

The seven heresies of Asclepius

How environmental and social context shapes health and well-being

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Well-being in modern societies

Asclepius was the Greek god of healing and medicine. From the 6th century BCE, some 800 Asclepian healing temples were built across the eastern and central Mediterranean. Typically, these were situated far from settlements on hilltops and promontories overlooking the sea, such as at Epidaurus, Pergamon and Kos, where light was multidirectional from sky and water, winds plentiful, and aromatics from pine forests and thyme-rich garrigue filled the air. At that time, it was assumed that well-being emerged from natural places (Hart, 1965; Gesler, 1993; Koenig, 2000). It is now increasingly being recognised that the natural and social context of individuals is a key determinant of well-being, providing protection against stressors and improving resilience and recovery (Sternberg, 2009; NEA, 2011).

The past century has seen great advances in health care and treatment. Mortality rates have fallen in most countries, and average lifespans are extending. Since the mid-1960s, mean life expectancy worldwide has risen from 56.0 to 70.4 years, and under-5 mortality has fallen sharply from 153 to 52 per 1000 live births; in the UK, under-5 mortality has fallen from 22 to 5 per 1000 (UNICEF, 2012). Over the same period, however, a new wave of health and well-being problems in modern societies has emerged largely as a result of changing lifestyles and the environments that shape these lifestyles (CMO, 2013).

Affluent societies are characterised by high levels of material consumption, abundant food and calories, a lower incidence of regular physical activity (increased sedentariness), a shifting demographic with a growing proportion of elderly people with care needs and often lacking social support, fractured community and family structures, growing inequality, fewer pro-social behaviours, and unchanged levels of average life satisfaction (Hossain et al., 2007; Pretty et al., 2015). Some of these find expression in the fast-increasing incidence of obesity, type 2 diabetes, mental ill-health, dementias, some cancers, and cardiovascular disease (Hossain et al., 2007). Mental disorders now account for a large proportion of the disease burden in many countries, affecting 13–20 per cent of 12–24 year olds in most industrialised countries (Patel et al., 2007), though it is important to note that perceptions of what constitutes mental ill-health have changed over the decades

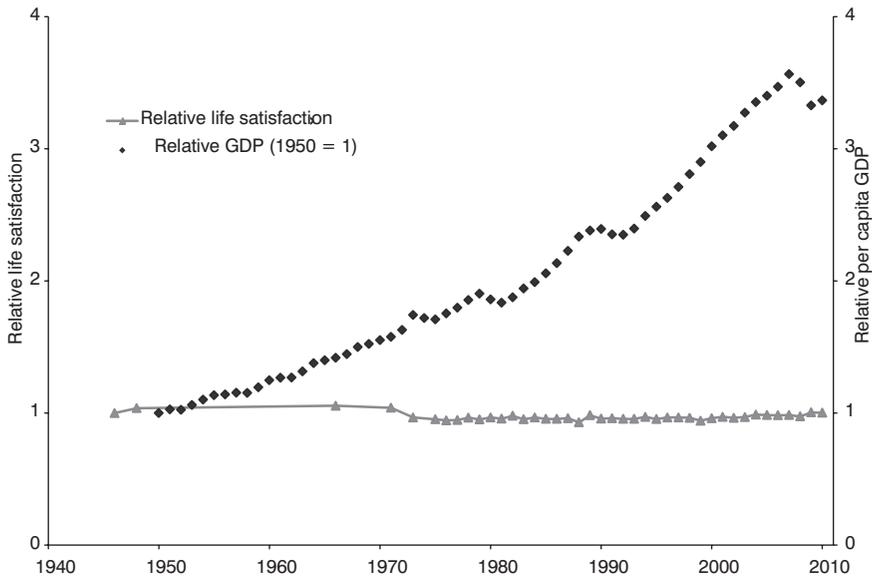


Figure 1.1 Changes in per capita GDP and life satisfaction, UK (1946–2011) (Pretty, 2013)

(Phelan et al., 2000). Communities and indeed whole countries have become wealthier, yet increased material consumption has displaced important protective life choices and behaviours that are in turn partly conditioned by policy and markets (Layard, 2006; Royal Society, 2012).

It is now clear that continuing increases in GDP in affluent countries have not been associated with increases in well-being (Royal Society, 2012; Pretty, 2013). Latitudinal analyses across countries show a characteristic consumption cliff and affluent uplands shape: at low per capita GDP, well-being increases with rising GDP; after a threshold, well-being is largely independent of GDP across the affluent uplands (Figure 1.1). More surprisingly, longitudinal analyses over 50–60 years show that well-being in already affluent countries has remained resolutely stable even though per capita GDP has risen (e.g. between 3 and 8 fold in the UK, USA and Japan) (Figure 1.2).

Despite the apparent lack of well-being dividend once countries have become affluent by GDP or other consumption measures, consumption patterns in many countries continue to converge on those of the richest. As the poorer take similar choices, seeking to use natural capital and environmental services in similarly damaging ways, so pressure on both natural and social systems grows (MEA, 2005; NEA, 2011).

Previous research has shown that the factors of consumption between different country groups are still substantially different (Table 1.1). Vehicle ownership in the Affluent North America-Europe-Oceania countries is 91 times greater than in the poorest countries, and in Affluent Asia 54 times greater than

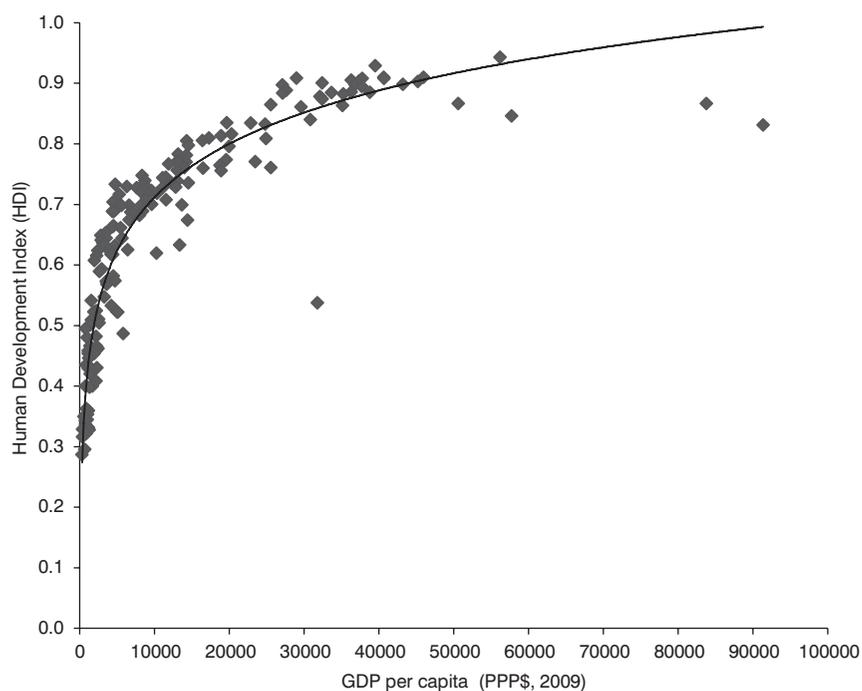


Figure 1.2 Relationship between GDP and HDI at country level (n=173) (Pretty, 2013)

Table 1.1 Factors of consumption from poorest to fast developing and most affluent countries

Consumption metrics	Poorest to Affluent North America–Europe–Oceania	Poorest to Affluent Asia	Fast developing (BRICs and CIVETS) to Affluent North America–Europe–Oceania	Fast developing (BRICs and CIVETS) to Affluent Asia
Motor vehicles	91.4×	54.3×	5.3×	3.2×
Domestic water	28.5×	16.6×	2.3×	1.4×
CO ₂ emissions	118.0×	90.0×	2.7×	2.1×
Oil consumption	38.0×	97.3×	3.9×	10.0×
Meat consumption	11.9×	4.8×	2.3×	1.3×

Note: BRICs are Brazil, Russia, India, China; CIVETS are Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa

Source: Pretty (2013)

the poorest. Oil consumption in the Affluent North America-Europe-Oceania countries is four times greater than in the fastest developing countries. With world population expected to rise by 2–3 billion from the current 7.5 billion by mid-century before stabilising (assuming low- to medium-fertility scenarios), this will add further to consumption.

The global metrics developed to demonstrate the impacts of human activities on finite Earth conclude that at current world population and existing levels of consumption, planetary overshoot has already occurred. These include the Human Development Index (UNDP), Genuine Progress Indicator (Daly and Cobb, 1989), Ecological Footprints using global hectare equivalents (WWF, 2012), the Happy Planet Index (NEF, 2013), and planetary boundaries (Rockstrom et al., 2009). Overshoot implies more resources are being used than can be regenerated each year. Climate change is likely to be one of the indicators of the negative side-effects of such consumption (IPCC, 2013). The Royal Society (2012) stated that indefinite growth is impossible in a finite world, yet conventional economic growth remains a primary goal in most countries. As a result, behaviours and policy choices that improve well-being and health tend to have been displaced, despite the fact that GDP continues to be used as a poor proxy for sustainable and equitable prosperity.

Tackling well-being and health challenges

The term ‘health’ is generally taken to incorporate physical health, mental or emotional health, social health, spiritual health, lifestyle and functionality. The World Health Organization (1948) definition of health remains the most widely cited and states that “health is a state of complete physical, mental and social (individual) well-being, and not merely the absence of disease or infirmity”. In a similar way, well-being is a positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity. It requires that basic needs are met, that individuals have a sense of purpose, that they feel able to achieve important personal goals and participate in society (Pencheon, 2012; ONS, 2013).

It is unlikely that apparently wealthy countries will have the financial capability to spend the necessary additional resources to solve the next wave of health problems brought about by high material consumption, unless new models of health and social care are developed. Jackson (2009) concluded that modern society has been “betrayed by affluence,” and Dasgupta (2010) observed that “the rogue word in GDP is gross,” as it does not deduct the costly depreciation of vital natural and social assets. A concept of the wealth of nations should include measures for natural capital, social capital and individual well-being. GDP currently does not (Pretty, 2013). This suggests the need to prioritise new interventions to improve well-being and health and combine these with existing medical treatments. Such interventions should focus on both direct treatment of individuals and the contextual conditioning brought about by social and natural environments. These external environments condition internal physiological, hormonal and neural pathways, which in turn directly influence well-being and health. In this way,

health is no longer described as simply a lack of disease, and highlights the need to revisit our (often contextual) framing of what it means to be healthy.

In the past two decades, a wide range of empirical evidence has emerged to show that well-being is improved by physical activity, diet and nutrition, direct engagement with nature and green places, attachments to people, attachments to personal possessions, the mind, and the fulfilment of values. The evidence has implications for the design of health and social care systems (models of care, hospitals and other health and care service buildings) transport policy, green space availability and use, food systems, social care policy and practice, the work place, leisure choices and child policy.

Evidence further suggests that there are substantial economic, financial and environmental gains to be made by adopting new interventions and choices (CMO, 2013). There remains, however, some scepticism and misunderstanding over both the evidence and its potentially powerful implications. Evidence to support seven interconnected themes of Asclepian healing is increasingly challenging some of the tenets of modern health care, the most powerful of which is that not all health care currently does good, and that much health care is important and needed largely because we have failed to create societies, cultures and economies that promote well-being.

Heresy I: Sensory inputs from natural places improve well-being

The natural environment provides important ecosystem services that underpin economies (MEA, 2005; NEA, 2011). It also provides health services (Pretty et al., 2011; Jackson et al., 2013). Ecosystems provide four generic health benefits i) direct positive effects on mental and physical health; ii) indirect positive effects by facilitating nature-based activity and social engagement (providing locations for contact with nature, physical activity and social engagement), all of which positively influence health, and catalysing behavioural change towards healthier lifestyles (improving life pathways, activity behaviour, consumption of healthy foods); iii) reducing the threats to health arising from pollution and disease vectors (through purification and control functions, such as local climate regulation, noise reduction, and scavenging of air pollutants), and iv) direct benefits to healthcare: e.g. most drugs can trace their origin back to natural products (from simple painkillers to complex anti-cancer drugs); and there are likely to be many more undiscovered therapies if we appreciate the important role of millions of years of evolution (e.g. through biomimicry).

Detailed scientific evidence has confirmed there are direct health benefits of light, colour, whole views, bird song and scents (Pretty et al., 2005; Joye et al., 2013; Ratcliffe et al., 2013). The view from the window enhances well-being and healing in hospitals and prisons (Moore, 1982; Ulrich, 1984), and views with natural elements (e.g. trees, green space, blue sky and water) have a positive effect while those with urban structures have a negative effect. Nature dominated

drives increase recovery from stress: commuters recover quicker from stress and reduce the likelihood of future stresses after nature-drives compared with urban-dominated drives. Urban areas with plentiful tree cover and green space have been shown to have children with a lower prevalence of asthma (though this may be because certain kinds of social groups are able to live in these areas), improved mental well-being, reductions in stress, positive effects on birth outcomes, lower morbidity, reduced cardiovascular disease (CVD) risk, greater longevity of the elderly and positive effects on cognitive function (Takano et al., 2002; Hartig, 2008; Lovasi et al., 2008; Mitchell and Popham, 2008; Park et al., 2008; Maas et al., 2009; Barton and Pretty, 2010; Bratman et al., 2012; Davvand et al., 2012). More green space results in healthier cortisol profiles; less green space typical of deprived communities produce higher stress and flattened cortisol profiles (indicating poorer capacity to recover from stress) and increased incidence of obesity (Lachowycz and Jones, 2011; Roe et al., 2013).

Further direct benefits arise from sunlight, which is important for vitamin D manufacture in the body, thus having a direct impact on health. Ultra violet B is absorbed by dehydrocholesterol in the skin, which is further converted to vitamin D3, and metabolised by the liver to a biologically active form. Lack of vitamin D causes rickets in children, cases of which in the UK rose from 147 in 1997 to 762 in 2010, as well as exacerbating osteoporosis and osteomalacia in adults. More recently it has been recognised that vitamin D deficiency is associated with increased risks of some cancers, CVD, multiple sclerosis, rheumatoid arthritis, and type 1 diabetes, with possible links to type 2 diabetes and schizophrenia, even though increased skin cancer incidence is related to too much exposure to sunlight (Kampman et al., 2007; Perrine et al., 2010; Juniper, 2013).

Heresy 2: Regular physical activity improves both mental and physical health

It is well-known that physical activity improves both mental and physical health (CDC, 1996; Foresight, 2007; DoH, 2009;). Physical inactivity results in 1.9 million deaths worldwide annually, roughly 1 in 25 of all deaths. Energy expenditure has fallen dramatically over the past half-century; pre-industrial people typically expended 1000 kcal on activity per day, whereas for moderns the average is only 300 kcal (Samson and Pretty, 2006). Inactivity increases the likelihood of obesity, and reduces life expectancy. Such physical inactivity is known to track from childhood, and is a key risk factor in many chronic diseases of later life (Wichstrom et al., 2013).

The costs of inactivity in the UK exceed £8.3 billion per year (NICE, 2009). In the UK alone, some 23 per cent of men and 26 per cent of women are sedentary. A 1 per cent reduction in inactivity (or a 1 per cent increase in activity), reduces morbidity by 15,000 cases and saves £1.4 billion. Never in human history have humans, as a species, moved bodies so far with so little physical effort. The benefits amount to £2420 per additionally active person per year (not including

the mental health benefits). In the USA, sedentary behaviour costs \$90 billion per year, and it is estimated that some 30,000 deaths could be prevented with adoption of regular physical activity (Brownson et al., 2005).

Ekblom-Bak et al. (2013) have coined the term *non-exercise physical activity* (NEPA) to draw attention to the health benefits of daily activities such as home repairs, cutting the lawn, car maintenance, bicycle rides, fishing and gathering mushrooms and berries: 60-year old Swedish men and women with high NEPA reduced the risk of first time CVD by 27 per cent and all-cause mortality by 30 per cent over a 12.5-year period. The term *green exercise* was coined to indicate the potentially synergistic well-being benefits arising from activity in green places (Pretty et al., 2005; Barton et al., 2009). A dose of nature (Barton and Pretty, 2010) has been shown to have an immediate positive effect on mental health for a wide range of activities (e.g. walking, angling, cycling, gardening), for all age groups, for men and women, for every green environment and habitat (with additional benefits from the presence of water), and for the already healthy and the mentally ill. Forest bathing (walking) in Japan reduces blood pressure and salivary cortisol, with greater benefits shown for the elderly and those already with high blood pressure and more stress markers (Li, this volume, pp. 79-89).

Green care arises from green exercise, and is the deliberate use of structured therapeutic programmes using walking, gardening and/or farming (Sempik and Bragg, this volume). It has been successfully applied for youth offenders, the self-declared mentally ill (e.g. *Mind* members), those suffering from dementias and post-traumatic stress (Mapes, this volume). In this way, attentiveness and mindfulness, outdoor activities and well-being can all be linked (Christie, 2013).

Heresy 3: The mind alone can improve well-being

The notion of the separate entities of mind and body has become outdated, as it is now clear that thought alone can cascade physiological pathways that influence well-being. There are two important evidence bases: from research on contemplation arising from mindfulness and prayer, and from research on the placebo effect.

Many philosophical, spiritual and psychological traditions emphasise the importance of the quality of consciousness on well-being. Mindfulness emphasises attentiveness to the present reality, with focused awareness providing heightened sensitivity, and is defined as paying attention in a particular way; on purpose, in the present moment and non-judgementally (Williams and Penman, 2011). It can be contrasted with states of mind in which attention is focused elsewhere, including preoccupation with plans or worries, and behaving automatically without ones actions. Such attentiveness may be external or internal, such as on breathing patterns. Mindfulness can be cultivated by practice, and has led to therapeutic uses through Mindfulness-Based Stress Reduction (MBSR) which has been effective with patients with anxiety or persistent pain (Nyklíček and Kuijpers, 2008; Shapiro

et al., 2008; Williams and Penman, 2011). In some contexts, mindfulness is used as a means to develop compassion for self and others, leading to observed reductions in stress and increases in quality of life. It has also been shown to increase enzyme activity that builds up telomeres, thus extending longevity (Jacobs et al., 2011).

A similar literature exists for prayer: the sending of prayer has no effect if the recipient does not know it is being practised; for those undertaking prayer it improves well-being (Dusek et al., 2002; Benson et al., 2006). Frequency of prayer and prayer experiences is a good predictor of well-being (Poloma and Pendleton, 1991), though this may be association rather than causation. The combination of mindfulness and exercise, such as by practising tai chi, improves well-being and produces stronger immune responses in practitioners. Lutz et al. (2008) showed that meditation cultivates positive emotions, and these alter brain circuitry linked to empathy, and relaxation through meditation, prayer, yoga and tai chi are all associated with instant decreased oxygen consumption, reduced blood pressure and heart rate, and increased serotonin and dopamine levels (Esch et al., 2003). Being in natural places further encourages attentiveness in many people, though it is not clear whether natural spaces support the ability to be mindful, or whether practitioners of mindfulness experience more positive health benefits when spending time in nature.

Yet something uncomfortable must also be concluded for this rational age: the decline of spirituality and attendance at formal religious ceremonies has removed some opportunities for engagement with community and place, and may have influenced well-being as well as negatively influenced the capability to cope with stress (Koenig, 2000). Modern society has become indifferent to, or even discouraging of, spiritual traditions, especially in the public sphere (Walker, 2011). Material culture has tended to fill the gap.

Recent research on the placebo effect (PE) has further shown the potential benefits of “self-healing”. The placebo has long been conceptualised as an inert process, and thus has been used both as a control in experiments and to separate imagination from reality. It is now known to be a genuine phenomenon, with thought leading to expectancy to effect (Finniss et al., 2010). Expectancy is critical, and beliefs and expectations are important in both patient and physicians/nurses. The PE has yielded beneficial clinical results for angina, bronchial asthma, herpes, ulcers, inflammatory bowel syndrome, and persistent pain (Price et al., 2008; Enck et al., 2008; Kaptchuk et al., 2008; Zubieta and Stohler, 2009). The largest amount of research has been on analgesics, which has shown that the PE mechanism centres on the self-release of endogenous opioids. The PE has been shown to be blocked if opioid inhibitors, such as naloxone, are given to patients. Fuente-Fernandez et al. (2001) used PET scanning to show that Parkinson’s disease patients substantially increase dopamine releases in response to placebos, and concluded that PE can be a powerful treatment.

The “open–hidden” paradigm is important: hidden treatment is generally ineffective, thus both patient and physician must expect a treatment to work. Finniss et al. (2010) noted that effective alternative therapies with no clear

scientific explanation but with elaborate rituals can thus induce placebo effects, particularly if there is a good relationship between practitioner and patient. PE is also accompanied by reduced neural activity in brain areas that process pain and anxiety. Kaptchuk et al. (2008) concluded that “augmented treatment” with warmth, attention, and confidence improves clinical outcomes. Patients thus engage in treating themselves if physicians, nurses and carers have a warm friendly manner, engage in active listening, show empathy, allow up to 20 seconds of silence in conversation, and communicate confidence and positive expectations. Compassion is important to recovery, and is clearly a crucial part of the whole patient experience, one of the three dimensions of quality in the English national health system, alongside safety and effectiveness.

There remain important ethical issues over patient deception with respect to PE and self-healing, though Kaptchuk et al. (2010) have shown how placebos without deception can work in trials to treat irritable bowel syndrome. One conclusion from the placebo research is that there exists some capacity to improve well-being without the need for drug interventions.

Heresy 4: The immune system can be trained to work better, especially from childhood

Recent research has demonstrated that social and environmental context and individual behaviour choices have a long-term effect on well-being and health. Multi-decade longitudinal cohort studies indicate clearly that many of the social and environmental conditions of childhood can predict adult health status. These include the 1972 Dunedin (now 40+ years after start), Cambridge (48 years after), Maudsley (21 years) and the Whitehall studies (Danner et al., 2001; Marmot and Bruner, 2004; Foresight, 2008). Danner et al. (2001) investigated the autobiographies that a group of ageing nuns had written six decades earlier at the age of about 20. Since then, their ways of living had been very similar, yet those in the lower half of the cohort when ranked for positive comments about life died nine years earlier than those in the top half. Positive mental health affected survival 60 years later in life.

It is clear that there is considerable tracking from childhood to adulthood. Ill-health tracks, and childhood mental ill-health is especially carried forward (Foresight, 2008). It has been shown that 80 per cent of children of low socioeconomic status become overweight adults, whereas only 40 per cent of those with high status become overweight (Wells and Lekies, 2006). Such tracking, though, is clearer from adolescence than early childhood. Early socially-stimulating environments are, however, crucial, with later emotional well-being and cognitive capacity profoundly influenced by early social development (Ainsworth et al., 1974).

This suggests a need to establish good behaviours early (Louv, 2005). Engagement with wild nature secures positive adult outcomes, and a visit to woodland as a child increases the number of visits made as an adult (Ward-Thompson et al., 2008). Play affects brain development. Outdoor activity has a

positive effect on long-term memory, and cognitive development is influenced by free play and exploration (Rickinson et al., 2004; Berman et al., 2008).

Related to the placebo effect is the concept of conditioning, the training of the body to react in a particular way to stimuli. Both expectancy and memory can be important. The repeated association between a neural stimulus and an active drug can result in the ability of the neural stimulus to elicit a response on its own (Finniss et al., 2010). Ader and Cohen (2002) showed that in subjects repeatedly given cyclosporin and a flavoured drink, immunosuppression was induced. At a later point, the same subjects given only the flavoured drink again responded with induced immunosuppression. Other subjects with no prior conditioning showed no suppression when given only the flavoured drink. Memory is important, as recollection of a previous placebo magnitude influences future treatment effects. In this way, once again, drug-like effects can be induced without drugs (Enck et al., 2008).

Heresy 5: Social bonds and attachment between people improves well-being

Insel and Young (2001) have written: “it is difficult to think of any behavioural process that is more important to us than attachment”. Attachment behaviour has emerged in humans as there are selective advantages to enduring bonds. The neuropeptide, oxytocin, has been shown to be a critical compound, and oxytocin receptors are concentrated in the dopamine-rich regions of the brain. Oxytocin can be released by touching, by being in safe environments, and on receiving signals of trust from others. Those with high levels of oxytocin or high numbers of receptors have a greater ability to empathise and increased motivations to be generous. Zak et al. (2007) have shown that subjects given oxytocin become more generous. Those who volunteer to help others are known also to have higher well-being (McCloughlan et al., 2011). Across the EU, 20 per cent of citizens participate in volunteering and charitable activities, the highest proportions are in Denmark, Finland and Sweden (>45 per cent). Volunteering is associated with improved happiness, self-esteem, sense of control and wider mental health; those attending religious ceremonies are more likely to volunteer (Thoits and Hewitt, 2001; Mellor, 2009; McCloughlan et al., 2011). In this way, the seven heresies are interlinked.

It is well-established that trusting relationships have an effect on health (Kawachi *et al.*, 1997). Conversely isolation and negative feelings affect health negatively (Ostrom, 1990). The value attached to relationships constitutes a form of capital, which has come to be known as social capital. This includes an individual’s contacts and networks; the common rules, norms and sanctions that regulate behaviour together with the reciprocity and exchanges that build friendships, respect and ultimately trust (Pretty and Ward, 2001).

Three types of social capital are commonly identified. These are i) bonding: the ability to engage positively with those closest who share similar values; ii) bridging: working effectively with those who have dissimilar values and goals;

and iii) linking: the ability to engage positively with those in authority either to influence their policies or obtain resources (Pretty, 2003). A central theme of Putnam's bowling alone thesis (1995) was that although just as many people in the USA participate in ten-pin bowling as they did half a century earlier, they tended now to bowl alone or in small groups of existing friends. When individuals were members of competitive teams in a league, then they played teams from other social and ethnic groups within cities, and as a result bridging social capital was built through regular contact. Such social attachment increases well-being (Esch and Stefano, 2005); mothers with strong attachment to their infants show greater activation of brain reward regions, especially of the oxytocin-associated hypothalamus, but insecure mothers showed much reduced responses.

It is clear that people engage with the outdoors not just for the connection to nature, but to provide the setting for the building of social capital. Nature is good for health; green places are good for social capital. Strong social support keeps the elderly alive, and membership of sports clubs contributes to well-being. A meta-analysis of 148 studies (Holt-Lunstad et al., 2010) found a 50 per cent increased likelihood of survival over seven years for those people with strong relationships.

The opposite of social attachment is loneliness. This has a directly negative effect on health, and thus a reduction in loneliness will improve well-being. The study of loneliness has demonstrated the biological effect of a lack of social relationships (Miller, 2011). Lonely adults tend to have higher blood pressure, greater epinephrine secretion at night, higher morning and night-time cortisol levels, and poorer sleep patterns (Glaser et al., 1985; Hawkley and Cacioppo, 2007). Short visits by carers may not help, as the quality of friendships and compassionate time spent together is important. The chronic stress experienced by carers themselves reduces immune responses to vaccines and slows wound healing (Kiecolt-Glaser et al. 1996). Stress plays a major role in neurodegenerative disease, mental disorder and memory. Both cortisol and epinephrine are markers of stress, and people who lack social support are more prone to ailments and illness (Hawkley and Cacioppo, 2007). Cortisol plays a key role in the HPA (hypothalamic-pituitary-adrenocortical) axis, which controls inflammatory processes and maintains immune function. Loneliness increases gene activity that promotes inflammation, and with poorer sleep and reduced night-time repair, ill-health outcomes increase. Loneliness tracks into adulthood, with lonely adults having a greater number of childhood adversities such as hospitalisation, parental divorce and physical abuse (Asher and Paquette, 2003; Hawkley and Cacioppo, 2007).

In the USA, 29 million people live alone, a 30 per cent increase since 1980, and people are three times more likely now to report having no one to talk to. Social exclusion decreases prosocial behaviour, and is related to higher anxiety, increased loneliness and more mental ill-health (Twenge et al., 2007), though higher social class is often associated with less prosocial behaviour (Piff et al., 2012). In the UK, 10 per cent of over 65-year-olds are always or very lonely

(900,000 people), and half of all 75-year-olds live alone (Campaign to End Loneliness, 2015). Loneliness has the equivalent risk as consuming 15 cigarettes per day and is twice as harmful as obesity (Bolton, 2012). Lonely people make more visits to GPs and attend A&E more often. Befriending, mentoring, wayfinding and gatekeeper services and group activities such as walking for health, have been shown to reduce hospital and health care costs. After such interventions, mean visits to GPs fall from 10.8 to 6.7 per year (Pitkala et al., 2009). Attachment and oxytocin interact to suppress anxiety and physiological stress (Tops et al., 2007). This suggests the need for access to green space for all social groups, and a role for green space in cities to play in reducing health inequalities (Kuo and Sullivan, 2001; Marmot Review, 2008).

Heresy 6: Attachment to possessions and place with emotional history improves well-being

Consumer culture has increased the turnover of possessions, and may also have undermined self and identity, thus also reducing well-being (Tuan, 1977; Belk, 1988; Walker, 2011). Sartre noted that people seek, express and confirm a sense of being through their possessions, and Marx used the term “commodity fetishism” to indicate the structural relations of capitalism that result in detachment, with consumers coming to believe commodities have some kind of power to make them happy (Jackson, 2006). Yet Walker (2011) has observed that “our contemporary market system sells, more than anything else, discontent and unhappiness”. The modern economy needs disposal and replacement; it is centred on ephemerality. Yet if people become more attached to both possessions and natural places, and thus do not purchase new goods or repair harm to ecosystems, then the economy will suffer (unless a different kind of prosperity based on well-being is pursued: Pretty, 2013). In contradiction, the planet would benefit incrementally from each increase in attachment. When possessions and places acquire a high degree of attachment for people, then they are less likely to be disposed of or damaged. Importantly, high attachment and affiliation also improve mental and physical well-being.

Cathexis is the process of charging an object, activity or place with emotional energy (Belk, 1988), which in turn emerges from memory creation. Attachments are formed with specific material objects, evolve over time, emerge from experience and personal history, and are thus a form of self-expression (Schultz et al., 1989; Belk, 1991). Cherished possessions with such meaning tend not to be substituted and, therefore, are more likely to be kept for a long time, becoming inalienable wealth or capital for families (Bell, 1997; Curasi et al, 2005). This in turn leads to greater well-being: cherished possessions and places with high affiliation value result in higher life satisfaction and well-being (Sherman and Newman, 1977). This has been recognised in hospitals and care-settings: patients and the elderly are viewed as more socially-capable and less dependent by medical and care staff if they display personal possessions in wards and rooms (Millard and Smith, 1981; Wapner et al., 1990). People with possessions are more in control,

less helpless, and more supported by staff. Recovering heart surgery patients with views of trees are more likely to have positive comments written about them by hospital staff (Ulrich, 2002).

People also invest more in possessions and natural capital when either or both are cathected and charged with emotional energy. The more strongly homeowners cathect their dwellings, for example, the more frequently they invest in mowing grass, painting, cleaning and remodelling. Sherman and Newman (1977) showed that the elderly with family possessions depicting grandchildren and key events, relationships and memories are happier than those who do not. When people are deprived of their valued possessions and places, their personal identity is harmed too (Albrecht, 2005). Possessions linked to memorable past events help to verify that the event occurred, and emotions (good and bad) are fixers of memory. In this way, possessions and green places can be thought of as magical vessels, carrying the power of kratophany and expressing stories, values and memories that are tangible proof of life events (Belk, 1991; Curasi et al., 2005; Kane, 2010; Christie, 2013).

Heresy 7: The design within buildings and settlements influences well-being

Design within buildings and settlements influences well-being, today usually for the worse. Buildings and settlements are part-planned in advance, and part emergent and changed according to contemporary needs (Brand, 1994; Orr, 2006; Walker, 2011). In the modern era, buildings tend no longer to care for users' and visitors' well-being, and sadly not even for staff; and settlements discourage activities and behaviours that would improve well-being, forcing people into care, reducing social interaction, and reducing time spent in nature. The hospice movement has long-understood the need to create a therapeutic healthcare environment, but hospitals have not (BMA, 2011). The hospital environment plays a significant role in staff and patient functioning, yet largely they are noisy, devoid of natural views or internal plants, do not use natural light or sunlight effectively, and do not provide places where visitors and/or staff can socially-interact. Ulrich (2002) concluded that many hospitals are "starkly stressful, unacceptably stressful, and unsuited to the emotional needs of patients, their families and even health care staff." Becoming ill is a stressful experience, and design makes this worse (Kings Fund, 2009; BMA, 2011).

The typically high levels of boredom and few opportunities for physical activity further undermine recovery. There is a tendency to focus much energy on how good or bad structures are, but relatively little attention is paid to the overall health and care system. Better models of prevention and care should be the priority and the structures needed to support such a system. This suggests more transformational models are needed. The built environment and the shared, open, natural environment have important negative and positive direct consequences on health and are powerful influences on health-related behaviours. In particular,

future-proofed environments need to be flexible (easy to change function), adaptable (easy to refurbish) and aesthetic (the health care environment has a particular responsibility to be both health-promoting and therapeutic).

Patients in east-facing rooms exposed to more light from early in the day spend less time on the ward and have lower mortality (Even et al., 2008). Private, allotment and community gardens have all been shown to reduce stress and improve well-being, as has green space in deprived communities (Ward-Thompson et al., 2012; Hawkins et al., 2013; Twiss et al., 2013). Having your own garden has also been shown to be restorative, again reducing stress. School gardens are important for pupil behaviour as well as outdoor learning (Ofsted, 2008).

Gardens in hospitals also have a number of positive effects on individuals, by helping them to feel more relaxed and able to cope, reducing stress and improving mood (Cooper-Marcus and Barnes, 1999). Even short visits to gardens of five minutes in duration have been demonstrated to have a positive effect on the mental well-being of patients (Barton and Pretty, 2010). Loud noise, though, increases stress, raises blood pressure and heart rates: noise is a major cause of sleep deprivation in hospitals, yet sleep is necessary for vital immune and endocrine functions (BMA, 2011). The TLC (Turning off unused equipment, switching off Lights, and Closing hospital doors) programme at Barts Health NHS Trust has already saved substantial sums of money through behaviour change (Barts Health NHS Trust, 2013).

Design thus matters. The Royal Children's Hospital in Melbourne integrates nature into the hospital by replaced facades, creating virtual and digital landscapes, has a seven metre aquarium in the waiting area, and has windows, skylights and viewing platforms to bring the neighbouring park into the building (Green, 2013). The BMA (2011) concluded that a therapeutic healthcare environment would induce positive clinical outcomes, reduce drug consumption, shorten average lengths of stay, create better doctor-patient relationships, and improve mental well-being. The social climate in hospitals should promote vital social bonds, which in turn improve well-being.

Saving money and increasing well-being

A largely unchallenged assumption for the past half century has been that increased material consumption and rising GDP leads to increased well-being. Now a priority is to redefine prosperity, and by substituting activities that improve social cohesion, happiness, mental and physical well-being, and memory creation for material consumption, the impact on natural capital and ecosystem services will be reduced whilst improving well-being. Green growth and the green economy have become important targets for national and international organisations (Boyle and Simms, 2009; O'Neill et al., 2010; Pretty, 2013). UNEP (2011) defines the green economy as “resulting in human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”.

A green-health economy that emphasises ecological public health would be one in which attention is paid to the environmental and social context of the public not yet ill, patients and all professionals and families engaged in treatment and care (Pencheon, 2012; CMO, 2013). The Marmot Review (2008) of health inequalities concluded that “economic growth is not the most important measure of our country’s success,” and recommended attention to accumulate the positive effects on well-being across the whole life course by building social capital, encouraging active travel, use of public transport, availability of green space and healthy eating. A particular concern centres on the sometimes sharp social gradients of health: childhood mortality in regions of the UK varies from 7 to 23/100,000; mental ill health in children comprises 17 per cent of those in families with no educational qualifications yet only 4 per cent of those with degrees (CMO, 2013).

The UK Office for National Statistics is now measuring well-being at the national level in the UK; but these measures have largely not changed policy or practice, particularly in health and social care. Hospitals have evolved considerably since their first establishment in Mesopotamia 3000 years ago (Retief and Ciliers, 2006), yet health and social care now needs to enter another phase of development. Mitchell and Popham (2008) concluded that “environments that promote good health might be crucial in the fight to reduce health inequalities”. The role of organised societal efforts can be to remove barriers and simply to create the right conditions for social resilience and health to develop naturally in communities.

Asclepian temples engaged in healing by combining the use of drugs obtained from medicinal plants alongside lengthy stays in temple surroundings, the use of dream rooms, hydrotherapy, exercise, healthy foods and the library. The caduceus staff of Asclepius depicts the harmless temple serpent, *Zamenis longissimus*, coiled around the staff, the snake a symbol of rejuvenation for its shedding of skin and ability to assume the shape of a circle, a symbol of eternity. It also kept temples free of rats, and came to represent a pluralistic approach to medical healing and treatment (Hart, 1965; Oberhelman, 2013). An Asclepian staff and snake is carved onto a relief at Sulis Minerva, one of the baths built by the Romans at Bath and used for some two centuries as a location for healing.

A substantial financial dividend would be released by a green-health economy centred on interconnected Asclepian principles of healing and well-being:

- i. regular engagement with nature;
- ii. regular physical activity (alongside healthy and available food);
- iii. use of the power of thought and contemplation;
- iv. train the immune system from childhood;
- v. enhance social bonds;
- vi. increase attachment to possessions and places;
- vii. redesign buildings and settlements, and create shared space, to ensure interaction and attachment.

This suggests there would be co-benefits from consideration of amended models of health care delivery, in which the primary location of care is the home and community setting, and the most appropriate need is translated into demand for general practitioner surgeries, leaving hospitals to focus on specialist care that cannot be delivered closer to home. This would be good for the health of patients, the public, the national economy and state of the planet: an important and wide range of co-benefits. Every unplanned admission is in some ways a sign of system failure. Health and care services must thus become more imaginative, flexible and human. In doing so, they would also become more financially viable and efficient. This will in turn need to create business models for sustainable health and social care that focus more on incentivising prevention and outcomes rather than simply rewarding activity.

It is clear that environmental and social context influences well-being and health, and thus actions that shape these contexts for individuals will increase the likelihood that more people will be able to live their lives well and for longer, as well as leave a better legacy for all.