Design With
People in Mind

The Nature Issue

Design in
Mental Health
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Welcome to the Research and Education Workstream of the Design in Mental Health Network. We are committed to the development of an evidence based resource, to inform decision making and improve experiences within mental health services

Contents

Design with nature in mind

This publication is the fourth in the Design with People in Mind booklet series, and we are delighted this year to present on the topic of nature. Within, we consider the way in which nature impacts on how people feel and behave, contributing to the overall atmosphere and management of health care environments. It is perhaps self-evident that being in nature increases well-being in everyday life; however, this principle can be overlooked in particular mental health settings, where artificial materials and a lack of access to natural light and sound are the norm.

During the times when long-stay asylums provided care for individuals with mental health challenges, immersion in nature was considered an essential part of the overall treatment programme, involving outdoor pursuits in the vast and often beautiful asylum grounds, tended by patients and staff (Cromby, Harper & Reavey, 2013).

The therapeutic potential of nature under this system was actively encouraged and archives reveal that nature access was one of the most significant aspects of asylum care that ex-patients reported to miss deeply once the institutions had closed (McGrath & Reavey, 2018).

Modern mental health care settings do not always have the space or funding to provide large outdoor areas for service users and staff, and concerns regarding risk can serve as a barrier to access. And yet, evidence suggests that access to even small amounts of nature can reduce stress and aggression for many, which in turn can increase safety for all and perhaps facilitate less risk aversive practices.

In this booklet we provide a summary of evidence relating to the therapeutic benefits of nature for mental health challenges. We explore a range of topics relating to nature that we hope will encourage reflection on how to facilitate recovery. We cover issues relating to what it means for individuals to feel more alive (Brown & Reavey, 2019) – to increase their sense of vitality and the kinds of outdoor pursuits deemed beneficial, such as gardening, walking, swimming, camping and adventure activities. It's not just passively being in nature that provides benefits, it's what we do to actively engage with the natural world and in turn improve our physical and mental health.

This 'biophilic' position on recovery further emphasises the importance of connecting the individual with nature and capitalising on our innate attraction to natural environments and materials. This in turn can positively affect well-being by improving our mood and decreasing physiological arousal, often associated with distress.

More positively, we have found that much can be done to encourage feelings of relaxation, positive mood, physical well-being and a greater sense of connection with others through natural environments. This is multi-sensorial, involving sounds (such as bird song or running water), sight (light and simply seeing water or green space) and touch (feeling natural materials next to our skin). MadLove – a group of people with lived experiences of distress have highlighted this in their research and creative work, and here we provide further evidence of the effectiveness of this approach.

This booklet on nature is an approachable way to learn about the relevant evidence, and we hope the beginning of further reflection on what we think the purpose of a mental health environment should be. Treatment goes beyond what talking therapy might be offered or the medication prescribed – treatment should be about the whole person; a person located in an environment that can help, or hinder.

Our vision is for this evidence to be put to good use, in the hope it will benefit those who live and work in care environments and beyond.

Professor Paula Reavey
Katharine Harding

Nature and vitality

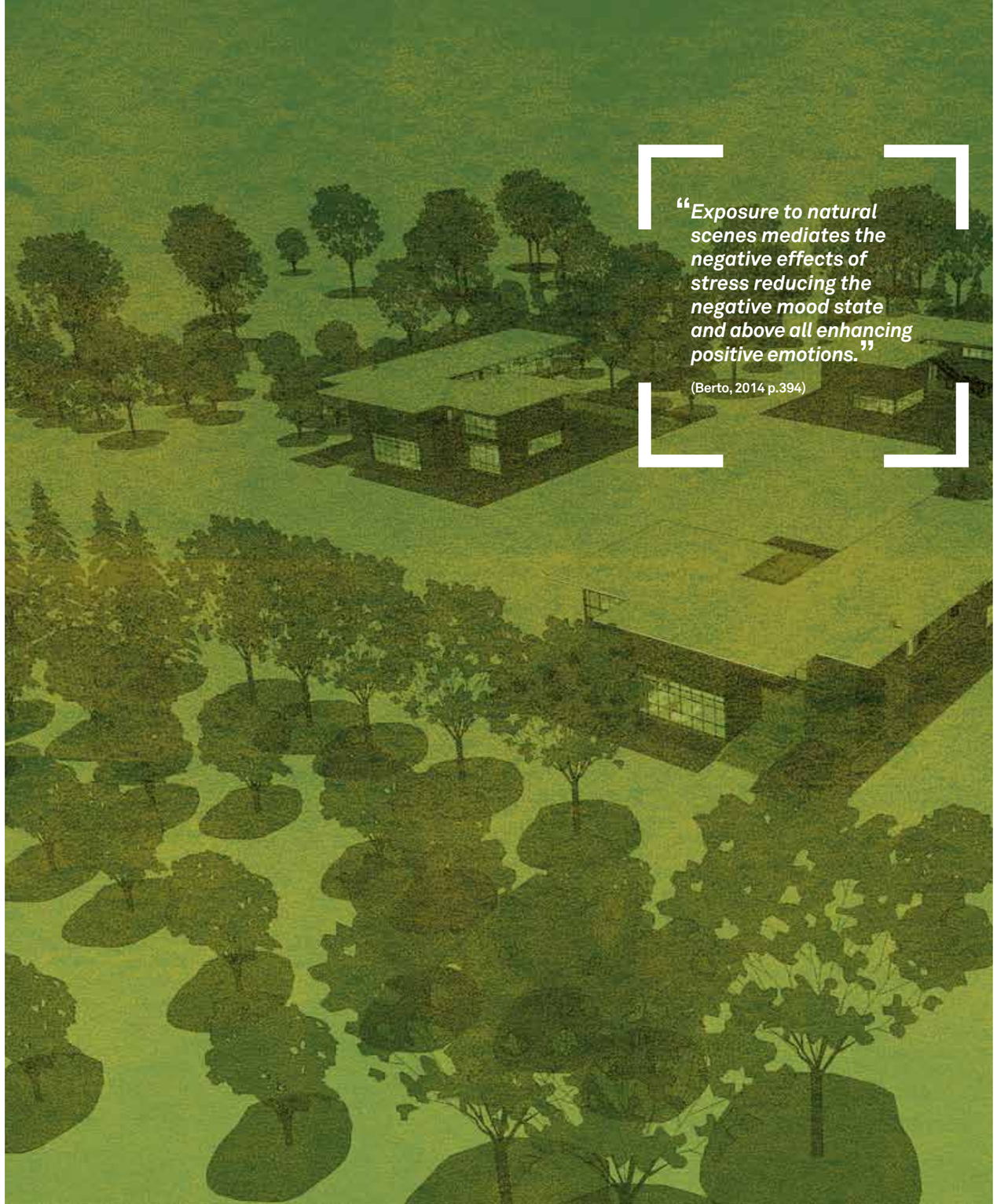
Associations between natural environments and mental health or well-being are well-established and research findings suggest that exposure to nature can provide restorative health benefits through mediating psychological and physiological stress (Berto, 2014).

The concept of biophilia suggests that contact with nature and other forms of life is an innate human need (Wilson, 1984) and it is proposed that human affinity with nature is associated with an evolutionary dependence on the natural landscape to provide essential resources for survival, including sunlight, water, food and shelter (Heerwagen, 2009).

Within an evolutionary perspective, the principles of Stress Recovery Theory (SRT) (Ulrich, 1983) suggest that humans have a pre-disposition towards natural environments and it is proposed that non-threatening natural spaces are able to engender positive feelings and increase perceptions of well-being through reducing stress and physiological arousal.

The principles of Attention Restoration Theory (ART) (Kaplan, 1995) suggest that humans have limited capacity to sustain 'directed attention' over time, however, this may be restored by spending time in natural settings. Within this theoretical framework it is argued that natural environments can provide a form of 'soft fascination' which activates involuntary attention processes, such that limited demands are placed on directed or voluntary attention to facilitate restoration from mental fatigue.

Within the context of increasing global urbanisation, the amount of time which people may typically spend within natural environments is decreasing (Turner, Nakamura, & Dinetti, 2004) and research findings suggest that reduced contact with nature may in turn be associated with an increase in mental health difficulties (Bratman, Hamilton, & Daily, 2012). Access to natural environments may therefore promote mental health and well-being and a study undertaken with people living within deprived urban



> *"Exposure to natural scenes mediates the negative effects of stress reducing the negative mood state and above all enhancing positive emotions."*
>
> (Berto, 2014 p.394)

Nature and Vitality

communities found a significant relationship between greater exposure to green space close to home and less stress (Ward Thompson et al., 2012).

A systematic literature review undertaken by McCormick (2017) also found an association between access to green space and improved mental well-being, cognitive development and overall health in children. The findings indicate that the benefits of access to green space for children may include moderating the impact of stress, promoting attention restoration and reducing inattention or hyperactivity in children with a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD).

The findings of a study combining smart phone questionnaires with global positioning system (GPS) technology to explore connections between participants' perceptions of subjective well-being and geographical location also suggest that people may be significantly happier in natural environments than in urban settings (MacKerron & Mourato, 2013).

Research suggests that contact with nature may offer an affordable, accessible and effective means of public health promotion and that natural environments, including parks and nature reserves, may be viewed as vital health resources which are able to promote mental health and well-being in general populations through providing access to nature (Maller, Townsend, Pryor, Brown, & St Leger, 2006).

A body of literature indicates that natural settings can constitute health-promoting or restorative environments (Berto, 2014; Kaplan, 1995) and studies suggest that contact with nature may contribute to reducing stress (McCormick, 2017; Ward Thompson et al., 2012), alongside enhancing perceptions of happiness (MacKerron & Mourato, 2013).

Therapeutic nature

The therapeutic role of natural landscapes has a long history within mental healthcare and key principles of asylum design during the 19th century centred on facilitating interaction between people and nature to promote well-being (Hickman, 2009).

At the end of the 18th century, the moral treatment approach pioneered at the York Retreat by the Tuke family aimed to provide humanitarian care within carefully designed environments for people experiencing mental distress (Hickman, 2014). The idea that the physicality of an institution in itself could possess therapeutic potential was integral to moral treatment ideology and the design of the external landscape was considered to be as important as the architecture (du Plessis, 2012).

> *"Employment… and recreation in the open air, are most advantageous as they tend… to occupy the mind… and promote a healthy state of the natural functions."*
>
> (Lunacy Commissioners, 1847, cited in Hickman, 2014 p.507)

Alongside minimising use of physical restraint, a key aspect of the approach focused on active therapy and meaningful pursuits including farming, gardening and walking were encouraged to promote engagement with nature and the seasonal cycle. Landscapes were therefore designed not solely for their appearance, but also to play an active therapeutic role in treatment, with objectives including reducing isolation by bringing people together in large open spaces (du Plessis, 2012).

Outdoor areas typically included ornamental gardens, airing courts, orchards and agricultural plots, in addition to recreational grounds for sports and lawn games including cricket, croquet and bowls (Collins, Avey, & Lekkas, 2016). Outdoor recreation and sporting activities were believed to possess social therapeutic value and the potential to create a sense of social connection amongst residents and staff (Cherry & Munting, 2005).

Consideration was also given to the therapeutic potential of passive engagement with nature through viewing natural landscapes and asylum buildings were commonly located in countryside locations and situated on hills to allow views of the adjacent scenery. Features of airing courts typically included perimeter ha-ha walls to restrict movement whilst maintaining views (du Plessis, 2012), or raised central mounds to allow views of the landscape beyond the surrounding walls (Hickman, 2009).

More recently studies within healthcare contexts have empirically examined the restorative effects of viewing nature (Ulrich et al., 2008) and research suggests that providing views of natural scenery through windows can lead to reductions in service user stress (Ulrich, Zimring, Quan, & Joseph, 2006), reductions in recovery time (Ulrich, 1984) and increased perceptions of connections with life outside hospital (Douglas & Douglas, 2005; Lawson, Phiri, & Wells-Thorpe, 2003).

Whilst 20th century developments including de-institutionalisation, community care and psychopharmacology contributed to a reduced focus on the therapeutic role of natural environments in mental healthcare, the more recent renewed interest in the restorative potential of nature within the concept of therapeutic landscapes (Gesler, Bell, Curtis, Hubbard, & Francis, 2004) suggests that a re-examination of asylum landscapes may be relevant today (Collins et al., 2016).

The nature of trees

A body of research examining the psychological and physiological impact of spending time in forests has been undertaken in Japan, where the term 'Shinrin-yoku', describes the popular practice of 'taking in the forest atmosphere' or 'forest bathing' to promote relaxation and reduce stress (Tsunetsugu, Park, & Miyazaki, 2010).

A survey undertaken by Morita et al. (2007) with 498 participants examined the psychological effects of forest bathing and found that self-rated measures of mood, including levels of hostility, depression and liveliness were significantly improved when participants visited forests, when compared with control days when no visits were made. Whilst the extent of effect was not linked with length of stay in the forest, the magnitude of effect was found to be associated with self-rated levels of psychological stress, such that people reporting the greatest levels of stress experienced greater effects.

The impact of forest walking on sleep quality for people experiencing sleep disturbance was examined in a study by Morita et al. (2011) in which 71 participants undertook a two-hour forest walk in either the morning or afternoon on eight occasions. Participants completed a questionnaire to compare their perceived sleep quality on the nights before and after each walk and actigraph data were also collected to measure sleep patterns. Forest walking was found to improve night time sleep conditions, including actual sleep time, immobile minutes and self-rated depth and quality of sleep.

> *"Two hours of forest walking improved sleep characteristics; impacting actual sleep time, immobile minutes, self-rated depth of sleep, and sleep quality."*
>
> (Morita et al., 2011 p.1)

The findings suggest that such improvements in sleep quality may result from both the exercise involved and the effects of forest walking on emotional well-being, including reduced anxiety. The effect of forest walking on sleep duration was also found to be greater following afternoon walks when compared with walking in the morning.

In a study with 30 older women patients Matsunaga et al. (2011) examined the physiologically relaxing effects of a forest created on the rooftop of a Japanese hospital. Participants each spent 12 minutes in either the rooftop forest or an outdoor carpark which formed a control setting. Heart rate variability (HRV) was measured as an indicator of physiological state and the findings indicated that the forest environment induced a physiologically relaxed state in participants. Within the forest condition, the parasympathetic nervous system, responsible for the body's 'rest and digest' processes was found to be more active and the sympathetic nervous system, responsible for 'fight or flight' mechanisms was less active.

The multi-sensorial experience of forest bathing is highlighted in a series of studies by Li (2010) who found that the inhalation of phytoncides (wood essential oils) had a positive impact on participants' immune system by enhancing natural killer (NK) cell activity following a three day forest visit. Blood tests also indicated that increased NK activity was maintained for over 30 days following the trips and by contrast, NK activity was not increased by a three day tourist visit to an urban environment. Although a significant decrease in participants' urinary adrenaline levels was also associated with the forest visits, there was no effect following the city visits, suggesting that participants were under lower stress whilst forest bathing.

Study findings suggest that spending time in forests can benefit both physiological and psychological health, including reducing levels of stress, depression and anxiety, improving sleep quality and promoting immune system activity (Morita et al., 2007, 2011; Tsunetsugu et al., 2010). Simply providing views of trees through the windows of healthcare environments may also improve health outcomes, including reductions in length of stay and pain-killing medication following surgery (Ulrich, 1984).

Active in nature

Ecotherapy as an overview term describes various therapeutic practices including horticultural therapy, wilderness adventure and animal-assisted therapy which are designed to promote well-being and strengthen a sense of connection with the natural environment (Chalquist, 2009).

Nature-based interventions provided in conjunction with healthcare providers to improve mental and physical health may also be described collectively as 'green care' services' and therapeutic activities may typically involve recreational or work-related activity with gardens, plants, animals and natural landscapes, including farms (Berget & Ekeberg, 2008).

> *"Animals are not that complicated to be together with, whereas being together with other people easily can be too complicated."*
>
> [Participant] (Granerud & Eriksson, 2014 p.325)

Granerud and Eriksson (2014) examined the impact of green care services in a study examining accounts of participating in farm work by people with lived experience of enduring mental distress. The findings suggested that working in a social context within natural environments and working with animals increased perceptions of personal growth and meaning in life. Participants perceived value in the uncomplicated nature of being with animals and taking responsibility for animal welfare contributed to a positive sense of mastering new skills and providing care for others. It was also found that physical tiredness resulting from farm work contributed to a sense of satisfaction and aided relaxation.

Ninety people with lived experience of mental distress participated in research undertaken by Berget, Ekeberg and Braastad (2008) to examine the effect of an animal-assisted therapy (AAT) intervention on perceptions of self-efficacy, coping ability and quality of life. Participants undertaking ATT worked with farm animals for three hours twice a week, whilst a control group received standard therapy as per usual treatment. Whilst no changes in quality of life were found, the results of questionnaire measures indicated a significant increase in self-efficacy ratings at six-month follow-up for the ATT intervention group only when compared with levels at the start and the end of the intervention. Participants experiencing the highest increase in self-efficacy measures during the ATT intervention also reported the greatest perceived increase in coping ability.

A pilot study undertaken by Kam and Siu (2010) examined the effects of a horticultural activity programme for people with lived experience of severe mental distress. Whilst the two week intervention had no significant impact on measures of work behaviour or quality of life, the findings indicated a significant decrease in self-reported levels of depression, anxiety and stress for participants undertaking the horticultural activity when compared with the control group. Qualitative data findings indicated that whilst fatigue and tiredness were commonly expressed as adverse effects of participating, the perceived benefits included extending social networks, gaining new skills, increasing connections with nature, reducing work stress and increasing motivation for work.

Barton and Pretty (2010) produced a multi-study analysis of research examining the therapeutic value of physical activity undertaken within nature and assessed the optimum amount of 'green exercise' exposure for improving mood and self-esteem. Physical activity undertaken within all the natural environments included was found to improve mood and perceived levels of self-esteem, with greater effects being produced in settings where water was also present. People experiencing mental distress were also found to perceive the greatest improvements in self-esteem following physical activity in natural environments.

Research indicates that physical activity in nature including ecotherapy practices can promote psychological well-being (Barton & Pretty, 2010; Mind, 2013) and studies suggest that benefits of gardening interventions for people experiencing mental distress can include significant reductions in the symptoms of anxiety and depression (Clatworthy, Hinds, & Camic, 2013; Kam & Siu, 2010) and improvements in perceived quality of life (Perrins-Margalis, Rugletic, Schepis, Stepanski, & Walsh, 2000).

Wild in nature

A range of terms including wilderness therapy, wilderness adventure therapy, adventure therapy and bush adventure therapy are used to describe camping and outdoor adventure programmes to promote health and provide therapeutic contact with nature through social and experiential outdoor activities (Bowen, Neill, & Crisp, 2016; Pryor, Townsend, Maller, & Field, 2006).

Wilderness therapy is an expanding area of mental healthcare for young people and research by Tucker, Norton, DeMille and Hobson (2016) examined its impact on both mental and physical health outcomes for 516 adolescent mental health service users participating in a rolling wilderness expedition programme over a two-year period.

The average length of stay was 79.8 days and the programme's primary physical activity involved hiking whereby the group moved nomadically without a base camp. Participants' body mass index (BMI) groupings ranged between underweight, normal weight, overweight or obese and the findings of pre-to-post evaluation measures indicated that alongside experiencing significant improvements in mental health, on average participants also progressed to a more healthy BMI and weight or maintained a healthy level.

Moxham, Liersch-Sumskis, Taylor, Patterson and Brighton (2015) undertook a five-day pilot camp intervention in the Australian bush with twenty-seven people aged between 21 and 71 years with lived experience of mental distress including diagnoses of schizophrenia, PTSD, anxiety and depression. Camp activities included shared meals and daily tai chi, alongside a range of physically and mentally stimulating outdoor experiences, defined as 'challenge-by-choice' therapeutic recreation.

Participants identified their expectations of the camp prior to taking part and afterwards evaluated the extent to which expectations were met. Satisfaction was expressed in areas including, connecting with nature, embracing new challenges, breaking routines, increasing sleep quality, having fun and meeting new people. Whilst expectations for recreation

> *"The camp has made a big difference in my life in the way of making me realise that I can meet challenges and overcome fears to a greater degree."*
>
> [Camp participant]
> (Moxham et al., 2015 p.71)

experiences to be de-stressing, relaxing or confidence-building were less fulfilled for some participants, the pilot camp was perceived to be successful overall. Only 5.63% of participants' expectations were evaluated as being not met or strongly not met and the majority were felt to have been met, strongly met, or completely met.

Cotton and Butselaar (2013) undertook research with 108 mental health service users who participated in social recreational activity as part of a four-day outdoor adventure programme provided across twelve separate camps. Qualitative data findings indicated that all activities offered were positively rated by participants and the more challenging activities received the highest ratings.

Whilst the findings of survey measures demonstrated significant improvements in participants' self-reported levels of mastery, self-esteem and social connectedness from a pre-camp baseline to the end of the camp, these improvements were not sustained at the four week follow-up. It is suggested that the lack of sustained improvement may reflect the limited duration of the programme and that post-camp provision of regular activities or support groups might maintain positive outcomes and promote social connection.

Research findings suggest that outdoor adventure activity for people with lived experience of mental distress may lead to positive outcomes including improved quality of sleep (Moxham et al., 2015) alongside increased perceptions of self-esteem and social connectivity (Cotton & Butselaar, 2013). Benefits of wilderness therapy for adolescents may also include reductions in mental distress and increases to overall functioning (Norton, 2010; Norton et al., 2014), in addition to improvements in physical health (Tucker et al., 2016).

Healing with Nature

Healing with nature

Alongside the physical and psychological health benefits of being active within nature (Mind, 2013), research suggests that simply spending time in natural spaces and gardens within healthcare settings can promote positive health outcomes including reduced stress amongst service users, staff and visitors (Ulrich, Zimring, Quan, & Joseph, 2006).

Stigsdotter and Grahn (2002) propose that whilst gardens can offer individuals a passive therapeutic experience, healing gardens should be designed not simply to be observed, but should communicate with the visitor via all the senses. It is also suggested that different aspects of gardens place varying levels of demands on visitors according to their state of mental well-being, such that the design of gardens as accessible healing resources for all should offer a variety of atmospheres and experiences.

Design recommendations for gardens and outdoor spaces based on research across healthcare settings include incorporating features such as transitional spaces between internal and external areas, shelter to allow use across the seasons, varied seating types and sensory elements including plants to attract insects and birds (Shukor, Stigsdotter, & Nilsson, 2012).

Shepley et al., (2016) examined aspects of inpatient mental health environments which may impact positively on service users or staff and the research findings highlight the significance of providing access to outdoor spaces with multiple therapeutic functions, including gardens, vegetable plots and sports facilities. A separate study examining visitors' perceptions of a new inpatient mental healthcare facility also found that gardens afforded tranquil meeting spaces, particularly when contrasted with the indoor spaces which were felt to lack privacy and where ambient noise levels were perceived to be uncomfortable (Wood et al., 2013).

Butterfield and Martin (2016) highlight the strong interaction between indoor and outdoor spaces which is typically manifest in the design of Maggie's Cancer Care Centres where both the architecture and gardens are considered with equal care to create an integrated therapeutic landscape. Whilst each centre is built to a unique design, common principles include the domestic scale of the architecture and a welcoming kitchen space, typically with direct garden access. Findings of research undertaken with visitors, volunteers and staff at several Maggie's Centres suggest the garden spaces to be especially valued and able to afford places of sociability, alongside spaces of sanctuary for emotional retreat and reflection.

> *"...The grounds in the new hospital are beautiful, the gardens are all lovely, I don't think there was anything else you could do to make it more relaxed..."*
>
> [Carer] (Wood et al., 2013, p.127)

A review of research examining the effect of passive interaction with indoor plants on psychological functioning undertaken by Bringslimark, Hartig and Patil (2009) found that flowering plants may have greater impact than foliage plants on stress reduction, pain tolerance and perceptions of the attractiveness of a room.

Findings including improvements in pain management in the presence of indoor plants were repeated across the literature, however, overall the review findings were mixed, which related in part to differences in experimental processes, implying that further research may be required to support suggestions that indoor plants can produce positive psychological change.

Research evaluating the impact of plants and garden spaces within healthcare environments and therapeutic spaces suggests that carefully designed gardens and outdoor spaces can offer supportive multi-sensory environments and afford diverse therapeutic experiences to suit visitors' needs (Iyendo, Uwajeh, & Ikenna, 2016; Shukor et al., 2012; Stigsdotter & Grahn, 2002).

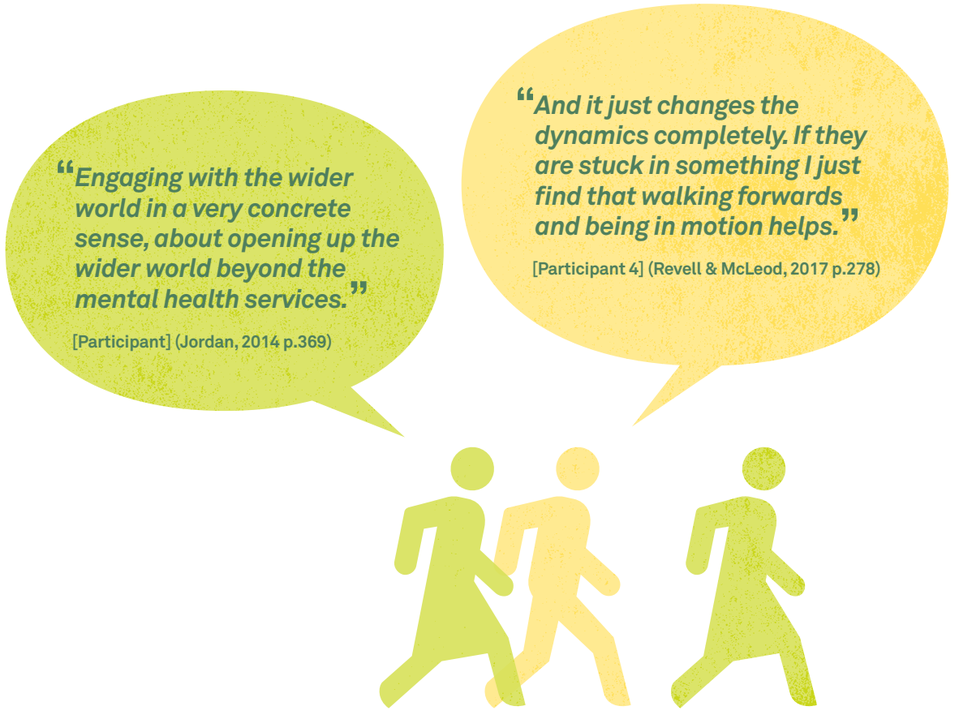
Walking in nature

Outdoor exercise in natural environments may be helpful to people experiencing mental distress and potential benefits may include increased mood or levels of self-esteem (Barton & Pretty, 2010), alongside reduced stress and increased social connectivity (Mind, 2013).

As a form of exercise which may be undertaken at no cost in a variety of settings, walking can be a widely accessible activity and research findings suggest that structured programmes of physical activity in groups, particularly walking, may be effective treatment for people with lived experience of mental distress (Richardson et al., 2005).

In a longitudinal study with 1516 participants, Marselle, Irvine and Warber (2014) examined the impact of group walking in nature on participants' mental health and well-being. The findings of questionnaire measures indicated that people participating in group nature walks reported significantly less depression, negative mood or perceived stress and significantly greater mental well-being, when compared with people who did not take part. It is therefore suggested that group walking programmes in local natural environments may contribute to public and individual health, with benefits including reduced stress and improved emotional well-being.

Although there are limited studies examining counselling and psychotherapeutic activity undertaken in outdoor environments, recent decades have seen increasing interest in this emerging area of therapeutic practice. Whilst different terms are used to describe the approach, 'walk and talk' may be used as a broad term to describe therapeutic practices in which clients and therapists walk outdoors together during a therapy session (Doucette, 2004; Revell & McLeod, 2017).



Doucette (2004) examined the effect of a six-week walk and talk therapy programme on eight adolescent clients and undertook interviews with participants before and after taking part in the intervention. The findings suggest that the benefits of participating in a walk and talk programme included increased perceptions of self-efficacy and overall well-being. Participants also perceived the impact of talking therapy to be enhanced by walking outdoors and that exercise provided a sense of physical release.

Revell and McLeod (2017) examined therapists' perceptions of undertaking therapy sessions outdoors and highlight that the traditional dynamics of therapeutic relationships are adjusted when therapists and clients walk and talk together side by side.

Participant accounts suggest that therapeutic activity and physical movement through outdoor environments may help to integrate mind and body activity, alongside promoting therapeutic movement and facilitating different perspectives.

In a study with counsellors and psychotherapists working in natural outdoor settings, Jordan (2014) found participants perceived that walk and talk practices could help strengthen a sense of connection between well-being and the natural environment and assist clients to develop individual connections with nature to support their well-being.

Research suggests that walking outdoors in natural settings can have psychological and physical health benefits for people with lived experience of mental distress (Mind, 2013) and whilst research examining outdoor walk and talk therapy is limited, studies suggest that therapeutic activity undertaken outdoors may improve individuals' perceptions of self-efficacy and overall well-being (Doucette, 2004).

The nature of water

Since ancient times, the healing and restorative properties of water have been acknowledged across different cultures and natural water sources including mineral and thermal springs have been used therapeutically with reputed benefits to physical and mental health (van Tubergen & van der Linden, 2002).

Studies examining more recent therapeutic uses of water and bathing include research undertaken by Blasche, Leibetseder and Marktl (2010) to evaluate the effects of a three week spa therapy programme on the health of 65 people recovering from occupational burn-out and exhaustion.

During the resort-based treatment participants undertook several therapeutic activities per day, including balneotherapy (treatment involving mineral water bathing), massage therapy and exercise in water. Questionnaire measures of participants' levels of fatigue, distress, reduced motivation and sleep quality taken following the programme were significantly improved in each area when compared to pre-treatment levels and the improvements were sustained at three months post-treatment.

Toda, Morimoto, Nagasawa and Kitamura (2006) examined the impact of spa bathing on stress and participants' salivary levels of cortisol and chromogranin A (CgA) were measured as markers of physiological stress before and after bathing in a mineral spa. Following an hour of bathing participants' salivary cortisol levels were significantly reduced when compared with the non-bathing control condition in which there was no change in cortisol or CgA levels. Cortisol level reduction was found to be more pronounced in people experiencing the greatest levels of stress and levels of self-reported stress were also significantly reduced following spa bathing.

Outdoor blue spaces may typically include the sea, rivers, streams or lakes and the concept of 'healthy blue space' may be defined as; 'health-enabling places and spaces, where water is at the centre of a range of environments with identifiable potential for the promotion of human well-being' (Foley & Kistemann, 2015 p.158). Whilst an expanding body of research suggests that natural environments may promote health, studies have typically examined the impact of green spaces and fewer studies have focused on the impact of water or blue spaces (Gascon, Wilma, Vert, White, & Nieuwenhuijsen, 2017; Völker & Kistemann, 2011).

Gascon et al. (2017) undertook a systematic review of research evidence to examine the effect of blue spaces on health and well-being. Whilst the findings indicated a positive association between exposure to outdoor blue spaces and benefits to mental health, it is suggested that further studies including longitudinal research are required to provide better understanding of any causal connections between blue space and health.

Research with participants living in a capital city undertaken by Nutsford, Pearson, Kingham and Reitsma (2016) found exposure to visible blue spaces to be associated with lower levels of psychological distress. Proximity to blue space has also been found to have a significant effect on mood and levels of self-esteem, particularly in people with lived experience of mental distress (Barton & Pretty, 2010).

Although studies within the emerging field of research examining the impact of healthy blue spaces are limited and further research is required, existing findings suggest that exposure to healthy blue spaces and activities involving water may be of benefit to mental health and well-being (Barton & Pretty, 2010; Foley & Kistemann, 2015; Gascon et al., 2017).

The Nature of Water

> *"Natural light should be incorporated into lighting design in healthcare settings, not only because it is beneficial to patients and staff, but also because it is… in a form that most people prefer."*
>
> (Joseph, 2006 p.1)

Designing with nature

Whilst healthcare environments may typically be perceived as clinical or detached from nature, studies have examined the ways in which spaces that promote exposure to natural elements and materials may impact on the health and well-being of service users, staff and visitors (Iyendo, Uwajeh, & Ikenna, 2016).

Within hospital environments, exposure to sunlight and fresh air may assist with infection control (Hobday & Dancer, 2013) and research findings suggest that further benefits of exposure to daylight in healthcare settings may include improved sleep quality or mood and reduced length of stay (Joseph, 2006).

A study undertaken by Beauchemin and Hays (1996) examined the impact of sunlight on length of stay in a psychiatric unit for people with a diagnosis of depression and reported a significantly shorter average length of stay for people whose bedrooms were sunny compared with those in dull rooms. Similarly, Benedetti, Colombo, Barbini, Campori and Smeraldi (2001) found a 3.67 day reduction in mean length of stay in hospital for people with a diagnosis of bipolar disorder occupying East-facing bedrooms with direct morning sunlight.

Research comparing the effects of morning or evening bright light treatment on measures of depression for people with a diagnosis of seasonal affective disorder undertaken by Lewy et al. (1998) found the effect of exposure to morning light to be at least twice as effective in reducing depression as evening light treatment. The findings of studies examining the impact of light quality on outcomes in healthcare settings are reflected in design recommendations proposed by Joseph (2006) which include orienting bedroom windows to optimise exposure to early morning sun and making provisions within bedrooms to facilitate temperature and glare control.

The potential impact of interior finishes on health outcomes is highlighted by Sakuragawa, Miyazaki, Kaneko and Makita (2005) in a study examining the visual effect of timber wall panels on participants' physiological and psychological responses when compared with white steel panels.

It was found that perceptions of depression or dejection were reduced in response to viewing the timber panels, but increased by the steel panels, which were also found to generate stress and increase blood pressure in people who disliked them. Although a significant decrease in blood pressure was measured in people who liked the timber panels, no significant increase was found in those who disliked them.

Zhang, Lian and Wu (2017) used a series of physiological measures to evaluate participants' responses to rooms clad with varying extents of timber and different timber tones, when compared to white-painted rooms with no timber panels. Following exposure to each environment, measures of participants' mean blood pressure and heart rate variability were found to be lower in the timber rooms than the white-painted rooms, suggesting that people experienced less stress and tension within the timber spaces.

Although research examining the impact of natural features within mental healthcare environments is limited, research findings suggest that design which promotes exposure to natural elements may be associated with positive health outcomes including improved mood and reduced length of stay (Iyendo et al., 2016; Joseph, 2006).

A sense of nature

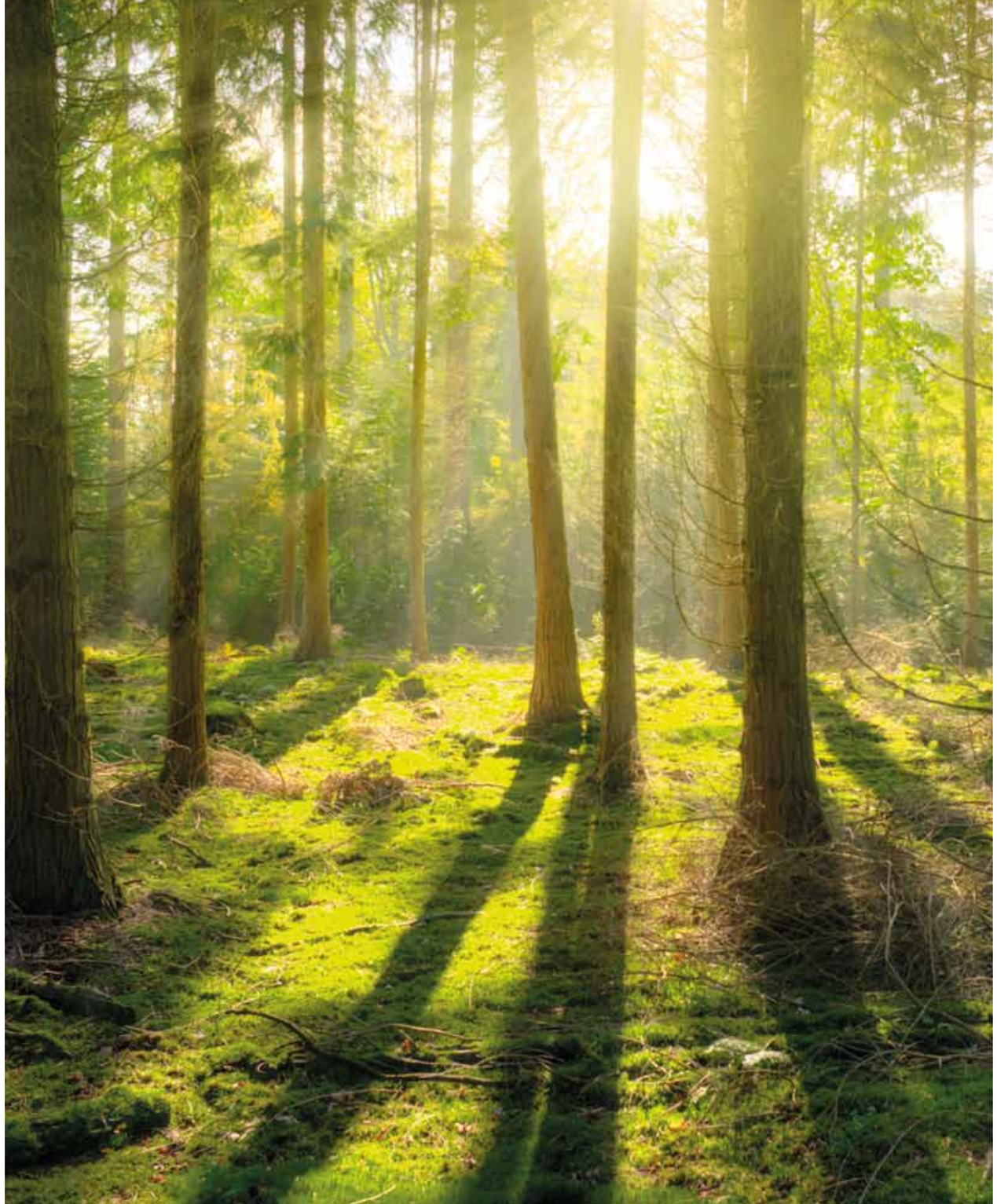
Research indicates that the visual experience of natural environments may be associated with physiological and psychological health benefits (Ulrich, 1984) and studies have also examined how the multi-sensorial qualities of nature, including natural sounds and smells may impact on health and well-being (Iyendo, Uwajeh, & Ikenna, 2016; Ulrich et al., 2008).

The findings of a literature review examining the effect of sound and music within healthcare settings suggest that natural sounds, including flowing water and bird song can promote restoration and reduce stress and anxiety (Iyendo, 2016). Research also indicates that exposure to natural sounds, when compared with noisy urban sounds, may promote quicker recovery from activity within the sympathetic nervous system prompted by psychological stress (Alvarsson, Wiens, & Nilsson, 2010).

Descriptions of natural settings perceived to possess a restorative quality following imagined stress or exhaustion were provided by participants in a study by Ratcliffe, Gatersleben and Sowden (2013) and participant accounts made reference to the restorative potential of natural sounds. Birdsong comprised 35% of the natural sounds discussed and was mentioned most frequently in relation to perceptions of recovery from imagined stress, followed by water sounds. In general birdsong was described in positive terms and perceived to have restorative potential, although bird sounds associated with threat or aggression were perceived less positively and less likely to promote health restoration.

The tactile effect of materials on human responses is highlighted by Sakuragawa, Kaneko and Miyazaki (2008) in research examining participants' physiological and subjective reactions to touching samples of timber, aluminium and acrylic stored at different temperatures. Sensations described as coarse and natural arose from contact with timber at room temperature or cooled timber and there was no associated increase in blood pressure in either condition.

In contrast, contact with aluminium at room temperature and cooled acrylic created sensations described as flat, artificial, dangerous or uncomfortable and was associated with a significant increase in blood pressure, implying a close



> *"Well, it's so tuneful. It starts to make you think about music and how music is put together. I don't know, I just like the sound of birds singing… Makes me feel happy, I suppose."*
>
> [Participant] (Ratcliffe et al., 2013 p.224)

association between people's subjective evaluation and physical response.

Perry and Perry (2006) highlight that natural essential oils have long been used for therapeutic purposes with various reputed physical and mental health benefits. Whilst empirical research examining the effect of aromatherapy in the management of psychological distress is limited, the authors' review of existing studies concludes that aromatherapy practices may provide a potentially effective treatment for a range of mental distress.

Fismer and Pilkington (2012) undertook a systematic review to examine the effect of inhaling lavender oil aroma on sleep. Whilst methodological inadequacies suggest that the findings should be reviewed with caution, the review concluded that lavender oil aroma may have a small to moderate effect on improving sleep. Research also suggests that the aroma of lavender oil may have a stress-relieving effect (Toda & Morimoto, 2008).

Whilst research examining associations between nature and health may commonly focus on the visual experience of nature, research findings suggest that experiencing the multi-sensorial qualities of nature and natural environments or materials may promote mental and physical health (Iyendo et al., 2016).

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Design With People in Mind

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