

Healthy Parks Healthy People: the state of the evidence 2015

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*Healthy Parks
Healthy People®*



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Healthy Parks Healthy People: the state of the evidence 2015

Executive Summary

Nature's goods and services are the ultimate foundations of life and health. A key mechanism for accessing the health benefits of nature is through parks.

This report has reviewed the post-2008 literature in relation to the health benefits of parks and natural spaces. Findings suggest that access to safe, high quality green space benefits individuals across every stage of the lifespan, enhancing their physical, mental, social and spiritual health and wellbeing. Accessing parks and green spaces may be particularly beneficial for specific community groups, including Indigenous Australians, those from CALD communities and people with disabilities.

Overall, the evidence connecting parks and health is substantial, offering strong justification for the promotion of, and investment in, parks as settings that enhance the health and wellbeing of community members across their lifespan.

The current state of evidence constitutes a solid knowledge foundation but, with some areas in need of further exploration, supports ongoing targeted research into the connections between nature and health in order to ensure the optimal benefits of parks for human health and wellbeing continue to be realised.

Key Findings

- Access and proximity to safe high quality parks results in both increased physical activity levels and improved health outcomes;
- Access and proximity to safe high quality parks improves mental health;
- In urban areas, parks foster social connections which are vital to community cohesion and contribute to social wellbeing;
- Contact with nature through parks can enhance spiritual health (meaning in life) which underpins all other aspects of health;
- For children, accessible and safe parks foster active play, which is associated with physical, cognitive and social benefits;
- For adolescents, parks improve mental and social health during what is often a tumultuous time of life;
- Park use is linked to physical and psychological health benefits among adults, especially older adults;
- Indigenous peoples are particularly sympathetic to and reliant on contact with nature for their physical, mental, social and spiritual health and this can be offered through parks;
- The potential health benefits of parks may be diminished through barriers to park use such as crime and safety concerns, injury risk, disabilities, gender-related concerns, social and/or cultural norms, proximity/accessibility, weather and pollution;
- Particular community groups, including those from culturally and linguistically diverse (CALD) backgrounds, face additional barriers to park use, including lack of awareness/information about parks and difficulties with accessing transportation; and
- The potential for improving health through use of parks can be enhanced through the promotion of the benefits of nature by park managers, researchers and policy makers, as well as designing spaces in parks that are readily accessible and inclusive, and that encourage visitation by accounting for diverse users' motivations and needs.

Glossary of Key Terms

Adolescents – individuals aged 11-18 years.

Adults – individuals aged 18-60 years, older adults are aged 60+ years.

At risk communities – refers to people at risk of major health diseases, poverty, or other forms of marginalisation.

Children – individuals aged 2-11 years.

Body Mass Index (BMI) – an indicator of body fat calculated by dividing a person's weight (kilograms) by height (metres squared). BMI is commonly used as a method of screening for weight problems (i.e. overweight and obesity) that may lead to health complications (1).

Diverse communities – refers to Culturally and Linguistically Diverse (CALD) communities and people with a disability.

Health: “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (2).

Mental health - is a state of emotional and social wellbeing. It influences how an individual copes with the normal stresses of life and whether he or she can achieve his or her potential. Mental health describes the capacity of individuals and groups to interact, inclusively and equitably with one another and with their environment, in ways that promote subjective wellbeing and optimise opportunities for development and use of mental abilities (3).

Nature - is defined broadly to include not only parks but the wider outdoor context - ‘features of the biophysical environment’ (4).

Parks/open space, green space – for the purposes of this report, we use the terms parks/open space and green space interchangeably. We define these terms as including: *protected areas*, in which the primary objective is to conserve nature or heritage; *regional parks and open space or green space*, which may have multiple objectives for conservation, recreation, cultural and landscape protection, and which may include linear trails; and *local or neighbourhood open space* which can range from small local urban parks and community gardens to civic open space.

‘High quality’ parks are accessible, comfortable and safe. These spaces are well maintained and provide adequate facilities, including lighting, amenities, paths, shelter and seating. High quality parks offer the opportunity for nature contact but also encourage a variety of other activities (i.e. exercise, play and social interaction) (5, 6).

Physical health - is critical for overall wellbeing and is the most visible of the various dimensions of health and includes: *physical activity, nutrition and diet, medical self-care and rest and sleep* (7).

Social health - refers to the dimension of wellbeing that relates to “the quantity and quality of an individual's relationships, social connections and support networks” (8).

Spiritual health - there are four domains of spiritual health: the personal, the communal, the environmental and the transcendental (9). This term recognises that spirituality is closely linked to connectedness to nature and that this link explains the benefits of nature contact for psychological health (10).

Wellbeing - “a valid population outcome measure beyond morbidity, mortality, and economic status that tells us how people perceive their life is going from their own perspective”(11).

Also note, in the context of this report, monetary values are reported in Australian dollars (\$AUD) unless otherwise specified.



1. Introduction

Everybody needs beauty as well as bread, places to play in and pray in, where Nature may heal and cheer and give strength to body and soul alike – Muir (1912) (12).

Nature's goods and services are the ultimate foundations of life and health. The quality of the air we breathe, the water we drink, the food we eat and many other features of the natural environment play a significant role in human health outcomes. According to the World Health Organization (13, 14), approximately one-quarter of the global disease burden and over 80 per cent of the diseases and injuries they monitor are affected by modifiable environmental factors. Such factors relate primarily to *environmental degradation*.

However, evidence is accumulating to confirm that humans are dependent on nature not only for their material needs, but also for their psychological, emotional and spiritual needs. Over the past three decades, a growing body of research has demonstrated that *environmental deprivation* also plays a key role in undermining human health.

The focus of this document is on the connections between time spent in nature, primarily through parks, and human health and wellbeing. This report provides an update on the state of the evidence, building on two previous *Healthy Parks, Healthy People* literature reviews, published in 2002 and 2008 (15). Being an update, this document reports primarily on post-2008 research and publishing. For those wishing to access the 2008 report, this can be found at http://parkweb.vic.gov.au/__data/assets/pdf_file/0018/313821/HPHP-deakin-literature-review.pdf.

While this report has been commissioned by Parks Victoria, and therefore has evidence and practice relating to the Victorian context as an important focus, it also draws on a wide range of national and international research and publishing. Accordingly, while the findings have specific relevance to the parks and health sectors in Victoria, they are also of relevance more widely (both in terms of their geographic applicability and their disciplinary applicability).

Recognising that there are many dimensions to human health, including physical, psychological, social, emotional and spiritual aspects, the definition of 'health' used as the basis for this report is inclusive. It is based on the World Health Organization's definition of health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" (2). It therefore includes the concept of 'wellbeing', which is defined by the US Centers for Disease Control and Prevention as "a valid population outcome measure beyond morbidity, mortality, and economic status that tells us how people perceive their life is going from their own perspective" (11).

It is instructive that Furnass links wellbeing with nature contact by noting that the components of wellbeing are: satisfactory human relationships, meaningful occupation, opportunities for contact with

nature, creative expression, and making a positive contribution to human society (16). Just as there are variations in definitions of health, so too is 'nature' a contested term. For the purposes of this report, the term 'nature' is defined broadly to include not only parks but the wider outdoor context - 'features of the biophysical environment' (4). Contact with nature, therefore, may be gained through a range of settings including parks, gardens, so-called 'green spaces' as well as waterways, bushland and a range of other natural and/or cultivated environments.

In previous editions of the *Healthy Parks, Healthy People* literature reviews, nature has also included contact with animals and gardening. However, in this edition, due to time and resource constraints and in the interests of conciseness, animals and gardening are only referred to where there are obvious links to parks and public open spaces (for example, pet walking in parks and community gardens in public open spaces).

1.1 About this report

This document draws on a review of recent (primarily post-2008) literature to report on the current state of the evidence for *Healthy Parks, Healthy People*. Highlighting key contextual changes impacting on people's use of parks, the report goes on to present a summary of the evidence on the benefits of nature contact through parks for physical, mental, social and spiritual health. For each of these dimensions of health, an overview of the links between nature contact and specific health benefits is provided. This is followed by a presentation of the benefits for particular groups: children, adolescents and adults (including adults from diverse cultural backgrounds and those with specific needs) and a discussion of the implications of the findings for research, policy and practice.

1.1.1 Parks and green space

Parks and green spaces vary enormously in their size, purpose, user catchments and management strategies. There are three broad types of parks:

- (i) Protected Areas, in which the primary objective is to conserve nature or heritage, while providing opportunities for sustainable visitor use. The International Union for Conservation of Nature (IUCN) has classified protected areas into six different categories based on their management objectives (17). These include national parks, wilderness areas, species management areas and protected land and seascapes.
- (ii) Regional parks and open space, which may have multiple objectives for conservation, recreation, cultural and landscape protection, and which include linear trails and regional scale green space.
- (iii) Local or neighbourhood open space, ranging from small local urban parks and gardens to outdoor sports facilities, civic open space and private amenity areas.

Management of parks and green space in Australia occurs within a nested framework of treaties, conventions, legislation, policies, strategies and codes of practice set at international, national, state and local levels.

1.2 The Current Context

Since the earlier reports of 2002 and 2008, much work has been undertaken internationally to identify connections between human health and wellbeing and nature contact. For instance, the Secretariat of the Convention on Biological Diversity and the World Health Organization recently (in 2015) published a review of the state of knowledge in relation to the links between biodiversity and its benefits to human health (18). It is now accepted that access to natural green space not only increases levels of physical activity (and thus reduces the risk of non-communicable diseases and improves immune function) but also has the potential to provide mental health benefits and facilitate social connectedness and independence (18).

The growth in this area of research has not only resulted in a higher number of publications but also increased the 'Impact Factor' of journals linking nature and health (which is calculated on the basis of frequency of citation of papers published). More than 600 additional documents, including peer-reviewed articles and research reports, have therefore been identified and incorporated into this 3rd Edition.

1.3 Key theories and frameworks for understanding the human health and nature links

In order to realise the potential benefits to human health and wellbeing to be gained from interacting with nature, it is important to understand how and why humans relate to nature. This section therefore briefly examines key theories and frameworks for exploring the connections between humans and nature. Further information regarding human-nature theories can be located in Appendix 1: Relevant human-nature theories.

1.3.1 Relevant human-nature theories

1.3.1.1 Biophilia

The Biophilia Hypothesis is based on the assertion that early in human history there was an evolutionary advantage in knowing about the natural world, particularly information concerning plants and animals, and that this knowledge contributed to survival (19). Advocates of biophilia therefore believe that humans continue to rely intellectually, emotionally, physically, and spiritually on our affiliations with nature (19-22).

1.3.1.2 Attention Restoration Theory

The Kaplans' 'Attention Restoration Theory' (ART) considers the restorative importance of natural environments for effective human functioning and wellbeing. The notion that natural environments provide restorative settings for people has long been held, with the famous American urban planner Frederick Law Olmsted quoted by Kaplan as stating in 1865 that natural scenery "employs the mind without fatigue and yet exercises it; tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system" (23).

1.3.1.3 Stress Reduction Theory

Similar to ART, 'Stress Reduction Theory' (SRT) is based on human responses to the natural environment and proposes that natural settings containing plants, water and other features, such as views of the sky, a lake or sea, have calming characteristics and are most likely to reduce stress in humans (24). According to SRT, to cope with the demands of the modern urbanised world, humans must be able to grasp the messages of nature, often in a minimal amount of time. Grahn and Stigsdotter suggest that this results in a message of safety which means "the whole body can relax and recover from stress" (25).

1.3.1.4 Place-based theories

In addition to reducing stress, natural environments may be beneficial for people's spiritual and mental health, as they can provide a mechanism for people to develop strong connections. Several place-based theories have been developed to describe the deep spiritual connections people have for particular natural places. For example, 'Eco-spirituality' is a term coined to describe humans' connection or relationship to nature. Lincoln defines eco-spirituality as "occurring when ecology and spirituality unite in a common cause and there is a spiritual connection between humans and the environment" (26).

'Sense of place' is another relevant place-based theory which recognises the spiritual connection indigenous (and non-indigenous) people have with their Country or 'place' and is defined as a long-lasting emotional attachment or positive connection between a person and a location(27, 28). Kamitsis and Francis concluded that spirituality could be an important aspect of people's 'sense of place' with nature and may have flow-on benefits for their spiritual health and wellbeing (10).

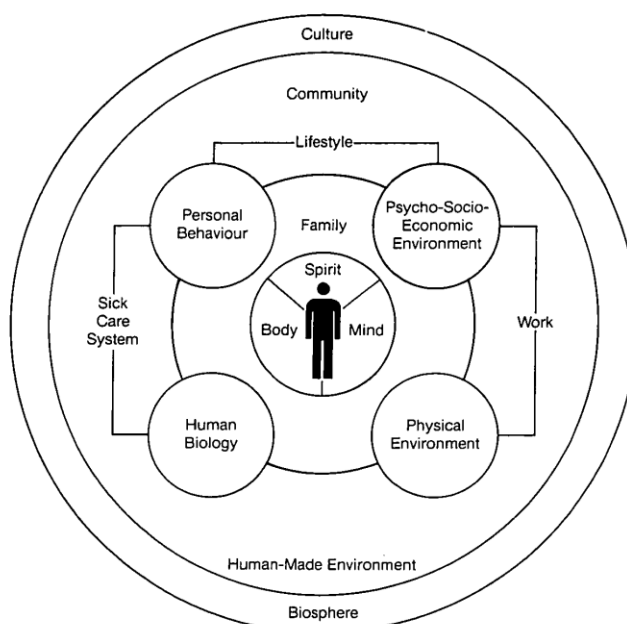
1.3.2 Health-based frameworks

Over the past three to four decades, a number of health-based frameworks have emerged to assist in the identification of the determinants of health and the development of policies and actions to address health differentials. A number of these include reference to environmental factors as health determinants.

1.3.2.1 The Mandala of Health

In 1985, Hancock drew on work undertaken by the City of Toronto Department of Health to present an ecological model of human health which could "clarify the interaction of culture with environment within the context of the holistic, interactive, and hierarchic nature of health" (29). The model is depicted in Figure 1.

Figure 1: Mandala of Health



Source: Hancock T. The mandala of health: a model of the human ecosystem. Family & Community Health. 1985;8(3):1-10.

While the diagram may appear to present in a relatively clear and simple way the “complex, interactive and hierarchic” determinants of human health (29), Hancock goes on to nullify any perception of the simplicity of the task of addressing health ecologically:

The human ecology approach to health problems, to the identification of those at high risk, and to the means of helping those at high risk, inevitably must confront the social and political nature of health at the personal, community, and societal level. This should not come as a surprise. Even in viewing the science of ecology itself (in the usual biologic sense of the word), Sears saw it as a potentially subversive science and wondered whether “if taken seriously as an instrument of the long-run welfare of mankind would it endanger the assumptions and practices accepted by modern societies, whatever their doctrinal commitments”.

1.3.2.2 Ottawa Charter for Health Promotion

Perhaps the most famous and the most relevant framework in relation to environmental determinants of health is the Ottawa Charter for Health Promotion, developed at the First International Conference on Health Promotion, held in Ottawa, Canada in 1986 (30). The Charter notes that a stable ecosystem is fundamental to human health. Setting out five action areas— Build Healthy Public Policy, Create Supportive Environments, Strengthen Community Actions, Develop Personal Skills and Reorient Health Services— the Charter highlights “the inextricable links between people and their environment constitutes the basis for a socio-ecological approach to health. It goes on to note that *“The protection of the natural and built environments and the conservation of natural resources must be addressed in any health promotion strategy”* (30).

1.3.2.3 Social Determinants of Health

Another key framework within the health sector over recent years has been the ‘Social Determinants of Health’ (SDH). This framework has been used to address the “need and demand for clear scientific evidence to inform and support the health policy-making process” (31). The framework recognises that “however important individual genetic susceptibilities to disease may be, the common causes of the ill health that affects populations are environmental” (31). However, while the framework addresses a broad range of factors in the social environment that impact on human health and wellbeing, its purely social focus necessarily excludes key environmental determinants of health, which potentially interact with these social factors to impact significantly on population health.

1.3.2.4 Bangkok Charter for Health Promotion

In 2005, participants of the 6th Global Conference on Health Promotion, Bangkok, Thailand produced a ‘Charter’, noting some significant changes affecting health:

- increasing inequalities within and between countries;
- new patterns of consumption and communication;
- commercialisation;
- global environmental change; and
- urbanisation.

Among other actions, the Charter recognised the need for cross-sectoral action to address “global health impacts, such as those associated with global environmental change” (32).

1.3.3 Environment-based frameworks

In the context of nature and health, over the past decade, a significant body of work has been undertaken internationally to explore the connection between human wellbeing and ecosystem health. The Millennium Ecosystem Assessment project between 2001 and 2005 (<http://www.millenniumassessment.org>) assessed the consequences of ecosystem change for human wellbeing to provide a comprehensive scientific appraisal of the condition and trends in the world's ecosystems and the services they provide. Flowing from this signature project, much work has since been undertaken to develop frameworks based on 'ecosystem services' (the human benefits derived from ecosystems). Under these common frameworks, health benefits arising from ecosystems are classified as "Cultural Services". Other relevant ecosystem services include spiritual and cultural connection and recreation.

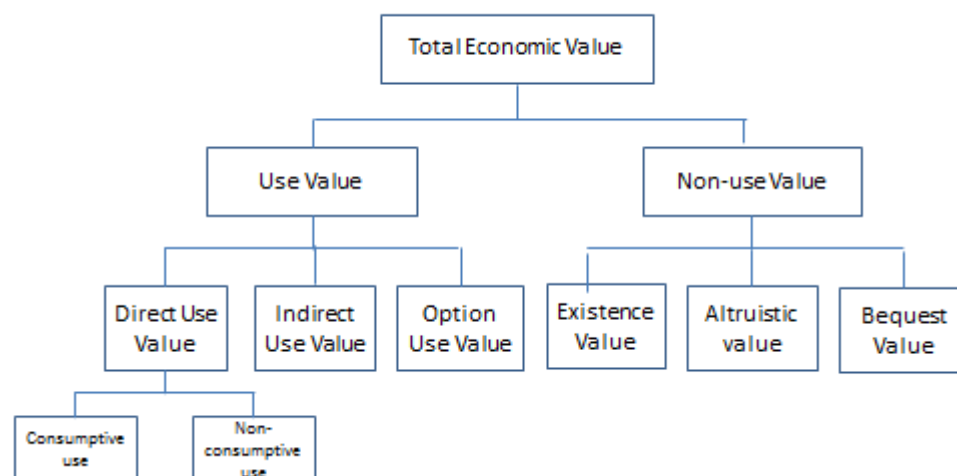
Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)

Established in April 2012 in response to the need for "scientifically credible and independent information that takes into account the complex relationships between biodiversity, ecosystem services, and people" (33), IPBES is an independent intergovernmental body open to all member countries of the United Nations. "The platform's aim is to enable decision makers to make well-informed decisions that could halt biodiversity loss, and thus promote human wellbeing and sustainable development through the sustainable use of biodiversity" (34). It "provides a mechanism recognised by both the scientific and policy communities to synthesise, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organisations, non-governmental organisations and indigenous communities" (33).

A number of ecosystem-service based frameworks seek to formally capture, organise and account for the quantity of ecosystem services and benefits generated, either in monetary or non-monetary measures.

Some ecosystem-service based frameworks such as The Economics of Ecosystems and Biodiversity (TEEB) framework and SEEA were developed to understand, recognise and account for the economic benefits of ecosystem services and to provide tools that enable proper account to be taken of this value in economic decision making. There is some controversy about this approach, whereby some are concerned that placing a monetary value on ecosystem services can potentially turn nature into a commodity (35), resulting in "potentially counterproductive effects for biodiversity conservation and equity of access to ecosystem services benefits" (36). However, it should be noted that the Total Economic Framework developed and used internationally for valuation of economic benefits provides a useful framework for valuation of *both* monetary and non-monetary benefits (refer Figure 2). This includes many of the non-use benefits of ecosystems such as existence value and altruistic value.

Figure 2: Total Economic Framework



1.3.4 Key drivers of change

A number of other drivers have been identified as affecting (either positively, negatively or both) the realisation of the health benefits of contact with nature. These include: urbanisation (including planning-related issues); technological developments; environmental degradation (including climate change); changing social norms (including risk perception); economic conditions; and trends in park management. As is evident in the discussion below, while these contextual issues can be separately identified, they do not operate without reference to each other.

Urbanisation (incl. planning-related issues)

Projections of a rapid growth in Australia's population over the next 35 years and the reality of recent urban growth, with Melbourne growing faster than any other Australian capital city in 2012-2013, have resulted in the adoption of a range of measures to contain urban growth and protect green-field sites on the urban fringes (37). These measures have variously been labelled "urban footprints, growth management boundaries, urban consolidation" (38). As Queensland-based research has shown, "the 'density imperative' presented by these collective urban policies affects the sourcing, provision and management of open space in inner-city locales" (38).

Technological developments

Modern technology brings many benefits to society, including the potential for enhanced global communication; new medical interventions; improved access to information (including health information) (39); and adaptive mechanisms which assist people who experience disabilities and opportunities for enhanced citizen participation and empowerment (40). However, there is also growing evidence that modern technology is associated with the potential for "cyber-based overload", resulting in increased stress (41), diminishing time spent outdoors (42), especially among children (39), as well as reduced levels of physical activity (43).

In 2012-13, 83 per cent of Australia's population over the age of 15 years was classified as internet users while, specifically for the 15-17 year age group, the rate was 97 per cent (44). Home internet access increased from 16 per cent of households in 1998 to 72 per cent of households in 2008-09. The extent of mobile phone usage is underlined by the fact that almost one-third of children aged 5-14 had their own mobile phones in 2009 (45).

Technology has been shown to have both substitution and complementary impacts. For example, while for some people digital and labour saving technologies may act as a substitute for engaging with outdoor environments (46), for others the technology may actually encourage such engagement and enhance the experience (47, 48).

Environmental degradation and climate change

With continuing economic and population growth, our natural capital, including the stocks of biodiversity, soil water and clean air, are declining. Climate change predictions of at least a two degree average rise in temperature are likely to have significant impacts on human health (49-51). Predictions of increased heat waves and droughts, increased extreme events and sea level rises (52) will significantly influence the patterns of outdoor recreation. A strategic risk assessment by Parks Victoria in 2010 outlined a wide range of potential effects on biodiversity, visitor use and other park values (53).

Changing social norms (including risk perception)

Change has become the norm in Australian society over recent decades. As Hayes notes "there is hardly any aspect of family life that has not changed in one way or another (54). Relationship patterns, fertility, gender roles, relationship breakdown, the work and family interface, and the growth of particular family types are but a few of the major changes to families that we have seen in recent decades" (54).

One prime example is the way in which, during the last half century, children's independent access across urban environments in Australia has declined significantly (55). Social commentator Hugh Mackay suggested that behind this constraining of children's independent mobility is a broad communal anxiety underpinned by rapid social and technological change (56). This anxiety plays out as extreme risk aversion, with parents, schools and local councils attempting to protect children and the community at large from activities perceived to include any risk of harm. The resultant lack of development of skills in risk assessment, and the potential flow-on effects of that deficit, are overlooked in favour of peace of mind and protection from legal and financial culpability (56, 57).

Economic conditions

Whereas in 1983 the predominant pattern of employment in couple families was one full-time worker (true in almost half of all families), by 2010 the proportion of couple families in this situation had declined to 30 per cent, with households with both a full-time and a part-time worker reaching 36 per cent (58).

In 2012, the Secretary to the Australian Government Treasury Martin Parkinson referred to "four big drivers of change sweeping across our economic landscape" (59). In addition to the potential for technological developments to have significant implications "for business, for individuals, and for governments", Parkinson identified three other key issues. The first of these— the economic developments occurring in China and India— may be more of a global issue but will nonetheless have impacts locally, particularly as Parkinson notes the projected 3.2 billion middle class people in the Asia-Pacific region by

2030 “will want better services, goods and experiences”. The second key driver is population ageing, given “the proportion of Australians aged over 65 projected to rise from 13.5 per cent in 2012 to almost one quarter by 2050”. As well as posing challenges fiscally, this will increase demand in the areas of health, aged care and disability. Parkinson observes that the third key challenge is environmental sustainability, including water and climate change but also encompassing “the range of pressures affecting our natural and built environments”. According to Parkinson, “all of these trends present both challenges and opportunities”(59).



This report is based on a substantial review of the current Australian and international ‘parks/nature and health’ literature published post-2008 (when the *Healthy Parks, Healthy People* 2nd edition was published). The data is therefore secondary (combination of quantitative, qualitative and mixed methods research) and was obtained through a search process using on-line databases and internet search engines, scanning reference lists of key articles as well as consultation with people known to have relevant expertise and knowledge (60). Further detail on the search strategy can be located in Appendix 2: Methodology.

A total of 663 articles were placed into the following major categories:

- Physical Health (including obesity)
- Mental Health (including emotional health/wellbeing)
- Social Health (including social values, social capital)
- Spiritual Health (including place attachment)

Reviewing all of this research is beyond the scope of this document and therefore a selection of the most-relevant articles has been chosen for review in Section 3. The additional sources are listed in **Appendix 3: Bibliography**.



From the literature identified through the process outlined above, it is apparent that the quantification of the health benefits of contact with nature through parks and other open spaces is increasing. At the same time, qualitative evidence is illustrating the underlying ways in which people value parks. Taken together, the growing quantitative and qualitative evidence base is testament to the increasing recognition, both internationally and locally and across disciplines and sectors, of the importance of parks to human health and wellbeing.

This section presents the evidence using the following broad and ultimately interlinked themes:

- Benefits for physical health
- Benefits for mental health (including resilience)
- Benefits for social (including social capital, connectedness, equality)
- Benefits for spiritual health.

2.1 The importance of parks for physical health

Key messages:

Parks and physical health:

- Physical inactivity and stress are key factors undermining human health
- Parks and green spaces have been shown to promote physical activity and decrease stress

Parks, physical health and children:

- Outdoor play promotes children's physical and cognitive development and their ability to assess risk
- Children's physical activity is decreasing due to greater use of technology and changes in parents' expectations and concerns about safety
- Physical activity patterns and benefits in childhood track through to adulthood

Parks, physical health and adolescents:

- Adolescents are more likely than any other population group to achieve adequate physical activity levels
- Neighbourhood walkability and safety are key factors influencing adolescents' physical activity
- Schools play a key role in engaging adolescents in outdoor settings

Parks, physical health and adults:

- 60 per cent of Australian adults do less than 30 minutes of physical activity per day
- Perceived lack of safety and traffic issues may inhibit park accessibility for adults
- Cultural differences, low socio-economic status, disability and gender have all been shown to impact on park use and thus on health.
- Adults living closer to parks are likely to have a lower BMI than adults who live further away

2.1.1 Overview

The health benefits of undertaking physical activity, and the adverse consequences of adopting a sedentary lifestyle are well established. A report by Richardson and Parker based on a review of the evidence relating physical activity, green space and health, noted that there are "sufficient robust research programmes and evidence led reviews to conclude that access to safe high quality green space is beneficial to both health and physical activity levels" (61). Despite this evidence, in Australia only one-third of children, and one in ten young people undertake the recommended 60 minutes of physical activity every day. Alarming, 60 per cent of Australian adults do less than 30 minutes of physical activity per day and only 1 in 10 adults report completing the recommended 10,000 steps per day (62). Significant physical, social and economic consequences arise from insufficient physical activity and are compounded

by increasing urban population growth and infrastructure density (63, 64). Given the evidence that parks foster physical activity (65-70), from a public health perspective, exposure to natural green spaces, particularly those that are easy to access and have no or low costs, has the potential for a significant buffering effect on physical health status, especially compared with many indoor physical activities.

A further benefit of parks for physical health relates to their contribution to immune system functioning. In a systematic review of the literature on the health benefits of exposure to natural environments, Bowler and colleagues (71) noted Japanese research by Tsunetsugu and colleagues and by Li and colleagues which highlighted immunological benefits from walking in forest environments.

Just as physical activity/inactivity plays a key role in physical health, so too stress is known to significantly contribute to the onset of preventable physical conditions such as cardiovascular disease, stroke, high blood pressure, diabetes and a number of cancers. The quality, quantity and accessibility of green spaces has been shown to have a significant relationship to stress among populations, especially in urban areas (72, 73). Accordingly, increasing interest is evident in the stress reduction potential of nature exposure in various forms (74-79), especially for individuals requiring physical recovery (hospital/rehab) and those in high-risk categories for compromised health, and for disadvantaged communities. Given the considerable contribution of prolonged feelings of stress to the onset of chronic disease (particularly stresses associated with urbanization), the stress reduction capacity of accessible green spaces should not be underestimated (80, 81).

2.1.2 Parks, physical health and children

Guidelines suggest that each day children should accumulate at least 60 minutes of physical activity to provide them with important physical, mental, and social health benefits (e.g. Salmon & Timperio, 2007; World Health Organization, 2009). Despite this, physical activity levels are decreasing among children in countries around the world, due to social and environmental changes (e.g. Godbey, 1997; Thompson, Rehman & Humbert, 2005).

Recent evidence related to children and physical activity highlights that children are spending significantly less time outdoors than they would have in previous generations, with substantial decreases in unstructured outdoor play (47, 82-84). Yet evidence exists showing that such play is important in the physical health and cognitive development of children (85-89). Children afforded opportunities to engage in unstructured play in a natural outdoor space are observed to engage in 'richer imaginative play; increased physical activity; calmer, more focused play; and positive social interaction' (90). Research into active play has emerged in the last decade and gained considerable momentum, with the emergence of the notion of children suffering from 'Nature Deficit Disorder' (91). The reality is that the long term consequences of children's widespread absence from parks and green spaces are yet to be realised (92).

As more literature emerges on active play, researchers are developing a clearer picture of the plethora of physical, cognitive and social benefits for children, and conversely the potential for serious long term consequences potentially linked to chronic disease for children not afforded the opportunity to experience daily active play. US researchers Kimbro and colleagues explored the relationship between time spent outdoors, time spent watching television and Body Mass Index (BMI) – a standard measure of overweight and obesity (93). They found that "Hours of outdoor play were negatively associated with BMI, and hours of television were positively associated with BMI" (93). In the absence of unstructured outdoor play (whether due to lack of opportunity or concerns about safety), structured outdoor experiences as part of educational programs have been shown to have significant health benefits for children (94-96).

One factor influencing the level of outdoor play may be the accessibility of parks. Research has shown that having access to parks encourages simple and complex movements (climbing and jumping) that use large muscle groups in comparison with movements associated with sedentary or even a large proportion of indoor activities (66). Children with access to natural green spaces receive greater physiological benefits than those that play indoors (97). Children with access to parks are less likely to be overweight or obese than children without access to parks (98, 99). Other reported benefits include better eyesight (100).

Moreover, the benefits of childhood physical activity are not time limited. Research has shown that being afforded opportunities to learn, live and play in natural green spaces (for example, in national parks via camping and trail walking and by utilizing local parks) is positively associated with levels of cardiovascular health not only in children but in later years (101). However, both the accessibility and quality of parks varies. In Melbourne, Australia, Crawford et al. found that green spaces in poorer neighbourhoods had fewer amenities to support physical activity amongst children (102).

The increasing preoccupation with the use of technology and associated sedentary behaviours is also linked to increased time spent indoors. Australian children (defined as up to 12 years old) can spend two or more hours per day on screen based activity, particularly if they have easy access to screen based media, for example in their bedroom (62). Sometimes the indoor prevalence is associated with parents or caregivers who are often time poor and conscious of safety (103). This view is supported by evidence that children who spend time with a parent after school are more likely to be passively supervised and to play inside, whereas children who spend time with siblings or other children are more likely to undertake vigorous physical activity outdoors (104). An absence of outdoor play is especially noted in CALD, disadvantaged and (somewhat surprisingly) rural communities, where children are considered high risk for the non-use of parks and lack of easy access to public play spaces.

Complex reasons underpin decreases in children's time spent outdoors, as Staempfili noted:

Reasons for these changes are diverse and multilayered, rooted in ever-evolving sets of social and parental expectations and the children's needs for entertainment and self-expression. Parents are struggling with competing, rational, and emotive judgments (personal and social in nature) about positive and negative risks associated with outdoor play (82).

Where there is a noted absence of safe, clean outdoor areas, parents are likely to view the home as a controlled space that is clean and safe (105). Variables such as 'on foot' accessibility, levels of crime, perceptions of safety, cultural norms and attitudes towards outdoor physical activity and park use are of particular interest to the health promotion advocates investigating children's time spent in public greens spaces (106). Implicit in the notion of accessibility 'on foot' is the understanding that children who live closer to parks are likely to access them more frequently than those children that live further away (98, 107). In addition to the obvious potential for increased accessibility to parks to foster outdoor play, access to safe, public parks that results in frequent use is also likely to result in less stress for children in CALD/low socioeconomic areas (108) and to increase the likelihood of selecting active transport as a method of accessing local green spaces (109).

There are also important flow-on effects of childhood access to parks. Active travel choices in adolescence and adulthood may result from the formation of healthy habits from an early age (98, 110). Similarly, childhood experiences are likely to influence later attitudes towards the environment. In a study by Cheng and Monroe, children's connection to nature, their previous experience in nature, their perceived family value toward nature, and their perceived control was found to positively influence their interest in performing environmentally friendly behaviours (111).

2.1.3 Parks, physical health and adolescents

Adolescents are the most likely of all Australians to be sufficiently active, with data showing 53 per cent of 18-24 year olds meet physical activity guidelines (62). In this age group, a large portion of the international literature regarding adolescents' use of parks focuses on social and mental health benefits and recognizes that the relationship between adolescents and accessing available green spaces is complex (112). There is also recognition that adolescents' needs differ from adults (113).

Research directed at adolescent park use is largely concerned with adolescents' perceptions of park spaces and attitudes towards park use (114, 115), recognising that, although adolescents report enjoying nature, they may not always get the opportunity to be engaged (116). 'Fun' is an engaging factor reported by young people who undertake programs in parks that are far away from their local area (116, 117). However, for some groups of young people, lack of availability of transport may limit their opportunity to access such settings.

Wood and colleagues noted that while access to parks provides opportunity for physical activity by young people (and indeed the population at large), the realisation of this potential is enhanced by outdoor activity programs which actively engage the young people in the outdoor environment (118). Sadly, perceptions about access remain a major issue (119). The health-related benefits of safe accessible spaces that allow adolescents to access local parks (via foot or bicycle) unaccompanied by an adult cannot be understated (120). Active transport (walking to and from the park) is viewed as an 'additional source of physical activity' that again is health-enhancing (121). Environment permitting, active transport behaviours are developed in childhood and continued in adolescence and adulthood (refer Section 2.1.2 above).

Authors examining youth attendance at parks show particular interest in 'at risk' adolescents. This includes, but is not limited to, adolescents from CALD communities, those with additional physical needs or those undergoing facilitated nature therapy programs, either in school groups or as part of an alternative therapy modality (refer Section 2.2.3).

Access to safe and appealing parks, particularly with facilities seen by adolescents as desirable (e.g. basketball courts, skate ramps), has provided a physical outlet for young adults from CALD communities. Park use by CALD communities can reverse perceptions of vulnerability and social exclusion (refer Section 2.3.3) (122, 123). Adolescents and young adults who spend more time in nature report greater engagement in learning and feelings of wellness. Overall, park use by youth offers significant facilitators of health during often-tumultuous times in their lives (85, 123). The implications of 'missing out' on venues for fun and physical activity are reflected by increases in anti-social behaviours, violence, crime and unemployment in adolescents (118, 124).

Access to parks may be the only opportunity for some adolescents to passively experience nature (98). Adolescents are likely to benefit from the restorative aspects of nature, including decreased tension, anger and depression when undertaking physical activity or other recreational or leisure activities if in outdoor green spaces compared with indoor spaces (125). However, fear of crime or violence is a significant deterrent from attending parks in some adolescent groups (123, 124, 126).

In some cases, safe outdoor spaces may only occur in a school or university setting, and so these institutions are considered key venues for providing settings in which recreation might occur (127). However, while the role of schools in engaging young people in physical activity in outdoor settings is widely recognized, empirical research related to the impacts of outdoor education on levels of physical activity is largely absent (128, 129). Nevertheless, schools remain important facilitators for both children

and adolescents' development of relationships with nature. Schools can be viewed as either key driving variables or constraints, depending on the opportunities afforded. Exposure to nature in school is a popular research topic (100, 130-133) now that the fundamental role of nature in our lives has been established and the detrimental effects of deprivation (i.e. allergies) are emerging.

2.1.4 Parks, physical health and adults

Research evidence indicates clear links between the proximity of parks and the physical health of adult populations (134). For example, men residing in areas with greater green spaces have lower risks of mortality from cardiovascular and respiratory diseases (135), while adults in urban environments who live closer to parks are likely to have a lower BMI than adults who live further away (136, 137). An Australian study found that residents in neighbourhoods containing greater than 20 per cent green space were significantly more likely both to walk and to participate in moderate to vigorous physical activities (MVPAs) on at least a weekly basis (65). However, another Australian study (138) found that factors such as perceptions of safety and concerns about traffic may influence the extent of walking in public open spaces. Similar findings emerged in a US study by Cutts and colleagues (137), which found that crime rates and traffic issues influenced use of proximal park spaces.

Due to the potential for enhancement of physical wellbeing through accessing parks and public outdoor spaces, local parks and accessible wilderness areas offer a convenient and cost effective setting for health promotion. However, Macintyre and colleagues found that provision of public parks was better in more affluent areas of Glasgow, Scotland than in poorer areas (139). Other research in Scotland found that increases in levels of green space in socio-economically deprived residential areas were associated with lower levels of stress (72). Similarly, US research showed that neighbourhood quality, including the adequate provision of public recreational spaces and playgrounds, have significant impacts on overall wellbeing (140).

Australian data shows that individuals considered to be the most disadvantaged in Australia are 1.5 times less likely to be sufficiently active than people living with the least disadvantage (62). As Cutts and colleagues noted: "Local parks and walkable neighbourhoods are commonly cited as elements of the urban environment that promote physical activity and reduce obesity risk (137). When those vulnerable to obesity-related diseases live in neighbourhoods without these qualities, it works against environmental justice goals that aim for a fair distribution of amenities" (137). These findings are concerning given that deprived populations exhibit lower physical activity and residents of deprived neighbourhoods may be less active even after adjustment for personal socioeconomic circumstances (67).

Even where access is good, research shows that comfort in using outdoor spaces as a setting for physical activity varies, with increases in exposure to parks enhancing levels of comfort (141). Independent of markers of socioeconomic status such as education and income, perceptions of green outdoor spaces differ among Australians from different ethnic, cultural and religious backgrounds. The evidence from the US is similar, with Metcalf and colleagues noting: "Historically, ethnic and racial minorities have not recreated in the US outdoor recreation areas at the same rate as Caucasian (traditional users). With a growing, diverse US population, it is imperative to land agency managers that they remain relevant to this non-traditional segment of our society" (142).

Another key factor undermining the frequency with which adults access green spaces is the constraints of modern lifestyles (48, 143). Busyness, workplace time constraints and workplace cultures may all inhibit adults from accessing for themselves the restorative and physically health promoting benefits of nature

(48). Some of the flow-on effects of this business and the associated separation of adults from nature have already been noted above in Sections 2.1.2 and 2.1.3 on children and adolescents.

Research has shown that local and accessible parks and outdoor spaces can facilitate active lifestyle behaviours that are modelled to children and family members. These include choosing active transport; supporting pet ownership; promoting pro-environmental behaviour within the family; and increasing direct participation in one's own community (144). Such choices have physical health benefits but also benefits for other dimensions of health. "Indeed community members who undertake environmental volunteering report significantly higher levels of physical activity, wellbeing and lower depressive symptoms" (144).

In addition to the health benefits of green spaces for the general adult population, research has shown specific benefits for those undergoing rehabilitation or clinical treatment. Literature examining environments that promote physical rehabilitation in clinical populations recognises that exposure to natural green spaces promotes greater sense of wellness (145). Adults undergoing cancer treatment who were able to undertake rehabilitation in outdoor spaces demonstrated significant positive physiological changes, particularly related to functional wellbeing (146). Other research has shown that individuals with access to green natural spaces during recovery from cardiac surgery experienced a range of benefits including improved physical health and elevated feelings of wellness, and were also more likely to choose to regularly exercise after rehabilitation was completed (147).

Other adult population sub-groups identified in the literature include older adults, Indigenous groups, CALD groups, those experiencing disabilities and other disadvantaged populations. There is also some evidence of differences based on gender. For instance, older adults are seen as key beneficiaries of local and easy access green space inclusive of facilities such as walking trails, toilets and lighting. Such spaces provide settings for both active and passive participation, including, but not limited to, socialising or participation in community groups such as Tai Chi (148). Australian research has shown that the benefits of access to local green space are amplified for older adults (65). Proximity to natural outdoor spaces has been shown to be correlated with greater life satisfaction in older adults (149). Other research has demonstrated that those who remain physically active outdoors report decreased feelings of depression, reduced fear of falling, have greater functional independence and increased quality of life (QoL) (150).

While walking is chosen as a key mode of transport by older adults who live in safe, connected communities with easy access to amenities (151), not all older adults are afforded this opportunity. Given the importance of physical mobility in the maintenance of autonomy amongst older adults, the value of well-maintained, safe, accessible park facilities cannot be over-estimated (152-154). Even when design-based alteration of parks and public green space is not possible, or where it may not be needed, using engagement strategies can significantly change adults' perceptions of being active in parks and encourage more time spent in parks (155). For example, the provision of structured activity in local parks is a motivator for older adults to visit, walk to or share with their peers (148).

Specific studies have focused on the links between access to nature and the health and wellbeing of Indigenous populations. For example, Kingsley and colleagues have reported on research into 'caring for Country' and its impacts on Victorian Aboriginal peoples' health and wellbeing (156, 157). Other research projects in Australia (158), Canada (159) and New Zealand (160) have explored links between green spaces and Indigenous health. Typically these studies have found that connections with the land over many generations make Indigenous peoples particularly sensitive to the physical, mental, social and spiritual benefits flowing from such contact (refer especially to Section 2.4 regarding spiritual health).

In some cases, cultural or social constraints may limit or prevent 'high risk' or vulnerable groups from using green spaces for the purpose of physical activity. Sampson and Gifford, for example, noted that refugees faced difficulties in negotiating the transition to unfamiliar physical and social terrains (161). "Perceptions of the physical environment use for CALD groups has been reported less frequently" (69). Some ethnic minority groups may be more likely to attend parks in large groups but not individually, more likely to engage in sedentary behaviours, and in the context of parks, to reconfigure spaces to suit their needs (137).

Sayan and colleagues explored cultural differences in perceptions of crowding in public open spaces, and found that, in comparison with Turkish park users, British and American park users were substantially less tolerant of seeing other visitors (162). Another factor undermining the use of parks by ethnic minority groups may be lack of awareness and/or lack of information, as research on forest-based recreation by non-traditional users (typically non-Caucasian population groups) found that deficiencies in information, combined with lack of transportation, constrained participation (142). Byrne and Wolch go so far as to say that some landscapes can become racialised, resulting in issues of environmental justice for minority groups (163).

Disability is another constraint on the use of parks for physical (and other) health benefits. Research in the UK by Burns and colleagues (2013), which explored the pursuit of outdoor leisure by people experiencing disabilities, found that the combination of self-perceptions about their capacity to cope and risk management practices combined to directly and indirectly limit opportunities for people with disabilities (164). One study, finding substantial disadvantages being experienced by anglers with disabilities (when compared with anglers with no disabilities), suggested the need for proactively considering people with disabilities when designing management plans for outdoor areas (165).

2.2 The importance of parks for mental health

Key messages:

Parks and mental health:

- A number of psychological conditions are attributed to living and working in urban environments
- Parks and green spaces can have a restorative effect and increase perceptions of wellbeing
- Living in close proximity to safe green spaces significantly contributes to mental health status
- Even brief exposures to nature via local parks and green spaces can produce significant personal benefit
- Parks provide restoration and coping with life events

Parks, mental health and children:

- Increasing use of technology/urbanisation has negative consequences for children's cognitive development
- Connecting with the outdoors promotes critical thinking and cognitive abilities
- Critical thinking developed in childhood has a direct impact on life coping skills in adulthood

Parks, mental health and adolescents:

- Access to safe, useable parks facilitates greater life coping in adolescents
- Nature therapy is a complementary tool for engagement of adolescents

Parks, mental health and adults

- Exposure to parks is protective against mental illness
- Workplace stress can be significantly attenuated by spending time in parks
- Age group preferences for green spaces considered to be restorative may vary

2.2.1 Overview

Depression is currently Australia's leading non-fatal disability and its associated costs to the Australian economy, in terms of morbidity alone, are over \$14.9 billion annually (166). Forty five per cent of Australians are diagnosed with a mental health condition at some point during their life and, most alarmingly, 2000 people commit suicide in Australia each year (167).

Urban living has been identified as a key factor in stress and mental ill health (168, 169). The impact of chronic stress associated with urban living is well recognised (140, 170), with chronic stress leading to a number of conditions associated with poor mental and physical health and contributing to a reduced quality of life (171). In this context, the contribution of being in nature to promotion of healing and restoration is well documented (105, 149, 172, 173). The restorative effects of exposure to parks and

green open spaces give rise to countless personal benefits, such as recovery among individuals experiencing clinical conditions associated with anxiety and depression; chronic stress such as PTSD (75, 174); reduced attentional fatigue in employees; and attenuation of hyperactivity in younger populations (98). Additionally, benefits include evocation of positive emotions (175), reduction of sub-clinical depressive/anxious states (176) and increased feeling of individual resilience (177).

Research investigating the connection between mental health and green spaces recognises that living in close proximity to useable parks and green spaces significantly mediates individual resilience and life coping skills (73). Stigsdotter and colleagues reported '*Respondents living more than 1 km away from a green space have 1.42 higher odds of experiencing stress than do respondents living less than 300 m from a green space*' (178). Additionally, Stigsdotter and colleagues note that people may visit parks for different reasons, depending on their stress levels. These authors mention that participants who were stressed were more likely to visit local parks with the aim of restoring their mental state (178).

Studies have also demonstrated that spending time in urban green spaces can increase self-reported levels of friendliness and wellbeing and reduce scores indicative of depression or anxiety (i.e. Multiple Mood Scale Short Form, State-Trait Anxiety Inventory) (179). Among individuals diagnosed with depression, nature contact appears to improve cognition and mood (180). Connection to nature, therefore, is vital not only to disease prevention but also for positive psychological states (80, 172, 181). Stress attenuation, via feelings of connection to nature, is closely linked with favourable mental and emotional health outcomes. This is particularly true for sub-clinical populations, who report increased recovery after time spent outdoors (182).

Given the potential buffering effect of parks for mental health status (183), urban design that promotes integration of green spaces into community settings has the capacity to promote wellbeing and positive psychological status. Living in close proximity to parks and green open spaces is accepted as a significant health promoting factor and has benefits linked to subjective ratings of happiness (184, 185), better mental health status (175), and lower rates of depression and anxiety (186). Exposure to the natural sounds expected to be found in parks also enhances mood recovery (187). Although some measurement limitations are acknowledged within empirical literature, decision makers should not ignore the importance of these restorative factors (188).

2.2.2 Parks, mental health and children

The vulnerability of children, who are in the process of developing important life coping skills, often makes them the target of research examining human health and nature interaction (186). However, this research on children's interaction with nature tends to highlight the cognitive/mental health benefits rather than focusing on mental illness. Blanchet-Cohen and Elliot identified that affording children opportunities to visit parks provides engagement, fun and education and noted that children can also 'discover nature' in the form of trees, plants, animals, insects and terrain (189). Additionally, it is well established that opportunities to play in parks allow children to explore the diversity of protective factors offered by experiencing nature: capitalizing on the chance to practise reasoning, reaction, observation, logic, attentiveness, responding to the environment and people, way finding, spacio-temporal relation and task accomplishment (82, 90, 101, 190). Active play research acknowledges that, while we do not yet completely understand the consequences of nature deprivation, as urbanisation and technology use increases, access to parks in which restorative experiences may occur is critical (95, 191-193).

This need is particularly relevant for groups experiencing social or economic disadvantage (46). For example, the view that absence of safe parks and outdoor spaces directly impacts the mental health of children, is supported by evidence that highlights the particular vulnerability of children in low socioeconomic areas (194). Similarly, in CALD communities, parental perceptions of play as 'risky' are often cited alongside 'neighbourhood safety' as reasons for not accessing parks (105). The 2013 'Growing up in Australia' study reports that, where parental concern about play risk or neighbourhood safety is high, children spend an average of 21 minutes less playing outside per day (equivalent to two hours and 27 minutes less per week) (195).

Such children may miss out on vital play and development, which may reduce opportunities for developing skills, knowledge and resilience (196, 197). This may be a factor contributing to the findings of the 'Growing up in Australia' study, which reports that temperament issues in children relating to restlessness, excessive worry and destructive behaviour, are significantly higher (11-20 per cent) in the lowest socioeconomic groups compared to the highest (198).

In educational settings, affording children opportunities to learn in outdoor settings as alternative classrooms can better engage students, particularly those who are considered to have additional needs. Children with behavioural or learning disabilities report being able to focus better after spending time in natural outdoor settings (90, 119). Parks and local green spaces are therefore considered to be valuable resources for primary education (132). As Olsen states: "*Outdoor settings, not limited to school grounds or gardens, should be considered as an extension of the classroom in terms of enriched learning and development opportunities*" (199).

2.2.3 Parks, mental health and adolescents

Parks are viewed as cost efficient settings for reducing the impact of conditions associated with negative mental health status in adolescence. Adolescents who report spending time in green outdoor spaces report a greater sense of calm, focus during study, wellness and appreciation for the environment, as well as empathy towards environmental issues (85, 115).

A plethora of literature focusing on adolescents in the context of outdoor education recognises that exposure to natural outdoor settings (initiated via alternative classroom learning) promotes key skills not always associated with classroom based learning (200). Students (particularly those deemed 'underachievers' within the classroom) are reported to come into their own when engaged with outdoor learning programs (201, 202). When given the opportunity, students with learning disabilities and/or behavioural conditions are reported to benefit the most from school-based learning that incorporates the outdoors (203). Outdoor-based learning can help counteract excessive time spent indoors associated with urban living, provide adolescents with meaningful experiences that increase quality of life (204), and indirectly 'teach' students about the world (205, 206).

Literature reporting on 'outdoor interventions' as an emerging topic (129) recognises outdoor behavioural healthcare or outdoor therapy as a complimentary therapeutic approach for the treatment of mental health conditions among adolescents. Nature therapy may be an alternative to be used where adolescents have lost faith in or had negative experiences with adults in 'the system', which may occur in some at risk communities/cultures or those where a culture of engagement with mental health services is low (207). In this context, nature therapy is a complimentary add-on or alternative to traditional therapeutic methods. Positive therapeutic interventions adopting a nature-based approach have shown increases in self-esteem and feelings of hope for adolescent participants (122).

It should be noted that adolescents and adults may still have different preferences for the spaces that will elicit these benefits (119). Roe and Aspinall highlighted that, compared to adults' findings, adolescents may report greater perceptions of psychological wellbeing when visiting far away locations (i.e. national parks) compared to everyday settings (116).

2.2.4 Parks, mental health and adults

Natural outdoor spaces are a valued multidimensional resource for promotion of positive mental health and associated wellbeing (80, 172). Aside from psychological wellbeing, the effects of nature on cognitive function in adults are among the most researched psychological outcomes related to undertaking passive or active recreation outdoors. Although the psychological effects of exercise in green spaces are less clearly understood than the physical benefits, the evidence has been progressively accumulating and numerous synergies exist between the two areas (208). Louv recognises that the negative consequences of nature deficit exist for children and adults alike (95).

In urban environments, access to parks or green spaces has the potential to promote wellbeing through attention restoration and stress reduction (209). Astell-Burt and colleagues report that undertaking passive activities in parks can reduce psychological arousal via a reduction of blood pressure (209). Attention restoration increases after sitting in a park for 15 minutes may contribute to the prevention of stress related disease (77).

Work-related stress is a key factor undermining health and wellbeing (79, 210). It is often under reported and can be attributed to burn-out, adjustment disorders and psychosocial exhaustion (79, 182, 211). Research evidence indicates clear links between time spent outdoors and increased work productivity and creativity (212). de Bloom and colleagues recognise the value of being exposed to natural settings during lunch breaks, which can decrease negative mood states, and improve self reported mental health (212).

Adults' park use is known to produce greater psychological benefits than equivalent time spent indoors (141). Specifically, green natural/open space benefits are more favourable than interventions involving indoor rest or meditation, particularly for adults who spend a large proportion of their week indoors (213). Similar levels of attention restoration cannot be obtained whilst undertaking equivalent physical activity indoors (214).

Moreover, adults who exercise in local parks often report mental health benefits such as improved relaxation and stress management, improving their capacity to disconnect from work/family/daily life (212, 215). Mayer and colleagues highlight that 15 minutes of walking in a park or green natural setting can increase perceptions of coping with stressful events and improve outlook on life (216). Literature examining environments that promote physical rehabilitation in clinical populations recognises that exposure to natural green spaces compared to indoor rehabilitation interventions promotes greater sense of wellness (145). Barton and colleagues report significant differences amongst clinically depressed populations who undertook recovery programs indoors and those who used green outdoor spaces (217). Participants attending outdoor recovery programs reported increased self-esteem and more stable moods compared with those who attended group indoor exercise programs (217).

In particular, nature has been recognised as an important restorative setting for adults experiencing stress, which supports the notion that people who are stressed are more likely to select natural settings on the basis that they are able to produce restorative and stress reducing benefits (218). In recent years, literature examining the impact of outdoor therapy in military populations values the importance of

nature as being able to foster resilience at an individual and community level (219), improve trust and responsiveness (207), improve sleep and reduce negative mood states (174).

For those experiencing older adulthood, recognised as a time in which people are vulnerable, the mental health benefits of access to parks are increased compared to either adolescents or other adults (173, 209). Older adults report being prone to feelings of loneliness and isolation and, in this respect, accessible green spaces/parks are critical for strengthening notions of lasting legacy (220) and improving Quality of Life (QoL) (149, 221).

2.3 The importance of parks for social health

Key messages:

Parks and social health:

- The social health benefits of parks are not as widely documented as the physical and mental benefits
- Parks and other natural environments can support social cohesion and social capital in urban communities which is said to be declining due to modern urban planning and lifestyles

Parks, social health and children:

- Children who have opportunities to engage in outdoor play, display more pro-social behaviour, social cohesion and social responsibility
- Children who interact with parks and green spaces have enhanced sense of empowerment; self-efficacy and empathy; social skills; confidence and make cross-cultural contacts and friendships

Parks, social health and adolescents:

- Adolescents who develop a connection to nature are more likely as adults to adopt pro-environmental behaviours
- Participation in nature-based programs may enhance adolescents' social health by promoting supportive relationships, coping, self-esteem, confidence and hope

Parks, social health and adults:

- Adults who visit parks and woodlands may have reduced feelings of social isolation and increased levels of social contacts
- For older adults, parks and green spaces should be safe and easy to access in order to promote a neighbourhood sense of community

2.3.1 Overview

Developing a sense of community is vital for the social health of urban residents and can be achieved through effective social capital and social cohesion. 'Social capital' has a range of different definitions and interpretations, but is commonly defined as 'networks between people that lead to cooperation and

beneficial outcomes. Trust is also seen as central to the successful operation of these networks' (222). Social capital forms a subset of 'social cohesion' as it refers to the social structures that facilitate the actions of members within a community (223). 'Social cohesion' therefore refers to two intertwined features of communities, these are: i) the absence of latent social conflict (e.g. in the form of income inequality, racial tensions or social polarisation) and ii) the presence of strong social bonds (measured by levels of social capital i.e. trust and social norms) (223). Some authors have suggested that 'social health in city neighbourhoods may be deteriorating because modern urban planning and design has in many cases failed to adequately provide for attractive public spaces for residents to gather, interact, and develop relationships' (171). Therefore, parks and other green spaces are vital for promoting social cohesion and social capital in urban communities (224).

As highlighted in Sections 2.1 and 2.2, many benefits are derived from interacting with parks, green spaces and other natural environments. Keniger et al. suggested that 'although many types of benefits have been studied, benefits to physical health, cognitive performance and psychological wellbeing have received much more attention than the social' (63). Few authors have attempted to examine the complex socio-emotional processes that could be affected by natural environment exposure (225). Authors attempting to examine the underlying mechanisms that contribute to levels of social health attribute the gap in literature to the absence of causal relationship identification (134, 226).

Despite potential methodological limitations, a growing body of evidence indicates that parks and other natural environments can support social cohesion and social capital in communities (227). For example, in the urban context, parks are viewed as a valuable setting for the development of neighbourhood/community level social characteristics rather than just as settings for leisure or physical activity (228). Interpersonal trust, social cohesion and reciprocity are key features of social capital and are facilitated by the availability of parks (78) and quality open spaces (229). Park specific social interactions (i.e. informal communication) are recognised not only as key mediators of social health perceptions among residents but also moderators of stress through the fostering of social support (78, 171).

Furthermore, Ball et al. highlighted that women are more likely than men to be affected by a lack of community cohesion (230). They found the detriment is greater in lower income communities, with people less likely to partake in walking outdoors where community trust is low (irrespective of levels of crime). Alternatively, where residents trust one another, women were more likely to seek out community interactions and participate in outdoor leisure time physical activity (230).

Other forms of natural environments have been found to foster social health. For instance, community gardening is considered a trending topic within the nature and human health domain. Particularly within Australia, this topic has received in depth examination, as such community gardens are now recognised as 'pillars of social justice and environmental equity; they are places where people can literally seek community' (231). Likewise, pet ownership may enhance owners' social health, with pets thought to indirectly foster social capital via increasing opportunities for positive interactions between people (232, 233). Owning a pet dog may also increase owners' need for walking in outdoor spaces, independent of weather (a frequently cited deterrent for park use in adults), which has potential social (and physical) health benefits (234).

2.3.2 Parks, social health and children

Play is not only important for children's physical development (refer Section 2.1.2) but is also recognised to provide children with social health benefits. 'Adventure playgrounds', which can include community

gardens and nature interpretive centres, are very interactive and allow children to develop social responsibility (82). Furthermore, adventure playgrounds provide children with opportunities to form new friendships and to engage in social interactions with people from varying age groups and locations (82). The benefits of play are also noted in the school context as Waite, Rogers and Evans found that children who had opportunities to engage in outdoor play were able to practice pro-social behaviour and promote positive social cohesion in the classroom (235).

Other social health benefits derived from children's interaction with nature have been noted in the literature. For example, hands-on contact with nature at school has been shown to enhance students' sense of empowerment (236); sense of self-efficacy and empathy (237); social skills and confidence (238) and promotes empathy for creatures, sense of oneness and sense of responsibility amongst primary school students (111). In Switzerland, urban green areas (parks, playgrounds, forests) were found to play an important role for children's social health by allowing them to make cross-cultural contacts and friendships (239). Additionally, Asah et al. suggested that opportunities to connect, engage and experience nature in childhood may direct operational pathways into adulthood via improved participation in nature based activities, such as continuing family traditions associated with being in green spaces and participation in pro-environmental behaviour and volunteering (193).

2.3.3 Parks, social health and adolescents

Similarly to children, there is emerging research regarding adolescents' social health in terms of their development of pro-environmental behaviours. Findings recognise that adolescents who are given ample opportunity to develop their own connection to nature via home and school experiences, are more likely to associate positive memories with their outdoor/nature experiences and are therefore more likely as adults to adopt pro-environmental behaviours (193, 240). Duerden and Witt surveyed high school students that participated in an international environmental education program, which included a preparatory program (indirect nature experience), a 7 to 14 day international field workshop (direct nature experience) and a post-trip service project, as well as a comparison group of high school students who did not participate in the program (241). The researchers found that program participants had a significant increase in environmental knowledge compared to the comparison group and that during the direct nature experience (i.e. the international workshop) both adolescents' environmental knowledge and attitudes developed rather equally and both environmental knowledge and attitudes were related to environmental behaviour.

Direct contact with nature through structured programs has been found to enhance adolescents' social health. For example, Wood, Hine and Barton evaluated the impact of the Youth Outdoor Experience (YOE) project on adolescents' wellbeing. The YOE project provides adolescents from disadvantaged urban areas in England with opportunities to participate in a 12-week program where they engage in weekly structured outdoor activities (118). Wood and colleagues found a number of interesting results in relation to adolescents' social health; project leaders reported positive changes in participants' attitudes, self-esteem and behaviour, while participants reported feeling healthier, safer, and more positive with regard to their achievements and school, home, and social lives (118).

In another study, Kogstad, Agdal and Hopfenbeck interviewed nine 'vulnerable' adolescents/young adults in order to better understand how Green Care enterprises (which can allow people to work with animals,

agriculture and other tasks related to nature) could add to more traditional recovery factors (122). The researchers found that the youth described core success factors corresponding to well-known recovery factors such as recognition, supportive relationships, motivation, meaning, positive coping, self-esteem, confidence and hope, thus enhancing their social health (122). Environmental volunteering has been shown to enhance adolescents' skill development and also increase their levels of social connectedness (242).

2.3.4 Parks, social health and adults

Research indicates that, much like children and adolescents, adults' social health is enhanced through nature contact. O'Brien, Morris and Stewart conducted a qualitative study involving 49 adults in the UK. The authors found that, at least for some participants, visiting woodlands enabled them to be more sociable and to feel part of wider society and their local community, thus reducing their feelings of social isolation (181). In the USA, Baur, Gomez and Tynon conducted a study of 1,000 randomly selected adults from the Portland metropolitan region to test whether urban nature parks at two proximity levels (within walking and within driving distance of peoples' homes) had a positive relationship to their perceptions of the social health of their neighbourhood (171). They found that both levels of park proximity were significantly and positively related to self-reported neighbourhood social health. These findings were regardless of whether participants reported being park users or not and were not influenced by socio-demographic variables.

Other research on the links between social isolation, green space and adults' health has been conducted, with mixed results. For example, Maas et al. measured social contacts and health in 10,089 residents of the Netherlands (some of which were adolescents but majority were adults) and calculated the percentage of green space within 1 and a 3km radius around each individual's address (134). After adjusting for demographic and socio-economic characteristics, the researchers found that less green space in people's living environment was associated with feelings of loneliness and with perceived lack of social support. It was suggested that loneliness and perceived lack of social support partly mediates the relation between green space and health. Maas and colleagues found that the relation between green space and social contact indicates people with more green space in their living environment feel less lonely and experience more social support, but it is important to note that they did not have more contact with neighbours or friends in the area and did not receive more social support (134).

Similarly, de Vries et al. studied the mediating effect of social cohesion on associations between green space and health and came to the same conclusion as Maas and colleagues: loneliness and perceived shortage of social support completely mediated the effect of the amount of green space on people's mental health (226). de Vries et al. studied data on quantity and quality of streetscape greenery in 80 neighbourhoods in four Dutch cities and also collected data on self-reported health and proposed mediators. They conducted a series of multilevel regression analyses, controlling for socio-demographic characteristics and found that both quality and quantity of streetscape greenery were related to perceived general health, acute health related complaints and mental health (226). The researchers concluded that social cohesion and social contacts were some of the strongest mediators "but that these underlying mechanisms do not presuppose a special function of streetscape greenery beyond making the neighbourhood more attractive" (226).

Given there is an increasing population of older adults in Australia, the older generation is more likely to be sensitive to environmental constraints, so safe and accessible green spaces within their direct living

environment are considered relevant for their outdoor activities (243). Research specifically related to older adults' social health and access to parks and green spaces has recently been conducted. Kemperman and Timmermans collected data from 1501 older adults (aged 60 years and over) from a nationally representative sample who participated in a survey about living surroundings in the Netherlands in 2009 (243). The objective of their study was to better understand the relationship between extent and nature of older adults' social contacts and various types of green spaces in their direct living environments, taking into account socio-demographic characteristics. Kemperman and Timmermans found that the availability of trees and grass and the perceived level of greenness strongly influenced older adults' social contacts. The authors suggested that green spaces support social contacts in the neighbourhood but the safety and maintenance of the green spaces is important; 'high quality green spaces support social contacts between neighbours and strengthen communities for the aging population' (243).

2.4 The importance of parks for spiritual health

Key messages:

Parks and spiritual health:

- **Parks provide an important opportunity for urban populations to connect with nature – a key factor in spiritual health**
- **Nature connectedness underpins spiritual health, but spiritual health also underpins people's attitudes and behaviour towards nature**

Parks, spiritual health and children:

- **Children's experiences of nature prompt them to articulate feelings commonly seen as expressions of spirituality**
- **For children with disabilities, nature elicits spiritual growth which offers hope and healing**

Parks, spiritual health and adolescents:

- **Transcendent experiences in nature are associated with increased resilience in adolescents**
- **For adolescents, such experiences depend on access to so-called wilderness areas**

Parks, spiritual health and adults:

- **Nature-based experiences have been shown to foster spiritual health, especially for Indigenous populations and for those who have experienced physical displacement, mental illness or life threatening illnesses**

2.4.1 Overview

Spirituality as a concept is distinguished from the concept of institutionalized religion, with spirituality seen as "the broader reality, a search for meaning and purpose that can be pursued either within or outside of a religious institution" (220). Womble and colleagues differentiate between spirituality

(connectedness to something greater than one's self) and religiosity/religious spirituality (devotion to particular set of beliefs or orientation) (244). Nevertheless, all of the major world religions are cognizant of the sacredness of nature (220), with spirituality seen as related to the intangible, non-material aspects of nature (245).

Whatever the interpretation of spirituality, there are clear links within the literature between spirituality and nature connectedness. Fisher describes four domains of spiritual health: the personal, the communal, the environmental and the transcendental (220). He notes that when relationships with these domains "are not right, or are absent, we lack wholeness, or health". Similarly, Kamitsis and Francis describe the eco-psychological understanding of spirituality as encompassing the movement from an individualized understanding of the self to an understanding in which the individual is connected to all life forms (10). According to Kamitsis and Francis, eco-psychologists recognize that spirituality is closely linked to connectedness to nature and that this link explains the benefits of nature contact for psychological health.

The notion that being in nature increases a sense of spirituality suggests that people who do not spend much time in nature may not develop a sense of spiritual health (216). Conversely, spirituality has been shown to influence attitudes and behaviours towards nature. According to Witt (2013), "Meaningful or spiritual experience of nature has a potential 'healing' effect on our worldviews and attitudes towards nature, potentially leading to more environmental-friendly attitudes and behaviours" (246). This is confirmed by a US study which found that spiritual beliefs influenced participants' desire to save energy (247).

The links between spirituality and health, whilst widely recognized, are difficult to define and explain. According to Rehman and colleagues, "The spiritual dimension of wellness involves seeking meaning and purpose in human existence. It includes the development of a deep appreciation for the depth and expanse of life and natural forces that exist in the universe" (248). Similarly, Reese and Myers refer to the concept of 'EcoWellness' as "a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness" (249).

Fisher speaks of spiritual health as "THE fundamental dimension of people's overall health and wellbeing, permeating and integrating all the other dimensions of health" (9). This view is supported by Womble and colleagues, who note: "A review of the research on health and spirituality suggests that people who rate themselves higher on spirituality also tend to have better health, less illness, better treatment response, and lower mortality rates than people who rate themselves lower on spirituality" (244). This seems to be borne out by Reynolds and colleagues who found that, among adolescents suffering Cystic Fibrosis (CF), those demonstrating positive spiritual coping (defined as "thoughts or beliefs related to seeking spiritual support ... or thinking about a difficult situation from a spiritual perspective") (250) also experienced better clinical health outcomes. Reynolds et al. go on to note that, while the mechanisms for such outcomes are not clear, "positive spiritual coping may be an important factor in maintaining emotional wellbeing and treatment adherence during the critical adolescent period, helping to preserve health and extend longevity in patients with CF" (250).

Whilst spirituality is fundamental in the examination of nature/human interaction, a key difficulty lies in the absence of recognised measurement of it, often the case with 'social values' (245). Despite the frequent reporting of spirituality within the context of the human health and nature connection, empirical exploration of 'the spiritual dimension' is generally absent or vague (246). Existing gaps in empirical literature may be attributed to difficulty in measurement or to cross-over with other psychological/emotional concepts, such as the wellbeing, restorative and therapeutic benefits derived

from nature (246). Whatever the cause, the gap in quantification of the benefits of these links is evident. Heintzman, in his study of the empirical research on nature-based recreation and spirituality, notes that the majority of studies have been qualitative (251). He suggests, among other things, that more quantitative research is needed to identify the potential for generalization of the findings to the broader population. He goes on to comment that “research on the long-term consequences and not just the immediate spiritual experience of nature-based recreation is needed” (251). In particular, in the context of modern society, Heintzman recommends research into the spiritual growth fostered by nature-based recreation and its efficacy for managing stress.

Within health discourse, spiritual health references are largely limited to author self-reports (252) or mentioned within studies focused on broader concepts such as ‘place’ (161). Nevertheless, the links between nature, spirituality and health are increasingly being recognized in the literature, underpinning (though not necessarily explicit in) the recognition of healthy places as “characterized by safety, availability of healthy options, mixed use design, environmental sustainability and stewardship, and the opportunity for nature contact” (253). Sampson and Gifford note: “Place matters both in relation to empirical, physical attributes as well as lived experiences, emotional ties and meanings and this evidence has been important for informing place-based health promotion interventions” (161).

Further difficulties lie in the lack of recognition of subset notions as elements of spirituality, and instead branding them as ‘social quietness ... facilitating personal and intimate engagement with natural environments’ (182). One such notion is ‘place attachment’. Place attachment, in the context of how we experience green outdoor spaces, references individuals’ own ideas, community values and perspectives, historical influences and cultural associations (254). Place attachment literature recognizes the importance of living close to green spaces, but also notes that people may be attached to wilderness/coastal settings that are further away (158). There is a suggestion that place significance can increase the potential for ‘reflective abilities’, but the authors acknowledge that the presence of place significance is not necessary for reflection to occur (216). Other research indicates that providing children and adolescents with the opportunity to develop a sense of place may ultimately assist in the adoption of sustainability-related behaviours (255). The take-home message from this is that connection to place is linked to conservation (256).

2.4.2 Parks, spiritual health and children

In their study of children’s experiences of nature, Van Wieren and Kellert noted that children articulated “an aesthetic sense of beauty, pattern and order, wonder and discovery; and the expression of such spiritual attributes as feelings of solace and peacefulness, commonality and connection, happiness and feeling at one with and at home in nature, a power greater than oneself, and a sense of divine presence or mystery” (257). These findings are supported by Moriarty’s study of primary school children in Victoria (Australia), in which she found that physical activity and sport were sources of “wonder and delight, and enhanced their physical, social and spiritual wellbeing. Positive influences were demonstrated in their sensory responses, their relationships with nature, their peers, family and the wider community through sport, and their sense of self-worth and identity” (258).

Reflecting on spirituality and disability among children, Zhang notes the potential benefits of nature contact in education for children with disabilities: “Encounters in nature with plants and animals foster spiritual sensitivities and help children to learn qualities such as empathy and compassion and to develop a sense a wonder” (259). Zhang goes on to note that the spiritual development arising from these experiences can foster “hope, healing and growth”.

2.4.3 Parks, spiritual health and adolescents

In their US-based study of adventure education, Griffin and LeDuc found that so-called ‘wilderness’ or ‘peak experiences’ contributed to spiritual growth among adolescents (260). Similarly, Allan and colleagues, in their analysis of the evidence on adventure education, noted that inspiration associated with nature or “a spiritual connectedness with a greater good” (sometimes referred to as ‘transcendence’) is associated with increased resilience (261). Shoshani and Slone, reporting on research into the subjective wellbeing of adolescents in Israel, note that: “Theological or transcendence strengths allow individuals to forge connections to the larger universe and thereby provide meaning to their lives” (262). They go on to comment that among adolescents, “transcendence strengths such as spirituality, gratitude, and hope have been related to wellbeing, quality of life, and life satisfaction”.

Several authors recognise statistically significant relationships with ‘far away’ places for adolescents compared to local green spaces, which may produce greater outcomes for adults (115, 116). Such relationships depend on the adolescents having had the opportunity to connect to such spaces and places.

2.4.4 Parks, spiritual health and adults

According to Sampson and Gifford, “There is now a solid body of evidence within public health (Duncan et al. 1993), social epidemiology (Kaplan, 1996) and medical sociology (Macintyre et al. 1993) that place matters when it comes to health and wellbeing” (161). The notion of place connection is particularly important to those who are vulnerable to social exclusion or marginalization. Particular attention in the literature focuses on the potential for place attachment to accessible green spaces (e.g. gardens) among people experiencing physical displacement such as refugees or those undergoing in-patient treatment (161).

One example of an explicit link between nature, spirituality and health for adult populations comes from a study of environmental volunteering in the United Kingdom, in which volunteering was used as eco-therapy for participants with mental health issues. Reporting on that program, O’Brien and colleagues note (263):

On a personal level participants found their relationship with nature to be therapeutic, rewarding, facilitating spiritual growth, allowing them to develop a sense of pride and helping them develop a sense of self and sense of place. This hands-on contact with nature helped them to accept and better cope with their illnesses/difficulties and develop some resilience.

Older adults, often vulnerable to social exclusion, loneliness and perceptions of isolation and hopelessness are key target groups for interventions and strategies aimed at optimizing perceptions of spiritual health. It is noteworthy that in cultures with a high sense of connection to the land, such as Indigenous cultures, older adults are often seen as custodians or imbued with a heightened sense of responsibility for protecting nature and educating younger generations (20).

While connection to natural spaces has been long recognised by some as significant, particularly to Indigenous cultures, the topic is receiving renewed and more widespread attention given its implications for individual and community health (264). Recognition of the evolution of Indigenous cultures and languages in close relationship with specific geographical areas and of the spiritual connections Indigenous people commonly hold to such places has implications for Aboriginal health and wellbeing (156, 265).

Along similar lines, a study of women's experiences of nature-based leisure in New Zealand found that there was strong recognition among participants of the spiritual nature of the experience (160).

In the current context of the ageing of the population and growing concern about climate change, Fischer highlights the potential of "a spirituality of aging that hones the relationship of elders to the world of nature, forging a bond that holds a hopeful future for both. Such a spirituality encourages older adults to love and learn from nature, discovering a path to the sacred and a source of comfort and healing in difficult times" (220). For adults experiencing life threatening illness such as cancer, recent research in Japan has shown that "the use of integrated medicine in urban green space improves spiritual wellbeing of cancer patients" (74). The integrated therapy, which included walking in a forest park, found significant improvements in both functional wellbeing and spiritual wellbeing.



This section draws together the research, by identifying key gaps in the literature, current and potential future applications of the research findings, and the implications of the findings for researchers, practitioners and policy-makers in relevant fields.

3.1 Strength of the Evidence

This report attempts to build the evidence-base on the health benefits of parks by drawing on 659 peer reviewed publications representing a thorough cross section of the breadth of available publications relevant to 'parks/nature' and 'health'. They include a range of research methodologies encompassing cross-sectional surveys, longitudinal studies, in-depth interviews and focus groups; are from a range of countries, including Australia, Canada, USA, UK, Europe and Asia; and cover a range of population groups, including children, adolescents, adults, the elderly and people with special needs.

It is important to note that, whilst quantitative methods are often deemed to be measures of validity and reliability, qualitative data methods can provide "in depth information in a real world context" (266). This is particularly useful when ascertaining peoples' perceptions about green spaces, wellbeing or restoration that may not be reliably captured using quantitative methods. Our synthesis of the research presented in this report suggests that both qualitative and quantitative methods provide useful information for interpreting the health benefits of parks and, in particular, when designing and assessing park-related interventions intended to improve health and wellbeing outcomes (69).

Overall, the evidence in relation to the health benefits of parks and natural spaces is comprehensive. There is, however, variation in terms of the strength of the evidence-base according to the different health dimensions (refer Table 1). Specifically, the evidence is considered strongest in relation to the benefits for physical health, primarily because of the greater number of studies investigating this dimension and the use of quantifiable measures. The benefits of parks for mental health have also been explored using validated scales of measurement, though the evidence-base is not as well developed and would therefore be considered moderate in strength. Research investigating the benefits for social health is weak-to-moderate, while the spiritual dimension of health is deemed to have the weakest evidence-base. Research in this area is in its infancy, perhaps because this aspect is less easily measured empirically and tends to overlap with other concepts, such as the wellbeing, restorative and therapeutic benefits derived from nature.

Table 1: Strength of the evidence

Theme	Strength	Justification
Parks and physical health		• Use of empirical measurements • Focus of greater number of studies • Evidence has been subject to review (267), including in relation to obesity (268)
Parks and mental health		• Includes use of validated scales (i.e. anxiety, depression) • Quantitative research • Fewer studies than physical health
Parks and social health		• Gaps in literature- attributed to difficulty establishing causal relationships • Reliance on qualitative research (cannot necessarily be generalised to other populations)
Parks and spiritual health		• Limited empirical evidence • Difficulties with measurement • Reliance on qualitative research

3.1.1 Systematic Reviews

Along with the quantitative, qualitative and mixed methods studies included in this report, we have highlighted three systematic reviews which readers may want to access to further add to the evidence-base on the health benefits of parks and green spaces (refer Table 2). Systematic reviews ‘attempt to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question. Researchers conducting systematic reviews use explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making’ (269).

Table 2: Systematic Reviews

Di Nardo F, Saulle R, La Torre G. 2010, Green areas and health outcomes: a systematic review of the scientific literature, <i>Italian Journal of Public Health</i>, vol.7, no.4, pp.402–13. (270)	The authors reviewed the most updated literature regarding the relationships between green spaces and wellness. They concluded that many contradictory and unexpected results probably occurred because of differences in measures and definitions of green space, the self-reported measures of 'wellbeing' and variations in population habits and geographical locations.
Bowler, DE, Buyung-Ali, LM, Knight, TM and Pullin, AS, 2010, A systematic review of evidence for the added benefits to health of exposure to natural environments, <i>BMC Public Health</i>, vol. 10, pp.456-466. (71)	The authors synthesised the findings of studies that compared measurements of health or wellbeing in natural and synthetic environments. The 25 reviewed studies suggested that natural environments may have direct and positive impacts on wellbeing, but the authors concluded further research was needed to understand the general significance for public health.
Konijnendijk, CC, Annerstedt, M, Nielsen, AB, Maruthaveeran, S, 2013, <i>Benefits of urban parks-a systematic review, A report for IPFRA. IPFRA. (228)</i>	The authors reviewed the current scientific evidence for urban park benefits (from 1 January 2000 through 1 April 2012). They were interested to find out whether parks promote the health benefits more as compared to other urban land use, as well as other types of green spaces. They found scientific evidence that parks contribute to human and social wellbeing, either directly (for example by making people more physically active) or indirectly (by their high biodiversity enhancing opportunities for nature experience and recreation).

3.1.2 Gaps in the literature

The process of undertaking this review of evidence has highlighted some areas in which published research is less readily available than other areas. These areas include: children, mental illness and nature; adolescents, mental illness and nature; spiritual health across all groups; social health, particularly in relation to children; and contact with nature for marginalized groups.

3.2 Applications of the findings

It is clear from the evidence cited above that parks and public green spaces have a key role to play both in the promotion of health/prevention of ill-health and in restoration and recuperation from ill-health. As Table 3 shows, both preventive and restorative aspects are apparent for all dimensions of health. This table provides an example of each aspect for each health dimension. The links with parks and public green spaces for each aspect of health are articulated in the text within Section 2 of this review.

Table 3: Preventive and restorative aspects of health dimensions

Health dimensions	Preventive aspects	Restorative aspects
Physical health	Bowler and colleagues noted Japanese research by Tsunetsugu and colleagues and by Li and colleagues which highlighted immunological benefits from walking in forest environments (71).	Adults undergoing cancer treatment who were able to undertake rehabilitation in outdoor spaces demonstrated significant positive physiological changes, particularly related to functional wellbeing (146).
Mental health	Living close to parks and green open spaces, is a significant health promoting factor with benefits to subjective ratings of happiness (184, 185), better mental health status (175), and lower rates of Depression and Anxiety (186).	In urban environments, access to parks or green spaces has the potential to promote wellbeing through attention restoration and stress reduction (209).
Social health	Parks and other green spaces are vital for promoting social cohesion and social capital (key social determinants of health) in urban communities (224).	A UK study found that visiting woodlands enabled participants to be more sociable and to feel part of wider society and their local community, thus reducing their feelings of social isolation (181).
Spiritual health	"...people who rate themselves higher on spirituality also tend to have better health, less illness, better treatment response, and lower mortality rates" (244).	"... participants found their relationship with nature to be therapeutic, rewarding, facilitating spiritual growth, allowing them to develop a sense of pride and helping them develop a sense of self and sense of place. This hands-on contact with nature helped them to accept and better cope with their illnesses/difficulties and develop some resilience" (263).

Potential future applications include:

- The use of nature-based experiential programs (typically targeted at adolescents) with other population groups (e.g. children, older people, CALD groups, people with disabilities);
- Engaging stakeholders such as psychologists and psychiatrists in the application of nature-based interventions as a treatment for mental health issues;
- The fostering of greater dialogue between park agencies, planners, health practitioners and educators to heighten awareness of the potential benefits of nature contact;
- Enhancing the recognition of the value of parks and nature through research to address the gaps in the quantification of the physical, mental, social and spiritual health benefits.
-

3.3 Barriers to park use identified through the research

A number of barriers to use of parks have been identified in the literature. These include crime/safety; injury and disability; gender; use perceptions/preferences and social/cultural norms; proximity; and weather conditions and pollution.

Crime/safety

Perceptions of crime and neighbourhood safety are significant barriers for potential park users (126). Parks and green areas that are considered to be unsafe are less likely to be visited and therefore restrict the realisation of the physical, mental and social benefits that are offered by these spaces. Implications are noted for children and adolescents in particular, who may miss out on opportunities to play independently because of parental concerns around safety (271). Crime/safety fears often extend beyond parks to surrounding neighbourhoods or streets, reducing the walkability of these areas.

Injury and disability

Fear of injury can manifest in parents' perceptions of risky play and preferences for 'safer' environments in which children can be easily supervised (271). This is despite knowledge that risky play facilitates significant developmental benefits for children (132, 271). Fear of injury may manifest in parents' reluctance to allow children and adolescents to undertake recreational activities, particularly as injury rates can be high (i.e. for mountain bike riding, horse riding, rock climbing) (272). Social or cultural norms as well as fear of injury may prevent some adults from trying new activities that are considered to be extreme or risky. It should be noted that fear, associated with undertaking 'extreme' sports, can be life transforming and produce a range of positive experiences (273).

Individuals with disabilities enjoy spending time in outdoor spaces, however, their participation is often limited by perceptions that they are 'at risk' (164). Parents of children or adolescents with a disability may have heightened fears about high risk of injury. Young people with disabilities may often be exposed to stigma or bullying associated with their disability and may be less likely to independently engage in typical activities as would be expected of their age group (92). Physical access and proximity issues, as well as lack of awareness as to what is available, may prevent adults with disabilities from undertaking certain activities (165).

Gender

Women are more likely to be considered vulnerable in some instances (i.e. fear of crime) and are more likely to perceive neighbourhoods to be unsafe compared to males (274). Females may be discouraged from participating in certain activities that are considered socially or culturally to be a male domain (275). Women in low socio-economic communities are known as important benefactors of the physical and social health potential of visiting parks and green spaces (106, 276).

Use perceptions and social/cultural norms

Perceptions of use (of parks and green spaces) may be influenced by geographical location, age and cultural background (48, 277). Certain behaviours, such as crowding or loitering, may be viewed differently according to social or cultural norms (162). Lack of information relating to available opportunities of what can be offered by green spaces is likely to constrain some CALD communities from participation (142). Differing perceptions of green spaces may alter the way in which people from different cultures view environmental issues (278).

Weather conditions and pollution

Weather (i.e. extreme heat/cold) can affect people's choices about spending time outdoors (279). Dog owners are less likely to be effected by weather than other potential park users. Air or noise pollution can significantly impact assessments of green spaces and thus their restorative value (280-283).

3.4 Implications of the findings

Based on the evidence provided in this report, there are multiple factors impacting negatively on the use of parks and green open spaces for health promotion and therapeutic purposes (refer to Section 3.3).

Prime among these are:

- Lack of awareness of the potential benefits
- Lack of accessibility
- Personal factors inhibiting use
- Social and contextual factors inhibiting use

Each of these categories of factors has implications for research, policy and practice.

3.4.1 Lack of awareness of the potential benefits

As noted in the evidence above (refer Section 2), the potential and actual health benefits of contact with nature through parks and other similar spaces are increasingly being recognised. However, there are still gaps in awareness among the public at large, health practitioners and policy-makers, and planning and design professionals and policy-makers. In some instances, this lack of recognition is due to gaps in the empirical evidence, while in other cases it is due to lack of appropriate communication of the benefits. To some extent, this latter issue relates to the cross-disciplinary nature of the evidence, but it is also likely to be affected by the predominantly 'medical' model of health that has prevailed over recent decades.

Research needs to be undertaken to fill the gaps identified in this report. In particular, the research needs to be framed and conducted so as to enable and encourage understanding across all relevant disciplines concerning the benefits of nature contact for human health and wellbeing. While quantifying the benefits is a high priority, qualitative research that provides an understanding of the underlying motivations and meanings of people's engagement with nature will remain valuable.

Effective communication of the existing and future evidence base is a key requirement if the lack of awareness about the human health and wellbeing benefits of contact with nature through parks is to be overcome. It is clear that publication of research findings in the peer-reviewed literature is insufficient as a mechanism to overcome this problem. Multiple strategies will be needed to address this issue, including both bottom-up and top-down approaches; use of 'credible witnesses' to channel information into specific professions and disciplines; and the development of the ability for individuals in specific discipline areas (e.g. park managers and health promoters) to 'translate' the evidence they hold in to a form which can be 'heard' by the other discipline/s. Only when this is achieved will policy and practice reflect the potential indicated in the evidence base outlined above.

3.4.2 Lack of accessibility

The lack of awareness outlined above undermines the accessibility of parks, since those who are ignorant of the benefits of such spaces for their health and wellbeing are less likely to make an effort to visit them. Conversely, the absence of such spaces locally and/or difficulties in reaching such spaces (either because

of traffic barriers or lack of available transport) will inhibit people's engagement with them and will result in them not appreciating firsthand the benefits to be gained.

In the context of growing urban density, efforts need to be made to ensure that every citizen has easy access to parks and green spaces. This has implications for the provision of such spaces, as well as for the design of roads, paths and trails to enhance connectivity and for public transport provision. Ultimately, these are matters for strategic planning, but unless the planners, designers and policy-makers responsible for such provision have access to relevant evidence and are familiar with that evidence, it is unlikely that the factors undermining the realisation of the potential health and wellbeing benefits will be overcome.

Thus, as our cities become more densely developed and populated, we need to ensure that we have a clear understanding (through research) of the cities' needs in terms of parks. This knowledge needs to be contextually based – that is, the knowledge gained through studies overseas may or may not be applicable, so local research and locally appropriate policies and practices are needed to take account of the particular cultural and geographic contexts being addressed.

3.4.3 Personal factors inhibiting use

There are a number of groups who experience particular personal factors preventing them from capitalising fully on the health benefits of contact with nature through parks. Among these groups are children; people from CALD backgrounds; some older people and those experiencing particular types of disability. For example, in some cases, people with severe vision impairment or those who are dependent on a wheelchair may have difficulty accessing and/or navigating some parks. While research has identified some of these personal factors, that is certainly not true for all factors or all of these groups. Moreover, even where such knowledge exists, it is not always true that the policies and practices adopted address the barriers. These shortfalls in knowledge, policy and practice need to be addressed if we are to ensure equitable access to the human health and wellbeing benefits of parks.

3.4.4 Social and contextual factors inhibiting use

A number of key social and contextual factors appear to influence the ways and extent to which people interact with parks. Among these factors identified above are: time poverty related to modern lifestyles; a trend to technological orientation; and concerns about crime and safety (often associated with declines in social connectedness/ social capital). While research could identify the impacts of these factors in undermining park use, there is also potential for action research to focus on strategies for overcoming these mediators. Such research could then be used to develop appropriate policies and practices to maximise human-nature interactions through parks, and thus to optimise the benefits for human health and wellbeing.

3.5 Opportunities

On the basis of the wide-ranging nature and strong level of evidence about the health benefits of nature presented in this review, community health and environmental policymakers and park managers have a strong foundation to make a case for additional investment in parks as a highly cost effective strategy to improve community health and wellbeing. Further, policymakers and managers have the opportunity to optimize the health benefits of parks by ensuring these spaces are not only designed with the population of users in mind but equally constitute settings where nature is recognized as a metaphor for healing, one's senses are stimulated and present moment awareness is encouraged (284).

3.5.1 Consider users' motivations

Visits to parks are motivated by a range of factors, including physical pursuits (i.e. walking); intangible elements of nature (i.e. fresh air); play for children; purposeful mental pursuits; social gathering; and purposefully unplanned time (285). In other cases, individuals may be motivated to visit parks and protected areas by the social and psychological health and wellbeing effects (286); their orientation towards nature (287); or the availability of green spaces nearby (288). Individuals may also have different motivations depending on their previous experiences with park visitation. Research suggests that people who are infrequent users of green space cite nature-related motivations as their reason for visiting, whereas those who access parks more often are motivated by physical pursuits and park features (183). Efforts to promote green spaces as health resources therefore need to take the multiple motivations and benefits identified by users into consideration (183, 285, 287, 288).

3.5.2 Enhance proximity

Proximity to safe parks and green spaces is associated with increased usage (107, 132), along with positive health outcomes throughout the lifespan (194). For example, residents in neighbourhoods with a greater quantity of green spaces experience less acute health-related problems and better mental health compared to those with fewer parks (5). Planners thus need to ensure access to parks is adequately maintained, particularly in urban settings.

3.5.3 Ensure park quality and usability

Green space quality is also an important consideration when attempting to maximize health benefits (5). Furthermore, individuals living in neighborhoods with high quality open spaces are more likely to experience low levels of psychological distress compared to those with access to poorer quality spaces (6). The attributes of quality public parks associated with low distress include water features, birdlife, walking paths, playgrounds, sufficient lighting and maintained lawns (6).

Likewise, individuals who consider their nearby parks and green spaces to be useable – in good condition and suitably equipped for visiting, with clear access points and paths and places to relax and socialize – report better overall general health compared to those with less positive views (289). More specifically, the usability (together with quantity and proximity) of natural spaces in local residential environments can be linked to reductions in non-communicable diseases and their risk factors (71, 225, 268, 289). Social health is also enhanced when inner-city parks are well maintained and provide good recreational facilities (224). Together, these findings suggest that the design and maintenance of parks can play a key role in enhancing nature contact and thus the realization of the potential health and wellbeing benefits.

3.6 Conclusion

This report, the 3rd edition of *Healthy Parks Healthy People*, has reviewed the post-2008 literature in relation to the health benefits of parks and natural spaces. Findings suggest that access to safe, high quality green space benefits individuals across every stage of the lifespan, enhancing their physical, mental, social and spiritual health and wellbeing. Accessing parks and green spaces may be particularly beneficial for specific community groups, including Indigenous Australians, those from CALD communities and people with disabilities. Therefore, while there are barriers to the use of parks, including crime and safety concerns and issues around accessibility, there are also positive opportunities for park managers to enhance the potential for health promotion and therapeutic use of parks. Increasing awareness of the benefits of access to nature, as well as designing readily accessible spaces that encourage visitation by

accounting for users' motivations and needs, will go a long way to ensuring the health benefits of parks are realised by all members of the community.

To conclude, the evidence connecting green space and health is substantial, offering strong justification for the promotion of parks as a means of enhancing community health. The evidence also offers a solid foundation upon which future research can continue to build. Researchers must endeavour to explore in more detail the benefits in relation to all dimensions of health, including social and spiritual health, and further develop their understanding of 'how much' exposure to nature individuals require. Doing so will ensure that, despite increasing urbanisation and technological advancements, parks and green spaces continue as significant health promotion settings.



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Appendix 1: Relevant human-nature theories

In order to realise the potential benefits to human health and wellbeing to be gained from interacting with nature, it is important to understand how and why humans relate to nature. Generated from numerous disciplines exploring the human relationship with nature (including religion) are a number of theories to explain: why humans interact with nature the way they do; the effect nature has on the human psyche, spirit, and wellbeing; the effect that humans have on the biosphere (both positive and negative); and how this in turn affects human society (particularly human health and wellbeing). This section briefly examines some of these theories, including Biophilia, Attention Restoration Theory, Stress Reduction Theory and place-based theories, with reference to current research.

Biophilia

Fromm first referred to 'Biophilia' as "love of life or living systems" back in 1964 and suggested it was the psychological tendency in humans to be attracted to all that is alive and vital (290). As an extension of this, the Biophilia Hypothesis was developed by Harvard biologist Edward O. Wilson (291) and has been expanded and debated by Wilson and numerous others (19, 22, 291-294). The hypothesis is based on the assertion that early in human history there was an evolutionary advantage in knowing about the natural world, particularly information concerning plants and animals, and that this knowledge contributed to survival (19). Apart from this knowledge, the essential aspects of biophilia— attraction and respect for nature— also contributed to survival (19). Kellert believes that an affiliation for nature addresses innate psychological needs such as intellectual capacity, emotional bonding, aesthetic attraction, creativity and imagination that are a product of our evolution and otherwise not easy to satisfy (19). It is believed by some that these innate psychological and neurological needs are mismatched with the results of technological progress (20, 22, 295). This notion is not new, and has been expressed by authors as early as 4,600 years ago (296).

Advocates of biophilia believe that humans evolved in the company of other living organisms and in a matrix of conditions making human existence possible, and that we continue to rely intellectually, emotionally, physically, and spiritually on our affiliations with nature (19-22). According to the theory, therefore, biophilia is: inherent; part of the human species' evolutionary heritage; associated with increased chances of survival via genetic fitness; likely to increase the possibility for achieving meaning in life and personal fulfilment; and a self-interested basis for the care and conservation of nature (especially biodiversity) (293).

Kellert has suggested there are nine underlying biological values of biophilia, which help to explain the connection between people and nature (19). These are summarised below:

- Utilitarian: people may benefit physically from their connection to nature as it provides sustenance, protection and security.
- Naturalistic: people may derive a sense of awe and fascination from their direct contact with nature's diversity and complexity.
- Ecologicistic-Scientific: some people may be motivated to study the natural environment and may believe that nature can be understood through systematic inquiry or empirical exploration.
- Aesthetic: people may enjoy an aesthetic experience of nature, particularly in urban areas where man-made, artificial structures can dominate.
- Symbolic: nature has been utilised in the development of human language as a means of effective communication.

- Humanistic: people may form deep emotional attachments to natural organisms. This is noticeable in the connection between people and companion animals.
- Moralistic: some people may feel a sense of ethical responsibility towards the natural environment. This can be reflected by a need for harmony or order in nature.
- Negativistic: some people have a fear or aversion towards natural environments.
- Dominionistic: people may desire to have a sense of mastery over the natural environment. This may result in destructive behaviours such as the dumping of waste.

In recent times, multidisciplinary teams of researchers have formed to explore biophilia and it is now gaining wider acceptance in the scientific community. For example, Zhang and colleagues conducted a study to understand how contact with nature affects children's propensity for biophilia and their conservation attitudes (297). Fifteen schools with different degrees of urbanization were selected for the study sample and 1119 pupils aged 9–10 filled out questionnaires focused on how frequently they engaged in 15 outdoor activities, and these scores were summed together to produce a measurement of their contact with nature. The authors found that children from urban schools had less contact with nature than students from rural schools and their contact with nature was significantly and positively related to their biophilic tendencies, which affected their willingness to conserve animals. Furthermore, Tidball has suggested that when humans are faced with a disaster, they may seek engagement with nature to demonstrate resilience in coping with such events which could suggest a biophilic connection (298).

Attention Restoration Theory

The Kaplans' 'Attention Restoration Theory' (ART) shares close ties with Wilson's biophilia hypothesis which is not surprising given that both Wilson and Kaplan and Kaplan believe that humans have deep biological affiliations with nature that are rooted in human evolution (291, 298, 299). Whilst Wilson focused on the biological connectedness of all living organisms (291), Kaplan and Kaplan considered the restorative importance of natural environments for effective human functioning and wellbeing (299).

The notion that natural environments provide restorative settings for people has long been held, with the famous American urban planner Frederick Law Olmsted quoted by Kaplan as stating in 1865 that natural scenery "employs the mind without fatigue and yet exercises it; tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system" (23). The need for restorative mechanisms is even greater in 21st century urban environments than it was in the context in which Olmsted was speaking. Modern city living is characterised by crowding, traffic, excessive stimulation and overload of information, and can be considered very stressful (300). "Feelings of stress, anxiety, and worry have been shown to have negative impacts on both physical and psychological wellbeing of humans" (300).

Modern living (especially given the technological developments noted earlier) may also contribute to some urban residents' mental fatigue through constant overload of information and difficulty in directing one's attention. ART (23, 299) argues that an individual's concentrated, or directed, attention can be fatigued by overuse. Directed attention requires intellectual effort because the material attended to may not be attractive or interesting and one maintains focus by inhibiting distractions (301). The sensory overload experienced by many urban residents means recovery from mental fatigue is a matter of importance to their quality of life. A 'restorative environment' is an environment that fosters recovery from such mental fatigue (23, 302).

Restorative environments require four elements: fascination (an involuntary form of attention requiring effortless interest, or curiosity); a sense of being away (temporary escape from one's usual setting or situation); extent or scope (a sense of being part of a larger whole); and compatibility with an individual's inclinations (opportunities provided by the setting and whether they satisfy the individual's purposes) (299, 303). For a more detailed discussion, see Hartig et al. (303) or Kaplan and Kaplan (299).

Over the last few decades, researchers have become increasingly aware of the restorative benefits of contact with nature (304). For example, research by the Kaplans has suggested that parks are ideal for restorative experiences due to their ability to satisfy the four elements described above (23, 299, 302). Additionally, when comparing a walk in a natural setting (a park), a walk in an urban setting, and relaxing in a comfortable chair, Hartig et al. found that mental fatigue was most successfully relieved by a walk in a park (303).

Adding to this body of research on ART, Mayer, Frantz, Bruehlman-Senecal and Dolliver conducted three studies to examine the effects of exposure to nature on positive affect and ability to reflect on a life problem (216). The participants of their study (76 university students) spent 15 minutes walking in a natural setting (Studies 1, 2 and 3), an urban setting (Study 1), or watching videos of natural and urban settings (Studies 2 and 3). In all three studies, the authors suggested that exposure to nature increased attentional capacity and the ability to reflect on a life problem; these effects were said to be more dramatic for actual nature than for virtual nature. More recently, Pilotti et al. conducted a study to determine if brief exposure to nature at the end of a workday enhances sustained attention and long-term memory (305). Sixty-three student advisors at an American University participated in the study and they viewed a video of either a natural environment or a busy city street after work. They then performed a tone-detection task that was intended to mimic a key feature of their job (being on the telephone). Pilotti et al. found that brief contact with nature at the end of a workday may provide individuals with a sense of vigour to complete additional tasks, sustain attention and retain information in their long-term memory, but the effects may be fleeting (305).

Furthermore, Stack and Shultis suggested that urban park planners and managers can use ART to improve visitor experiences and increase support for and use of urban parks and green spaces (306). They reviewed key issues in ART and provided specific recommendations for leisure managers to effectively incorporate the principles and benefits from this theory into active living and new urbanism movements.

Stress Reduction Theory

Similar to ART, 'Stress Reduction Theory' (SRT) is based on human responses to the natural environment and proposes that natural settings containing plants, water and other features, such as views of the sky, a lake or sea, have calming characteristics and are most likely to reduce stress in humans (24). According to Reed and Jones and the principles of SRT, to cope with the demands of the modern urbanised world, humans must be able to "read the possibilities and obstacles of the natural environment, i.e., to read the 'affordances'" (25). This means that humans must grasp the messages of nature, often in a minimal amount of time (i.e. a fraction of a second), which may be in terms of finding material to build with, finding food and water, or sensing when danger is imminent. Grahn and Stigsdotter suggest that this results in a message of safety which means "the whole body can relax and recover from stress" (25).

Several researchers believe that nature plays an important role in reducing humans' stress. For example, Lottrup, Grahn and Stigsdotter investigated whether access to a green outdoor environment at work is related to employees' perceived level of stress and attitude toward the workplace (307). Their study was based on data from a questionnaire completed by 439 randomly selected individuals in Sweden and addressed the respondents' level of stress and workplace attitude, and the characteristics and accessibility of the outdoor environment at the respondents' workplace. Results of Lottrup, Grahn and Stigsdotter's study showed that, for male participants, significant relationships between physical and visual access to workplace greenery and a positive workplace attitude and decreased level of stress were evident (307). On the other hand, for female participants, a significant relationship between physical and visual access to workplace greenery and a positive workplace attitude was found, but not between access to workplace greenery and level of stress. Therefore, some of their findings supported the link between SRT and contact with nature.

Another study conducted by Währborg, Petersson and Grahn found support for SRT and nature contact (308). They completed intervention research to determine the effect of a nature-assisted rehabilitation programme in a group of patients with reactions to severe stress and/or mild to moderate depression. Their study comprised of 118 participants referred to a nature-assisted rehabilitation programme, and 678 controls recruited from the Skåne Health Care Register in Sweden. Their results indicated a significant reduction in outpatient visits to primary healthcare among participants in the rehabilitation programme compared with the control group. Währborg, Petersson and Grahn concluded that structured, nature-based rehabilitation programmes for patients with reactions to severe stress and/or depression could be beneficial (308).

Place-based theories

In addition to reducing stress, natural environments may be beneficial for people's spiritual and mental health, as they can provide a mechanism for people to develop strong connections. Various theorists and philosophers have claimed that a meaningful or spiritual experience of nature has a potential 'healing' effect on people's worldviews and attitudes towards nature, which may potentially lead to more environmental-friendly attitudes and behaviours (246).

Several place-based theories have been developed to describe the deep spiritual connections people have for particular natural places. For example, 'Eco-spirituality' is a term coined to describe humans' connection or relationship to nature. Lincoln defines eco-spirituality as "occurring when ecology and spirituality unite in a common cause and there is a spiritual connection between humans and the environment" (26).

For thousands of years, spirituality and religion have been based on the notion that humans are a part of nature. For example, the original teachings of religions such as Judaism, Christianity, Islam and Hinduism are based on a deep connection to nature and the relationship between people and the natural environment (15). Such religions regarded humans and the natural world as part of the same universe, however it is suggested that modern living and current environmental crises have brought about a loss of such a connection. Suzuki, in reference to their earlier work, believes that city living has created a divide between humans and nature whereby inner city residents are dependent on man-made inventions and feel devoted to consumerism, thus resulting in a loss of connection to the rest of the living planet (20). While Suzuki claims that most of the original religions (Judaism, Christianity, Islam and Hinduism) consider people as separate from nature, there is now evidence of a growing 'ecothology' movement within all of

the major faiths. Ecotheology “focuses on the interrelationships of religion and nature, particularly in the light of environmental concerns” (309).

Typically, the worldviews of Indigenous humans describe a universe in which everything is connected with everything else: stars, clouds, forests, oceans, and human beings are seen as interconnected components of a single system in which nothing can exist in isolation (20). Indigenous cultures around the world regard nature as the realm of the spirit and the sacred; the natural world is seen as inherently spiritual, and humans are seen as an integral part of it. From this perspective follows an attitude of respect, and an instinctive understanding of the need to consider future generations and the future health of our ecosystem - in other words, a sustainable approach to life and health (20). In Australia, Indigenous people are said to be connected to their ‘Country’ which can include land, air, water and stories of “Dreaming” being dynamic and multilayered, forming the rules, norms and beliefs of existence between species and humans (157). Kingsley cites the work of Weir, who highlighted that “in country humans and nature, and nature and culture, are not regarded as separate, but are entangled together in all types of relationships” (157). Therefore, it can be argued that Indigenous people have little room to separate themselves from Country as they are embedded within it through a spiritual connection built over thousands of generations (157).

‘Sense of place’ is another relevant place-based theory which recognises the spiritual connection indigenous (and non-indigenous) people have with their Country or ‘place’ and is defined as a long-lasting emotional attachment or positive connection between a person and a location (27, 28). Research conducted by Kamitsis and Francis on the extent to which engaging with nature, through both exposure and connectedness, influences sense of place and psychological health, investigated the role of spirituality in this relationship (10). The authors surveyed 132 females and 58 males using the Nature Exposure Scale, the Connectedness to Nature Scale, the Mysticism Scale, and the psychological health subscale of the WHOQOL-BREF and found that nature exposure and connectedness to nature were positively associated with psychological wellbeing and spirituality. Kamitsis and Francis concluded that spirituality could be an important aspect of people’s ‘sense of place’ with nature and may have flow-on benefits for their spiritual health and wellbeing (10).

Appendix 2: Methodology

This report is based on a substantial review of the current Australian and international ‘parks/nature and health’ literature published post-2008 (when the *Healthy Parks, Healthy People* 2nd edition was published). The data is therefore secondary (combination of quantitative, qualitative and mixed methods research) and was obtained through a search process using on-line databases and internet search engines, scanning reference lists of key articles as well as consultation with known experts (60).

Search strategy

A semi-systematic literature search was undertaken, in which an unmanageably large quantity of articles were uncovered. The following databases were utilised in the search for relevant literature: Show all Academic Search Complete; AMED - The Allied and Complementary Medicine Database; CINAHL with Full Text; E-Journals; Education Research Complete; Environment Complete; Global Health; GreenFILE; Health Policy Reference Center; Health Source - Consumer Edition; Health Source: Nursing/Academic Edition; Informit; Information Science and Technology Abstracts; MEDLINE; MEDLINE with Full Text; MLA International Bibliography; Political Science Complete; PsycARTICLES; PsycBOOKS; PsycEXTRA; Psychology and Behavioural Sciences Collection; PsycINFO; and the Ebook library as well as Newsbank.

We determined the overarching search terms to be ‘nature’, ‘environment’, ‘land’, ‘country’, ‘outdoor’, ‘setting’, ‘wilderness’, ‘garden’, ‘public space’, ‘park’, ‘green’, ‘forest’, ‘reserve’, ‘health’, ‘condition’ and ‘wellbeing’. The key search terms were used simultaneously with one or more of the following terms searched with Boolean format where applicable (i.e. using "and" between two words so that we searched for documents containing both of the words, not just one of them):

1. animals, pets, wildlife
2. social capital, interaction, neighbourhood
3. urban planning, sustainability
4. psychology, stress, coping, recovery
5. active, recreation, disease, physical activity
6. passive, observation, participation
7. Biophilia, connection, public health, health promotion
8. gardening, kitchen garden, horticulture, forestry
9. outdoor recreation, leisure, education
10. spirituality, outdoor experience

After a large-scale search of these terms using the above databases, we also conducted back-referencing and grey literature searches in order to trace articles and find similar work. This was especially useful for guidelines and reports as well as local work that had not been put into the databases. A total of 663 articles were downloaded and placed into the following major categories:

- Physical Health
- Mental Health (including emotional health/wellbeing)

- Social Health (including social values, social capital)
- Spiritual Health (including place attachment)

The approach adopted throughout the search phase was to be open to inclusions of all relevant articles and books (both peer reviewed and non-peer reviewed). Accordingly, articles were not excluded on the basis of perceived empirical merit or the perceived quality of the journal in which they were published (for example, the journal impact factor). Whilst a number of key journals were specifically targeted during the literature search phase, maintaining inclusion criteria as wide as possible, whilst not moving away from the focus of the research, enabled increased breadth and depth in the exploration of emerging topics.

Literature categories/themes

We also engaged experts in the parks/nature and health field (mix of academics, government employees, practitioners, educators) in a roundtable consultation, during which the unanimous decision was made to continue undertaking a ‘snowball’ technique of searching which included manually assembling literature known to us, consulting with known academics/practitioners and scanning reference lists of key articles (60). During the roundtable consultation, all of the participants agreed that the scope of this research was limitless, and in the context of *Healthy Parks Healthy People*, there was an expressed need to provide a key document outlining what is known in this area (applicable to policy and practice) and to identify emerging trends and gaps in the literature.

As a result of the roundtable discussion, the following were identified as new/emerging themes that were not included in ‘Healthy Parks Healthy People - The Health Benefits of Contact with Nature in a Park Context: A Review of Current Literature’ and ‘Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context—A Review of Relevant Literature’ (2nd edition) and therefore required consideration in this current version:

- Gen-Y and technology
- Understanding diversity from a psychological perspective
- Planning and management dimension
- Urbanisation
- Environmental diseases – immunity, asthma
- Climate change, fire, tree falls
- Economics
- Risk perception
- Spirituality (including diversity of spirituality)
- Justice/rights to access nature
- Collaboration and partnerships (especially the importance of these)
- Philosophies – organisational and individual
- Light and sound pollution

Limitations

As this review did not adopt a critical appraisal of the reviewed literature, it is important to note that we have not commented on any potential methodological limitations of the research. Rather, we have provided a synthesis and overview of the key research in the ‘parks/nature’ and ‘health’ field. Whilst every

attempt was made to review all the relevant literature in this field from 2008 onwards, it is probable that we have not captured all the available information as a result of our search methods and search terms. However, we feel that the 663 studies reviewed for this report do provide a comprehensive overview of the key research findings.

When reviewing the literature, we did uncover some limitations in terms of: inconsistency of terminology; the fact that research in the parks/nature and health field does not always engage under-represented populations (i.e. people with disabilities); and that the health benefits of nature cannot always be measured robustly (i.e. qualitative findings are not always considered as valuable as quantitative findings). Where relevant, we have attempted to highlight these limitations throughout the evidence implications sections.

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