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REVIEW ARTICLE

The Impact of Blue and Green Spaces on Wellbeing: A Review of Reviews through a Positive Psychology Lens

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Abstract

The impact of blue and green spaces on wellbeing has been universally acknowledged. However, the meaning of "wellbeing" differs depending on the lens through which it is viewed. The current review of reviews considers the impact of blue and green spaces from the positive psychology perspective, which focuses on the gains in psychological outcomes (e.g., optimism, positive affect) instead of a reduction in deficits (e.g., depression, anxiety). Of the 149 systematic review and meta-analysis papers, 17 were included in the current review of reviews. The results highlighted the scarcity of systematic reviews that assess the positive outcomes of blue and green spaces and moderating factors associated with them. The existing systematic reviews identified inconsistent wellbeing frameworks, focused primarily on positive affect as an outcome of engaging in nature and disregarded eudaimonic aspects of wellbeing. Limitations of the current systematic reviews and future directions are discussed along with the implications for practice.

Keywords: Blue and green spaces, wellbeing, positive psychology, systematic review

Wellbeing is underpinned by natural capital, which relates to stocks of natural renewable and non-renewable resources that include water, soil, vegetation and air (Bateman & Mace, 2020). When natural capital is of poor quality, it impacts individuals and communities negatively. Natural capital may benefit people directly, for example via the quality of drinking water they consume; or indirectly, for example by supporting the economy, which will in turn impact their quality of life (Bateman & Mace, 2020). Ecosystem services which describe the flow of benefits from natural capital to humans (Costanza, 2020) and are therefore crucial to life on earth (Bateman & Mace, 2020; Guerry et al., 2015).

Globally, populations are rising (United Nations, 2019), especially in urban areas where 55% of the people currently live and have limited contact with the natural environment, such as green and blue spaces (United Nations, 2019). The provision of high-quality blue and green space can play a significant role in alleviating many of the grand challenges we face as a society, including mitigating the impacts of climate change, improving air quality, increasing biodiversity, as well as improving our physical and mental wellbeing (Geary et al., 2021). Recently, blue and green spaces' interventions were introduced as a range of positive health tools that enhance psychological, emotional and physiological health and wellbeing (Burke et al., 2022), thus their contribution is invaluable given the rising population.

While extensive research has been undertaken on ecosystem services, the specific role of natural capital in supporting positive physical and mental health has received less attention (Jones et al., 2022; Thompson et al., 2021). Its importance, however, is evident, as was particularly apparent during pandemic conditions where access to blue and green space played an essential role in maintaining wellbeing and providing an outlet for society during lockdown (Geary et al., 2021). Understanding the role of blue and green space on wellbeing may play an essential role in caring both for our health and our natural spaces, leading to more informed design and management, which

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maintains the necessary flow of ecosystem services from natural capital to humans. At the same time, it is important that research on green and blue spaces incorporates various models of health and wellbeing, including a positive psychology perspective, which is a scientific study of what makes lives worth living (Peterson, 2008).

Wellbeing

Wellbeing is often understood and measured as the absence of illness, e.g., reduction of mood disorders; thus, by the beginning of the century, the ratio of research published about depression/anxiety compared with happiness/wellbeing was 17:1 (Achor, 2010). The same trend existed in other fields of research, e.g., barely 7% of neuroscientific articles were published about a healthy brain as opposed to a damaged brain, 99% of management articles delved into pathologies in managers instead of what it means to be a good manager, and 2.35% of articles delved into positive aspects of education (Randolph, 2022; Rusk & Waters, 2013). This biased perspective resulted in an unbalanced view of human beings. This is why in line with the World Health Organisation's health (WHO, 2022a), the Positive Psychology movement was created to redress the imbalance by focusing on what is right rather than wrong with people (Seligman & Csikszentmihalyi, 2000). As part of this movement, wellbeing research expanded towards exploring the positive aspects of wellness, not only deficits (Burke & Arslan, 2021; Dempsey & Burke, 2021) and what makes life worth living (Arslan & Wong, 2022; Peterson, 2008).

Wellbeing perceived as a presence of positive outcomes does not correlate with deficits, as they are conceptually different aspects of human behaviour and attitude outcomes (see Moneta, 2013 for a review). Moreover, both deficits and positive outcomes can co-exist; individuals may experience severe depression and symptoms of psychological flourishing (the highest level of emotional, psychological and social wellbeing) simultaneously (e.g., Keyes et al., 2010). Thus, positive outcomes of wellbeing are not opposites of the adverse outcomes or the other side of a wellbeing continuum but distinct psychological concepts with their unique role in the wellbeing process and as such need to be measured.

The positive psychological outcomes of wellbeing are presented as individual concepts, such as harmonious passion (Vallerand, 2012), post-traumatic growth (Tedeschi et al., 2018); or as part of flourishing models and measures (e.g. Diener et al., 2010; Huppert & So, 2013; Keyes, 2002; Seligman, 2011). They include such hedonic outcomes as positive affect, emotional stability; or eudaimonic outcomes such as engagement, relationships, meaning in life, purpose, accomplishment, self-actualisation, autonomy, optimism, self-esteem, environmental mastery, competence, resilience, personal growth, social contribution, social integration, social acceptance, social coherence, self-acceptance and many other. Eudaimonic components of wellbeing are more stable and are associated with a life worth living (Ryff, 1989). Therefore, when assessing the impact of blue and green spaces on wellbeing, it is essential to explore their impact on a range of positive outcomes.

Initially, positive psychology aimed to accentuate the positive processes and characteristics that lead to positive outcomes such as happiness (Seligman & Csikszentmihalyi, 2000). Subsequently, the purpose of positive psychology has evolved and shifted towards flourishing, considered the highest level of psychological functioning (Arslan & Wong, 2022; Seligman, 2011). Four main models of flourishing have emerged (Hone et al., 2014), which conceptualised flourishing differently. The Wellbeing model, otherwise known as PERMA, comprised five elements, i.e., positive emotions, engagement, relationships, meaning, and accomplishment (Seligman, 2011). The Mental Health Continuum model incorporated two main theories of wellbeing, i.e., Psychological Wellbeing (Ryff, 1998), Subjective Wellbeing (Diener et al., 1984), and an additional component of Social Wellbeing (Keyes, 1998). The Huppert and So's model (2013) identified core elements of wellbeing, i.e., positive emotions, engagement, interest, meaning, and purpose, and additional elements, i.e., self-esteem, optimism, resilience, vitality, self-determination and positive relationships. The Flourishing model developed by Diener et al. (2010) comprises positive relationships, engagement, purpose and meaning, self-acceptance and self-esteem, competencies, optimism and social contribution. In addition to the main flourishing models, alternative models have been proposed that include additional elements, such as health, financial wellbeing, character and virtues (Donaldson, 2020; Vanderveele, 2017). This paper will focus on the wellbeing elements from the flourishing models and similar positive wellbeing outcomes when exploring wellbeing.

Positive Psychological Perspective on Green and Blue Spaces

The rationale for conducting this review is threefold. Firstly, it draws the attention of researchers specialising in green and blue spaces to explore the positive psychology angle of wellbeing when conducting original research and systematic reviews. Currently, this field is overcrowded by research assessing the reduction of mental health issues, such as depression and anxiety (e.g., Geneshka et al., 2021 White et al., 2021), and when wellbeing assets are assessed, they usually incorporate basic Subjective Wellbeing elements, such as happiness or positive affect (e.g., Britto et al., 2022). Opening up researchers' perspectives on the more complex elements of wellbeing that incorporate eudaimonic wellbeing can enrich the research perspective and reduce the current gap in research relating to blue and green spaces.

Secondly, we aim to understand and map out the knowledge that already exists in relation to the impact of blue and green spaces on wellbeing. This will help researchers and practitioners consider incorporating more nature into Positive Psychology Interventions (PPIs) developed to improve flourishing, not only reduce mental health issues. PPIs are tools that (1) aim to build positive variables (e.g., Subjective Wellbeing or meaning); (2) provide empirical evidence that they can change the variable; (3) demonstrate empirical evidence that manipulating the variable will result in positive outcomes for the population (Parks & Biswas-Diener, 2013). Understanding the processes involved in engaging with blue and green spaces and their impact on wellbeing assets can assist in developing a range of PPIs that improve most people's wellbeing, not only reduce illness.

Thirdly, one of the differentiating factors in psychology is its focus on conceptualising complex concepts, such as wellbeing; and developing validated and reliable scales that assess them (Seligman, 2011) so that the findings can be compared, contrasted, generalised and developed to advance the field of research further. Therefore, it is crucial to tap into the extensive developments in positive psychology over the last two decades and use its tools and resources to enrich the blue and spaces research. Equally, finding links between positive psychology concepts and green and blue spaces research can assimilate nature research within the positive psychology field. With this in mind, an in-depth examination of existing research on blue and green spaces is required in the context of positive psychology research developments (e.g., measures of positive outcomes), which the current review aims to address.

The Current Review

The current review of reviews aims to explore the systematic reviews about the impact of blue and green spaces on wellbeing perceived through the lens of positive psychology, which considers positive psychological outcomes. Thus, the three research questions were: (1) What is the impact of blue and green spaces on positive wellbeing outcomes? (2) What are the factors that contribute to the impact of blue and green spaces on positive wellbeing outcomes? (3) What is the impact of blue and green spaces' interventions on wellbeing?

Method

A systematic review of reviews was used to synthesise the evidence from available systematic reviews and meta-analyses to explore the impact of blue and green spaces on wellbeing. This review has been conducted in accordance with the Cochrane and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Higgins & Green 2008; Liberati et al. 2009; Moher et al. 2009). The protocol for this review has been published on Prospero (registration number: 365602).

Inclusion and Exclusion Criteria

Systematic reviews, incl. meta-analyses associated with wellbeing impact of blue and green spaces were considered in the current review. To be included in this review, studies needed to report on the impact of blue and green spaces, interventions, correlations, qualitative and quantitative research. They also needed to be peer reviewed, from any country, published between 1998 and 2022 (Positive Psychology movement began in 1998) and belong to a category of an academic article. Studies which did not meet all these criteria were excluded. Furthermore, studies that delved into the impact of blue and green spaces on reducing mental illness, as well as any studies about the impact of pollution or physical exercise (without differentiating between outdoor and indoor exercise) were also excluded.

Search Strategy

The following search strategy was used to search each database. "green spaces" or "outdoor" or "water" or "blue spaces" or "natural capital" or "nature-based" or "biodiversity" or "eco-system" or "eco system" and "wellbeing" or "well-being" or "wellbeing" and "systematic review" or "meta-analysis".

Information Sources

Electronic databases (Scopus, Web of Science Core Collection, Academic Search Complete, Medline, PsycInfo) were searched in May 2022. A supplementary grey literature search was conducted using grey literature database (OpenGrey.eu and Google Scholar). These databases have a broad scope and the ability to conduct specific searches (Godin et al. 2015).

Study Screening

Rayyan, an online database for conducting systematic reviews, was used to screen all studies. Two reviewers screened titles and abstracts based on the eligibility criteria and then both reviewers independently reviewed each text. Meetings were conducted to discuss and resolve any conflicts in reviewers' assessments. There was an option to involve a third reviewer if agreement could not be reached. However, this was not necessary as, following discussion, the original two reviewers reached agreement on all papers for inclusion.

The database search yielded 149 studies (Figure 1). After duplicates were removed, 149 studies were screened and further 121 articles were removed after the title and abstract screening. Following the full text review, 11 additional articles were excluded, leaving 17 studies included in this review. The results are presented in a PRISMA diagram in Figure 1. All studies met at least 6 criteria on the Mixed Method Appraisal Tool (Pluye et al., 2011).

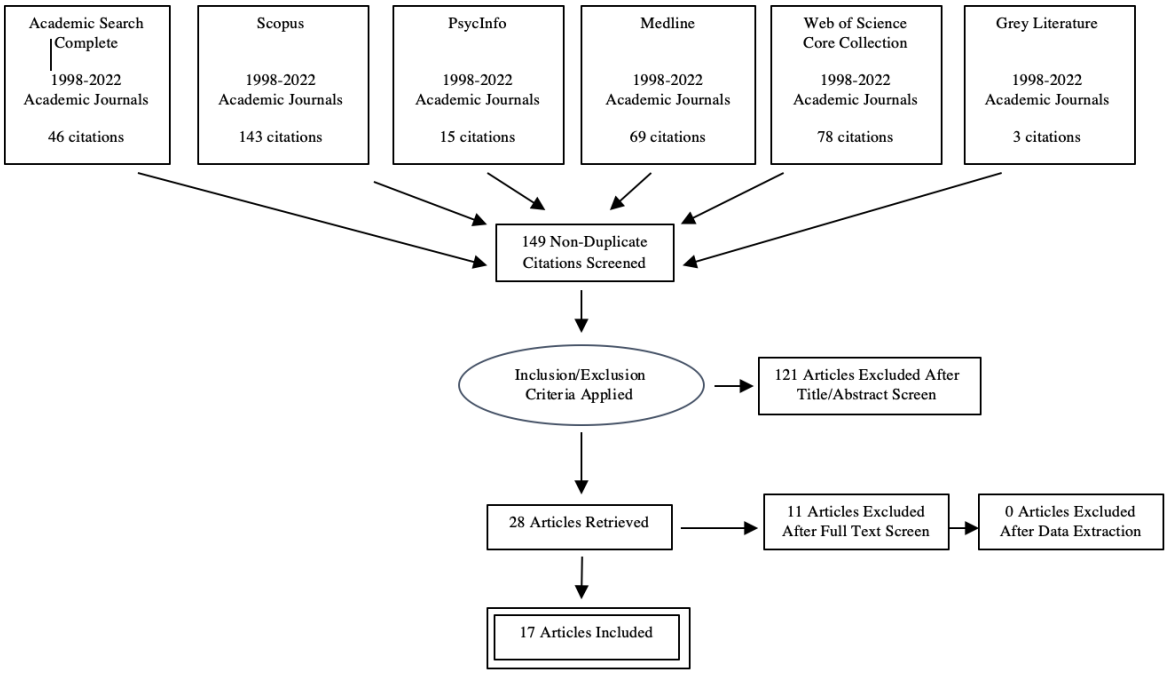

Figure 1. PRISMA diagram of the review of reviews.

Data Extraction Process

A data extraction template was developed to capture the relevant information from included studies. This template was based on the third version of guidelines produced by Cochrane (2014) and recommendations from Hoffmann et al. (2014). Information was collected for aims, design, theoretical underpinnings, details of the intervention, participant information and outcomes.

Quality Assessment

The Mixed Methods Appraisal Tool (Pluye et al. 2011) was used to assess the quality of included studies.

Study Synthesis

A narrative approach to synthesis was used to describe the findings from the included (Popay et al. 2006). This process followed three iterative steps: organising studies into logical categories by becoming familiar with them; comparing them to one another and synthesising their findings; analysing the findings within each category by exploring relationships within and between the studies and synthesising data under the relevant themes (Popay et al. 2006).

Publication and Researcher bias

To minimise the risk of publication bias, searches were conducted on academic and grey literature databases. Researcher bias was limited through having two reviewers independently assess the eligibility of the included papers and through conducting a quality assessment of all included papers.

Results

RQ1: What is the impact of blue and green spaces on positive wellbeing outcomes?

Many of the studies in this review of reviews included clinical population. Most systematic reviews that used validated wellbeing scales examined wellbeing as the absence of health, i.e., they reported impact of nature on depression, suicide, and psychological distress. In Batterman et al. (2021), only one study used a single-item wellbeing measure; in Nyugen et al. (2021), some of the quality-of-life measures included wellbeing items to assess impact of green spaces, e.g., over the last four weeks, how much time were you a happy person. However, the majority of questions were negative. Smith et al. (2021) showed that majority of measures assessing wellbeing impact of blue spaces related to reduction of mental disease (e.g. depression). Only selected papers used positive wellbeing measures such as Cantril Self-Anchoring Striving Scale (Cantril 1965), WHO-5 (Bach, 2004), Personal Wellbeing Index (International Wellbeing Group, 2013), Thus, in large, the systematic reviews reported the outcomes of measures assessing the absence of wellbeing.

Of the systematic reviews that highlighted the positive aspects of wellbeing (see Figure 2 for summary), three systematic reviews (Brito et al., 2022; Coon et al., 2021; Thompson et al., 2011) assessed the wellbeing impact of green spaces by differentiating between outdoors and indoors. They reported a wide range of benefits for exercising outdoors as opposed to indoors, such as greater enjoyment and satisfaction with activities, which led to a greater likelihood of repeating it; higher levels of positive affect, happiness, pleasantness and delight, feelings of comfort and calmness, greater vitality, restrictiveness, revitalization, pride, self-esteem, and more positive mood. The positive effect of nature was also evident in virtual engagement with physical activity in nature versus indoors (Brito et al., 2022). However, it is unknown how much impact on positive wellbeing outcomes was contributed to the physical activity vis-à-vis being in nature. Finally, the authors of the systematic reviews noted that limited data existed about the impact of time spent outdoors and indoors when exercising, nor differentiation between exercising in urban or rural areas, which may have affected the results.

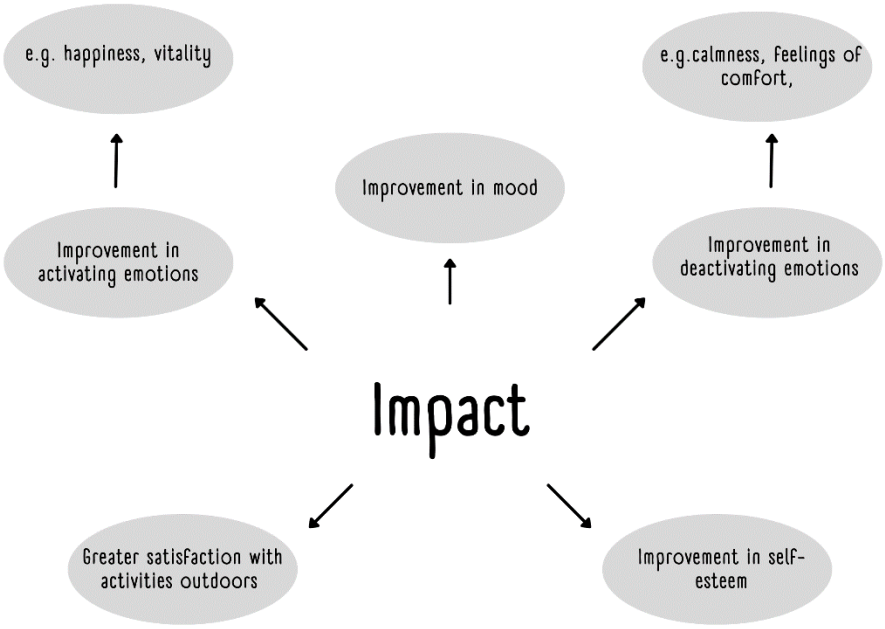

Figure 2. The impact of blue and green spaces on wellbeing

Four reviews (Bowler et al., 2010; Jabbar et al., 2021; Menardo et al., 2021; Shuvo et al., 2020) assessed the impact of green space on wellbeing without comparing spending time in nature versus indoors. Menardo et al. (2021) found

that participants perceived natural environments as more conducive to experiencing restorative feelings, and their effect size was large. At the same time, they warned not to overestimate these results as human beings strive to restore their depleted cognitive resources in whatever way they can, so the environment may be just one of many factors that play a role in this process. The remaining studies showed that natural environments resulted in improved energy and revitalization; simultaneously, there was no impact on individuals' calmness or tranquillity before and after they were exposed to nature (Bowler et al., 2010).

Four systematic reviews (Britton et al., 2020; Gascon et al., 2017; Smith et al., 2021; Volker & Kistermann, 2011) examined the impact of blue spaces on wellbeing. Two of these reviews considered the wellbeing impact of living near water, one focusing on the urban blue spaces (Smith et al., 2021) and another on the urban and rural spaces (Gascon et al., 2017). Smith et al. (2021) found four studies showing that urban blue spaces were associated with higher levels of wellbeing, without identifying specific aspects of wellbeing. They also reported the restorative impact of water and that young people experienced higher levels of "emotional" wellbeing when exposed to water (Smith et al., 2021) However, Gascon et al. (2017) found mixed results about living near water, showing that being around water doesn't necessarily improve wellbeing. Also, they noted that while studies reported a reduction in mental illness, there was not enough evidence to suggest that living near water was associated with increased mental health as measured by positive outcomes.

Concerning the impact of visiting blue space on wellbeing, Gascon et al. (2017) noted a single study showing an increase in momentary happiness when participants were around the coastal, salty water and no difference when they visited inland water. In contrast, Smith et al. (2021) found a study showing no increase in momentary happiness when exposed to blue space. Furthermore, Volker and Kistemann (2011) point out that while being around blue spaces, all individuals' senses are engaged, e.g. higher levels of humidity, different smell, wildlife, the sound of water, colour, clarity, motion, but also the context within which the experience sits, e.g. physical activity, social connection, connectivity to nature. Furthermore, the authors noted that from the aesthetic perspective, the water did not positively impact the wellbeing, seeing it from another aspect of the environment, e.g. two-thirds of water and one-third of the nature around it.

RQ2: What are the factors that contribute to the impact of blue and green spaces on positive wellbeing outcomes?

Five reviews (Batterham et al., 2021; Jabbar eta l., 2021; Nguyen et al., 2021; Richardson& Maratos, 2016; Zhang et al., 2021) examined the factors that impacted the relationship between green space and wellbeing. Richardson & Maratos (2016) called for the Heart Rate Variability (HRV) to be considered when assessing nature's impact on wellbeing. HRV measures the changes that occur in the autonomic nervous system. Across 15 studies that analysed HRV, most showed that the natural environment increases parasympathetic nerve activation, associated with a release of chemicals such as opiates and oxytocin that result in feelings of contentment, relaxation, calm, connection or safety. At the same time, green-space exposure is associated with lower sympathetic activity, linked to the chemical Dopamine associated with drive and activating emotions such as joy, stimulation, or vitality. The author explained that the boost of wellbeing occurs due to these two types of nervous system activation and urges the researchers to consider the physiological factors associated with wellbeing. At the same time, they also point to emerging research showing that for some participants, green space may be associated with threat and fear (e.g. potential of being bitten by snakes or spiders); thus, the effect may not always be positive; but the factors that influence it may relate to evolutionary affect regulation. Intricacies of emotions need to be considered by future researchers.

Other factors mentioned by systematic reviews (see Figure 3 for summary) were the air quality and physical activity in which individuals engage when in green space (Zhang et al., 2021). At the same time, the review showed mixed results relating to social cohesion being the mediating factor between green space exposure and wellbeing. Further research is required to examine this. Nguyen et al. (2021) consider the type of green spaces and individual differences such as age as factors impacting wellbeing. For example, older people experienced higher levels of health when the paths they used were paved, whereas younger people preferred wild paths. These studies provide preliminary research on the factors affecting wellbeing when in nature. More research is required to delve into it.

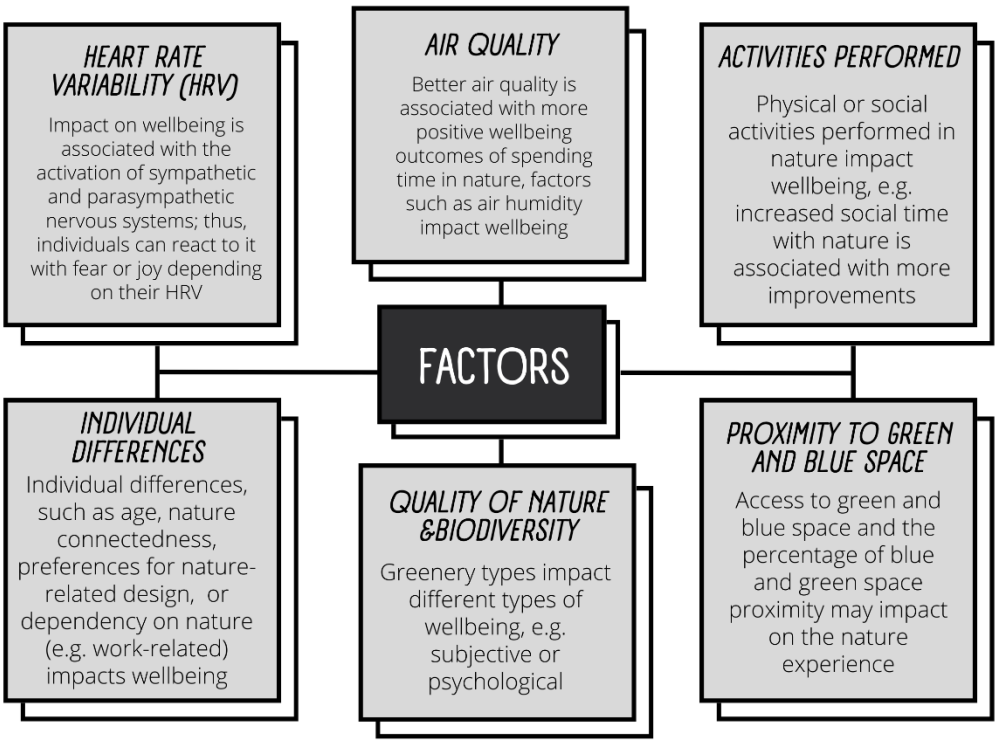

Figure 3. Factors contributing to the impact of blue and green spaces on wellbeing

Bowler and colleagues (2010) found that when subjective measures were employed, the association between green space and positive outcomes of wellbeing was more robust compared with more objective measures such as vegetation coverage (Shuvo et al., 2000). This difference meant that individuals' perception of nature or their connectedness to it may play an essential role in the extent of wellbeing they experience when exposed to green spaces.

Only two reviews (Batterham et al., 2021; Nguyen et al., 2021) considered factors that may negatively impact the relationship between green space and wellbeing. Nguyen et al. (2021) pointed out that some of the factors associated with nature may have a two-directional effect. On the one hand, they may positively impact wellbeing; on the other hand, they may be associated with adverse outcomes. For example, birds may enhance their wellbeing when visiting green spaces. Still, they can also make the environment loud and inconducive to relaxation, not to mention the droppings they leave behind, which may adversely impact individuals. More research is required into the dual negative-positive factors affecting the relationship between green space and wellbeing.

Also, Batternham et al. (2021) pointed out the differences in which individuals may perceive nature due to their dependency on it. Specifically, the review delved into the studies assessing mental health and the environment among farmers. Compared with other reviews, their land was more functional than aesthetic for farmers. Therefore, extreme weather conditions, such as droughts or climate change, were adversely associated with their mental health. An essential factor that mediated their wellbeing was their financial health. The more financial strain they experienced, the more negative the impact of nature changes on their wellbeing.

Jabbar et al. (2021) was the only systematic review that differentiated the impact on wellbeing by assessing psychological, subjective and social wellbeing separately. While they showed a positive relationship between the various types of wellbeing and green space, they noted that the impact on psychological wellbeing differed according to the types of green spaces and the richness of biodiversity. For example, meadows impacted participants' psychological wellbeing less than trees (Southon et al., 2018). For subjective wellbeing, the proximity of green spaces to their residence was necessary, as well as the extent of their connectivity to green infrastructure and biodiversity. Unlike psychological wellbeing, subjective wellbeing was improved when exposed to different types of greenery. Keeping in touch with nature, especially for those residing in urban areas, enhanced their life satisfaction, which is a cognitive component of subjective wellbeing. Furthermore, green spaces served as a context

within which individuals were exposed to others, and connected and interacted with them, which resulted in social wellbeing. Thus, the main factor that affected social wellbeing was the time spent outside that allowed for interaction.

In relation to blue spaces, the characteristics of the blue spaces, such as busy roads, or whether or not they are rural or urban impacted wellbeing (Gascon et al., 2017). However, Britton et al. (2020) noted the need to define blue space when conducting research, as this could muddle the nuances of wellbeing impact measures.

RQ3: What is the impact of blue and green spaces' interventions on wellbeing?

Three systematic reviews (Coon Thompson et al., 2011; Coventry et al., 2021; Lackey et al., 2021) examined the impact of Nature-Based Interventions (NBIs) or physical activity conducted outdoors on wellbeing. NBIs ranged from interventions relating to outdoor recreation, natural green spaces, defined wilderness programme, forest bathing, urban green space and nature visualisation (Lackey et al., 2021) through to gardening, green exercise, forest, and nature-based therapy (Coventry et al., 2021) and a short walking and running intervention outdoor (Coon Thompsonet al., 2011). However, most of the research was cross-sectional, and a lack of experimental and quasi-experimental research was evident (Lackey et al., 2021). See Figure 4 for further detail.

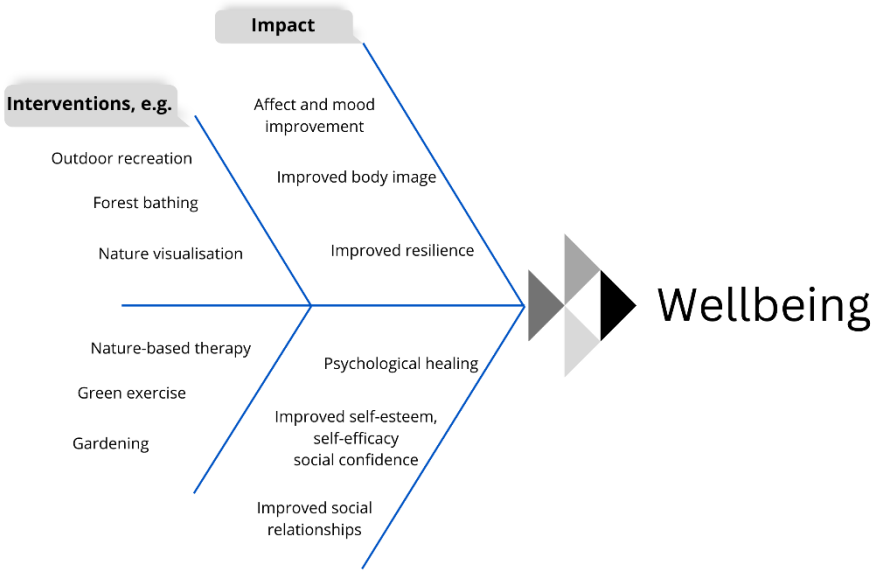

Figure 4. Impact of nature-based interventions on wellbeing

The most prevalent component of wellbeing measured by researchers when assessing the impact of NBI was positive affect (Coon et al., 2011; Coventry et al., 2021). Of 51 studies, 46 showed at least one positive association between NBI and improvements in affect, cognition, restoration or overall wellbeing (Lackey et al., 2021). When walking indoors was compared with walking outdoors, participants reported outdoor activity as more energising, pleasurable, delightful, revitalising and improving positive mood; however, running outdoors did not have the same effect, meaning that the type of nature-intervention matters (Coon et al., 2011). Additionally, qualitative research added positive outcomes, such as psychological healing, improved body image, and resilience (Lackey et al., 2021). Coventry et al. (2021) reported that the most effective green exercise intervention for a healthy population was 12-13 weeks long, lasting between 20-50 minutes, whereas taking all the NBIs into the equation, the most effective were delivered over 8-12 weeks and lasted an average of 20 to 90 min. Also, the authors noted the impact of different type of green spaces on wellbeing, for example positive affect increased more when in a tended forest than in a wild forest. Thus, the type and quality of green space should be considered when assessing its impact on wellbeing.

Table 1. The aims and characteristics of the systematic reviews included in the review of reviews

Author	Included studies	Systematic review type	The aim of the systematic review
Batterham et al., 2022	28	Systematic review of quantitative and mixed method studies	Explore the relationship between environment and mental health in rural settings
Bowler et al., 2010	25	Systematic review and meta-analysis, included observational and experimental studies included	Compare measurements of health or wellbeing in natural and synthetic environments.
Britto et al., 2022	24	Meta-analysis	To assess the magnitude of the effects on both performance efficacy and performance efficiency, as well as on wellbeing of exercising in natural vs indoor settings, using the process of systematic review followed by meta-analysis.
Britton et al., 2020	33	Systematic review included only studies with interventions, both qualitative and quantitative	To address the gap in understanding the impacts of blue space within existing interventions for targeted individuals.
Coon et al., 2011	11	Systematic review, narrative synthesis of randomised and nonrandomised controlled trials	To compare the effects on mental and physical wellbeing in natural environments compared with physical activity indoors.
Coventry et al., 2021	50	Systematic review and meta-analysis of randomised controlled and noncontrolled trials	To review controlled and uncontrolled evidence for outdoor NBIs to identify which are most effective, or what format and dose is most efficacious.
Gascon et al., 2017	35	Systematic review of quantitative studies (incl. ecological, longitudinal, cross-sectional, experimental)	To systematically review the current quantitative evidence on human health and well-being benefits of outdoor blue spaces.
Jabbar et al., 2021	46	Systematic review of quantitative studies (incl. correlations and comparison)	To analyse the significance of urban green spaces for human wellbeing
Lackey et al., 2021	51	Systematic review of quantitative, qualitative and mixed-method research	To conduct a systematic review of available research regarding the potential mental-health benefits of nature-based recreation.
Menardo et al., 2021	22	Meta-analysis of quantitative research	Estimate how much natural environments are perceived as being more restorative than urban environments.
Nguyen et al., 2021	68	Systematic review of quantitative research	Examine whether particular green space types and qualities have been shown to provide health benefits and if so, which specific types and qualities, and which health outcomes.
Richardson et al., 2016	15	Systematic review and meta-analysis of quantitative research	To present the evidence to support the use of an existing evolutionary functional model of affect regulation (the three circle model of emotion) that provide a tripartite framework in which to consider the mental wellbeing benefits of nature and to

			guide nature based wellbeing interventions.
Shuvo et al., 2020	22	Qualitative and quantitative synthesis	To explore and synthesize the quality of greenspace-health studies reported from low- and middle-income countries
Smith et al., 2021	25	Systematic review and meta-analysis of quantitative research	To explore the benefits of blue spaces in urban context.
Thompson et al., 2011	11	Narrative synthesis of quantitative, experimental research	To compare the effects on mental and physical wellbeing, health related quality of life and long-term adherence to physical activity, of participation in physical activity in natural environments compared with physical activity indoors.
Volker et al., 2011	36	Systematic review of qualitative, quantitative (cross-sectional and experimental) research and theoretical papers	To provide a systematic, qualitative meta-analysis of existing studies that are relevant to blue space and human wellbeing.
Zhang et al., 2021	26	Systematic review and meta-analysis of quantitative research	To synthesise current evidence on the pathways linking objectively-measured greenspace exposure and mental health using a systematic review approach.

The reviews noted the urgent need to employ a longitudinal study design when assessing the impact of green space on wellbeing. Furthermore, they called for more rigorous methods, more random controlled trials and precise research questions when designing research. Lackey et al. (2021) suggested that researchers need to be more specific about the measures and models they use to ensure that studies can be compared when assessing wellbeing. Coventry et al. (2021) suggested that the quality of green space should be assessed when evaluating the impact on wellbeing, as it makes a difference to individuals. Finally, research with a more diverse population and differentiating between the percentage of blue and green spaces should be noted. It may influence participants self-reported wellbeing assessed after engaging in a nature-based intervention.

One review (Britton et al., 2020) focused on blue water interventions. Most are related to coastal/saltwater interventions, followed by freshwater and mixed interventions. They all took place in rural and urban areas. They showed a range of positive outcomes, such as increased self-esteem, self-efficacy, social confidence, resilience, mood, and enhanced social relationships. It is important to note that some of the blue space interventions were related to adverse outcomes. However, they were primarily associated with clinical participants.

The authors of the reviews called for more rigorous research designs and more longitudinal studies. They suggested that future research should employ more validated measures, as many studies used instruments that could not be compared with other research. Also, they asked for a more rigorous description of participant characteristics and more diversity in participant selection. In addition, they suggested that socio-cultural differences should be explored, and rich descriptive data could help understand the intricacies between samples. Finally, many studies presenting interventions did not mention their length (Britton et al., 2020).

Discussion

Many of the studies included in this review of reviews included participants experiencing mental health issues and provided evidence of their impact on reducing mental illness, e.g., reduction in symptoms of depression. This review highlighted the importance of blue and green space researchers to expand their research and systematic reviews to non-clinical populations when measuring wellbeing. After all, the clinical population represents approximately 26-28% of society (WHO, 2022b), and Positive Psychology Interventions that include Nature-Based Interventions are primarily designed for a healthy population to help them improve moderate levels of wellbeing and reach emotional, psychological and social flourishing (see Burke, 2021 for a review). Thus, more research is required to explore the

positive outcomes of nature in the context of a healthy population to encourage the majority of people to engage in nature.

Furthermore, the review of reviews highlighted the urgent need for researchers to identify a clear wellbeing framework when assessing the impact of blue and green spaces on wellbeing. Systematic reviews noted that definitions of wellbeing varied across the studies, making it difficult to establish their theoretical stance. Whilst some acknowledged the difference between mental health and mental illness, most studies mixed terminology making it difficult to discern their results. Future research assessing the impact of blue and green spaces needs to ensure a clear definition of wellbeing and theoretical perspectives so that the benefit and outcomes of the research output can be maximised.

Only one systematic review delved into the difference between psychological, subjective and social wellbeing (Jabbar et al., 2021). The review highlighted significant differences in the impact of green spaces on various types of wellbeing. Subjective wellbeing refers to higher levels of positive affect, lower levels of negative affect and life satisfaction (Diener, 2012); Psychological wellbeing refers to personal growth, self-acceptance, autonomy, environmental mastery, positive relationships, and purpose in life (Ryff, 2014). Finally, social wellbeing refers to various components such as social contribution, social integration, social actualisation, social acceptance, and social coherence (Keyes, 1998). They are conceptually different models and approaches to measuring wellbeing, which explains why different types of nature impact them differently. The nuances of the impact of green spaces on a variety of wellbeing models need to be explored as it can help us understand how individuals can engage in blue and green spaces to maximise their positive impact on their wellbeing. Furthermore, future green space wellbeing research could expand beyond these three models into differences between flourishing models and components of wellbeing to create a more comprehensive picture of wellbeing.

When assessing green space benefits, many positive affect outcomes were mentioned in systematic reviews, e.g. happiness, vitality, restorative feeling, pleasantness, calmness, pride or positive mood. In contrast, scarcity of research on positive cognitive outcomes were highlighted, such as self-esteem. This imbalance in green space research means that those eudaimonic aspects of wellbeing remain largely unknown. They are the deeper-level wellbeing outcomes that provide a long-lasting positive impact on individuals and make their lives worth living. Ignoring them when assessing benefits of green spaces, points to incomplete perspective on the psychological impact of green spaces. They may include components from a range of positive psychology wellbeing frameworks (see Hone et al., 2015 and Willen et al., 2022 for review). Therefore, future green and blue space research and associated systematic reviews should expand beyond measuring merely positive affect in the context of wellbeing benefits.

Furthermore, the systematic reviews highlighted that more validated scales should be used to assess wellbeing in future research. Evaluating impact using alternative scales or no scales at all resulted in a range of generic outcomes of positive affect being reported in the context of blue and green spaces. In the last two decades, research on positive emotions has progressed significantly. With new theories of positive emotions, such as the Broaden and Build theory (Fredrickson, 1998), the Positivity Resonance (Fredrickson, 2013), Taxonomy of Positive Emotions (Keltner & Cowen, 2021), researchers explore the nuances of positive emotions and differentiate between the impact of specific emotions on participants' health and wellbeing. Future research should explore a range of emotions associated with nature and the differences between them, e.g., awe, elevation, curiosity, and pride and how each one impacts different aspects of wellbeing in positive and negative ways. This nuanced approach to positive outcomes may play a significant role in the relationship between green spaces and wellbeing.

What constricts systematic review insights are the original studies' research questions and findings. Therefore, following this review of reviews, more research is recommended to be published that examines positive aspects of wellbeing in this context. Future studies should explore the eudaimonic impact of nature on wellbeing, such as meaning, purpose or psychological engagement. Also, in relation to the factors impacting wellbeing, future research may focus on concepts such as optimism, emotional stability, and character strengths.

Most of the systematic reviews called for more longitudinal research. This is particularly relevant to the positive outcomes measured, especially positive affect. Positive emotions are fleeting, which is why the concept of happiness based on affective change has been challenged in psychological literature (e.g., Ryff, 2022). Furthermore, the impact of positive psychology interventions is usually relatively short (Lyubomirsky et. al, 2005). What improves the

longevity of impact is helping individuals improve eudaimonic aspects of wellbeing instead of a systematic review affect and often small changes in how the interventions are introduced could make a difference (Keyes et al., 2010; Trom & Burke, 2022). Thus, for green space interventions to show more lasting change, the assessment of interventions should be expanded beyond the measure of positive affect, and more longitudinal studies should be introduced to show the lasting benefits of nature.

The current review has also noted the need for more meta synthesis, as of qualitative research could explore the meaning of nature for individuals. For example, do people believe they have a spiritual connection with trees or with the water and does this increase their sense of wellbeing when in natural spaces? Is spending time in nature considered a relational activity of connecting with spirit or the universe?

Conclusion and Limitations

The current review of reviews was the first one to highlight the gap in relation to the assessment, conceptual frameworks and findings concerning the impact on blue and green spaces on wellbeing. It put a spotlight on the importance and meaning of exploring positive outcomes in blue and green spaces' research. Finally, it provided a range of future directions that green and blue spaces research should explore in relation to wellbeing to enrich its findings. These findings can be used to design future green and blue spaces that impact different aspects of wellbeing.

Despite its strengths, the current review of reviews comes with three main limitations. First, the primary studies were not included in the review; instead, the systematic reviews of the studies were analysed. This means that our perspective is influenced by the authors of systematic reviews' perspectives. Second, only reviews published in English were included, despite several non-English systematic reviews being published. Third, the review focused on wellbeing as a psychological construct. As mentioned in the review, studies are emerging that show objective physiological changes that exposure to nature can benefit health. Many of these physiological changes are correlated with improvements in wellbeing, as perceived from the positive psychological perspective, e.g. HRV changes that impact the nervous system making us feel calm and safe. Therefore, the review is limited by not looking at physiological changes and their correlations with wellbeing. Such a focus would allow the authors to call for future research that uses objective physiological measures already known to correlate with wellbeing and/or combines physiological measures with validated psychological measurements of wellbeing (O'Boyle et al., forthcoming). For example, an epigenetic Vantage Sensitivity model considers the impact of genetic predisposition to positive experiences on wellbeing (Pluess, 2015). In the same vein, emerging research demonstrates the impact of environmental sensitivity as perceived via the Vantage Sensitivity model on how individuals connect with nature (see Setti & MacIntyre, forthcoming, for review). Thus, a positive physiological impact on wellbeing must be considered part of the positive psychology approach to blue and green spaces.

Compliance with Ethical Standards

Ethical Standards

Ethical approval was not required for this study, as the research did not involve the collection of data from human participants.

Declaration of Conflicting Interests

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References

Achor, S. (2010). *The happiness advantage: The seven principles that fuel success and performance at work.* Ebury Publishing.

Arslan, G., & Wong, P. T. P. (2021). Measuring personal and social responsibility: An existential positive psychology approach. *Journal of Happiness and Health, 2*(1), 1–11. https://doi.org/10.47602/johah.v2i1.5

Bech P. (2004). Measuring the dimensions of psychological general well-being by the WHO-5. *Quality of Life Newsletter, 32*, 15-16.

Bateman, I. J., & Mace, G. M. (2020). The natural capital framework for sustainably efficient and equitable decision making. *Nature Sustainability, 3*(10), 776–783. https://doi.org/10.1038/s41893-020-0552-3

Batterham, P. J., Brown, K., Trias, A., Poyser, C., Kazan, D., & Calear, A. L. (2022). Systematic review of quantitative studies assessing the relationship between environment and mental health in rural areas. *Australian Journal of Rural Health, 30*(3), 306–320. https://doi-org.elib.tcd.ie/10.1111/ajr.12851

Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health, 10,* 456. https://doi-org.elib.tcd.ie/10.1186/1471-2458-10-456

Brito, H. S., Carraça, E. V., Palmeira, A. L., Ferreira, J. P., Vleck, V., & Araújo, D. (2022). Benefits to Performance and Well-Being of Nature-Based Exercise: A Critical Systematic Review and Meta-Analysis. *Environmental Science & Technology, 56*(1), 62–77. https://doi-org.elib.tcd.ie/10.1021/acs.est.1c05151

Britton, E., Kindermann, G., Domegan, C., & Carlin, C. (2020). Blue care: a systematic review of blue space interventions for health and wellbeing. *Health Promotion International, 35*(1), 50–69. https://doi-org.elib.tcd.ie/10.1093/heapro/day103

Burke, J. (2021). *The ultimate guide to implementing wellbeing programmes for school*. Routledge

Burke, J., Dunne, P., Meehan, T., O'Boyle, C., van Nieuwerburgh, C. (2022). *Positive Health: 100+ positive psychology and lifestyle medicine tools for enhancing your wellbeing*. Routledge.

Cantril, H. (1965). *The pattern of human concerns*. Rutgers University Press.

Coon Thompson, J., Boddy, K., Stein, K., Whear, R., Barton, J., & Depledge, M. H. (2011). Does Participating in Physical Activity in Outdoor Natural Environments Have a Greater Effect on Physical and Mental Wellbeing than Physical Activity Indoors? A Systematic Review. *Environmental Science & Technology, 45*(5), 1761–1772. https://doi-org.elib.tcd.ie/10.1021/es102947t

Costanza, R. (2020). Valuing natural capital and ecosystem services toward the goals of efficiency, fairness, and sustainability. *Ecosystem Services, 43*, 101096. https://doi.org/10.1016/j.ecoser.2020.101096

Coventry, P. A., Brown, J. E., Pervin, J., Brabyn, S., Pateman, R., Breedvelt, J., Gilbody, S., Stancliffe, R., McEachan, R., & White, P. L. (2021). Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis. *SSM - Population Health, 16,* 100934. https://doi-org.elib.tcd.ie/10.1016/j.ssmph.2021.100934

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*(3), 542–575. https://doi.org/10.1037/0033-2909.95.3.542

Diener, E. (2010). New Well-Being Measures: Short Scales to Assess Flourishing and Positive and Negative Feelings. *Social Indicators Research, 97*(2), 143–156.

Diener, E. (2012). New findings and future directions for subjective well-being research. *American Psychologist, 67*(8), 590–597. https://doi.org/10.1037/a0029541

Donaldson, S.I., van Zyl, L.E., & Donaldson, S.I. (2022). PERMA+4: A Framework for Work-Related Wellbeing, Performance and Positive Organizational Psychology 2.0. *Frontiers in Psychology, 12,* 817244. doi: 10.3389/fpsyg.2021.817244

Dempsey, M., & Burke, J. (2021). Flourishing during COVID-19: Exploration of the factors that impacted the wellbeing of school leaders during the pandemic in Ireland. *Journal of Happiness and Health, 1*(1), 28–39.

Fredrickson B. L. (1998). What Good Are Positive Emotions? *Review of General Psychology: Journal of Division 1, of the American Psychological Association, 2*(3), 300–319. https://doi.org/10.1037/1089-2680.2.3.300

Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. *Advances in Experimental Social Psychology, 47*, 1-53. https://doi.org/10.1016/B978-0-12-407236-7.00001-2

Gascon, M., Zijlema, W., Vert, C., White, M. P., & Nieuwenhuijsen, M. J. (2017). Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. *International Journal of Hygiene & Environmental Health, 220*(8), 1207–1221. https://doi-org.elib.tcd.ie/10.1016/j.ijheh.2017.08.004

Geary, R. S., Wheeler, B., Lovell, R., Jepson, R., Hunter, R., & Rodgers, S. (2021). A call to action: Improving urban green spaces to reduce health inequalities exacerbated by COVID-19. *Preventive Medicine*, *145*, 106425. https://doi.org/10.1016/j.ypmed.2021.106425

Geneshka, M., Coventry, P., Cruz, J., & Gilbody, S. (2021). Relationship between Green and Blue Spaces with Mental and Physical Health: A Systematic Review of Longitudinal Observational Studies. *International journal of environmental research and public health*, *18*(17), 9010. https://doi.org/10.3390/ijerph18179010

Guerry, A. D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G. C., Griffin, R., Ruckelshaus, M., Bateman, I. J., Duraiappah, A., Elmqvist, T., Feldman, M. W., Folke, C., Hoekstra, J., Kareiva, P. M., Keeler, B. L., Li, S., McKenzie, E., Ouyang, Z., Reyers, B., … Vira, B. (2015). Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences*, *112*(24), 7348–7355. https://doi.org/10.1073/pnas.1503751112

Godin, K., Stapleton, J., Kirkpatrick, S.I. et al. Applying systematic review search methods to the grey literature: a case study examining guidelines for school-based breakfast programs in Canada. *Systematic Review 4,* 138 (2015). https://doi.org/10.1186/s13643-015-0125-0

Higgins, J. P. T., & Green, S. (Eds.) (2008). *Cochrane handbook for systematic reviews of interventions.* John Wiley & Sons, Ltd.

Hoffmann, T. C., Glasziou, P. P., Boutron, I., Milne, R., Perera, R., Moher, D., Altman, D. G., Barbour, V., Macdonald, H., Johnston, M., Lamb, S. E., Dixon-Woods, M., McCulloch, P., Wyatt, J. C., Chan, A.-W., & Michie, S. (2016). Better Reporting of Interventions: Template for Intervention Description and Replication (TIDieR) Checklist and Guide. *Gesundheitswesen (Bundesverband Der Arzte Des Offentlichen Gesundheitsdienstes (Germany)), 78*(3), e174. https://doi-org.elib.tcd.ie/10.1055/s-0037-1600948

Hone, L.C., Jarden, A.,Schofield, G.M., & Duncan, S. (2014).Measuring flourishing: The impact of operational definitions on the prevalence of high levels of wellbeing. *International Journal of Wellbeing, 4*(1), 62-90. doi:10.5502/ijw.v4i1.4

Huppert, F. A., & So, T. T. (2013). Flourishing Across Europe: Application of a New Conceptual Framework for Defining Well-Being. *Social indicators research, 110*(3), 837–861. https://doi.org/10.1007/s11205-011-9966-7

International Wellbeing Group (2013). *Personal Wellbeing Index: 5th Edition*. Australian Centre on Quality of Life, Deakin University. Retrieved from: http://www.acqol.com.au/instruments#measures

Jabbar, M., Yusoff, M. M., & Shafie, A. (2022). Assessing the role of urban green spaces for human well-being: a systematic review. *GeoJournal*, *87*(5), 4405–4423. https://doi-org.elib.tcd.ie/10.1007/s10708-021-10474-7

Jones, L., Anderson, S., Læssøe, J., Banzhaf, E., Jensen, A., Bird, D. N., Miller, J., Hutchins, M. G., Yang, J., Garrett, J., Taylor, T., Wheeler, B. W., Lovell, R., Fletcher, D., Qu, Y., Vieno, M., & Zandersen, M. (2022). A typology for urban Green Infrastructure to guide multifunctional planning of nature-based solutions. *Nature-Based Solutions*, *2*, 100041. https://doi.org/10.1016/j.nbsj.2022.100041

Keltner, D., & Cowen, A. (2021). A taxonomy of positive emotions. *Current Opinion in Behavioral Sciences, 39*, 216–221. https://doi.org/10.1016/j.cobeha.2021.04.013

Keyes, C. L. M. (1998). Social Well-Being. *Social Psychology Quarterly*, *61*(2), 121–140.

Keyes, C.L.M. (2002). The Mental Health Continuum: From Languishing to Flourishing in Life. *Journal of Health and Social Behavior*, *43*(2), 207–222. https://doi.org/10.2307/3090197

Keyes CLM, Dhingra SS, & Simoes EJ. (2010). Change in level of positive mental health as a predictor of future risk of mental illness. *American Journal of Public Health*, *100*(12), 2366–2371. https://doi-org.elib.tcd.ie/10.2105/AJPH.2010.192245

Lackey, N.Q., Tysor, D.A., McNay, G.D., Joyner, L., Baker, K.H., & Hodge, C.J. (2019). Mental health benefits of nature-based recreation: a systematic review. *Annals of Leisure Research, 24*, 379 - 393.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS medicine, 6*(7), e1000100. https://doi.org/10.1371/journal.pmed.1000100

Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology, 9*(2), 111–131. https://doi-org.elib.tcd.ie/10.1037/1089-2680.9.2.111

Menardo, E., Brondino, M., Hall, R., & Pasini, M. (2021). Restorativeness in Natural and Urban Environments: A Meta-Analysis. *Psychological Reports, 124*(2), 417–437. https://doi-org.elib.tcd.ie/10.1177/0033294119884063

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine, 6*(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Moneta, G.B. (2013). *Positive Psychology: A Critical Introduction*. Palgrave.

Nguyen, P.-Y., Astell-Burt, T., Rahimi-Ardabili, H., & Feng, X. (2021). Green Space Quality and Health: A Systematic Review. *International Journal of Environmental Research and Public Health, 18*(21). https://doi-org.elib.tcd.ie/10.3390/ijerph182111028

O'Boyle, C., Lianov, L., Burke, J., Frates, B., & Boniwell, I. (forthcoming). Positive Health: An emerging new construct. In J.Burke, Boniwell, I., Frates, B., L.Lianov, & C.O'Boyle (Eds.), *The Routledge International Handbook of Positive Health*. Routledge.

Parks, A. C., & Biswas-Diener, R. (2013). Positive interventions: Past, present, and future. In T. B. Kashdan & J. Ciarrochi (Eds.), *Mindfulness, acceptance, and positive psychology: The seven foundations of well-being* (pp. 140–165). New Harbinger Publications, Inc..

Pluess, M. (2015). Individual Differences in Environmental Sensitivity. Child Development Perspectives, 9(3), 138-143. https://doi.org/https://doi.org/10.1111/cdep.12120

Pluye P, Robert, E., Cargo, M., Bartlett, G., O'Cathain, A., Griffiths, F., Boardman, F., Gagnon, M.P., Rousseau, M.C. (2011). *Proposal: A mixed methods appraisal tool for systematic mixed studies reviews.* McGill University 2,1-8.

Popay J, Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. *ESRC methods programme,* 92.

Randolph, J.J.(2022). *Positive neuropsychology: Evidence-based perspectives on promoting brain and cognitive health.* Springer.

Richardson, M., McEwan, K., Maratos, F. et al. (2016). Joy and Calm: How an Evolutionary Functional Model of Affect Regulation Informs Positive Emotions in Nature. *Evolutionary Psychological Science 2,* 308–320. https://doi.org/10.1007/s40806-016-0065-5

Rusk, R.D., & Waters, L.E. (2013). Tracing the size, reach, impact, and breadth of positive psychology. *The Journal of Positive Psychology, 8*(3), 207-221,. DOI: 10.1080/17439760.2013.777766

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069–1081. https://doi-org.elib.tcd.ie/10.1037/0022-3514.57.6.1069

Ryff, C. D. (2014). Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics, 83*(1), 10–28. https://doi-org.elib.tcd.ie/10.1159/000353263

Ryff, C. (2022). Positive Psychology: Looking Back and Looking Forward. *Frontiers in Psychology.* DOI: https://doi.org/10.3389/fpsyg.2022.840062

Seligman, M. E. P. (2011). *Flourish: a visionary new understanding of happiness and well-being.* Atria.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5–14. https://doi.org/10.1037/0003-066X.55.1.5

Setti, A., MacIntyre, T. (forthcoming). Person-nature fit: Fostering wellbeing through nature. In J.Burke, Boniwell, I., Frates, B., L.Lianov, & C.O'Boyle (Eds.), *The Routledge International Handbook of Positive Health*. Routledge.

Shuvo, F. K., Feng, X., Akaraci, S., & Astell-Burt, T. (2020). Urban green space and health in low and middle-income countries: A critical review. *Urban Forestry & Urban Greening, 52,* 126662. https://doi.org/10.1016/j.ufug.2020.126662

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,* N.PAG. https://doi-org.elib.tcd.ie/10.1016/j.cities.2021.103413

Tedeschi, R.G., Shakespeare-Finch, J., Taku, K., & Calhoun, L.G. (2018). *Posttraumatic Growth: Theory, research and applications.* Routledge.

Trom, P. & Burke, J. (2022). Positive psychology intervention (PPI) coaching: an experimental application of coaching to improve the effectiveness of a gratitude intervention. *Coaching: An International Journal of Theory, Research and Practice*, 15(1), 131-142, https://doi.org/10.1080/17521882.2021.1936585

Thompson, D. A., Fry, R., Watkins, A., Mizen, A., Akbari, A., Garrett, J., Geary, R., Lovell, R., Lyons, R. A., Nieuwenhuijsen, M., Rowney, F., Stratton, G., Wheeler, B., White, M., White, J., Williams, S., & Rodgers, S. E. (2021). Exposure to green-blue spaces and mental health: A retrospective e-cohort study in Wales. *The Lancet*, *398*, S85. https://doi.org/10.1016/S0140-

Vallerand, R.J. The role of passion in sustainable psychological well-being. *Psychological Well-Being 2*, 1 (2012). https://doi.org/10.1186/2211-1522-2-1

Völker S, & Kistemann T. (2011). The impact of blue space on human health and well-being - Salutogenetic health effects of inland surface waters: A review. *International Journal of Hygiene & Environmental Health, 214*(6), 449–460. https://doi-org.elib.tcd.ie/10.1016/j.ijheh.2011.05.001

United Nations, Department of Economic and Social Affairs, Population Division. (2019). *World urbanization prospects: The 2018 revision*. United Nations. https://population.un.org/wup/publications/Files/WUP2018-Report.pdf

VanderWeele T. J. (2017). On the promotion of human flourishing. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(31), 8148–8156. https://doi.org/10.1073/pnas.1702996114

White, M.P., Elliott, L.R., Grellier, J. *et al.* (2021). Associations between green/blue spaces and mental health across 18 countries. *Scentifici Reports, 11,* 8903. https://doi.org/10.1038/s41598-021-87675-0

Willen, S. S., Williamson, A. F., Walsh, C. C., Hyman, M., & Tootle, W. (2022). Rethinking flourishing: Critical insights and qualitative perspectives from the U.S. Midwest. *SSM - Mental Health*, *2*, 100057. https://doi.org/10.1016/j.ssmmh.2021.100057

WHO (2022a). *WHO Constitution*. Retrieved from: https://www.who.int/about/governance/constitution

WHO (2022b). *Mental disorders.* Retrieved from: https://www.who.int/news-room/fact-sheets/detail/mental-disorders

Zhang, R., Zhang, C.-Q., & Rhodes, R. E. (2021). The pathways linking objectively-measured greenspace exposure and mental health: A systematic review of observational studies. *Environmental Research, 198,* 111233. https://doi-org.elib.tcd.ie/10.1016/j.envres.2021.111233