nature, air, water, soil, trees – impacts our health and how our lifestyle choices impact the environment's health underscored our need to become stewards of the planet. Finally, we saw how all of these lifestyle choices came together to form the **root causes of lifestyle diseases** through a common pathogenesis (process) of inflammation, oxidative stress, and imbalance.

Most importantly, we are now armed with awareness of critical, science-based health knowledge and the tools needed in our journey toward healthy minds and bodies. Through the simple, evidence-based changes in our daily routines summarised in Table 12.3, we can prevent, treat, and reverse lifestyle diseases and risk factors.

Table 12.3. Evidence-based lifestyle recommendations for adults aged 18–60

Lifestyle medicine recommendations*	
Nutrition	**Physical movement & exercise**
Eat 95–100% plant-based foods	Weekly 150–300 min of moderate intensity aerobic activity ***or*** weekly 75–150 min of vigorous intensity aerobic activity
Eat whole foods as much as possible	
Increase intake of leafy greens	Strength training for major muscle groups 2 or more days per week
Drink mostly water	Limit sedentary activities like sitting
Incorporate nuts and seeds into meals	Improve flexibility
Get adequate vitamin D3, B12, and omega-3 fatty acids	Practice balance exercises
Eat 1–2 servings of legumes (beans, lentils, pulses) a day	Monitor body weight and composition, and waist circumference

Lifestyle medicine recommendations*	
Eat breakfast on a regular basis	**Sleep**
Adopt time-restricted eating	Get 7–8 hours of sleep at night
Increase use of spices and herbs	Be active throughout the day
Reduce sugar and salt	Avoid alcohol before bed
Greatly reduce or eliminate dairy, eggs and fish	Avoid caffeine later in the day
Eliminate processed foods	Avoid eating late at night
Eliminate oil	Avoid bright light an hour before bed
Eliminate meat	**Toxic Substances**
Eliminate soda and fruit juices	Eliminate alcohol
Stress Resilience	Eliminate tobacco and stop smoking
Reduce exposure to stressors	Eliminate non-prescribed drugs
Adopt a mindful hobby	Identify and eliminate addictions
Exercise regularly	**Social Connections**
Sleep well	Join social groups and/or volunteer
Eat well	Adopt mindfulness practices
Develop positive social connections	Eat at least one meal daily with family or friends
Try proven practices for managing stress (yoga, tai chi, meditation, prayer, mindfulness)	Use technology to connect with long-distance friends and family
Environment	**Purpose and Meaning**
Spend time in nature	Pursue what you love to do
Decrease exposure to air pollution	Explore spiritual connection
Adopt a whole food plant-based eating pattern	Nurture gratitude, forgiveness, hope
Improve the environment around you (*e.g.* plant trees)	Cultivate small joys by creating a thankfulness list
Decrease exposure to environmental toxins	Practice small acts of kindness
*These evidence-based recommendations are for adults aged 18–60. This is a non-exhaustive list. Many of these suggestions can be adopted by children, teenagers, and older adults, with some adjustments made to certain categories like hours of sleep and amount of exercise. Any significant changes to lifestyle should be made after thorough research and/or discussion with a qualified healthcare provider.	

Longevity and Ageing

Research in the related field of longevity and ageing has been growing in popularity. The Longevity India Research Centre at the Indian Institute of Science, Bengaluru, was launched in 2024. Longevity researchers examine the molecular and cellular factors that accelerate or decelerate the ageing process, and can contribute to longer, healthier lives. There are obvious overlaps with the core pillars of lifestyle medicine. In his book *Why We Die*, the Nobel Laureate Venki Ramakrishnan examines the history of longevity research, noting that: "Ironically, the very same advances in biology that are the basis of the anti-ageing industry also thoroughly validate some age-old advice for living a long and healthy life: diet, exercise, and sleep […] These remedies currently work better than any anti-ageing medicine on the market, cost nothing, and have no side-effects." Highlighting the nutrition pillar's effects on longevity, Ramakrishnan draws on the famous words of Michael Pollan: "Eat food. Not too much. Mostly plants."

II. Personal Health Plan

We are by now familiar with the gems of knowledge across the pillars of lifestyle medicine that can help us reach our maximum health potentials. However, actually changing our lifestyles – our habits and behaviours – is hard! Just look at the February 1st graveyard of New Year's resolutions. How can we take these lessons and successfully apply them in our lives? Thankfully, a lot of research has been done to provide us with methods that work. We will use these methods to create our very own Personal Health Plan.

A **Personal Health Plan** (PHP) is a roadmap to achieving your health and wellness goals. It is a personalised plan that outlines your current health status, identifies your health risks and goals, and develops strategies for achieving those goals. PHPs can assist people of all ages and health conditions. They can help improve overall health, prevent disease, manage chronic conditions, and reverse some chronic conditions. A PHP typically includes the following elements:

- **A health assessment:** This includes a review of your medical history, family history, lifestyle habits, and current health status.
- **Health goals:** These are specific, measurable, achievable, relevant, and time-bound (SMART) goals that you want to achieve.

- **Action plans:** These are detailed plans that outline the steps you will take to reach your health goals.
- **Resources:** This is a list of resources, including books, websites, support groups and healthcare providers, that can help you achieve your health goals.

Your Health Assessment

Numerous Personal Health Plan templates can be found online, in both short and long form. They usually include a health assessment so that you may have a snapshot of the state of your health at this moment in time. A health assessment, also known as a health history questionnaire, will include details such as the following:

Medical History

- Do you have any chronic health conditions, such as high blood pressure, diabetes, or heart disease?
- Have you ever been hospitalised or had surgery?
- Do you have any allergies or sensitivities to medications?
- Do you have any family history of chronic health conditions?

Links to more complete questionnaires can be found at the end of this chapter.

Lifestyle Habits

- What do you eat on a typical day and in a typical week?
- Do you eat animal products (dairy, eggs, meat)?
- Do you eat ultra-processed foods?
- How many times a week do you eat vegetables, leafy greens, fruits, seeds and nuts, whole grains, legumes (peanuts, soya beans, and pulses, which include beans, peas, and lentils)?
- Do you smoke or use tobacco products?
- Do you drink alcohol? If so, how much and how often?
- How much physical activity do you get on a typical day and in a typical week?
- Do you have a sedentary lifestyle? How many hours are you sitting on a regular day?
- How many hours of sleep do you get at night?
- How many times a week do you meet family or friends socially?
- Do you have effective ways to manage your stress levels?

Current Health Status

- What is your current weight and height?
- What is your BMI?
- What is your waist circumference?
- What is your blood pressure?
- Have you had cholesterol tests (HDL, LDL, triglycerides, total cholesterol, Lp(a) and ApoB)?
- Have you had blood sugar tests (A1C test, fasting blood sugar test, glucose tolerance test, random blood sugar test)?
- Are you vaccinated according to the recommended guidelines?

Risk Factors

- Are you overweight or obese?
- Do you have a family history of heart disease, stroke, diabetes, or cancer?
- Do you have high blood pressure, high cholesterol, or high blood sugar?
- Do you get adequate dietary fibre via fruits, vegetables, legumes, and whole grains?[10]
- Do you eat ultra-processed foods,[11] red meat,[12] or dairy?
- Do you skip breakfast?[13] Do you eat late at night?[14]
- Is your diet high in sodium?[15]
- Do you drink alcohol?[16]
- Do you smoke or use tobacco products?
- Do you participate in adequate physical activity (see Chapter 7 chart)?[17]
- Do you get enough sleep, free of sleep disturbances (see Chapter 8 chart)?[18]
- Have you had multiple adverse childhood experiences (abuse, neglect, parental conflict, bullying, family financial problems, *etc.*)?[19]
- Do you engage in night-shift work?[20]
- Are you socially isolated or do you often feel lonely?[21]
- Are you exposed to dangerous levels of indoor or outdoor air pollution?
- Are you often stressed, without adequate coping mechanisms?

Health Goals

The foundation of the personal health plan (PHP) approach rests on two key principles:[22]

(1) The ability of the mind and body to self-repair with the support of appropriate therapies and interventions

(2) Ideal health is a lifelong process that requires ongoing reassessment and rebalancing. When developing a PHP, you are encouraged to look beyond

your current health state or challenges toward a healthy future. To that end, the following types of questions are addressed to help you determine your health goals.

- How do you picture your best health?
- What are your health goals?
- What do you want to achieve in the next year?
- What do you want to achieve in the next five years?

These can be spread across the eight pillars of lifestyle medicine, including nutrition goals, exercise goals, sleep goals, stress management goals, avoidance of toxic substances goals, and goals for creating healthy social connections. Use the SMART goal framework in the next section to help you with this.

B. Action Plans

Once your health goals are set, the next step on our PHP journey is:

- What steps will you take to reach your health goals?

The following four areas form the foundation for creating the action plan that will lead you to your health goals.

- **WHY:** What is the purpose and meaning that provides the motivation behind your health goals?
- **HOW:** How can you make S.M.A.R.T. goals to achieve changes across one or more of the eight pillars of Lifestyle Medicine?
- **WHERE:** What steps are needed to ensure that your environment supports you as you work to achieve your health goals?
- **TIPS:** What are the simple tips that can make this journey fun and sustainable?

The Why and the How

We have shown the importance of making better choices across multiple fundamental pillars of lifestyle medicine. If our goal is to change our lifestyle habits, understanding the "why" and "how" is crucial. By delving into the motivations (why) and mechanisms (how) underlying our actions, we can design effective ways to change our behaviours. **Purpose and meaning provide the *Why*** behind our choices and behaviours. **The remaining pillars of Lifestyle Medicine provide the *How*.** This includes evidence-based recommendations for ideal lifestyle behaviours and habits across the pillars of

nutrition, sleep, exercise, stress management, avoidance of toxic substances, and developing healthy social connections.

But is there an evidence-based method for making realistic goals across these Lifestyle Medicine pillars that can actually stick? Recall SMART Goals.

The How: SMART Goals

I want to lose weight!

I have to eat healthier.

I want to start going to the gym.

I'm going to sleep more at night.

I have to quit smoking.

I need to make friends.

Human beings are hopeful by nature. We are hardwired to find solutions to what we perceive as problems. With so many of us suffering from chronic illness and risk factors such as high blood pressure, excess weight, obesity, and high cholesterol, the vast majority have made these types of goals and resolutions for the new year. But there is a problem.

When we make generic goals — *I want to lose weight* — we find them difficult to achieve. And if we do achieve them, we find them hard to sustain. Instead, we will draw upon the SMART goals strategy described in Chapter 5. There are five criteria for effective goal setting: they should be Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). SMART goals are more effective because they are more clear, focused, and attainable, making it more likely for you to achieve your goals.

- **Specific**: A specific goal is clearly defined and leaves no room for ambiguity. For example, instead of setting a goal to "lose weight," a specific goal might be to "lose 8 kg by the end of the year."
- **Measurable**: A measurable goal has a quantifiable outcome that can be tracked and evaluated. For example, instead of setting a goal to "improve your fitness," a measurable goal might be to "complete 10,000 steps every day for the next one week."
- **Achievable**: An achievable goal is challenging but realistic. It should be something that you can achieve with the effort and resources you have available. For example, instead of setting a goal to "become a crorepati," an achievable goal might be to "save Rs. 5,000 per month."
- **Relevant**: A relevant goal is aligned with your overall goals and objectives. It should be something important to you that will make a

positive impact on your life. For example, instead of setting a goal to "learn a new language," a relevant goal might be to "learn Gujarati so that I can communicate with my elderly family members who live in Surat."

- **Time-bound**: A time-bound goal has a specific deadline for completion. This helps to create a sense of urgency and motivation. For example, instead of setting a goal to "start a health blog," a time-bound goal might be to "start a whole food plant-based cooking blog and publish one new post per week for the next 12 months."

Putting It All Together

Once we have identified the reasons behind our goals (the Why), we can now apply the SMART framework with lifestyle medicine principles (the How) to create the action plan of our PHP. Here are some of our old lifestyle goals reimagined under the new framework.

Nutrition		
Old Goal		*I'm going to eat healthier this year.*
SMART Goal		**I will incorporate 2 whole food plant-based (WFPB) ingredients into at least 1 meal per day for the next 4 weeks.**
WHY?	**Your Motivation**	I want to eat healthier so that I am not diagnosed with Type-2 Diabetes like my grandparents, parents, aunts, and uncles.
HOW?	**Specific**	2 WFPB ingredients, into 1 meal per day, for 4 weeks. For example, adding spinach to dal, and adding ground sesame seeds into roti.
	Measurable	The number of WFPB ingredients consumed each day can be measured. Progress can be tracked by keeping a food journal or using a meal planning app.
	Achievable	Small, achievable steps (1 meal per day) have been set rather than drastic changes.
	Relevant	A plant-predominant eating pattern has been shown to support health and reduce risk of chronic disease.

	Time-bound	A specific timeframe of 4 weeks has been set to achieve the goal.

Weight Loss		
Old Goal		*My new year's resolution is to lose a ton of weight.*
SMART Goal		**I will lose 3 kg in the next 12 weeks.**
WHY?	**Your Motivation**	I want to lose weight so that I can enjoy an active life with my grandchildren, run around with them on the playground, and take them on treks.
HOW?	**Specific**	3 kg in 12 weeks
	Measurable	Progress can be tracked by weighing yourself regularly, using a consistent scale and time of day. Maintain a weight loss journal to record your progress and any changes in your diet or exercise routine.
	Achievable	The goal is incremental and realistic (less than half a pound per week over the next 12 weeks). Set a realistic weight loss goal that aligns with your current weight, health, and lifestyle.
	Relevant	Ensure that the weight loss goal is aligned with your overall health and well-being. Consider any underlying health conditions or limitations that may impact your weight loss journey.
	Time-bound	A realistic timeframe of 12 weeks has been set to achieve the goal. The goal can be broken down into smaller, weekly, or monthly targets to maintain motivation and track progress.

To create your own PHP Action Plan, consider applying this framework to your own healthy lifestyle goals, across the pillars of lifestyle medicine. You can use the tables provided in the Appendix to write down your new SMART goals.

TIPS

- Be gentle with yourself. It took you 20, 30, 40, 50, 60 years to get to this point. Enjoy the gentle journey back to good health.
- Take everything in moderation, including moderation! It's OK to binge or celebrate once in a while.
- Embrace movement in unexpected ways, like running alongside your children, parking farther away from the store, and dancing around your living room.

- Live in the present moment. One piece of nutrition advice that stayed with me was – "Don't think about what you'll be serving at next year's Diwali party. Just focus on the next thing you're putting in your mouth."
- Continue to learn about healthy lifestyles by reading books, research papers, and research-based websites.
- Be kind to yourself and celebrate your achievements!
- Don't try to change too many things at once.
- Keep going even if you fall off track. A bad day doesn't have to be a bad year.
- Avoid the "all or nothing" mindset. If lunch involved poor choices, don't give up on the entire day!

Resources

The next part of your PHP involves identifying the resources you will need to achieve your goals.

- Books and websites on health and wellness
- Support groups for specific health conditions
- Healthcare providers who specialise in lifestyle medicine

The references and resources section of each chapter provide a good starting point. Use the QR code or link at the end of the book to access them.

Tracking Progress

Congratulations – you've set your SMART goals! You're on your way. The final part of this journey involves monitoring your progress, coming up with a strategy to get back on track if you veer off course, and calibrating your goals and milestones as you work your way through your health journey. The many types of wearable and other technology described in the previous chapters can help in this regard. A health assessment is just a starting point. It is important to review your PHP regularly and make adjustments as needed.

Becoming a Health Ambassador

Once you begin your journey toward health and wellness using the timeless wisdom of lifestyle medicine, you'll find it hard to keep it to yourself! Here are some ways to share what you've learned with friends, family, community, and workplace.

Kids and Family

1. Make healthy eating fun, engaging, and easy:

    - Involve your kids in meal planning and preparation. Let them help you choose recipes, chop vegetables, independently prepare simple dishes like overnight oats and chia seed pudding, creatively plate food, or decorate the table in fun ways. This will give them a sense of ownership and encourage them to try new foods.
    - Create colourful and visually appealing meals. Use a variety of colours and textures to make food look more appetising to kids. You can use fruits and vegetables to create rainbows on their plates or use cookie cutters to make sandwiches into fun shapes. Search the web for more ideas!
    - Learn about all of the creative ways to incorporate vegetables, seeds, and nuts into kid-friendly foods, like adding zucchini to chocolate cake, blending broccoli into pesto sauce or dal, adding flax seed powder to cookies, and making laddoos with tahini. Search the web for interesting ways to include fruits and vegetables in children's foods.
    - Having meals as a family is hugely beneficial, as shown in research from the Family Dinner Project![23] Turn mealtimes into family bonding time. Sit down together to eat and chat about your day. This will help you connect with each other and create positive memories around food.
    - For members of your household staff and those of your community, organise healthy cooking classes to teach them simple ways to transform family meals, including using no oil in dals and sabzis, incorporating more herbs and greens, and preparing healthy green smoothies.[24]

2. Make physical activity a family affair:

    - Plan regular family walks, bike rides, or hikes.
    - Join your community nature group to explore birdwatching, trekking, and camping.
    - Play active games together.
    - Create experiences that combine exercise and service, such as walking around your neighbourhood picking up litter.

3. Be a role model:

    - Show your kids that you value your health by making healthy choices yourself.
    - Talk to your kids about the importance of healthy living.
    - Encourage your kids to talk to you about their health concerns.

Friends

There are a few fun ways to share health lifestyle habits with your friends (without lecturing!):

1. Host a festival potluck and swap healthy recipes.
2. Start a wellness-focused book club.
3. Organise a "healthy habits" group and text to share health goals, progress, and challenges.
4. Attend health and wellness events together, such as retreats or lectures.
5. Try new fitness classes or activities together.
6. Start a healthy meal planning and prepping group to plan meals together, cook in bulk, and portion out meals for the week ahead.

Community and Workplace

Here are a few creative ways to be a health ambassador to your community:

1. Collaborate with local organisations and businesses to host a health fair or wellness event with health screenings and fitness demonstrations.
2. Establish a community garden where people can grow their own fresh produce.
3. Organise cooking classes with neighbourhood restaurant chefs to teach participants how to prepare healthy meals using locally grown ingredients.
4. Lead a community fitness group or walking challenge.
5. Host or join a 21-day kindness/mindfulness/nature/gratitude challenge.[25]

In your workplace:

1. Remember the power of random acts of kindness in supporting good health. Get joyfully creative with your anonymous expressions of kindness to coworkers and leave behind Smile Cards to inspire them to pay it forward.[26]
2. Initiate a workplace wellness challenge or program (such as Stairs Only September, Junkless January or Meatless Monday) and offer incentives for participation.
3. Establish a healthy snack program or vending machine makeover.
4. Encourage your company to sponsor lunchtime fitness classes.
5. Organise wellness seminars, inviting lifestyle medicine physicians and researchers from local hospitals and universities to give talks.

6. Encourage employees to walk, bike, or use public transportation to work.
7. Train and empower employees to become health ambassadors within their departments.

By incorporating these creative ideas, you can encourage your family, friends, community, and workplace to adopt healthier habits, build stronger connections, and create a supportive environment for overall well-being.

A Comma, not a Full Stop

This book is intended to be an inspiring stepping stone in your journey toward a healthier life for self, family, and society.

While we have presented the most cutting-edge research in the field, each day brings to light new evidence that supports the benefits of healthier lifestyles. Leading scientific journals, including Nature, New England Journal of Medicine, Journal of the American Heart Association, BMJ, Cell, Mayo Clinic Proceedings, The Lancet and many others, publish groundbreaking studies each year, showing the undeniable link between health and nutrition, physical movement, sleep, stress resilience, social connection, and other crucial aspects of lifestyle. Many of these studies have been referenced in this book. We invite you to dive deeper into the fascinating world of lifestyle medicine, to ask questions, to seek answers, and above all, to pursue your health journey with curiosity and joy.

RESOURCES

Websites

1. Nutrition Facts with over 2000 videos by Dr. Michael Gregor
2. Pubmed, a free database of over 36 million biomedical citations, maintained by the National Institutes of Health
3. American College of Lifestyle Medicine (ACLM)
4. Mayo Clinic Health System Primary Care History Form
5. American College of Lifestyle Medicine (ACLM) and Loma Linda University Lifestyle Assessment Long Form

APPENDIX

Use these tables to turn your old goals into new SMART goals. Refer to Chapter 12 for detailed instructions. One table (Exercise) has been filled in to serve as an example.

Exercise		
Old Goal		*I'm going to improve my fitness this month.*
SMART Goal		**I will increase my running endurance by continuously running 3 miles within 30 minutes by the end of January.**
WHY?	**Your Motivation**	I used to enjoy running when I was in school, and I want to feel that joy again.
HOW?	**Specific**	3 miles within 30 minutes, by the end of January.
	Measurable	Progress can be tracked by recording running distance, pace, and duration in a running log or using a fitness tracker app.
	Achievable	Start with a baseline assessment of your current running ability and gradually increase your running distance and duration over time. Break down your goal into smaller, achievable steps, such as increasing your running distance by 0.5 miles each week.
	Relevant	Consider your current fitness level, any injuries or limitations, and your access to running facilities or equipment.
	Time-bound	A realistic timeframe (end of January) has been set for achieving the goal.

Nutrition		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Sleep		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Exercise		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Stress Resilience		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Addiction		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Healthy Social Connections		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Weight Loss		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Resistance Training		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

Intermittent Fasting		
Old Goal		
SMART Goal		
WHY?	**Your Motivation**	
HOW?	**Specific**	
	Measurable	
	Achievable	
	Relevant	
	Time-bound	

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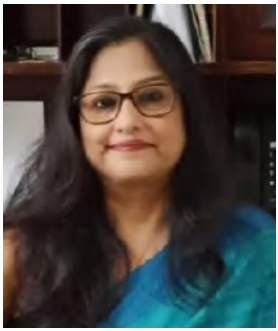
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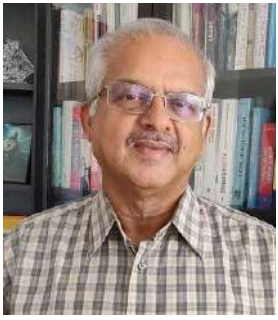
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