
Preface

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Affluent countries and social groups across the world are facing a number of relatively new health and wellbeing challenges. Many of these are chronic non-communicable diseases and conditions that are lifestyle-driven, and include type 2 diabetes, obesity, cardiovascular disease, hypertension and some cancers. Many are a consequence of rising inactivity and rapid changes in food and calorie consumption, all of which also link to wider social changes centre on shifting family and community structures, changing work and non-work opportunities, new transport options, and a demographic shift towards the elderly in populations. At the same time, natural environments worldwide continue to come under pressure – from urban and transport development, from climate change, and from the direct negative externalities of growth, such as air and water pollution.

Inactivity is now the fourth leading risk factor for mortality worldwide and is contributing to a rapidly growing financial burden on health services. Yet we also know that higher rates of physical activity and lower incidence of obesity have been associated with regular physical activity, time spent outdoors, and access to green space. It has become clear that the structure of environments, both social and natural, plays a role in encouraging active and healthy behaviours. Individuals with easy physical and cultural access to natural settings are three times as likely to engage in physical activity, experience less mental distress and have overall better wellbeing. In contrast, as residential distance from green space increases, the likelihood of being sufficiently physically-active to prevent ill-health diminishes. The odds of becoming overweight or obese also significantly increase. Access to green space also improves perceived general health, reduces asthma prevalence, and risk of mental illness and stress levels, lowers morbidity and cardiovascular disease risk, increases life longevity, improves cognitive function and produces healthier cortisol profiles. We also know that people with green space close to their homes are less lonely, have more social support and experience an increased sense of community. Urban living has now become more common than rural worldwide, yet urban dwellers are more likely to develop mental illness, suffer from anxiety and develop mood disorders.

This book draws together internationally-recognised research on the synergistic health benefits of being physically active in green spaces: we call this *Green*

Exercise. We know both exercise and nature are independently facilitative of good health and wellbeing. The findings of recent research and practice suggest that the combination has an even more compelling effect. This book discusses the green exercise concept and brings together issues and research from a wide variety of disciplines from physiology through to environmental design. Novel perspectives cover the spectrum of health benefits from cellular to behavioural change, and the impacts of a variety of natural environments on health outcomes are assessed, including USA and UK urban nature, Australian parks, UK coastal settings and wildlands, and Japanese forests. We also consider the evidence for the benefits on a wide range of different social groups, and integrate cross-cutting key themes relevant to each stage of the life course from childhood to healthy ageing.

We also present the therapeutic properties of green exercise, known as green care, and present the outcomes of deliberate use of structured therapeutic programmes using walking, gardening and/or farming for vulnerable groups. Several chapters analyse the effectiveness of nature-based interventions for youth at risk, the role of probation services working from correctional facilities, individuals suffering from dementia, and the potential roles of green exercise in promoting healthier workforces. Some authors also explore how green exercise evidence could be used to influence urban design and planning, and how health and environmental agendas could be integrated to enable green exercise to be more widely used as a mechanism for both improving population health and maintaining natural environments.

We begin by discussing how environmental and social contexts shape health and wellbeing. Evidence is summarised to support seven interconnected themes that date back to the classical era of Asclepian healing. These feed directly into a number of chapters throughout the book. Nature contact is not only a multisensory experience, exposing individuals to sunlight to aid vitamin D production, but it also provides a space to be active, mindful, socially-interactive, develop a sense of place and attachments to both people and places. Authors conclude it is important to incorporate nature into the design of buildings, hospitals, homes and community spaces to create shared spaces which facilitate interaction and attachment and increase opportunities for green exercise. This includes both direct experience of nature (for green exercise) and indirectly via paintings, pictures and views from the window. This evidence also calls for an integrated biophilic design of healthcare facilities to promote a nature experience that we know contributes to patient recovery and comfort and enhances performance and productivity of healthcare personnel. All too often, however, simple design principles are forgotten during urban development and building design. We conclude that investing in natural environments in all contexts equates to investing in human health and wellbeing.

Another key message of the book relates to the idea of an optimal dose of nature and green exercise for greatest health benefit. A dose of nature has been shown to have an immediate positive effect on mental health for a wide range of activities (e.g. walking, angling, cycling, gardening), for all age groups, for men

and women, for every green environment and habitat (with additional benefits from the presence of water), and for the already healthy and the mentally-ill. However, identifying optimal doses needs to account for a wide range of mediators that include environmental factors such as quality (e.g. biodiversity, air quality, noise) and quantity (e.g. tree canopy cover) and weather; personal factors such as age, gender, beliefs about the value of nature, nature relatedness, prior experiences and childhood memories, as well as perceptions of risk; social and community factors including social interaction, trust, ethnic, cultural and social norms, and accessibility of green spaces.

For a variety of reasons, time spent outdoors appears to be diminishing, especially in affluent countries, so unplanned contact with nature occurs less often. Advances in technology and increased accessibility to computers and communication devices at a much earlier age may mean children are less likely to engage in outdoor play and recreation. Children today often learn more about the environment and nature from television and the internet than from real experience. This is despite mounting evidence that contact with nature has positive effects on physical and mental health, emotional and cognitive development, mental resilience, personal and social development, social skills and even academic achievements and life pathways. Unplanned outdoor activity helps encourage children to engage in spontaneous and unregulated play. Now disconnection is common. Using the outdoors as a learning space can help address this growing disconnection, making a strong argument for outdoor learning to be embedded in educational curricula: we know that active experiential learning in an alternative context enhances academic attainment, concentration and attention. Nature is thus also a learning resource that promotes resilience in young people and positively affects their future lifecourse opportunities.

It is not just green space that is of importance to health: blue environments by rivers, lakes and coasts seem to have intrinsic qualities that promote restoration and improved mental health and wellbeing. Authors also discuss evidence from coastal areas highlighting the importance of water for facilitating nature-based activities. Forests and woodlands also provide spaces for physical activity: research from Japan is leading the way in understanding and promoting forest bathing. Research shows walking in forests, forest bathing, reduces blood pressure and salivary cortisol, with greatest benefits shown for the elderly and those already with high blood pressure and more stress markers (again suggesting a therapeutic application). Further chapters discuss care farming as an intervention for probationers, the success of wilderness walking for youth at risk, and using nature to help those suffering from dementia to control and push back symptoms. Nature-based interventions offer a diverse applicability for many different cohorts of people and cumulatively this evidence should inform public health funding and government health and social care policies. Green exercise can be used as a vehicle to drive behavioural change and ensure a more inclusive approach to health.

The rise in inactivity levels and the associated problems with body-weight are a priority on many governments' agendas and although there is a general

acknowledgement that green spaces encourage physical activity, the relationship between accessibility and health outcomes still needs further investigation. There are many areas of policy reform that could help increase the uptake of green exercise, though it is clear that there is a need for more detailed and comprehensive economic analyses to indicate exactly what benefits green exercise can bring to the whole economy. Participating in green exercise seems to be a more sustainable option in maintaining long-term activity levels. It is the interaction with the environment and the social contact that are the main incentives and the health benefits derived from the exercise are often secondary outcomes. Thus, competently managed, high-quality, accessible green spaces are essential for long-term sustainability and healthy communities. Green spaces offer collective benefits, but full economic costings need to be conducted. These would highlight the potential savings for national health systems and add further credence to the argument, attract national interest and set objectives for policy development.

In affluent countries, people have become more stressed, are more likely to experience mental ill health, are at higher risk of developing non-communicable diseases, and are less active and more sedentary. Green exercise offers one way of addressing these emerging health problems successfully, quickly and cost-effectively. This book offers some potential solutions. It contains diverse international evidence from around the world on the health benefits of green exercise and nature-based interventions. The type of nature, activities, cultures and individuals may all vary but the message is universal and clear: green exercise benefits individual health and wellbeing, increases knowledge and care for natural environments, and provides a policy link between health and the environment.