# Reconnecting Healthcare and Nature: The Role of Home Gardens in Advancing Eco-Surplus Culture and Sustainable Well-Being

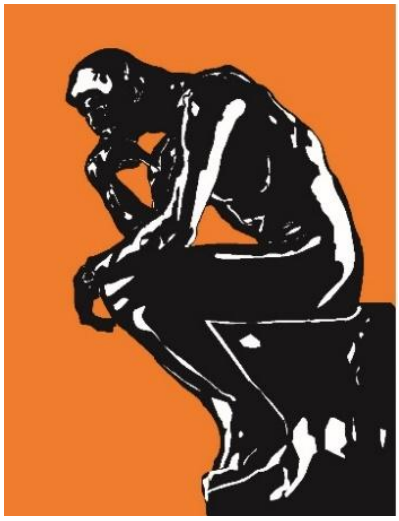
Quan-Hoang Vuong [1], Ni Putu Wulan Purnama Sari [2,*], Viet-Phuong La [1,3], Minh-Hoang Nguyen [1]

[1] Centre for Interdisciplinary Social Research, Phenikaa University, Hanoi, Vietnam

[2] Faculty of Nursing, Widya Mandala Surabaya Catholic University, East Java, Indonesia

[3] Professor, University College, Korea University, Seoul, South Korea

* Correspondence: wulanpurnama@ukwms.ac.id



May 8, 2025

[*Original working draft v1 / Un-peer-reviewed*]

> "With only his beak, he utilizes every readily available material in nature, such as grass and soil, and there we have a talented artist."
>
> In 'Contentment'; *Wild Wise Weird* (2024)

## Abstract

Although global awareness of environmental challenges is increasing, modern healthcare systems marginalize nature-based healing practices. This paper advocates for a renewed integration of healthcare and the natural world by highlighting the cultural, historical, and scientific foundations of natural healing. Through a multidisciplinary synthesis spanning ethnobotany, public health, and ecological psychology, we examine how home gardens serve as practical embodiments of an eco-surplus culture—a worldview that positions nature as foundational to human well-being and planetary sustainability. Home gardens offer measurable health benefits, such as stress reduction, immune enhancement, biodiversity conservation, and climate resilience. Drawing on diverse case studies—from Indigenous land-based healing to immigrant communities preserving ethnomedicine—we show how gardening fosters physical, psychological, and cultural health. The paper concludes by proposing integrative care models that align biomedical treatments with nature-based interventions and calls for policy innovations that recognize gardens as essential health infrastructure. Reimagining home gardens in this way opens new pathways toward more holistic, equitable, and sustainable approaches to wellness.

**Keywords:** nature-based healing; home gardens; eco-surplus culture; green healthcare; traditional medicine

## Introduction

Despite unprecedented global awareness of environmental issues, a paradox remains: mainstream healthcare continues to underutilize nature as a healing resource (Feng, Liu, Liu, Chi, & Osmani, 2024; Uhing & Tannenbaum, 2022), even when evidence shows that herbal medicines relying on sustainable resources have less negative impact on the environment (Jamal, 2023). Modern healthcare focuses on pharmaceuticals and technological interventions, as modern technologies continue to develop in advanced and become essential today (Thacharodi et al., 2024), even with the expense of traditional, nature-based healing practices (Lauwers, Bastiaens, Remmen, & Keune, 2020). This bias contributes to the marginalization of low-cost and high-impact healthcare strategies supporting social-ecological functioning, such as spending time in community gardens or parks (McMillen, Campbell, Svendsen, & Reynolds, 2016; Shankar, 2015). Despite visible societal and political commitments to environmental well-being, nature remains peripheral in medical thinking and practice (Leimgruber, 2018), leading naturalness to become an issue in medical ethics and practices of care (Nissen, 2015). This disconnect is increasingly difficult to justify in light of a growing body of evidence demonstrating the mental and physical health benefits of nature exposure (Jimenez et al., 2021), as well as enduring cultural knowledge that regards nature as medicinal (Menendez-Baceta et al., 2015; Saslis-Lagoudakis et al., 2014).

Integrating nature into healthcare supports broader sustainability goals by generating co-benefits for both human well-being and the environment (Lennox, Maher, & Reed, 2018). For

example, hospital gardens designed as sensory therapeutic spaces can simultaneously aid patient recovery, sequester carbon, and provide habitat for urban wildlife (Dinu Roman Szabo et al., 2023; Feng et al., 2024). Therefore, re-establishing a connection between healthcare and the natural world represents a mutually reinforcing strategy, presenting a transactional relationship of nature as "healthcare service provider" (Victorson, 2024)—promoting healthier people and ecosystems alike—and embodies the core principles of an eco-surplus culture, a cultural value system that considers nature as a prerequisite for humanity's well-being and sustainability (M.-H. Nguyen & Jones, 2022; Vuong, 2021; Vuong & Nguyen, 2024a). In healthcare, an eco-surplus culture encourages the use of nature—such as local biodiversity (Castelli, Silva, & Dunning Jr, 2021), traditional ecological knowledge (Mekonen, 2017), and accessible green spaces (Ekkel & de Vries, 2017)—as therapeutic resources that complement modern biomedicine (Anyinam, 2016).

The current article argues that reconnecting with nature—particularly through home gardening—can serve as an essential component of a sustainable healthcare paradigm. Nature-based interventions should not be viewed as mere alternatives but rather as historically rooted practices increasingly validated by contemporary scientific research. Home gardens, as tangible expressions of an eco-surplus culture, offer a practical and accessible means of incorporating nature into daily health routines, thereby fostering well-being and resilience.

## The Historical and Cultural Foundations of Natural Healing

Healing practices have long been integral to human societies, playing a significant role in addressing health and wellness (Elendu, 2024). Human healing traditions have long drawn from nature, as ancient healing practices have used natural remedies (Elendu, 2024), with many medicinal substances originating from natural sources (Haque, Chowdhury, Shahjahan, & Harun, 2018). Across cultures and centuries, plants, landscapes, and the broader environment have served as primary foundations for medicine and well-being (van den Bosch, 2017).

The effectiveness of traditional plant-based medicine has been illustrated in many examples that have direct comparisons with Western practices (Schiebinger, 2017). A notable example comes from the Caribbean in 1773, when an experiment in Grenada directly compared an African-derived herbal remedy with standard European treatments (Schiebinger, 2017). In this cure-off, an enslaved healer treated patients with yaws—a debilitating tropical infection—using a tea made from local tree bark, while a European physician administered the prevailing mercury-based treatment. The outcomes were striking. After two weeks, patients treated with the herbal remedy recovered, while those receiving mercury did not (La Fleur, 2018).

Throughout the colonial era, remedies developed by enslaved and Indigenous peoples were often effective, yet their knowledge was frequently dismissed, appropriated, or uncredited by colonial authorities. The Grenada case exemplifies the early dynamics of tropical medicine, which often involved both exchange and contestation between European and African healing

traditions (Schiebinger, 2017). While valuable botanical cures—such as quinine from cinchona bark or, more recently, artemisinin from Artemisia (Gachelin, Garner, Ferroni, Tröhler, & Chalmers, 2017; Gruessner et al., 2019)—were eventually incorporated into mainstream medicine, the original knowledge holders rarely received recognition or benefit (Jansen et al., 2021; Sen & Chakraborty, 2017).

Indigenous and land-based healing practices around the world further underscore the deep-rooted relationship between nature and healthcare (Johnson-Jennings, Billiot, & Walters, 2020). In many Indigenous cultures, healing is inseparable from the land (J. M. Redvers, 2016). Among First Nations in Canada, for instance, land-based healing involves intentional engagement with local landscapes—such as gathering traditional medicines, spending time on ancestral territory, and participating in natural ceremonies—to promote individual and communal well-being (Acharibasam, Hurlbert, Datta, & wâsakâyâsiw Lewis, 2024; J. Redvers, 2020). These practices conceptualize the land itself as a healer (J. Redvers, 2020), offering not only physical remedies but also spiritual and psychological restoration through a renewed sense of connection and identity. Recent work with Swampy Cree and Métis Indigenous communities, the two remote Indigenous communities in Saskatchewan, such as the Star Blanket Cree Nation and Cumberland House Village, also confirms that reconnecting with land and water is essential to addressing health challenges, affirming that maintaining a strong bond with the land and water is integral to Indigenous healing traditions (Acharibasam, Datta, et al., 2024; Acharibasam, Hurlbert, et al., 2024; Acharibasam, Riley, Datta, McKenzie, & Favel, 2024).

Similar perspectives can be found across Southeast and South Asia, where traditional medical systems such as Ayurveda and Traditional Chinese Medicine evolved in close relationship with local ecosystems (Prajapati, 2024; Ryan Chen, 2024). Generations of traditional healers developed extensive knowledge of medicinal flora and fauna, creating holistic healthcare systems long before the rise of modern pharmaceuticals (Aziz, Khan, Adnan, & Ullah, 2018; Borah & Prasad, 2017). Many of these traditions have endured alongside the expansion of biomedicine—for example, the continued use of Ayurvedic and Unani remedies in India (Zaigham, Tauheed, & Ali, 2019), jamu herbal tonics in Indonesia (Sumarni, Sudarmin, & Sumarti, 2019), and Chinese herbal medicine across East Asia (L. Chen et al., 2015; Shim & Kim, 2018). In some contexts, these practices have been integrated with biomedical approaches (Gupta, 2024; W.-j. Wang & Zhang, 2017), while in others, they were marginalized or suppressed (Cameron, 2010; Chang & Lim, 2019), often dismissed as “superstitious” by colonial or postcolonial authorities due to their association with spiritual beliefs and ancestral customs (Madhumithaa, Kavitha, & Ramaswamy, 2020).

The rise of industrialization and the emergence of the modern biomedical paradigm in the 19th and 20th centuries led to the systematic marginalization of nature-based healing practices (Boyd, Allen, Robinson, & Redvers, 2024). As laboratories began synthesizing pharmaceuticals and germ theory revolutionized medical science, traditional herbal remedies, nature-healing practices, and holistic approaches were increasingly dismissed as ‘unscientific’

and ‘alternative’ (Sherbekov, Jalilova, & Pulatova, 2025). In some cases, herbal medicines were even removed from markets under European regulatory frameworks (Waddell, 2020). Healthcare development came to equate "progress" with hospitals as the largest component in most health systems (Durrani, 2016; Huang, Chien, & Chiou, 2016), pharmaceuticals and medical knowledge (Al Mogrin et al., 2022), and, more recently, digital technologies initiating healthcare revolution (Thacharodi et al., 2024)—typically excluding gardens, community rituals, and ancestral herbal knowledge.

While some elements of traditional medicine have been absorbed into modern healthcare, such as making modern medicine from natural products (Yuan, Ma, Ye, & Piao, 2016) or modern herbal medicine (Bone & Mills, 2012), this integration has often been partial and extractive. Pharmaceutical companies have isolated active compounds from plants—such as aspirin from willow bark containing salicin (Mahdi, 2010), or Digoxin from foxglove containing digitalis (Kaul, Ahmed, Zargar, Sharma, & Dhar, 2013)—but typically in ways that commodify the resource, often using chemical solvents and advanced extraction techniques (Rasul, 2018). In many cases, once a plant’s active ingredient is synthesized into a pill, the broader context of its traditional use—and the community wisdom surrounding it—is sidelined or appropriated without equitable benefit-sharing, leading to environmental injustice (Nomani, 2020). This shift resulted in a significant erosion of support for natural healing, as environmental injustice decreases the environmental health capital (Ezell, 2022). In many contexts, knowledge that had been passed down for generations was disrupted, forgotten, or rendered obsolete. Meanwhile, (Patra, Das, Lee, Kang, & Shin, 2018) highlight that only a limited number of species are both pharmacologically effective and commercially viable in the pharmaceutical industry and that the processes of identification, isolation, and extraction are highly complex and labor-intensive.

Despite the marginalization of nature in the modern biomedical paradigm, the World Health Organization estimates that approximately 80% of the population in developing countries continues to rely primarily on herbal medicine for basic healthcare needs (M. S. A. Khan & Ahmad, 2019). This enduring reliance underscores the value of traditional knowledge that formal health systems have yet undervalued or neglected, raising an issue in the holistic health systems (Priya & Kurian, 2018). Medicinal plants not only preserve Indigenous knowledge and cultural identity but also hold potential for global health applications, especially when global health has outlined a culturally sensitive blending of conventional biomedicine with traditional healing practice (N. Redvers, 2018). Their use can empower women and strengthen communities (Gorjestani, 2004), and facilitate the transmission of healing knowledge across generations orally or through cultural immersion (AM, 2019; J. Hunter, 2014)—making them especially relevant in addressing 21st-century health challenges (S. K. Basu et al., 2024).

### Scientific Evidence on the Healing Power of Nature

Nature's healing power extends beyond the medicinal properties of plants (F. Khan & Khan, 2024). Even simple exposure to natural environments can enhance human well-being, but to

note, different types of exposure are associated with different aspects of well-being (White, Pahl, Wheeler, Depledge, & Fleming, 2017). Over the past few decades, researchers have systematically examined how exposure to natural environments influences human health. Across domains such as stress reduction (Yao, Zhang, & Gong, 2021), mood improvement (Neill, Gerard, & Arbuthnott, 2019), immune enhancement (Andersen, Corazon, & Stigsdotter, 2021), and chronic disease management (Buckley & Brough, 2017), various studies have documented consistent benefits associated with contact with green (vegetated) environments (Adewuyi, Knobel, Gogna, & Dadvand, 2023) and blue (aquatic) spaces (Smith et al., 2021). This growing body of evidence provides a strong scientific rationale for integrating nature into healthcare practices as part of an eco-surplus strategy.

One particularly well-studied area is mental health and psychological well-being. A longitudinal survey in England revealed that individuals living closer to the coast reported better general and mental health, even after adjusting for socioeconomic and demographic factors (White, Alcock, Wheeler, & Depledge, 2013). Coastal visitors commonly describe coastal landscapes as therapeutic settings that foster emotional well-being (Bell, Phoenix, Lovell, & Wheeler, 2015). Spending time by the sea evoked feelings of calm, escape, and self-reflection, contributing to their everyday sense of wellness (Severin et al., 2022). A large-scale study in Belgium focusing on home gardens and neighborhood vegetation found that higher exposure to greenery was linked to lower stress and depression levels (Krols et al., 2022). Importantly, the quality of these green spaces—measured through indicators such as biodiversity and size—was a significant predictor associated with being active in the garden, which was, in turn, associated with lower values of depression. The finding suggests that richer and larger environments may offer greater restorative benefits (Krols et al., 2022).

Contact with natural environments has been shown to elicit a range of positive psychophysiological responses, including reductions in cortisol, the body's primary stress hormone, evaluated by salivary biomarkers (M. R. Hunter, Gillespie, & Chen, 2019), and lowered blood pressure (Yao et al., 2021), as well as favorable changes in heart rate and heart rate variability (Scott et al., 2021). These effects reflect the activation of the parasympathetic nervous system, which promotes relaxation and stress recovery (Scott et al., 2021). Experimental studies further demonstrate that individuals recover more quickly from stress and mental fatigue when placed in natural settings (Tyrväinen et al., 2014), or even when exposed to images of nature (Brown, Barton, & Gladwell, 2013). According to Attention Restoration Theory, natural environments promote a mental state of "soft fascination" and "mental bandwidth" (A. Basu, Duvall, & Kaplan, 2019)—for example, watching clouds drift or leaves rustle—which gently engages attention without cognitive effort, allowing the brain's directed attention (used for focused tasks) to rest and restore (Ohly et al., 2016).

In healthcare contexts, one of the earliest studies on this topic found that postoperative patients with a window view of trees recovered faster and required fewer painkillers than those with views of a brick wall (Ulrich, 1984), illustrating that even passive exposure to nature can enhance healing. More recent clinical trials on "forest bathing" (*Shinrin-yoku* in Japan)—

immersive experiences in forested environments—have reported reductions in self-reported stress and hostility, along with increased feelings of vitality (Antonelli, Barbieri, & Donelli, 2019; Queirolo et al., 2024). These psychological improvements are frequently accompanied by physiological changes, such as decreased cortisol and lower levels of inflammatory cytokines, further substantiating nature's role in promoting holistic well-being collectively (mental, physical, and spiritual) (Londono-Escudero, 2023; Steele, 2020).

Moreover, exposure to nature can also contribute to immunity enhancement (Andersen et al., 2021). The biodiversity hypothesis suggests that regular contact with diverse natural environments—such as soil, plants, and wildlife—can enrich the human microbiome, the vast community of microorganisms living in and on our bodies, which plays a critical role in regulating immune responses (Panthee, Gyawali, Panthee, & Techato, 2022). (Tischer et al., 2022) found that interventions introducing natural elements, such as outdoor play areas with soil and vegetation, increased microbial diversity on the skin and in the gut. These changes were partially associated with beneficial immune markers, including improved regulation of inflammation. In this context, "doses" of biodiversity may act like a natural vaccine, enhancing immune defenses by ecosystem services essential to health (Rook, 2013).

Supporting this idea, studies have shown that children raised on farms, where exposure to soil, animals, and environmental microbes is high, exhibit lower rates of asthma compared to those who are rural but not raised on farms (Adler, Tager, & Quintero, 2005). These effects are thought to be mediated by factors such as N-glycolylneuraminic acid, arabinogalactan, and microbial diversity (Frei, Heye, & Roduit, 2022). Beyond microbes, trees and plants emit phytoncides—aromatic compounds that, when inhaled, have been shown to increase the activity of Natural Killer (NK) cells, T-cells, and cytotoxic effector molecules in humans, thereby enhancing immune surveillance against pathogens and potentially even tumors (Lew & Fleming, 2024).

In addition to individual health benefits, nature-based interventions often yield ancillary outcomes such as increased social interaction through community gardening (Rogge, Theesfeld, & Strassner, 2018), walking groups (Harada et al., 2019), and improvements in local environmental quality and well-being (Liu, Jay, & Chen, 2021). These benefits can generate positive feedback loops, where improved social cohesion and safer, more attractive public spaces further reinforce health-promoting behaviors (Veen, Bock, Van den Berg, Visser, & Wiskerke, 2016).

From a public health perspective, nature-based interventions are increasingly recognized as credible adjuncts—or even alternatives—to conventional therapies. For instance, a clinical trial (randomized controlled trial) comparing nature-based intervention with standard care for depression resulted in better outcomes (Hyvönen, Salonen, Paakkolanvaara, Väkeväinen, & Korpela, 2023). Programs such as therapeutic gardening (Soga, Gaston, & Yamaura, 2017), wilderness therapy (Fernee, Gabrielsen, Andersen, & Mesel, 2017), green exercise like group walks in parks (Loureiro & Veloso, 2016), and physician-issued "nature prescriptions" (Kondo et al., 2020) are being actively implemented and evaluated. Nature-based therapy also

complements the standard treatment for communication disorders in a well-mannered (Lundgren, 2004). A recent meta-analysis found that prescribing time in nature significantly improved symptoms of depression and anxiety while also increasing physical activity levels—effects that rival some pharmacological treatments but with virtually no adverse side effects (P.-Y. Nguyen, Astell-Burt, Rahimi-Ardabili, & Feng, 2023).

The increasing amount of empirical evidence supports the healing power of nature that traditional cultures have long extolled. Nature exposure can restore equilibrium to our minds and bodies through multiple pathways, like reducing stress (Yao et al., 2021), enhancing mood (Neill et al., 2019), and improve cognitive functioning (L. Nguyen & Walters, 2024), encouraging physical activity (Shanahan, Franco, Lin, Gaston, & Fuller, 2016), enhancing social connection (Goldy & Piff, 2020), and even tuning our immune systems (Andersen et al., 2021). These effects translate into tangible health outcomes like reduced depression (Hyvönen et al., 2023), faster recovery times (Dinu Roman Szabo et al., 2023), and potentially lower incidence of chronic diseases (Beyer, Szabo, Hoormann, & Stolley, 2018). Collectively, these findings suggest that contact with nature can serve as a multi-component "medicine" that operates by modulating stress responses, stabilizing heart rhythms, and supporting balanced immune function. Viewed through this lens, home gardens—compact ecosystems that encapsulate many of these benefits—offer a practical and accessible way to integrate nature into daily health routines, promoting resilience and overall well-being (Vuong & Nguyen, 2024a).

### Home Gardens as a Demonstration of the Eco-Surplus Culture

Home gardens are defined in multiple ways, highlighting various aspects based on the context or emphasis, and the study aims (Hoogerbrugge & Fresco, 1993). Generally, a home garden is a small-scale production system supplying plant and animal consumption and utilitarian items, which tends to be located close to the dwelling for security, convenience, and special care, and is marked by low capital input and simple technology (Niñez, 1985). In this study, home gardens are defined as gardens situated at one's residence, whether in the form of a backyard plot, front lawn, balcony containers, or community allotments. It represents an underrecognized reservoir of both health and environmental value. Environmentally, a home garden is an integrated system that comprises different things in a small area, taking the role of a biological diversity repository (Agbogidi & Adolor, 2013). Historically, in many societies, such as Lithuania and the Greek island of Lesvos, home gardens were a cultural norm. They provided families with medicinal herbs, fresh produce, and a private space for connecting with nature and engaging in restorative practices (Mahtani-Williams, 2024; Pranskuniene, Bajoraite, Simaitiene, & Bernatoniene, 2021). In contemporary urban contexts, however, functional gardens have often been replaced by ornamental lawns or paved spaces, reducing opportunities for everyday nature interaction. Modern housing trends, including limited gardening spaces, have shifted the purpose of home gardens toward decorative and leisure functions (Santos et al., 2022). Revitalizing the tradition of home gardening offers a

compelling eco-surplus strategy—one that delivers multiple synergistic benefits across personal, social, and ecological domains.

From the ecological perspective, home gardens transform underutilized resources into valuable ecosystem services. Even a small plot of soil can support vegetation that sequesters carbon dioxide, releases oxygen, and mitigates urban heat stress (Li & Wang, 2021). Cumulatively, the carbon captured by urban gardens—via trees, perennial shrubs, and carbon-rich soils—can become significant, particularly in cities with thousands of residential plots. Home gardens also serve as important micro-reserves for biodiversity (Agbogidi & Adolor, 2013). Often designed with mixed, multilayered plant species, they can support a high level of biodiversity (Pushpakumara, Sokolow, Sthapit, Sujarwo, & Hunter, 2020). A modest home garden with a variety of flowers, shrubs, and trees can attract pollinators such as bees and butterflies, provide shelter and food for birds, and support rich soil microbiota, contributing to the soil formation important for nutrient cycling (Cogger, Brown, & Kurtz, 2016), and supporting ecosystem stability (Agbogidi & Adolor, 2013). Cross-nation studies have proved the ecosystem service capabilities of home gardens, as investigated in Spain (Calvet-Mir, March, Corbacho-Monné, Gómez-Baggethun, & Reyes-García, 2016), China (Clarke, Li, Jenerette, & Yu, 2014), Sri Lanka (Mohri et al., 2013), Ecuador (Caballero-Serrano et al., 2016), Cyprus (Ciftcioglu, 2017), Indonesia, and Vietnam (Mohri et al., 2013).

Gardens also provide valuable ecosystem services for urban water management. Planted areas improve rainwater infiltration, reduce stormwater runoff, and support groundwater recharge—services especially critical in flood-prone cities (Alizadehtazi, Gurian, & Montalto, 2020). When used for growing food, home gardens help reduce “food miles,” lower greenhouse gas emissions, and minimize packaging waste. Food miles control is important to improve cities' microclimate and environmental sustainability (Gasperi, 2017). A study using vehicle kilometers and fossil fuel use to assess food transport in peri-urban areas advocated home gardening as a sustainable alternative (Manawadu, 2020). Organic kitchen waste can be composted to enrich garden soil, creating a regenerative system of “organic kitchen gardening” (Singh, Singh, Singh, Singh, & Singh, 2024) and creating a localized resource loop for sustainable waste management. In addition, home gardens reduce the global warming pollutants associated with waste disposal by turning leaves, grass, woody garden offcuts, and dead garden waste into mulch or compost (Santos et al., 2022), supporting organic waste recycling.

From a health perspective, home gardening fosters a degree of self-sufficiency in personal healthcare. A garden stocked with medicinal plants effectively becomes a living pharmacy, as seen in urban home gardens in Heredia (Costa Rica) (González-Ball, Bermúdez-Rojas, Romero-Vargas, & Ceuterick, 2022), Holguin (Cuba) (Heredia-Díaz et al., 2018), Mexico (Central America) (García-Alvarado, Verde-Star, & Heredia, 2001; Gheno-Heredia, Gámez-Pastrana, Nava-Bernal, & Ávila-Akerberg, 2016), Honduras (Espinoza-Turcios, Zambrano, Castro-Ramos, Armada, & Mejia, 2025), Peru (Villegas et al., 1997), Lithuania (Pranskuniene et al., 2021), Greece (Mahtani-Williams, 2024), Thailand (Panyadee, Balslev,

Wangpakapattanawong, & Inta, 2019), Polish and Belarus (Dapkūnienė, Snieškienė, & Maciulevičienė, 2020). Common culinary herbs such as ginger, turmeric, garlic, mint, and basil serve dual roles—not only enhancing flavor but also addressing inflammation, infections, digestive issues, and stress (Souza et al., 2019). Other widely cultivated plants like aloe vera (used for skin healing and burns), chamomile (a mild sedative), and echinacea (known for immune support) are staples in herbal medicine traditions (Souza et al., 2019). Cultivating these plants empowers individuals and communities to manage common minor ailments (Okoli, Aigbe, Ohaju-Obodo, & Mensah, 2007), manage prevalent diseases (Mintah et al., 2019), prevent and treat chronic diseases (Eddouks, Chattopadhyay, De Feo, & Cho, 2012), prevent and treat bacterial infections (Mahady, 2005), promote disease prevention (Sofowora, Ogunbodede, & Onayade, 2013), and reduce reliance on pharmaceuticals by increasing medicinal plant reliance continuum (Smith-Hall, Larsen, & Pouliot, 2012).

For immigrant communities, home gardens can also act as important conduits for preserving ethnomedicine and cultural healing practices. Turkish migrants in Cologne (Germany), for example, use home gardens to maintain traditional herbal remedies through the utilization of herbal products/phytotherapeuticals from local medicinal plants and trans-cultural pharmacy (Pieroni, Muenz, Akbulut, Başer, & Durmuşkahya, 2005). Similarly, immigrant families in Southern California intentionally grew plants native to their countries of origin for use in culturally specific foods and home treatments, deriving both physical and spiritual nourishment from these practices (Mazumdar & Mazumdar, 2012). More specifically, the Mixtec migrant families in California use homeland seeds and plants to anchor themselves to grow small family farms, generating alternatives to biomedical healthcare (Bade, 2004; Hondagneu-Sotelo, 2014). In addition, Surinamese migrants in the Netherlands continue using medicinal plants from their home country for health promotion, disease prevention, and cure, and consumption of bitter vegetables grown in their home gardens is one of the most popular traditional health practices among them (Van Andel & Westers, 2010). In this way, the home garden not only becomes a space for preserving physical health, but also a means of cultural identity.

Beyond cultivating specific remedies, the very act of gardening contributes to comprehensive health outcomes through an active lifestyle and preventive actions (F. Wang & Boros, 2025). The physical labor involved—digging, weeding, watering, lifting—constitutes a form of low-to-moderate-intensity exercise (Park et al., 2017), which is particularly beneficial for individuals who may not engage in formal fitness routines. Such activity supports muscular strength, cardiovascular endurance, balance, flexibility, coordination, and reaction time while also reducing physical frailty in older adults and helping to prevent chronic disease (Tse, Wong, & Lee, 2015). Sunlight exposure during gardening supports circadian rhythm regulation, improving sleep quality and bone health. A nationwide U.S. study found that gardening was associated with fewer sleep complaints compared to exercise alone (K. Wang et al., 2024). Similarly, research on women in their 40s showed that regular sun exposure through outdoor

activities like gardening significantly reduced the risk of osteoporosis and fractures, with positive implications for long-term healthcare costs (Kopiczko, 2020).

In addition to physical benefits, gardening is an adaptive emotion regulation strategy, equal to mindfulness and cognitive reappraisal (Vitale & Bonaiuto, 2024). The process of tending to plants has been associated with reduced anxiety (Ediati & Utari, 2017) and depression (Dempsey, Devine, Gillespie, Lyons, & Nolan, 2018). Many gardeners describe the experience as therapeutic, which instills a sense of purpose, calm, and accomplishment, helping buffer the effects of chronic stress (Andzaurova & Nartova-Bochaver, 2023). In a survey of 587 gardeners, the majority reported that their gardening practice significantly reduced stress and improved their overall quality of life (Krols et al., 2022).

Gardens serve as sanctuaries for stress recovery (Adevi & Mårtensson, 2013), relaxation and meditation (Harutyunyan, 2023), reflection (Salahub, 2023), creative engagement and artistic expressions (Harutyunyan, 2023)—offering psychological restoration through even simple interactions with soil, sunlight, and growing plants. Engaging with the natural rhythms of plant life fosters patience and hope; observing flowers bloom or vegetables ripen offers a quiet counterbalance to the overstimulation of modern digital life (Elliott, 2024). During crises like the COVID-19 pandemic, individuals with access to a garden or natural backyard coped significantly better with lockdown measures, reporting lower levels of depression and isolation than those without such access (Zhang, Zhang, & Zhai, 2021). For individuals coping with severe stress or trauma, such as military veterans, therapeutic horticulture programs have used gardening as a clinical modality to alleviate symptoms of post-traumatic stress disorder (PTSD) and improve mood (Mottershead & Ghisoni, 2021).

Home gardens embody the principles of eco-surplus by transforming underutilized residential spaces into vibrant sources of health, nourishment, and ecological renewal. They promote self-sufficiency in health care through the cultivation of medicinal and nutritional plants, support environmental sustainability by enhancing biodiversity and reducing waste, and improve mental health and community cohesion through everyday engagement with nature. More widespread integration of home gardening within urban planning, public health strategies, and cultural norms holds significant potential to strengthen both human and planetary well-being.

## Future Directions and Research Opportunities

The journey to reconnect healthcare with nature remains in its early stages, yet a confluence of emerging trends offers promising momentum. Rather than framing natural healing and modern medicine as oppositional, the future of healthcare lies in their thoughtful combination. Integrative clinics that house physicians, herbalists, nutritionists, and eco-therapists collaborate could provide patients with a holistic list of options (Homberg et al., 2022). For instance, a patient with hypertension might receive conventional antihypertensive medication alongside a “nature prescription” for forest bathing, green exercise, or a gardening class, coupled with dietary guidance that includes home-grown herbs known to support

cardiovascular health (Bikomeye, Balza, Kwarteng, Beyer, & Beyer, 2022; Chrysant & Chrysant, 2017).

Studying such integrated approaches—comparing patient outcomes in hybrid versus standard care—could yield valuable data on both effectiveness and cost-efficiency (Vuong, 2018). Some community health centers and veterans' hospitals have established therapeutic gardens or greenhouses (Fleming, Zhang, & Nelson, 2022), and hospitals are increasingly partnering with parks departments or botanical gardens to extend the healing environment beyond clinical walls (Nieberler-Walker, Desha, Bosman, Roiko, & Caldera, 2023). In the future, "green referrals" may become as routine as specialist referrals. In pediatrics, for example, a physician treating a child with anxiety-related eczema might prescribe conventional ointments while also referring the family to wilderness therapy or a nature-based mindfulness program (Djernis et al., 2019). Such holistic care has the potential to enhance outcomes, targeting symptoms pharmacologically while addressing root causes like stress, disconnection, and environmental deprivation (Johansson, Juuso, & Engström, 2022).

Interdisciplinary research is essential for advancing the integration of nature into healthcare. It becomes a key challenge for ecological approaches in public health (Galway, Parkes, Allen, & Takaro, 2016). Health issues are naturally multidisciplinary, and healthcare has an interdisciplinary nature (Newton & Ashley, 2020). Collaborative efforts among medical scientists, ecologists, neuroscientists, and social scientists can deepen our understanding of how natural environments generate specific health benefits—and for whom (Finn, Herne, & Castille, 2017). For example, MRI studies by neuroscientists can reveal how exposure to natural landscapes affects brain regions involved in emotion regulation and attention (Tang et al., 2017). Immunologists can measure how forest bathing influences immune system markers, such as natural killer cell activity and inflammatory cytokines (Chae et al., 2021), while ecologists can identify plant species that offer dual benefits, such as aromatic herbs that reduce stress while supporting pollinators (Tomlinson & Akerele, 2015).

Technology, when used thoughtfully, can support rather than supplant nature. Technology that promotes connection to nature reframes the roles of technology in outdoor engagement and conservation (Newton & Ashley, 2020). For instance, smartphone apps guide users through nature-based mindfulness exercises, helping people engage more deeply with outdoor environments (Bakolis et al., 2018; Ho & Vuong, 2024; McEwan, Richardson, Sheffield, Ferguson, & Brindley, 2019). For patients unable to access real nature, virtual reality (VR) nature simulations—such as forest or ocean scenes—have shown promise in reducing stress and promoting relaxation in intensive care settings (Gerber et al., 2019). While VR cannot replace actual green space, it may serve as a stepping stone toward re-establishing nature-connectedness. Virtual nature may be a future effect of information technology on human relationships with nature, supporting health (Levi & Kocher, 1999). The future of healthcare need not be a binary of high-tech versus high-nature. The two can coexist. Imagine hospitals equipped with cutting-edge diagnostics yet designed with biophilic principles: natural light, indoor greenery, therapeutic gardens, and outdoor rehabilitation areas. These so-called

“biophilic hospitals” are already emerging—for instance, in China, where a series of twelve hospitals have begun to incorporate biophilic design elements to reduce patient stress and support healing (Zhao, Zhan, & Xu, 2022). Such models suggest a pathway for health environments that are both technologically advanced and deeply human-centered. Biophilia is gradually considered the humanization of hospitals (Etezadifar, 2020), because basically, biophilic design is a human-centric design (Javid Khan & Lucas), promoting therapeutic design for sustainable healing (Feng et al., 2024).

Emerging frameworks, like Granular Interaction Thinking Theory (GITT), offer promising ways to quantify and unify disparate health interventions—whether pharmacological or nature-based—within a common conceptual language (Vuong & Nguyen, 2024a, 2024b, 2024c). GITT, which draws from quantum mechanics (Hertog, 2023; Rovelli, 2018), information theory (Shannon, 1948), and mindsponge theory (Vuong, 2023), suggests that every interaction—molecular, psychological, or societal—carries informational value that can either increase or decrease the entropy of a system. In this framework, illness is conceptualized as a state of elevated entropy (disorder or uncertainty within physiological signaling), while healing involves entropy reduction and a return to systemic homeostasis. Natural healing modalities may excel in this regard because they act across multiple scales, representing the healing power of nature (Y.-H. Chen, 2006)—recovering psycho-physiological stress (Corazon, Sidenius, Poulsen, Gramkow, & Stigsdotter, 2019), restoring emotional equilibrium (Yan, Azmi, Mansor, Wang, & Wang, 2024), and fostering social coherence (Jennings & Bamkole, 2019)—thereby reducing entropy holistically. Future studies could, in principle, attempt to quantify the entropy-reducing potential of a 30-minute garden intervention relative to a pharmacological treatment, using biomarkers and systems modeling. While speculative, such efforts could help transition holistic care from primarily qualitative discourse into measurable scientific inquiry. Moreover, GITT will also help update how interactions with nature can help update individuals’ values and beliefs towards nature through exposure to new information and experiences (M.-H. Nguyen, Le, & Vuong, 2023; M.-H. Nguyen, M.-H. T. Nguyen, et al., 2023; Vuong, Duong, Sari, La, & Nguyen, 2024a). These insights can help guide strategies for promoting eco-surplus health behaviors, suggesting that experiential learning—such as a positive personal encounter with nature—may be an effective way to shift skeptical or hesitant individuals toward an eco-surplus mindset that consider natural protection and restoration as prerequisites for ensuring personal well-being (M.-H. Nguyen, 2024; Vuong & Nguyen, 2024a).

Another fascinating interdisciplinary avenue is quantum biology, a nascent field exploring quantum phenomena within biological systems (Kim et al., 2021). Some researchers have hypothesized that consciousness and physiological regulation may rely on quantum-level processes, which are extraordinarily sensitive to environmental inputs (Bhadra, 2017). If such theories prove valid, natural environments—rich in fractal geometry, e.g., soil microbiome (Boddy & Donnelly, 2008), full-spectrum light, e.g., natural sunlight (Ball, 1995), negative ions, e.g., outdoor space (Millar, Walsh, & Field, 2017), and other bio-compatible stimuli—may better “tune” these delicate systems than artificial ones, promoting well-being at a

fundamental level. Though speculative, this perspective opens the door to redefining health not merely as the absence of disease but as a state of harmonic resonance with one's environment. Supporting this view, Geesink and Meijer (2017) propose that nature's electromagnetic harmonics—spanning first, second, and third resonances—can organize coherent biological rhythms from the cellular to the organismal scale, forming the energetic foundation of health.

Future policy and structural changes should prioritize embedding eco-surplus values into the fabric of everyday life, either for aesthetic and diversity purposes (Vuong, Duong, Sari, La, & Nguyen, 2024b), to get cultural and economic benefits (Vuong, Duong, Nguyen, et al., 2024), or managing health problems based on eco-deficit/eco-surplus methodology (Kannan, Anandhi, & Jeong, 2018). For instance, updated building codes could mandate a minimum amount of green space per occupant in residential developments, akin to fire safety or accessibility regulations. Healthcare systems might begin reimbursing nature-based therapies, such as therapeutic gardening or forest bathing. Currently, the use of herbal remedies often results in high out-of-pocket expenses, as these interventions are rarely covered by health insurance (Chrysant & Chrysant, 2017). Paying for nature-based solutions may exacerbate inequities in access to ecosystem services, showing negative impacts on social equity (Thompson, Bunds, Larson, Cutts, & Hipp, 2023). Expanding reimbursement models would help integrate nature-based care into mainstream healthcare and promote greater accessibility. Educational reform is another key avenue. Schools could incorporate gardening and outdoor learning into the core curriculum, fostering a generation that is not only academically literate but also has a high nature quotient (NQ) (Vuong & Nguyen, 2025). In some places, garden-based education has been conducted through extracurricular or subject-specific modules (Christensen & Wistoft, 2019).

Equity in research and application is critical. Most existing studies on nature and health come from mainstream settings, limiting the universality of findings. For instance, studies in high-income countries, such as the distribution of nature-based solutions in cities across Europe (Cooper, Cunningham, Bracken, & Collier, 2024), or studies in urban environment, such as mapping, measuring, and valuing the benefits of nature-based solutions in cities (Guerry et al., 2023). Expanding research into underrepresented populations—such as residents of urban slums in tropical regions, pastoralist communities, or those in conflict zones—would deepen our understanding of how different cultures perceive and use nature for health. Analyzing how these communities self-construct health through cultural lenses—including their integration of natural elements—can illuminate important social mechanisms and reveal new avenues for policy and design (Das, Angeli, & van Schayck, 2020).

Additionally, the looming reality of climate change will reshape future nature experiences. As biodiversity declines and extreme weather intensifies due to extreme weather and climate events (Maxwell et al., 2019), the therapeutic potential of nature must be safeguarded and adapted. Nature-based solutions offer a path forward, simultaneously enhancing human resilience and ecological integrity (Malhi et al., 2020). Urban planning can play a pivotal role,

using zoning, incentives, and infrastructure design to support the integration of green elements in built environments (Bush & Doyon, 2019). For instance, urban tree planting offers dual benefits: mitigating urban heat islands (health benefit) and sequestering carbon (climate benefit) (Willis & Petrokofsky, 2017). Such "win-win" interventions deserve greater attention and localization across diverse urban contexts.

Humanity stands at a critical juncture. The fast-paced, high-stress, resource-intensive activities and lifestyle of modern societies are placing immense strain on the health of humans and ecosystems (Flandroy et al., 2018). Reconnecting with nature—through practices as simple as tending a home garden—offers a quiet but powerful antidote. It reminds us that not all effective solutions must be high-tech or costly; sometimes, they lie in soil, seeds, and sunlight. For instance, the utilization of outdoor nature-based activities to prevent or treat chronic diseases is considered cheaper and more effective (Buckley & Brough, 2017). Fostering an eco-surplus culture enables us to address gaps in healthcare, particularly in prevention and mental health, while also cultivating broader ecological stewardship. The home garden is both a symbol and solution in this vision: accessible, adaptable, and abundant in benefits. As we confront lifestyle diseases, mental health challenges, pandemics, and climate stress, the healing power of nature has become a necessity. A future where clinics distribute garden kits, and doctors prescribe time in parks is not a utopian fantasy but an achievable goal grounded in both traditional wisdom and contemporary science. By realigning healthcare with the natural world, we take meaningful steps toward a more holistic, equitable, and sustainable model of wellness—one in which people and nature flourish together.

## References


Acharibasam, J. B., Datta, R., Hurlbert, M., Strongarm, E. S., Starblanket, E. E., Mckenzie, E. D., . . . Starr, V. (2024). Community-led water governance: Meanings of drinking water governance within remote First Nations and Métis communities in Saskatchewan. *Environmental Science & Policy, 157*, 103790.

Acharibasam, J. B., Hurlbert, M., Datta, R., & wâsakâyâsiw Lewis, K. (2024). Meanings of indigenous land-based healing and the implications for water governance. *EXPLORE, 20*(5), 102998.

Acharibasam, J. B., Riley, K., Datta, R., McKenzie, E. D., & Favel, E. V. (2024). Rethinking Water Governance in the Saskatchewan River Delta Through Indigenous Relational Worldviews. *Australian Journal of Environmental Education, 40*(3), 487-502.

Adevi, A. A., & Mårtensson, F. (2013). Stress rehabilitation through garden therapy: The garden as a place in the recovery from stress. *Urban forestry & urban greening, 12*(2), 230-237.

Adewuyi, F. A., Knobel, P., Gogna, P., & Dadvand, P. (2023). Health effects of green prescription: a systematic review of randomized controlled trials. *Environmental research, 236*, 116844.

Adler, A., Tager, I., & Quintero, D. R. (2005). Decreased prevalence of asthma among farm-reared children compared with those who are rural but not farm-reared. *Journal of allergy and clinical immunology, 115*(1), 67-73.

Agbogidi, O., & Adolor, E. (2013). Home gardens in the maintenance of biological diversity. *Appl Sci Rep, 1*(1), 19-25.

Al Mogrin, M. M., Al Khleb, A. A., Al Shehri, B. M., Al Shreeaf, K. A., Al Busaysi, K. F., Al Rashidi, A. M., & Al Harbi, A. H. (2022). EVOLUTION AND ADVANCEMENTS IN THE DEVELOPMENT OF PHARMACEUTICAL CARE SERVICES. *EPH-International Journal of Medical and Health Science, 8*(1), 1-7.

Alizadehtazi, B., Gurian, P. L., & Montalto, F. A. (2020). Impact of successive rainfall events on the dynamic relationship between vegetation canopies, infiltration, and recharge in engineered urban green infrastructure systems. *Ecohydrology, 13*(2), e2185.

AM, H. M. (2019). Emerging trends in the generation, transmission and protection of Traditional Knowledge. *Indigenous Policy Journal, 30*(1), 1-15.

Andersen, L., Corazon, S. S., & Stigsdotter, U. K. (2021). Nature exposure and its effects on immune system functioning: a systematic review. *International journal of environmental research and public health, 18*(4), 1416.

Andzaurova, P. O., & Nartova-Bochaver, S. K. (2023). Gardening and garden therapy as a resource for human psychological well-being. *RUDN Journal of Psychology and Pedagogics, 20*(2), 331-351.

Antonelli, M., Barbieri, G., & Donelli, D. (2019). Effects of forest bathing (shinrin-yoku) on levels of cortisol as a stress biomarker: a systematic review and meta-analysis. *International journal of biometeorology, 63*(8), 1117-1134.

Anyinam, C. (2016). Ecology and ethnomedicine: exploring links between current environmental crisis and indigenous medical practices. In *Health Psychology* (pp. 260-270): Routledge.

Aziz, M. A., Khan, A. H., Adnan, M., & Ullah, H. (2018). Traditional uses of medicinal plants used by Indigenous communities for veterinary practices at Bajaur Agency, Pakistan. *Journal of ethnobiology and ethnomedicine, 14*, 1-18.

Bade, B. (2004). Alive and well: Generating alternatives to biomedical health care by Mixtec migrant families in California. *Indigenous Mexican migrants in the United states*, 205-248.

Bakolis, I., Hammoud, R., Smythe, M., Gibbons, J., Davidson, N., Tognin, S., & Mechelli, A. (2018). Urban mind: Using smartphone technologies to investigate the impact of nature on mental well-being in real time. *BioScience, 68*(2), 134-145.

Ball, J. C. (1995). A comparison of the UV-B irradiance of low-intensity, full-spectrum lamps with natural sunlight. *Bulletin of the Chicago Herpetological Society, 30*(4), 69-71.

Basu, A., Duvall, J., & Kaplan, R. (2019). Attention restoration theory: Exploring the role of soft fascination and mental bandwidth. *Environment and Behavior, 51*(9-10), 1055-1081.

Basu, S. K., Mukherjee, S. S., Cetzal-Ix, W., Magbalot-Fernandez, A., Zandi, P., & Sinh, L. N. (2024). Indian Medicinal Plants and its Importance to Explore World Wide Mass Education through Integrated Media Learning Process: A Challengeable Envisage at Present Era. *A Basic Overview of Environment and Sustainable Development [Volume: 3]*, 31201.

Bell, S. L., Phoenix, C., Lovell, R., & Wheeler, B. W. (2015). Seeking everyday wellbeing: The coast as a therapeutic landscape. *Social Science & Medicine, 142*, 56-67.

Beyer, K. M., Szabo, A., Hoormann, K., & Stolley, M. (2018). Time spent outdoors, activity levels, and chronic disease among American adults. *Journal of behavioral medicine, 41*, 494-503.

Bhadra, N. K. (2017). The Complex Quantum-State of Consciousness. *IOSR Journal of Applied Physics, 9*, 57-93.

Bikomeye, J. C., Balza, J. S., Kwarteng, J. L., Beyer, A. M., & Beyer, K. M. (2022). The impact of greenspace or nature-based interventions on cardiovascular health or cancer-related outcomes: A systematic review of experimental studies. *PLoS One, 17*(11), e0276517.

Boddy, L., & Donnelly, D. P. (2008). Fractal geometry and microorganisms in the environment. *Biophysical chemistry of fractal structures and processes in environmental systems, 239*, 72.

Bone, K., & Mills, S. (2012). *Principles and practice of phytotherapy: modern herbal medicine*: Elsevier Health Sciences.

Borah, M. P., & Prasad, S. B. (2017). Ethnozoological study of animals based medicine used by traditional healers and indigenous inhabitants in the adjoining areas of Gibbon Wildlife Sanctuary, Assam, India. *Journal of ethnobiology and ethnomedicine, 13*, 1-13.

Boyd, F., Allen, C., Robinson, J. M., & Redvers, N. (2024). The past, present, and future of nature and place-based interventions for human health. *Landscape Research, 49*(1), 129-145.

Brown, D. K., Barton, J. L., & Gladwell, V. F. (2013). Viewing nature scenes positively affects recovery of autonomic function following acute-mental stress. *Environmental science & technology, 47*(11), 5562-5569.

Buckley, R. C., & Brough, P. (2017). Nature, eco, and adventure therapies for mental health and chronic disease. *Frontiers in public health, 5*, 220.

Bush, J., & Doyon, A. (2019). Building urban resilience with nature-based solutions: How can urban planning contribute? *Cities, 95*, 102483.

Caballero-Serrano, V., Onaindia, M., Alday, J. G., Caballero, D., Carrasco, J. C., McLaren, B., & Amigo, J. (2016). Plant diversity and ecosystem services in Amazonian homegardens of Ecuador. *Agriculture, Ecosystems & Environment, 225*, 116-125.

Calvet-Mir, L., March, H., Corbacho-Monné, D., Gómez-Baggethun, E., & Reyes-García, V. (2016). Home garden ecosystem services valuation through a gender lens: a case study in the Catalan Pyrenees. *Sustainability, 8*(8), 718.

Cameron, M. (2010). Feminization and marginalization? Women ayurvedic doctors and modernizing health care in Nepal. *Medical Anthropology Quarterly, 24*(1), 42-63.

Castelli, K. R., Silva, A. M., & Dunning Jr, J. B. (2021). Improving the biodiversity in urban green spaces: A nature based approach. *Ecological Engineering, 173*, 106398.

Chae, Y., Lee, S., Jo, Y., Kang, S., Park, S., & Kang, H. (2021). The effects of forest therapy on immune function. *International journal of environmental research and public health, 18*(16), 8440.

Chang, L., & Lim, J. C. J. (2019). Traditional Chinese medicine physicians' insights into interprofessional tensions between traditional Chinese medicine and biomedicine: a critical perspective. *Health Communication, 34*(2), 238-247.

Chen, L., Fu, Y., Zhang, L., Zhao, S., Feng, Q., Cheng, Y., . . . An, S. W. (2015). Clinical application of traditional herbal medicine in five countries and regions: Japan; South Korea; Mainland China; Hong Kong, China; Taiwan, China. *Journal of Traditional Chinese Medical Sciences, 2*(3), 140-149.

Chen, Y.-H. (2006). The way of nature as a healing power. In *Handbook of multicultural perspectives on stress and coping* (pp. 91-103): Springer.

Christensen, J. H., & Wistoft, K. (2019). Investigating the effectiveness of subject-integrated school garden teaching. *Journal of outdoor and environmental education, 22*(3), 237-251.

Chrysant, S. G., & Chrysant, G. S. (2017). Herbs used for the treatment of hypertension and their mechanism of action. *Current hypertension reports, 19*, 1-10.

Ciftcioglu, G. C. (2017). Social preference-based valuation of the links between home gardens, ecosystem services, and human well-being in Lefke Region of North Cyprus. *Ecosystem Services, 25*, 227-236.

Clarke, L. W., Li, L., Jenerette, G. D., & Yu, Z. (2014). Drivers of plant biodiversity and ecosystem service production in home gardens across the Beijing Municipality of China. *Urban ecosystems, 17*, 741-760.

Cogger, C., Brown, S., & Kurtz, K. (2016). Soil formation and nutrient cycling. In *Sowing Seeds in the City: Ecosystem and Municipal Services* (pp. 25-52): Springer.

Cooper, C., Cunningham, N., Bracken, L. J., & Collier, M. (2024). Distribution of Nature-based Solutions in cities across Europe. *Land use policy, 141*, 107160.

Corazon, S. S., Sidenius, U., Poulsen, D. V., Gramkow, M. C., & Stigsdotter, U. K. (2019). Psycho-physiological stress recovery in outdoor nature-based interventions: A systematic review of the past eight years of research. *International journal of environmental research and public health, 16*(10), 1711.

Dapkūnienė, S., Snieškienė, V., & Maciulevičienė, I. (2020). Plants at homesteads gardens in Polish and Belarus borden zone of Lazdijai District Municipalty.

Das, M., Angeli, F., & van Schayck, O. C. (2020). Understanding self-construction of health among the slum dwellers of India: a culture-centred approach. *Sociology of Health & Illness, 42*(5), 1001-1023.

Dempsey, S., Devine, M. T., Gillespie, T., Lyons, S., & Nolan, A. (2018). Coastal blue space and depression in older adults. *Health & place, 54*, 110-117.

Dinu Roman Szabo, M., Dumitras, A., Mircea, D.-M., Doroftei, D., Sestras, P., Boscaiu, M., . . . Sestras, A. F. (2023). Touch, feel, heal. The use of hospital green spaces and landscape as sensory-therapeutic gardens: a case study in a university clinic. *Frontiers in Psychology, 14*, 1201030.

Djernis, D., Lerstrup, I., Poulsen, D., Stigsdotter, U., Dahlgaard, J., & O'Toole, M. (2019). A systematic review and meta-analysis of nature-based mindfulness: Effects of moving mindfulness training into an outdoor natural setting. *International journal of environmental research and public health, 16*(17), 3202.

Durrani, H. (2016). Healthcare and healthcare systems: inspiring progress and future prospects. *Mhealth, 2*, 3.

Eddouks, M., Chattopadhyay, D., De Feo, V., & Cho, W. C. (2012). Medicinal plants in the prevention and treatment of chronic diseases. *Evidence-based complementary and alternative medicine: eCAM, 2012*, 458274.

Ediati, A., & Utari, A. (2017). Adolescents' anxiety in the coastal region of central Java, Indonesia. *Advanced Science Letters, 23*(4), 3454-3456.

Ekkel, E. D., & de Vries, S. (2017). Nearby green space and human health: Evaluating accessibility metrics. *Landscape and Urban Planning, 157*, 214-220.

Elendu, C. (2024). The evolution of ancient healing practices: From shamanism to Hippocratic medicine: A review. *Medicine, 103*(28), e39005.

Elliott, C. (2024). *Hope in the garden.* Paper presented at the Outdoor Learning in Higher Education: Educating Beyond the Seminar Room.

Espinoza-Turcios, E., Zambrano, L. I., Castro-Ramos, H. N., Armada, J., & Mejia, C. R. (2025). Factors Associated with the Use of Medicinal Plants for Treating Diseases and Symptoms in Honduras. *Journal of herbs, spices & medicinal plants, 31*(1), 38-48.

Etezadifar, S. (2020). *The role of biophilia in hospital humanization the case study of san luigi gonzaga university hospital.* Politecnico di Torino,

Ezell, J. M. (2022). Environmental health capital: A paradigm for environmental injustice prevention and truth and reconciliation. *Local Environment, 27*(2), 131-144.

Feng, H., Liu, Y., Liu, Z., Chi, Z., & Osmani, M. (2024). Sustainable Healing and Therapeutic Design Driven Well-Being in Hospital Environment. *Buildings, 14*(9), 2731.

Fernee, C. R., Gabrielsen, L. E., Andersen, A. J., & Mesel, T. (2017). Unpacking the black box of wilderness therapy: A realist synthesis. *Qualitative Health Research, 27*(1), 114-129.

Finn, S., Herne, M., & Castille, D. (2017). The value of traditional ecological knowledge for the environmental health sciences and biomedical research. *Environmental health perspectives, 125*(8), 085006.

Flandroy, L., Poutahidis, T., Berg, G., Clarke, G., Dao, M.-C., Decaestecker, E., . . . Plovier, H. (2018). The impact of human activities and lifestyles on the interlinked microbiota and health of humans and of ecosystems. *Science of the Total Environment, 627*, 1018-1038.

Fleming, L., Zhang, W., & Nelson, K. (2022). Horticulture for Health Activity in US Hospitals: Horticultural Therapy, Nutrition-led Programming, Gardens at Hospitals, and Affiliated Community Gardens. *Journal of Therapeutic Horticulture, 32*(1).

Frei, R., Heye, K., & Roduit, C. (2022). Environmental influences on childhood allergies and asthma—The Farm effect. *Pediatric Allergy and Immunology, 33*(6), e13807.

Gachelin, G., Garner, P., Ferroni, E., Tröhler, U., & Chalmers, I. (2017). Evaluating Cinchona bark and quinine for treating and preventing malaria. *Journal of the Royal Society of Medicine, 110*(2), 73-82.

Galway, L. P., Parkes, M. W., Allen, D., & Takaro, T. K. (2016). Building interdisciplinary research capacity: a key challenge for ecological approaches in public health. *AIMS public health, 3*(2), 389.

García-Alvarado, J. S., Verde-Star, M. J., & Heredia, N. L. (2001). Traditional uses and scientific knowledge of medicinal plants from Mexico and Central America. *Journal of herbs, spices & medicinal plants, 8*(2-3), 37-89.

Gasperi, D. (2017). Urban horticulture: reducing food miles to improve cities microclimate and environmental sustainability.

Geesink, H. J., & Meijer, D. K. (2017). Nature unites first, second and third harmonics to organize coherent electromagnetic frequency patterns that are crucial for health and disease. *A Solit. algorithm discrete Freq. ordering Ther. Restor. life Process.*, 1-9.

Gerber, S. M., Jeitziner, M.-M., Sänger, S. D., Knobel, S. E., Marchal-Crespo, L., Müri, R. M., . . . Nef, T. (2019). Comparing the relaxing effects of different virtual reality environments in the intensive care unit: observational study. *JMIR perioperative medicine, 2*(2), e15579.

Gheno-Heredia, Y. A., Gámez-Pastrana, R., Nava-Bernal, G., & Ávila-Akerberg, V. (2016). Diversity of Medicinal Plants used by the "Nahuaxihutil" Organization of Traditional Indigenous Midwives and Doctors from Ixhuatla ncillo, Veracruz, Mexico. *Etnobiología, 14*(1), 57-72.

Goldy, S. P., & Piff, P. K. (2020). Toward a social ecology of prosociality: why, when, and where nature enhances social connection. *Current opinion in psychology, 32*, 27-31.

González-Ball, R., Bermúdez-Rojas, T., Romero-Vargas, M., & Ceuterick, M. (2022). Medicinal plants cultivated in urban home gardens in Heredia, Costa Rica. *Journal of ethnobiology and ethnomedicine, 18*(1), 7.

Gorjestani, N. (2004). Indigenous knowledge for development. *Protecting AND Promoting Traditional Knowledge: Systems, National Experiences AND International Dimensions, 265*.

Gruessner, B., Cornet-Vernet, L., Desrosiers, M., Lutgen, P., Towler, M., & Weathers, P. (2019). It is not just artemisinin: Artemisia sp. for treating diseases including malaria and schistosomiasis. *Phytochemistry Reviews, 18*, 1509-1527.

Guerry, A. D., Lonsdorf, E. V., Nootenboom, C., Remme, R. P., Griffin, R., Waters, H., . . . Janke, B. D. (2023). Mapping, measuring, and valuing the benefits of nature-based solutions in cities. In *Nature-based solutions for cities* (pp. 259-293): Edward Elgar Publishing.

Gupta, R. (2024). Integrating ayurveda with modern medicine for enhanced patient care: Analysis of realities. *The Physician, 9*(1), 1-6.

Haque, M. I., Chowdhury, A. A., Shahjahan, M., & Harun, M. G. D. (2018). Traditional healing practices in rural Bangladesh: a qualitative investigation. *BMC complementary and alternative medicine, 18*, 1-15.

Harada, K., Masumoto, K., Fukuzawa, A., Touyama, M., Sato, K., Kondo, N., & Okada, S. (2019). Social interaction in walking groups and affective responses among Japanese older adults. *Journal of Aging and Physical Activity, 28*(2), 287-293.

Harutyunyan, M. (2023). Exploring the rich tapestry of gardens and parks: a journey through history, education, and artistic expressions. *Indonesian Journal of Multidiciplinary Research, 3*(2), 403-416.

Heredia-Díaz, Y., García-Díaz, J., López-González, T., Chil-Nuñez, I., Arias-Ramos, D., Escalona-Arranz, J. C., . . . Sánchez-Torres, M. (2018). An ethnobotanical survey of medicinal plants used by inhabitants of Holguín, Eastern Region, Cuba. *Boletín latinoamericano y del caribe de plantas medicinales y aromáticas, 17*(2).

Hertog, T. (2023). *On the origin of time: Stephen Hawking's final theory*: Random House.

Ho, M.-T., & Vuong, Q.-H. (2024). Five premises to understand human–computer interactions as AI is changing the world. *AI & Society, 40*, 1161-1162. doi:10.1007/s00146-024-01913-3

Homberg, A., Scheffer, C., Brinkhaus, B., Fröhlich, U., Huber, R., Joos, S., . . . Rostock, M. (2022). Naturopathy, complementary and integrative medicine in medical education–position paper by the GMA Committee Integrative Medicine and Perspective Pluralism. *GMS journal for medical education, 39*(2), Doc16.

Hondagneu-Sotelo, P. (2014). *Paradise transplanted: Migration and the making of California gardens*: University of California Press.

Hoogerbrugge, I. D., & Fresco, L. O. (1993). Homegarden systems: agricultural characteristics and challenges.

Huang, N., Chien, L.-Y., & Chiou, S.-T. (2016). Advances in health promotion in Asia-Pacific: promoting health through hospitals. *Global health promotion, 23*(1_suppl), 26-34.

Hunter, J. (2014). *Seven generations healing: traditional ecological knowledge, recording, application, maintenance and revival.* Macquarie University,

Hunter, M. R., Gillespie, B. W., & Chen, S. Y.-P. (2019). Urban nature experiences reduce stress in the context of daily life based on salivary biomarkers. *Frontiers in Psychology, 10*, 413490.

Hyvönen, K., Salonen, K., Paakkolanvaara, J.-V., Väkeväinen, P., & Korpela, K. (2023). Effects of nature-based intervention in the treatment of depression: A multi-center, randomized controlled trial. *Journal of environmental psychology, 85*, 101950.

Jamal, A. (2023). Embracing nature's therapeutic potential: Herbal medicine. *International Journal of Multidisciplinary Sciences and Arts, 2*(3), 117-126.

Jansen, C., Baker, J., Kodaira, E., Ang, L., Bacani, A., Aldan, J., . . . Stokes, A. (2021). Medicine in motion: Opportunities, challenges and data analytics-based solutions for traditional

medicine integration into western medical practice. *Journal of Ethnopharmacology, 267*, 113477.

Javid Khan, R. A., & Lucas, J. Building Environments for Human Experiences: An In-Depth Exploration of Human-Centric Design. *Available at SSRN 4893106*.

Jennings, V., & Bamkole, O. (2019). The relationship between social cohesion and urban green space: An avenue for health promotion. *International journal of environmental research and public health, 16*(3), 452.

Jimenez, M. P., DeVille, N. V., Elliott, E. G., Schiff, J. E., Wilt, G. E., Hart, J. E., & James, P. (2021). Associations between nature exposure and health: a review of the evidence. *International journal of environmental research and public health, 18*(9), 4790.

Johansson, G., Juuso, P., & Engström, Å. (2022). Nature-based interventions to promote health for people with stress-related illness: An integrative review. *Scandinavian journal of caring sciences, 36*(4), 910-925.

Johnson-Jennings, M., Billiot, S., & Walters, K. (2020). Returning to our roots: Tribal health and wellness through land-based healing. *Genealogy, 4*(3), 91.

Kannan, N., Anandhi, A., & Jeong, J. (2018). Estimation of stream health using flow-based indices. *Hydrology, 5*(1), 20.

Kaul, S., Ahmed, M., Zargar, K., Sharma, P., & Dhar, M. K. (2013). Prospecting endophytic fungal assemblage of Digitalis lanata Ehrh.(foxglove) as a novel source of digoxin: a cardiac glycoside. *3 Biotech, 3*, 335-340.

Khan, F., & Khan, N. (2024). Healing from Nature: Medicinal Plant Extracts and Fractions. *SUSTAINABLE INNOVATIONS IN MICROBIOLOGY*, 111.

Khan, M. S. A., & Ahmad, I. (2019). Herbal medicine: current trends and future prospects. In *New look to phytomedicine* (pp. 3-13): Elsevier.

Kim, Y., Bertagna, F., D'souza, E. M., Heyes, D. J., Johannissen, L. O., Nery, E. T., . . . Spencer, M. G. (2021). Quantum biology: An update and perspective. *Quantum Reports, 3*(1), 80-126.

Kondo, M. C., Oyekanmi, K. O., Gibson, A., South, E. C., Bocarro, J., & Hipp, J. A. (2020). Nature prescriptions for health: A review of evidence and research opportunities. *International journal of environmental research and public health, 17*(12), 4213.

Kopiczko, A. (2020). Determinants of bone health in adults Polish women: The influence of physical activity, nutrition, sun exposure and biological factors. *PLoS One, 15*(9), e0238127.

Krols, J., Aerts, R., Vanlessen, N., Dewaelheyns, V., Dujardin, S., & Somers, B. (2022). Residential green space, gardening, and subjective well-being: A cross-sectional study of garden owners in northern Belgium. *Landscape and Urban Planning, 223*, 104414.

La Fleur, J. (2018). Improvising Caribbean Medicine in the Age of Slavery. *New West Indian Guide/Nieuwe West-Indische Gids, 92*(3-4), 285-291.

Lauwers, L., Bastiaens, H., Remmen, R., & Keune, H. (2020). Nature's contributions to human health: a missing link to primary health care? A scoping review of international overview reports and scientific evidence. *Frontiers in public health, 8*, 52.

Leimgruber, W. (2018). The Marginalization of the Environment. In *Between Global and Local* (pp. 195-228): Routledge.

Lennox, L., Maher, L., & Reed, J. (2018). Navigating the sustainability landscape: a systematic review of sustainability approaches in healthcare. *Implementation Science, 13*, 1-17.

Levi, D., & Kocher, S. (1999). Virtual nature: The future effects of information technology on our relationship to nature. *Environment and Behavior, 31*(2), 203-226.

Lew, T., & Fleming, K. J. (2024). Phytoncides and immunity from forest to facility: A systematic review and meta-analysis. *Pharmacological Research-Natural Products*, 100061.

Li, P., & Wang, Z.-H. (2021). Environmental co-benefits of urban greening for mitigating heat and carbon emissions. *Journal of Environmental Management, 293*, 112963.

Liu, H.-Y., Jay, M., & Chen, X. (2021). The role of nature-based solutions for improving environmental quality, health and well-being. *Sustainability, 13*(19), 10950.

Londono-Escudero, C. (2023). Nature governance for collective well-being: reconciling holistic sustainability and human development. *Journal of Humanities and Applied Social Sciences, 5*(3), 193-210.

Loureiro, A., & Veloso, S. (2016). Green exercise, health and well-being. In *Handbook of environmental psychology and quality of life research* (pp. 149-169): Springer.

Lundgren, K. (2004). *Nature-based therapy: its potential as a complementary approach to treating communication disorders.* Paper presented at the Seminars in Speech and language.

Madhumithaa, S., Kavitha, G., & Ramaswamy, R. (2020). *Effects of superstitious beliefs, old customs and practices on human health*. Retrieved from

Mahady, G. B. (2005). Medicinal plants for the prevention and treatment of bacterial infections. *Current pharmaceutical design, 11*(19), 2405-2427.

Mahdi, J. G. (2010). Medicinal potential of willow: A chemical perspective of aspirin discovery. *Journal of Saudi Chemical Society, 14*(3), 317-322.

Mahtani-Williams, S. (2024). *Uses, Functions, and Values of Home Gardens: a case study on the Greek island of Lesvos.*

Malhi, Y., Franklin, J., Seddon, N., Solan, M., Turner, M. G., Field, C. B., & Knowlton, N. (2020). Climate change and ecosystems: threats, opportunities and solutions. In (Vol. 375, pp. 20190104): The Royal Society.

Manawadu, L. (2020). Assessment of Food Miles and Reduction of Greenhouse Gas Emissions Promoting Home Gardening.

Maxwell, S. L., Butt, N., Maron, M., McAlpine, C. A., Chapman, S., Ullmann, A., . . . Watson, J. E. (2019). Conservation implications of ecological responses to extreme weather and climate events. *Diversity and Distributions, 25*(4), 613-625.

Mazumdar, S., & Mazumdar, S. (2012). Immigrant home gardens: Places of religion, culture, ecology, and family. *Landscape and Urban Planning, 105*(3), 258-265.

McEwan, K., Richardson, M., Sheffield, D., Ferguson, F. J., & Brindley, P. (2019). A smartphone app for improving mental health through connecting with urban nature. *International journal of environmental research and public health, 16*(18), 3373.

McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing stewardship practices as indicators of social resilience: In living memorials and in a community garden. *Sustainability, 8*(8), 775.

Mekonen, S. (2017). Roles of traditional ecological knowledge for biodiversity conservation. *Journal of Natural Sciences Research, 7*(15), 21-27.

Menendez-Baceta, G., Aceituno-Mata, L., Reyes-García, V., Tardío, J., Salpeteur, M., & Pardo-de-Santayana, M. (2015). The importance of cultural factors in the distribution of medicinal plant knowledge: a case study in four Basque regions. *Journal of Ethnopharmacology, 161*, 116-127.

Millar, T. J., Walsh, C., & Field, T. A. (2017). Negative ions in space. *Chemical reviews, 117*(3), 1765-1795.

Mintah, S. O., Asafo-Agyei, T., Archer, M.-A., Junior, P. A.-A., Boamah, D., Kumadoh, D., . . . Agyare, C. (2019). Medicinal plants for treatment of prevalent diseases. *Pharmacognosy-medicinal plants, 17*, 1-9.

Mohri, H., Lahoti, S., Saito, O., Mahalingam, A., Gunatilleke, N., Hoang, V. T., . . . Herath, S. (2013). Assessment of ecosystem services in homegarden systems in Indonesia, Sri Lanka, and Vietnam. *Ecosystem Services, 5*, 124-136.

Mottershead, R., & Ghisoni, M. (2021). Horticultural therapy, nutrition and post-traumatic stress disorder in post-military veterans: Developing non-pharmaceutical interventions to complement existing therapeutic approaches. *F1000Research, 10*, 885.

Neill, C., Gerard, J., & Arbuthnott, K. D. (2019). Nature contact and mood benefits: Contact duration and mood type. *The journal of positive psychology, 14*(6), 756-767.

Newton, K. T., & Ashley, A. (2020). Introducing the Interdisciplinary Nature of Health Care Through Case Study Models. *Journal of Education and Training Studies, 8*(1), 20-31.

Nguyen, L., & Walters, J. (2024). Benefits of nature exposure on cognitive functioning in children and adolescents: a systematic review and meta-analysis. *Journal of environmental psychology*, 102336.

Nguyen, M.-H. (2024). How can satirical fables offer us a vision for sustainability? *Visions for Sustainability*. doi:10.13135/2384-8677/11267

Nguyen, M.-H., & Jones, T. E. (2022). Building eco-surplus culture among urban residents as a novel strategy to improve finance for conservation in protected areas. *Humanities and Social Sciences Communications, 9*(1), 426. doi:10.1057/s41599-022-01441-9

Nguyen, M.-H., Le, T.-T., & Vuong, Q.-H. (2023). Ecomindsponge: A novel perspective on human psychology and behavior in the ecosystem. *Urban Science, 7*(1), 31. doi:10.3390/urbansci7010031

Nguyen, M.-H., Nguyen, M.-H. T., Jin, R., Nguyen, Q.-L., La, V.-P., Le, T.-T., & Vuong, Q.-H. (2023). Preventing the separation of urban humans from nature: The impact of pet and plant diversity on biodiversity loss belief. *Urban Science, 7*(2), 46. doi:10.3390/urbansci7020046

Nguyen, P.-Y., Astell-Burt, T., Rahimi-Ardabili, H., & Feng, X. (2023). Effect of nature prescriptions on cardiometabolic and mental health, and physical activity: a systematic review. *The Lancet Planetary Health, 7*(4), e313-e328. doi:10.1016/S2542-5196(23)00025-6

Nieberler-Walker, K., Desha, C., Bosman, C., Roiko, A., & Caldera, S. (2023). Therapeutic hospital gardens: Literature review and working definition. *HERD: Health Environments Research & Design Journal, 16*(4), 260-295.

Niñez, V. K. (1985). *Household gardens: Theoretical considerations on an old survival strategy* (Vol. 1): International Potato Center.

Nissen, N. (2015). Naturalness as an ethical stance: idea (l) s and practices of care in western herbal medicine in the UK. *Anthropology & Medicine, 22*(2), 162-176.

Nomani, M. Z. M. (2020). The access and benefit-sharing regime: An environmental justice perspective. *Environmental Policy and Law, 49*(4-5), 259-263.

Ohly, H., White, M. P., Wheeler, B. W., Bethel, A., Ukoumunne, O. C., Nikolaou, V., & Garside, R. (2016). Attention Restoration Theory: A systematic review of the attention restoration potential of exposure to natural environments. *Journal of Toxicology and Environmental Health, Part B, 19*(7), 305-343.

Okoli, R., Aigbe, O., Ohaju-Obodo, J., & Mensah, J. (2007). Medicinal herbs used for managing some common ailments among Esan people of Edo State, Nigeria. *Pakistan Journal of Nutrition, 6*(5), 490-496.

Panthee, B., Gyawali, S., Panthee, P., & Techato, K. (2022). Environmental and human microbiome for health. *Life, 12*(3), 456.

Panyadee, P., Balslev, H., Wangpakapattanawong, P., & Inta, A. (2019). Medicinal plants in homegardens of four ethnic groups in Thailand. *Journal of Ethnopharmacology, 239*, 111927.

Park, S.-A., Lee, A.-Y., Park, H.-G., Son, K.-C., Kim, D.-S., & Lee, W.-L. (2017). Gardening intervention as a low-to moderate-intensity physical activity for improving blood lipid profiles, blood pressure, inflammation, and oxidative stress in women over the age of 70: A pilot study. *HortScience, 52*(1), 200-205.

Patra, J. K., Das, G., Lee, S., Kang, S.-S., & Shin, H.-S. (2018). Selected commercial plants: A review of extraction and isolation of bioactive compounds and their pharmacological market value. *Trends in Food Science & Technology, 82*, 89-109.

Pieroni, A., Muenz, H., Akbulut, M., Başer, K. H. C., & Durmuşkahya, C. (2005). Traditional phytotherapy and trans-cultural pharmacy among Turkish migrants living in Cologne, Germany. *Journal of Ethnopharmacology, 102*(1), 69-88.

Prajapati, R. I. (2024). Role of Ayurveda and Indigenous Knowledge in Developing Green Entrepreneurship. *Research Review Journal of Indian Knowledge Systems, 1*(2), 33-43.

Pranskuniene, Z., Bajoraite, R., Simaitiene, Z., & Bernatoniene, J. (2021). Home Gardens as a Source of Medicinal, Herbal and Food Preparations: Modern and Historical Approaches in Lithuania. *Applied Sciences, 11*(21), 9988.

Priya, R., & Kurian, C. M. (2018). Regulating access and protecting traditional health knowledge through intellectual property rights? Issues from a holistic health systems perspective. *Science, Technology and Society, 23*(3), 504-529.

Pushpakumara, G., Sokolow, J., Sthapit, B., Sujarwo, W., & Hunter, D. (2020). Keeping it close to home: Home gardens and biodiversity conservation. *Home gardens for improved food security and livelihoods*, 46-77.

Queirolo, L., Fazia, T., Roccon, A., Pistollato, E., Gatti, L., Bernardinelli, L., . . . Berrino, F. (2024). Effects of forest bathing (Shinrin-yoku) in stressed people. *Frontiers in Psychology, 15*, 1458418.

Rasul, M. G. (2018). Extraction, isolation and characterization of natural products from medicinal plants. *Int. J. Basic Sci. Appl. Comput, 2*(6), 1-6.

Redvers, J. (2020). “The land is a healer”: perspectives on land-based healing from Indigenous practitioners in northern Canada. *International Journal of Indigenous Health, 15*(1), 90-107.

Redvers, J. M. (2016). Land-based practice for Indigenous health and wellness in Yukon, Nunavut, and the Northwest Territories.

Redvers, N. (2018). The value of global indigenous knowledge in planetary health. *Challenges, 9*(2), 30.

Rogge, N., Theesfeld, I., & Strassner, C. (2018). Social sustainability through social interaction—A national survey on community gardens in Germany. *Sustainability, 10*(4), 1085.

Rook, G. A. (2013). Regulation of the immune system by biodiversity from the natural environment: an ecosystem service essential to health. *Proceedings of the National Academy of Sciences, 110*(46), 18360-18367.

Rovelli, C. (2018). *Reality is not what it seems: The journey to quantum gravity*: Penguin.

Ryan Chen, M. (2024). Unnatural Climate Solutions: The Naturalizing Practice of Traditional Chinese Medicine.

Salahub, A. (2023). Using ecological gardening to promote nature connection, wellbeing, and group building: a pilot service using experiential learning, mindful activities, and reflection to study the effects of nature and gardening together.

Santos, M., Moreira, H., Cabral, J. A., Gabriel, R., Teixeira, A., Bastos, R., & Aires, A. (2022). Contribution of home gardens to sustainable development: perspectives from a supported opinion essay. *International journal of environmental research and public health, 19*(20), 13715.

Saslis-Lagoudakis, C. H., Hawkins, J. A., Greenhill, S. J., Pendry, C. A., Watson, M. F., Tuladhar-Douglas, W., . . . Savolainen, V. (2014). The evolution of traditional knowledge: environment shapes medicinal plant use in Nepal. *Proceedings of the Royal Society B: Biological Sciences, 281*(1780), 20132768.

Schiebinger, L. (2017). *Secret cures of slaves: People, plants, and medicine in the eighteenth-century Atlantic world*: Stanford University Press.

Scott, E. E., LoTemplio, S. B., McDonnell, A. S., McNay, G. D., Greenberg, K., McKinney, T., . . . Strayer, D. L. (2021). The autonomic nervous system in its natural environment: Immersion in nature is associated with changes in heart rate and heart rate variability. *Psychophysiology, 58*(4), e13698.

Sen, S., & Chakraborty, R. (2017). Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: Importance, challenges and future. *Journal of traditional and complementary medicine, 7*(2), 234-244.

Severin, M. I., Raes, F., Notebaert, E., Lambrecht, L., Everaert, G., & Buysse, A. (2022). A qualitative study on emotions experienced at the coast and their influence on well-being. *Frontiers in Psychology, 13*, 902122. doi:10.3389/fpsyg.2022.902122

Shanahan, D. F., Franco, L., Lin, B. B., Gaston, K. J., & Fuller, R. A. (2016). The benefits of natural environments for physical activity. *Sports medicine, 46*(7), 989-995.

Shankar, D. (2015). Health sector reforms for 21st century healthcare. *Journal of Ayurveda and integrative medicine, 6*(1), 4.

Shannon, C. E. (1948). A mathematical theory of communication. *The Bell System Technical Journal, 27*(3), 379-423. doi:10.1002/j.1538-7305.1948.tb01338.x

Sherbekov, A., Jalilova, S., & Pulatova, I. (2025). ENGLISH TERMINOLOGIES RELATED TO NATURAL HEALING. *JOURNAL OF INTERNATIONAL SCIENTIFIC RESEARCH, 2*(1), 150-153.

Shim, J.-M., & Kim, J. (2018). Cross-national differences in the holistic use of traditional East Asian medicine in East Asia. *Health promotion international, 33*(3), 536-544.

Singh, P., Singh, T., Singh, S., Singh, O., & Singh, A. (2024). Organic Kitchen Gardening: A Way Towards Sustainable Waste Management. In *Encyclopedia of Green Materials* (pp. 1-8): Springer.

Smith-Hall, C., Larsen, H. O., & Pouliot, M. (2012). People, plants and health: a conceptual framework for assessing changes in medicinal plant consumption. *Journal of ethnobiology and ethnomedicine, 8*, 1-11.

Smith, N., Georgiou, M., King, A. C., Tieges, Z., Webb, S., & Chastin, S. (2021). Urban blue spaces and human health: A systematic review and meta-analysis of quantitative studies. *Cities, 119*, 103413.

Sofowora, A., Ogunbodede, E., & Onayade, A. (2013). The role and place of medicinal plants in the strategies for disease prevention. *African journal of traditional, complementary and alternative medicines, 10*(5), 210-229.

Soga, M., Gaston, K. J., & Yamaura, Y. (2017). Gardening is beneficial for health: A meta-analysis. *Preventive medicine reports, 5*, 92-99.

Souza, C. A., Andrade, W. M., Ramos, T. S., JS Filho, A., Freitas, A. L., Lima, T. C., . . . Silva, F. A. (2019). Medicinal plants in basic care: A study of clinical practice. *Pharmacognosy Journal, 11*(4).

Steele, L. (2020). Holistic well-being: Mental, physical, and spiritual. *Good Health and Well-Being*, 373-382.

Sumarni, W., Sudarmin, S., & Sumarti, S. (2019). *The scientification of jamu: A study of Indonesian's traditional medicine.* Paper presented at the Journal of Physics: Conference Series.

Tang, I.-C., Tsai, Y.-P., Lin, Y.-J., Chen, J.-H., Hsieh, C.-H., Hung, S.-H., . . . Chang, C.-Y. (2017). Using functional Magnetic Resonance Imaging (fMRI) to analyze brain region activity when viewing landscapes. *Landscape and Urban Planning, 162*, 137-144.

Thacharodi, A., Singh, P., Meenatchi, R., Tawfeeq Ahmed, Z., Kumar, R. R., V, N., . . . Hassan, S. (2024). Revolutionizing healthcare and medicine: The impact of modern technologies for a healthier future—A comprehensive review. *Health Care Science, 3*(5), 329-349.

Thompson, A., Bunds, K., Larson, L., Cutts, B., & Hipp, J. A. (2023). Paying for nature-based solutions: A review of funding and financing mechanisms for ecosystem services and their impacts on social equity. *Sustainable Development, 31*(4), 1991-2066.

Tischer, C., Kirjavainen, P., Matterne, U., Tempes, J., Willeke, K., Keil, T., . . . Täubel, M. (2022). Interplay between natural environment, human microbiota and immune system: A scoping review of interventions and future perspectives towards allergy prevention. *Science of the Total Environment, 821*, 153422.

Tomlinson, T. R., & Akerele, O. (2015). *Medicinal plants: their role in health and biodiversity*: University of Pennsylvania press.

Tse, A. C., Wong, T. W., & Lee, P. H. (2015). Effect of low-intensity exercise on physical and cognitive health in older adults: a systematic review. *Sports medicine-open, 1*, 1-13.

Tyrväinen, L., Ojala, A., Korpela, K., Lanki, T., Tsunetsugu, Y., & Kagawa, T. (2014). The influence of urban green environments on stress relief measures: A field experiment. *Journal of environmental psychology, 38*, 1-9.

Uhing, W., & Tannenbaum, L. (2022). Getting back to nature: Healing the mind, body, and spirit of healthcare workers. *Journal of Interprofessional Education & Practice, 29*, 100583.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *science, 224*(4647), 420-421.

Van Andel, T., & Westers, P. (2010). Why Surinamese migrants in the Netherlands continue to use medicinal herbs from their home country. *Journal of Ethnopharmacology, 127*(3), 694-701.

van den Bosch, M. (2017). Natural environments, health, and well-being. In *Oxford Research Encyclopedia of Environmental Science*.

Veen, E. J., Bock, B. B., Van den Berg, W., Visser, A. J., & Wiskerke, J. S. (2016). Community gardening and social cohesion: different designs, different motivations. *Local Environment, 21*(10), 1271-1287.

Victorson, D. (2024). Cultivating Reciprocity Between People and Planet: Habit-Stacking Planetary Health Prescriptions Into Existing Nature RX Encounters During Integrative

Health Visits. *Global Advances in Integrative Medicine and Health, 13*, 27536130241245429.

Villegas, L. F., Fernández, I. D., Maldonado, H., Torres, R., Zavaleta, A., Vaisberg, A. J., & Hammond, G. B. (1997). Evaluation of the wound-healing activity of selected traditional medicinal plants from Peru. *Journal of Ethnopharmacology, 55*(3), 193-200.

Vitale, V., & Bonaiuto, M. (2024). The role of nature in emotion regulation processes: An evidence-based rapid review. *Journal of environmental psychology*, 102325.

Vuong, Q.-H. (2018). The (ir)rational consideration of the cost of science in transition economies. *Nature Human Behaviour, 2*, 5. doi:10.1038/s41562-017-0281-4

Vuong, Q.-H. (2021). The semiconducting principle of monetary and environmental values exchange. *Economics and Business Letters, 10*(3), 284-290. doi:10.17811/ebl.10.3.2021.284-290

Vuong, Q.-H. (2023). *Mindsponge theory*: Walter de Gruyter GmbH.

Vuong, Q.-H. (2024). *Wild Wise Weird*: AISDL.

Vuong, Q.-H., Duong, M.-P. T., Nguyen, Q.-Y. T., La, V.-P., Nguyen, P.-T., & Nguyen, M.-H. (2024). Ocean economic and cultural benefit perceptions as stakeholders' constraints for supporting conservation policies: A multi-national investigation. *Marine Policy, 163*, 106134. doi:10.1016/j.marpol.2024.106134

Vuong, Q.-H., Duong, M.-P. T., Sari, N. P. W. P., La, V.-P., & Nguyen, M.-H. (2024a). From beauty to belief: The aesthetic and diversity values of plants and pets in shaping biodiversity loss belief among Vietnamese urban residents. *Humanities and Social Sciences Communications, 11*, 1510. doi:10.1057/s41599-024-04036-8

Vuong, Q.-H., Duong, M.-P. T., Sari, N. P. W. P., La, V.-P., & Nguyen, M.-H. (2024b). From beauty to belief: The aesthetic and diversity values of plants and pets in shaping biodiversity loss belief among Vietnamese urban residents. *Humanities and Social Sciences Communications, 11*(1), 1-15.

Vuong, Q.-H., & Nguyen, M.-H. (2024a). *Better economics for the Earth: A lesson from quantum and information theories*: AISDL.

Vuong, Q.-H., & Nguyen, M.-H. (2024b). Exploring the role of rejection in scholarly knowledge production: Insights from granular interaction thinking and information theory. *Learned Publishing*, e1636. doi:10.1002/leap.1636

Vuong, Q.-H., & Nguyen, M.-H. (2024c). Further on informational quanta, interactions, and entropy under the granular view of value formation. *The VMOST Journal of Social Sciences and Humanities*. doi:10.2139/ssrn.4922461

Vuong, Q.-H., & Nguyen, M.-H. (2025). On Nature Quotient.

Waddell, G. (2020). *The Enchantment of Western Herbal Medicine: Herbalists, Plants, and Nonhuman Agency*: Aeon Books.

Wang, F., & Boros, S. (2025). Effect of gardening activities on domains of health: a systematic review and meta-analysis. *BMC Public Health, 25*(1), 1102.

Wang, K., Li, Y., Na, M., Wang, C., Ba, D. M., Sun, L., & Gao, X. (2024). Association between gardening and multiple sleep complaints: A nationwide study of 62,098 adults. *Journal of Affective Disorders, 355*, 131-135.

Wang, W.-j., & Zhang, T. (2017). Integration of traditional Chinese medicine and Western medicine in the era of precision medicine. In (Vol. 15, pp. 1-7): Elsevier.

White, M. P., Alcock, I., Wheeler, B. W., & Depledge, M. H. (2013). Coastal proximity, health and well-being: Results from a longitudinal panel survey. *Health & place, 23*, 97-103.

White, M. P., Pahl, S., Wheeler, B. W., Depledge, M. H., & Fleming, L. E. (2017). Natural environments and subjective wellbeing: Different types of exposure are associated with different aspects of wellbeing. *Health & place, 45*, 77-84.

Willis, K. J., & Petrokofsky, G. (2017). The natural capital of city trees. *science, 356*(6336), 374-376.

Yan, S., Azmi, A., Mansor, N., Wang, Z., & Wang, Y. (2024). Healing spaces as a design approach to optimize emotional regulation for patients with mood disorders. *Buildings, 14*(2), 472.

Yao, W., Zhang, X., & Gong, Q. (2021). The effect of exposure to the natural environment on stress reduction: A meta-analysis. *Urban forestry & urban greening, 57*, 126932.

Yuan, H., Ma, Q., Ye, L., & Piao, G. (2016). The traditional medicine and modern medicine from natural products. *Molecules, 21*(5), 559.

Zaigham, H., Tauheed, A., & Ali, A. (2019). Recent trend in traditional medicine dosage form and present status of Unani and Ayurvedic medicine. *Int J Pharm Sci & Res, 10*(4), 1640-1649.

Zhang, X., Zhang, Y., & Zhai, J. (2021). Home garden with eco-healing functions benefiting mental health and biodiversity during and after the COVID-19 pandemic: a scoping review. *Frontiers in public health, 9*, 740187.

Zhao, Y., Zhan, Q., & Xu, T. (2022). Biophilic design as an important bridge for sustainable interaction between humans and the environment: Based on practice in Chinese healthcare space. *Computational and Mathematical Methods in Medicine, 2022*(1), 8184534.