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Review Article

The Labelling-Evidence Mismatch in Mental Health Promoting NbS Projects: A Global Review of Case Studies.

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Abstract: Nature-Based Solutions (NbS) are increasingly promoted as beneficial to mental health, yet many urban interventions rely on intuitive claims without evidence. In this review, 2.718 NbS projects from all around the world were screened across eight extensive repositories, using a three-level structure to assess the mental health relevance. Out of 1.044 projects which referenced health and wellbeing, 245 addressed mental health explicitly, but only 13 claimed to monitor the outcomes. With further investigation, only 3 were found to have documented evidence of mental health benefits, such as clinical tracking and wellbeing surveys. These findings shed light on the scale of the issue of mislabelling and misclassifying NbS, which can result in undermining the role of nature in contributing to people's mental health, and result in limiting the integration of NbS into mental health strategies. There is need for clarity around mental health promotion mechanisms and their links to specific NbS and their public descriptions, supported with the monitoring tools.

Implications: It is important that urban designers and planners consider mental health from the conception of the projects, including design solutions and monitoring tools that are known to benefit users' psychological wellbeing. With that, the credibility of the initiatives can be preserved and overstatement avoided.

Keywords: Nature-Based Solutions; mental health; monitoring; evidence-based design; case studies.

1. Introduction

The European Commission defines Nature-based Solutions as:

"Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions." (European Commission, n.d.)

Other than providing ecosystem services, NbS are being more and more recognised for bringing a number of socio-economic and environmental co-benefits, together with benefits to mental health and wellbeing (Baldacchini et al., 2025; Dumitru et al., 2021; Kabisch et al., 2017). It has been suggested that human health should even be integrated in the EU Commission definition as a crucial aim and outcome of NBS implementation (van den Bosch, 2017). With the understanding of the importance of contact with nature for human health benefits, and even the potential to prevent and provide treatment (Frumkin et al., 2017), NbS are a promising medium to mitigate the stressors of urbanisation (Bratman et al., 2019). Within the Sustainable Development Goals (SDGs), following the 2030 Agenda for Sustainable Development, NbS has also demonstrated a potential to contribute to the SDG 3, Good Health and Wellbeing (Okolie et al., 2025; Sharma et al., 2025; The Global Goals, n.d.).

Studies demonstrated that as little as 10-20 minutes spent in nature was found to already have significant positive effects on physiological and psychological markers (Meredith et al., 2020). However, when it comes to the types and characteristics of nature

research has shown that not all green spaces or elements have the same salutogenic power (Frumkin et al., 2017; Beute et al., 2023), and quality of perceived environment with all its complexity impacts human health and wellbeing stronger than the quantity or length of exposure to natural elements (Zhang et al., 2024; Olszewska-Guizzo et al., 2022).

In an effort to determine a framework of NbS implementation in urban areas, the following phases were found to be important, based on best-practices from some European cities: defining the challenge and cycle of action, knowing the scale of application, identifying the actions to be integrated in the area, and monitoring of the measurements implemented (Sommese, 2024).

Nevertheless, the translation of scientific findings into clearly evidenced NbS interventions for mental health is inconsistent. Many projects claim mental health benefits but lack documented design logic or outcome monitoring. This gap between established knowledge and applied practice creates a risk of mental health becoming an assumed, rather than a demonstrated, outcome of NbS.

We argue that the struggle in labelling, describing and promoting NbS in the public sphere can risk undermining public trust, misguiding policy, and diluting the credibility of NbS as therapeutic interventions (Raymond et al., 2017). Moreover, without rigorous evidence, such claims may also erode confidence within the medical community, making it less likely for health professionals to consider NbS as serious components of mental health promotion strategies (Sterckx et al., 2024; Trøstrup et al., 2019).

This review demonstrates the scale of this phenomenon by systematically evaluating the inclusion and accuracy of mental health references across major NbS case study repositories. By doing so, this review aims to contribute to a more accountable and evidence-based approach to designing urban environments that genuinely support mental health. It also highlights the need for interdisciplinary collaboration between urban designers, mental health professionals, and environmental scientists to ensure that NbS fulfil their therapeutic potential.

2. Methods

2.1. NbS Catalogues Selection

To evaluate how mental health is addressed and monitored in NbS, a comprehensive dataset of publicly available NbS repositories was compiled. The identified catalogues included:

Urban Nature Atlas (UNA) - developed by the Central European University (CEU), in partnership with the Ecologic Institute, it is a product of the Naturvation project (NATure-based URban innoVATION, a Horizon 2020 research project). UNA website contains information from over 1.600 nature-based solution case studies, from all continents. The data is searchable, with filters such as “Health and wellbeing (SDG 3)”, valuable for the present screening. Case studies can be updated and new ones submitted, making it a continuing project (Urban Nature Atlas, n.d.).

Oppla - developed in collaboration with OPERA and OpenNESS projects, it is an open platform, with over 800 case studies. It is regularly updated, and case studies can be searched through an interactive map (Oppla, n.d.). It is recognised as a NbS knowledge repository (European Commission, 2021).

Nature4Cities - the handbook aims at practitioners, project coordinators and government officials (Oppla, 2020), offering a knowledge repository to facilitate the implementation of NbS by the practitioners. It is divided into three sections consisting of examples of case studies, tools and social acceptance. Case studies are further categorised into main themes: rainwater management, parks and green residential areas and urban ecological networks (Jeuken et al., 2020).

REGREEN - the report D2.2 is a product of the REGREEN Consortium, creating 14 fact sheets, examining 11 topics related to NbS. The information was based on a selection from nearly 300 case studies from Oppla, which represent good practices. Among those cases, 13 were picked as representatives of good practices within the NbS-related topics, of which included biodiversity, heat mitigation and health and wellbeing (Rizzi et al., 2021).

URBiNAT - the NbS selection tool is based on the URBiNAT Catalogue, which contains four NbS categories: territorial, technological, social and solidarity economy, participatory. The tool allows for key word searching, other than filtering by wellbeing, health, nature, mobility, participation and economy score impacts (URBiNAT, n.d.).

CLEVER Cities - the regional solutions catalogue investigates NbS interventions, compiling good practices case studies from Europe, Latin America and China. With that, it exemplifies the different benefits that urban NbS could bring to the environment and the population (Horn et al., 2023).

ProGIreg - meaning *productive Green Infrastructure for post-industrial urban regeneration*, was a project funded by the European Commission supported by the Horizon 2020 programme. The website displays case studies within the 8 categories of NbS types, which includes aquaponics, pollinator biodiversity, accessible green corridors and others. (ProGIreg, n.d.)

Catalogue of Nature-Based Solutions for Urban Resilience (World Bank Catalogue) - developed by the *World Bank's Global Program on nature-based Solutions (GPNBS)* and the *City Resilience Program (CRP)*, the catalogue had also the participation of landscape and urban design companies. Benefiting from this collaborative input, it serves as a guidance document, identifying potential investments in NbS. Its main focus is on NbS for heat risk management and floods in urban areas (World Bank, 2021).

These catalogues document interventions across different countries, and vary in format and update frequency. Repositories which are available online, with an interactive database that is actively maintained and updated with new case studies or revisions, were defined as "active repository" (e.g. Urban Nature Atlas and Oppla). Catalogs that are not active were understood as static online platforms or compilation of projects that are no longer updated after being published (e.g. Nature4Cities, REGREEN).

Table 1. Summary of screened catalogues.

Catalogue	Active repository	Date of access/publishing	Total number of NbS case studies	Reference link
UNA	YES	Last accessed 17th of April 2025	1631	https://una.city/
Oppla	YES	Last accessed 23rd of October2025	873	https://oppla.eu/knowledge/case-studies
Nature4Cities	NO	September 2020	16	https://oppla.eu/resource/nature4cities-nbs-projects-implementation-handbook
REGREEN	NO	March 2021	13	https://www.regreen-project.eu/wp-content/uploads/REGREEN-D2.2-NBS-knowledge-base.pdf
URBiNAT	NO	2021	41	https://urbinat.eu/nbs-catalogue/
CLEVER Cities	NO	September 2023	57	https://clevercities.eu/resources/clever-regional-solutions-catalogue/
ProGIreg	NO	November 2023	31	https://progireg.eu/nature-based-solutions/background/
World Bank	NO	November 2021	56	https://documents.worldbank.org/en/publication/documents-reports/documentdetail/502101636360985715

Notes: UNA - Urban Nature Atlas, World Bank - Catalogue of Nature-Based Solutions for Urban Resilience.

2.2. Screening Procedure

Catalogues were selected by one author, were accessed between November 2024 and October 2025, and screening was conducted by one other author. Due to the overall high number of projects, in-depth individual study of each proposal was unattainable. In total, 2.661 NbS projects were checked, using a three-level structure to assess the mental health relevance, based on the content present in the catalogues only, as follows:

- Level 1: General mention of health and/or wellbeing (e.g. SDG 3 alignment, physical activity, social connection), in the title, description or category of the NbS. Search terms used for such screening included: *health*, *wellbeing* or *physical*;
- Level 2: Specific mention of "mental health" or related terms in the description of the NbS. Search terms included: *mental*, *psych**, *stress*, *cognit** or *therap**;
- Level 3: Evidence of monitoring or evaluation of mental health outcomes from exposure to NbS in the description or category of the NbS. Search terms included:

*clinic**, *survey* or *monitor**. At this level, manual review and fact-checking was used for ambiguous cases, by analysing related papers and publications written about them.

The full dataset of screened health-related (Level 1, 2 and 3) NbS projects, which sums to 1.044, is available in the supplementary database (https://zenodo.org/records/17866171).

3. Results

Out of the 1.044 NbS projects included (Level 1), only 245 specifically mention mental health (Level 2), and from these, 13 were found to include any evidence of mental health benefits from visiting them (Level 3). Breakdown can be seen in Table 2 and Figure 1, bellow:

Table 2. Result of screening - number of projects addressing health, mental health and claiming to monitor the conditions.

Catalogue	Total number of NbS case studies	Level 1 Mention health and/or wellbeing	Level 2 Mention mental health	Level 3 Evidence of mental health outcomes
UNA	1631	740	195	10
Oppla	873	199	37	3
Nature4Cities	16	2	1	0
REGREEN	13	11	2	0
URBiNAT	41	41	4	0
CLEVER Cities	57	3	1	0
ProGIreg	31	19	4	0
World Bank Catalogue	56	29	1	0

Notes: UNA - Urban Nature Atlas.

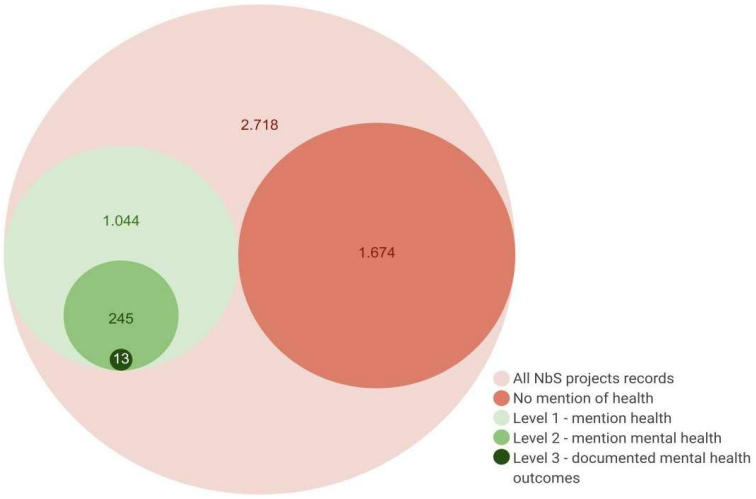
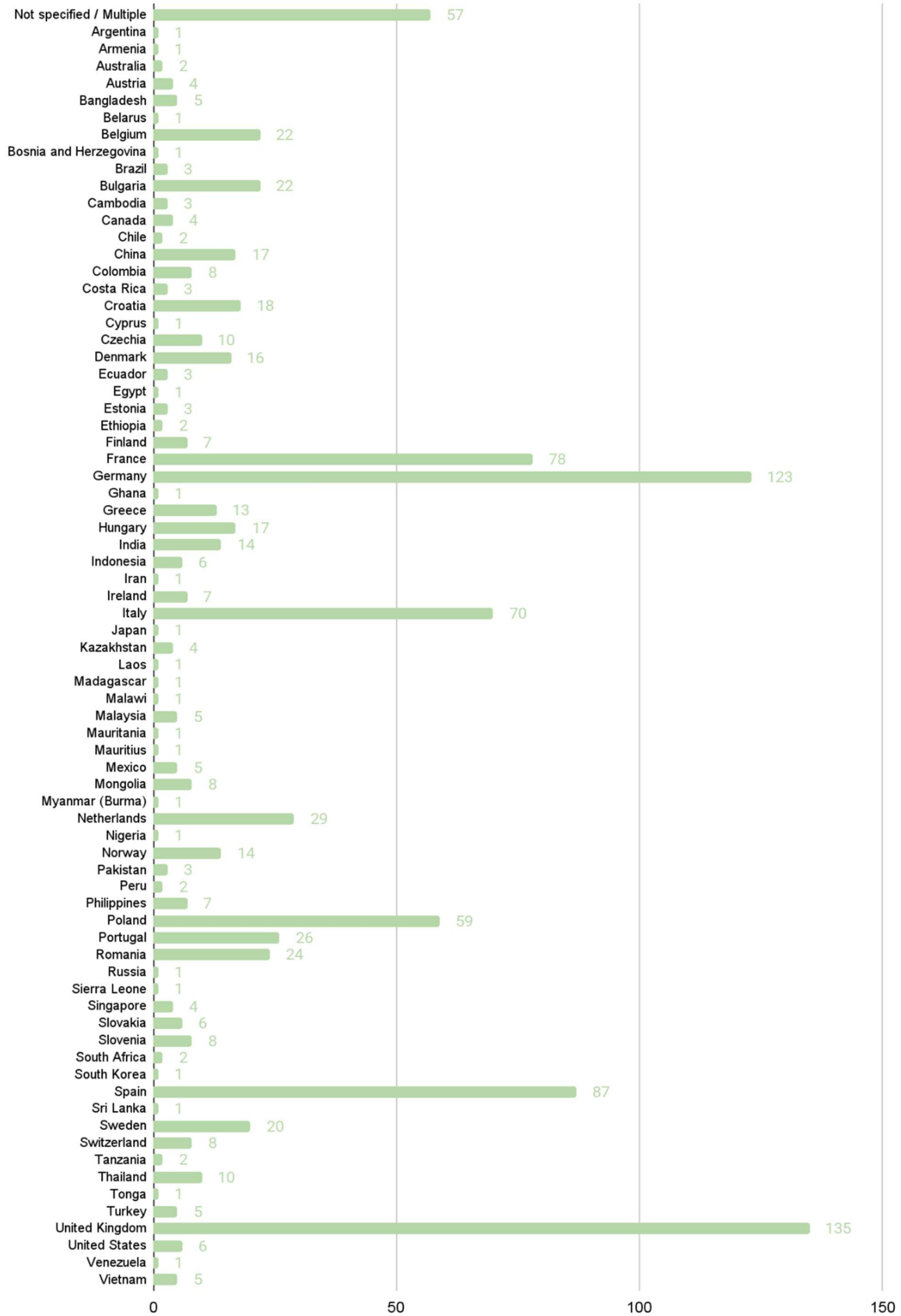


Figure 1. Distribution of screened NbS projects included in each Level, according to the framework assessing mental health relevance.

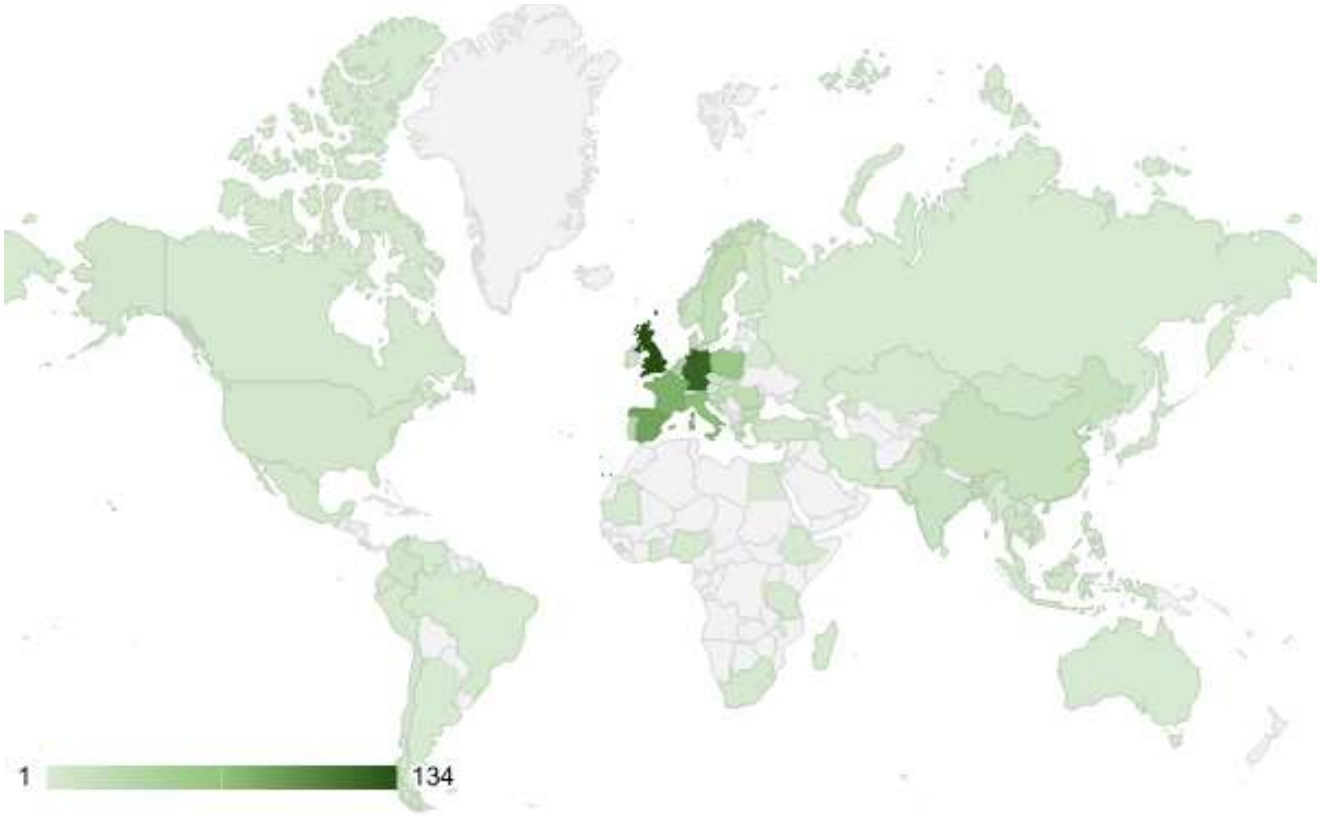
3.1. Level 1 - NbS Tackling Health

Within the 8 studied repositories, there were 2.718 projects, of which 1.044 were described as contributing to health and wellbeing, hence identified as Level 1 projects. References to the subject were often related to broader understandings of health, such as social cohesion, environmental quality, physical activity and alignment with SDG 3 (The Global Goals, n.d.). On the other hand, more than half of the projects screened (1.674) did not include in their description any claims of their contribution to health and wellbeing.

NbS projects were identified across 74 different countries, with 57 projects which did non-specify a location or were present in multiple locations. European countries were found to have the highest concentration of Level 1 NbS case studies, in particular the United Kingdom (135 projects), Germany (123 projects), and Spain (87 projects), reflecting the dominance of European projects in the catalogues, as it can be seen in Figures 2a and 2b:


Not specified / Multiple 57
Argentina 1
Armenia 1
Australia 2
Austria 4
Bangladesh 5
Belarus 1
Belgium 22
Bosnia and Herzegovina 1
Brazil 3
Bulgaria 22
Cambodia 3
Canada 4
Chile 2
China 17
Colombia 8
Costa Rica 3
Croatia 18
Cyprus 1
Czechia 10
Denmark 16
Ecuador 3
Egypt 1
Estonia 3
Ethiopia 2
Finland 7
France 78
Germany 123
Ghana 1
Greece 13
Hungary 17
India 14
Indonesia 6
Iran 1
Ireland 7
Italy 70
Japan 1
Kazakhstan 4
Laos 1
Madagascar 1
Malawi 1
Malaysia 5
Mauritania 1
Mauritius 1
Mexico 5
Mongolia 8
Myanmar (Burma) 1
Netherlands 29
Nigeria 1
Norway 14
Pakistan 3
Peru 2
Philippines 7
Poland 59
Portugal 26
Romania 24
Russia 1
Sierra Leone 1
Singapore 4
Slovakia 6
Slovenia 8
South Africa 2
South Korea 1
Spain 87
Sri Lanka 1
Sweden 20
Switzerland 8
Tanzania 2
Thailand 10
Tonga 1
Turkey 5
United Kingdom 135
United States 6
Venezuela 1
Vietnam 5
0
50
100
150

(**a**)



(**b**)

Figure 2. Distribution of NbS projects referencing health (**a**) by country; (**b**) on the World map.

Other than the geographic differences, it was also possible to identify through the screening the most common main NbS type related to the case studies. A total of 178 types of NbS were identified, with the most frequent ones being in the category of *parks and urban forests*, of which *large urban parks or forests* (183 NbS projects) and *pocket parks/neighbourhood green spaces* (121 NbS projects) stood out, followed by *community gardens* (110 NbS projects). The 5 most frequent Level 1 NbS types are presented in the Figure 3, bellow:

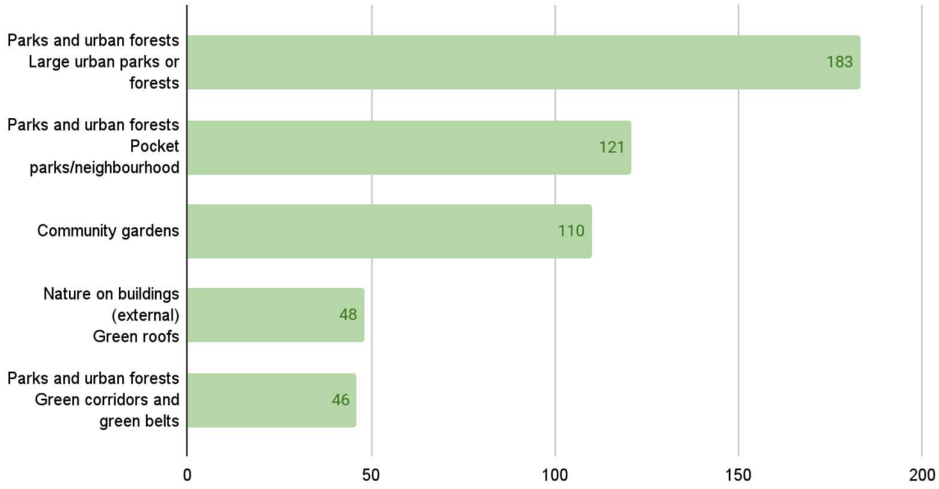


Figure 3. The 5 most frequent main NbS types in the Level 1 case studies.

3.2. Level 2 - NbS Tackling Mental Health

Among the 1.044 Level 1 case studies, 245 NbS projects were identified as having mention of mental health and included in Level 2 group. The majority of them (191) in their description reported rather unclear connections to mental health, usually only being annotated with a category tag. Furthermore, 31 of the Level 2 NbS were not specific when it comes to aspects of mental health they targeted, often using generic terms such as "mental health issues" and "psychological wellbeing". Only 23 projects referenced more specific conditions, such as stress (6), dementia (3), anxiety and depression (3), including others, which can be seen in the Figure 4 below:

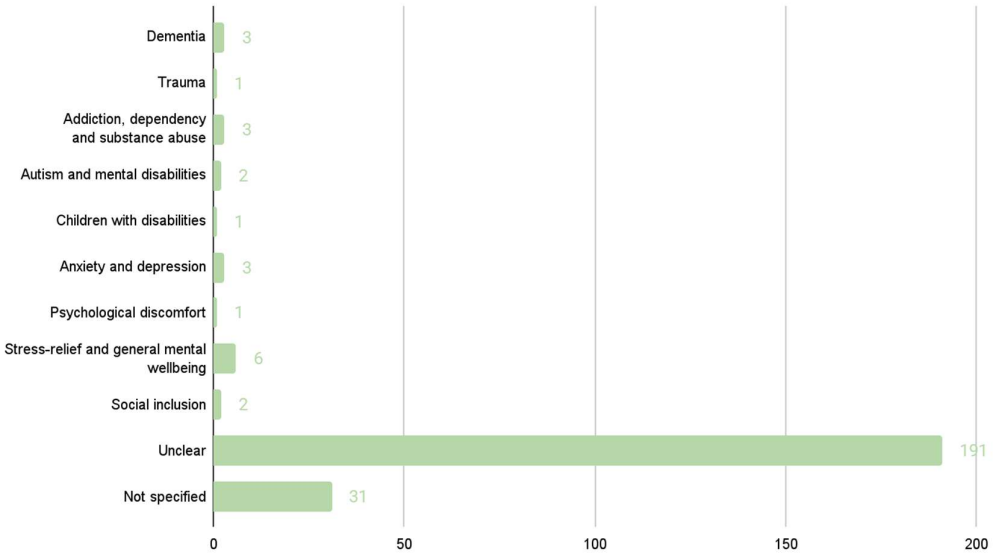


Figure 4. Mental health conditions referenced in the Level 2 NbS projects.

We identified 55 NbS types related to the Level 2 case studies. The most frequent one was *community gardens* (50 case studies), followed by *large urban parks or forests* (42 case studies) and *pocket parks/neighbourhood green spaces* together with *green roofs* taking the third place in frequency (20 case studies each). NbS typologies repeating more than twice are presented in the Figure 5 below:

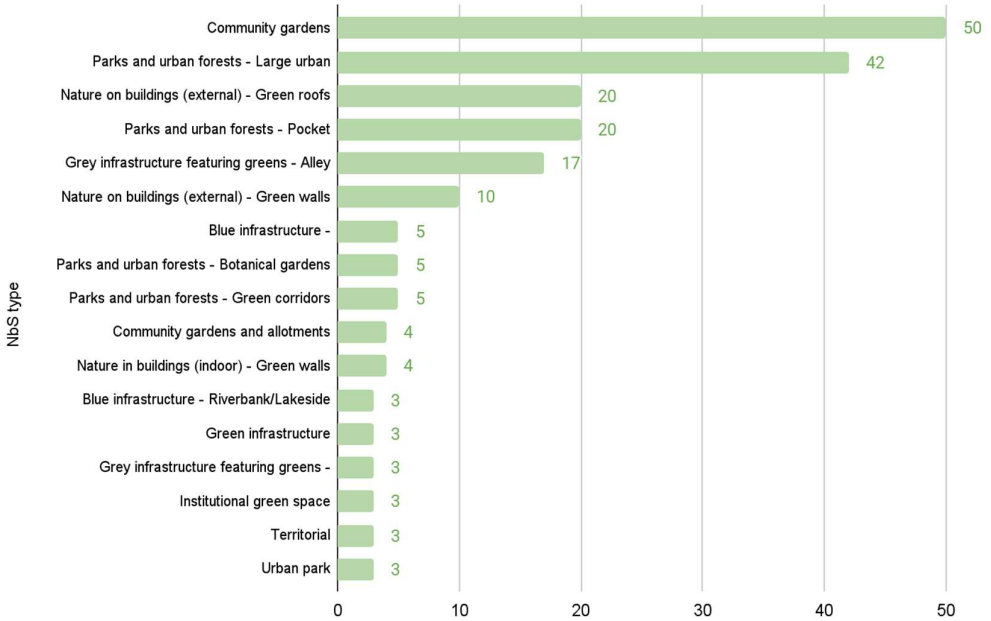


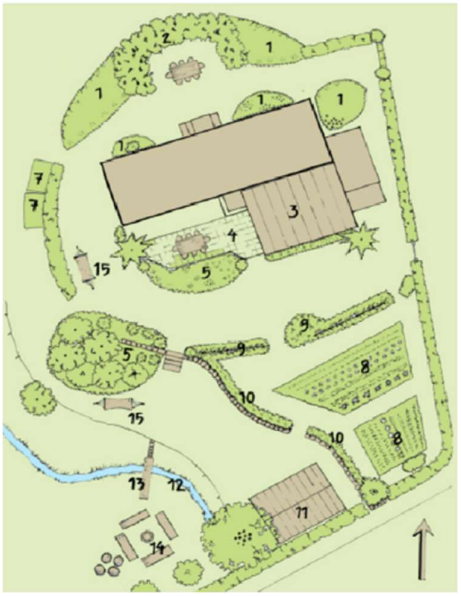
Figure 5. NbS projects typologies repeating across the Level 2 case studies more than twice.

3.3. Level 3 - NbS Monitoring Mental Health

After manual review of projects' descriptions, keywords and linked documentation, from the 245 projects related to mental health (Level 2), only 13 projects were found to reference monitoring of conditions, meeting the criteria for inclusion into Level 3. Details of these projects can be found in Table 3.

Based on the catalogues content and external sources, mainly referenced by the repositories themselves, it was possible to further analyse the extent of the monitoring conditions for Level 3 case studies. This exercise revealed that, of the initially flagged 13-Level 3 projects, only 3 appeared to have credible and targeted mental health monitoring. There three projects included: Numbered lists can be added as follows:

1. **Gröna Rehab in Gothenburg, Sweden** - Nature-based rehabilitation programme at the Gothenburg Botanical Garden, in collaboration with the Institute for Stress Medicine. The programme was launched in 2006 for individuals with stress-related mental health conditions, combining occupational therapy, psychotherapy and physiotherapy (Västra Götalandsregionen, n.d.). According to multiple evaluations led by Eva Shahlin, the participants show significant reductions in symptoms of exhaustion, depression and anxiety, together with improved work ability and reduced sick leave. Participants were tracked with self-assessment form on perceived burnout and stress-related symptoms, current work ability and degree of sick leave in the past year. Together with interviews on the experience of the "green" content in the course from the participants. Such a course was held at no charge, in a site surrounded by a nature reserve, a small brooks and allotment gardens (Sahlin et al., 2014);



1. Perennials at the entrance
2. Arbor of lilacs
3. Conservatory
4. South-facing patio
5. Herb garden
6. Rhododendron
7. Composts, chopping block and woodpile
8. Raised garden beds
9. Trellises with climbing roses, blackberries and clematis
10. Retaining wall with berry bushes
11. Greenhouse
12. Brook
13. Wooden bridge
14. Assembly area at the fire pit
15. Hammock

Figure 6. The Venue, Gröna Rehab at Gothenburg Botanical Garden (from Sahlin et al., 2014)

2. **The Environment and Me (TEaM) in Coventry, UK** - social project developed in partnership with the mental health charity "Coventry and Warwickshire Mind", and Warwickshire Wildlife Trust and Coventry City Council. It aimed at offering opportunities for socialisation and outdoor activities to residents with mental ill health (Mind Coventry and Warwickshire, 2023). Within multiple locations in Coventry and Warwickshire, through woodland workshops and bushcraft, people had the opportunity to create new wildlife meadows and ponds, grow an organic garden and plant trees. Participants were found to successfully reduce hospital admissions, return to the workforce and education, or participate in other social and volunteering activities (Director of Public Health's Annual Report 2020).

3. **Peacefully Green in Hague, the Netherlands** - the study using LIDAR-based tree volume mapping, explored how urban greenery in The Hague correlated with public health outcomes across neighbourhoods. The data, translated into a map, displays the tree volume per inhabitant in the neighbourhood, linking it to human health indicators,

such as percentage of the population suffering with anxiety or depression, chronic diseases or that meets the fitness standard. This data was analysed to assess correlations between tree volume per inhabitant and wellbeing metrics, being the strongest correlation that between tree volume and fitness standard, suggesting that greener areas support more active lifestyles and better perceived health. (Connecting Nature, 2019). Based on the maps it is possible to identify the most health-promoting areas.

The remaining 10 projects claiming to monitor mental health in their catalogue descriptions lacked methodological transparency or used unclear mental health metrics, such as: park use tracking or participatory feedback. In some cases, the monitoring referred to environmental or social metrics rather than psychological outcomes. For example, in the Urban Gardens Zagreb project, the monitoring programme focuses on soil and water quality, contamination risks and food safety, rather than mental health indicators (Energy Cities, n.d.; Grad Zagreb, n.d.). Another example, the Vertical Garden project in Seville, Spain, showcases one of the first hospital-based green wall systems in Europe. It confirmed the commitment to patient comfort and psychological support, but does not link these directly to the garden's impact (Archdaily, 2012; Europa Press, 2012, Inhabitat, 2012).

Table 3. Summary of NbS projects referencing monitoring of mental health conditions.

NbS name	NbS Type	Location	Catalogue	Mental health focus	Monitoring method	Description	Source
Gröna Rehab - Green Rehab*	Parks and urban forests Botanical gardens	Gothenburg, Sweden	UNA	Stress, depression (work-related)	Clinical tracking, physiotherapy, psychotherapy	Clinically monitored nature-based therapy for stress-related illness with long-term follow-up	https://www.vgregion.se/ov/grona-rehab/
The Environment and Me (TEaM)*	Community gardens	Coventry, United Kingdom	UNA	Anxiety, depression	Ecotherapy-based surveys and wellbeing indicators	Ecotherapy programme targeting anxiety and depression with structured wellbeing assessments	https://www.warwickshirewildlifetrust.org.uk/wild-wellbeing
Urban Gardens Zagreb	Community gardens	Zagreb, Croatia	UNA	Community well-being	Behavioural engagement, routine-based feedback	Community gardening supporting wellbeing, a therapeutic garden. Monitoring focuses on soil and water, not mental health	https://www.zagreb.hr/gradski-vrtovi/84058
Urban Greening Actions	Blue infrastructure Riverbank/Lakeside greens	Rajshahi, Bangladesh	UNA	General well-being	Claimed impact measurement, unclear methodology	Pilot project links nature access to wellbeing with biodiversity tracking and community feedback	https://urban-leds.org/new-greening-plan-to-revitalize-rajshahi-as-climate-responsive-sustainable-city/
Vertical Garden - Jardin Vertical	Nature on buildings (external) Green walls or facades	Sevilla, Spain	UNA	Social cohesion, stress relief	Participatory feedback, reuse of water systems	Hospital-based green wall designed to reduce stress. No formal evaluation of psychological outcomes	https://inhabitat.com/terapia-urbanas-vertical-garden-brightens-a-seville-hospital-with-40-species-of-lush-greenery/
Walk Among Old Trees – Canalejas Passage	Grey infrastructure featuring greens Alley or street trees and other street vegetation	Alicante, Spain	UNA	Mental comfort, heritage-based wellbeing	Interpretative signage, experimental data	Heritage tree walk fosters emotional connection. Lacks structured mental health monitoring	https://alicanteturismo.com/jardines/parque-de-canalejas/
Weaver Park	Parks and urban forests Pocket parks/neighbourhood green spaces	Dublin, Ireland	UNA	Social inclusion, mental comfort	Usage tracking, community feedback	Community park improves social inclusion and comfort. No mental health evaluation documented	https://www.dublincity.ie/parks-and-nature/dublin-city-parks/visit-park/weaver-park
Wirral Waters project	Parks and urban forests Pocket parks/neighbourhood green spaces	Wirral, United Kingdom	UNA	Community mental health (NHS-linked)	NHS collaboration, regeneration-linked wellbeing	Regeneration project includes health goals. Monitoring focuses on environment and economy	https://www.wirralwaters.co.uk/
Yearly maintenance of green surfaces	Grey infrastructure featuring greens Alley or street trees and other street vegetation	Zagreb, Croatia	UNA	Routine-based wellbeing	Municipal tracking of green space upkeep	Seasonal planting supports aesthetics and air quality. No mental health metrics tracked	https://www.zrinjevac.hr/default.aspx?id=571
Ecological Zone in City Centre	Parks and urban forests Pocket parks/neighbourhood green spaces	Ljubljana, Slovenia	UNA	General mental health promotion	Integrated into Healthy City strategy	Promotes wellbeing through pedestrianisation and green access. No mental health monitoring found	https://urbanizehub.com/ljubljana-european-green-capital-2016/
Creating a Climate-resilient City	Urban Green Infrastructure	Poznań, Poland	Oppla	Creativity, psychological wellbeing	NbS-CoBAs tool, participatory evaluation	Natural playgrounds promote child wellbeing;. Monitoring focuses on ecology and education.	https://invest4nature.eu/about/partners/city-of-poznan/
Peacefully Green *	Green infrastructure	The Hague, The Netherlands	Oppla	Anxiety, depression (population-level)	Correlation analysis with tree volume and density	Spatial analysis links tree volume to health indicators including anxiety and depression	https://connectingnature.oppla.eu/casestudy/19308
Canal and North Gateway	Green-blue corridor	Glasgow, United Kingdom	Oppla	Addiction, youth mental health	NHS partnership, therapeutic design, social metrics	Inclusive green corridor supports wellbeing. Monitoring focuses on biodiversity and access.	https://www.glasgow.gov.uk/article/2552/Canal-and-North-Gateway

Notes: * ***NbS projects with documented evidence of mental health benefits,*** *UNA - Urban Nature Atlas, NHS - National Health Service,*

4. Discussion

This study systematically evaluated the prevalence and accuracy of mental health claims across 2,718 Nature-Based Solutions (NbS) case studies sourced from eight major publicly available repositories, including the Urban Nature Atlas and Oppla. Using a three-level framework, the review aimed to contribute to a more accountable, evidence-based approach for designing urban environments that genuinely support mental health.

The results reveal a substantial disconnect between the promotion of NbS for health benefits and the documented evidence supporting those claims. While 1,044 projects (38.5% of all screened cases) referenced general health and/or wellbeing (Level 1), only 245 (9% of all projects, or 23.5% of Level 1) specifically mentioned mental health promotion (Level 2). This suggests that while the positive influence of green spaces on general health is widely recognized, it remains a minority characteristic across all documented NbS.

The most frequent NbS types referencing general health (Level 1) included large urban parks/forests (183 projects), pocket parks/neighbourhood green spaces (121 projects), and community gardens (110 projects). For mental health promotion (Level 2), community gardens (50 case studies) were the most frequently tagged type, followed by large urban parks/forests (42 case studies). However, the catalogues did not reference evidence confirming that any specific NbS type possesses unique benefits.

Crucially, the study found that only 13 projects referenced monitoring of mental health conditions (Level 3). Upon detailed investigation, only three projects—Gröna Rehab (Sweden), The Environment and Me (UK), and Peacefully Green (Netherlands)—were found to have credible, documented evidence of mental health benefits, such as clinical tracking or wellbeing surveys.

The severe reduction in projects from Level 1 to the documented evidence base of Level 3 demonstrates that mental health benefits are frequently assumed or arbitrarily labelled rather than demonstrated. NbS developers consistently mention health and wellbeing values, but few base these claims on explicit evidence or describe the specific characteristics contributing to mental health benefits.

The majority of Level 2 projects (191 out of 245) reported unclear connections to mental health, often using only a category tag. Furthermore, 31 projects used generic terms such as “mental health issues” and “psychological wellbeing,” failing to specify the aspect of mental health being targeted. Only 23 projects referenced more specific conditions, such as stress, dementia, anxiety, or depression. This lack of specificity makes the link between the NbS intervention and the supposed psychological outcome difficult, if not impossible, to verify.

The significant gap between projects claiming monitoring (13 projects) and those providing documented evidence (3 projects) highlights a failure in methodological transparency. The remaining 10 projects lacked transparent methodologies or utilized monitoring metrics that were unrelated to psychological outcomes. For instance, some projects claiming to monitor mental health outcomes focused instead on environmental metrics (e.g., soil and water quality in Urban Gardens Zagreb) or general community feedback without formal mental health evaluation (e.g., Vertical Garden in Seville).

It has been noted, though, that the few evidence displaying cases Gröna Rehab and TEaM were related to studies on patients, clinical intervention project types that need constant monitoring, and are often fortunate to have higher resources and budgets devoted to them. On the other hand, Peacefully Green utilized correlational ecological data, presenting dissimilar loads in evidence, as well as interest and financial support.

Budget allocation for NbS projects is a frequent challenge, brought out by limited knowledge of the actual profit coming from NbS implementation. (Kauark Fontes et al., 2023). Using a function of the distance, a natural area can be found from an urban population and the mental health outcomes and expenses for this population, a study found that a loss in natural areas could lead to an annual increase in mental health treatment spending of almost 3 million dollars (Guerry et al., 2023). Repeatedly NbS are not measured after projects’ conclusion due to lack of resources and financial allocation to investigate its results, changes in design or expectations.

Accordingly, designating a financial plan at the conception of a project which includes evidence-based measurements must be encouraged for a successful NbS application. Acquiring and analysing relevant data for advancement in NbS functions would benefit subsequent designs. However, NbS still face implementation challenges such as uncertainty over their cost-effectiveness, weak financial models and rigorous governance (Liu et al., 2021).

Yet, the failure to translate scientific findings into clearly evidenced NbS interventions, supported by consistent outcome monitoring, creates a significant risk that mental health becomes an assumed, rather than demonstrated, outcome. Even if underlying evidence exists for certain projects, the failure to consistently report it undermines the credibility of the entire field.

An example of a good practice effort within wellbeing and public health monitoring is the development of the euPOLIS platform, enabled by artificial intelligence. Outlined to collect data on health and environment, and measure physical activity from multiple sources, it would audit the impact of NbS (Gallos et al., 2022, Protopapadakis et al., 2024).

The practice of claiming mental health benefits without providing documented evidence risks undermining public trust, misguiding policy, and diluting the credibility of NbS as therapeutic interventions. When urban greening initiatives are promoted using claims of scientific backing that cannot be confirmed or traced, the practice observed in this review can even be described as sciencewashing. Sciencewashing, similar to greenwashing, creates skepticism and resistance toward NbS, questioning their practical relevance. Without rigorous evidence, such arbitrary claims may also erode confidence within the medical community, making it less likely for health professionals to integrate NbS into mental health promotion strategies.

A significant limitation of this study is the low geographic diversity found in the case study catalogues. A majority of Level 1 projects were concentrated in European countries, particularly the United Kingdom (135 projects), Germany (123 projects), and Spain (87 projects). This bias toward European and high-income countries limits the generalizability of findings and reinforces the bias for evidence-based health benefits. Consequently, mental health outcomes in urban greening in low- and middle-income countries, where rapid urbanization is occurring, are often overlooked or underevaluated, limiting the potential use of NbS in their policies and urban design. The inconsistent labelling of NbS types across different catalogues also posed a potential risk of data duplication.

It is important to highlight that the lack of data within the catalogues does not automatically suggest deficiency in the projects themselves. The implementation of NbS contributes to protecting human health by reducing disaster risks, improving urban resilience, mitigating climate change, among other solutions. It does, however, uncover a shortfall in a framework to be followed when it comes to designing for better mental health. It is likely that catalogues would not document on the processes used for evaluating the claimed mental health improvement, due to formatting limitations, lack of reporting, precision or even monitoring.

A craving for guidance in how to implement good practices for mental health improvement within NbS projects has been identified. A reference of a conceptual model to follow is presented by Bratman, starting from the natural features, meaning composition, size, type and configuration of the space; the duration to which people are exposed to nature; the experience such exposure triggers; and finally the effects, or mental health impacts, the nature experience translates into (Bratman et al., 2019).

5. Conclusions

The review shows the broad classification of NbS as mentally beneficial, however, such claims are not reporting evidence to support these claims. Without a clear evaluation, claims of therapeutic benefits risk becoming anecdotal, undermining credibility, not only of the projects, but of NbS in general, and confusing the public.

A more in-depth research of each project published by the catalogues would be necessary to confirm the lack or presence of monitored benefits to mental health, and to understand the impact of the implemented NbS. With a larger sample size, other than a more diversified collection of NbS catalogues from different geographic amplitudes, a higher number of case studies could be considered for a more conclusive analysis, further reducing communication liabilities.

NbS repositories must prioritize transparency of claims according to defined mental health goals and integrate monitoring tools already during the design phase. Such effort can lead to urban nature being recognized as a legitimate contributor to mental health promotion strategies.

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