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Bibliometric Analysis Of Scientific Production In SCOPUS On The Relationships Between Humans And Nature With An Emphasis On Well-Being And Mental Health

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Abstract

There is a large and well-documented body of scientific literature that highlights the positive impact of nature on individuals' well-being and mental health. In this research, the authors propose a bibliometric analysis of the relationship between these variables and how they relate to mental health. To this end, the researchers selected studies in Spanish and English that were indexed in SCOPUS and published between 2018 and 2023. For the data analysis, the authors used VOSviewer and analyzed annual productivity networks, thematic trends, and keyword co-occurrence. As a result, we were able to identify three key trends in the literature, which revolved around the psychological benefits of exposure to natural environments, ecotherapy, and the sociocultural and environmental dimensions of these relationships. We conclude that current research prioritizes applied approaches, such as therapeutic interventions, but pays less attention to inequalities in access to natural environments. This study provides a systemic view of the field, useful for guiding future research toward gaps such as the role of urbanization and environmental justice.

Keywords: *Human well-being, Mental health, Nature, Bibliometrics and Ecotherapy.*

Introduction

The relationships between humans and nature have been fundamental to the development of societies (Monzón-Pinglo et al., 2023; Yang, 2018). However, according to Kahn (2022), the accelerated process of urbanization, the disconnection from natural environments, and the environmental crisis have generated growing interest in understanding how these links influence psychological well-being and mental health.

Such is the case that seminal studies such as those by Almagambetovich (2021) and Ecersberg et al. (2022) concluded that exposure to natural spaces and their associated biodiversity significantly reduces stress by improving mood. In this sense, Yoshida et al. (2022) highlight the importance that the scientific community is giving to these therapeutic modalities based on ecotherapy, especially given the ongoing mental health pandemic (Borges Machín & González Bravo, 2022).

Biophilia, a common concept in the literature on this topic, emphasizes that people have an almost inherited affinity towards nature and its attributes, which, according to Pasanen et al. (2018), explains the restorative effects of these therapies. More specifically, the Attention Restoration Theory, according to Kimura et al. (2021), proves that natural environments influence the recovery of mental responses (Cardeño-Portela et al., 2023; Gonzales-Tito et al., 2023). According to Ataher and Runnerstrom (2018), the theoretical and conceptual frameworks that support these forms of ecotherapy have a significant influence on environmental psychology, medicine, and the social sciences, a finding corroborated by Subiza-Pérez et al. (2021).

However, it is essential to acknowledge the significant gap in sociocultural research that explores the relationships between people and their natural environments. This is the documented case where Crossan and Salmoni (2019) emphasize the unique role of green spaces in mental health. But in parallel, Stevenson et al. (2018) warn that urban inequality and the lack of equitable access to natural spaces contribute to this.

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Therefore, the lack of consensus in the literature and the associated tenets on the topic are notable. Because of this, the objective of this study is to identify thematic trends in the literature on the relationships between people and nature from the perspective of well-being and mental health.

Methodology

To conduct this research, the authors employed a theoretical review paradigm with bibliometric analysis. The focus was to analyze scientific production regarding the relationship between nature and people from the perspective of well-being and mental health.

To meet the objectives, the Scopus database was selected due to its broad coverage of scientific information, as demonstrated in previous research (see, for example, Eslava-Zapata et al., 2023; Gómez-Cano et al., 2023; Subiza-Pérez et al., 2018). Data processing was conducted using the functions associated with this platform and the VOSviewer software. Researchers performed Keyword co-occurrence analyses, annual literature production, citation impact, and thematic content analysis.

Phase 1. Search and information collection strategy used

During the first phase, the bibliographic search was carried out in Scopus using the following search formula: *(TITLE-ABS-KEY ("human-nature" OR "natur* connect*" OR "relación humano-naturaleza") AND TITLE-ABS-KEY ("mental health" OR "well-being" OR "salud mental") AND PUBYEAR > 2017 AND PUBYEAR < 2024) AND (LIMIT-TO (DOCTYPE, "ar"))*. As could be observed, the studies were limited to scientific articles, published in Spanish and English and published between 2018 and 2023.

Phase 2. Data extraction and filtering

The results were refined using inclusion and exclusion criteria, which eliminated duplicates, retained only articles in English and Spanish, and excluded non-systematic reviews, conference papers, and book chapters. After a manual review of titles and abstracts to ensure thematic relevance, the final sample consisted of 63 articles. Metadata was exported in CSV format for analysis.

Phase 3. Bibliometric analysis with VOSviewer

The filtered data were analyzed using VOSviewer to examine three key dimensions: productivity, conceptual networks, and scientific collaboration. Annual article production was quantified to identify temporal trends in the field of study. Keyword co-occurrence maps were subsequently generated, revealing thematic clusters using clustering algorithms based on the strength of semantic associations. Additionally, co-authorship networks by country and institution were analyzed to visualize patterns of international collaboration. To ensure data consistency, terminological variants were normalized, and lexical similarity filters were applied. This analysis allowed us to identify dominant conceptual cores and their evolution during the period 2018–2023, providing a graphical representation of the intellectual structure of the field of study.

Phase 4. Interpretation and synthesis of results

The clusters identified by VOSviewer were qualitatively interpreted by triangulating them with theoretical reviews to define three dominant thematic axes: psychological effects of exposure to nature, ecotherapy-based interventions, and socio-environmental inequalities in access to green spaces. This phase integrated bibliometric metrics with critical discussions of research gaps, such as the underrepresentation of studies from the Global South.

This methodology allowed for reproducible mapping of the state of the art. This highlighted emerging trends and opportunities for future transdisciplinary research (Bogert et al., 2022; Soga & Gaston, 2021).

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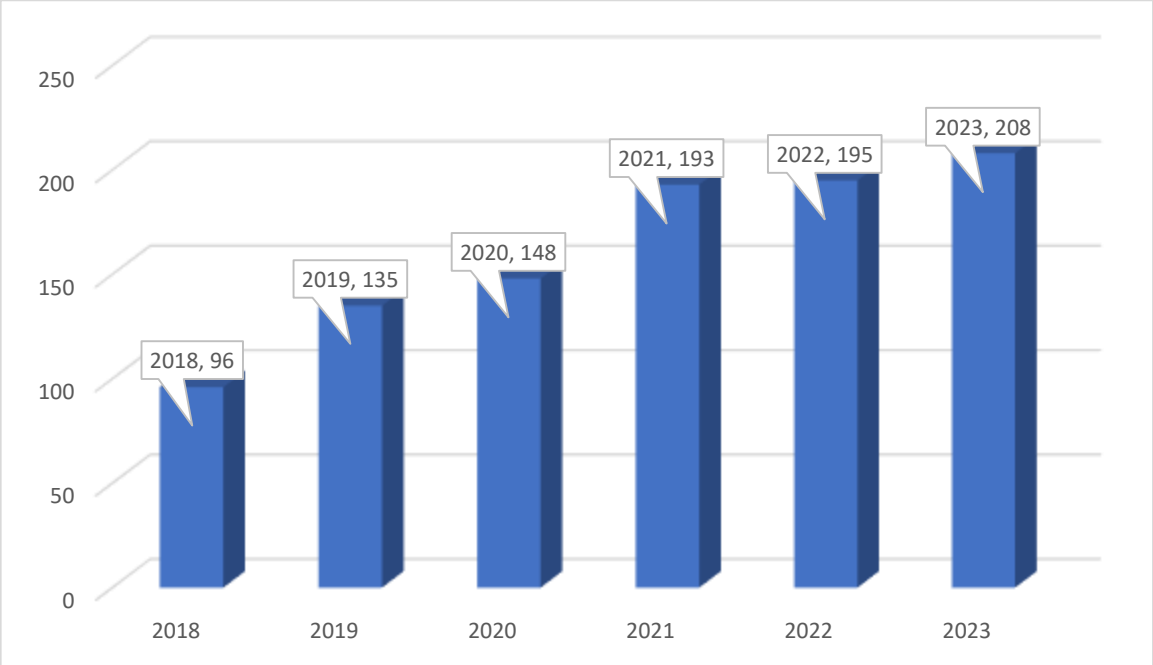
Results

Bibliometric analysis

Temporal trend of publications

The Scopus search identified 975 studies distributed annually, indicating a notable growth in academic production on the relationship between humans and nature, well-being, and mental health. In 2018, 96 documents were registered, a figure that progressively increased to 208 in 2023 (see Figure 1)..

Figure (1). Annual distribution of publications



This annual increase (with peaks in 2021-2023) suggests a growing scientific awareness of the topic, possibly driven by the COVID-19 pandemic, which highlighted the importance of natural spaces for mental health. The stability in the volume of publications between 2021 and 2023 (193-208 documents) indicates that the topic has consolidated its relevance on the research agenda.

Featured Institutions and Countries

The most productive institutions include University College London (26 papers), the University of Toronto (25), and the University of Melbourne (22), reflecting the leadership of English-speaking countries in this area (see Figure 2). At the national level, the United States (276 papers) and the United Kingdom (225) dominate production, followed by Australia (121) and Canada (96) (see Figure 3).

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Figure (2). Most productive institutions

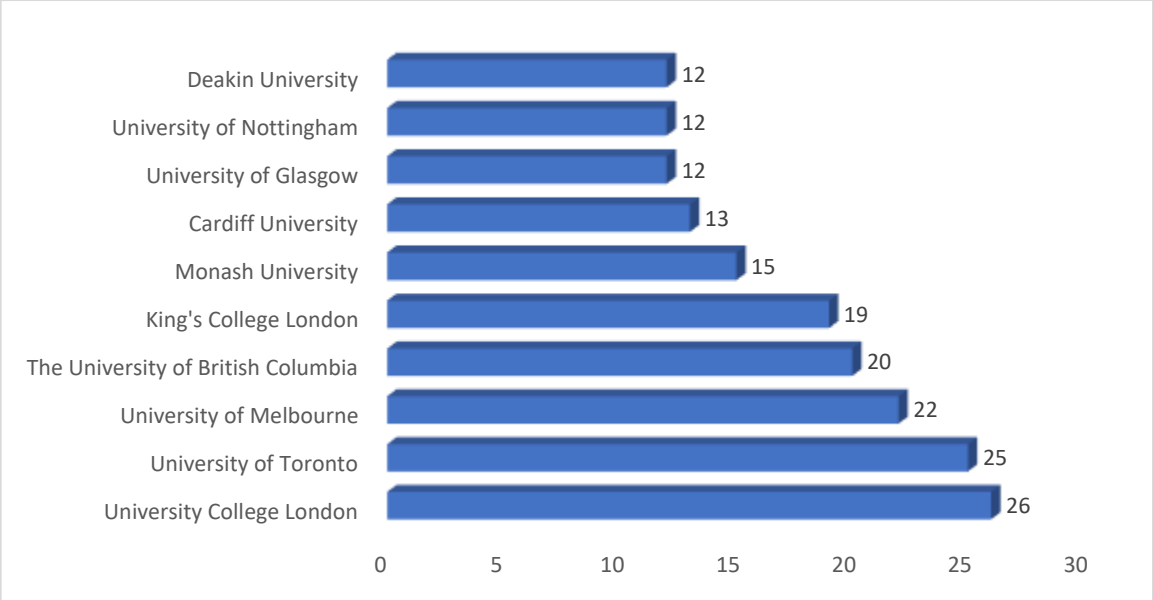
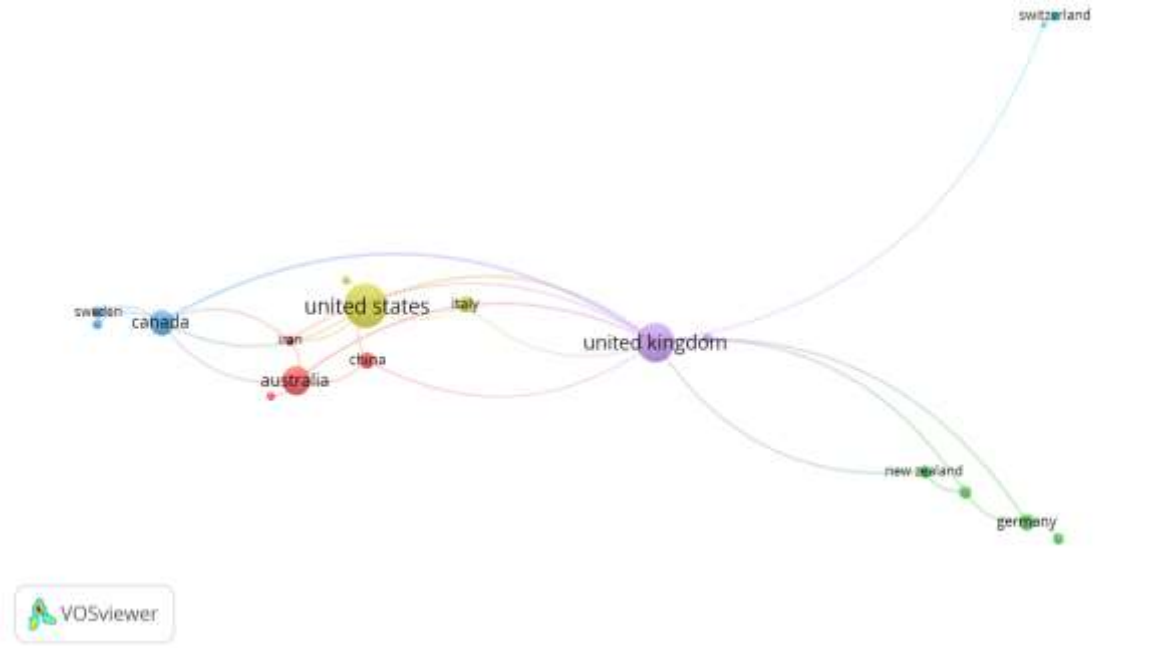


Figure (3). Most productive countries



This distribution shows a strong influence from countries with a tradition of research in public health and environmental psychology, as well as access to urban and rural natural environments that facilitate empirical studies. The presence of European countries such as Germany (43) and Spain (40) suggests a growing interest in the European context, although with a lower comparative volume.

Main Thematic Areas

Medicine is the discipline with the greatest contribution (623 documents), followed by psychology (227) and social sciences (196). This underlines the multidisciplinary approach to the topic, where clinical (mental health), behavioral (psychological well-being), and sociocultural (society-nature relationship) perspectives

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converge (see Table 1). The presence of environmental sciences (174) highlights the integration of ecological dimensions in health studies, while areas such as nursing (83) and neuroscience (50) reflect practical applications in healthcare and biological mechanisms.

Table (1). Areas of study of the publications

Subject area	Documents
Medicine	623
Psychology	227
Social Sciences	196
Environmental Science	174
Nursing	83
Arts and Humanities	51
Neuroscience	50
Biochemistry, Genetics and Molecular Biology	32
Multidisciplinary	32
Agricultural and Biological Sciences	31
Computer Science	18
Veterinary	18
Engineering	17
Health Professions	14
Pharmacology, Toxicology and Pharmaceutics	13
Business, Management and Accounting	11
Energy	11
Earth and Planetary Sciences	9
Mathematics	4
Decision Sciences	3
Immunology and Microbiology	3
Dentistry	2
Economics, Econometrics and Finance	2
Physics and Astronomy	2
Materials Science	1

Scientific Impact

The 932 documents analyzed accumulate 23,754 citations, with an h-index of 71, indicating a considerable impact. The citation curve exhibits exponential growth, particularly between 2020 and 2023, coinciding with the pandemic, during which studies on well-being in natural contexts gained increased value (see Figure 4).

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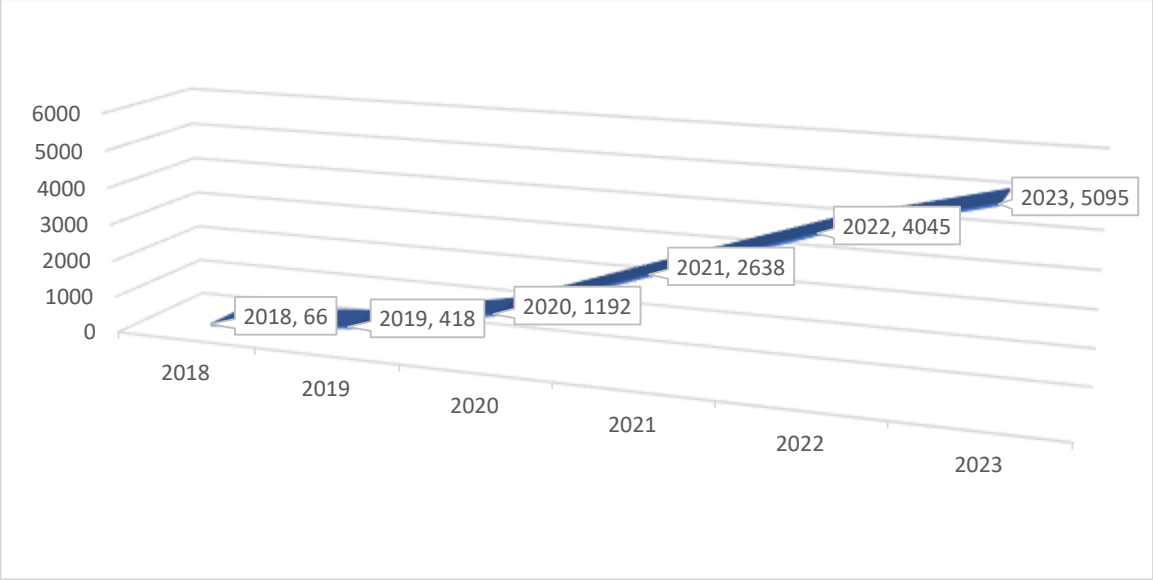
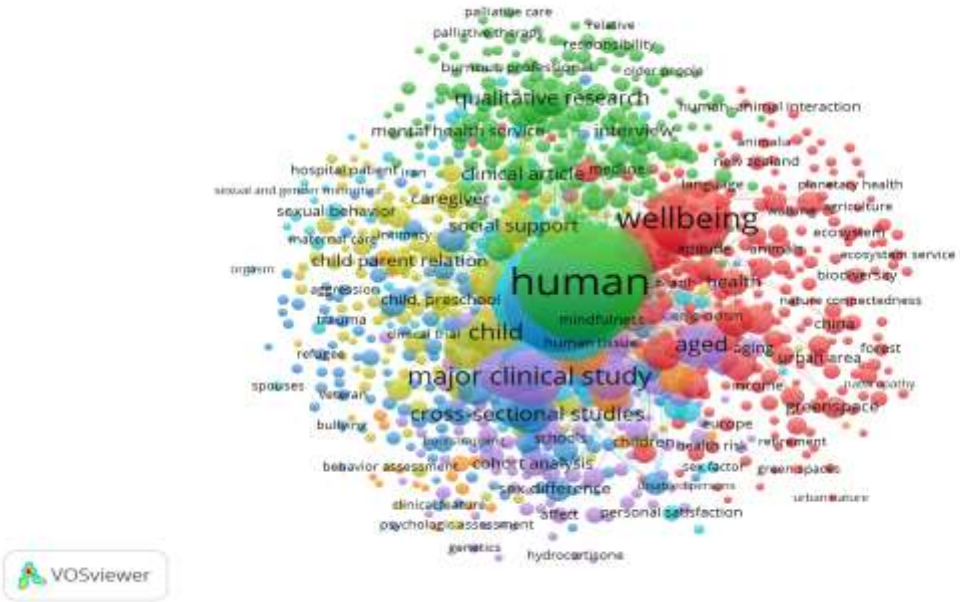
Figure (4). Scientific impact of documents by year



Trends in literature

The results of the keyword co-occurrence analysis reveal a dynamic and multidisciplinary field of research, with an emphasis on practical applications (urban planning, public policy) and underlying mechanisms (psychological, neurobiological) (see Figure 5).

Figura (5). Red de coocurrencia de palabras claves



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Trends in literature

Analysis of the psychological effects associated with exposure to natural environments

Qualitative trends developed from bibliometric analysis overall agree on the psychological benefits of contact with natural environments (Eslava-Zapata et al., 2023). Moreover, research such as that developed by Pries (2022) emphasizes that exposure to what the author calls "green spaces" has a statistically significant effect on reducing mental rumination and improving emotional self-regulation skills.

These effects are explained by Sheehan et al. (2018) from the perspective of Attention Restoration Theory, arguing that exposure to nature mitigates the cognitive fatigue associated with stress. Furthermore, several authors, such as Elkins et al. (2021) and Tzafestas (2018), who explore underlying mechanisms of action, point out that the reduction of cortisol (the stress hormone) is frequently associated with exposure to direct contact with nature.

In addition, there is still uncertainty in the scientific community about how long and how this exposure should last. Gill et al. (2018), in particular, agree that brief interactions alone can generate positive psychological impacts. In contrast, Timm et al. (2018) suggest prolonged experiences to ensure a lasting effect.

In another case frequently cited in the literature, Osher et al. (2020) discuss the role of perceived biodiversity. For these authors, each natural environment has a distinct impact on people's mental health, and they hypothesize that visual complexity or the presence of water can enhance psychological responses in various ways.

Another important gap that the authors of this research observed in this trend mapping is the need to establish a differentiation between green environments and non-urbanized natural environments (González Ávila et al., 2023; Pérez Gamboa et al., 2019). This distinction, in the authors' opinion, serves as the starting point for designing public policies that produce healthy cities.

In this regard, a key differentiation is made in parallel by Mani et al. (2023) and Rigolot (2021). For these authors, green environments, although more accessible, often present limitations due to noise pollution. Conversely, non-urbanized natural environments are frequently associated with greater potential for stress reduction.

The authors believe there is a need to expand studies in diverse populations. Most of the evidence comes from Western countries and high socioeconomic groups, which limits the generalizability of results (Eversberg, 2021; González Vallejo, 2023). Recent research is beginning to explore cultural differences in the perception of nature and its impact on well-being, a still nascent but critical area for addressing mental health equity (Stanley, 2021)..

Interventions based on ecotherapy

The second thematic axis brings together applied approaches that use nature as a therapeutic tool, from structured programs to informal interventions in urban settings (González-García et al., 2023; Silva & Moreira, 2020). Ecotherapy has established itself as a complement to conventional treatments for anxiety, depression, and post-traumatic stress disorder, with meta-analyses reporting moderate but consistent effect sizes (Osipov et al., 2018). According to Carmel (2023), its success lies in combining biological mechanisms with social dimensions.

However, the methodological heterogeneity of these interventions poses challenges. While Japan and South Korea have standardized protocols for shinrin-yoku, with parameters such as duration, forest type, and guided activities, less systematic approaches predominate in other contexts (Higuera Carrillo, 2022; Johnson et al., 2022). This lack of uniformity makes it difficult to compare results and ensure replicability, a problem acknowledged even in systematic reviews (Jiang et al., 2023).

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A promising development is the integration of digital technologies to expand access. Virtual reality applications that simulate natural environments have proven effective in groups with reduced mobility or in hospital settings (Chung et al., 2018; López-Gónzalez, 2023). At the same time, criticisms of technological solutionism are emerging, which could exacerbate inequalities if not accompanied by improvements in access to tangible green spaces (Cassarino et al., 2019; Biassoni et al., 2023)..

Socio-environmental inequalities in access to green spaces

The third emerging theme criticizes the supposed universalism of nature's benefits, highlighting how factors such as class, race, or geographic location mediate access to and effects of nature. Studies in cities in the US, the UK, and Latin America show that marginalized communities have less access to quality green spaces (Mogrovejo Andrade, 2022; Pérez-Gamboa et al., 2023). This practice limits opportunities for well-being and reinforces mental health disparities.

Green gentrification illustrates this paradox: urban reforestation projects often increase land values by displacing original residents and perpetuating exclusion (Jiang et al., 2020). In response, concepts such as ecological justice emerge, linking access to nature with human rights by requiring community participation in the design of spaces (Han, 2020; Noroña González et al., 2023). This approach is especially relevant in the Global South, where accelerated urbanization and privatization of natural areas exacerbate inequalities (Gómez-Cano & Sánchez-Castillo, 2021).

Additionally, a palpable inequality in the literature reviewed relates to the differential patterns between urban and rural areas. A seminal study was that of Carmel et al. (2023), who found that rural populations may have higher rates of depression. According to these authors, this could be related to the social isolation they experience and their livelihoods.

Discussion

In this study, the authors were able to verify that the relational links between natural environments and mental health are scientifically significant. Furthermore, as can be seen in the notable data provided by Gómez-Cano & Sánchez-Castillo (2023) and Vázquez-Vidal & Martínez-Prats (2023), there is growing interest in the scientific literature in exploring the psychophysiological mechanisms underlying the reported benefits of direct contact with nature (Pungas, 2022; Stainforth et al., 2018).

Based on these data, it is interesting to mention the systematic barriers reported by the authors to the equitable implementation of therapeutic interventions based on interaction with nature. In addition to the scientific support for this type of intervention, Egner et al. (2020) warn of the limited application of these interventions due to the lack of availability of green spaces in urban areas and the limited accessibility for vulnerable people due to the disconnection from formal public health systems (Rodríguez-Torres et al., 2022).

In this regard, Cassarino et al. (2019) rightly state in their research that scientific results of effectiveness or causal associations are not sufficient to achieve a large-scale effect in the implementation of these interventions. In this sense, we agree with this group of authors that scientific results must be transformed into public policies and that these will be effective as long as they combine mental health, environmental, and pro-urbanist perspectives.

This line of thinking is corroborated by the bibliometric patterns analyzed, which highlight the meritorious analysis of social and political dimensions in these interactions we study. Such is the case with the pattern presented by Barger et al. (2022) and Guzmán et al. (2020), who question the way this content has been addressed in the scientific literature, as it associates trends toward the unequal distribution of green spaces with dynamics of marginalization and exclusion. This, in the authors' opinion, only maintains a reductionist narrative in the scientific corpus regarding the universal benefits of nature.

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Conclusions

The analysis presented in our study clearly indicates progress in recognizing nature as a beneficial element for mental health and overall well-being. However, individualistic and Western-centric perspectives persist in the scientific literature.

This biased view of events, in the authors' opinion, requires the methodological rigor of a conceptual framework. To function effectively, it must address the connections between mental health, the environmental crisis, and social inequality in non-Western contexts.

In addition, a context of solid scientific development is observed in understanding the psychophysiological factors associated with the effectiveness and efficacy of nature-based interventions. However, it is important to highlight that future studies would benefit from incorporating inclusive and multidisciplinary designs that encourage the translation of scientific output into public policy.

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