Beyond Blue to Green:

The benefits of contact with nature for mental health and well-being

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Photo: VicHealth

1. Introduction

Thousands of tired, nerve-shaken, over civilised people are beginning to find out that going to the mountains is going home; that wildness is a necessity; that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life.

John Muir 1901

This quote, from the founder of the Sierra Club, the largest grassroots environmental organisation in the USA, highlights the fact that mental exhaustion, assumed to be a common outcome of everyday life in modern societies, is not new. Of much greater importance, however, is that he reminds us of the human need for contact with nature and of nature's capacity to benefit not only our physical needs but our psychological well-being as well.

This report, commissioned by *beyondblue: the national depression initiative (beyondblue)*, provides a review of existing Australian and international literature on the links between mental health and well-being and contact with nature, especially through green spaces. The evidence included in the review has been drawn from a range of sources including relevant electronic databases, peer-reviewed journals and grey literature. In contrast to past reviews, which have been broader in scope, the major focus of *Beyond Blue to Green* is on the links between parks and other green open spaces and mental health, in particular depression

and anxiety. While the review mainly concentrates on the most recent literature, where it is relevant (for example, to demonstrate changes in attitudes and understandings), older literature from earlier reviews has been included.

The conviction that contact with nature—for example through viewing landscapes that contain vegetation, water and other natural features—ameliorates stress and benefits humans in general, including patients in healthcare settings, is evident as far back as the earliest documented histories of China, Greece and Persia (Velarde et al. 2007, p. 49). The earliest hospitals in Europe were situated in monasteries which typically included cloistered gardens, providing "relief to the ill" (Velarde et al. 2007, p. 200). However, approaches to health have become increasingly technical since that time, leading to a decline in recognition of nature's healing role (Velarde et al. 2007).

Since the early 1980s, environmental psychologists have studied the health effects of contact with nature (Nielsen and Hansen 2007). At the same time, models that promote ecological health have informed the development of strategies such as "healthy cities", "healthy schools" and "healthy workplaces" which recognise the importance of natural environments for human health and well-being (Burls 2007b). Nevertheless, until recently even within these strategies, the major focus has been on the health effects of environmental degradation, with little attention paid to environmental deprivation (Townsend and Ebden 2006).

In the 1980s, the Ottawa Charter for Health Promotion (World Health Organization 1986) noted that "the fundamental conditions and resources for health are peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice and equity". Over the past two decades, there has been a growing acknowledgement that humans depend on nature not simply for material requirements such as water, food and shelter but also for emotional, psychological and spiritual needs (Friedmann and Thomas 1995; Frumkin 2001; Katcher and Beck 2006; Wilson 2001).

The recent past has seen researchers across a range of disciplines, including environmental health, public health policy, psychiatry, land use planning, horticulture, leisure, recreation and wilderness, contributing to the accumulation of evidence that supports the notion that contact with nature is beneficial for human health and well-being (Maller et al. 2006; Wells and Evans 2003). Based on this evidence, efforts have been made to improve quality of life in neighbourhoods and cities (Diener et al. 2006) through interventions such as increasing access to natural settings. While the major focus of this report is on green spaces and mental health, other nature-based approaches such as wilderness therapy, ecotherapy, ecopsychology, adventure therapy, horticulture therapy, animal-assisted therapy and garden therapy are also discussed in this review. A growing body of research evidence has supported these approaches for their ability to enhance health and well-being, skills and behaviours as well as reduce the risks of ill health (Pryor et al. 2006).

Identifying environments as "living entities" (Parr 2007, p. 539) which are intimately involved with humans, the powerful agency of nature as an "actively shaping force" (Parr 2007, p. 539) is considered in this report in relation to a variety of populations. *Beyond Blue to Green* aims to explore the evidence on the human–nature relationship and to understand

the ways in which nature helps to mitigate or even prevent mental health related issues and challenges faced by society today.

1.1 Definitions

Nature is defined as "an organic environment where the majority of ecosystem processes are present (e.g. birth, death, reproduction, relationship between species)" (Maller et al. 2006, p. 46). Nature also refers to "any single element of the natural environment (such as plants, animals, soil, water or air), and includes domestic and companion animals as well as cultivated pot plants" (Maller et al. 2006, p. 46). Nature can also refer "collectively to the geological, evolutionary, biophysical and biochemical processes that have occurred throughout time to create the Earth as it is today" (Maller et al. 2006, p. 46).

Nature has been subdivided into the following categories by the Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment ([HCNDACRSP] 2004, p. 25):

- Urban nature: nature in urban settings (e.g. gardens, parks, leisure parks)
- Agricultural nature: a primarily agricultural landscape with small, set-aside patches of nature
- Natural forests: nature in woodland where management is geared towards more authentic vegetation
- Wild nature: nature in an environment that develops spontaneously and can be maintained with minimal management (natural rivers, marshy woodlands, etc.).

Another study defines ***parks*** as "public natural environments, spaces reserved for their natural or cultural qualities, usually owned, managed and administered by public institutions" (Maller et al. 2006, p. 46).

The literature distinguishes between three different levels of contact with nature, each having its individual benefits for the participant (Pretty 2004; Stone 2006):

- Viewing nature: such as through a window, book, painting or on the television
- Being in the presence of nearby nature: such as walking, cycling to work, reading in the garden or talking to friends in the park
- Active participation in nature: such as gardening, farming, trekking, camping, running, horse riding, hedge laying or forestry.

Health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization 1946, p. 100). As this is one of the most widely cited definitions of modern times, it will be used for the purpose of this literature review.

Mental health is defined as "a state of complete physical, mental, spiritual and social well-being in which each person is able to realise one's abilities, can cope with the normal stresses of life, and make a unique contribution to one's community" (VicHealth, 2008, p. 1).

Well-being has been described as being not just the benefits gained from good psychological and physical health, but as being related to specific aspects such as favourable thoughts and feelings, satisfaction with life, ability to be self-sufficient and proactive, possessing a sense of happiness, and a positive evaluation of one's life in a general sense (Diener et al. 1999). According to the Australian Bureau of Statistics (ABS), there are multiple factors underpinning well-being, one of which is the natural environment.

From birth to death, life enmeshes individuals within a dynamic culture consisting of the natural environment (light, heat, air, land, water, minerals, flora, fauna), the human-made environment (material objects, buildings, roads, machinery, appliances, technology), social arrangements (families, social networks, associations, institutions, economies), and human consciousness (knowledge, beliefs, understanding, skills, traditions). Well-being depends on all the factors that interact within this culture and can be seen as a state of health or sufficiency in all aspects of life.

Australian Bureau of Statistics 2001, p. 6

Health promotion is defined as "the science and art of helping people change their lifestyle to move toward a state of optimal health. Optimal health is defined as a balance of physical, emotional, social, spiritual and intellectual health" (O'Donnell 1989, p. 5).

Biophilia is defined as the love of nature and living things (Sacks 2009).

Hortophilia is defined as the desire to interact with, manage and tend nature (Sacks 2009).

1.2 Examining past and present trends in humans' contact with nature

From infancy we concentrate happily on ourselves and other organisms. We learn to distinguish life from the inanimate and move towards it like moths to a porch light. To explore and affiliate with life is a deep and complicated process in mental development. To an extent still undervalued in philosophy and religion, our existence depends on this propensity, our spirit is woven from it, hope rises on its current.

Wilson 1984, p. 1

Documentation from history describes Egyptian physicians advising disturbed patients to walk in gardens and early nineteenth-century hospitals in Europe involving patients in the planting, caring and harvesting of crops in institutional farms (Nebbe 2006). In 1879, Pennsylvania's Friends Asylum for the Insane (later called the Friends Hospital) maintained a greenhouse for the use of its patients. In Michigan, the Pontiac State Hospital included patients in farming activities during the late nineteenth century (Nebbe 2006). At the conclusion of the Second World War, members of the National Federation of Garden Clubs volunteered at veterans hospitals around the USA in attempts to introduce war veterans to growing plants and gardening (Nebbe 2006). Plants and flowers as gifts have long been

known as symbolic gestures of positive thoughts and good wishes, expressions of friendship, means of extending an apology, and as tokens of love (Nebbe 2006).

While it has been argued that humans have an innate appreciation of close contact with nature, which is believed to have derived from the living conditions under which humans evolved (Frumkin 2001), more recently the growth of populations, increasing urbanisation and rapid technological developments have resulted in a new era with less "green" and more grey concrete surroundings. Kellert (2002, p. 118) observes that society today has become "so estranged from its natural origins, it has failed to recognise our species' basic dependence on nature as a condition of growth and development". Many researchers have come to the conclusion that humans may not be fully adapted to urban living and the stress related to such a lifestyle suggests that urban environments are not optimal habitats for humans (Bagot 2005; Kellert 1993; van den Berg et al. 2007).

Ironically, the need for attractive natural environments to relax in is increasing because of today's stressful and fast-paced lifestyles (Stone 2006). It is also useful to keep in mind that, even though technology is advancing rapidly, adapting successfully to these changes is likely to be a huge challenge since there have been minimal advances in our evolutionary development. Williams and Nesse (1991), for example, report that our genetic makeup has changed only 0.005 per cent in the last 10,000 years.

Fortunately, accessible green spaces have been identified as part of the solution to this maladaptation as they can promote holistic human health in modern urban environments (Bird 2007; Lee et al. 2009; Wendel et al. 2008).

2. Methodology

2.1 Literature search strategy

Relevant papers reflecting the benefits of nature and green spaces for the mental health and well-being of humans were identified using a number of databases: GreenFile, Global Health, Medline, Medline Pubmed, Medline With Full Text, Science Direct, Science Direct Freedom Collection, Academic Search Premier, Web of Science, ISI Web of Knowledge, Informaworld, Informit, Ingenta-connect, Sage Journals Online, Factiva, Scopus, Springerlink, Springer Ebooks, Ebscohost Ejs, CINAHL With Full Text and Blackwell Synergy.

The main terms used in the search strategy were: green space, nature, green settings, parks, forests, woodlands, wildlife, urban green settings, urban landscapes, horticulture therapy, eco-therapy, gardens, gardening, community gardens, animal-assisted therapy, pet ownership, pet therapy, animal therapy, equine therapy, adventure therapy, contact with nature, mental health, well-being, health, health promotion, open space, stress reduction, relaxation, depression, mood, anxiety, attention deficit hyperactivity disorder, physical activity, social contact, interaction, social connect, attention fatigue, concentration, brain injury, tree climbing, human–animal interaction. These terms were used to identify relevant articles with any of the above words in the main subject heading, abstract, body of the text or in key words.

Papers published after the year 2000 were considered during the initial search. As too few articles could be located for certain sections of the review, the second search included

articles from 1980 onwards, although most articles were from the mid to late 1990s, except for classic studies from the early 1980s.

Apart from peer-reviewed journal articles, grey literature was retrieved and used wherever relevant. This was drawn from a range of websites such as the World Health Organization, The Latham Foundation, Australian Conservation Society, VicHealth, Victorian Department of Planning and Community Development, Australian Institute of Health and Welfare (AIHW), Australian Institute of Urban Studies, New South Wales Department of Sports, Tourism and Recreation, IUFRO, and Friends of the Earth International.

The search engines Google and Google Scholar were utilised to search and locate articles which could not be accessed through the sources cited above and below.

A number of books were selected from and located through bibliographies, library searches, e-books and personal book collections of the authors. Those books are listed in Appendix A.

2.2 Selection of articles for the review

All accessible and relevant post-2000 articles located were used. However where documents with significant evidence from earlier decades were located, these studies were also cited in the review, especially in sections lacking sufficient post-2000 data.

Information and data from both grey literature and books were selected depending on the relevance of subject material to the review.

2.3 Analysis

Literature collected via the search strategy outlined above was read to identify key relevant themes and sub-themes, and to gather and collate evidence.

3. Prevailing theories linking well-being and contact with nature

When one tugs at a single thing in nature, he finds it attached to the rest of the world.

John Muir 1901

This chapter outlines a range of theories about the effects of contact with nature on human health and well-being, and specifically for mental health. While these theories come from a range of discipline areas, not surprisingly the majority of them have their basis in psychology.

3.1 The biophilia hypothesis

First developed in the 1980s by Wilson (1984), and since explored further by him and others, the most basic definition of "biophilia" is the love of nature and living things (Sacks 2009). This hypothesis revolves around the concept that "people possess an inherent inclination to affiliate with natural processes and diversity, and this affinity continues to be instrumental in humans' physical and mental development" (Kellert and Derr 1998, p. 63). The close links people have had with the natural environment from the beginning of human existence are hypothesised to have ingrained this affinity with nature in human genotypes through the evolutionary process (Kellert 1993). However, Kellert, an eminent scientist and researcher on this topic, notes "the manifold ways by which human beings are tied to the remainder of life

is poorly understood" (Kellert 1993, p. 42). Nevertheless, despite this lack of understanding, there is a growing recognition that this need for nature is connected not just to material exploitation of the natural environment, but also to human emotional, cognitive, aesthetic and spiritual growth (Kellert and Derr 1998; Konijnendijk 2008b; Wilson 1984).

Drawing on research by Kellert and Derr (1998) in the field of adventure therapy, Burls (2007b, p. 29) highlights the benefits of human interaction with nature in terms of nine 'values' of nature:

- Aesthetic value (physical attraction and beauty of nature): adaptability, heightened awareness, harmony, balance, curiosity, exploration, creativity and an antidote to the pressures of modern living
- Dominionistic value (mastery and control of nature): coping and mastering adversity, capacity to resolve unexpected problems, leading to self-esteem
- Humanistic value (affection and emotional attachment to nature): fondness and attachment, connection and relationship, trust and kinship, co-operation, sociability and ability to develop allegiances
- Moralistic value (spiritual and ethical importance of nature): understanding of the relationship between human wholeness and the integrity of the natural world, leading to a sense of harmony and logic
- Naturalistic value (immersion and direct involvement in nature): immersion in the sense of authenticity of the natural rhythms and systems, leading to mental acuity and physical fitness
- Negativistic value (fear and aversion of nature): developing a healthy respect for the risks, power and dangers inherent in nature with an equivalent sense of awe, reverence and wonder, leading to learning to deal with fears and apprehensions in a constructive way
- Scientific value (knowledge and understanding of nature): developing a cognitive capacity for critical thinking, analytical abilities, problem-solving skills leading to competence
- Symbolic value (metaphorical and figurative significance of nature): being able to access the limitless opportunities offered by the process in the natural world to develop understanding of one's own circumstances, leading to cognitive growth and adaptability
- Utilitarian value (material and practical importance of nature): emphasising the practical and material importance of the natural world on which we rely for survival.

These values, and the evidence of how they influence humans' relationships with nature (Kellert and Derr 1998), provide support for the biophilia hypothesis as they indicate ways in which contact with nature contributes to various facets of physical, emotional and intellectual growth and development (Burls 2007b).

3.2 Attention restoration theory

Humans are said to have two types of attention: voluntary and involuntary (James 1962). Voluntary attention, which Kaplan (1995) refers to as directed attention, is the type of attention used when a task requires deliberate and sustained attention (Herzog et al. 2003; James 1962). By contrast, involuntary attention (sometimes referred to as 'soft fascination') does not require an effort. James (1962, p. 231) proposed that certain elements in our environments such as "strange things, moving things, wild animals, bright things, pretty things, etc." can draw in this type of attention.

Building on the work of James, Kaplan and Kaplan (1989) describe attention fatigue as a process that occurs during the performance of cognitive tasks which require prolonged use of directed attention and active suppression of irrelevant information. When the capacity to maintain directed attention becomes overloaded, performance declines, and people are subjected to increased levels of mental fatigue, leaving them less capable of dealing with uncertainty and having a reduced ability to plan (Korpela et al. 2001, pp. 575–576).

Involuntary attention or 'soft fascination' (typically associated with contact with nature through ordinary natural settings) is capable of restoring voluntary or directed attention, and has been highlighted by a number of authors (e.g. Faber-Taylor et al. 2001; Herzog et al. 2003; Kaplan and Kaplan 1989). According to Kaplan and Kaplan (1989), contact with nature contributes to recovery from this process in four ways. First, natural environments provide opportunities to gain distance from routine activities and thoughts. This is referred to as "being away". It may be associated with easily accessible natural environments within urban areas, as well as with more distant areas in close proximity to the sea, mountains, lakes, streams, forests, meadows and other idyllic places commonly used to "get away" from busy city living (Kaplan 1995).

Second, the "soft fascination" automatically associated with aspects of nature such as clouds, sunsets, snow patterns and the motion of leaves in the wind holds human attention effortlessly, while providing sufficient opportunity to allow the mind to think about other things. Third, the 'extent' of the natural environment can provide a scope or depth of experience in which one can become immersed so that the mind is engaged and gains rest from other concerns (Kaplan 1995). Fourth, because people have an inherent affinity with nature, natural environments provide a setting that is compatible or well matched to human desires, which allows attention to rest.

While non-natural experiences could have these four characteristics present, many studies have shown that contact with nature is the most common and most reliable source of mentally restorative experiences to contain all four simultaneously (Bodin and Hartig 2003; Hartig et al. 2003; Herzog et al. 2002; Herzog et al. 2003; Wells 2000).

An environment abundant with these four characteristics, or even just one of two, is likely to invoke involuntary attention, which allows directed attention to rest and replenish (Kaplan 1995). Korpela et al. (2001) deems that a restorative experience which includes all four factors working together to a relatively high degree during a given period of time will eventually lead to an individual gaining the ability to confront difficult personal matters and

reflect on themselves and their priorities in life. A Swiss study (Hansmann et al. 2007) found that visits to forests and parks promoted recovery from stress in 87 per cent of respondents, and a sense of being well-balanced in 40 per cent of respondents. This supports the view that recovering direct attention capacity leads to a contemplative state of mind, where people can attain a state of calm or balance and think through and gain perspective on their problems (Francis and Cooper-Marcus 1991).

3.3 Stress reduction theory

Closely related to the biophilia hypothesis, and sometimes referred to as "psycho-evolutionary theory", stress reduction theory proposes that natural environments promote recovery from stress (as distinct from attention fatigue, discussed above), while urban built environments tend to hinder the same process (Konijnendijk 2008a; Velarde et al. 2007). Psycho-evolutionary theorists suggest the underlying mechanism for this benefit works because natural environments do not require large amounts of information to be processed and therefore an individual's arousal (stress) level is reduced by spending time in such settings (Ulrich 1979).

In the context of this theory, stress is defined as a set of physiological responses to any situation which threatens well-being (Baum et al. 1985). According to this theory, the body responds to threats through negative emotions, physiological indicators and increased autonomic arousal (Ulrich 1983; Ulrich et al. 1991). Fear, anger, sadness, and increased blood pressure and heart rate are some of the many emotions and indicators that are central to the stress response (Ulrich 1983). This theory contends that in early human existence the restorative effects of natural settings such as savannahs and places with water assisted in relieving stress and in restoring expended energy levels and thereby created an evolutionary advantage to humans (Ulrich 1983; Ulrich et al. 1991).

Because humans developed and evolved in natural environments as opposed to urban settings, it is proposed that engagement with such environments continues to be positively adaptive for modern humans (Ulrich et al. 1991). To display a stress response involving high levels of physical arousal in the face of an unthreatening natural setting would be maladaptive, since this process would cause fatigue and lead to chronic cardiovascular and endocrine responses that would adversely affect health. This is why such behaviour is not usual for humans (Ulrich et al. 1991). In contrast, according to Ulrich et al. (1991), a similar innate biological preparedness to respond positively to urban settings is not likely to have developed. Stimulating environments such as cities—especially those with high levels of visual complexity, noise, intensity and movement—can affect people negatively by producing excessively high, stressful and fatiguing levels of psychological and physiological "excitement". Because environments containing plants or other nature tend to be lower in intensity and less perceptually jumbled than many urban environments, they have comparatively positive, stress-reducing effects on people (Ulrich and Parsons 1992).

Studies have demonstrated the validity of stress reduction theory (Ulrich 1981; Ulrich et al. 1991). For example, Ulrich and colleagues have found that places for which people typically

have an aesthetic preference—settings which evoke moderate levels of interest, pleasantness and calm—are usually found to be places where recovery from stress takes place (Ulrich 1983; Ulrich et al. 1991). In such settings negative feelings are replaced by positive ones, negative thoughts are inhibited, and autonomic arousal decreases (Ulrich 1983; Ulrich et al. 1991). Features usually found in settings of recovery include moderate depth and stimulus complexity, a focal point, and the presence of appropriate features such as vegetation and water (Ulrich 1983; Ulrich et al. 1991), all of which are commonly found in natural settings (Herzog and Strevey 2008).

3.4 Environmental self-regulation hypothesis

Self-regulation is a process which enables an individual to adapt in situations or environments that are emotionally arousing by using various mental, physical, social and environmental strategies (Vuorinen 1990). There are differing views about the ways such self-regulation occurs. According to Korpela and his colleagues (2001), environmental self- and emotion-regulation strategies involve the use of places, place cognitions and affects.

Results from studies indicate that positive emotional states can be achieved and enhanced during time spent viewing natural settings, as well as during contact with nature (e.g. Faber-Taylor et al. 2001; Faber-Taylor et al. 1998; Kellert and Derr 1998).

Study results (see section 6.1) have also confirmed physical activity in natural settings greatly improves positive emotions, self-esteem and behaviours (Boldeman et al. 2004; Health Walks Reseach and Development Unit 2000; Humpel et al. 2004; Morris 2003; Townsend and Ebden 2006). Natural settings promote social exchanges and interactions which result in positive emotional states and behaviours, as indicated in the numerous studies cited in section 6.2 (e.g. Bertera 2003; Bowling et al. 2003; Glass et al. 2006; Kweon et al. 1998; Sugiyama and Thompson 2008; Townsend and Ebden 2006; Wells and Evans 2003).

The studies cited above and in the following section reinforce the validity of the numerous environmental strategies (for example, the use of natural spaces and restorative environments such as parks, tree-lined streets and natural water features) deployed to change negative feelings to a more positive state within the context of this hypothesis (Korpela et al. 2001).

3.5 The bio-ecological model

The principle rule in this theory is that genetic material does not produce finished traits, but interacts with the environmental experience in determining developmental outcomes (Gottlieb 1991, 1992; Cairns 1991; cited in Bronfenbrenner and Ceci 1994).

It has been suggested human development occurs through progressively complex reciprocal interactions between an active, evolving human or organism, and the persons, objects and symbols in its immediate environment. The effectiveness of this process is believed to depend on its regularity over a considerable length of time (Bronfenbrenner and Ceci 1994).

Within this theory, interactions with the immediate environment are known as “proximal

processes". They include problem solving, acquiring new knowledge, performing complex tasks, and active involvement in group or solitary play (Bronfenbrenner and Ceci 1994). This means proximal processes are the primary engines of effective development (Bronfenbrenner and Ceci 1994).

A number of the studies cited in section 4.2.1 describe how natural environments are conducive to the effective occurrence of proximal play, especially in children (Bagot 2005; Burdette and Whitaker 2005; Burls 2007a; Burls and Caan 2005; Castonguay and Jutras 2009; Derbyshire 2007; Heerwagen 2009; Kellert 2002; Loukaitou-Sideris 2003; O'Brien 2005b).

Using this lens, one could also postulate that "nature deficit disorder", which is referred to by Louv (2008) as children's lack of contact with nature, is likely to be closely connected to developmental deficits in such children.

3.6 The relaxation response

The relaxation response is a subjective state unique to individual experiences, but similar to the state produced during meditation. Regardless of the cultural sources that describe the experience, there appear to be four basic elements underlying the relaxation response (Katcher et al. 1983).

The first element is a quiet environment, where one turns off not only internal but also external distractions. Many people are known to use the outdoors for this purpose. The second element is something to focus attention on such as a word, object or sound repetition. Directing attention to this element helps eliminate other thoughts and can assist in clearing the mind. The third element is a passive mind where thoughts, imagery and feelings will drift in and out of one's awareness without being the focus of concentration. This is also referred to as being in a reverie. The fourth and final element is the availability of comfort.

Katcher and colleagues (1983) comment that natural objects of contemplation, and sights that induce a reverie in nature, have a similar quality in that they induce relaxation. However, they claim this is unlike the state of mind achieved through meditation which induces relaxation through deliberately monotonous techniques. According to this theory, it is the inherent combination within natural objects of beauty, novelty, monotony, constancy and sudden beauty (such as the movement of brightly coloured fish in a tropical reef, the passing of birds through a forest, the pattern of clouds, the sea or a glowing fire which momentarily attract a human's gaze, but descend again into an essential constancy) that induce such a response.

3.7 Maslow's hierarchy of needs

The hierarchy of human needs developed by Abraham Maslow (1970), although not specifically focused on nature or the natural environment, outlines the needs of humans in terms of a hierarchy, with the meeting of more basic needs preceding the meeting of "higher order" needs. An analysis of the hierarchy indicates numerous ways in which nature and natural experiences may contribute to an individual meeting his or her needs. The following diagram and subsequent description provides an outline of the hierarchy and its elements (Maslow 1970).

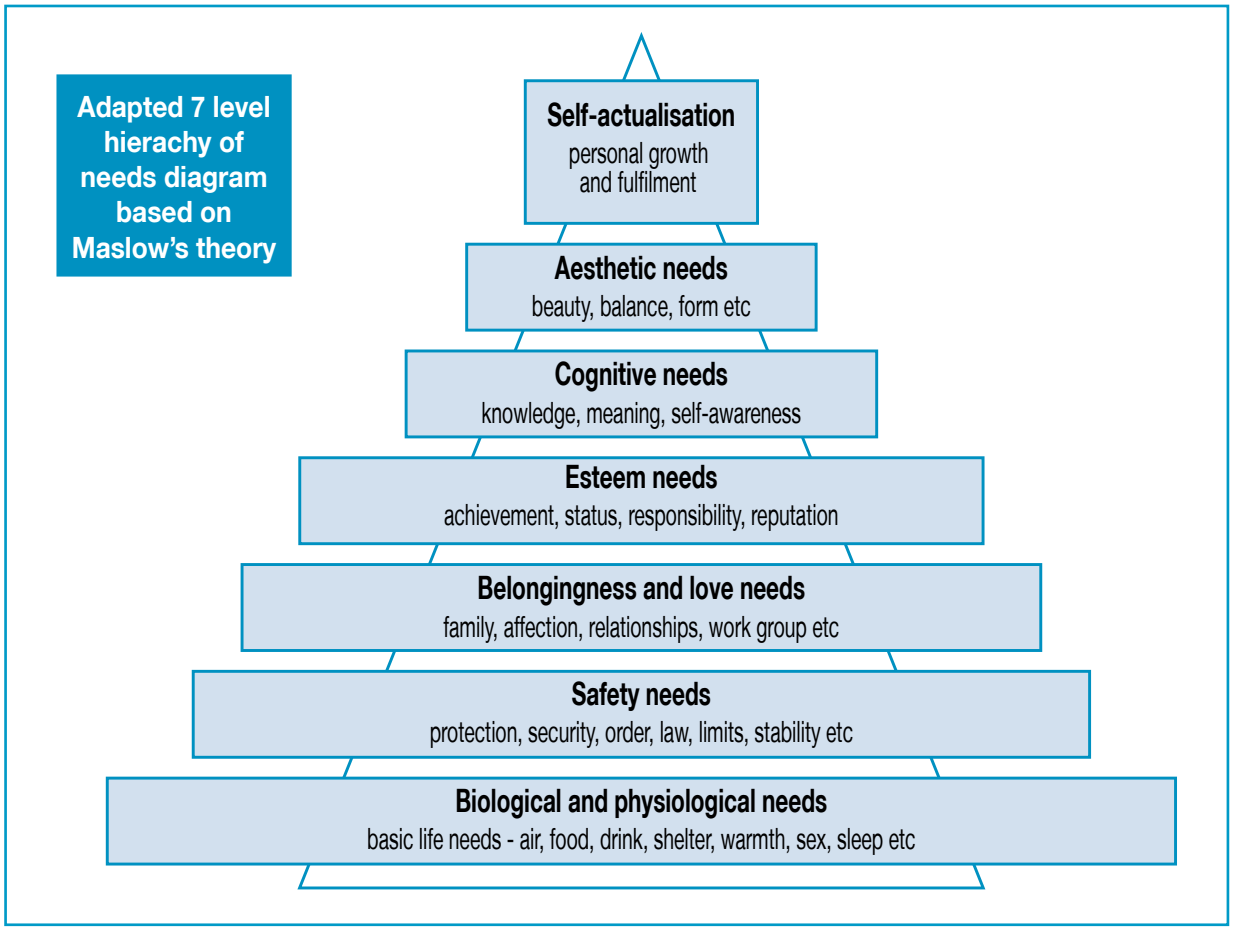


Figure 1: Adapted hierarchy of needs diagram based on Maslow's theory (Chapman, 2001–2007).

Drawing on Maslow's (1970) hierarchy, Macintyre and colleagues provide a list of areas which exhibit the importance of environment or place to human health (Macintyre et al. 2002). At the bottom level humans require basic essentials such as unpolluted air, clean water, sufficient food and shelter for survival, while at the other end of the hierarchy humans require supportive personal relationships, a sense of spirituality, opportunities to participate in group activities, and prospects for recreation.

Townsend and Ebden (2006) used this as a framework for an intervention entitled "Feel Blue, Touch Green" in which people experiencing depression and/or anxiety were given an opportunity for hands-on interaction with natural environments. The study showed the activities contributed significantly to higher-level needs being met. Similarly Nebbe (2006) reports that, in a therapeutic setting, the deficits in a patient in relation to this hierarchy of needs can be dealt with through diverse interventions that draw on the numerous features and opportunities provided in nature. Swan (1977; cited in Nebbe 2006) reports that the spiritual or enlightening experiences which Maslow (1970) refers to as "peak experience" are often known to occur in natural environments.

4. Health benefits associated with contact with nature

Put the pale withering plant and human being into the sun, and, if not too far gone each will recover health and spirit

Nightingale 2008, p. 123

4.1 Introduction

Narratives dating back centuries describe gardens, pastoral landscapes and natural settings with miniature lakes and meadows, as places where people can take refuge, find shelter and comfort during moments of sadness and pain; as places where the body and mind can both heal (Ottosson and Grahn 2008). Such places were portrayed as settings longed for both in life and in the afterlife (Stigsdotter and Grahn 2002). Over 2000 years ago, greenhouses and gardens, perceived as beneficial to health, were created by Chinese Taoists (Louv 2008). In 1699, the book *The English Gardner, or, A sure guide to young planters and gardners* advised the reader to spend "spare time in the garden, digging, setting out, or weeding; there is no better way to preserve your health" (Louv 2008, p. 45). In the nineteenth century nature began to be viewed as a source of beauty as well as healing powers, and spas and sanatoriums were built on mountains or close to the sea based on these beliefs (HCNDACRSP 2004; Wells and Evans 2003). During this time Romantic writers, poets and painters began to glorify what remained of "wild untamed nature" (HCNDACRSP 2004).

A plethora of research has shown humans appreciate the diverse features offered by nature such as the varied foliage in a wood, the sound of bird song or the sight of ocean waves lapping at the seashore (Frumkin 2001). The therapeutic effects gained from the sounds of flowing water and the wind rustling through the leaves has also been given increasing attention in recent studies (Nilsson 2006). It has also been noted that tree density and vegetated settings also elicit positive emotions in observers (Hull and Harvey 1989; Ulrich 1983). Frumkin (2001, p. 235) quotes Richard Kaplan as stating, "Nature matters to people. Big trees and small trees, glistening water, chirping birds, budding bushes, colourful flowers. These are important ingredients in a good life." The sense of calmness, reinvigoration and rejuvenation of mind, body and spirit during an experience in the outdoors (Heerwagen 2009) relates to the rudimentary features of nature which elicit feelings of safety, opportunity, connection and pleasure in the environment (Kellert et al. 2008).

In the United Kingdom, 1.2 billion visits are made to the countryside each year, with a further five billion visits to urban parks (Peacock et al. 2007). Peacock and colleagues collected data which showed that in the UK five million people were regular anglers; 15 million people garden on a regular basis; six of every 10 households have a family pet; and millions of others are bird watchers, wild-fowlers, pigeon racers, dog walkers, ramblers, runners, horse-riders, cyclists and game-shooters (Peacock et al. 2007). While this data clearly indicates humans have a special affinity for nature in which many of them are engaging in recreation, it is disheartening to know parks and public nature reserves are now perhaps the only means of accessing nature in the daily lives of many urban-dwelling individuals (Maller et al. 2006).

Melbourne is reported to have the largest area of parkland within a 3-kilometre radius of the CBD of any major city in the world (Australian Institute of Urban Studies and City of Melbourne 2005). In 2002–2003, 105.7 million visits were made to parks and gardens in the Melbourne metropolitan area. While 6.9 million of these were made to major metropolitan parks, the rest were to local parks and gardens around Melbourne (Parks Victoria, undated; cited in Australian Institute of Urban Studies and City of Melbourne 2004).

Other Australian research has shown growing numbers of urban dwellers moving to coastal areas and "the bush" (Burnley and Murphy 2004). This may reflect, perhaps, the search for locations idealised in childhood memories of favourite holidays or iconic places in nature, where many hope to lead a different and simpler life in an attempt to spend more time on relationships with family and friends (Abbot-Chapman 2006).

4.2 Research linking nature contact with health and well-being

It is a well-established fact that, until the recent past, humans developed as an integral part of the natural world. The environments humans now evolve and live in have changed significantly, and humans are losing touch with the natural world at a rapid rate (Nebbe 2006). Scientific evidence has clearly shown how displacement of species from their habitats has an adverse impact on their quality of life and development, and in certain cases has given rise to their extinction (Nebbe 2006). The deep-seated human need for contact with nature suggests that in the modern world there is a pressing need to bring about a closer affinity with the

natural world. Without such a change, a detriment of huge proportions will be inflicted on humanity (Nebbe 2006).

Research has shown that, irrespective of socio-economic background, age or gender, natural environments are perceived as an important link to a more stable world, one that assists in reforming chaotic thoughts and feelings into more harmonious forms (Stigsdotter and Grahn 2003). A study which used a questionnaire including a set of open-ended questions to identify people's favourite places showed that natural settings were the clear favourite among the majority of participants, as well as being under-represented among places perceived as unpleasant (Korpela et al. 2001). Among the dominant benefits reported in favourite places were relaxation, calmness, emotional well-being, happiness, enjoyment, excitement, forgetting of problems and the opportunity to reflect on personal matters (Korpela et al. 2001).

Scientific research on the well-being benefits of contact with animals and plants has revealed that encounters with the natural environment are very likely to have a significant positive effect both physiologically and psychologically on human health and well-being (Burls 2007b; Ewing et al. 2007; Faber-Taylor et al. 2001; Faber-Taylor and Kuo 2009; Friedmann 2000; Heerwagen 2009; Herzog and Strevey 2008; Kaplan 1995; Kellert and Derr 1998; Maller and Townsend 2006; Parish-Plass 2008; Park et al. 2008; Parr 2005, 2007). Contact with nature affects numerous facets of a person's physical, mental and social life such as:

- reducing anger, frustration and aggression (Groeneweggen et al. 2006)
- increasing a sense of belonging and acceptance
- a range of other aspects including socialisation, mobility, mental stimulation, touch, physiological benefits, and the fulfilment of basic needs such as love, respect, usefulness, trust, self-worth and nurturing (Nebbe 2006; O'Brien 2005b).

Research on the physiological health benefits of gardening, for example, has shown that gardening:

- reduces the risk of cardiovascular disease (Lemaitre et al. 1999)
- reduces HDL cholesterol levels in elderly men (Bijnen et al.1996)
- improves the health of diabetes patients (Armstrong 2000a)
- reduces risk of gastro-intestinal haemorrhage (Pahor et al. 1994).

Further, natural environments have been shown to increase feelings of social safety and to reduce crime and aggressive behaviours (Kuo and Sullivan 2001b; Kuo et al. 1998).

For many people in urban areas, parks offer one of the only opportunities for contact with nature. Parks were initially designed to reduce disease, crime and social unrest while also being a source of enjoyment to people, a means to cleanse the air, to provide a place for recreation and to offer an easy escape from the everyday stresses of life (Bedimo-Rung et al. 2005; Maller et al. 2006; Wong and Domroes 2005). Therefore, it is useful to keep in mind Kaplan and Kaplan's (1989, p. 173) comment that "people with access to nearby natural

settings have been found to be healthier overall than other individuals. The longer term, indirect impacts of nearby nature also include increased levels of satisfaction with one's home, one's job and with life in general."

Both physiological and psychological benefits arise from the use of parks and there is a link between the two. Park-based leisure which provides physiological benefits has been shown in addition to improve mood, reduce perceived stress levels, and enhance an individual's sense of wellness (Orsega-Smith et al. 2004) . Enjoyable scenery, seeing others exercise, having access to and being pleased with the available recreational facilities (Brownson et al. 2001; Cohen et al. 2006; Epstein et al. 2006; Humpel et al. 2002; King et al. 2000; Sallis et al. 1992; Wilcox et al. 2000) have all been shown to be factors which promote physical activity in a park environment. Parks have also been identified as reducing air pollution through the absorption and storage of gaseous pollutants by park trees (Nowak 1994), as well as providing shade and moderating temperatures by cooling the areas, thereby helping to reduce heat-related illnesses in city dwellers (Blum et al. 1998; Cummins and Jackson 2001; Nowak et al. 2000).

Investigating poor urban areas, studies of a Chicago public housing community found trees and natural landscaping prompted more people to visit the outdoor areas compared to settings devoid of these natural features (Coley et al. 1997). Similarly, trees and natural landscaping have been associated with improved social interaction (Kweon et al. 1998). Studies of the impact of building surroundings on human health and behaviours have shown that increased greenness and natural elements around a building reduced crime levels in the area, as well as intra-family aggression and violence levels of residents in the area (Kuo and Sullivan 2001a, 2001b).

Hartig et al. (1991) have found that mental fatigue is most successfully alleviated by walking in a park. Thus the evidence once again suggests the restorative effects of both parks and nature as a whole (Maller et al. 2006).

A Hong Kong-based study used 15 images of Kowloon Park as visual stimuli and evaluated what is most liked or preferred by the park's visitors. The responses were used to establish the "likeability index" (percentage of respondents who liked or disliked the scene) of the scene as well as an appraisal rating score in which respondents evaluate each scene according to 10 appraisal aspects such as unpleasant/pleasant and sleepy/arousing (Wong and Domroes 2005). Most perceived scenes with vegetation (natural elements) as a major source of delight, whereas built scenes were a source of displeasure in urban park settings. These results correspond with results from similar studies (Kaplan and Kaplan 1989; Ulrich 1983). Greenery (especially diverse types of vegetation), water (especially the sound of it, which was reported to increase relaxation), and waterfowl and fish were particularly useful in enhancing the likeability of an urban park (Wong and Domroes 2005).

A report from the former government agency, English Nature (2003; cited in Burls 2007b), recommends the availability of at least two hectares of accessible natural green space per 1000 people, and that no one should live more than 300 metres (or five minutes' walking distance) from the nearest area of natural green space. This report argues that to gain a

significant benefit from green spaces on a regular basis (that is, three or more times each week), access needs to be localised. Functional and easily accessible natural environments have been shown to serve as a positive determinant of human health (Anderson and Part 2005; Corvalan et al. 2005; O'Brien 2005b). This connection to nature on a daily basis is additionally believed to reinforce the values of care and respect for the ecosystem which are requirements for a sustainable society (Heerwagen 2009).

Green settings have also been identified as places accessible to everyone in the community without any formal, financial or symbolic restrictions, where social transactions such as respecting unfamiliar gender roles or developing friendships which cross ethnic and cultural boundaries can take place in a neutral, restorative and aesthetically pleasing environment (Dyment and Bell 2006; Seeland et al. 2009). Having acknowledged these facts, it is important to reiterate that achieving the health and well-being benefits outlined above is largely determined by the quality, quantity and accessibility of these green spaces (O'Brien 2005b; O'Brien 2005a; Tyrväinen et al. 2005).

In a large-scale urban nature project in the Netherlands, a nationwide study on the benefits to human health from green space, titled "Vitamin G", was conducted at a household, community and regional level (Groeneweggen et al. 2006). Evidence from the project showed that residents living close to green spaces, with household gardens and access to neighbourhood parks, had a better health status compared to those living further away or having poorer access (Heerwagen 2009).

An Estonian study, which evaluated the restorative effects of nature as well as its connections to human health, indicated that respondents gained positive effects and benefits from activities such as observing nature, taking walks in natural surroundings, hiking and hunting, gathering berries and mushrooms, gardening, fishing and working in the forest (Raudsepp 2005; cited in Hansmann et al. 2007). Both the fact of spending time in nature, and the length of time spent in nature have been shown to influence health outcomes. In a study conducted in Zurich, Switzerland, by Hansmann et al. (2007), the duration of stay in green spaces (parks and forests were used for the purpose of this study) was significantly and positively related to increases in well-being reported by the participants.

Based on the hypothesis that income-related inequality would have less of an impact on populations if they had greater exposure to green open spaces, a study was conducted in England dividing people who were younger than retirement age into four income-deprivation groups and five groups according to the access they had to green space. The study evaluated predicted mortality levels (Mitchell and Popham 2008). Mortality data for 2001–2005 showed that deaths from all causes in income-deprived communities was lower for those living in the most green areas and higher for those living in less green areas (Mitchell and Popham 2008).

A Finnish case study examined the use and value of green spaces in the context of the daily lives of teenagers (Mäkinen and Tyrväinen 2008). Questionnaires and surveys were used to collect data on teenagers' perceptions of small and large parks, green corridors and forests as well as remote natural areas which are accessed less often. While the more

easily accessible areas were perceived as providing opportunities to enjoy the natural scenes, peace, quiet, restoration and social interaction, the less accessible areas were also appreciated for their aesthetic beauty, opportunities for adventure and contact with nature.

A study in the UK and Italy investigating the use of green spaces and perceptions of its benefits focused on six green spaces. A total of 800 subjects from Italy and 400 from the UK took part (Lafortezza et al. 2009). The spaces were visited on days which were hot and sunny and when air temperatures were significantly higher than on average days. Results showed a positive association between the frequency of visits and time spent in green spaces, and the benefits and well-being reports provided by participants during the survey. Statistical analysis of the data supported the study hypothesis that frequency of use of green spaces could generate benefits and well-being for people. This can be partly explained by the capacity green spaces possess to provide better thermal comfort during periods of intense heat, which is known to cause heat stress (Gómez et al. 2004).

In terms of workplace health, multiple studies have identified the benefits of views of nature through a window for employees. For example, a survey was undertaken by Kaplan and colleagues (1988) with 163 employees of whom 55 had no views to the outside or no view of natural elements, 60 could see natural elements from their workplace and 48 whose work took place mostly in natural settings such as parks. The research included questions about perceived job stress and effectiveness of various restorative opportunities, life satisfaction, physical health and certain workplace environmental characteristics. Although the participants who conducted work mostly outdoors reported the most positive feelings in relation to the questions on the survey, the researchers suggest that this could have been attributable to the type of work being done and therefore cannot be assumed to be the result only of time spent in natural environments. However, the comparison between those who could and could not view nature or any natural elements showed that individuals with natural views reported fewer ailments and higher job satisfaction.

A subsequent study used a survey with questions on health, psychological functioning, life satisfaction and work environments to investigate the association between contact with nature and employee satisfaction and health (Kaplan 1993). It involved 615 participants who were in relatively sedentary jobs. Employees who could look out on to the natural world reported feeling less frustrated; showed improved levels of patience; found their job more challenging and expressed greater enthusiasm for it; and reported higher life satisfaction and overall health. A further study by the same research group investigated the effect of views on psychological restoration in an office environment. Findings showed a view displaying greater availability of nature had a strong effect on satisfaction and restorative ratings. Subjects displayed less frustration and more patience; a greater enthusiasm and life satisfaction; and improvements to overall health ratings. By contrast, views without natural elements had the opposite effect in terms of satisfaction and restoration (Kaplan 1993).

Similarly, a study by Leather and colleagues found that a higher percentage of rural elements such as trees, vegetation, plants and foliage in a given view buffered the negative impacts of job stress for subjects. Their intention to quit reduced and a marginal but positive effect was seen in their general well-being (Leather et al. 1998). Where there were lower percentages

of the same elements or when they were completely absent, subjects showed higher stress, reported lower job satisfaction and an increased intention to quit (Leather et al. 1998). Pretty (2004) and Wells (2000) have also described examples of the benefits gained from windows in offices. Pretty (2004), like Leather and colleagues, showed nature views from windows acted as a buffer for stress. Wells (2000) describes increased cognitive function among office workers, associated with looking out into greener outdoor environments.

For people with chronic and terminal illnesses, contact with nature has also been shown to be beneficial. Sacks (2009) identified two types of non-pharmacological 'therapy' which are vital for patients with chronic neurological diseases: therapy using music and gardens. Sacks believes humans have a biological need and craving for music and greenness. According to Sacks, despite numerous and varying disabilities, it is rare that humans would stay indoors when an opportunity to be outdoors is provided.

In people with terminal and chronic illness, studies have shown increased communication during interactions with nature. Recalling memories, planning and setting goals, and learning new ideas are commonly seen evidence of mental stimulation associated with nature contact. Below are examples from Reynolds (1995) which describe this:

> Scenario 1: Bill is an 80-year-old man, and as he is digging in the dirt he begins to talk about his life before the institution: "I once had a farm. I built all the stone walls on my 100 acres" (Reynolds 1995, p.68).
>
> Scenario 2: An extract from a story from *Bring Me the Ocean* (Reynolds 1995, p. 9). A young tree is shown around, its roots held in burlap so that it can be seen top to bottom before being replanted. A young girl who is blind strokes the roots and says: "Now I see how a tree stands! I've never seen roots before."

Sacks (2009) draws on research to cite two cases where contact with nature appeared to overcome (at least for a time) the effects of chronic illness: one person with Tourette's syndrome whose tics completely disappeared during a hike in a desert, and the second with Parkinson's disease who, although often unable to initiate movement, climbed up and down a rock garden unaided during a single visit there. Similarly, advanced dementia or Alzheimer's disease patients who have very little sense of orientation to their surroundings, know exactly what to do when dealing with plants in a garden. The importance of natural environments to those experiencing cognitive difficulties and reduced physical dexterity due to age or illness is illustrated through the launch of eight Alzheimer's Memory Gardens in cities across the United States (Brawley 2004).

Many studies investigating the benefits of contact with nature through human–animal interactions for people with chronic or terminal illnesses have also found positive results (McCulloch 1983; Fritz et al. 1995; Arnold 1995; Kovacs et al. 2004; Allen et al. 2000; Barak et al. 2001; Marr et al. 2000; Nathan-Barel et al. 2005; Richeson 2003). These studies are described in detail in section 5.6.2.

Civic volunteering, which is discussed within other sections of this review, can also be focused on nature through examples such as "Friends of Parks" groups (Maller et al. 2006).

This is another example of how parks can contribute to people's general health and well-being, as well as increase social connectedness by working within a cohesive group towards common community development tasks in a local natural area.

The benefits of contact with nature and other life forms for human health and well-being are already well documented. Such benefits hold true regardless of age, gender, race, ethnicity and health status. Nature is now identified as a commodity which should be readily available to urban dwellers and not just to the lucky few who live close to parks and open spaces (Heerwagen 2009; Pretty 2004). The importance of this for social inequality is emphasised by Maller et al. (2006, p. 50) who comment that ecological inequality or the lack of opportunity to experience contact with nature may come to be considered as "a third powerful determinant of health and well-being" in populations, and that accessibility to nature may be seen within social justice paradigms.

4.2.1 Research linking nature contact with children's development

It is commonly believed that children have a predilection for natural environments and that environments preferred by children are primarily comprised of natural elements (Seeland et al. 2009; Wells and Evans 2003). Research by Moore (1986; cited in Wells and Evans 2003) showed that when children from urban areas aged nine to 12 years were requested to make a map or drawing of their favourite places, approximately 96 per cent of the illustrations were of outdoor places, while only four drawings reflected interior spaces. A study conducted in Canada to evaluate the place preferences of children from low-income families living in poor neighbourhoods found similar results to Moore's study (cited above), in terms of the most common features in their favourite places (Castonguay and Jutras 2009). The majority of children referred to nature during the description of their favourite places, and showed awareness and sensitivity to the natural elements present in the environments, such as specific trees and even a flowering plant.

As Kaplan and Kaplan (1982, p.147; cited in Wells and Evans 2003) point out, "an organism must prefer those environments in which it is likely to thrive". The outdoors is believed to be one of the most suitable and favourite places for young children to indulge in free play and gross motor activity, due to the presence of trees and flowers (Loukaitou-Sideris 2003). This type of setting is described as an enriched environment (Burdette and Whitaker 2005; Burdette et al. 2004). Nature's enriched environment is believed to function multiple ways by providing both a platform for play, as well as objects to play with (Kellert 2002). An enriched environment opens avenues for exploration and building in older children, which will aid in orientation and developing a sense of direction. It also results in unique developmental benefits in learning and memory, provides opportunities to accrue and display decision-making skills and stimulates problem solving and creative thinking, due to the varied and unstructured characteristics of natural settings (Bagot 2005; Burdette and Whitaker 2005; Burls 2007a, 2007b; Castonguay and Jutras 2009; Derbyshire 2007; Kellert 2002; O'Brien 2005a). Among younger children, small-scale natural environments such as flower beds and even features such as flowers, stones, sticks and water assist in stimulating imaginative play, which is considered a foundation of social and cognitive development (Heerwagen 2009).

Researchers (Burdette and Whitaker 2005; Ginsburg 2007; Heerwagen 2009) believe playing in outdoor settings at home, camps and schools has long-term benefits for physical, social, emotional and cognitive development in children. Results from Wells' (2000) study confirmed this, showing that children who experienced high levels of contact with nature reported higher global self-worth and higher cognitive function.

Play and motor development, developing a sense of identity, autonomy, psychological resilience and learning healthy behaviours are key elements of child development fostered through contact with nature (HCNDACRSP 2004; Kellert and Derr 1998).

Recent research on child development has shown children's abilities declining in relation to the Piagetian model of development, leading to the suggestion that lack of outdoor adventure is partly to blame for this trend (Crace 2006). Research funded by the Economic and Social Research Council of the UK, and conducted by Michael Shayer, Professor of Applied Psychology at Kings College, University of London, showed the development pattern of 11- and 12-year-old children indicates on average that they are two to three years behind where children of a similar age were 15 years ago, in terms of cognitive and conceptual development (Shayer undated; cited in Crace 2006). Shayer and colleagues suggest the growth of TV and video game cultures, alongside the decrease in opportunities for experiential play, have taken away the type of active play which helped children experience how the world operates and make informed judgments about certain abstract concepts encountered during such play.

A research program in Sweden compared children from similar socio-economic backgrounds, who undertook measures of motor co-ordination and attention capacity. Participants were selected from two daycare centres set in urban environments: one was surrounded by buildings, a brick path and low plants while the other was an outdoor all-weather centre surrounded by orchards on two sides, as well as an untamed garden and a woodland (Grahn et al. 1997). Children from the more natural centre were found to have fewer sick days, better motor coordination and better attention/concentration capacity.

In the US, a study observed the behaviour of public housing residents in two different outdoor spaces: one with many trees and the other with a relatively barren environment with limited tree growth (Faber-Taylor et al. 1998). Findings indicated that spaces with trees were more supportive of children's play and that children had more access to adults in greener outdoor spaces than in the largely barren setting. The authors believe that these factors, which are critical to a child's social and cognitive development, are dependent to a certain extent on the percentage of outdoor green space in residential settings, as shown from the study. The types of play in different settings were also examined and results indicated that creative play, which has been associated with stronger cognitive abilities such as problem solving, was more prominent in children playing in the area which contained more trees.

A longitudinal study in the US examined the effect natural green settings in residential areas have on seven- to 12-year-old, low-income, urban-dwelling children's cognitive function (Wells 2000). Results showed that those who moved away to live in housing within closer

proximity to nature tended to have elevated levels of cognitive functioning relative to those who continued to experience a lesser amount of nature nearby.

An Australian investigation of the perceived benefits of activities based in nature in Melbourne primary schools reported a number of social and mental health benefits (Maller 2005). These included benefits related to: caring for living things; seeing the changes taking place in the cycle of life such as growth and change which builds resilience; improved attitudes towards school and relationships with peers and adults; greater calmness and reduced disruptive behaviour; giving children a sense of freedom to be innovative, creative and make discoveries which enhanced their self-esteem and self-confidence; and increased enjoyment to the senses which increased perceptions of wellness and gave a sense of empowerment and achievement.

Although surveys and field studies have shown that playing outdoors in natural environments is still a favourite pastime for most children, the fact most outdoor activities take place under parental supervision has effectively restricted children's freedom to play outdoors (Burls 2007b; Elsley 2004; Louv 2008; Travlou 2006). This situation is believed to be further accentuated in low socio-economic neighbourhoods, which may have higher crime rates, heavier traffic, poorer variety of facilities for physical activity outdoors, more unsafe play areas, greater physical deterioration and fewer natural elements compared to wealthier neighbourhoods (Coen and Ross 2006; Evans 2004). A study conducted in Zurich showed that five-year-old children who could not access outdoor play areas unsupervised, due to dangerous traffic conditions, displayed poorer social behaviours, less well-developed motor skills and had fewer playmates than their counterparts with better access to the outdoors (Hüttenmoser 1995).

A review of the literature on children's access to nature showed that children from ethnic minorities, children with disabilities and females are represented in lower proportions among young user groups (Travlou 2006). The resultant disconnection with nature is believed to have resulted in this age group making fewer visits to the countryside than in the past (Krisberg 2007; Peacock et al. 2007).

Louv (2008) uses the term "nature deficit disorder" to describe the situation of children having decreased opportunities to be in contact with and benefit from their natural surroundings, due to perceived dangers in outdoor environments. Other researchers have made similar comments (Burdette and Whitaker 2005; Burls 2007b; Cock and Shaw 2006; Derbyshire 2007; O'Brien 2005a; Travlou 2006). Louv's (2008) book sparked unprecedented interest in the benefits nature offers for children's health, from previously unconcerned parents unaware of this concept (Krisberg 2007). It is claimed that Louv's book created a new generation of nature lovers, livers and protectors. The movement "No Child Left Inside" which he founded has become established across the United States and has given rise to campaigns with state and national funding aimed at increasing children's contact with nature (Krisberg 2007).

Peacock and colleagues in the UK have also suggested spending more time in natural settings and having an improved knowledge of nature is likely to motivate people to visit outdoors for lengthier time periods. It is, if you like, a spiral of engagement: engaging children with nature and encouraging more participation in outdoor activities is hypothesised to

increase the likelihood of them making longer and more frequent visits to the countryside and green spaces in general as they grow older (Peacock et al. 2007).

One example of such engagement comes from Switzerland, where the 80 parks and other green spaces such as urban forests in Zurich's municipal area total up to 43 per cent of the city's land content. These "green spaces" are known to be attractive to the city's young people (Seeland et al. 2009). In Zurich there are dedicated schools in forests and these have a history of success in outdoor environmental education. Schools also carry out projects such as "nature around school" to increase awareness about the environment among young students. Some classes are taken on field trips to public urban green spaces and visits to the special forest schools to explore nature outdoors and interact in settings and contexts which vary from their usual school routine.

4.2.2 Research linking nature contact with health and well-being of elderly people

A study in the USA involving elderly residents of a retirement community showed they preferred good viewing positions with panoramic views of extended scenery in an informal setting with water, grass and trees (Browne 1992). They reported that opportunities to observe the variety, colours and details in vegetation were important to the viewing experience. The study reports that providing a variety of plants with seasonal variation has an aesthetic importance, as well as helping elderly people recall previous home environments, maintaining healthy mental activity, promoting awareness of time and reducing boredom.

A five-year longitudinal study of elderly participants living in Tokyo, Japan, found that greater access to green spaces in which they could readily walk was an accurate predictor of longevity, and those who walked in the green spaces lived longer (Takano et al. 2002).

A cross-sectional survey conducted in Britain aimed at exploring what aspects of neighbourhood open space are associated with health, life satisfaction and outdoor activity, mainly walking (Sugiyama et al. 2009). The survey showed pleasantness, safety and distance to the open space were qualities relevant to older people's life satisfaction. The pleasantness factor included, among other things, the quality of trees and plants in the area, and these findings are consistent with other research studies which have shown that well-landscaped grounds and green open spaces are associated with people's satisfaction with their neighbourhoods (Kaplan and Austin 2004; Sugiyama et al. 2009). The distinct association between neighbourhood open spaces and life satisfaction is postulated to occur because of "use of open space, contact with natural elements, social interaction taking place in the space, a sense of community nurtured by such a place or simply the fact of knowing that a good park is nearby" (Sugiyama et al. 2009, p. 13).

A study which investigated the socio-cultural value of woodlands and trees in both urban and rural areas in north-west and south-east England involved qualitative analysis of in-depth discussions with groups of residents from diverse socio-economic backgrounds who lived close to and had good access to woodland areas (O'Brien 2005b). Analysis of the participants' interactions and relationships with woodlands brought out a number of themes

such as: feelings of well-being expressed by the public from viewing and using woodlands; the importance of education and learning about the environment; the sense of personal and community identity in relation to woodlands; the importance of effective public participation to reduce anti-social behaviours and increase people's surveillance of their local woods; and the value of place for people, which enhances their sense of ownership of a place with which they can identify themselves. In particular, elderly participants reported that having greater access to woodlands and trees made them enjoy learning about their natural environments and take pride in their increasing knowledge. They felt this increased the enjoyment they gained from their daily lives as well as from their surrounding environment.

4.3 Mental health and well-being benefits from contact with nature

Everybody needs beauty as well as bread, places to pray in and play in where nature may heal and cheer and give strength to the body and soul.

John Muir 1901

Mental health is described as "not merely the absence of mental illness. It is the embodiment of social, emotional and spiritual well-being. It is fundamental to physical health, productivity in the workplace, school, family and overall quality of life. Mental health provides individuals with the vitality necessary for active living, to achieve goals and to interact with one another in ways that are respectful and just" (VicHealth 2009).

In 2007, 45 per cent of Australians aged 16 to 85 years (or 7.3 million people) had, at some point in their lifetime, experienced anxiety, mood and/or substance use disorders (ABS 2009a). While the focus of this review is on the mental health and well-being benefits of contact with nature, many studies address both the mental and physical health outcomes of such contact. Thus, in this section, physical health and well-being benefits are included where they are relevant. The focus in this section is on examining this association for a range of population groups.

4.3.1 Benefits for the general population

Evidence collected by marketing firms in America suggests people's preferences for the wilderness or decisions to move to rural environments are related to the desire both to escape the stressors of a fast-paced urban environment, as well as to become engrossed in a more "soothing" and "healthy" setting (Stilgoe 2001, p. 244). Research has now suggested that being trapped in high-rise built environments is likely to exhaust or reduce vitality and health in many people (Stilgoe 2001). The following quote describes the benefits elicited by connection to nature: "… the wind rustling in the trees, the water running out of a pond, the smell of the damp soil, the heat of the sun warming the skin, face, hands and arms, all this is an encouragement to natural relaxation, and brings a feeling of physical and mental well-being" (Ousett et al. 1998, p. 372).

An American study conducted by Sheets and Manzer (1991) showed the viewing of a slide containing urban scenes with vegetation generated a positive effect on the subjects' cognitive and emotional experiences of the urban setting. A follow-up study to assess the generalisability of these results to real settings was conducted several months later. In this study a set of 10 slides of a metropolitan suburb being redeveloped showed pre-vegetation scenes and 10 other slides showed post-vegetation scenes. Sixty-nine residents of the area who were university students participated voluntarily, and were randomly assigned to view either the pre- or post-vegetation slides. They answered a questionnaire based on the scenes. In similar results to the first study, subjects in the follow-up reported greater positive emotions when viewing a tree-lined street; subjects felt friendlier, more co-operative, less sad and depressed when viewing scenes with vegetation. Reports from the second study suggest vegetated places were perceived as better, safer and cleaner places to live in, and easier places in which to make a living.

People are drawn to visit natural places in attempts to recover attention focus, forget worries or increase positive feelings, or when facing matters which are pressing on the conscience (Korpela et al. 2001). Evidence from Swedish studies also suggests people generally report relaxing and calming down in their favourite places (parks, beaches, forests) following difficult events (personal disappointments or quarrels) which have created negative emotions such as distress, fatigue and anxiety (Korpela 2003). Such studies indicate that, as an environmental strategy which aids self- and emotion-regulation, visits to natural favourite places such as those mentioned here afford experiences which have a restorative quality and result in a restorative outcome (Korpela and Ylén 2007).

Recently, a Danish survey was conducted to examine the impact green areas have on human health and well-being (Nielsen and Hansen 2007). For this study, 2000 Danish adults were mailed a questionnaire and 63 per cent responded. The questions focused on: activities conducted in public green spaces, participant evaluations and preference for these places; distance to the areas from home, frequency of visits; and health questions which had a focus on mental stress as well as being overweight and obesity, the latter two known indirectly to affect mental health and well-being. The results demonstrated that there was less stress in subjects who visited the green areas more frequently (Nielsen and Hansen 2007). Results were controlled to prevent confounding through variables including differences caused by levels of education, urbanity, gender, age, employment, second home ownership and cycling to work. The final analysis revealed being overweight and levels of experienced stress are connected with greater distance from a publicly accessible green space, as well as less access to private or shared gardens.

A very recent study of community forestry in the UK collected qualitative data which explored the perceptions of health, environment and the relationship between them (Pinder et al. 2009). The data was collected over a year at many sites, activities at which included a walking program, a conservation group and THERAPI programs involving guided walks and education in countryside practices for mental health service users. As well as data gathered from reviews of policy documents, informal interviews were conducted with staff managing the forest projects, users of the forest and participants in THERAPI projects. Interviews

were also conducted with local people, and participant observation of meetings, events and everyday life at the forest added further data (Pinder et al. 2009). Data revealed that the concept of green environments being good for people was commonsense knowledge among the majority of respondents. Many reported feeling happier, calmer and emotionally uplifted just thinking of a walk in the country, and described it as a place where you could go “to get away from your troubles” and “alleviate depression” (Pinder et al. 2009, p. 353). Others described the aesthetic pleasures which were inherent in the outdoors such as “birds, flowers, and enjoying the sun on the face, walking in the wind and even the rain” (Pinder et al. 2009, p. 354). Studies and surveys conducted in Scotland as part of an earlier study identified similar beliefs and knowledge regarding the uses and benefits of being in nature (Morris 2003).

A recent article in *The Boston Globe* newspaper stated scientists have found that merely being in an urban environment impairs our basic mental processes (Lehrer 2009). After a few minutes in a crowded street, the brain can hold less things in the memory and individuals suffer from decreased self-control (Lehrer 2009). Writing of a milestone which ironically marks “the movement of a species born to live in small tribes in the African savannah to concrete jungles flooded with taxis, traffic and millions of strangers”, Lehrer suggests it is this change in our surroundings which is unfamiliar from that which we have evolved to live in, that has ultimately resulted in the altering of our perceptions, thoughts and caused serious implications for people’s physical and mental health. The mind has an innate requirement for nature, and so the planting of a few trees or a variety of plants in the inner cities is believed to significantly reduce the negative side-effects of city life (Lehrer 2009).

This seems to be borne out by recent research. An epidemiological study conducted in Adelaide, Australia, used a mailed survey to examine the association of perceived neighbourhood greenness with perceived physical and mental health, as well as to determine if walking and social interaction can account for any connections found (Sugiyama et al. 2008). The study results were adjusted for socio-economic variables and measures showed that subjects who perceived their neighbourhoods as very green had a 1.37 to 1.60 times greater likelihood of better physical and mental health respectively, when compared with those who perceived their neighbourhoods as lower in greenness. Perceived greenness was also correlated with recreational walking and social factors, which in turn were associated with mental health. There was a significant relationship between mental health and greenness, and the authors concluded neighbourhood greenness was more strongly associated with mental health than with physical health. Earlier, a major study in the city of Bari in Italy had shown that green areas affect inhabitants’ perceptions of the quality of the urban environment as well as their mental health (Sanesi and Chiarello 2006).

4.3.2 Benefits for children and young people

It is my dream that all children grow up like magnificent trees. Tall and strong. Kind and unique. Helping others to grow.

Gathright 2009

One repercussion of the restricted, protected lives of modern-day children, who are largely disconnected from nature, is the potential for serious negative effects on their physical, emotional and cognitive development (Cooper 2005). Burls (2007b) believes the number of children walking to and from school has reduced drastically, while the quantity of time spent by children in front of the television is rising. An average of four hours each day is believed to be the estimated time spent watching television (Burls 2007a). Louv's idea of "nature deficit" (2005; cited in Burls 2007b) can be set alongside Norris's idea of "extinction of experience" (2004; cited in Burls 2007b) for children, as key factors in declining childhood health and well-being. The sedentary nature of the lives led by modern-day children is very likely to be a large contributing factor to the global obesity epidemic reported in medical statistics locally and internationally (Burls 2007a). The close links between obesity, depression, stress and anxiety indicates there is likely to be a high cost to mental health if the current generation does not change its sedentary, indoor lifestyles, as suggested by Louv (2008) and others (Burdette and Whitaker 2005; Burls 2007b; Cock and Shaw 2006; Derbyshire 2007; O'Brien 2005a; Travlou 2006).

One article published in a British newspaper made reference to a report which gives warning that the long-term mental health of twenty-first century children is in peril (Derbyshire 2007) because of their isolation from nature. Derbyshire (2007) cites the report by Dr William Bird, health adviser to Natural England, in which he argues that the current generation is missing out on exposure to the natural world, which the generations before them enjoyed without any restrictions. These same convictions have been voiced by participants in numerous woodland nature-related studies (Castonguay and Jutras 2009; Derbyshire 2007; Louv 2008; O'Brien 2005b; Travlou 2006).

An American study of six- to 12-year-old children who lived in rural areas evaluated the capacity of natural elements to reduce the impact of stressful life events (Wells and Evans 2003). Stressful life events have a negative impact on children's ability to learn and concentrate, increasing their anxiety levels and diminishing self-esteem. The study found that the restorative effect played by nature is potentially useful in enhancing children's cognitive functioning.

Adolescents in the general population have also indicated the desire for a safe place in which to take a break from everyday life, to restore energy levels and make sense of the highs and lows of life (Abbot-Chapman 2006). An Australian study investigating adolescents' favourite places and reasons for these choices, collected data from 1436 respondents in Years 9 to 12 from public and private schools, rural and urban backgrounds and a range of socio-economic conditions in Tasmania (Abbot-Chapman 2006). Nature-based favourite places were indicated by approximately 31 per cent of Year 9 and 10 children, 25.4 per cent of Year 10 children and 24.1 per cent of Year 11 and 12 children. Reasons for the choice of

such places included the words “peace”, “quiet”, “calm”, “where I can think about things”, “where I can be myself” (Abbot-Chapman 2006, p. 12). There was also emphasis on natural places providing opportunities for “relaxation, peacefulness, freedom and leisure pursuits such as walking, bike riding, motorbike riding, horse riding, camping, sailing, fishing, surfing, swimming, waterskiing and body boarding” (Abbot-Chapman 2006, p. 13). The study findings indicate the important role played by natural environments in maintaining stable mental health for adolescents, who live in a modern world where societal changes and pressures are rising at a rapid rate. Similarly, Louv (2008) describes the healing powers of nature for children living in a destructive family or neighbourhood environment.

As the preceding pages indicate, studies spanning across different cultures, ages and socio-economic conditions, in different experimental conditions and relating to diverse levels of exposure to various types of nature have consistently shown that natural settings are associated with strong developmental benefits for children when compared with urban built settings. The stimulation and solace found in these settings has been shown to improve children’s behaviour and learning (Burls 2007a). As the numerous studies cited above have indicated, natural environments have an enhanced ability to assist children in resolving their internal conflicts and fears, to improve the development of non verbal communication, to reduce negative behavioural problems and to facilitate self-esteem, autonomy and independence (Kellert and Derr 1998).

4.3.3 Benefits for elderly people

Older people, defined commonly as those over the age of 65 years, represent an increasing proportion of the Australian population (ABS 2006). Data collected from June 2003 to June 2008 indicated that the number of people aged 65 years and over increased by 300,000 (or 11.8 per cent) to reach 2.8 million (ABS 2009b). The proportion of the population in this age group also increased, rising from 12.7 per cent to 13.2 per cent (ABS 2009b).

Increasing age is related to long-term health conditions, higher rates of disability and poorer reported health status (ABS 2006). Long-term health conditions are more common with increasing age (ABS 2006). In 2005, nearly all people aged 65 years or more reported at least one long-term health condition; almost half of all older persons (48 per cent) were classified as either overweight (33 per cent) or obese (15 per cent); of people aged between 65 and 74 years, 36 per cent reported being sedentary in the two weeks prior to interview, and these rates rose to 53 per cent for those aged 75 to 84 years and 68 per cent for those aged 85 years or older. In 2004–2005, 11 per cent of older persons reported a high or very high level of psychological distress compared to 9 per cent in 2001. Population ageing, and the health of older people, is therefore likely to impact on the overall health status of the Australian population.

Areas with natural landscaping, green neighbourhood meeting places, group-based nature activities such as walking, shared gardens for the elderly and allotment gardens can facilitate social contact, which has been shown to reduce the risk of developing chronic diseases such as depression and cardiovascular disease as well as to increase longevity (HCNDACRSP 2004; Peacock et al. 2007).

4.3.4 Benefits for residents of detention facilities

At the end of June 2008 there were 27,615 prisoners both sentenced and unsentenced in Australian prisons, which is an increase of 1 per cent (391 prisoners) since June 2007 (ABS 2008a). This represented an imprisonment rate of 169 prisoners per 100,000 adults in the population (ABS 2008a). The number of young people in juvenile justice detention is also increasing, according to a report released by the Australian Institute of Health and Welfare in November 2009. The report, "Juvenile justice in Australia 2007–2008", found that the number of young people in detention on an average day in Australia (except New South Wales, where data were not available) increased by 17 per cent, from 540 in 2004–05 to 630 in 2007–08 (Australian Institute of Health and Welfare 2009). Based on these rising statistics, the need to ensure the mental health and well-being of such a significant section of the population is vital.

A recent report on the development of an evidence-based model of residential services for teenage youth with drug problems revealed that youth described "an ideal environment for a residential service being a green retreat" (Bell 2005a, p. 77). Their ideal would be "somewhere green and quiet; a place to get away from troubles and be happy and calm; to escape from drug dealers and all former problems to a kind of Arcadia, somewhere lush and quiet, far from the trouble and temptations of city life" (Bell 2005a, p. 87).

Moore's (1981) classic study described in section 5.1.9 is also a reminder of the usefulness of nature in bringing about positive physical and psychological health and well-being benefits in the lives of prisoners. Studies investigating the benefits of human–animal interactions for this socio-demographic group (Robin et al. 1983; Edney 1995; Beck 1985; cited in Sockalingam et al. 2008) have also shown positive findings. These are discussed in section 5.6.2.

Evidence from a horticulture therapy program involving juveniles who were dealing with serious substance abuse issues (Sandal 2004), and a post-release outcomes investigation of 48 former inmates of the San Francisco County Jail involved in horticultural activities during their incarceration, was reviewed. The post-release review showed that the inmates benefited from involvement in the program both during incarceration and following their release (Rice 1993; cited in Lindemuth 2007). In relation to the program involving juvenile substance abusers, Sandel (2004) comments that the propagation of plants in a detention setting leads to elevated self-pride and a sense of belonging, increases co-operation and social skills, and is likely to provide a soothing and relaxing pause in the stresses brought about due to institutional living. Decrease in illegal activity and drug use, higher self-esteem, and lower anxiety and depression levels were seen as outcomes of the horticulture therapy programs (Lindemuth 2007). Discussion about the human–nature interaction has also suggested that, due to the stress-reducing effect of this interaction, there is a great likelihood of it also reducing the use of drugs by young people (Bricker et al. 2008).

A partnership between the Forestry Commission of UK and the West Hill Resettlement Unit of HM's Prison Winchester has created an initiative known as "Offenders and Nature", allowing pre-release offenders to work at local woodland sites (Foresty Commission England and HMP Winchester, undated). Among the project objectives cited is the opportunity offenders are offered "to experience the restorative effects of being outdoors in the natural environment to enhance

their physical and mental well-being" (Foresty Commission England and HMP Winchester undated, p. 1). The participants reported "improvements to their fitness levels; a sense of well-being and better sleeping patterns; they enjoy being outdoors and feel happier doing something worthwhile" (Foresty Commission England and HMP Winchester, undated, p. 1).

Numerous similar "Offender and Nature" schemes exist in the UK such as the Dartmoor prisoner resettlement initiative; Natural England's Working with Prisoners initiative; Natural England's initiative with Phoenix Futures (a substance misuse charity); North West England prisoner resettlement initiative; and the Forestry Commission's participation in "Project Scotland" (to offer volunteer placements and training to young disadvantaged, marginalised and academically low-performing young people including young offenders). These programs, carried out across the UK, involve offenders opportunities as volunteers on nature conservation and woodland sites, undertaking tasks such as: "creating and maintaining footpaths, opening up dense vegetation to create more diverse habitats, establishing ponds and building boardwalks" (Carter and Hanna 2007, p. 2). These schemes have been highlighted as having a positive effect on risk factors which contribute to reoffending, such as "lack of employment, drug and alcohol misuse, poor mental and physical health, problematic attitudes, thinking and behaviour, poor or non-existent family networks and lack of life skills" (Carter and Hanna 2007, p. 2).

A number of the benefits and impacts (including those for mental health and well-being) have been summarised in Appendix F.

4.3.5 Migrants

The 2006 Census of Population and Housing data reveals that 22 per cent (4.4 million) of people in Australia were born overseas (ABS 2008b). A further 26 per cent of people who were born in Australia had at least one parent who was born overseas. This shows the increasing representation of migrants in the Australian population. In 2006, almost one in seven people born in countries other than Australia or main English-speaking countries reported they had no source of support during a time of crisis. Migrants also face difficulties such as language barriers, cultural differences and discrimination, which are likely to affect their ability to participate in certain social activities (ABS 2008b; Townsend 2006). Additionally, these same issues pose other problems such as accessing services and gaining a sense of social connectedness (Knox and Britt 2002; Townsend 2006; Webber 2003).

Ethnic and race-based discrimination has also been identified as a key factor underpinning depression, especially in migrant communities (VicHealth 2008). Furthermore, VicHealth (2008, p. 6) notes that "the impacts of ethnic and race-based discrimination are not confined to those directly subjected to it ... [but] can create a climate of apprehension and fear that may curtail the activities and aspirations, and affect the mental health and well-being, of others from similar backgrounds". The VicHealth report also suggests that there is an intergenerational impact from such discrimination and notes that children of parents affected in this way "are at higher risk of developing behavioural and emotional problems" (p. 6).

A report discussing the use of green open spaces by recently arrived migrants in the Australian City of Whittlesea (Townsend 2006) in Victoria seems to bear this out, noting that the research on which it was based confirmed the findings of previous research undertaken in the US that "the fear of crime is more of a deterrent to using parks than fear of the environment" (Pain 2000; cited in Townsend 2006, p. 28).

In an era of increasing migration, attempts have been made in countries such as the US and Germany to use urban green spaces to create "international gardens" to promote public participation since these settings have been identified as being both conducive to multicultural encounters and the most dominant arena for the facilitation of face-to-face communication and personal interaction (Seeland et al. 2009). As described previously, such settings have also been identified as ideal places for developing friendships across ethnic and cultural boundaries, by providing neutral, restorative and aesthetically pleasing environments (Seeland et al. 2009). However, in the Australian study discussed above, language barriers were found to pose a significant problem in attempts to encourage engagement in conservation groups and, to a lesser extent, the use of parks and public open spaces (Townsend 2006).

Nevertheless, there is evidence of the potential of urban green spaces to assist in overcoming such issues. An empirical study was conducted in selected schools in Zurich, Switzerland, to investigate if leisure activities in urban forests and public green spaces have potential to facilitate social interaction between Swiss and immigrant young people (Seeland et al. 2009). Public urban green spaces such as forests and especially parks and playgrounds, were shown to be visited frequently by both groups of young people and were shown to play a significant role in the formation of friendships across cultures, which has been identified as a pre-requisite for social inclusion.

4.3.6 Indigenous populations

Aboriginal and Torres Strait Islander people comprise 2.4 per cent of the total Australian population, with estimates as of June 2001 showing a figure of 458,500 (ABS 2002). Trauma and grief have been identified as significant issues for Aboriginal and Torres Strait Islander communities and individuals (Australian Health Ministers 2003). An ABS report released in April 2008 noted that "Aboriginal and Torres Strait Islander people suffer higher rates of mental illness than non-Indigenous people [with] Indigenous adults ... twice as likely as non-Indigenous Australians to report high to very high levels of psychological distress in 2004–2005" (ABS 2008b).

Data on hospitalisations and mortality due to serious mental disorders and illnesses indicate that the likelihood of an Aboriginal and Torres Strait Islander person being involuntarily admitted to psychiatric care is three to five times higher than for other Australians (ABS 2003; ABS 2004; Australian Institute of Health and Welfare 2003). In 2001–2002, Aboriginal and Torres Strait Islander people were reportedly hospitalised for conditions classified as "mental and behavioural disorders" at a higher rate than other Australians (ABS 2003; ABS 2004; AIHW 2003).

Historically, Indigenous cultures have described how in one form or another, they all emerged from the land—from the Native American Abenaki, who believe they sprang from the ash trees, to the Lenape, who believe they sprang from a great tree, and the Mayans and Rarámuri of northern Mexico, who believe they came from corn (Salmon 1995, 2000). Indigenous people have long perceived themselves and the earth as being significant parts of the same ecological family, sharing ancestry and roots (Salmon 2000). Indigenous notions of wellness have a holistic and ecological basis, which incorporates a wide range of personal and ecological factors (Vicary and Westerman 2004). Acknowledgement of the interconnected and spiritual bond humans have shared with nature for centuries is reflected in the statement: "… the sacred landscape, framed within the confines of the church or cathedral walls for the European, existed for the Aboriginal as open space, trees, rocks and rivers, central to well-being and happiness" (Jordon 2009, p. 27).

The following extract of Chief Seattle's famous letter to President Franklin Pierce in 1851 (Seattle 1851) reflects similar integrated notions:

Every part of the earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every meadow, every humming insect. All are holy in the memory and experience of my people. … Will you teach your children what we have taught our children? That the earth is our mother? What befalls the earth befalls all the sons of the earth. This we know: the earth does not belong to man, man belongs to the earth. All things are connected like the blood that unites us all. Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself.

Based on this interdependent relationship with nature, Indigenous people believe their spiritual, physical, mental and social health is reliant on the ability to live in harmony with the rest of the natural world (Salmon 2000; Wilson 2003b). Indigenous cultures reflect the belief that if an individual does not maintain physical, spiritual, social and mental health, they cannot truly connect with the natural world. Conversely it is believed that by harming the environment, man harms himself (Salmon 2000).

Research evidence is mounting concerning the links between contact with nature, in terms of traditional lands, and the health and well-being of Indigenous peoples. A research study conducted in-depth interviews with the Anishinabek (First Nations) peoples, living on an isolated reserve in Ontario, Canada, to understand the ways in which relationship to the land affects their health (Wilson 2003b). The following participant comments explain the deep connection the Anishinabek peoples share with nature and its perceived mental health and well-being benefits (Wilson 2003b, pp. 89–90):

- "She [Mother Earth] is something that heals you if you let it. You don't always feel it. You have to be thinking about it. You have to be spiritually connected to feel her."
- "It doesn't matter where you go. If I have problems I take a walk in the bush. I talk to the trees and they listen. They take my problems away."

- "I hunt, I camp, I fish and I have always done that and I always feel good when I am out there in the bush. To me it's almost like a cleansing. I can go out there and I just feel so good, like my mind just gets cleared. I love it."

Australian research conducted by Kingsley and colleagues, based on documented evidence, case studies, focus group discussions and interviews with Indigenous people, has confirmed the close affinity they share with the land and nature (Kingsley et al. 2008). From this research, it is hypothesised that an increase in the number of Indigenous people and communities participating in the management of the natural environment is likely to increase, among other factors, their health and well-being (Kingsley et al. 2008). Similarly, Davis and colleagues suggest that cultural practices, such as Aboriginal land management, are tools which can facilitate the integration of spiritual, emotional and physical aspects of their health and well-being (Davis et al. 2004).

However literature, both peer reviewed and grey literature, on the benefits of contact with nature for the mental health of Indigenous populations is almost non-existent, and therefore only general assumptions can be made, based on cultural perceptions of this connection.

4.3.7 People in work environments

It is well established that multiple factors affect an employee's productivity in the workplace, amongst which psychological issues play a leading role. Research indicates that the ability to perceive nature from office windows is a micro-restorative experience, which is believed to provide an employee with a brief respite from the demand for directed attention which functions at a high level during work (Kaplan 1993). Research conducted in a variety of parts of the world over a period of more than 20 years has demonstrated benefits for workplace mental health arising from contact with nature.

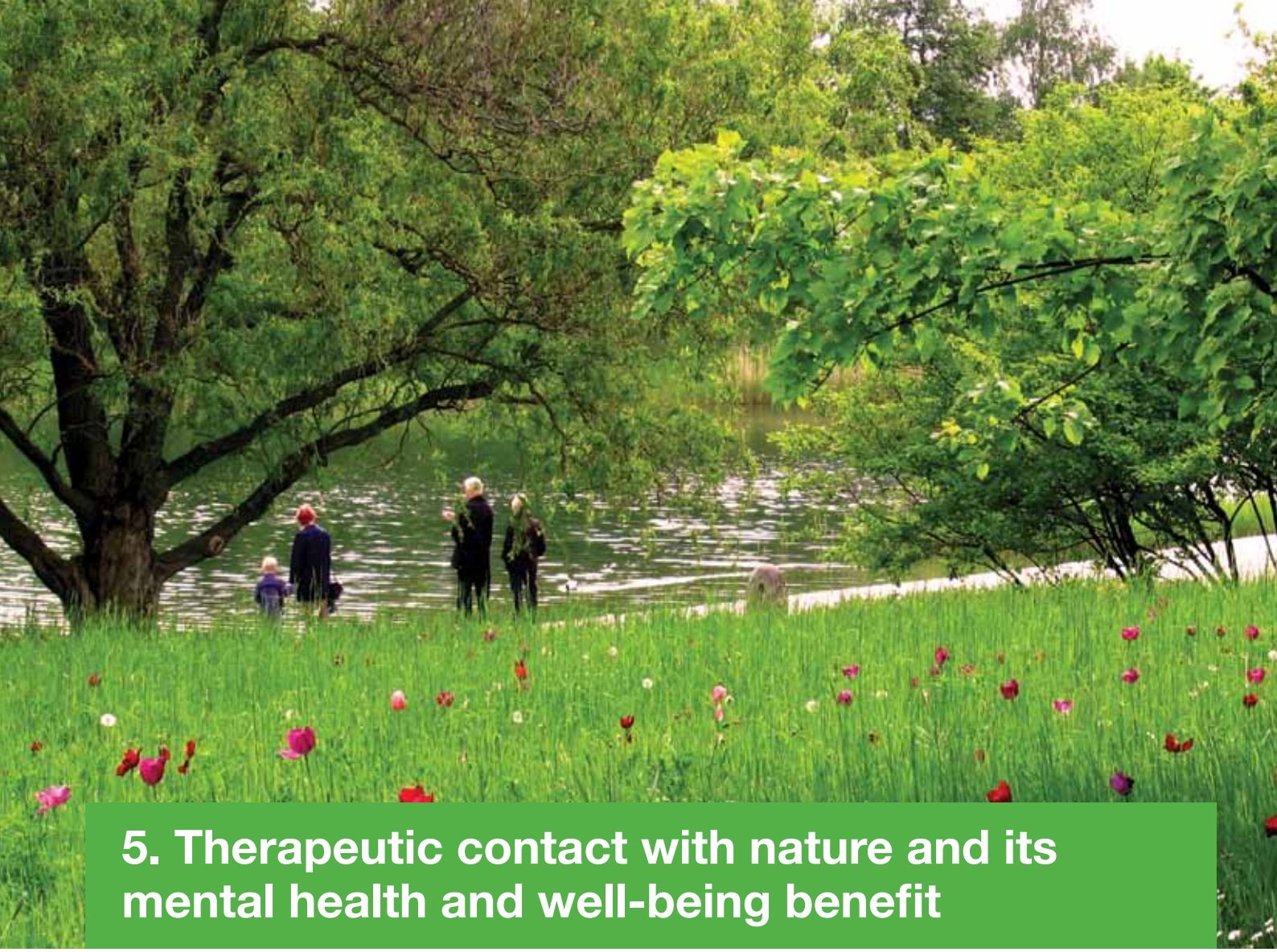
A Swedish study examining the effects of workplace greenery on worker stress levels considered four levels of greenery ranging from no view of and no access to a garden, to both view and access to a garden in the workplace (Stigsdotter 2004). Both view and/or access to a garden improved levels of comfort, pleasure and well-being in employees while reducing their levels of stress. The no access or view subjects reported a worse perceived general health status.

In the context of education, elementary school teachers, who usually spend long hours with the same group of children and have limited opportunities to take a break, are believed to have a higher potential for stress than other members of the teaching profession (Gulwadi 2006). Teacher stress and burnout is known to be associated with negative emotions and behaviours such as feelings of frustration, anxiety and alienation from work, and physiological symptoms such as fatigue and heart disease. A study examining the places teachers selected as restorative settings showed gardening in school and social interaction with colleagues as popular ways to relieve stress in the work environment. Based on the finding of this American study, the author suggests incorporating green spaces in school environments.

4.3.8 People with disabilities

For people with disabilities, contact with nature through gardens and pets can be important. Increasingly, sensory gardens are being used in hospitals, rehabilitation settings and day care facilities to assist in overcoming "feelings of diminished self-worth" and promoting "a sense of peace—the effortless concentration that increases the ability to rest" (Davis 2009, p. 20). Marginalised communities and individuals with disabilities and mental health issues have, by tending to nature through horticultural programs or environmental volunteering, reported discovering a sense of empowerment, which is likely to regenerate a feeling of possibility, relief from struggles and the opening of new social prospects (Burls 2007b; Wong 1997).

Numerous studies investigating the benefits of interaction with animals for people with a disability have shown positive benefits for both physical and mental health (e.g. Collins et al. 2006; Fairman and Heubner 2000; Guest et al. 2006; Camp 2001; Wysong 2000; Hart et al. 1996; Mader et al. 1989; Lessick et al. 2004). These studies are described in detail in section 5.6.



5. Therapeutic contact with nature and its mental health and well-being benefit

We would have a tremendous psychological deficit if we got rid of most of it [biodiversity]. We would enter … after the Mesozoic, the age of reptiles, and the one we're in, the Cenozoic, the age of mammals, the Arimozoic, which means the age of loneliness. And we'd never get it [biodiversity] back, and we'd really have missed something that should be thought of as part of humanity—that is, our relationship with the rest of life, in all its diversity.

Wilson 2002; cited in Burls 2007a, p. 19

This section discusses how nature can be particularly therapeutic in the area of mental health, with well-being benefits that have been demonstrated through empirical studies.

5.1 Therapeutic landscapes

Therapeutic landscapes are places with "an enduring reputation for achieving physical, mental and spiritual healing" (Gesler 1993, p. 171). Velarde et al. (2007) also note that people do not have to peform activities in nature to gain satisfaction from it, but rather just have opportunities to notice and observe it, since greener views are believed to enhance clearer thinking (Pretty 2004). This is further reinforced by Gordon Orians, Professor Emeritus of

Zoology at the University of Washington, who states that "research suggests our visual environment profoundly affects our physical and mental well-being" (Louv 2008, p. 46).

Sierra Tucson is an institution providing personalised and integrated treatment solutions to individuals who suffer from alcoholism, drug addiction, depression, anxiety, trauma, eating disorders, sexual compulsivity and other mental and behavioural disorders (Sierra Tucson 2009). Set in the foothills of the picturesque and remote Santa Catalina Mountains of Arizona, this institution and its setting has a significant impact on the patients. One patient commented: "When I first saw the isolation of this strangely beautiful place—so far removed from the scenes of my day-to-day dysfunctional life—I felt an immediate stirring of feelings, of serenity … and hope. I would be safe here, protected by the eternity of the mountains, the silence, and the desert" (Sierra Tucson 2009). Sierra Tucson has specifically focused on natural elements and treatments to capitalise on the multi-dimensional manner in which nature affects the human mind.

Among the studies that have indicated the general benefits of therapeutic landscapes is one by Laumann and colleagues (2001) which found that natural scenes with forest, lakes and creeks; parks with diverse plant species and an artificial creek; sea areas with coastline, grass, cows and birds; and mountains with snow and ice had a greater restorative effect than urban scenes comprising major pedestrian streets, bus and train stations and rush-hour traffic (Laumann et al. 2001). Similarly, a study conducted by Hartig et al. (2003) found that, when compared with an urban scene with all its attendant features, natural settings with tree views and nature reserves with vegetation and wildlife reduced stress levels and blood pressure while improving mood and lowering anger and aggression in participants.

The benefits of therapeutic landscapes within a medical context have also been recognised. Beginning in the 1870s, the Quakers' Friends Hospital in Pennsylvania used natural landscape spanning many acres and a greenhouse as part of its treatment plan for those with mental illnesses (Louv 2008). The degree of openness in various settings has been hypothesised to have an effect on tranquillity and perceptions of danger. However, a study by Herzog and Chernick (2000) showed that natural scenes with fields or forests, including both high and low degrees of openness, elicited higher levels of tranquillity and fewer perceptions of danger in participants (Herzog and Chernick 2000) when compared to urban scenes. In urban scenes with similarly varying degrees of openness, participants showed lower feelings of tranquillity and greater feelings of danger (Herzog and Chernick 2000). Accordingly, it appears that it is not the degree of openness, but the extent to which the setting is urban or natural which influences these feelings.

Yet another group of studies has explored the benefits of therapeutic landscapes within a residential context. A study investigating the effects of urban versus natural landscapes on human health showed that natural scenes dominated by green vegetation, including cultivated fields, improved well-being and reduced anxiety in subjects, increased positive feelings and reduced the arousal of fear (Ulrich 1979). Another study, in Chicago, found that increased green vegetation in neighbourhood common spaces was associated with lower mental fatigue in residents. Those closer to natural settings were more able to deal with important matters in their lives and felt more hopeful and less helpless about confronting life

issues, whereas those living with minimal or no green vegetation nearby had the opposite experience (Kuo 2001). Likewise, a study of residents in public housing buildings where the level and naturalness of nearby trees and grass were rated on a scale from 0 to 4, found that residents whose nearby natural settings scored higher on the scale showed lower levels of mental fatigue and reported less aggression and violence than residents situated closer to the lower end of the scale (Kuo and Sullivan 2001a).

5.2 Local parks and green spaces as settings for therapeutic nature contact

Asphalt, drywall and fluorescent lights are a far cry from meadows, trees and stars. A walk in the woods, planting a garden, visiting a wilderness and catching a glimpse of wild creatures does something quite indescribable for the soul. The peace, inspiration and pleasure brought by contact with nature is downright therapeutic. The further we get from it, the less whole we feel.

Wysong 2000, p. 57

Green spaces such as parks, botanical gardens, community gardens, allotments, farms and woodlands offer unique and creative opportunities for restoring and improving not only the physical but the spiritual, emotional, neurological and psychological aspects of human health and well-being (Campbell and Wiesen 2009; Mass et al. 2009; Peacock et al. 2007; Sacks 2009). Such therapeutic benefits may be accessed coincidentally or intentionally. Nonetheless, the value of such restoration of health is reinforced by the recent agreement of a group of Federal agencies in the US to work together to promote the uses and benefits of the country's public lands, water resources and natural settings to enhance all aspects of human health and well-being (Bricker et al. 2008).

A range of psychological benefits of parks has been identified. These include feelings of open space; a place to escape to away from campus or workplace; and changes to the scenery (Ulrich and Addoms 1981). Other benefits include improvements to the mood of older adults who visit the park frequently (Godbey and Blazey 1983); lower levels of anxiety and sadness following a visit to the park (More and Payne 1978); lower stress levels (Hull and Michael 1995); and lower levels of depression associated with the increased physical activity of park users (Craft and Landers 1998; Lawlor and Hopker 2001; North et al. 1990).

The innate need for such recreational opportunities by people who are often caught up in the busy schedule of modern living, results in "mental and nervous excitability, moroseness, melancholy, or irascibility" if unfulfilled (Olmsted 1952, p. 21). Occasional contemplation in natural settings away from ordinary cares, with a variation of environment, is believed to enhance health and benefit the intellect, while simultaneously increasing the capacity for happiness as well as offering ways to harness it (Olmsted 1952).

A recent study conducted in Toronto, Canada showed that participants reported that the presence of neighbourhood green space was an important contributor to good mental health (O'Campo et al. 2009). An epidemiological study in Netherlands enrolled 17,000 patients from

over one hundred general medical practices around the country, to compare the effects that availability and volume of green spaces in residential environments have on human health (De Vries et al. 2003). The positive effects of greater volumes of proximal nature included both physical and mental health benefits for individuals and increased the individual's level of activity. This positive effect was seen in the population as a whole, but especially among children below the age of 16, housewives, people with low socio-economic status and those below the age of 65, who were found to spend more time being outdoors and active.

This study also showed that the self-reported physical and mental health of those living close to nature or green spaces was more positive than for those living in densely urbanised areas with little or no easy access (De Vries et al. 2003). A considerable number of studies confirm these findings, showing that visits to green spaces and exposure to natural elements can decrease psychological strain, increase psychological well-being and support recovery from illnesses (Frumkin 2001; Kaplan 2001; Parsons et al. 1998; Ulrich 1984; Ulrich 1986).

In a qualitative study to analyse the benefits to health and well-being from participation in health-promoting outdoor activities in group settings, Batt-Hawdon and Tellnes (2005) found positive results. Participants with stress symptoms, psychosocial problems such as anxiety and depression, sleep disturbances, and those with home- or work-related stress commented that the activities contributed towards understanding ways to cope and master the burdens, crises and challenges of everyday life.

Following a classroom discussion conducted at the University of San Diego on nature and childhood, Lauren Haring, a participant aged 20, described the importance of nature to her emotional health:

Growing up, I lived in a house that had a fairly big backyard and a creek across the street. It was when I was by myself that the environment meant the most to me. Nature was the one place where, when everything in my life was going bad, I could go and not have to deal with anyone else. My dad died of brain cancer when I was nine. Going out into nature was one outlet that I had, which truly allowed me to calm down and not think or worry. I really believe that there is something about nature, that when you are in it, it makes you realise that there are far larger things at work than yourself. This helps to put problems in perspective. Being in nature can be a way to escape without fully leaving the world.

Louv 2008, pp. 51–52

Another Dutch study investigated the relationship between green space in people's living environments and their morbidity levels for a number of selected diseases (Maas et al. 2009). The data was derived from the medical records of 195 general practitioners, in 96 Dutch practices, serving 345,143 patients (Maas et al. 2009). The percentage of green space within a radius of between 1 and 3 kilometres was calculated for each suburb, and then for each household, and a multi-level regression analysis was conducted to control for demographic and socio-economic characteristics. Of the 24 investigated diseases, 15 had a lower annual prevalence for participants living within a kilometre of green spaces. Green spaces closer

to home appeared to play a major role in morbidity prevention, relative to green spaces some distance away. This relationship, as hypothesised by the researchers, was strongest for people who were expected to spend more of their time closer to their homes, such as children and people with lower socio-economic statuses. Contrary to the original study hypothesis, the relationship was stronger for people between the ages of 46 and 65, rather than for elderly people. From a disease perspective, the relationship was strongest for anxiety disorder and depression (Maas et al. 2009).

5.3 Forests and woodlands as settings for therapeutic nature contact

Humans, it has been shown, originally lived in forest environments, but our ancestors are believed to have moved away from these settings only around 2000 years ago (Yamaguchi et al. 2006). The favourable physiological and psychological effects these environments have on people is evidenced by the deliberate location of numerous sanatoria on forested plateaus. Such locations have therefore been suggested as suitable environments for use in reducing the poor health trends seen in most industrialised and urbanised societies (Lee et al. 2009).

Woodlands offer opportunities for physical activities that are beneficial for health; provide settings where people can relax and enjoy time with friends and family; and promote the conservation and further planting of trees which cleanse the atmosphere (Central Scotland Countryside Trust 2001). Studies on the benefits of trees and woodland areas in general have shown that people enjoy the calming sensation brought on by listening to the sound of water in a woodland setting and the almost symbolic sense of stability and continuity given to life in the presence of trees (Milligan and Bingley 2007). Some studies have shown that the perceptions of the therapeutic value of woodlands were based partly on the age and size of the trees as well as on their perceived qualities of safety and protection. For other respondents, it was experiencing the diversity of a woodland environment in a multi-sensory way that made it therapeutic.

The health promoting benefits of Shinrin-yoku, the Japanese therapeutic method of bathing in the forest air and walking, were examined in a study by Yamaguchi et al. (2006). These recreational activities are believed to promote physical activity and psychological relaxation. A non-invasive, stress-free method, using saliva sampling, to measure the circadian rhythm of salivary amylase activity was employed in the study, since increased sympathetic nervous system activity is a major stimulator of salivary amylase. First, the salivary amylase activity was measured in healthy male subjects under stress-free conditions, where levels remained constant throughout the day. In the active phase of the study, measures of salivary amylase activity prior to and following a walk in an urban and forest environment individually, showed that salivary amylase activity of the subjects was reduced in the forest environment, relative to the urban environment, thereby indicating that the sympathetic nervous system of subjects is less active when in forest environments. The authors suggest that forest environments have a positive association with reduced environment-derived stress in healthy people.

Subsequent studies on the benefits of Shinrin-yoku were undertaken to evaluate its physiological effects on humans (Park et al. 2008; Park et al. 2007; Park et al. 2009). All the studies utilised 12 male participants and experimental procedures were similar to the Yamaguchi (2006) study in all aspects, such as the settings, testing time and methods. Measured data was also similar, measuring the activity in the pre-fontal cortex and salivary cortisol levels in the first study (Park et al. 2007); heart rate variability, salivary cortisol and pulse rate in the second study (Park et al. 2008); and heart rate variability, pulse rate and blood pressure in the third study (Park et al. 2009). All of the outcome measures showed significantly lower values in the forest environment. The results of the physiological measurements in all the studies showed that Shinrin-yoku was an effective relaxation technique which benefits both people's body and spirit (Park et al. 2008; Park et al. 2007; Park et al. 2009). The authors believe the results from all these studies support the findings that forest environments improve the psychological and physiological wellness of people.

An experimental study in Tokyo, Japan (Li et al. 2007a), explored the effect of forest bathing on human immune function. The subjects took part in a three-day trip visiting three different forests, and blood was sampled on the second and third days to measure immune system activity. Prior to the experiment, similar measurements were made on a normal working day to provide baseline data. Nearly all the subjects (11 out of 12) showed higher immune system activity after the trip (about a 50 per cent increase) relative to before. The findings of this and subsequent studies by the same research group indicate that a forest bathing trip can have beneficial effects on the body's immune function (Li et al. 2008a; Li et al. 2007a; Li et al. 2007b). The relevance of this research to this report lies in the mediating role of the immune system in the bi-directional relationship between coronary artery disease and depression (Kop and Gottdiener 2005).

A recent project in Norway aimed to study whether or not people on long-term sick leave who suffered from mental fatigue and stress-related illnesses were likely to show improvements to their health and capacity to function while undertaking meaningful activities in a restorative setting such as a forest (Nordh et al. 2009). Participants were randomly assigned to one of three groups: two groups during autumn 2006, followed by a short evaluation, and the third group during spring 2007. Each group participated in a program consisting of regular forest-related activities, teaching and recreation in a forest environment. Results showed that after the intervention, the manner in which participants functioned, by balancing meaning and manageability in everyday life, improved (Nordh et al. 2009, p. 9). Leaders of the groups reported witnessing improved mood and more laughter as the intervention progressed.

Another recent study examined the physiological and psychological responses to real forest landscapes as well as the therapeutic uses of forests relative to urban environments (Lee et al. 2009). Twelve Japanese male university students, aged 20 to 23, who were of reported good health and did not smoke or drink, were selected to participate (Lee et al. 2009). Each subject was randomly assigned to either the forest or urban environment group. Physiological and psychological measurements were taken at various time intervals: in the morning, prior to breakfast at the place of accommodation; upon arrival at the site after resting for 15 minutes in each site and recorded as "before viewing"; following instructions to view the landscape

for a 15-minute period and recorded as "after viewing", and finally in the evening, before dinner at the place of accommodation. The physiological data measured salivary cortisol concentration to assess the stress response of subjects to different environments, and systolic and diastolic blood pressure and pulse rate were used to study the activity of the autonomic nervous system (Lee et al. 2009). Results indicated that both "prior to viewing" as well as "during viewing" measures of salivary cortisol levels showed significant reductions in the forest environment, thereby supporting the possibility that not only viewing but merely being in a forest has stress-reducing potential. Both the diastolic blood pressure levels and pulse rate, which are associated with the activation of the parasympathetic nervous system, showed significantly lower values in the forest environments. Self reports also indicated that the young men felt more comfortable, soothed and refreshed following the viewing of a forest scene relative to an urban one.

5.4 Gardens as a setting for therapeutic nature contact

The world for humans is richer for the presence of an environment formed by other species. The carefully tended gardens around a Japanese Buddhist temple are tributes to this human need.

Birch 1993, p. 88

While gardening is commonly perceived as a leisure activity, it has always gained some recognition for its healing powers. In the Middle Ages monasteries and convents created gardens as places where people could meditate and recover from ill health (Ulrich 2002; Wells and Evans 2003). Gardens have been identified as places which can generate calm, rational reflection and help patients to regain serenity and peace in their lives through contact with beautiful, natural surroundings (Hartig et al. 1996; Ousett et al. 1998; Parr 2007). The Victorian era saw gardens being located in hospitals for the benefit of patients, and hospitals themselves were located in pleasant surrounding (Wells and Evans 2003). Gardens are also reported to have historically been used for vocational training and therapy in some US prisons, providing a space to reflect and heal from the incidents which brought prisoners into the correction system (Lindemuth 2007).

Over recent years, the recognition of gardening as a basic way of connecting with and benefiting from the healing powers of nature has grown. This positive effect is believed to be mediated through the feelings of comfort and opportunities for individual mental, physical and spiritual renewal provided through gardening (Milligan et al. 2004). Gardens are perceived as providing opportunities for fresh air, sunshine, physical activity and a place to undertake other familiar activities such as growing vegetables, filling a bird bath and sweeping paths. Such tasks support dexterity and provide people suffering from chronic illnesses such as Alzheimer's with a sense of purpose (Brawley 2004). Gardens also assist people with cognitive impairments to remain connected with nature and their surrounding environment. Brawley adds that feelings of isolation, vulnerability or loss of capability are minimised through time spent in gardens.

In a study to investigate these effects, especially ways in which the interrelationship between older gardeners and their environments contribute to quality of life and mental well-being, a study was conducted in northwest England, in a predominantly low socio-economic area with 23 per cent of the population over the age of 60 (Milligan et al. 2004). Participants over the age of 65, with no documented mental confusion, and who were physically mobile, were selected for the study from a general practitioner list. Subjects had a choice to garden communally or in individual plots, and were requested to keep and later provide both verbal and written reports. Longitudinal data was gathered through the completion of standard weekly diaries based around three structured questions about their health and well-being over the week. Study findings indicated that there were numerous benefits from gardening, especially communal gardening, for physically mobile elderly people. The subjects reported feelings of peace, tranquillity, exhilaration and they gained positive impacts from the growth and renewal visible in the natural landscapes. Passive engagement such as looking at or sitting or walking in the garden was appreciated by the subjects, while active engagement where subjects worked as a part of a group, sharing knowledge, skills and providing support to others was shown to improve social interaction, promote neighbourhood renewal, instil a sense of achievement and satisfaction, and provide aesthetic pleasure from contact with nature. Active engagement in communal gardening was also perceived as a way for elderly people to combat social exclusion and isolation. The authors believed that these positive effects should be given due consideration within a healthy ageing development agenda, as the evidence shows promise in contributing significantly to such a cause.

A study by Ulrich (2002) provided evidence that dementia and stroke patients show improved mobility and dexterity, elevated confidence and enhanced social skills as a result of gardening activities. Ulrich also suggests that gardens will have a greater calming and stress reduction capacity if they are rich in foliage, flowers, contain water features, harmonious nature sounds and visible wildlife such as birds, fish and turtles. These thoughts are put into action at the Derby Hospital in the UK, where staff are raising funds to build an aesthetically pleasing garden where patients can work, relax or spend time in contemplation, using their imagination and enhancing their relationships with the natural world (Hodgson 2006).

A recent analysis of data gathered from a Scottish Health Survey has found that “domestic activity such as gardening was associated with a 13–20 per cent reduction in the risk of psychological distress” (Hamer et al. 2008). Research conducted in Australia points to a possible causal relationship between physical activity such as gardening and the reduction of anxiety and depression in the elderly (Patterson and Chang 1999). Newspaper columnist Lisa Abraham writes of a woman who had successfully taken up gardening to battle her depression. Abraham comments on the benefits of gardening for depression: “any gardener can tell you an hour pulling weeds in the sunshine is a great cure for being upset, angry, frustrated or blue” (Abraham 2007, p. 2).

A number of other therapeutic benefits from gardening activities, such as opportunities for empowerment and enhanced capabilities and skills, as well as a pathway to enhance social support and interaction in the broader community, have been identified in the literature (Armstrong 2000b; Myers 1998).

Relf (1998, p. 28) points out that there are three basic ways in which plants can foster the development of healthy communities:

- by providing a physical condition or appearance that makes people proud to be considered part of the community and by enhancing the social condition of the community
- by providing opportunities for the sharing of values, interests and commitments that open the door to friendly association and lead to further cooperation, which has the impact of demonstrating the individual's ability to have control and responsibility for the changes in the community
- by providing a surrounding that is more comfortable physically in which to live and work.

Gardening and greening activities in school settings has been shown to provide opportunities for children to take pride in their work as well as improve their sense of responsibility and self-confidence while providing a constructive channel for energy (Maller 2005; Relf 1998). Recent evaluations of school garden projects in Melbourne (Gibbs et al. 2009) and the USA (Virginia Tech University 2003) have indicated promising results. These studies are discussed more thoroughly in section 5.5.8.

Some contemporary detention/prison facilities continue the tradition of including gardens, which has been shown to be beneficial for inmates and staff in both physical and psychological terms (Lindemuth 2007). Psychologically, the therapeutic qualities of gardens are believed to assist inmates to manage behavioural symptoms heightened by the tension, alienation and sterility of the prison settings. Officers at New York City's Rikers Island Jail have confirmed these findings. Lindemuth believes that, although gardens do not have the ability to solve all health- and stress-related problems associated with incarceration, they can reduce a few of the harmful effects and improve an individual's ability to cope with life both inside and out of the institution. It is, however, important to keep in mind that the degree of positive impact that can be attained depends, at least to some extent, on the richness and diversity of material and plantings within the gardens.

5.4.1 Community gardens

The American Community Gardening Association (ACGA) defines community gardens as pieces of land gardened by a group of people in urban, suburban or rural settings (Teig et al. 2009). Community gardens in some areas have focused on a particular socio-demographic group such as people with mental illness or disabilities, or residents of abused women's shelters (Armstrong 2000b).

Community gardens are powerfully associated with social policy goals of inclusion, such as the integration and normalisation of people who have previously been socially excluded from everyday society (Parr 2007). Some of the key components of social inclusion—such as participation in the process of consumption, production, social interaction and political engagement—are identified as elements present in collective garden work (Burchardt et al. 2002).

Results from a recent study by Bartolomei et al. (2003) of community gardens in an urban renewal area of Sydney indicated gardening-related activities enhanced community and social life, developed a sense of peace and relaxation, and promoted happiness and personal renewal, as well as reducing food costs, increasing physical activity, assisting skills development, and providing aesthetic benefits (Bartolomei et al. 2003, p. 56).

A sample of elderly people from New York who attended a local seniors centre took part in a study investigating if community gardening had positive effects on the levels of functional health, depression and physical fitness for independent living elders (Austin et al. 2006). Scores from the Dartmouth COOP Functional Health Assessment Charts showed broad-ranging improvements, especially for social activities. Total Emotional Score and the Geriatric Depression Scale indicated improved scores as well as improved function.

In Canada, active community gardens in south-east Toronto were identified, and participant observations, focus groups and in-depth interviews used to gather data on the experiences and benefits subjects reported as a result of community gardening activities (Wakefield et al. 2007). Participants voiced their perceptions in relation to the gardening, saying: " … gardening is such a great thing; it encourages love for the area, love for the city"; "we share … tools, vegetables, we share the foods, we share even the knowledge, cultures, through gardening"; "you can share stories, or talk to each other" (Wakefield et al. 2007, p. 98). Participants also repeatedly commented on the effects gardening had on keeping them physically and mentally active, relaxed, calm, and without stress. The gardens were seen as places for positive social interaction, breaking the isolation for some, especially in communities where social exclusion and marginalisation were persistent issues. The evaluations clearly indicated that the gardens enhanced community health by improving relationships among residents, increasing community pride and serving as an extensive impetus for building broader community involvement.

Two similar studies, one in Denver, Colorado, and the other in upstate New York, investigated the benefits of community gardens for neighbourhoods and health. The Denver study involved in-depth interviews with the gardeners (Teig et al. 2009), and the New York study involved a survey examining 20 community garden programs. Both studies sought to identify the types of characteristics required for community development and health promotion in the neighbourhoods (Armstrong 2000b). Results showed community gardening:

- fostered and enhanced social connections and ties
- improved reciprocity both in and out of the garden in terms of sharing recipes, advice on gardening and exchanging healthy food at garden events
- improved feelings of safety through the development of mutual trust and civic engagement to address issues concerning public safety in the area.

As a consequence, there was:

1. improved cohesion amongst the gardeners which motivated them to protect each other and the neighbourhood from crime, theft and vandalism

2. improved self-esteem through leadership activities during gardening group activities and collective decision making
3. enhanced quality of life through engagement in extra activities associated with additional volunteer work in the garden.

Armstrong 2000b; Teig et al. 2009

The capacity of community gardens to foster social connections has particular relevance to mental health and well-being when we consider evidence from VicHealth (2005) that social supports strengthen mental health; confiding relationships protect against depression; and social connection reduces anxiety.

5.4.2 Healing gardens

Healing gardens are typically located in health care facilities such as hospitals and residential care units. These gardens are defined as natural spaces where opportunities are provided for relief from physical symptoms, for stress reduction, and for improvements in one's sense of well-being through activities such as observation, listening, strolling, sitting and exploring the natural space (Cooper-Marcus and Barnes 1999). For example, a group of three healing gardens has been provided adjacent to a children's cancer centre in Southern California. The three gardens are abundant with plants and flowers but also with various unique features such as brightly coloured cloth butterflies providing shade for children, wooden benches and chairs, water features, mosaics and a mailbox-sized 'wish house' where children can place wishes they have written (Sherman et al. 2005). The purposes of a healing garden are identified as: supporting recovery from stress for patients, visitors and staff who encounter stressful experiences in such centres; beautification of an institutional environment; creation of a serene and quiet refuge which can be accessed easily during hectic work hours; as well as provision of a facility to be used during certain treatment regimes (Hartig and Cooper-Marcus 2006; Peacock et al. 2007).

In a study which compared Alzheimer's patients from facilities with and without gardens, results indicated patients who had access to and use of gardens were less troubled by negative reactions and fits of anger than patients without access to such a facility (Mooney and Nicell 1992).

An investigation of the effects of a hospital paediatric healing garden on patients, visitors and staff, used behavioural observations and structured interviews (Whitehouse et al. 2001). Findings indicated that, even though a majority of patients used the garden for less than five minutes at a time, its perceived value was high. Use of the garden was positively linked with improved mood and satisfaction with the facility, and the majority of respondents felt a garden should be an important feature of any hospital.

Some hospitals have gardens with varied features and ground textures which can assist during rehabilitation therapy of patients with particular conditions (Hartig and Cooper-Marcus 2006). The Good Samaritan Hospital in Portland, Oregon, has patient-specific gardens

designed with a variety of walking surfaces and planter heights, so that physiotherapists who work on rehabilitation with patients who have had strokes, spinal and brain injuries can use these features. A benefit of this is that patients often are not acutely aware of being in a treatment regime in these surroundings. The Rusk Institute of Rehabilitative Medicine in New York City has a play garden where children with brain injuries can regain their skills in an outdoor environment as opposed to a formal indoor exercise room.

Special healing gardens have also been developed for patients with Alzheimer's disease, with the aim of stimulating the senses in a positive manner and thereby encouraging positive memories and emotions, while providing them with a space to exercise without becoming agitated (HCNDACRSP 2004; Hartig and Cooper-Marcus 2006). At the Oakwood intermediate care unit in Reading, England, perceptions of the nursing team who transformed a weed-ridden backyard into an attractive healing garden for their patients were very positive. Among their comments were: "gardens can restore a sense of order, safety, privacy and calm for individuals who may be experiencing chaos induced by illness"; "by being engaged in gardening activities, individuals can experience a sense of peace—the effortless concentration that increases the ability to rest"; "gardening reduces people's worries about illness and other difficulties" (Davis 2009, p. 20).

Davis (2009) cites data from the national horticultural charity Thrive, which reports that regular gardening has the potential to reduce the risk of dementia by 36 per cent. This statistic is confirmed through the results from an Australian study conducted in Dubbo, New South Wales (Simons et al. 2006).

The nursing team from the Oakwood healing garden project stated: "there are clear benefits for patients with dementia, say, who may have been gardening all their lives, or for people who need exercises for hand-eye co-ordination. It is also an ideal opportunity for social interaction as it brings people out of their rooms"; "working in the garden increases patients' mobility and dexterity, as well as offering gentle exercise and movement" (Davis 2009, p. 20). Other benefits for mental well-being such as improved mood, increased self-esteem and reduced depression were also identified through the nurses' observations.

5.5 Specific therapeutic approaches using nature contact

The following section highlights a range of different approaches to the therapeutic use of contact with nature. While the main focus of this document is on green spaces—that is, the influence of nature-based settings for mental health and well-being—it is also valuable to draw attention to other relevant forms of nature-based therapies.

5.5.1 Ecotherapy

- "Healing or therapeutic generally refers to a process which benefits overall health and well-being" (Velarde et al. 2007, p. 200). They are also terms commonly used to describe the following three processes which can occur individually or in unison: relief from physical symptoms such as illness and trauma in post-surgical patients

- stress reduction and increased comfort for individuals dealing with emotional and/or physically tiring circumstances
- improvement to overall sense of well-being.

Cooper-Marcus and Barnes 1995; cited in Velarde et al. 2007, p. 200

Much of the therapeutic contact with nature used to enhance mental health and well-being has its basis in eco-psychology or ecotherapy. Eco-psychology is defined as "an integration of the fields of ecology and psychology" (Roszak et al. 1995; cited in Davis and Atkins 2004, p. 212). Clinical eco-psychology is based on the theoretical premise that numerous psychological and physical afflictions are likely to result from modern humans withdrawing from the healing powers of the natural world (Schull 2001; Levinson 1969; Roszak et al. 1995, cited in Pryor et al. 2006). Eco-psychology has been successfully applied to treat patients suffering from a number of negative psychological states associated with severe trauma, cancer, depression and anxiety, by utilising activities in nature as the basis for treatment (Burns 1998; cited in Pryor et al. 2006).

Ecotherapy has grown out of eco-psychology as the underlying mechanisms are essentially quite similar to those in eco-psychology. Ecotherapy is defined by Clinebell (1996; cited in Beringer and Martin 2003, p. 34) as "a type of therapy explicitly relying on the natural world to achieve therapeutic goals, and overtly seeks to reconnect humans and nature and thereby let the healing process occur". Clinebell (1996; cited in Jordon 2009, p. 26) also describes ecotherapy as a form of "ecological spirituality", "whereby our holistic relationship with nature encompasses both nature's ability to nurture us, through our contact with natural places and spaces, and our ability to reciprocate this healing connection through our ability to nurture nature".

The numerous types of nature-related therapies discussed in this section, such as horticulture therapy, green exercise, wilderness therapy, time in forests and parks, and viewing of landscapes, are identified within the scope of the ecotherapeutic approach (Jordan 2009; Mind 2007). Although the levels of exertion and direct participation for each individual therapy differ, they all can be considered forms of ecotherapy. In this sense, one could suggest there is no definitive label of ecotherapy. Rather it can be viewed as a set of practices or a process which has an experiential connection with nature (Jordan 2009).

Burls (2007a) contends that the primary component in ecotherapy is active participation, which is typified by activities such as gardening, farming, trekking, walking, horse riding and active nature conservation. Research involving participants who work with nature in this manner, through direct engagement, management, contribution to design, restoration and maintenance of public green spaces, indicates that there are benefits to both participants and the environment (Burls and Caan 2005; Townsend 2005b).

The educative model used in ecotherapy is aimed at assisting people to reconnect with nature (eco-bonding) and replacing the alienation with nature, which is referred to as eco-alienation (Wilson 2003a). The model has two prominent elements, centred around reciprocity and reflection, which supports the two-way nurturing of man and nature, by active participation in nurturing the environment through experiential learning (Burls 2007a).

Through reflection, a person can ponder on internalised thoughts, norms and values with the aim of finding what is most suitable for their life; at the same time they can recognise the dysfunctional behaviours and emotions within them and understand how these can take effect, thus attaining greater control over their life experiences (Burls 2007a). While this method assists people to develop ecologically sensitive lifestyles, the synergy that develops between man and nature leads not only to self-preservation but to preserving the future for the next generations, which Burls (2007b) believes is the basis of sustainability.

This model facilitates healing in a three-dimensional way, encompassing the mind-body-spirit concept (Burls 2007a). The three experiential dimensions specific to this model are as follows (Clinebell 1996; cited in Burls 2007a, p. 22):

- developing openness towards being more fully intentional and regularly supported by nature, in a caring and respectful interaction
- enabling people to become more cognitively aware of their place in nature and of the wider meaning, self-transcending or spiritual dimension in their experiences of nature
- motivating people to learn how to adopt more ecologically caring lifestyles and behaviours and to participate in actions that will help save their ecosystem and biosphere.

Eco-educative and therapeutic activities include:

- restoration of green urban areas for public use and community development
- conservation work for the sustainable preservation of native flora and fauna
- ongoing work in botanic gardens and identification of wild plants and particular crops, edible and medicinal plants, which may advantage ethnic communities and people with special needs
- assessment and documentation of species in woods, parks, and wild areas aimed at cataloguing and identifying native or endemic flora and fauna, contributing to scientific research and repopulation projects
- work in wild animal rescue and rehabilitation centres
- assessment of the need for protection and habitat regeneration of local wildlife
- creation of artefacts that increase the aesthetic and sustainable value of local wildlife-supporting environments as well as promoting enjoyment of nature by people.

Burls 2007a

Jordon (2009) asserts that if nature is to act as a therapeutic presence, the person engaging in therapy needs to form a therapeutic relationship with nature, just as they would with a therapist. This bond could be created by passively receiving the aesthetic and healing beauty of nature and natural environments, which are places of healing and restoration by themselves, or, during active engagement, utilising resources in natural settings by taking part in adventure, wilderness and horticulture therapy.

Special instances of personal transformation that occur during journeys into nature have been documented in numerous studies conducted on the benefits of ecotherapy. This is described by one scientist as "the wonderful feeling of being a part of something bigger, deeper and more real than anything in the city. This is wilderness, this is freedom, this is magic, this is living" (Andrew 1999, p. 40). This sense of personal transformation was also noted by Davis and Atkins (2004), when they reported on a counselling program which included, among other things, a planned weekend outdoor retreat in the Appalachian Mountains. One participant commented: "I was reunited with some primal and familiar part of myself; I was reminded of earth, air, fire and water, that I am made of these and I am a part of them" (Davis and Atkins 2004, p. 217).

The "Feel Blue, Touch Green" study in Australia selected people experiencing depression, anxiety and/or social isolation and studied their experiences and the improvements to their mental and physical health and well-being, following participation in the activities of a conservation group (Townsend and Ebden 2006). Participants described the skills they developed, such as the improved ability to take risks and confront challenges, as a result of participating in the program. A few statements related to the general mental health and well-being benefits reported by participants follow: "being involved in 'Feel Blue, Touch Green' helps me manage depression"; "you don't get criticised in the bush, self-criticism, negative criticism, does not occur in the outdoors"; "the physical exertion leads to feeling calm"; "it takes the tension and focus away from myself and I forget reality … This natural environment grabs you" (Townsend and Ebden 2006, pp. 30–31).

These comments indicate that the participants' levels of confidence and self-worth improved alongside their mental health status in areas such as stress, anxiety, depression and mood management. There were also increasing levels of social integration and connectedness built through this project (Townsend and Ebden 2006).

Burls (2007a, p. 23) outlines the most common outcomes derived from the eco-therapeutic activities at Meanwhile Gardens in London:

- a sense of physical and psychological well-being
- a sense of synergy with nature
- a sense of freedom in the outdoors
- a sense of reconciliation with events/people/situations through the use and understanding of metaphors given by nature
- a sense of expectation and surprise
- a lack of negative judgments
- trust in oneself, pride and improved self-esteem
- skills development and employability
- a sense of place.

The findings from this study confirm results from other ecotherapy studies which show improvement in physical well-being and development of skills such as dexterity, mobility, resilience and stamina through exercise; psychological well-being through improved concentration, memory and numeracy; relief from depression and anxiety as well as improved social well-being such as self-management, self-esteem, improved social relations; employability skills, socio-political awareness and a greater eco-ethical consciousness (Burls 2007a; Burls and Caan 2005; Wakefield et al. 2007).

Similarly, the most recent report on ecotherapy by Mind, the leading mental health charity for England and Wales, reinforces the results from similar studies cited in this section. It claims a significant improvement in people's mental health when they participate in activities in nature (Mind 2007).

5.5.2 Adventure therapy and wilderness therapy

Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves.

John Muir 1901

Adventure therapists have acknowledged the strong connections that this type of therapeutic relationship holds with the outdoors and the natural world (McKenzie 2000). When the quality of "naturalness" is included in a therapy program, it is referred to as "wilderness therapy", "wilderness adventure therapy" or "outdoor recreation therapy" (Beringer and Martin 2003, p. 29). It is also useful to understand that the concept of adventure therapy does not embrace only high risk activities but is a therapeutic process which embraces both body and mind. However, it is interesting to note the argument that the value of adventure therapy is due to 'adventure' acting as a healing factor and, similarly, that in wilderness therapy being away from the usual urban base and the distance the wilderness provides is what has created the therapeutic success, as opposed to the 'naturalness' of the surroundings.

A quasi-experimental field study and a true experiment were conducted to explore the uses of the different theoretical models of restorative experience (Hartig et al. 1991). The former consisted of wilderness backpacking and non-wilderness vacation conditions, as well as a control condition in which participants continued with their daily routines. The latter had urban environment, natural environment, and passive relaxation conditions. Assessments of restoration involved multiple methods and consisted of self-reports of emotional states and cognitive performance in the first study, and physiological measures in the latter study. Overlapping evidence from the self-report and performance results obtained in both studies indicated a greater restorative effect arising from experiences in nature. Research has shown that wilderness experiences have been shown to improve sustained attention, according to data from self reports, as well as to create feelings of peacefulness and provide opportunities for reflection (Hartig et al. 1996).

In a study of the evolution of wilderness adventure therapy programs in Australia, Pryor (2009, p. 27) drew on evidence from Crisp and Hinch (2004) to support her claim that "one of the ways in which mental health problems (particularly depression) can be both prevented and managed is through a strategic intervention that combines physical activity, social connection and the natural environment within therapeutic frameworks".

This type of therapy is known to be commonly used with at-risk adolescents classified as young people experiencing or having experienced physical and/or sexual abuse, neglect or abandonment, dysfunctional families, multiple placements and resulting offending behaviours (Sveen and Denholm 1993; McNutt 1994, cited in Travlou 2006, p. 16), and alcohol and substance abuse (Russell et al. 2000). The psychological process involved in this form of therapy for adolescents with addictions is described as follows (Russell 1999; Russell et al. 2000):

- a cleansing phase: addressing clients' chemical dependencies by removing them from the destructive environments that perpetuated their addictions
- a personal and social responsibility phase: natural consequences and peer interaction helps clients to learn and accept personal and social responsibility. Self care and personal responsibility are facilitated by natural consequences in the wilderness and not by authority figures that troubled adolescents are prone to resist
- a transition and aftercare phase: clients prepare to return to the environment from which they came. Staff works with them to process what they have learned and how to take these lessons home with them.

Findings also show that the challenges faced in a natural environment during this type of therapy encourage participants to master new skills and develop confidence which in turn has the ability to contribute positively to enhanced self-concept, self-awareness and self-responsibility (Barrett and Greenaway 1995; McKenzie 2000; Russell et al. 2000). Increased skills, which can enhance employment opportunities, realisations of personal behaviour, constructive use of leisure opportunities, and reduced rates of reoffence are also seen as beneficial effects of this form of therapy (Barrett and Greenaway 1995).

5.5.3 Therapeutic gardening

Therapeutic gardening is a form of occupational therapy used in psychiatric institutions, children's homes and residential care facilities (HCNDACRSP 2004). People of all ages with psychological problems, as well as the elderly with dementia, are considered to gain benefits from this therapy (Aldridge et al. 2003; Smith 1998). Therapists as well as participants report a variety of positive outcomes from this type of therapy, such as social integration during group-based projects, improved self-confidence and self-worth, better concentration and the learning of practical skills (Aldridge et al. 2003; Sandel 2004).

Therapeutic gardening introduced to a long-term juvenile detention facility in Texas was found to be a success, far exceeding expectations, after the first year (Sandel 2004). The program was aimed at reducing aggression and providing the residents with an enjoyable, productive and therapeutic activity. The results showed that aggressive incidents declined

and overall levels of civility rose alongside the increasing satisfaction with the program for both staff and residents (Sandel 2004). Additional benefits gained through this program are discussed in section 4.3.4.

5.5.4 Horticulture therapy

The process known as horticulture/horticultural therapy refers to the use of plants and work in gardens to meet clinically defined goals within a treatment strategy for individual patients (Gigliotti and Jarrott 2005; Parr 2007). These programs are designed with the aim of assisting in the recovery process, where healing and curative effects are commonly seen as part of the care plan and goals (Sandel 2004).

During World War II, one of the great pioneers of psychiatry, Carl Menninger, led a horticulture therapy movement in the Veterans Administration Hospital in Topeka, Kansas, USA. In the 1950s, a more widespread movement emerged which recognised the benefits of gardening for people with chronic illnesses (Louv 2008). Horticulture therapy is perceived to provide benefits in social, psychological, physical and cognitive spheres of function to many populations. These include: people with mental illness; people with head injuries; people with physical injuries; cognitively agile elders and institutionalised elders exhibiting various symptoms; young people who have been in trouble with the law; and people in settings such as elderly citizens' facilities, rehabilitation centres, psychiatric hospitals, correctional facilities such as alcohol and drug rehabilitation centres, work co-operatives for people with physical and mental disabilities, and in programs for people with visual impairments (Gigliotti and Jarrott 2005; Nebbe 2006; Sandel 2004).

Three types of horticulture therapy programs are identified, with each having a different objective (Sandel 2004). The first—vocational programs—are designed "to assist people recover from illness, injury or disability" and develop skills and characteristics which will lead them to employment. This type of horticulture therapy is rooted within a rehabilitation model (Sandel 2004, p. 124). The second type is therapeutic horticulture programs that are focused on achieving a sense of wholeness for the participants, where healing and curative effects are commonly seen. This is described in detail in the next section. The third type is a social program, designed to offer gardening as a leisure and recreation activity which is believed to be beneficial for the individual in terms of achieving overall wellness.

Among the benefits reported from horticulture therapy are: increases in socialisation, reminiscence, self-esteem, confidence, life satisfaction, motivation and social interaction; improved communication skills; stimulation of curiosity, sensory awareness and creativity; relief from stress and tension; enhanced understanding of life and life processes; increased patience and delayed gratification; as well as engagement in activities and improved physical function which results in elevated levels of autonomy (Gigliotti and Jarrott 2005; Mooney and Milstein 1994; Nebbe 2006).

An investigation was undertaken, post release, of the outcomes for 48 former inmates of the San Francisco County Jail, who had been involved in the horticulture therapy program, 'The Garden Project'. The study showed that the inmates benefited from involvement in the program

both during incarceration and following their release (Rice 1993; cited in Lindemuth 2007). Benefits included: a reduction in the rate of involvement in illegal activities from 66.7 per cent to 25 per cent; fewer friendships with criminal associates; reduced drug use; and an increased desire for help (Lindemuth 2007). Psychological benefits such as higher self-esteem, reduced anxiety, depression and risk-taking behaviours were also evident from the results.

People in residential facilities, retirement communities and senior citizens' centres benefit from horticulture therapy programs by gaining access to fresh air, healthy food production, opportunities to belong to a community and having an object to focus on. Such programs are also useful in reducing stress and connecting people with the land (Sandel 2004).

A study to assess the effectiveness of horticulture therapy activities was conducted at an adult day-service program centre in Virginia, USA, in a group setting (Gigliotti and Jarrott 2005). The study compared affective and behavioural responses which are believed to be indicators of competence (Lawton and Nahemow 1973), during horticulture therapy and the more traditional adult day-service activities to determine the relative effectiveness of each (Gigliotti and Jarrott 2005). Participants showed sustained active engagement in horticulture therapy activities; spent more time being active during the therapy activities compared to traditional activities; and displayed greater positive affect during horticulture therapy activities.

Another study, conducted in the United Kingdom, involved 137 clients of whom 49 had mental health problems including schizophrenia, depression, anxiety disorders and post-traumatic stress disorder. Participants ranged in age from 18 to 78 and participated in a range of horticulture therapy projects (Sempik et al. 2005). The study indicated that the participants' involvement in therapeutic horticulture had improved their relationships with their family (54 per cent) and improved their relationship with friends (43 per cent) due to enhanced self-esteem and self-confidence. It was perceived that the projects promoted social inclusion of normally socially excluded, vulnerable adults who were commonly otherwise subjected to prejudice and stereotyping. Projects were seen as providing structure to subjects' lives, and 81 per cent of participants felt their health had improved, with 26 per cent of these saying they felt fitter. More than a third (34 per cent) reported "reduced symptoms or reduced 'negative feelings' or emotions" (Sempik et al. 2005, p. 25).

5.5.5 Green exercise

Green exercise is defined as "physical activity which takes place outdoors, in areas as diverse as urban green corridors, through to large rural countryside settings" (Welsh Assembly Government Department for Public Health and Health Professionals 2008, p. 1). Participation is often free or at a minimal cost, which is also useful to keep in mind when considering the benefits of this method (Peacock et al. 2007).

A Swedish study found that regular runners who run to maintain a healthy level of physical fitness show a significantly greater preference for a park environment compared to an urban environment. However, the tendency for regular runners to have stronger positive emotions during a run in the park as opposed to an urban environment was non-significant, a fact the

authors suggest could be due to the small sample size of the study (Bodin and Hartig 2003). A UK study utilised 100 adult subjects between the ages of 18 and 60 to study the effects of exercise while being exposed to various rural and urban photographic scenes, which were categorised by an independent panel of 50 people as "rural pleasant", "rural unpleasant", "urban pleasant" and "urban unpleasant" (Pretty et al. 2005). Although exercise alone slightly reduced blood pressure (systolic, diastolic and mean arterial), and significantly increased self-esteem and mood, the combination of exercise with the viewing of different scenes showed clear effects on both blood pressure and the two psychological measurements of self-esteem and mood. Pleasant rural scenes, which were comprised of trees, water, blue sky, clouds and animals such as lambs and calves, had the greatest effects in reducing blood pressure and increasing self-esteem, while a non-significant but positive effect was shown in the improvement of mood. The results from this study were useful in establishing that green exercise is more effective than exercise alone in improving both cardiovascular and mental health related measures.

A research project undertaken by the University of Essex to measure the effects of 10 green exercise activities (such as walking, cycling, horse riding, fishing and canal boating) involved 263 participants from four counties in the United Kingdom (Pretty et al. 2006; Pretty et al. 2007). Findings indicated that participants felt less angry, depressed, confused and tense after engaging in the activities and their self-esteem showed significant improvement. The fact that none of these improvements were affected by the type, intensity or duration of the activities, indicates there is great potential for a wider health and well-being dividend from green exercise activities.

The "Green Gym" initiative, which was set up by the British Trust for Conservation Volunteers, encourages people experiencing mental illnesses to participate in local nature conservation activities to improve their health and well-being and establish social networks (Peacock et al. 2007). Initial evaluations of these initiatives by the School of Health and Social Care at Oxford Brookes University found that participants of the "Green Gym" groups showed significant improvements in mental health scores, a reduction in depression, and a trend towards reduction in weight.

In a study commissioned by Mind (2007) and conducted by the University of Essex, findings confirmed that participating in green exercise activities provides numerous benefits for health and well-being. The effects of green exercise for 20 people with mental health problems were examined, to test its impact on self-esteem, mood and enjoyment (Mind 2007). Participants took part in two walks: the outdoor walk being around woodlands, grasslands and lakes in Belhus Woods Country Park in Essex and the indoor walk around a shopping centre complex in Essex (Mind 2007). Results of the study indicated positive benefits for mental health and well-being. Whereas 71 per cent of participants reporting decreased levels of depression after the green walk, only 45 per cent experienced a decrease in depression after walking through an indoor shopping centre and 22 per cent of the shopping centre walkers actually felt their depression increased. Similarly, while 71 per cent said they felt less tense after the green walk, 50 per cent said they felt tenser after the shopping centre walk. In terms of self-esteem, 90 per cent said their self-esteem increased after the green walk, whereas 44 per

cent reported decreased self-esteem after window-shopping in the shopping centre. Eighty-eight per cent of respondents reported improved mood after the green walk, while 44.5 per cent of people reported feeling in a worse mood after the shopping centre walk. Following the green walk, 71 per cent of people said they felt less fatigued and 53 per cent said they felt more vigorous (Mind 2007).

5.5.6 Tree climbing

Treehab (a word coined to describe tree climbing as an activity of rehabilitation and therapy) and tree climbing in Japan was founded by ecologist, essayist, and environmental and social media commentator John Gathright in 1997 (Tree Climbing Japan 2009). The organisation was founded with the goal of assisting people with physical disabilities to challenge themselves to climb huge trees. The organisation lists its objectives and aims as being able to provide non-discriminating fun and challenging tree-friendly activities to enable people regardless of age, nationality, gender, physical and mental abilities, to come to the forests, climb trees and enjoy nature.

A study conducted by John Gathright and colleagues at Nagoya University compared the physiological and psychological effects of climbing a tree in a forest with those associated with climbing a concrete tower in the same forest (Gathright et al. 2006). Psychological and physiological tests were conducted on all climbers prior to, during and following the experiment. The psychological test results revealed that tree climbing produced enhanced vitality and lowered tension, confusion and fatigue in subjects, while physiological tests showed that the body appeared to be more relaxed following tree climbing.

5.5.7 Care farming

Care farming is a technique that is utilised to provide mental and physical health benefits for a range of individuals, through the combined care of people and the care of the land, reconnecting people to the land and to the food produced by domestic farming (Peacock et al. 2007). “Care farms”, which are agricultural facilities where vulnerable people can go for day care or supervised work in natural environments, are prominent in the Netherlands, and are also evident in Norway, Italy, Germany, Austria, Belgium and Slovenia (HCNDACRSP 2004; Peacock et al. 2007). Between 1998 and 2002, the number of care farms in the Netherlands rose from 75 to around 320 (HCNDACRSP 2004).

Farms and agricultural landscapes are suitable for those seeking to address both social and medical needs, such as psychiatric patients, those suffering from depression, people with learning disabilities, people with a drug history, disaffected youth as well as people suffering from work-related stress or obesity (HCNDACRSP 2004; Peacock et al. 2007).

This form of therapy is not new, with the Nottingham Borough Asylum (later renamed the Mapperley Hospital) reported as using cultivated nature in the form of farm work as a therapeutic and ethical activity, with the added advantage of fresh air and an occupation, for patients from the 1850s onwards (Parr 2007). Similarly, the Glasgow Royal Lunatic Asylum

as early as 1861 recognised “outdoor labour” as keeping patients in good physical health, “tranquilising their nervous system” and diverting patients from their particular hallucinations (Parr 2007, p. 6).

5.5.8 School ground greening

School ground greening is a broad term that is used in this context to refer to the transformation of school grounds which may be barren, flat land with minimal aesthetic pleasantries, into a more welcoming place with a diverse range of natural features such as ponds, trees, shrubs, wild flower gardens, shelters, seating areas and rock amphitheatres. This is now a common activity occurring globally in places such as Australia, Canada, the USA, New Zealand and Scandinavia (Bell and Dyment 2008).

From a mental health perspective this method of contact with nature is believed to be especially useful for child development, while also fostering greater communication, cooperation and improving social interaction at many levels between teachers, children and parents where they work towards shared goals. Greening of school grounds has been identified as an activity which enhances social inclusion and equality in a school community (Dyment 2005; Dyment and Bell 2008). Refer to section 4.1.2 on child development for detailed information on the benefits of contact with nature in children.

Green schoolyards provide opportunities to relax, exercise and restore attention for all children. They also improve teacher motivation, social behaviours and relationships while having extra benefits for children with Attention Deficit Disorder (ADD) (Daniels and Johnson 2009; Faber-Taylor et al. 2001). Researchers suggest all children may perform better throughout the school day if provided with breaks in green settings (Dyment 2005; Faber-Taylor et al. 2001). Greening of school grounds, which enhances the physical qualities of the outdoor environment, has also been shown to improve physical activity levels for children of all ages regardless of their sex, by increasing and encouraging forms of enjoyable, non-competitive and open-ended forms of play at school (Bell and Dyment 2006; Bell and Dyment 2008; Boldeman et al. 2006).

A summary of research studies on the benefits of school gardens was compiled by Virginia Tech University in 2003. Findings indicated that students who were involved with gardening projects in school settings developed more positive attitudes about health, nutrition and the consumption of vegetables (Virginia Tech University 2003). They also showed improved standardised achievement test scores, improved attitude towards school, and improvements in interpersonal skills and class room behaviours. Research also confirmed that gardening leads to higher levels of self-esteem, responsibility, and stronger group cohesiveness in children when incorporated into a school setting.

Recent evaluation of the Stephanie Alexander Kitchen Garden Program conducted in Melbourne showed a number of positive findings similar to those above (Gibbs et al. 2009).

The key findings from the evaluation of the program are as follows:

- the program was particularly effective at engaging 'non-academic learners' and children with challenging behaviours
- children showed an increased willingness to try new foods
- children reported enhanced enjoyment during cooking
- enjoyment during gardening classes was reported, although the result was not statistically significant
- children's competent use of knives in the kitchen was valued by stakeholders as evidence of skills and a symbol of trust
- there was evidence of increased child knowledge, confidence and skills in cooking and gardening
- the program helped create links between the schools and their communities
- there was evidence of the transfer of program benefits to home environments
- overall there were improvements in school social environments.

These findings are supported by data from a Melbourne study (Maller and Townsend 2005, p. 369), which found that "principals and teachers perceive that there are benefits to children's mental health and well-being from participating in hands-on nature-based activities at school".

5.5.9 Outdoor activities in rehabilitation

Outdoor activities such as walking, hiking, gardening and contact with pets have been shown to provide numerous positive benefits for daily living of the population at large, but also for those undergoing rehabilitation (Burls and Caan 2005; Batt-Hawdon and Tellnes 2005). By providing a sense of meaningfulness to life which gives it continuity and coherence, these activities are believed to favour a resistance to disease as well as to assist in the path to recovery from ill health (Batt-Hawdon and Tellnes 2005). In the context of rehabilitation, participation in such activities is believed to be stimulating and informative for patients, giving them opportunities to be creative and empowered, while making some of them forget their ill health or social problems for a short while.

A clinical study of post-surgical breast cancer patients supported the findings highlighted earlier of nature's restorative benefits (Cimprich 1992, 1993). Using a wide range of attention and other measures, the subjects were studied four times during a three-month period. Participants were randomly assigned to either the experimental (intervention) or control (usual care) group. In the intervention group, each participant agreed to take part in three restorative activities each week, each being approximately 20 minutes in length . The activities generally selected by participants comprised nature-based activities such as walking in nature or gardening. The control group received no information about the attention-restoring activities

until the study was completed and they took part in discussing the importance of usual self-care activities such as taking frequent breaks and monitoring unusual symptoms.

The author reports subjects showed a severe lack of attention following surgery prior to the intervention. However, the intervention group showed significantly improved attention performances at each of the measuring sessions (Cimprich 1992, 1993). Measurements using the Necker Cube Pattern Control, which is sensitive to attention changes, indicated that the experimental group showed enhanced ability to limit pattern reversals, while the control group showed significant decline in this same task at the end of the three-month study period. Participants from the experimental group were more likely to return to full-time employment, showed greater inclination to commence new projects such as volunteer work, music lessons and exercise, and showed significantly greater improvements on quality of life ratings at the end of the three-month period.

A Swedish study exploring the effects of nature on people affected by crisis in varying degrees showed that "experiencing nature" and "taking a walk in natural surroundings" as opposed to "being critical of others" or "being with friends" had a more positive effect on the rehabilitation potential of individuals who were affected by high levels of crisis (Ottosson and Grahn 2008). Having access to nature in the daily lives of people can have a buffering effect on their mental state, as shown by individuals who have more experiences in nature being less affected by the crises in life, compared to those who have fewer such natural experiences (Louv 2008; Ottosson and Grahn 2008; Townsend and Ebden 2006; Wakefield et al. 2007).

Drawing on an example from a program assisting in the rehabilitation of young people who have experienced drug and/or alcohol abuse and other problematic issues, Pryor et al. (2006 p. 114) note that "'active', 'social' and 'adventurous' contact with nature may be combined within a treatment intervention to protect and enhance the health of individuals experiencing chronic mental, emotional and physical health difficulties". The program, which includes group work both before and after a 12-day trek in a remote wilderness area, was transformational for many participants. "As well as improvements in physical health, all participants displayed signs of improved mental health and well-being. Several participants appeared to have experienced what might be called a transformational learning experience, evident in language and stories reflecting new-found personal identities, for example, 'I'm strong'" (Pryor et al. 2006, p. 118).

5.6 Contact with animals

I have always enjoyed animals and marvelled at their effect on people. They seem to possess several of the characteristics that Carl Rogers described as being so important to the therapeutic relationship: 'unconditional positive regard and warmth'.

Parshall 2003, p. 55

It is now common knowledge that the positive relationship humans share with animals facilitates human health and well-being (Allderidge 1991; Barker 1999; Fine 2000; Levinson

1969; Parshall 2003; Serpell and Fine 2006; Urichuk and Anderson 2003). Even in ancient mythology, the recognition of the healing powers of animals dates as far back as Aesculapius, god of medicine and son of Apollo (Serpell 2000). History says the dogs that lived around the shrine dedicated to Aesculapius were endowed with miraculous healing powers, curing the illnesses of the many devotees who flocked there by simply licking them (Serpell 2000). The notion that dogs could heal injuries persisted into the Christian era, where Saint Roch, who was depicted in the company of a dog, appears to have been cured of plague sores by the licking of his canine companion (Serpell 2000). The following timeline on historical perspectives on human and animal relationships, and the development of research on that topic draws primarily on data from Morrison (2007). Where data is drawn from other sources, they are noted.

In 1790, rabbits and chickens were used in therapy with the mentally ill in York, England; 1830 saw the British charity commissioner recommend animals for mental institutions; in 1867 farm animals and horses were used in the treatment of epilepsy patients in Bethel, Bielefeld, West Germany; and in Gheel, Belgium, in the nineteenth century, animals were used in treatment plans for handicapped people.

In 1919, St Elizabeth's Hospital in Washington, DC, introduced dogs as companions for residents in psychiatric care (Urichuk and Anderson 2003); in 1942 patients in the US Army Air Corps Convalescent hospital, in New York, worked with farm animals and reported the treatment made them feel restful; in 1944, sociologist James Bossa's publication "The Mental Hygiene of Owning a Dog" discussed beneficial relationships between pets and their owners.

By 1962, psychologist Boris Levinson used his dog Jingles in the treatment of an adolescent patient, and published the findings in "The dog as the co-therapist". By the 1970s, a visiting therapy dog, Skeezer, became a permanent resident at the Children's Psychiatric Hospital, Ann Arbor, Michigan, and psychiatrist Michael McCulloch prescribed pets for patients. Around the same time, veterinarian Leo Bustad started Bustad Buddies at Pullman Memorial Hospital and Tacoma Lutheran Nursing Home in Washington. In 1972, Boris Levinson conducted a survey which found that one-third of New York psychotherapists used pets in treatment.

In 1973, the Humane Society's 'pet mobile' program brought animals to visit nursing homes in the Pikes Peak region of Colorado; and in 1977, Dr Aaron Katcher and Erika Friedman conducted early research on the effects pets have on blood pressure and human mortality rates (Friedmann et al. 1980). The Delta Society—an organisation which focuses on the human–animal bond was founded in 1980 (Morrison 2007).

Evidence suggests that the very presence of an animal has a positive influence in altering children's attitudes about themselves, increases self-esteem and improves their ability to relate to others (Edney 1995; Thompson et al. 1983). The most notable long-term influences for children from this bond have been identified as positive changes to attitudes and behaviours, verbal communication and increased social competency (Beck and Meyers 1996; Edney 1995). Children with pervasive developmental disorders have shown both behavioural and social improvements following therapy with dogs, displaying a more playful mood, improved focus and awareness of the environment during therapy sessions (Martin and Farnum 2002).

However, it is not just children who benefit from contact with animals. Adults who have various forms of physical illness or socially maladaptive behaviours are also seen to benefit from contact with animals or pets in various settings (Wysong 2000). Interactions with animals have been shown to impact on both physiological and psychological functions in humans of all ages. A study investigating the changes to immune function when participants petted a real dog, a stuffed animal (dog), or just sat quietly, found that those who petted the real dog had significantly higher levels of immunoglobulin post-intervention, than did the other two groups (Charnetski and Riggers 2004). This enhanced psycho-neuro-immunological response gained from petting a live dog is suggested to have implications for improving the ability to fight off infections (Morrison 2007).

Psychological and well-being benefits of contact with animals include: improvement of morale and reduced risky behaviours, as well as reduced stress and anxiety (Barker and Dawson 1998; Wilson 1991); reduced loneliness and depression (Beck and Katcher 1983; Triebenbacher 1998); improved self-esteem and self-worth (Enders-Slegers 2000; Hart 1995); reduced aggression (Kanamori et al. 2001); and improved psycho-social interactions with others (McNicholas et al. 2005), especially for older adults (Rogers et al. 1992).

For many years, animals have been used as aids, such as guide dogs to assist the blind. Use of animals as adjuncts in treatments has occurred for many years within paediatrics, geriatrics, acute care facilities, outpatient rehabilitation and community care. Likewise, use of animals has occurred in many ways, across a variety of settings and for a range of purposes, including in prevention and healing of diseases (All et al. 1999). Animals have also been used as co-therapists when working with clients both individually and in a group setting, such as in psychotherapy and private counselling sessions, residential and psychiatric treatment centres, hospitals, schools, rehabilitation facilities, acute and critical care units and prisons (Souter and Miller 2007).

Animals are also useful in the assessment, evaluation and diagnostic process, where information can be extracted through observing a client's interaction with an animal, such as: how they have been touched, nurtured and mistreated; the types and quality of their previous interpersonal relationships and attachments. Utilising the client's style of relating (Parish-Plass 2008), and observing the animal's reaction to the client, mirrors certain aspects about the self back to the client as well as facilitating self-awareness (Ewing et al. 2007; Fine 2000; Rector 2005). This provides opportunities for growth and change (Schlote 2009). Clients have been seen to externalise and communicate aspects about themselves and their experiences to animals, through storytelling, narratives and play (Chandler 2005; Fine 2000; Parish-Plass 2008; Reichert 1998). Animals can also act as metaphors serving as another individual or opportunity for interaction in the client's life (Parish-Plass 2008).

Animals are also perceived as a source of calm and relaxation (Kruger and Serpell 2006; Lefkowitz et al. 2005); as a source of connection with reality and the here and now (Mallon 1994); as a source of motivation to attend therapy sessions (Halcomb and Meacham 1990); and as an attachment figure in other scenarios (Parish-Plass 2008).

Researchers have also looked into the evidence for the health benefits for their owners resulting from having pets (Hall and Malpus 2000). The perception of pets providing social support appears to be based on convincing evidence of long-term improvements to the mental health and well-being of humans. Research has shown that over 70 per cent of children of all ages tend to talk to and confide in animals (Serpell 2000). Since research has clearly identified the lack of supportive social companionship networks as one of the leading causes of depression, stress and suppression of the immune system (Serpell 1986/1996), considering animal companionships in this context as a suitable alternative could be useful (Hart 2006). Through the stimulation of conversations, providing opportunities to meet people while out walking, encouraging people to interact through shared interests and providing a topic for conversation, dogs act as social catalysts (Hart 2006; Hunt et al. 1992; McNicholas and Collis 2000; Rogers et al. 1993). The more recent literature says that, due to the boundless capacity to forgive that is innate in animals, as well as their ability to show adoration, attention, forgiveness and unconditional love, interaction with and ownership of animals is beneficial (Bustad and Hines 1983; McNicholas et al. 2005).

Documented evidence shows that people who feel any connection for companion animals or nature have reduced risk levels of developing disease compared to those without such emotions (Beck and Katcher 1983; Friedmann 2000). The theory that introducing an animal for a person to care for and nurture can change a person's locus of control from external to internal, was confirmed by reports indicating that individuals show greater concern and care for their health and well-being, and show increased participation in decision-making processes concerning their health and rehabilitation if they know an animal is dependent upon them for love and care (Garrity et al. 1989). The basis for the positive effect on health and well-being resulting from interaction with a pet is defined as the 'human–companion-animal bond' (Beck and Meyers 1996).

Two forms of contact with animals will be discussed in the sections that follow. The first is the contact arising from pet ownership which, although not a formal therapy, has therapeutic benefits for humans. The second focuses on various forms of therapy involving animals, which describes therapy as a type of process which involves a special kind of relationship between an individual who requests help presenting a psychological problem and another individual who is trained to provide that help (Patterson 1980).

5.6.1 Pet ownership

There seems to have been a universal need and affection for pets, which took different forms in different cultures and ages. Nevertheless, man in every generation found reaffirmation of his unity with nature and with the elemental forces of nature which may be symbolised by God. It appears that the possession of pets symbolises this unity with nature and thus satisfies some deep human needs.

Levinson 1972; cited in Nebbe 2006, p. 385

Our need for love, closeness and touching, and connection with nature, is what draws us to pets and makes that contact so beneficial. Although domesticated pets are still quite wild, with senses and abilities that still makes them suited for survival in nature. Our close relationship with them keeps nature ever near, and in a very convenient, safe, cuddly and loving form.

Wysong 2000

Approximately 80 per cent of Australian households own pets (Petnet 2009), with dogs and cats being the most common types of pets, occurring in 53 per cent of households (Headey 2006). According to Headey (2006 p. 20) 92 per cent of respondents to a survey in 2006 "felt very close to their pet"; 56 per cent "felt that having their pet around helped them to meet new people and make new friends"; and 62 per cent "felt that the presence of a pet made it easier to get into conversation and create a friendly atmosphere".

The literature notes a number of therapeutic benefits of pet ownership such as love, companionship, humour, play, exercise, a sense of power, outlets for displacement, projection and nurturance (Enders-Slegers 2000; Savishinsky 1983). An estimated 50 per cent of adults and 70 per cent of adolescents confide in their pets (Beck and Meyers 1996). Talking to animals and petting them has a stress-reducing effect, promotes feelings of reverie and comfort, and enhances longevity and physical health (Katcher 1981). Studies of human–dog interactions focusing on physiological and psychological effects have shown that such interactions are associated with: the release of serotonin, which is known as a "feel good hormone"; reduction to physiological indicators of stress such as blood pressure (Allen et al. 2000; Anderson et al. 1992; Friedmann et al. 1983); reduced risk and problems related to coronary heart disease (Friedmann et al. 1980; Rowan and Beck 1994; Serpell 1991; Siegel 1990b); and fewer minor health issues and visits to the doctor (Friedmann and Thomas 1995; Headey et al. 2002; Rowan and Beck 1994; Serpell 1991; Siegel 1990b). In a study of nearly 1000 non-institutionalised older adult Medicare patients, those who owned pets appeared to experience less distress and needed fewer visits to the physician than non-owners (Beck and Meyers 1996).

Contact with pets, caring for and ownership of pets, provides abundant occupational opportunities with personal and social meaning, involving many activities and experiences which enrich and enhance human lives (Zimolag and Krupa 2009). Most pet owners have reported that pets provided them with added opportunities for relationships, fun, play, exercise and a sense of security (Willis 1997). Pets meet the important need for therapeutic touch—touching and being touched as a form of non-verbal communication. Among elderly people, who often experience sensory deprivation and loss of the opportunity for giving and receiving affection, this may be especially important (Bustad and Hines 1983). Animals are also identified as reducing loneliness and being a source of fulfilment in the lives of people, regardless of their health and socio-demographic status (Urichuk and Anderson 2003).

Any type of relationship in which an individual feels cared for, loved or valued can be considered a positive social relationship (Serpell 2000). Due to the fact that social support has a positive effect on the competency of individuals to cope with the everyday stressors of life, the effect of animals on humans might not only be physical but may promote mental

well-being as well (Parshall 2003). Describing findings from his classic studies, Levinson (1969) points out that, for elderly people, the impacts on mental health from loss of relatives and withdrawing from active participation in human affairs may be overcome by companion animals leading them into new interests, facilitating interaction within the environment such as walking and talking with others, and by being objects to love without fear of rejection.

A small Australian study of pet visitation in an aged care facility (where pet ownership is usually not possible) showed similar benefits. Prior to the introduction of the program, staff observed that residents "tended to show feelings of sadness, hopelessness and pessimism to at least a moderate degree and to lose interest in activities they once enjoyed" and "that before each session, participants had limited conversation and spoke extensively about health complaints". However, during the time the animals were present, increased communication and social interaction between residents was observed and there were "no complaints regarding poor health" (Prosser et al. 2008, p. 32).

It is now commonly recognised that social support has the capacity to buffer or improve the harmful effects of long-term stress. Two basic mechanisms which account for the effects seen during human–animal interactions are suggested. The first relates to the fact that animals have the capacity to induce an immediate, physiologically de-arousing state of relaxation by attracting and holding our attention (Katcher et al. 1983). The second mechanism reflects the fact that companion animals have the ability to provide people with a type of stress-reducing or stress-buffering social support (McNicholas and Collis 1995; Serpell 1996, 2000).

Considered through this lens, pet ownership has potential as a form of occupation which can improve the quality of living and life satisfaction levels of people with serious mental illnesses as well (Goldberg et al. 2002; Zimolag and Krupa 2009). Positive effects from companion animal studies are backed up by reports of people with serious mental illnesses reporting that they felt the animals provided opportunities to care for a living creature, without the complexities often present in a human relationship (De Souza 2000).

Humour is an emotional state known to have both physiological and psychological benefits such as enhanced immune function and the reduction of either perceived stress or the factors responsible for the production of stress (Lefcourt 2001; Martin 2001). The use of humour is a recognised medical intervention in a number of rehabilitation scenarios (Kuiper and Martin 1998; Nezlek and Derks 2001). Dogs especially have been identified as a frequent source of this humour (Beck and Meyers 1996; McMullough 1981; Valeri 2006).

Even though the link between animals providing social support to humans has been given minimal recognition in the medical arena (Serpell 2000), evidence from the human–animal interaction studies described below, shows promising results for health benefits to people experiencing mental health issues.

Pets are believed to play a significant role in the lives of children and adolescents, especially those who are needy, lonely, emotionally disturbed, abused or delinquent. One study incorporated self-selected participants from the general population, residents of an inpatient psychiatric ward for emotionally disturbed youth and students from two state-run schools

for “delinquent” youth (Robin et al. 1983). Respondents reported that they sought pets when feeling lonely or bored, or for emotional support when distressed or needing comfort. Most felt pets are non-judgmental and good listeners.

In a UK study, 71 adults from Cambridge, England, who had just acquired pets were compared with 26 non-pet owning controls, to determine the effect dog or cat ownership has on human health and well-being (Serpell 1991). Within a month of becoming a pet owner, subjects showed a statistically significant reduction in minor health issues and, in the first six months of pet ownership, a significant improvement in psychological well-being was observed. Interestingly, only the dog owners, not the cat owners, showed sustained improvements throughout the 10-month study period. A similar study conducted in the United States examined the number of physician visits each participant made within an identified time span (Siegel 1990a). Non-pet owners showed a higher number of physician visits as a result of stressful life events compared to pet owners, and the authors have interpreted these results to suggest that owning a pet is likely to mediate stress.

“There is consistent evidence that people who are homeless have a much higher prevalence of mental illness than the general population” (St Vincent’s Mental Health Service and Craze Lateral Solutions 2005, p. iv). A pilot study conducted interviews with 105 homeless adult men and women, half of whom owned pets, to assess the benefits and liabilities of owning a pet (Kidd and Kidd 1994). Although providing food and veterinary care for pets was a problem, many respondents noted the importance of pets for their mental health in terms of companionship, friendship and love as well as positive impacts on their physical health (Kidd and Kidd 1994).

A UK study assessing the benefits of dog ownership used focus group discussions to collect data from 62 dog walkers recruited from 12 popular dog walking sites in the Hampshire countryside (Knight and Edwards 2008). Analysis of subject reports showed that dogs motivated people of all ages, as well as those suffering minor ailments such as heart conditions, to be physically active through dog walking. Dogs were described as therapists for their owners, especially when feeling depressed, isolated or lonely and the dogs were perceived as motivators to not give up on life.

Studies have shown people with serious mental illnesses experience positive benefits from companion animals (Enders-Slegers 2000). A recent study on pet ownership showed that pet owners with serious mental illnesses living in the community engage in more meaningful activities and demonstrate better physical, social and psychological community integration than those living without pets (Zimolag and Krupa 2009).

Pets are also perceived as beneficial to people with disabilities, who show improvements in “motor skills, balance, self-esteem, mood, attention span, memory, vocabulary and overall health” (Wysong 2000, p. 57), following contact with pets. In one study, people with hearing impairments rated themselves as less lonely if they already owned a hearing dog or after receiving their dog, and also reported feeling less lonely than those who were hoping to receive a hearing dog in the near future (Hart et al. 1996). Numerous studies have shown that, for people with physical disabilities, contact with animals leads to fewer depressive

symptoms (Collins et al. 2006), increased community participation (Fairman and Huebner 2000; Guest et al. 2006), and increased social interaction (Camp 2001).

5.6.2 Animal-assisted interventions (AAI)

Considerable debate circulates around the definitions provided for each currently existing AAIs (Schlote 2009). The definitions used by Schlote (2009) provide a clear and concise meaning to each area defined, and therefore will be used for the purpose of this review. The flow chart below (Figure 2), indicating the various types of AAI, has been extracted from Schlote (2009, p. 4).

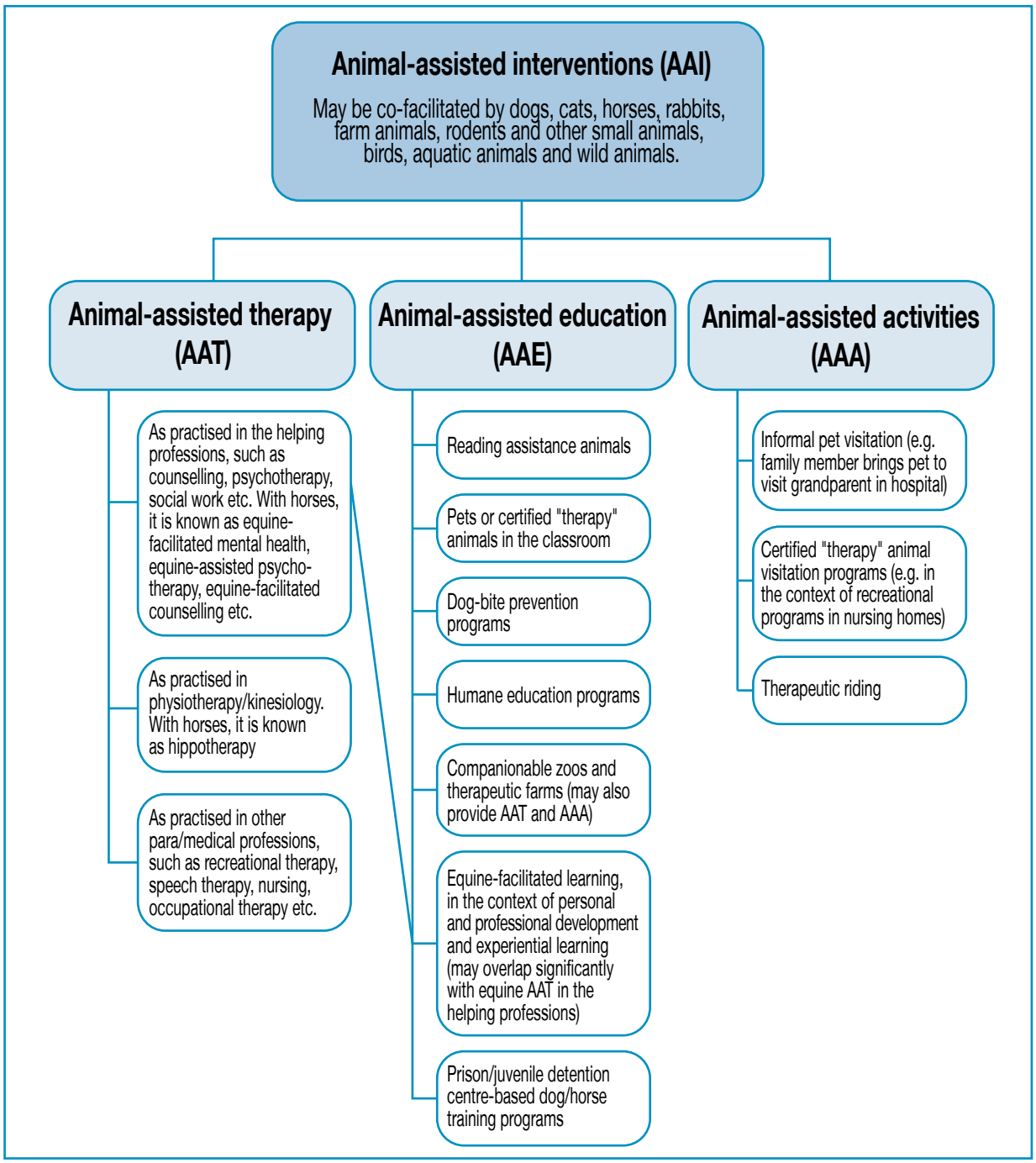


Figure 2: Types of animal-assisted interventions (Schlote 2009, p. 4)

Animal-assisted activities (AAA) refers to "any kind of activity which involves humans and animals and is most often recreational in nature" (Schlote 2009, p. 2). Commonly, activities such as informal pet visitation, when relatives bring along pets to hospitals, or more structured visits when trained volunteers bring "certified therapy animals" to engage with patients or residents as a part of the recreational program, are scenarios which can be identified within the boundaries of AAA (Delta Society 2003; cited in Schlote 2009).

Animal-assisted education (AAE) refers to "activities where animals serve to facilitate learning" (Schlote 2009, p. 2). Given the health-related focus of this report, only AAT is discussed in any detail.

Animal-assisted therapy (AAT) refers to "the participation of animals in therapeutic treatments of humans, in various medical, paramedical, and other professional fields" (Schlote 2009, p. 3). This final category is given greater attention in the context of this review, and is therefore described in greater detail in the section which follows. At this point it is useful to keep in mind that a number of the activities/programs mentioned in the two previous categories overlap and fall into this last category, and a number of research findings will focus on these areas as well, even though for purposes of clarity and structure, this will be presented through an AAT lens.

5.6.2a Animal-assisted therapy / Pet-facilitated therapy

Pets can bring out the best in us. They help us empathise, focus outward, nurture, develop rapport, have fun, teach socialisation, stimulate mentally and spiritually, provide unquestioned non-judgmental acceptance and teach loving touch. Pets put us in touch with that good and kind inner being we so sparingly let out.

Wysong 2000, p. 57

Animal-assisted therapy (AAT) is a goal directed intervention in which animals who meet specific criteria become an integral part of the treatment process or team, and should be administered by an appropriately trained healthcare professional (All et al. 1999; Edney 1995; Urichuk and Anderson 2003). Pet-facilitated therapy is another term commonly used to describe AAT and can be defined as "a type of therapy that uses dogs or other pets to improve the physical and mental health of patients with certain acute or chronic diseases" (Dictionary of Cancer Terms 2009). The animals may take on a number of roles such as acting as a companion, a social facilitator, or a substitute for close interpersonal relationships (Arnold 1995; Francis et al. 1985). Niksa (2007) explains that animals have the capacity to teach human beings to understand qualities about themselves as well as others.

One of the earliest recorded uses of animals in a therapeutic health care setting is by John Locke in 1699 who advocated "giving children dogs, squirrels, birds, or any such thing to look after as a means of encouraging them to develop tender feelings and a sense of responsibility for others" (Locke 1699, p. 154; Serpell 2000, p. 12). The late eighteenth century saw the socialising benefits of animal companionship being applied to the treatment

of the mentally ill (Nightingale 1969). The York Retreat mental institution allowed their inmates to wander around the retreat's gardens and courtyards, which contained various small domestic and other animals such as rabbits, seagulls, hawks and poultry which, records indicate, were useful in awakening social and benevolent feelings in some of the inmates who interacted with these animals (Serpell 2000). The nineteenth century also saw mental institutions accepting animals as a common feature within their precincts. The women's ward at Bethlem Hospital for instance was enlivened by pet animals and aviaries, and the men's ward included pet birds, cats, canaries, squirrels and greyhounds (Allderidge 1991). The patients were reported to have paced the corridors of the ward speaking of their troubles to a voluntary listener or, if no one was available, to the animals (Allderidge 1991).

All et al. (1999, p. 50) has cited the many positive effects which can be brought about by pet visitation, the simplest form of AAT, which is focused on building rapport and initiating communication, as identified by Savishinsky (1992) and listed below:

- fostering socialisation
- increasing a withdrawn person's responsiveness and animation
- providing pleasure
- enhancing morale
- fulfilling the need to nurture and be nurtured
- enhancing the treatment setting
- reducing dependence on psychotropic medications
- helping to keep individuals in touch with reality by providing forms of sensory stimulation.

Patients who have symptoms of withdrawal and show little response towards attempts by staff to engage in interaction, have been shown to respond well to a therapy dog with smiles, hugs and talking (Voelker 1995). Animals are also identified as frequent icebreakers, where they assist in easing the anxiety patients feel at the start of therapy and act as a conversation stimulant on which therapist and client can build rapport (Fine 2000). AAT is a particularly useful tool to use with "hard to reach" clients and victims of abuse and trauma, for whom confiding in another human is often daunting and threatening (Parish-Plass 2008).

Studies examining the therapeutic effects of animals and pets for people with dissociative disorders and schizophrenia have shown positive results, with both short- and long-term improvement to patients' physiological and psychological health (Arnold 1995; Kovacs et al. 2004). Children with autism (Sams et al. 2006b), people with HIV/AIDS (Allen et al. 2000), and hospitalised patients with mental illnesses (Barak et al. 2001; Kovacs et al. 2004; Marr et al. 2000; Nathans-Barel et al. 2005) showed improved social functioning following the therapeutic introduction of animals.

AAT with children and young people

A remarkable discovery from the mid-twentieth century was that made by the man known to many as the father of pet therapy, Boris Levinson, a psychology professor at Yeshiva University in New York City, who was attempting to treat a difficult and uncommunicative child (Reichert 1998). Leaving his dog, Jingle, unaccompanied with the child for a few minutes, on his return to the room he experienced the extraordinary phenomenon of seeing the child talking to the dog (Jalongo et al. 2004a, 2004b; Reichert 1998).

In the case of children and adolescents with severe emotional disorders, who often display an absence of empathy in their emotions, AAT has been shown to instil this characteristic (Ewing et al. 2007; Nebbe 2003; Urichuk and Anderson 2003). A study of a small sample of 10 children between the ages of two and a half and six and a half with pervasive developmental disorders showed both behavioural and social improvements following therapy with dogs (Martin and Farnum 2002).

Similarly, a study of AAT in an educational context with two boys with emotion-related mental health problems, showed positive results (Kogan et al. 1999). During the first 10 to 20 minutes of each session, the boys discussed positive and negative events of the week with the animal handler and spent the remaining part of the session on training the dog for a demonstration to the class. Following the implementation of these sessions, both boys showed heightened confidence, greater ability to pay attention in class, less hyperactivity, an improvement in social skills and less negative behaviour than they had prior to the sessions.

Effects of pet therapy dogs on inpatient paediatric cardiology patients was studied by allowing each patient and their parents to receive a 10- to 20-minute visit from a pet therapy dog (Wu et al. 2002). The study included 31 pet therapy visits, and the subjective questioning of both patient and parents on the experience, as well the use of an observer's subjective evaluations of the interactions during the sessions, suggested that these visits, which included rapport and physical contact with the animals, resulted in reduced stress and improved both the patients' and the parents' morale.

Paediatric hospital inpatients participating in pet therapy were compared with those participating in child–life groups, with respect to self- and parent-reported mood and observer reported effect (Kaminski et al. 2002). Forty patients participating in the child–life activity and 30 in pet therapy were randomly allocated into the two groups. Reports showed patients receiving pet therapy were significantly happier compared to the other group and a positive affect was reported 46 per cent of the time in the pet therapy group while the child–life group only reported 19 per cent.

A qualitative study examined the effects of dogs on 30 adolescent psychiatric patients admitted to an inpatient unit (Bardill and Hutchinson 1997). The unit had a resident cocker spaniel, which was available for interaction upon patients' requests. The residents had daily journals, which were reviewed for comments regarding the dog for a month, to evaluate if the dog had an effect on the patients. Tape-recorded interviews were conducted with 15 patients, who spent 15 to 30 minutes expressing their feelings about the dog. Qualitative analysis of the results showed patients saying they "were able to talk to the dog about problems" and

"felt the dog was their best friend" (Bardill and Hutchinson 1997, p. 17).

One study investigated the effects of AAT on self-reported depression of adult college students based on scores from the Beck Depression Inventory (BDI) (Folse et al. 1994). Half of the 44 students involved in the study were allocated to the control group, while the remaining 22 students were divided into two groups, namely directive and non-directive AAT groups. The non-directive group used an energetic and outgoing collie, while the directive group used a quiet and gentle collie. The participants met once a week for seven weeks for a duration of 45 minutes. Results indicated that the non-directive group showed the greatest improvement in their mood when compared with the directive group using AAT and the control group using no AAT.

AAT in hospitals

Reported data from numerous hospitals claim that patients and staff are happier, less sad, and feel more loved following AAT (Cole and Gawlinski 2000). AAT has been shown to "decrease feelings of loneliness, increase physical and psychological well-being, decrease need for medications, enhance quality of life, improve physical function, decrease stress and anxiety and increase motivation" (Connor and Miller 2000 cited in Fontaine et al. 2001, p. 31).

In one study, a survey was distributed to 224 hospital staff including nurses, doctors and therapists six weeks prior to the implementation of a pet visitation program and 12 weeks after the introduction of the program (Moody et al. 2002). Prior to the introduction of the program, the common perception among staff was that the program would be a good source of distraction away from the illness and provide relaxation to the children. These expectations were met strongly according to data collected following the program implementation. But the follow-up survey also showed that the work environment was perceived as a more interesting place and the ward a happier one with the presence of the pets.

A classic study on the use of animals therapeutically to assist inpatients to handle stress was conducted in 1984 by Katcher, Segal and Beck (cited in Frumkin 2001). The patients were about to undergo oral surgery and were exposed to one of five experimental conditions: a half hour of looking at an aquarium with or without hypnosis; a half hour of looking at a picture of a waterfall with or without hypnosis; and a half hour of sitting quietly (Katcher et al. 1984; cited in Frumkin 2001). The patients' comfort levels were evaluated independently by the oral surgeon and the investigator as well as the patients themselves. Patients who viewed the aquarium were the most relaxed regardless of hypnosis, while the viewers of the waterfall showed almost similar levels of relaxation but only if hypnotised prior to viewing, while non hypnosis and viewing of the picture showed relaxation scores as low as those of the control patients.

Twenty-five hospital paediatric patients who had surgery and were experiencing post-operative pain were used as subjects in a dog visitation study (Sobo et al. 2006). The dog visited the patients and the length of each visit was determined by the patient. Assessments were made both prior to and following the visit, and self-reported physical pain and emotional pain measures were found to have significantly reduced following the session.

AAT with adult psychiatric inpatients

A study to gain insight into the impact AAT has on anxiety levels of psychiatric inpatients enrolled 313 adult patients who were referred for therapeutic recreation (Barker and Dawson 1998). The subjects were divided into two groups, either attending therapeutic recreation or AAT sessions. The results showed statistically significant reductions in anxiety scores for patients with psychotic disorders, mood disorders and other disorders after AAT, and for patients with mood disorders after therapeutic recreation sessions. The authors concluded that AAT was associated with reduced anxiety levels for inpatients with a variety of psychiatric diagnoses, while a routine therapeutic recreation session was only related to reduced anxiety levels for those with mood disorders.

A more recent study conducted to evaluate the benefits of using AAT in groups of inpatient psychiatric patients again indicated the success of AAT (Marr et al. 2000; cited in Parshall 2003). Sixty-nine inpatients diagnosed with a mental illness and a history of drug or alcohol abuse met for one hour each day for four weeks in different experimental settings. Half of the patients were in a control group, while the other half had animals such as dogs, rabbits, ferrets and guinea pigs visit the class each day, and each member was permitted to observe, hold, interact or play with the animals if the group was not being disturbed. Results were significant, showing that when compared to the control group, the patients who had AAT were found to "socialise more with other patients and were seen to be smiling and clearly demonstrating pleasure in their activities" (Marr et al. 2000; cited in Parshall 2003, p. 49).

A study which utilised clients with severe and enduring psychiatric illness to examine the relationship between a "pets as therapy" (PAT) dog and levels of social interaction in long-stay clients, beyond those accounted for by the presence of a human visitor such as a handler without a dog, showed positive results (Hall and Malpus 2000). The results showed that the introduction of a PAT dog resulted in a notable increase in the quantity of verbal and non-verbal (e.g. smiling and touching) interaction displayed by the clients. The fact that this increase was greater than that observed when only the dog handler was present confirms findings from previous studies which concluded that the presence of a pet promotes social interaction and positive behaviours among psychiatric patients.

A volunteer-run program developed at the Robinson Memorial Hospital, Ohio (titled 'Love on a Leash') involves trained volunteers and certified dogs interacting with patients, staff and visitors for several hours each day. The program appears to have a positive impact on the individuals involved, who show improved socialisation skills and relaxation following these visits (Parshall 2003). The author describes an incident related to her grandfather, who developed a chronically depressed mood. The presence of a terrier, adopted by the nurse in charge, resulted in improvements to his appetite, sleep patterns, energy levels and concentration (Parshall 2003).

A case study of an assault victim who had treatment resistant depression, shows evidence supporting the benefits of AAT for persons with mood disorders and recent histories of trauma (Sockalingam et al. 2008). The patient had a history of bipolar affective disorder, and, at the time he presented himself to the hospital, did not display any psychotic symptoms or meet the criteria for mania. What he did present were symptoms of atypical depression

characterised by low mood, hopelessness, persistent tearfulness, rejection sensitivity, reduced spontaneous speech, worsening self-esteem and a significant lack of motivation (Sockalingam et al. 2008, p. 77). The subject's medical team decided to introduce informal and unstructured pet therapy into the treatment regime, through the introduction of a golden retriever named Ruby. The subject was instructed to take Ruby for walks and to care for the dog, placing emphasis on the fact that the dog was his responsibility during their time together. The patient's improvements and the effectiveness of AAT was measured through patient self-reports, patient's satisfaction with the therapy, and evaluation of his functional status by nurses and physicians. The patient's level of confidence, motivation, and decision-making abilities were found to improve, while at the same time he was less dependent on others for approval and reassurance.

AAT within the criminal justice system

In 1975, at Lima State Hospital for the Criminally Insane, David Less, a psychiatric social worker requested the hospital staff to permit parakeets and tropical fish in the hospital, based on the evidence from previous groundbreaking studies (Levinson 1972 and Corson et al. 1975; cited in McCulloch 1983). The pet therapy at this hospital was based on an incentive system where the patient had to earn the privilege of having his or her 'own' animals through caring for the fish aquarium and gerbils in the ward. Once the patient demonstrated responsible behaviour, a request was made to the staff and upon evaluation, a suitable animal such as a cage bird, rodent (hamster, gerbil or guinea pig), or fish were selected for the patient to care for and feed. The patient had to work in the hospital greenhouse to raise food to sell or exchange for pet food or sacrifice personal spending allowances. This intervention resulted in decreased violence amongst patients and between patients and staff, and improved the morale and level of trust among staff and patients.

An Australian prison study involving eight women who participated in a dog training program, to evaluate if there were benefits to inmates from participation, showed positive results (Walsh and Mertin 1994; cited in Parshall 2003). The women trained the dogs to be companions to people who were older and disabled and the program lasted six months. The Coopersmith Self-Esteem Inventory and the Personality and Ability Testing Depression Scale, both administered prior to and following the implementation of the program, were utilised to measure depression scores. Depression scores decreased and self-esteem scores increased following their work with the dogs. Reports from other inmates also described the participants as being calmer and happier following the program.

AAT with residents of aged-care facilities

A study conducted in a Japanese nursing home involved eight female patients: four with Alzheimer's type dementia and the rest with vascular type dementia. Patients agreed to take part in dog therapy activities conducted for one hour each day, for four consecutive days (Motomura et al. 2004). Although results did not show a significant improvement in depression and irritability scores, significant improvement occurred in apathy scores. The authors suggest there is potential to include AAT programs in multi-disciplinary treatment for patients with dementia to increase levels of socialisation, activity and a sense of mastery. That suggestion seems to be supported by the findings of a quasi-experimental study,

examining the effects of dog therapy on agitated behaviours and social interaction of 15 elderly patients with dementia. The results showed significant improvements from the pre- to post-test scores (Richeson 2003).

In another study, nursing home patients who had contact with pets were tested using the Mini-Mental Health Examination and measures of perceived quality of life (Colombo et al. 2006). For the purpose of the study, participants were randomly assigned to one of three groups: Group 1 was responsible for caring for an animal (a canary); Group 2 was responsible for taking care of a plant; and the control group did not have anything to look after. After three months, measures showed that the greatest and only significant improvement in perceived health was for Group 1; while Group 2 showed improvements which were not statistically significant. The control group showed a decrease in perceived health. Other measures of well-being such as self-care scales, anxiety, depression, physical function and life satisfaction scores showed highest improvements in Group 1.

5.6.2b Therapeutic use of dolphins

A recent study has examined the effects of dolphins on mildly to moderately clinically depressed patients (who scored 11 or more on a 'modified' Hamilton Rating Scale for Depression and Beck Depression Inventory), and who were off medication and psychotherapy for four weeks prior to the study (Antoniolo and Reveley 2005). Random selection assigned participants into a group which participated in AAT with dolphins and a second group assigned to a therapy activity involving snorkelling around a coral reef (Antoniolo and Reveley 2005). Post-intervention scores indicated that therapy with dolphins significantly improved depression ratings according to the combined scales.

5.6.2c Therapeutic use of horses

There is something about the outside of a horse that is good for the inside of a man.

Sir Winston Churchill, cited in Haylock and Cantril 2006, p. 267

Historically the use of horses in therapy can be dated as far back as Chiron, the centaur (half man, half horse) in early Greek mythology, who is most famously referred to as the first physician and teacher of Aesculapius (Bieber 1983). Aesculapius is believed to have prescribed riding for people with wounds and diseases that would not heal, and medical writers such as Galen and others are also believed to have commented with optimism on the mental and physical benefits of riding (Bieber 1983).

Horses are believed to be unique in the manner in which they respond to humans and, due to the sensitivity they show the environment, they are believed to have the ability to read people in terms of their feelings and intentions (Roberts et al. 2004, p. 33). Especially when people try to hide these feelings from the world or even themselves, horses can respond to the internal state of the human being, which is described as an innate ability to mirror body

language and feelings back to the client (Roberts et al. 2004, p. 33; Shultz 2005, p. 18). Other qualities and features of horses—such as being easily approachable for physical contact with humans, being non-judgmental and providing unconditional positive regard—are all valuable factors contributing to the strengths of this particular type of therapy (Vidrine et al. 2002). Interaction with horses has been shown to improve client motivation to attend counselling sessions as well as participate and co-operate during therapy (Trotter et al. 2008).

Equine-facilitated therapy (EFT)

Equine-facilitated therapy (EFT) is a type of therapy which is commonly used to address mental health issues such as "behavioural and attention deficit disorders, eating disorders, abuse issues, depression, anxiety, relationship problems and communication requirements" (Rothe et al. 2005, p. 375). Commonly, activities used in the therapy program are feeding, and riding (Ewing et al. 2007). The interaction between human and horse is perceived to promote exploration of personal feelings, powers of intuition and energy, understanding of self, nature, relationships and communication, and to help humans develop emotional growth (Rothe et al. 2005).

Research has shown that the majority of adolescents and children with severe emotional disorders perceive adults, therapists and teachers with mistrust and apprehension (Ewing et al. 2007). EFT—which has been shown to foster companionship, socialisation and communication, promote self-esteem, and encourage affection—is a useful tool which can be utilised to overcome such situations (Ewing et al. 2007; Melson 2001; Rothe et al. 2005).

Evaluation of an EFT program for at-risk adolescents, conducted in Pennsylvania, USA, found that subjects showed a significant decrease in depression following the program (Bowers and MacDonald 2001). Data gathered through self-reports from participants and observations, showed that the program had "fostered the development of life skills including open and direct communication, honesty, patience, respect, and the proper use of power and control" (Bowers and MacDonald 2001, p. 69).

Equine-facilitated psychotherapy (EFP) / Equine-assisted psychotherapy (EAP) / Equine-assisted counselling (EAC)

EFP is a form of psychotherapy which includes a horse in the therapy session and at times involves the mechanism of resonance, which is described by Martha Rogers (1970; cited in Roberts et al. 2004, p. 33) as "the rhythmic flow of energy waves which exists between man and environment". EAP is a type of recreational therapy that has branched off from AAT and "combines traditional therapeutic interventions with a component involving relationships and activities with horses" (Shultz 2005, p. 7). EAC is another term used to define the same process, "which is the incorporation of horses into the counselling process to facilitate a therapeutic outcome" (Trotter et al. 2008, p. 255). For the purposes of this report, discussion of all three terms is combined.

Following an EFP program in the USA, adolescent participants (aged between 13 and 16), who were referred through residential treatment centres and homes, were found to display significant increases in self-esteem and internal locus of control (MacDonald and Cappo 2003). The study findings also showed participants reported increasing feelings of social

acceptance and peer popularity, indicating the improved ability of participants to form friendships and have successful social interaction with people.

In another study conducted in the USA, a total of 66 subjects participated in eight consecutive EFP programs within a period of eight months (Klontz et al. 2007). As hypothesised, participants showed reductions in psychological distress and an enhanced sense of psychological well-being from pre-test to post-test and follow-up. Reports showed fewer psychological symptoms and reduced scores measuring intensity of psychological distress. Participants reported being more oriented in the present; enhancements in the ability to live more fully in the here and now; feeling less burdened by regrets, guilt and resentment; being less focused on fears related to the future; and being more independent and self-supportive. Despite the study having limitations related to sampling (which was non-random), lack of control and comparison groups, and the failure of some subjects to return follow-up data six months post-intervention, nevertheless the authors suggest it provides important findings which can be used to further explore the value and applicability of this type of therapy (Klontz et al. 2007).

A study targeting both adults and adolescents with behavioural, mood, and psychotic disorders, conducted measures at both pre-test and post-test periods to evaluate the statistical significance of an EAC intervention (Mann and Williams 2002). Results indicated that nine of the 11 clients displayed statistically significant improvement to overall symptoms following the intervention.

An evaluation of five EAC programs conducted in the United States examined and measured aggression, depression, self-esteem, internal locus of control, empathy and loneliness (MacDonald 2004; cited in Trotter et al. 2008). Of the five, two programs when assessed independently showed statistically significant outcomes. The first study showed adolescents between the ages of 13 and 16 reporting increases in self-esteem, greater internal locus of control, and feelings of being in control of their lives, after 14 weeks of a therapeutic riding program. In the second study, statistically significant decreases in self-reported hostility and global aggression following the intervention were observed, while participant observations reported improved life skills, communication, honesty, respect and awareness of both power and control struggles.

A research study focusing on the effects of Equine Assisted Psychotherapy (EAP) for at-risk adolescents conducted in Colorado, USA, showed promising results (Shultz 2005). “At-risk” for the purpose of the study was defined in relation to “certain factors place children at risk of failing to succeed in life” (Shultz 2005, p. 9), and focused on risk factors such as “poverty, family discord and disorganisation, violence and abuse, substance abuse, congenital defects, low birth weight, perinatal stress, divorce, parental alcoholism, more than four siblings living at home, and parental mental illness” (Rak and Patterson 1996; cited in Shultz 2005, p. 10). Fifteen at-risk adolescents (aged 12 to 18) were recruited into the treatment group and 14 into the control group, being chosen if they exhibited three or more of the ‘at-risk’ factors described above. According to the primary caregivers’ perceptions, there was a statistically significant improvement in the psychosocial functioning of subjects. The analysis of the adolescents’ own perceptions showed statistically significant improvements in psychosocial

functioning following the program. Both adolescents and primary caregivers reported statistically significant improvements to intrapersonal distress indicators such as depression, anxiety, fearfulness, hopelessness and self-harm following EAP.

An EAC program conducted in the USA, which was designed to meet the therapeutic needs of juvenile offenders, showed positive effects in a variety of areas (Chandler 2005). Observations revealed at-risk teens "reduced and eliminated manipulative behaviours, overcame fears, displayed courage, developed and practised stress management and anxiety reduction skills, supported and helped each other, and looked out for and encouraged one another" (Chandler 2005, p. 112).

A Texan study, which examined the effects of an EAC program compared it to a standard classroom counselling program to investigate the effects on students who are identified as "at risk" for social or academic failure by displaying serious behavioural issues, learning difficulties or social adjustment problems (Trotter et al. 2008). The EAC treatment plan consisted of group interaction with the horses with the aim of facilitating both prevention and resolution of emotional and behavioural problems. The program consisted of activities "designed to enhance participants' self-awareness, enhance their recognition of dysfunctional behaviour, and foster healthy relationships" (Trotter et al. 2008, p. 260). Improvements in areas of social stress, self-esteem, self-satisfaction, and sense of identity, as well as ego development were observed following EAC. There was also evidence of reduced hyperactivity in EAC subjects, who displayed greater ability to stay focused, absence of over activity, and the ability to remain at a task. Participants in the EAC group also showed statistically significant decreases in negative behaviours and statistically significant improvements in self-reported areas measured by an emotional symptom index, clinical maladjustment composite, atypical scale, sense of inadequacy scale, and relationship with parents scale. Parent reports showed similar statistically significant improvements in areas measured by the behavioural symptoms index, externalising problems composite, internalising problems composite, adaptive skills scale, hyperactivity scale, aggression scale, conduct problems scale, anxiety scale, depression scale, somatisation scale, attention problems scale and social skills scale. A direct comparison between EAC and standard counselling found the EAC group displaying enhanced behaviours over the standard group on seven scales.

Therapeutic horseback riding

Currently over 700 riding centres operate in the USA and Canada, assisting over 30,000 people with diverse disabilities (Lessick et al. 2004). Riding for the Disabled Association of Australia Limited provides information on similar services offered to people with diverse disabilities throughout the country (Riding for the Disabled Association of Australia Limited 2009).

Therapeutic riding focuses on achieving therapeutic goals which are physical, emotional, social, cognitive, behavioural and educational in nature (Lessick et al. 2004). It places emphasis on the learning of riding activities and building up a relationship between the horse and its rider (Lessick et al. 2004). Participants with various physical and mental disabilities have reported that riding provides them with a sense of normality. It provides an opportunity

for people who are often socially isolated to interact and communicate with others who have similar interests, while the horse has also been shown to serve as a therapeutic outlet for communication and stress.

Successfully manoeuvring and forming a close bond with such a large animal, likely to weigh in excess of 450 kilograms, has also proved to be a very satisfying and rewarding experience for the rider (All et al. 1999), and has been shown to increase confidence and self-esteem (Lessick et al. 2004). Additionally, social, educational and psychological benefits such as improved self-perception, social interaction and confidence, motivation, co-operation, willingness to try new activities, and enthusiasm from this therapy have also been reported (MacKinnon et al. 1995).

A University of Minnesota study examined the effects of therapeutic horse-back riding on children who had emotional and behavioural problems, using Harter's Self-Perception Profile for measurement purposes, and 46 fifth- and sixth-grade school girls as subjects (Krawetz and DePrekel 1993). Scores indicated statistically significant improvements in social acceptance, close friendships, and global self-worth on the Harter Profile (Krawetz and DePrekel 1993).

5.6.2d Other animals used therapeutically

Apart from the types of animals discussed above, other animals such as rabbits, birds, rodents, fish, farm livestock, and even wildlife have been utilised in treatment processes for children, adolescents, adults and the elderly (Souter and Miller 2007).

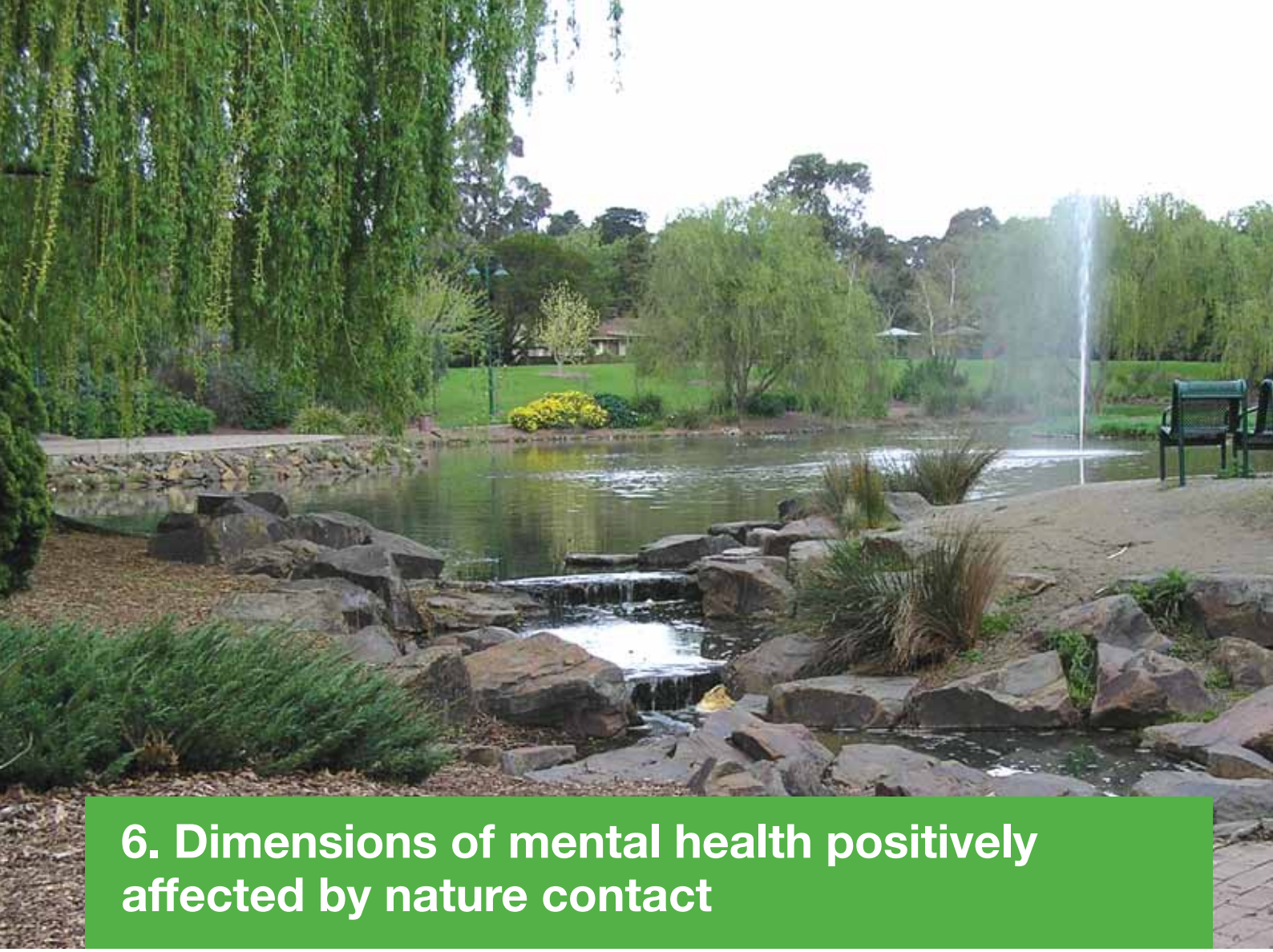
In the spontaneous changes and nurturing role taken on by patients at the State Mental Hospital in Lima, Ohio, when a sparrow was injured and found by an inmate, the staff observed that the usually detached and withdrawn patients began working together to help care for the sick bird (Lee 1984; cited in Urichuk and Anderson 2003). Today the hospital has a variety of animals such as dogs, cats, parrots, goats, deer and snakes. A study spanning 12 months examined the effects animals had on patients and found that, compared to the wards without animals, the wards with animals used half the quantity of medication, had significantly fewer suicide attempts, and reduced violence levels.

The potential for observation of fish in an aquarium to reduce anxiety in human subjects has been explored by several studies. In one study of elderly participants, an anxiety-relieving effect was found to be associated with watching ornamental fish (Edney 1995). Another study produced evidence which showed that two categories of people watching fish in a standard aquarium—the first being those with normal blood pressure and the second being those with hypertension—both exhibited lowered systolic and diastolic levels during the viewing process and following it (Beck and Meyers 1996).

In Serenity Park, Los Angeles, USA, a trauma recovery program with an ecotherapeutic approach is applied to benefit the health and well-being of both war veterans and birds who have survived severe trauma (The Association for Parrot CARE; US Department of Veterans Affairs 2009). The birds are reported to have arrived from diverse backgrounds stemming

from illegal importation, via rescue groups, and due to the loss of guardians/owners. Los Angeles has over 20,000 homeless war veterans which makes up 11 per cent of the global population of homeless war veterans. This population group is known to suffer from various medical conditions such as brain injury from roadside bombs and other explosive devices; post-traumatic stress disorder (PTSD); and other stress-related conditions related to living and working in war zones. The parrots also have a history of stressful conditions due to illegal capture and, often throughout their lives, confinement in small cages and none of the natural stimulation usually experienced in the wild. The program has had great success and visiting psychiatrists have been known to prescribe "parrot therapy" for the veterans and to discontinue their usual medication regimes. Through a mutual partnership both man and bird undergo healing, and experience a life without violence, abundant with trust, love and caring. For the veterans, most of whom suffer from PTSD and who are unable to trust in normal social situations, the interaction and socialisation with the parrots rebuilds this capacity to trust, which contributes to a healthy transition into post-war life and re-entry to the community as healthy individuals.

An AAT study involving a 12-week intervention program with farm animals investigated the effect such a program has on self-efficacy, coping ability and quality of life among adult psychiatric patients diagnosed with a variety of mental conditions (Berget et al. 2008). In a randomised control trial and follow-up, 59 women and 31 men with schizophrenia, affective disorders, and anxiety and personality disorders completed questionnaires which measured self-efficacy (the expectation that one can effectively cope with and master situations through one's own personal efforts (Bandura 1977)), coping ability and quality of life during three time periods: before the intervention, at its end, and at a six-month follow-up (Berget et al. 2008). Two-thirds of the study group participated in the intervention while one-third acted as controls. Findings showed significant increases in self-efficacy in the intervention group, both from before intervention to the six-month follow-up period, as well as from end of intervention to the follow-up period, but similar improvements were not found in the control group. Improvements in coping strategies were similar, showing increases from before the intervention up to the six-month follow-up period. While studies have shown that people with higher self-efficacy have better strategies to cope with daily stressors (Ventura et al. 2004), the results from the study indicated that AAT with farm animals could be potentially beneficial to patients with long-lasting psychiatric symptoms in terms of improving self-efficacy and coping abilities. Not surprisingly, the patients who reported the largest increase in coping abilities also reported the greatest enjoyment of physical contact with animals.



6. Dimensions of mental health positively affected by nature contact

That which is non human can touch and open the human heart. For others a walk in the wild or a meditation in nature activates a deeper connection that is larger than us.

Rochecouste 2006, p. 5

Parr (2007, p. 5) describes Foucauldian thought, stating "to labour amongst nature, was to be potentially freed from the 'artificial clutter' of society and to be subjected only to the 'gentle constraints of nature' (Foucault et al. 2001, p. 185), where living by seasons and by the demands of the land was to submit oneself to powers of 'natural obligation' that might help to counter the confusion of the insane mind". Thus nature is portrayed in Foucauldian thinking as possessing "organic disciplinary power", which can be attached to or accessed during the correction of human deviance (Parr 2007, p. 5).

Foucault argued that early "eighteenth- and nineteenth-century thinkers about madness [sic] advocated that it was the unnatural 'absenting' of nature itself, arising in the rapidly industrialising urban West", which caused or made direct links with the existence of both individual and collective mental health issues (Parr 2007, p. 5). Reoccupation of natural spaces would partly alleviate the problem of "madness" according to this logic, argues Parr (2007). Evidence also confirms the argument that less green nature means reduced mental well-being or at least a reduction in the opportunity to recover from mental stress (Grahn and Stigsdotter 2003; Mitchell and Popham 2007, 2008; Nielsen and Hansen 2007; Peacock et al. 2007; Pretty 2004).

Mental illness such as depression, anxiety disorders and schizophrenia are potentially debilitating conditions, and affect over 450 million people, families and carers globally (VicHealth 2008). Mental ill health has adverse economic and social impacts for those affected and for those connected to them, both directly and indirectly (VicHealth 2008). Mental health disorders constitute 10 per cent of the global burden of disease (VicHealth 2009). In Australia, mental disorder is the greatest contributor to the disease burden (Mathers et al. 2000). In Britain, mental ill health-related costs, such as provision of care, lost outputs and costs to individuals and families, are around £77 billion per annum (Pretty 2004).

Depression alone is predicted to be the most common cause of disability in the developed world by the year 2030 (WHO 2009). In terms of societal and economic burden of disease, depression is ranked second only to ischemic heart disease. In Australia alone it has been estimated that undiagnosed depression costs the economy $4.3 billion in lost productivity each year (Hilton 2004). The most common coping mechanisms for depression, such as smoking, alcohol consumption and over-eating, have their own serious health consequences, regardless of depression, which adds to the burden of disease (Pretty 2004; Pretty et al. 2005). Depression is also identified as a risk factor for other physical illnesses such as asthma, arthritis, diabetes, strokes and cardiovascular disease (Ostir et al. 2001; Turner and Kelly 2000).

Scientists also believe that the behaviours of people in modern human societies have created internal conflicts between our "innate need to relate to nature as our ecosystem and our disconnection from it" (Burls 2007a, p. 20). This in turn creates negative emotions such as unhappiness and alienation, and related physical and psychological problems, which are compensated for by depending on material goods for happiness (Burls 2007a). There is an increasing pattern of using artificial means to relate to nature and this in turn leads to ill health and various dissociative behaviour problems (Burls 2007a).

It is crucial that public health strategies, which aim to reduce these statistics in the future, should consider ecological solutions alongside already accepted clinical, behavioural and technological interventions. Investigating solutions within an ecological paradigm is likely to create a shift in thinking, as well as result in the creation of integrated strategies that potentially bring humans closer to their origins and simultaneously create a future where humans and planet can co-exist in physiological, mental, spiritual and ecologically sustainable harmony (Maller et al. 2006). Modern day mental health promotion promises to use a sustainable approach towards eliminating or minimising the harmful factors that create distress and loss of well-being, while introducing and increasing those situations in which everyone can thrive and in many instances recover from illness (VicHealth 2008). Studies have also suggested the possibility that ecologically based solutions to mental illness can be affordable, accessible and equitable choices to consider within both preventative and restorative public health interventions (Maller et al. 2006; Mind 2007).

A cross-sectional study conducted to assess what elements of the physical environment are significantly linked to mental health showed that access to green space was an important predictor of mental health status and vitality, regardless of socio-economic status, age and sex (Guite et al. 2006).

It is also vital to keep in mind during the discussion that follows, that people with serious mental illness experience greater marginalisation in society, face occupational imbalances, and have expressed the desire to participate in occupations which facilitate social interactions and the opportunity to live as"normal" a life as possible under prevailing circumstances (Zimolag and Krupa 2009). In this context, the numerous studies on the benefits of interaction with animals and their association with engaging in meaningful activities, which leads to multi-dimensional community participation, cited in section 5.6, should be considered alongside the many ecotherapeutic approaches described in sections 5.1 to 5.5.

6.1 Relaxation, restoration and stress reduction

Stress is defined as the process used by individuals to respond psychologically and physiologically to situations that challenge or threaten well-being (Baum et al. 1985). One of the main factors underpinning ill health in modern day societies is believed to be stress (Grahn and Stigsdotter 2003; Pretty 2004), as both physiological and psychological stress can have a huge impact on human health and well-being (HCNDACRSP 2004).

Psychologically, individuals appraise situations using cognitions which elicit fear, anger and sadness in their attempts to cope with the stress (Ulrich et al. 1991). Physiological stress responses are visible in the cardiovascular, skeletomuscular and neuroendocrine systems, which are used to assist individuals to cope and deal with stressful situations (Ulrich et al. 1991). During such processes, energy is expended and, if prolonged, this leads to fatigue (Ulrich et al. 1991). Long-term stress can undermine the immune system and affect the body's defence mechanisms while also being a strong predictor of mortality (HCNDACRSP 2004). Unhealthy behaviours such as the consumption of alcohol, drugs and cigarettes, and heightened frustration are common during stressful situations, as are reduced performance levels (Cohen and Wills 1985; Ulrich et al. 1991). Mental stress has now been recognised as a common lifestyle-related illness and Danish statistics have shown that 44 per cent of the population experienced stress in their daily lives in the year 2000, compared to 35 per cent in 1987 (National Institute of Public Health 2003; cited in Nielsen and Hansen 2007). The World Health Organization has now identified pain and depression due to stress as priority areas for action (WHO 2009).

The influential and popular nineteenth-century American landscape architect and planner Frederick Law Olmsted was perceptive when he wrote that the stressors associated with cities and the demands of jobs are effectively reduced and restoration and recovery from such negative experiences occurs during the viewing of nature (Olmsted 1865; Olmsted 1952). Describing the underlying mechanism through which relaxation in natural settings takes place, Olmsted wrote: "… the enjoyment of scenery employs the mind without fatigue and yet exercises it; tranquilises 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" (Olmsted 1865; cited in Rybczynski 1999, p. 258).

It has been well established that natural environments offer a more effective way of restoration from stress and mental fatigue compared to ordinary outdoor urban environments

(e.g. HCNDACRSP 2004; Maas et al. 2009). A recently conducted nationwide survey in the Netherlands showed that 95 per cent of the respondents reported a visit to a natural setting as an ideal way of relieving stress (Fredrichs 2004; cited in van den Berg et al. 2007). Another study, investigating people's perceptions of the restorative power of natural and urban environments, requested volunteers to rate the restorative quality of views of natural and urban settings which were presented to them using slides (Berto 2005). The slides with natural scenes of lakes, rivers, hills and the sea were ranked highest for restorative power, while urban scenes with city streets, industrial zones and housing areas were ranked lowest for restorative power (Berto 2005).

Another study, comparing the stress levels of car drivers stuck in traffic in attractive natural surroundings with those stuck in traffic in densely built-up areas, found that those who could view nature demonstrated reduced levels of stress (Ulrich 1981). Researchers believe this occurs because the exposure to an unthreatening natural environment stimulates positive affect responses, has a behavioural impact and promotes sustained, wakefully relaxed attention (Hansmann et al. 2007). Due to this effect, there is a reduction in stress as well as in negatively-toned feelings and physiological arousal typically associated with high stress levels (Ulrich 1981). Similarly, a study that compared videos of different roadside views on a virtual drive to work showed that the urban drive was increasingly stressful while the drive through natural, greener settings was more protective against stresses that arose during the course of a normal work day (Parsons et al. 1998).

To test the hypothesis (rooted in the psycho-evolutionary theory) that nature has a restorative effect on stressed individuals, one study used 120 participants who were first shown a movie that would induce stress (Ulrich et al. 1991). They were then exposed to a variety of visual- and sound-simulated videotapes of urban and natural settings. Physiological measures such as heart rate, muscle tension, skin conductance and pulse transit time, which is utilised to measure systolic blood pressure, as well as self ratings of emotional states, were taken from recovering participants following the presentation of the simulated tapes. Both the physiological and verbal measures indicated that subjects recovered faster and more completely when they were exposed to natural rather than urban settings.

A Swedish study selected 953 individuals from nine Swedish cities through random selection to answer a questionnaire related to their health and use of urban green spaces both in and around the city (Grahn and Stigsdotter 2003). Results showed a statistically significant association between the use of urban green spaces and the levels of stress experienced by participants, regardless of age, sex and socio-economic status. The levels of stress experienced were seen to be dependent on the frequency of visits to green spaces, with lower levels experienced with increased frequency in visits. The authors suggest that distance was an important determinant of the frequency of visits and should be kept in mind during the planning and implementation of preventative health promotion strategies.

Drawing on evidence from the UK, Derbyshire (2007) observes that stress levels fall within minutes of viewing green spaces. Derbyshire observes that Dr William Bird, medical adviser to Natural England, has suggested that filling a home with flowers and plants can increase concentration and reduce stress (Derbyshire 2007). Similarly, viewing images of nature and

walking in nature have both been shown to improve mood and reduce negative feelings such as stress (Lindemuth 2007; Peacock et al. 2007). The results from a study by Korpela and Ylén (2007) that investigated the role of favourite natural settings in regulating negative emotions and coping with perceived stress showed that favourite natural places were more likely to be selected by participants who complained of headaches, chest or stomach pains and faintness or dizziness compared to those with fewer complaints. Positive feelings were shown to be created or enhanced during time spent in favourite natural places and especially when relaxing in them. Participants with health problems were seen to gain more emotional benefits from time spent in favourite natural places compared to those without health problems.

The stress-reducing potential of natural environments is applicable to children as well as to adults. One study showed that increased access to nearby nature for children aged six to 12 years reduced the psychological impact of a stressful life event, such as family relocation, being bullied or punished at school, or being subject to peer pressure (Wells 2000). The study showed that those who are most vulnerable and experiencing the highest levels of life stress benefited most from a high degree of exposure to nature. Similarly, a study of children aged eight to 10 in five upstate New York communities explored the extent to which exposure to vegetation in homes and gardens has an impact on the level of stress felt by children (Wells and Evans 2003). Results indicated that children who were exposed to both indoor or outdoor vegetation experienced less stress and a faster recovery rate from stressful incidents, compared to the children living in homes and backyards without any vegetation (Wells and Evans 2003).

A study aiming to develop and validate useful measures of the four components of a restorative setting used 512 university students who were asked to view 70 colour slides of 35 urban and natural environments respectively (Herzog et al. 2003). All subjects rated each of the 70 slides on one of 10 measured variables during a single session. The two criterion variables measured in the study were the perceived restorative potential of a setting and the preference for it. The four predictor variables additionally included in the study were the four common features of a restorative setting discussed in section 2.0: the openness of the setting, visual access to the diverse areas of the setting, ease with which one can move through the setting and perceived setting care (which has been connected to preference and sense of safety responses). The study findings showed that in each of the above mentioned variables the natural scenes elicited higher scores and all comparisons between urban and natural scenes were significant except for “fascination”. The authors believe this could have been due to the definition used for fascination in the study questionnaire as well as the fact that the questions were oriented to focus on fascination instead of soft fascination, which is supposed to have special restorative benefits as described previously in attention restoration theory.

Thematic analysis of data collected from in-depth discussions with residents in four scenic, woodland locations in south-east and north-west England, showed that among other emotional and psychological pleasures was quietness, being away from pressures, relaxation, opportunity to contemplate in privacy and the calmness of the environment that people most appreciated (O’Brien 2005b). Subjects reported the underlying causes for these psychological and emotional pleasures were the varied greenery of the woodlands and

colours of flowers, the open space and sense of distance, the opportunity to view wildlife, experiences of personal pleasure during walking and exercise, and the beauty of the scenery as a whole.

The findings of a study undertaken in 2003–2004 by Townsend and colleagues from Deakin University, Victoria, which investigated the health and well-being benefits of civic environmentalism demonstrated through membership of a park's "Friends Group", reflected many similar views. Study participants believed that:

- participation was "spiritually beneficial from the sharing of fun with other members"
- being in nature was "mentally beneficial, calming"
- participants gained from "the mental relaxation derived from the serenity of the bushland environment, including the sounds of birds and water"
- "participation provides a break in the fast pace of life" and "provides peace"
- belonging to the group "provided a source of support or help when required by any member and this helped in reducing stress that may otherwise have been felt" (Townsend and Maller 2003).

A study to evaluate if Shinrin-yoku (a type of Japanese relaxation therapy where walking or staying in the forest is believed to promote health) has psychological benefits and what factors are associated with these benefits, selected 498 participants who were healthy (Morita et al. 2007). Surveys were conducted twice in the forest on the same day and twice on the control day and outcomes were measured using the Multiple Mood Scale Short Form and the State-Trait Anxiety Inventory. Participants showed beneficial effects when simply entering the forest, thereby implying that forest environments are related to positive emotions, regardless of the time spent there. The study results also showed that Shinrin–yoku is most beneficial for chronically stressed individuals and the authors suggest it can be used as a stress reduction technique in future interventions.

A study which evaluated the impact of park and forest visits on stress levels and headaches showed that overall recovery rate from stress was 87 per cent and reduction in headaches was 52 per cent, in terms of average improvements following visits to the two settings (Hansmann et al. 2007). The study results indicate that visits to green spaces can be considered an effective reducer of acute stress of varying intensities. Leisure activities in forests and parks have been shown to eliminate intense levels of psychological stress. The results of this study were not affected by a placebo effect of the respondents' perceptions of forests and parks as having restorative effects on the health of humans, and therefore has increased generalisability to other population groups.

The sense of rejuvenation and relaxation that has been documented in many of these studies is likely to be a result of the time spent in natural settings, reflecting the restorative effect such settings have on directed attention, a common precursor to many of the symptoms listed in this section (Faber Taylor and Kuo 2009; Kuo and Faber-Taylor 2004).

6.2 Attention deficit hyperactivity disorder (ADHD) and attention deficit disorder (ADD)

ADHD is deemed to be the most common neurobehavioural disorder during childhood (American Academy of Pediatrics 2000), and affects one in 20 children in the United States (Mental Health America 2009). According to the Australian Institute of Health and Welfare (AIHW) (2008, p. 276), in 1998 "it was estimated that ... 13 per cent of children aged six to14 years had attention deficit hyperactivity disorder (ADHD), 3 per cent had conduct disorder and 3 per cent depressive disorder". The detrimental effects as a result of losing attention capacity include negative impacts on school life, interpersonal relationships and personal growth, which are considered vital cognitive and social development areas in a growing child's life (Faber-Taylor et al. 2001; Centers for Disease Control and Prevention 2009). These effects in turn have been shown to increase the risk of developing low self-esteem, depression, anxiety, aggression and antisocial behaviours (Barkley 1997).

In a well-designed educational program which was centred around animal contact with children who had ADHD and defiant disorders, "animal companionship showed a positive impact on societal health" (Katcher and Wilkins cited in Kellert and Wilson 1993, p.484). Children whose educational process involved having contact with animals, had "better attendance rates, improved measurements in a variety of knowledge and skills, objectives, and displayed significantly lesser antisocial and violent behavior".

An American study of children with ADD found that playing in natural environments lessened the symptoms of the disorder (Faber-Taylor et al. 2001). Findings indicated that ADD symptoms were milder for children who had greener play settings, while children playing in windowless indoor settings exhibited significantly more severe symptoms compared to those who played in grassy outdoor spaces. The authors have also specifically tested for confounding factors such as "being outdoors, social environment, amount of physical activity, types of activity, preference for nature, or timing of medication", all of which did not provide alternative explanations for the study results. The results from this study show that this is both a cost-effective and easily applicable alternative treatment with or without medication for children affected by ADD. A similar but more generalisable study which had participants with a range of individual, residential and case characteristics (e.g comorbidity, general severity of symptoms) showed similar results (Kuo and Faber-Taylor 2004).

The most recent study by these authors examined the effects of exposure to various physical environments on the attention of children with ADHD (Faber-Taylor and Kuo 2009). Single blind controlled trials were conducted in a within-subjects, cross-over design, with each child serving as their own control. The three settings which had equal terrain, noise levels and minimal pedestrian traffic levels were an urban park, a residential area and a downtown area. Puzzles which had been chosen to induce a certain degree of attentional fatigue were completed by the children prior to each of the walks and all three settings were a two-and-a-half to three-minute drive from the quiet, indoor facility where the children completed the puzzles. The accompanying guides kept the walk to the scheduled 20 minutes, discouraged conversation and made sure a relaxed pace was maintained. Upon arrival back in the indoor facility, the children completed concentration and impulse control tests, administered by a

single adminstrator who had no knowledge of the children's walking conditions. The children's reported experiences of the three settings, and their attention performance following the walk, showed the same pattern for the three settings, with the park being the most positive experience and no significant difference in results between the two remaining settings. Results confirmed green play settings are capable of reducing symptoms of ADHD in children (Faber-Taylor and Kuo 2009; Kuo and Faber-Taylor 2004). Research from this study inspired one of the largest tree-planting programs in the history of Chicago (Heerwagen 2009).

Recent studies by Ferrini (2003; cited in Burls 2007a) showed that the number of children with ADD is rising, but their behaviour problems have shown improvement when they are permitted to be in natural environments, exploring, being active and absorbing the surrounding living landscape. This type of engagement, which is believed to be supported by the living and restorative elements of plants, trees, animals, weather and constantly changing natural surroundings, is supported by Kaplan and Kaplan's (1989) attention restoration theory (Burls 2007a).

6.3 Acquired Brain Injury

Due to the unexpected and sudden nature of Acquired Brain Injury (ABI), individuals are faced with life-changing situations that impact on daily functions, relationships, employment and various other facets of their life (Kortte et al. 2003; Williams and Evans 2003). Clearly these impacts affect the individuals' physical and mental health, and commonly result in depression (Finset and Anderson 2000; Khan et al. 2003; Kortte et al. 2003; Stonnington 2001; Williams and Evans 2003). Anxiety, stress, aggression, reduced social interaction and poor self-esteem are common issues for ABI patients (Khan et al. 2003; Kortte et al. 2003). Specific anxiety disorders such as post-traumatic stress disorder (PTSD), mood disorders and irritability states are also commonly identified in survivors of ABI (Khan et al. 2003; Williams and Evans 2003).

A fact sheet published by what was then the NSW Department of Tourism, Sport and Recreation states that participation in sports and recreational activities is a powerful way to improve the quality of life for people with ABI (Department of Tourism, Sport and Recreation NSW 2001). Such activity provides them with opportunities to contribute, challenge themselves both physically and mentally, gives them greater control over their lives and provides a broader range of life choices, such as participating not only in playing but through coaching, volunteering, officiating, managing and training. As natural settings have been commonly cited as popular places used for sports and recreational activities, here again the link with nature is established.

Affection therapy, which focuses on frequent and regular reminders to the patient that they are wanted and cared about by using unconditional rewards of affection, especially physical signs of affection, have been shown to reduce behavioural problems in ABI patients (Kortte et al. 2003). These results can be linked to animal-assisted therapy in section 5, which partly focuses on providing physical contact and unconditional love to human subjects, with proven results in diverse population groups.

6.4 Cognitive functioning: concentration and attention fatigue

The benefits from nature for cognitive functioning has been suggested and documented by many philosophers, writers and laypeople, and recent studies have proven the validity of these claims (Berman et al. 2008).

While social incivility, irritability and deterioration of interpersonal relations have been noted as some of the negative consequences of directed attention (Herzog and Strevey 2008), evidence in the literature shows that directed attention plays a crucial role in successful cognitive and emotional functioning (Posner and Rothbart 2007), as well as in short-term memory (Jonides 1981) and success in school (Diamond et al. 2007) .

Controlled perception, which can also be described as directed attention, is utilised to a very high degree in a city environment, over endowed with stimuli which cannot be ignored due to health hazards, law enforcement and safety (Berman et al. 2008; Lehrer 2009). However, natural settings do not require the same level of directed attention, and nature provides a relaxing and restorative environment which does not trigger negative emotions (Lehrer 2009). Logically, therefore, tasks which require cognitive attention and thus a large percentage of directed attention would be performed at higher levels in natural settings than would otherwise be the case (Berman et al. 2008). Studies of walking in more “untamed” nature suggest a strong positive effect on recovery from attention fatigue while simultaneously providing a restful experience (Hartig et al. 2003; Hartig et al. 1991; Herzog et al. 1997).

A study to test the effects of different environments on attention fatigue randomly assigned students to natural environments, urban environments and passive relaxation conditions (Hartig et al. 1991). The students spent 40 minutes in the allocated setting, which followed a similar time span undertaking an attentionally demanding task. Self-reported evaluations of the 40-minute restorative condition included measures of being away, fascination, coherence, and compatibility. The study results indicated that contact with natural settings increased capacity for sustained attention. The evaluation was linked with the results from a previous study to create a “perceived restorativeness” score, which showed positive correlations between the capacity to complete the attention-demanding task of proof reading and relaxation in the natural environment. Students in the group in the natural environment achieved the highest scores for perceived restorativeness.

A study was undertaken in Sweden to test the hypothesis that Swedish adults would have a more favourable attitude to walking in a natural rather than an urban environment, as well as a second hypothesis that, with increasing attention fatigue, the positive attitude towards walking in a natural environment will increase, with the opposite reaction towards an urban environment (Hartig and Staats 2006). One hundred and ten Swedish college students between the ages of 19 and 48 years from both sexes participated in a between-subject study. Participants were first assigned to one of the two conditions, being more or less fatigued, and then randomly assigned to either one of the two environments. Each environment was represented in 50 slides, which showed progression along a walk through the allocated environment. The city slides were taken in a central area in Stockholm, which was urban, densely built, mostly with high-rise buildings, filled with pedestrian and vehicle

traffic, and with minimal greenery. The forest slides were taken in a popular recreation spot in Umea, Sweden. All the slides showed a dirt path, no signs of human presence, groves of spruce and pine with varying shade, openness and forest undergrowth. Both study hypotheses were supported by the results. Participants felt that recovery from attention fatigue and increased reflection were more likely to occur in the forest environment; and this result was greater for the more fatigued participants.The authors state that the study highlights the importance of understanding how people's preference for place is related to its use in restoration, and provides evidence that supports the understanding of how recreational and residential access to natural environments is likely to promote the physical and mental health of urban dwellers especially (De Vries et al. 2003).

Another Swedish study (Ottosson and Grahn 2008) has shown that taking a walk in nature has an influence on concentration restoration potential. Further, the oldest participants, who were in wheelchairs, were compared with non-wheelchair users to test if difference in physical activity affected the outdoor experience. The results showed there was no difference in the manner both groups were affected by the outdoor experience. Instead, the study confirmed it was the nature experience alone that had an impact on their ability to concentrate.

6.5 Mood: depression, anxiety, aggression, anger and humour

Evidence from research on affective recovery has shown that short-term contact with nature has significant positive effects on mood (Hartig et al. 1996; Hartig et al. 2003; Hartig et al. 1991; van den Berg et al. 2003). These studies and others suggest that viewing images of nature and walking in nature improve mood by reducing negative feelings such as anxiety and anger, while at the same time increasing positive feelings (Lindemuth 2007; Peacock et al. 2007). These restorative effects have occurred during exposure to both natural woodland and urban nature such as parklands and large bodies of water (Bell et al. 2005b). Wilderness trips have also been found to elevate people's mood (HCNDACRSP 2004).

Post-operative heart surgery patients were examined to assess the effect exposure to simulated nature views has on recovery (Ulrich et al. 1993). At Uppsala University Hospital in Sweden, 160 patients who had undergone heart surgery were allocated according to a modified random procedure to a visual condition consisting either of a nature picture (trees, water/vegetation), an abstract picture dominated by either rectilinear or curving forms, or a control condition with either a white panel or no picture. Findings suggested that individuals exposed to the view of water/vegetation experienced less post-operative anxiety than the control groups and those exposed to the other types of pictures. Additionally, those patients with the water/vegetation views shifted more quickly than other groups from strong pain drugs to moderate strength pain drugs.

The mood benefits of nature scenes seem to be supported by reports from a Swedish psychiatric hospital describing how the patients complained about and damaged paintings on the wall over a period of 15 years (Ulrich 1993). Interestingly, damage was only inflicted on abstract paintings, while no records exist on attacks of paintings depicting nature and landscapes. Along the same lines, a study of Alzheimer's disease patients in five homes

showed that those who lived in the three homes with gardens had significantly lower levels of aggression and violence than those in the two without gardens. Pretty (2004) claims that people who cannot compensate for the lack of windows to provide a view of nature (in this case because of their illness) experience increased aggressive and stressful behaviours.

The connection between less aggressive behaviour and better concentration is indicated from the results of a study among a group of women in the Robert Taylor Homes, a disadvantaged neighbourhood in Chicago, consisting of identical apartments (Kuo and Sullivan 2001a). This study focused clearly on the complex relationship between nature, aggression and concentration, and showed that viewing nature can increase concentration and thereby reduce aggression in participants. A study in the same setting by the same research team showed that the percentage of crimes reported to the authorities was reduced closer to blocks with more greenery (Kuo and Sullivan 2001b).

In Finland a questionnaire, which was mailed to 730 residents in three urban housing areas, was utilised to evaluate the association between negative mood and place preference in adults (Korpela 2003). Despite a relatively low response rate of 35 per cent and a non-random sampling method, the study indicated that adults with a higher negative mood showed a greater likelihood of selecting natural places over and above other places as their preference.

Another comparative study, this time in the UK (Pretty et al. 2005), used the standardised Profile of Mood States test (POMS) in comparing mood profiles for people active in natural settings with profiles for people active in gyms. The study showed statistically significant differences, with the POMS profile of people actively participating or involved with nature showing they felt less depressed.

Other research on happiness indicates that over and above objective factors such as excess wealth, age, gender and perfect health, a number of psychosocial variables such as self-esteem, feeling in control of one's life, optimism, supportive friendships and a framework within which one's life makes sense are important predictors of happiness (Herzog and Strevey 2008). Drawing on the numerous studies describing these exact benefits from contact with nature, it can be established that nature in all its diversity can provide a number of the variables required for eliciting happiness in humans. In a study by Korpela and Ylén (2007) cited previously, results also showed that, for people who had visited a nature-based setting, among the three most common post-visit emotions which showed improvement was mood.

6.6 Impact on physiological processes underpinning mental health

It is clearly evident that a number of physiological processes, such as the secretion of hormones under stressful conditions, degeneration of neurons in the brain and suppressed immune function, occur during circumstances which induce stress, anxiety, depression and over exertion of directed attention. Outlined below is evidence which shows how nature and natural settings can contribute to the restoration and optimal functioning of suppressed or fatigued physiological processes.

Various hormones, which are secreted under stressful conditions, are broken down and disperse faster during physical exercise (Grahn and Stigsdotter 2003). Cortisol and melatonin levels which increase stress are also known to be adjusted to lower levels during exposure to daylight. Remaining hormones, which accumulate in the body, affect digestion, blood pressure, pulse, and breathing, making it harder to relax and sleep. As the presence of accessible and pleasant green spaces has been shown to encourage physical activity, green spaces appear to be positively implicated in relation to both sunlight and exercise, and therefore to reducing levels of stress hormones.

Also interesting to note is that self-control diminishes in urban environments due to over-exertion of the pre-frontal cortex, which is the same area responsible for directed attention, and has occurred over and above coping capacity during a long walk in the city (Lehrer 2009). Therefore in such an environment, it is harder to exert self-control, and this can be related to loss of emotional control, displayed as aggression and through irrational behaviours, which are more common in urban settings than in more calming natural settings (Kuo and Sullivan 2001b).

Studies of the plasticity of the brain in rats (e.g. Komitova et al. 2005) have shown that, during lengthened periods of prolonged stress, the hippocampus dendritic neurons degenerate greatly. After an experimentally induced brain injury involving rats, neurogenesis (the process through which neurons are created from stem cell deposits) has been activated in the brain and the newly formed nerve cells move to the injured area in attempts to repair the area (Komitova et al. 2005). The study by Komitova and colleagues (2005) showed that a stay in enriched environments greatly affected regeneration of damaged hippocampal regions of animals. Researchers have proposed that this process may be relevant to people who suffer severe burnout/crises, and who often exhibit signs of acute stress (Eriksson and Wallin 2004).

Certainly, in other related studies, natural environments have been shown to function as a type of restorative/rehabilitative aid (Ottosson and Grahn 2008). Therefore the authors theorise that the rehabilitative effect of nature is tied to its function as an enriched environment, which among other features contains trees and flowers (Loukaitou-Sideris 2003), and has been described in many studies as such (Burdette and Whitaker 2005; Burdette et al. 2004). Nature appears to be an important dimension of an enriched environment, capable of providing the harmonic balance required for the body to repair damaged or dysfunctional areas in the brain through neurogenesis (Ottosson and Grahn 2008).

7. Other links between nature and mental health and well-being

Although not directly identifiable as mental health problems, both physical inactivity and lack of social connectedness have been identified as leading contributors to a number of health conditions with underlying impacts on psychological health and well-being. Therefore these two indicators of physical and mental health and well-being are important factors which are discussed in connection to this topic.

7.1 Physical activity

Lack of physical exercise has now become a permanent fixture in the plethora of public health issues the world faces today. Adequate physical activity is shown to have a beneficial effect on both physiological and psychological health and well-being (Rimmele et al. 2009; Travlou 2006). Free play (in which physical activity may play a key role) is believed to possess qualities which enhance and improve numerous aspects of emotional well-being such as reducing anxiety, depression, and aggression as well as sleep problems (Burdette and Whitaker 2005).

Evidence from physiologically based studies has shown a positive effect of physical activity on body weight, body fat percentage, blood pressure, cholesterol ratios, triglyceride levels, glucose tolerance, insulin sensitivity and bone density (Bedimo-Rung et al. 2005; Grahn and Stigsdotter 2003; Peacock et al. 2007; Pryor et al. 2006). Additionally, it has been shown to

lower the risk of developing, as well as promote a better prognosis for, numerous chronic diseases such as cardiovascular disease, diabetes mellitus type 2, osteoporosis, stroke, depression and some forms of cancer (Bedimo-Rung et al. 2005; Grahn and Stigsdotter 2003; Peacock et al. 2007; Pryor et al. 2006).

Exercise is also known to foster healthy muscle and bone development, maintain health and independence in the elderly, reduce their risk of falls, improve mental health (Pretty 2004), reduce cognitive impairments, and delay the onset and reduce the severity of Alzheimer's disease and dementia in both elderly men and women (Adlard et al. 2005; Laurin et al. 2001; Weuve et al. 2004). Apart from the above cited benefits, physical activity in natural environments has been shown to reduce rates of smoking and substance abuse, as well as improve functioning at work and home (Morris 2003).

Physical activity is well known to offer effective treatment and preventative benefits for stress related illnesses (McEwen 2002; VanItallie 2002), adverse effects from life stressors (Ketelhut et al. 2004; Talbot et al. 2002) and other non-physical mental stressors (Claytor 1991; Cox 1991). Reports indicate that physical activity helps people feel better, as reflected in improved mood and decreased state and trait anxiety (Goodwin 2003; Parfitt and Eston 2005; Peacock et al. 2007). Studies have also shown that heightened periods of exercise as well as prolonged periods of over 10 weeks of aerobic exercise have been shown to reduce anxiety levels (Goodwin 2003; Petruzzello et al. 1997; Petruzzello et al. 1991; Salmon 2001).

Physical activity helps people feel better about themselves through improved physical self-perceptions and improved self-esteem (Peacock et al. 2007). Higher levels of physical activity have been shown to increase feelings of self-efficacy as well as confidence, independent of variation in the Body Mass Index (BMI), which has also been shown to have an impact on the mental health status of overweight children (Goldfield et al. 2007), and to result in a decreased physiological reaction to stress, as well as in improved sleep (DOH 2004). The promotion of both daily and recreational exercise is therefore an important strategy to utilise when tackling modern day public health issues.

Exercise is now recognised as an antidepressant (Craft and Landers 1998; Goodwin 2003; Lawlor and Hopker 2001; North et al. 1990; Rimmele et al. 2009; Singh et al. 2001). Especially in adults, physical activity can lower depressive symptoms (Dunn et al. 2001; O'Neal et al. 2000). This has been shown to be true in the case of both asymptomatic people of all ages as well as for people who are diagnosed with severe mental illnesses (defined as a diagnosable mental disorder found in people 18 and over, that is so long lasting and severe that it seriously interferes with a person's ability to take part in major life activities) (United States Departments of Health and Human Services cited in Carless and Sparkes 2008, p. 192).

While physical activity is useful in reducing the weight gain common in people taking antipsychotic medication, it has also been identified as providing opportunities for social interaction, achievement and relaxation, which contribute to quality of life for people with mental illness (Carless and Douglas 2004). Findings support the suggestion that both the above identified populations can gain health and fitness benefits from physical activity (Beebe et al. 2005).

Reports of success stories, related by people with severe mental illnesses who gained health benefits and a better quality of life following participation in physical activity, add strength to the already well documented evidence base on this topic (Carless and Sparkes 2008). Adults who exercise have been shown to have lower anxiety levels, both chronic and acute (Petruzzello et al. 1991). Experimental studies with older children have shown that physical activity elevates mood and emotional well-being (Williamson et al. 2001). Interestingly, along with physical activity, sunlight has also been shown to affect mood if the activity occurs in outdoor settings (Wirz-Justice et al. 1996).

In a study which focused on evaluating whether or not participation in sports at different levels had a positive impact on emotional and behavioural well-being, especially self-concept, results were significantly positive (Donaldson and Ronan 2006). Results indicated that children who "felt" more competent performing sports reported significantly reduced emotional and behavioural problems compared to children who, according to their teachers and based on their achievements, were not competent at sports. Results also showed participation in certain areas of sports to have a positive correlation with self-concept.

The studies cited below outline why natural settings are regarded as an appropriate and popular setting for physical activity.

In a physical activity promotion program set up across the United Kingdom to attract normally sedentary people to start walking, the participants have reported improved physical fitness, and highlighted the social factor and the countryside as the most important motivating factors (Health Walks Reseach and Development Unit 2000). While this report does not specify the mental health motivations for physical activity, it is clear from the evidence cited below that recognition of the importance of daily physical activity in "green spaces" for all age groups is imperative to promote public health solutions that optimise both physical and mental well-being.

There is some evidence that attractive environments nearby may encourage physical activity. An Australian study has found that people who live closer to a beach take longer walks compared to those who do not (Humpel et al. 2004). Another study by Boldeman et al. (2004) has shown that pre-school children playing in areas that were more natural had increased levels of physical activity compared to those playing in open pre-constructed playgrounds.

The "Feel Blue, Touch Green" study described previously showed that membership in the group increased opportunities for physical activity/exercise, which contributed to improved mood, cardiovascular benefits and helped to manage weight, as well as providing opportunities to breathe fresh air, providing associated respiratory health benefits (Townsend and Ebden 2006).

Several studies have shown that having access to a nearby neighbourhood park has increased physical activity levels in school-aged children (Cohen et al. 2006; Epstein et al. 2006). The Epstein (2006) cross-sectional study showed that children with access to large parks, which are less than half a mile away from their homes, were more likely to be involved in moderate to vigorous physical activity and less likely to participate in sedentary behaviour.

An examination of women's levels of physical activity was conducted in Prospect Park, Brooklyn, New York, USA (Krenichyn 2006). It is a 526-acre (1315-hectare) urban park designed and built in the 1860s by the famous landscape architects Frederick Law Olmsted and Calvin Vaux. Interviews with regular users between the ages of 18 and 85 years from a diverse range of ethnic backgrounds revealed the following:

- the diverse topography such as the presence of steps and hills to climb when walking, jogging or cycling utilised different muscle combinations
- the park offered a more smooth and continuous workout in a safer and more controlled environment compared to streets and footpaths with traffic
- the provision of drinking fountains and toilets encouraged people to use the park for exercise
- the park provided an environment which allowed women to dress more comfortably and freely for exercise, drawing less attention and comments than in the streets
- it offered a setting separated from the urban environment where participants could pretend they were in more remote outdoor settings like the countryside
- participants particularly enjoyed the presence of nearby nature and aesthetically pleasing scenery.

The findings from the Nielsen and Hansen (2007) study cited in section 4.1.1 can be construed to suggest that access to public green spaces has an impact on levels of overweight in the population, and therefore should be a significant component during environmental planning and design, as well as in preventative health promotion programs aimed at reducing and alleviating sedentary living in society.

Pretty et al. (2007) claim that green spaces provide incentives and opportunities for exercise as well as being an important determinant of physical and mental health and well-being. This is confirmed in a research survey investigating the influence of physical environments in encouraging women to be physically active (King et al. 2000). Results indicated that hills and scenery were significant contributors to women's levels of physical activity (King et al. 2000).

The annual cost of physical inactivity in Australia is reported to exceed $13.8 billion per year (Medibank Private 2008). There is evidence that indicates fewer people are now actively involved in regular physical activity than in the past, and the Australian Government Department of Health and Ageing (DoHA 2005) has developed recommendations for levels of physical activity for adults, being "at least 30 minutes of moderate intensity physical activity on most, preferably all, days".

Vigorous physical activity, compared to walking, relaxing or observing nature, has been shown to result in greater decreases in stress levels and improvements to a well-balanced feeling (Hansmann et al. 2007). Green spaces such as parks and forests are recommended for activities such as those listed above, as studies have shown they are suitable and contain the required features for this purpose (Hansmann et al. 2007; Mitchell and Popham 2007, 2008). The restorative value of natural settings is believed to result from certain reinforcing

factors during the experience of nature such as the distance it has from everyday demands, the possibilities it offers for aesthetic appreciation and also the active interest it instils in human minds (Mitchell and Popham 2008).

Studies have shown that walking for older adults has numerous mental health and well-being benefits such as improvements in cognitive function in older women (Yaffe et al. 2001); reduced depression (Mobily et al. 1996); and improved social ties (Bowling et al. 2003; Glass et al. 2006). Green open space in residential areas, such as parks, play areas, and village greens, have been shown to promote elderly people's participation in walking. A recent study investigated the aspects of neighbourhood open spaces that are associated with older people's walking (Sugiyama and Thompson 2008). For the purpose of the study, neighbourhood open spaces referred to parks, community gardens, play and sports areas, village greens, and river or canal banks. "Pleasantness", such as suitability for children's play; a general relaxing and welcoming atmosphere; and the quality of trees and plants, was shown to be significantly associated with people taking longer walks in the area. The presence of footpaths, which are enjoyable, easy to walk on and obstacle-free, and the availability of good facilities such as toilets and a place to have a refreshment or take a break when tired have been factors in a neighbourhood open space shown to encourage older people to walk, and to use as a route to reach other destinations such as shops, services and transport stops. The authors suggest that regular maintenance of these neighbourhood open spaces to keep them pleasant will attract more older people to use them for walking both for recreational and transport requirements.

Another study examined the effect of varying levels of physical activity on psychological, adrenal and autonomic responses to a standardised psychosocial stressor (Rimmele et al. 2009). The manner in which the subjects responded to the stressor varied alongside the levels of physical activity, with the lowest cortisol, heart rate and psychological responses seen in individuals participating in the highest levels of physical activity. However only elite sportsmen showed consistently lower stress levels, as measured by heart rate and cortisol levels, compared to untrained men.

7.2 Social connectedness and interactions

The degree of integration within a social network is shown to have a direct impact on well-being regardless of the presence of stressful circumstances (Berkman and Glass 2000; cited in Kawachi and Berkman 2001). Individuals connected within a social network are more likely to experience positive psychological states such as a sense of purpose, belonging, security and a sense of self-worth (Cohen and Wills 2000; cited in Kawachi and Berkamn 2001). These positive effects in turn are believed to have a flow-on effect in increasing self-care and reducing stress symptoms in people (Kawachi and Berkman 2001). Belonging to these social networks is also believed to increase the likelihood of accessing support services when the necessity arises and thereby reducing negative emotional states such as depression and distress, as well as reducing the odds of experiencing negative life events such as unemployment (Kawachi and Berkman 2001; Lin et al. 1999). There is a clear link between social isolation and lower well-being, as well as evidence that smaller social

networks, smaller perceived social support systems and low numbers of close relationships have all been linked to poorer ratings on psychological well-being measures and depression in particular (Barnett and Gotlib 1988; Durkheim 1955; cited in Kawachi and Berkman 2001; Cohen and Wills 1985).

The link between social support and stress is explained using the Stress Buffering Model, which shows that perceived availability of social support in the face of a stressful event reduces the event's impact as well as the likelihood that it may trigger a cascade of future negative emotions and behavioural responses to stress (Kawachi and Berkman 2001). Research also indicates that, in the presence of social support during a stressful situation, the physiological and behavioural responses to it, such as cardiovascular responses, are shown to reduce (Kamarck et al. 1990).

The Victorian Health Promotion Foundation (2006; cited in Pryor et al. 2006) has found that elderly people who are socially isolated have a greater likelihood of developing Alzheimer's disease, while other research has also shown that people of all ages who do not get sufficient social and emotional support, have a greater likelihood of experiencing depression (Wilkinson and Marmot 2003). Numerous research studies have also cited evidence linking geriatric depression to the elderly population living in healthcare and long-term care settings (Smyer and Bartels 2002). Outdoor activities such as walking improves contact with friends and neighbours (Bertera 2003), promotes the formation of social ties and has been shown in turn to improve the mental health and well-being of elderly people (Bowling et al. 2003; Glass et al. 2006).

One of two separate studies conducted in the same area showed that use of green common areas was a reliable predictor of both the strength of neighbourhood ties and sense of community among older adults (Kweon et al. 1998). The other study showed that areas containing a more natural landscape were used by larger groups as well as more groups containing diverse age groups, compared to landscapes with less nature (Coley et al. 1997). Another study that measured the quantity of green vegetation in neighbourhood common spaces, where greenness was rated on a scale from 0–4, showed that more greenness resulted in stronger social ties, and a higher sense of safety and adjustment to the environment (Kuo et al. 1998).

Social integration and connectedness through the promotion of utilising green spaces can help in reducing unhealthy behaviour, which is an important determinant of psychosocial and health-related problems in underprivileged areas of urban developments (HCNDACRSP 2004; Wells and Evans 2003).

In Portland, Oregon, a central intersection was transformed into a public gathering place by the residents, who embarked on an urban experiment to create a place where people could gain a sense of place, identity, belonging and improve physical activity levels (Semenza 2003). City officials also participated in the second phase by building an art wall from cob (a traditional building material composed of clay, straw, water and sand) and a cob information kiosk was opened to exchange messages and notices. A solar-powered fountain drew passersby to it, where they would pause to hear the sound of running water and interact with

others. Two years since its initial construction, cross-sectional surveys of participants living within a two-block radius of the piazza showed that ratings of the neighbourhood liveability level had risen. Eighty-six per cent of respondents reported excellent or very good general health compared with 70 per cent in the adjacent neighbourhood and 57 per cent compared with 40 per cent in the adjacent neighbourhoods reported feeling “hardly ever depressed”.

The Australian “Friends Group” study cited previously also showed that the participants described an increased sense of belonging and connectedness with their local community as a result of being in the group (Townsend and Ebden 2006). Many parents commented that, in an era where children are constantly being warned about “stranger danger” and have limited opportunities to enjoy the outdoors unsupervised, members’ children had increased opportunities to play and widened their social circles, resulting in an elevation of children’s confidence levels and interaction with others in the community.

8. Climate change and mental health

In an era where the drastic and relentless changes occurring in the earth's climate are visible across the globe (Inter-Governmental Panel on Climate Change [IPCC] 2007), a review of this nature must consider the inextricable links between climate change and mental health and well-being. Behaviours and mental health are known to be affected by both societal and climatic factors, so changes to global climates will create numerous mental health issues for people across the world (Global Warming 2009).

There is increasing evidence that climate systems are warming faster than was estimated in the recent past (IPCC 2007). Rising global air and ocean temperatures, heat waves, melting of snow-caps, ice glaciers and polar ice sheets, and rises in average global sea levels provides evidence that climate change is no longer impending but has arrived.

The IPCC (2007, p. 4) defines climate change as "the change of climate attributed directly or indirectly to human activity, altering the composition of the global atmosphere, in addition to natural climate variability over comparable time". Change in levels of greenhouse gases has been identified as the leading cause for this situation (IPCC 2007). The concentration of carbon dioxide, the most common greenhouse gas, has increased by 70 per cent between 1970 and 2004 due to human activities (IPCC 2007). Significant rises in concentrations of carbon and greenhouse gases in the atmosphere have led to increases in temperature and drastic and unstable weather conditions in recent times (Unkles and Stanley 2008).

8.1 Underlying impacts of climate change for mental health and well-being

Given that human mental health is a state of being that is both affected by and affects the world in which we live, the link between mental health and climate change is critical if we are to achieve positive change. Currently western ways of thinking and doing perpetuate the illusion that we are not an integral part of a planetary system, but rather above and in control of it. Human well-being—indeed survival—is likely to be very limited if this world view does not change.

Andrew Lyon and Maddy Halliday, 2005, 'Climate Change and Mental Health in the 21st Century', International Futures Forum; cited in Global Warming 2009

Numerous emotional and mental health conditions have been identified as consequences of climate variability and extremes. Seasonal variation is known to impact mood. The depression symptoms seen at the start of autumn and winter and the appearance of mania or hypomania in spring is described as Seasonal Affective Disorder (SAD) (Chand and Murthy 2008).

Mental health conditions such as post-traumatic stress disorder, depression, anxiety and stress have been identified as flow-on effects of deprivation, social exclusion, social isolation, personal loss of property, death of loved ones and displacement resulting from the negative impacts of climate change and climate-related natural hazards to populations (Chand and Murthy 2008; Few 2007; Global Warming 2009; Manual 2006; McMichael 2006). The stress brought on through the displacement of family and community is believed to be especially detrimental to the mental health of children (Global Warming 2009). Negative behaviours such as increased alcohol, drug and cigarette consumption (which are common coping mechanisms for people undergoing stress), depression, unemployment and anxiety are also known to increase in the aftermath of natural disasters (Horton and McMichael 2008; Long 2003). It is also likely that these conditions, brought on by hazardous climatic events, could be a result of the economic incapacity to actively participate in society created by those events, which is identified as a social determinant of health (Wilkinson and Marmot 2003).

Disaster

Following the Asian tsunami of 2004, the WHO made estimations that 20 to 40 per cent of those who were affected suffered from short-term mild forms of psychological distress, while another 30 to 50 per cent suffered from a more moderate to severe condition of psychological distress (WHO 2008; cited in Chand and Murthy 2008).

Reports from the New Orleans medical community state that people are still suffering from the physiological and psychological stress of Hurricane Katrina, as a result of ongoing financial problems and from deeply disturbing fears of being subjected to crime (Global Warming 2009). This fact is further confirmed by the state's coroner, Dr Frank Maynard, reporting of "people with pre-existing conditions that are made worse by the stress of living here after the storm. Old people who are just giving up and people who are killing themselves because they feel they can't go on" (Global Warming 2009). Statistics have shown that the percentage of deaths in the state has increased by 25 per cent, while social workers report a

tripling of people with mental health issues such as depression, anxiety, suicidal tendencies, and drug and alcohol abuse problems (Global Warming 2009). Later studies from 2007 indicated that 50 per cent of the residents suffered from anxiety and mood disorders in the months following Hurricane Katrina, while 49 per cent of residents surveyed five to seven months after the disaster were diagnosed with depression, panic disorders or post-traumatic stress disorder (Global Warming 2009).

Damage to local infrastructure such as roads and bridges following natural disasters interrupts local and national economic and lifestyle patterns, as well as having a detrimental impact on the basic income of individuals relying on natural resources to earn a livelihood, such as fisher folk and crop gardeners (Long 2003). This in turn can be related back to the flow-on effects identified at the beginning of this chapter.

Forest fires, drought and heat

Climate change is believed to exacerbate the frequency and extremity of forest fires, droughts and heat waves (Chand and Murthy 2008). Droughts and forest fires affect farming communities severely, where they have to face difficulty during the growing, stocking, improving and breeding of crops under extreme weather conditions (Chand and Murthy 2008). This in turn can result in severe mental health issues caused by stress, worry and anxiety, and brought on by loss of income, strained family relationships, increased isolation as partners move away from the farm to find additional income, lack of social support, and leading to increases in the number of suicides (Chand and Murthy 2008).

The IPCC's (2007) projected calculations show increases in bushfires and drought in Australia by 2030. The increased dryness and drought will exacerbate exposure to dust, smoke and heat, as well as bring about shortages of water, which will contribute to hygiene problems and lack of food (Horton and McMichael 2008). Increased air pollution as a result of bushfires is also likely to result in more deaths and health risks as a result of injury, burns, mental and physical trauma (Horton and McMichael 2008).

Already, the quality of life for many European residents is believed to have been lowered due to intensified heat stress episodes, which are resulting from both local and global climate change (Nicholls and Alexander 2007). An intense heat wave in Europe in 2003 is documented to have increased heat-related mortality rates significantly (Johnson et al. 2005). For example in France 14,802 people died in a period of less than three weeks (Kovats, Wolf and Menne 2004). While people with mental illness are believed to be more prone to heat stroke (Naughton et al. 2002), this condition can itself present with neuropsychiatric symptoms such as confusion, delirium and persisting neuropsychological deficits (Romero et al. 2000).

Flooding

Global warming is likely to increase the frequency of extreme flooding (Chand and Murthy 2008), and a study from southern England reported a fourfold higher risk of psychological distress following a severe flood in the area (Reacher et al. 2004).

It is now predicted that by 2050 there will be increases in coastal flooding from rising sea levels and storms, leading to the displacement of coastal dwellers (IPCC 2007). The Australian Conservation Foundation (ACF)—a leading environmental organisation in

Australia—has stated that climate change will result in agricultural instability, crop failures and water restrictions (ACF et al. 2008). The loss of arable land will result in loss of income for farming communities and their subsequent displacement (Stanley 2007). With rural suicide rates already out of proportion to the population distribution, such factors may compound the mental health issues of a population already experiencing stress.

Loss of biodiversity

Loss of culturally significant biodiversity such as the Kakadu wetlands, the Queensland wet tropics and the Great Barrier Reef is projected to occur by the year 2020 (IPCC 2007). This is likely to result in economic hardship for Indigenous and other communities whose income depends on these ecological attractions (McMichael 2006). These circumstances are likely to result in stress for the affected populations and, potentially, mental health conditions.

8.2 Connections between contact with nature, environmentally sustainable stewardship and mental health

The environmental crisis is an outward manifestation of a crisis of mind and spirit. There could be no greater misconception of its meaning than to believe it is concerned only with endangered wildlife, human-made ugliness, and pollution. These are part of it, but more importantly, the crisis is concerned with the kind of creatures we are and what we must be in order to survive.

Professor Lynton K. Caldwell 1969; cited in Townsend 2005a, p. 7

It is good to realise that if love and peace can prevail on earth, and if we can teach our children to honour nature's gifts, the joys and beauties of the outdoors will be here forever.

Jimmy Carter 2002

The Ottawa Charter for Health Promotion, developed in 1986, recognised that environmental protection and conservation of natural resources was an essential element of promoting human health (WHO 1986).

While environmental protection and sustainability are closely connected to human health benefits, environmental degradation on the other hand will have detrimental effects on people. Thus fostering the sustainability of ecosystems will also have a synergistic effect in fostering and promoting human health and well-being. As Maller et al. (2006, p. 49) succinctly and precisely stated "to seek human health and well-being without considering the importance of environmental sustainability is to invite potentially devastating consequences for the health and well-being of whole populations".

The urgent need to awaken awareness concerning environmental issues and their implications for the future of life, as well as to identify roles that various segments of the community can play to ensure a healthy and sustainable future for both the planet and its people, has been outlined in the literature (Townsend 2005a), and is discussed in the next part of this section. It is important to keep in mind that the current values people have

towards the environment affect their behaviour and actions, but also that these values are related to the cultural and historical context of the society people live in (O'Brien 2005b). Therefore, changing these values to attain the above objective will necessitate changing the underlying beliefs and perception of each target society.

The Urban Green Spaces Task Force (DLTR 2002) report also provided evidence of the benefits of developing strategic partnerships. Such partnerships will:

- help to reinforce the need to improve green spaces as a resource for health
- empower communities to collectively create solutions and work towards common goals
- create a sense of ownership and foster a sense of community cohesion and social integration among participants.

The projects discussed in the book *Restorative Commons: Creating Health and Well-Being Through Urban Landscapes* (Campbell and Wiesen 2009), could be used as a guideline for the inter-sectoral collaboration of relevant stakeholders in the creation of a productive, manageable and sustainable green space plan. It could result in a model which creates a socially inclusive guardianship and stewardship of natural resources by various communities such as industries, organisations, neighbourhood communities, as well as diverse socio-demographic groups such as the socially and economically disadvantaged and people with mental and physical disabilities and health issues. Thus, the challenge of climate change could be addressed by forming a multidisciplinary, multi-agency synergy, motivated towards working for environmental sustainability (Burls 2007b).

Maller et al. (2006, p. 52) point out that this approach is further reinforced by the fact that it is an "affordable, accessible and equitable choice" of re-establishing public health and averting ill health. This is the concept of "kinship systems" at work—actively healing each other—which is currently only exploited by a few groups such as some health promoters and psychotherapists. But it is a model which, if given the deserved and relevant attention, could address many of the local and global ecological and public health challenges of today (Burls 2007b).

Research conducted by the NiCHE research group at Deakin University, Melbourne, has also shown that people engaged in activities aimed at restoring or maintaining natural habitats and settings have shown improved health and well-being. This has been evident in increased social interaction, better communication, improved spiritual well-being, improved mental relaxation derived from the serenity of the bushland environment, reduced social isolation and a reduction in the associated mental health risks such as depression, and increased social inclusiveness especially for older people. Studies have confirmed that these results were not confounded by existing environmental awareness and appreciation (Townsend 2005a).

In the Australian "Friends Group" study undertaken in 2003–2004 by Townsend and colleagues from Melbourne's Deakin University, which investigated the health and well-being benefits of civic environmentalism, and was demonstrated through membership of a park's "friends group", results once again confirmed inherent knowledge that belonging to such a group and taking part in activities associated with such a group, exposed people not only to the benefits of the natural environment, but also to other people with similar interests

(Townsend 2005a). It also provided opportunities to contribute productively to tasks which are socially valued. Elderly people also benefited from being given opportunities to assist in environmental stewardship which didn't require them to undertake physical work, by preparing newsletters and publishing activities. A similar project by the same research team, involving people who were experiencing depression, anxiety and/or social isolation in hands-on environmental activities, demonstrated that there were significant improvements to mood for all participants.

A recent report investigating the potential motivators, barriers and benefits of environmental volunteering (EV), which is linked to the concept of environmental sustainability and stewardship, highlights a number of positive benefits which affect the health and well-being of people with and without mental health issues as follows (O'Brien et al. 2008):

- EV is both linked to and promotes social inclusion
- EV is seen as a potential tool to overcome social exclusion and isolation[1]
- EV promotes social capital, which is commonly used to refer to social structures (e.g. networks, trust and social norms) that foster co-operation and cohesion within communities and which benefit its members
- EV improves self-esteem and pride[2]
- EV enhances self-efficacy and has empowering potential
- EV promotes opportunities for being outdoors enjoying nature and its elements.

Participants in this study commented:

"I can sit in the hillside for ten minutes and it can be as effective as a Prozac. I can sit there and I just get a high, I suppose from looking at the beauty."

O'Brien et al. 2008, p. 82

"I mean, we come out bird watching, it doesn't cost us a penny, but at the end of the day, I'll go home after I've had a good day out somewhere, hit the pillow on the night and there's no rubbish in your head; you hit the pillow and you're gone. You wake up the next day and you're refreshed and you feel better within yourself and you feel like you've achieved something and you just feel that you're a better human being and you haven't got any time for the dross that's going on around you."

O'Brien et al. 2008, p. 82

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1 A US study showed that people experiencing social isolation were "6.59 times less likely to survive a stroke, 3.22 times more likely to commit suicide and 1.59 times less likely to survive coronary heart disease" (Kawachi et al. 1996; cited in O'Brien et al. 2008, p. 30).

2 Low self-esteem has been identified as associated with risk factors such as alcohol abuse (Pritchard et al.; cited in O'Brien et al. 2008). Additionally "self-esteem can buffer the impact of stress on psychological distress (Marcussen 2006, p. 6).

"Forestry has made me see what wildlife there is out there and [want] to take care of it."

O'Brien et al. 2008, p. 89

Yet, despite these obvious benefits, money, transport, lack of motivation, lethargy-related medications, depression, avoiding social contact and the reduction of government benefits when doing volunteer work have been identified as barriers against participation in nature-based or conservation activities (Townsend and Ebden 2006).

Although Kellert and Derr's (1998) adventure therapy study resulted in an in-depth analysis of how the nine values of nature linked to the biophilia hypothesis influence people's relationship with nature itself, the study results showed participants had minimal environmental and behaviour knowledge in relation to the study (Burls 2007b). The participants showed few conservation behaviours and minimal knowledge of environmental facts related to the protection and restoration of nature (Kellert and Derr 1998). From a conservation perspective, the study results implied that humans view nature as something for entertainment, pleasure, perhaps connected to well-being or to be used in therapy, but not as an entity which requires nurturing and protection in its own right (Burls 2007b).

It is evident from the facts cited above that environmental stewardship has strong connections with both the present and future mental health and well-being of human populations. As numerous researchers, scientists, philosophers and political leaders have said, it is vital that the present generation—and especially children, who are the torchbearers of tomorrow—needs to understand the vital importance of protecting and actively participating in sustaining the earth. From both conservation and public health perspectives, sending this message out widely, urgently and effectively is imperative to the survival and well-being of both humans and plant.

Wood (2006, p. 28) has put into words a very valid statement regarding the youth of the world: "They make up 20 per cent of the world population but they are 100 per cent the future of the world. In our thrust to be analytical, impartial and scientifically rigorous, we may have lost the passion for educating future generations to ensure the protection of the natural environment."

Wood (2006) founded and created the River Health Conference Program to provide children with hands-on, student-centred learning about how to create paradigm shifts of thought in the way we perceive our natural world. Students are given the option of selecting an environmental topic of interest, researching it with an allocated mentor/expert and presenting it at a state or international conference. The work described here is what makes the difference in creating a future generation endowed with the skills, knowledge and confidence to be passionate leaders in the environmental debate and to promote the sustainability of the planet. It is essential to keep in mind that children's contact with nature lays the stepping stones for the next generation's support of nature conservation (HCNDACRSP 2004).

Tell me and I may forget,
Show me and I may remember
Involve me and I will understand.

Wood 2006, p. 30

9. Urban environments: the relationship with mental health and well-being

The aesthetics of natural and green landscapes is known to have a significant impact on the mental health of people since plants and aesthetically pleasant landscapes are known to create a more relaxing, inviting setting for restoration and recovery (Browne 1992). It is well known that humans and their culture are parts of the natural world, and that the health of humans is inextricably linked to the condition of the environment (Jackson 2003). Natural open spaces and well-designed green spaces are known to provide opportunities for recreation, social interaction, and community activity (Gordon and Grant 1997; MacArthur 2002; Steptoe and Butler 1996; Ulrich and Parsons 1992). Therefore, with the aim of improving the health and well-being of citizens through facilitation of these activities, as well as stress recovery and physical activity, contemporary urban planners are increasingly challenged to create improvements to public spaces (Hansmann et al. 2007).

Other researchers posit that certain designs utilised by urban planners in the United States, such as the urban grid and single-use zoning, which reduces social interactions and reduces the availability of places for the public to gather, could be partly to blame for the rising levels of obesity (Kumanyika 2001), diabetes (Hu et al. 2001) and depression (Narrow et al. 2002) in that country (Semenza 2003).

The famous American landscape architect and conservationist Frederick Law Olmsted was convinced of the visual benefits of nature for the emotional and physiological health of city

dwellers, and his theories on the health and restorative benefits of nature in urban settings had a huge impact on the design of parks and urban landscapes (Morris 2003). It is probably these beliefs that led to Olmsted's creation of New York's Central Park and of the Emerald Necklace in Boston, as escapes for people from the difficulties of urban life (Lehrer 2009).

Research has shown that public urban green spaces have to be appealing and aesthetically pleasing to attract users, as well as to encourage the users to be physically active rather than choosing to stay indoors and lead a more sedentary lifestyle (Hansmann et al. 2007). Enjoyable scenery and hills are among the factors that people report as promoters of exercise, while those that deter individuals from being physically active have been cited as low socio-economic status, lack of time and high crime rates in the area (Brownson et al. 2001).

Well-designed, planned and managed urban green spaces have further environmental benefits for their users through the creation of visual and sound barriers; provision of temporary cover for empty or derelict sites, providing a more aesthetically pleasing look to the area; filtering of air pollution (e.g. soot and poisonous chemicals); interception of rainfall, which reduces flooding; and encouraging the sustainability of wildlife habitats (Baines 2002; National Urban Foresty Unit [undated]), all of which have health and well-being benefits for those who reside and work in such environments.

Strategies to mitigate heat stress, especially in urban environments, have identified the need for increasing the quantity of green spaces, city parks, urban woodlands, street trees, rooftop gardens and vertical greening on buildings as a means of providing shade and cooler air temperatures within the vicinity of these settings (Li et al. 2005). Architects designing hospitals and other care facilities are also beginning to pay attention to "healing environments", such as the creation of healing gardens in hospitals (de Swaan et al. 2006).

Research investigating the effects of nearby nature in urban housing projects has shown positive effects among neighbourhood relations, reduced levels of violence and crime, and increased overall satisfaction with one's home (Sullivan and Kuo 1996; Taylor et al. 1998). The literature states that most architectural designs which have health in mind during the design phase provide the inhabitants of the buildings with natural light, ventilation, views of greenery and close proximity to green spaces (Jackson 2003, p. 192).

A link between closeness to urban green spaces, frequency of visits and duration of stay regardless of sex, age and socio-economic status has been demonstrated (Grahn and Stigsdotter 2003). The presence of a private or public garden close to one's home is also a relevant factor to be considered in this equation, as the study showed that the most persistent obstacles to accessing and using these green spaces was time and distance. Other research has shown that people are more likely to use green spaces than barren spaces, and that greener areas are more supportive of social activity (Sullivan et al. 2004).

The quality of outdoor experiences in a neighbourhood environment, such as opportunities for social interaction and contact with nature, has been shown to have health benefits for older residents, independent of exercise. This evidence can be useful in relation to design recommendations and policy development for aged care, as such elements are conducive

to maintaining and promoting the health and well-being of elderly residents (Sugiyama and Thompson 2007).

However, it is not just for older people, but for all population groups, that the location, facilities provided and physical characteristics of green spaces impacts on use of these areas. Parks have been identified as important public places which encourage social interaction and physical activity with clear and vital health implications (Kuo et al. 1998). Parks have also been identified as valuable settings which protect and sustain essential biologically diverse ecosystems (Maller et al. 2006). Research suggests that the quantity and type of vegetation; the presence of interesting and meandering pathways; quiet areas for sitting and reading; recreational amenities; adequate information and signage; and perceived levels of safety are important factors to keep in mind during the planning and building of parks (Cooper-Marcus et al. 2002 cited in Frumkin 2003). Consideration of the findings of this research should therefore be given during the planning and designing process of such spaces in the future.

Appendix A – List of books used during the literature search

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Appendix B—Potential benefits from outdoor play and adventure in natural settings

Benefits on physical health

- Increased levels of physical activity and fitness
- Positive views towards undertaking physical activity
- Activation of higher cognitive processes and healthy brain development
- Promotion of mental health and emotional well-being
- Reassuring effect on children in need of hospital treatment
- Better mental health and well-being in later years (young adulthood)

Educational and societal benefits

- Learning of social skills (e.g. interpersonal, negotiation and listening skills) and formation of peer groups
- Promotion of language development and socialisation
- Acquisition of problem-solving skills
- Improvement of internalisation of locus of control
- Improved self-esteem and ability for goal-setting
- Enhancement of self-control
- Enhancement of self-efficacy
- Encouragement of responsibility
- Revelation of child's developmental stage, interests and needs
- Importance for children's learning, including practical experience that informs scientific understanding of how the world works
- Ability to realistically appraise risks
- Development of flexibility and adaptability to changing surroundings
- Development of ecological consciousness
- Encouragement of constructive use of leisure
- Long-term appreciation of wilderness and its therapeutic potential

Source: Potential benefits from outdoor play (Travlou 2006)

Appendix C—Key assertions

The following is a summary of key assertions about the health benefits of interacting with nature (Maller et al. 2002).

Evidence key

A = Anecdotal T = Theoretical E = Empirical

What the research demonstrates with certainty

Assertion	Evidence			Key reference/s
	A	T	E	
There are some known beneficial physiological effects that occur when humans encounter, observe or otherwise positively interact with animals, plants, landscapes or wilderness	✔	✔	✔	Frumkin 2001, Beck and Katcher 1996, Rohde and Kendle 1994, Ulrich et al. 1991, Parsons 1991, Friedmann et al. 1983a, Friedman et al. 1983b
Natural environments, such as parks, foster recovery from mental fatigue and are restorative	✔	✔	✔	Kaplan 1995, Hartig et al. 1991, Kaplan and Kaplan 1990, Kaplan and Kaplan 1989, Furnass 1979
There are established methods of nature-based therapy (including wilderness, horticultural and animal-assisted therapy among others) that have success healing patients who previously had not responded to treatment	✔	✔	✔	Fawcett and Gullone 2001, Crisp and O'Donnell 1998, Lewis 1996, Russell et al 1996, Beck et al. 1986, Katcher and Beck 1983, Levinson 1969
When given a choice people prefer natural environments (particularly those with water features, large old trees, intact vegetation or minimal human influence) to urban ones, regardless of nationality or culture		✔	✔	Herzog et al. 2000, Newell 1997, Parsons 1991
The majority of places that people consider favourite or restorative are natural places, and being in these places is recuperative	✔	✔	✔	Herzog et al. 2000, Hertzog et al. 1997, Newell 1997, Korpela and Hartig 1996, Rohde and Kendle 1994, Kaplan and Kaplan 1989
People have a more positive outlook on life and higher life satisfaction when in proximity to nature (particularly in urban areas)	✔	✔	✔	Kuo 2001, Kuo and Sullivan 2001, Kaplan 1992a, Leather et al. 1998, Lewis 1996, Kaplan and Kaplan 1989
The majority of health problems society will face, now and in the future, are likely to be stress-related illnesses, mental health problems and cardiovascular health problems	✔	✔	✔	Commonwealth Dept of Health and Aged Care and Australian Institute of Health and Welfare 1999, Australian Institute of Health and Welfare 1998

Assertion	Evidence			Key reference/s
	A	T	E	
Social capital is decreasing and is likely to continue to decline	✔	✔	✔	Putnam 1995
Exposure to natural environments, such as parks, enhances the ability to cope with and recover from stress, cope with subsequent stress, and recover from illness and injury	✔	✔	✔	Parsons 1991, Ulrich et al. 1991, Ulrich 1984
Observing nature can restore concentration and improve productivity	✔	✔	✔	Taylor et al. 2001, Leather et al. 1998, Tennessen and Cimprich 1995
Having nature in close proximity (e.g. urban or national parks), or just knowing it exists, is important to people regardless of whether they are regular "users" of it	✔	✔	✔	Cordell et al. 1998, Kaplan and Kaplan 1989

What the research demonstrates with promise

Assertion	Evidence			Key reference/s
	A	T	E	
People have an innate affiliation with nature that enhances health, and humans rely on nature intellectually, emotionally, physically and spiritually	✔	✔		Fawcett and Gullone 2001, Frumkin 2001, Roszak et al. 1995, Kellert and Wilson 1993, Katcher and Beck 1987, Wilson 1984
There may be a genetic basis to human affiliation with, and attraction for, nature	✔	✔		Kellert 1997, Newell 1997, Kellert and Wilson 1993
Separation from nature via modern living is detrimental to human development, health and well-being	✔	✔		Frumkin 2001, Scull 2001, Stilgoe 2001, Kellert 1997, Katcher and Beck 1987
Regular contact with nature, such as provided by parks, is required for mental health		✔		Kellert 1997, Bustad 1996, Wilson 1993, Lewis 1992, Katcher and Beck 1987
There are psychological and physiological benefits to health from the act of nurturing living things (including plants, animals, and humans)	✔	✔		Kellert 1997, Bustad 1996, Wilson 1993, Lewis 1992, Katcher and Beck 1987
Nurturing is an essential part of human development, and lack of opportunities to nurture may be detrimental to health and well-being	✔	✔		Kellert 1997, Bustad 1996, Wilson 1993, Lewis 1992, Katcher and Beck 1987
Too much artificial stimulation and lack of exposure to natural environments, such as parks, can cause exhaustion and reduce vitality		✔		Stilgoe 2001, Parsons 1991, Katcher and Beck 1987, Furnass 1979, Stainbrook 1973 in Lewis 1996

What research is required

Assertion	Evidence			Key reference/s
	A	T	E	
Theoretical and/or empirical evidence on whether human health is affected by lack of opportunities to experience nature	✔			Frumkin 2001, Stilgoe 2001, Kellert 1997, Katcher and Beck 1987
Theoretical and/or empirical evidence on whether the destruction of the nature environment directly affects human health and well-being and is linked to the prevalence of mental disorders in modern society	✔			Roszak et al. 1995
Anecdotal and/or empirical evidence on the importance of parks to the community in terms of health and the actual health benefits people derive from parks		✔		Kickbusch 1989
Theoretical and/or empirical evidence on the role that natural environments (natural capital) play in facilitating social and human capital, and the outcome/s in terms of health	✔			Frumkin 2001, Putnam 1995
Empirical evidence on the role of nature in wilderness and adventure therapy	✔	✔		Crisp and O'Donnell 1998, Crisp and Aunger 1998
Evidence on whether the health and life satisfaction of some population groups (e.g. Friends of Parks groups, park volunteers, wildlife feeders and carers, or birdwatchers) is greater than others, where those groups have regular contact with nature/wilderness via parks	✔			Townsend and Maller 2003, Townsend 2006, Moore et al. 2007
Evidence on the extent, nature and process of the impact of nature and parks in maintaining psychological health	✔			Krenichyn 2005, Wood et al. 2008
Evidence on the extent, nature and process of the impact of nature and parks on quality of life (and happiness)	✔	✔		Wood et al. 2008, Ho et al. 2005, Louv 2005
Evidence on whether exercise carried out in natural settings (parks) has greater health benefits than indoor exercise	✔	✔	✔	Pretty et al. 2007

Appendix D—Examples of goals and strategies to address mental health concerns

Treatment goals	AAT strategy
Anxiety	
Decrease symptoms of anxiety or agitation	Hold or stroke the companion animals while interacting with the therapist or the therapy group. Talk to the animal. Receive affection from the animal.
Improve ability to relax using diaphragmatic breathing and relaxation techniques	Observe how a relaxed animal rests and breathes. Practise imitating the animal while imagining stressful situations in anxiety hierarchy (desensitisation).
Identify and reduce irrational thoughts which trigger or exacerbate anxiety	Discuss possible origin and symptoms of the animal's irrational fears (e.g. thunder) and relate to client's fears when possible. Have client consider the origins of their own anxiety or phobia and identify the thoughts and sensations that trigger anxiety. Have client explain why the animal need not be afraid. Help client develop coping self-statements for client's situation. If client is a child, then ask child to help animal confront fears with rational and more positive beliefs. A card game that matches irrational thoughts with the best counter ideas could be developed.
Reduce avoidance of anxiety provoking situations, place, groups etc	While client pets the animal, use guided imagery to desensitise fears (e.g. confrontations, using elevators, giving a speech, taking a test successfully, sleeping alone in the dark). The animal may be able to accompany the client while they face some fears.
Increase assertiveness	Discuss fight or flight reactions in animals (cowering vs aggression) and apply to people. Practise role-playing with the animal taking various roles. Practise process of gradually getting the animal to approach something it initially fears.
Identify and modify lifestyle variables that increase stress	Discuss stressors on animals and people (e.g. excessive noise, not eating or sleeping well, arguments, losses) and how these situations could be improved.

Treatment goals	AAT strategy
Reduce frequency of worrying, apprehension and avoidance tactics	Write/tell stories (related to client's own anxiety and worries) about a dog or other animal that overcomes its fears by facing them and discovering they are not real. If client is a child, then ask them to illustrate the story.
Reduce secondary symptoms of anxiety (e.g. restlessness, fatigue, irritability, stomach aches, and sleep disturbances)	Include client's symptoms in above stories with ways to reduce them. If client is a child, then exercise/play hard with animal, then practise relaxing while petting animal and imagining relaxing scenes together.
Depression	
Brighten affect and mood	Hold or stroke the companion animal while interacting with the therapist or the therapy group. Teach the animal to do a trick or engage in play with the animal.
Decrease learned helplessness behaviours. Increase sense of control over self and environment	Work with the human–animal team to effectively command the animal and to problem-solve when it does not respond correctly. Directly confront this issue, using the animal as an example, and transfer it to other situations.
Reduce isolation, boredom, loneliness	Engage in play with the animal. Learn about and then assist in the care/grooming/feeding of the animal. Reminisce about the past. Remember and repeat information about the animal. Learn about the animal, then introduce the animal to peers. Take the animal for a walk. Receive apparent acceptance from the animal. Give appropriate affection to the animal.
Decrease feelings of worthlessness	Provide pleasure for, or give affection to, the animal. Spend time caring for/grooming the animal. Take the animal for a walk, play its favourite game (e.g. fetch).
Address grieving/loss issues	Talk about animals the person has known. Reminisce about past animal loss/es. Discuss how animals might feel when their animal companion dies, when baby animals leave their mothers etc. Transfer this to the human situation.

Treatment goals	AAT strategy
Reduce suicidal ideation/behaviour	Ask: "If the animal were to die suddenly what impact would his death have on those who love him? What impact would YOUR suicide have on your family and friends?" Reflect on the animal's total self-acceptance without shame, without judging or comparing himself to others. If the client is a child, then talk about how the animal has suffered a loss similar to the child's. Discuss how the animal might feel sad, hopeless or guilty, and what could be done to help the animal feel better. Then discuss how the animal could let you know that he was feeling better. Apply to the child.
Increase positive mood, attitudes for a period of __ consecutive weeks	Consider the simple things that make animals/ people happy. Engage in some of those activities. Have client keep a Pleasure Journal of small, enjoyable events. Ask clients about their future and what will make them happy. If client is a child, then ask them to draw a picture of themself in the future.
Improve reality-testing and orientation (reduce dissociation, self-mutilation etc.)	Have client touch or stroke animal to help ground them in the present. Have client describe the animal objectively in terms of their appearance, needs, activities; where the animal is now, what month it is etc.
Increase energy, initiative and activity level	Play actively with the animal, take animal on regular walks (either client's own animal or yours). Have client plan and teach the animal a new trick.
Increase assertion	Have client obedience train their own animal or yours. Compare the ways animals and people react to an assertive tone of voice, to "no", to positive reinforcement etc.
Improve decision-making and concentration	Ask client what to do about a problematic behaviour of the animal's (parallel to client's behaviour when possible). Plan short-term goals and steps toward reaching goals. Apply process to client's situation. If client is a child, then allow the child to decide what food treat to give the animal, or which game to play, or to decide when the animal needs to go out.

Treatment goals	AAT strategy
Reduce irrational thoughts that increase or maintain depression	Discuss the client's (or animal's) negative self-beliefs. Practise contradicting with rational statements. As evidence to refute client's irrational thoughts, point out the animals affection and loyalty to client, despite past mistakes, imperfections etc.
Increase social interaction	Have client interpret the animal's feelings based on the animal's behaviour. Ask the client to talk about their own feelings and behaviours in similar circumstances. In groups, take turns to throw a ball for the animal or demonstrate tricks the animal has learned to do. Discuss amazing animal tales or feats.
Get an adequate amount of restorative sleep most nights for a period of ___	Client observes how relaxed the animal is and how it breathes deeply. Practise similar breathing techniques while visualising relaxing dream images for the client (or animal). Try the same technique at night.
Increase interest and participation in daily activities	Monitor attendance and interaction at AAT sessions. Talk about the client's daily activities and determine what may make them more fun. Note how frequently the client smiles at or pets the animal.
Improve appetite most days for a period of ___ consecutive weeks	Point out character flaws or flaws in physical appearance of the animal and how they do not affect the animal's self image. Work on translating this to clients who have problems with their own self image. If client is a child, then have a tea party where the child feeds the animal and him or herself. Play "red light green light" when eating meals.
Attention Deficit Hyperactivity	
Improve attention/concentration	Teach the animal a trick or an obedience command. Transfer success in activities with the companion animal to treatment activities and daily living activities.

Treatment goals	AAT strategy
Decrease distractibility	Work with the human–animal team to help maintain concentration on the work with the animal when giving commands or teaching a trick. Directly confront this issue, using the animal as an example, and transfer it to other situations.
Improve memory (short-term or long-term) or recall.	Recall information about the animal (name, age, colour, etc.). Reminisce about animals the person knew or had in the past. Remember details about the animal and the animal's care. Describe the animal when it is not present. Follow a sequence of instructions with the animal.
Improve reality orientation	Take the animal around and introduce it to others. Interact with (pat, play with, talk to, groom, etc.) the animal. Reminisce about the past. Remember and repeat information about the animal. Describe the animal.
Decrease self-talk relating to fantasy world	Work with the human–animal team to emphasise the importance of staying focused on the "here and now" with the animal when giving commands. Directly confront this issue, using the animal as an example, and transfer it to other situations.

(Information extracted from The Therapy Dog Training Institute, 1999, 'Utilising therapy dogs in mental health settings'; The Delta Society, 1996, 'The Human Health Connection: Standards of practice for animal-assisted activities and therapy'; and The Delta Society, 1997, 'Therapeutic Interventions'; cited in Urichuk and Anderson, 2003, pp. 94–105).

Appendix E—English terminology in the literature and in practice

Animals in general

Pet therapy
Pet-assisted therapy
Pet-facilitated psychotherapy
Pet-oriented child psychotherapy
Pet-oriented psychotherapy
Pet psychotherapy
Pet-mediated therapy
Pet visitation
Human/companion animal therapy
Animal-facilitated therapy
Animal-assisted therapy
Animal-assisted psychotherapy
Animal-assisted counselling
Animal-assisted social work
Animal-assisted education
Animal-assisted learning
Animal-assisted nursing
Animal-facilitated counselling
Animal-assisted activities
Animal-assisted interventions
Animal-assisted support services
Animal-assisted support measures
Animal-assisted crisis response
Co-therapy with an animal
Four-footed therapy

Other species

Canine-assisted therapy
Dog-assisted therapy
Cat-assisted therapy
Bird-assisted therapy
Llama-assisted therapy
Bovine-assisted therapy
Farm animal-assisted therapy
Dolphin-assisted therapy
Elephant-assisted therapy

Horses

Equine-facilitated psychotherapy
Equine-assisted psychotherapy
Equine-facilitated counselling
Equine-facilitated personal development
Equine-facilitated experimental learning
Equine-assisted experimental learning
Equine-facilitated mental health
Equine-facilitated wellness
Equine-facilitated life coaching
Equine-assisted coaching
Equine-assisted growth and learning
Equine-assisted learning and coaching
Equine-guided education
Equine-guided coaching
Equine-assisted self-improvements
Equine-assisted therapy
Equine-assisted learning
Equine-facilitated learning
Equine-guided learning
Hippotherapy
Therapeutic riding
Riding therapy
Horse-assisted therapy
Horse-assisted learning
Horse-assisted coaching
Horse-guided learning
Equine experimental learning
Equine experimental learning and coaching

Table extracted from Schlote 2009, p. 9.

Appendix F—Impacts and benefits of "offenders and nature" schemes

Nature provider organisations	Prison and offender management	Offender/ volunteers	Community	Environment
Ability to carry out work that is desirable but not done due to lack of resources (staff time unavailable or contractor costs high)	Prison delivering effective rehabilitation and reintegration opportunities to prisoners	Opportunity to test structured approach to working	Areas made lighter and brighter (improved feeling of security)	More diverse woodlands and habitats
Work completed to a high standard due to enthusiasm and hands-on approach; more finished and refined look by using hand tools	Large step forwards for prisoners nearing end of their sentences in being granted release on temporary license to work outside prison	Opportunity to improve mental health and well-being and self-esteem through regular physical outdoor activities; also affects emotional stability and ability to adjust to life's demands	Improved aesthetics of woodland nature conservation areas (areas looking tidier and appreciated by most, although not all)	Increased populations of common and rare fauna and flora due to active conservation management practices
Ecosystems improved through targeted management of habitats to favour diversity	Offenders carry out reparative work—repaying debt they owe to society	Chance to experience restorative effects of woodlands and green spaces	Improved accessibility, better-maintained paths	Restoration of neglected habitats
"Investing in People"; providing an opportunity for disadvantaged people to gain work experience and training in the land-based employment sector	Offenders have the opportunity to gain experience in a commercial but supportive environment, improving their employability after release	Opportunity to improve physical fitness and experience; other benefits of outdoor work (fresh air, pleasant surroundings)	Increased sightings of birds, butterflies, flora and fauna due to active conservation-management practices	

Nature provider organisations	Prison and offender management	Offender/ volunteers	Community	Environment
Nurturing a future workforce and volunteer base	Enabling offender to develop personal skills (communication, decision making, endurance/ stamina, team -working)	Chance to develop personal and interpersonal skills in a non-prison environment (with supervisor, fellow workers and site visitors)	Experiencing positive outcomes of "punishment systems"; form of reparation and reconciliation	
Increasing public awareness of investment in social forestry, nature conservation and public access to green space	Duty of care to prisoners in terms of providing a healthy environment and staying in good health	Develop team-working skills, awareness of health and safety issues, and a safe approach to working in a potentially hazardous environment	Experiencing offenders as "working people" and "fellow human beings" (part of a restorative process)	
	Positive thinking and experiences of prisoners can send a message of hope and opportunity to other inmates		Movement towards more environmentally, socially economically sustainable outcomes	

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