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# The importance of nature contact for maintaining well-being and mental health during the COVID-19 pandemic

## *A importância do contato com a natureza para a manutenção do bem-estar e da saúde mental durante a pandemia da COVID-19*

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**ABSTRACT**: The physical and mental well-being of society can be significantly improved by nature contact. However, the outbreak of the COVID-19 pandemic, caused by the SARS-CoV-2 virus, required government-imposed lockdowns and movement restrictions worldwide to contain the virus. This led to a decrease in contact with nature and a simultaneous increase in cases and reports of depression and anxiety symptoms. Therefore, this study aimed to determine the benefits of nature contact during the pandemic to maintain mental health. The results showed that participation in various nature-related activities was highly effective in reducing symptoms of stress, depression, and anxiety during the COVID-19 pandemic.

*Keywords*: anxiety; depression; ecotherapy; nature.

**RESUMO**: O contato com a natureza é uma das atividades capazes de proporcionar melhora na saúde física e mental da sociedade. Com o início da pandemia da COVID-19, causada pelo vírus Sars-CoV-2 e a necessidade de os governos realizarem *lockdown* ou impor medidas de contenção da circulação de pessoas em diversas localidades do planeta para contenção do vírus, houve uma diminuição do contato com a natureza. Paralelo a isso, um aumento nos casos e relatos de sintomas de depressão e ansiedade. Dessa forma, o presente estudo buscou identificar os benefícios do contato com a natureza durante o período da pandemia para a manutenção da saúde mental. Os resultados demonstraram que há uma alta eficácia na realização de diversas atividades de contato com a natureza para a redução dos sintomas de estresse, depressão e ansiedade durante a pandemia da COVID-19.

*Palavras-chave*: ansiedade; depressão; ecoterapia; natureza.

## *1. Introduction*

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, had its first reported cases in Wuhan, China, between late December 2019 and early January 2020. Following these initial reports, an investigation was launched to determine the epidemiology of the virus and the origin of the outbreak, which revealed a direct link to the Huanan Seafood Wholesale Market (HSWM), which sells seafood and wildlife. Many of the initial patients were either stallholders, employees, or regular visitors to the HSWM (World Health Organization, 2020).

Between February and March 2020, the virus spread rapidly around the world, prompting authorities in several countries to impose restrictions on the movement of people, holding events, and nonessential services. These measures were considered the most effective way to contain the spread of COVID-19 (Hellewell *et al.*, 2020; Tang *et al.*, 2020).

In addition to movement restrictions, there were changes in work practices and social isolation. The emergence of a new unknown disease with no effective preventive measures and a high mortality rate led to behavioral changes and stress symptoms, thereby affecting the well-being and mental health of the global population. Studies reported depressive symptoms, anxiety (Peretti-Watel *et al.,* 2020; Solomou & Constantinidou, 2020; Tang *et al.*, 2020; Turna *et al.*, 2021), increased feelings of loneliness, increased consumption of alcohol, sugar, and fat (Bell *et al.*, 2021) decreased sense of well-being (Yang & Ma, 2020; Bell *et al.*, 2021), and sleep disorders (Peretti-Watel *et al.*, 2020). Groups with the highest levels of anxiety and depressive symptoms included women, adolescents, university students, and unemployed individuals (Solomou & Constantinidou, 2020).

One of the activities suspended in many countries to control the spread of the virus was visiting natural environments. This activity is often sought by individuals for physical exercise, socialization, emotional resilience, and restoration of well-being (Tomasso *et al.*, 2021). The World Health Organization (WHO) defines mental health as "a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community" (World Health Organization, 2022, online). Thus, the aim of the present study was to identify the benefits of nature contact for maintaining well-being and mental health during the COVID-19 pandemic by emphasizing the benefits of the human-nature relationship for individuals in potentially stressful situations.

## *2. Methodology*

A narrative literature review was conducted to explore the importance of contact with nature during the COVID-19 pandemic. Our review question is as follows: What is the importance of contact with nature for maintaining mental health during the COVID-19 pandemic? Search for relevant articles were conducted on PubMed, a database known for its specificity and relevance in health sciences. PubMed has articles from several countries and published in different languages, thereby providing a global perspective on the topic.

Searches were conducted using Boolean searches with the following keywords: "Covid-19"

AND “ecotherapy” (one result); “Covid-19” AND “nature contact” (one result); “Covid-19” AND “green spaces” (33 results); “Covid-19” AND “environmental enrichment” (four results); “Covid-19” AND “forest bathing” (five results); “Covid-19” AND “Shinrin-yoku” (two results), for a total of 46 articles. These keywords were chosen for their relevance in relating different forms of nature contact to mental health benefits. In Portuguese these keywords are “contato com a natureza”, “ecoterapia”, “espaços verdes”, “enriquecimento ambiental”, “banho florestal” (the last one means both forest bathing and Shinrin-yoku). A thorough reading of abstracts was performed, selecting those that were relevant to the objectives of the study, which was to understand how contact with nature can benefit mental health and well-being during the COVID-19 pandemic. Articles that were not related to the use of nature contact to promote mental health and well-being during the COVID-19 pandemic were excluded. After reviewing abstracts, articles published between 2019 and 2021 that addressed the review question were selected.

## *3. Results*

A total of 46 articles published between 2019 and 2021 were found, of which 14 were directly related to the review question (Table 1).

Results are presented in two sections, organized retrospectively, based on the objective of the study and the information collected from the articles:

(3.1) Demonstrations of the mental health situation, correlated with the level of nature contact during the COVID-19 pandemic, and

(3.2) Forms of nature contact to restore mental health during the pandemic.

TABLE 1 – Summary of articles selected from PubMed search

| **Search strategy** | **No. of results from PubMed** | **Selected studies** |
|---|---|---|
| “Covid-19” AND “ecotherapy” | 1 | (Chaudhury & Banerjee, 2020) |
| “Covid-19” AND “green Spaces” | 33 | (Berdejo-Espinola *et al.*, 2021) (Cole *et al.*, 2020) (Dzhambov *et al.*, 2020) (Geary *et al.*, 2021) (Huerta & Utomo, 2021) (Pouso *et al.*, 2020) (Ugolini *et al.*, 2020) |
| “Covid-19” AND “nature contact” | 1 | (Tomasso *et al.*, 2021) |
| “Covid-19” AND “environmental enrichment” | 4 | (Zabini *et al.*, 2020) |
| “Covid-19” AND “forest bathing” | 5 | (Olson *et al.*, 2020) (Roviello & Roviello, 2021) (Roviello *et al.*, 2021) (Spurio, 2021) |
| “Covid-19” AND “Shinrin-yoku” | 2 | (Pasieka, 2021) |

SOURCE: Authors of the present study.

### *3.1. Demonstrations of the mental health situation correlated to the level of nature contact during the COVID-19 pandemic*

With the onset of COVID-19 pandemic and the measures implemented to control the spread of COVID-19, approximately 42% of people reported a reduction in the amount of time they spent outdoors, which was correlated with a sense of nature deprivation during the same period (Tomasso *et al.*, 2021) and a concomitant increase in symptoms of depression and anxiety (Pouso *et al.*, 2020). Conversely, greater subjective well-being and lower psychological distress during the COVID-19 pandemic were observed in individuals who visited urban green spaces one or more times a week compared to those who used these spaces less frequently or not at all (Ribeiro *et al.*, 2020; Huerta & Utomo, 2021). Table 2 provides details from the articles selected for the review.

### *3.2. Forms of nature contact to restore mental health during the COVID-19 pandemic*

Nature contact has been linked in several studies to restorative benefits for human physical and mental health, including the reduction of stress and anxiety symptoms (Table 3).

## *4. Discussion*

The present study highlights studies that reported the importance of nature contact for maintaining well-being and mental health during the COVID-19 pandemic. Our results indicate during the pandemic, there was a reduction in time spent outdoors and hence an increase in symptoms of anxiety and depression in areas with greater restrictions. Since the beginning of the COVID-19 pandemic, the daily routines of citizens around the world have changed dramatically. In addition to sanitation and hygiene measures, varying degrees of restrictions on the movement of people have changed routines for work, physical activity, and contact with family, friends, and nature. Studies have shown that the prevalence of depression during the pandemic may have been up to 3-fold higher than in 2018, the year before the pandemic began (Jané-Llopis *et al.*, 2021). Pouso *et al.* (2020) report on individuals in areas with more severe movement restrictions had more moderate to severe symptoms of anxiety and depression than those living in areas with more lenient restrictions. Women, young adults, and pet owners were more affected than men, older individuals, and those without pets. This study also showed under more severe restrictions, people without natural elements in their views (i.e., those with very limited or entirely urban views) showed more clinically significant symptoms of depression.

Conversely, we have identified several ways to restore well-being and mental health, such as

(a) forest bathing (Olson *et al.*, 2020; Pasieka, 2021; Roviello *et al.*, 2021; Roviello & Roviello, 2021; Spurio, 2021);

(b) urban green spaces (Ribeiro *et al*., 2020; Ugolini *et al.*, 2020; Berdejo-Espinola *et al.*, 2021; Geary *et al.*, 2021);

(c) green or blue views from windows (Dzhambov *et al.*, 2020; Pouso *et al.*, 2020);

(d) indoor plants or home gardens (Dzhambov *et al.*, 2020; Ribeiro *et al.*, 2020);

TABLE 2 – Strategy used to identify symptoms of depression and/or anxiety in different populations.

| Article | No. of people included in the study | Place where the study was conducted | Strategy used to identify symptoms of depression and/or anxiety |
|---|---|---|---|
| Dzhambov *et al.*, 2020 | 323 | Bulgaria | This research involved an online survey by using the Patient Health Questionnaire and the Generalized Anxiety Disorder Scale, along with questions related to environmental quality and interaction with nature. |
| Huerta; Utomo, 2021 | 1954 | Mexico | This research involved an online survey of individuals' perceptions and use of urban green spaces, and their subjective well-being assessed by using the Short Warwick-Edinburgh Mental Wellbeing Scale. Multilevel, mixed-effects regression analyses were conducted to examine the association between frequency of use of urban green spaces and subjective well-being. |
| Pouso *et al.*, 2020 | 5218 | United States, United Kingdom, Spain, Germany, Portugal, France, Italy, New Zealand, and Mexico | This is an online survey with a questionnaire to assess how the severity of restrictions during the pandemic and the level of contact with nature affected individuals' mental health. |
| Ribeiro *et al.*, 2020 | 3157 | Portugal and Spain | A questionnaire was administered by using Microsoft Forms to measure exposure to nature (including green and private green spaces, views of nature, and public natural spaces) as well as sociodemographic, housing, and confinement characteristics, levels of stress, psychological distress, and somatization. |
| Tomasso *et al.*, 2021 | 529 | United States | An online survey was conducted to assess questions about levels of nature contact or nature deprivation from an adapted version of the Harvard Flourishing Index (HFI). The HFI highlights five central domains as vital elements of human flourishing: happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue, and close social relationships. |

SOURCE: Authors of the present study.

TABLE 3 – Forms of contact with nature and benefits.

| Artigo | Metodologia de realização do estudo | Resultados do estudo |
|---|---|---|
| Olson; Hansen; Vermeesch, 2020 | This is a review of the literature on the use of forest bathing techniques, mindfulness, and psychological well-being. | Positive correlation between nature contact, mindfulness, and psychological well-being in times of stress and uncertainty. |
| Pasieka, 2021 | This is a literature review of the relationship between forest bathing and levels of cortisol. | Reduction of the levels of cortisol by nature contact through observations and interventions. |
| Roviello *et al.*, 2021 | This is a literature review of the relationship between contact with forested areas, reduction in the levels of cortisol, and immune system function. | Positive correlation between nature exposure, especially forest environments, and decreased cortisol levels, which improves immune system function. |
| Roviello; Roviello, 2021 | This is an analysis of volatile organic compounds found in forest environments and their potential to strengthen immune system function against COVID-19. | The use of forest bathing as a complementary therapy shows positive results for the functioning of the immune system due to the presence of volatile organic compounds with antiviral properties. |
| Spurio, 2021 | This is a case study on the relationship between nature contact and coping with trauma such as grief. | Techniques of nature contact and interventions in natural environments have been shown to be a positive complementary therapy during the stages of grieving. |
| Berdejo-Espinola *et al.*, 2021 | This is a study of 1,002 people in Brisbane, Australia, examining changes in their use of urban green spaces. | A significant increase in the use of urban green spaces by the population as well as a perceived improvement in the well-being of individuals who used these spaces more frequently during the COVID-19 pandemic. |
| Geary *et al.*, 2021 | The literature review article correlates investments in urban green spaces with improvements in population health and well-being. | Positive correlation between access to urban green spaces and improved quality of life, physical and mental health, highlighting how investment in urban green spaces is a way to reduce inequalities in access to factors that contribute to better public health. |
| Ribeiro *et al.*, 2020 | This is a cross-sectional study of 3,157 participants using an online questionnaire to assess exposure to nature, sociodemographic characteristics, psychological distress, and somatization. | Positive correlation between higher levels of nature contact (private green spaces such as gardens, vegetable plots and indoor plants, and community green spaces) and increased well-being and reduced psychological distress. |

| | | |
|---|---|---|
| Ugolini *et al.*, 2020 | A questionnaire about visiting habits and nature contact during the COVID-19 pandemic and the reasons why individuals sought nature contact. | Clarification of behavioral changes related to visits to urban green spaces, showing individuals changed their habits of nature contact, seeking different ways to meet their needs for relaxation and physical activity during the pandemic by exploring different green spaces. |
| Dzhambov *et al.*, 2020 | An online questionnaire with 323 participants about the severity of depressive and anxiety symptoms experienced in the past two weeks, experiences with indoor and outdoor vegetation, restorative qualities of the home environment, and social support. | Positive correlation between mental health and increased time exposed to vegetation during the period of social isolation. |
| Pouso *et al.*, 2020 | An online questionnaire with 5,218 participants examining the level of nature contact during the COVID-19 pandemic according to the level of confinement imposed in their countries and its relationship with the presence of depression and anxiety symptoms. | The study showed the stricter the social distancing measures imposed and the lower the level of contact with nature during this period, the greater the negative impact on individuals' mental health. Conversely, the greater the availability of green or blue spaces to visit and/or view, the fewer anxiety and depression symptoms the participants exhibited. |

SOURCE: Authors of the present study.

(e) horticulture;
(f) outdoor exercises; and
(g) ecotherapy techniques (Chaudhury & Banerjee, 2020).

Experiments with forest bathing have also demonstrated high efficacy in maintaining individuals' mental health during the COVID-19 pandemic (Olson *et al*., 2020; Roviello *et al.*, 2021; Roviello & Roviello, 2021; Spurio, 2021) when used alone or in combination with mindfulness techniques (Olson; Hansen; Vermeesch, 2020). In addition to its effects on mental health, forest bathing helps strengthen the immune system, making it more prepared to fight pathogens, which is highly necessary during a viral pandemic (Roviello &Roviello, 2021). Environmental enrichment techniques using digital means, such as watching a video of a forest environment, have also been shown to be effective in reducing anxiety during periods of social distancing (Zabini *et al.*, 2020).

Greater subjective well-being during the pandemic was observed in people who visited urban green spaces one or more times a week compared with those who used these spaces less frequently or not at all (Huerta & Utomo, 2021). People who increased or maintained their use of public green spaces during the pandemic showed lower levels

of psychological distress (Ribeiro *et al.*, 2020). Reduced symptoms of depression and anxiety were found in people with access to indoor (Dzhambov *et al.*, 2020) or outdoor green spaces in their homes, such as gardens, balconies, or public spaces (Pouso *et al.*, 2020). In terms of different forms of contact, studies prior to the pandemic already indicated the benefits of contact with nature not only via direct interaction, but also indirectly via sensory stimulation, whether visual (Cox *et al.*, 2017), olfactory, auditory, gustatory, or tactile (Franco *et al*., 2017).

To maintain well-being, individuals commonly seek out natural spaces for socialization, physical activity, and emotional resilience and recovery activities (Tomasso *et al.*, 2021). Nature contact promotes greater interaction between people (Kabisch *et al.*, 2017), cohesion (Ulmer *et al.*, 2016), the ability to coexist (McCormick, 2017), a sense of community (Soga *et al.*, 2017), and the perception of these benefits (Finlay *et al*., 2015). During the pandemic, many people were unable to access these places due to movement restrictions. As a result, those with a greater affinity for natural spaces experienced a greater sense of nature deprivation (Pfefferbaum & North, 2020; Tomasso *et al.*, 2021). These authors also state that, if possible, nature contact could alleviate symptoms of stress, depression, anxiety, and other pathologies resulting from health, financial, or emotional concerns caused by the COVID-19 pandemic.

In addition to these forms of nature contact, various ecotherapy techniques have been shown to be beneficial for maintaining mental health and well-being. Ecotherapy, defined as healing and growth facilitated by healthy interaction with the earth (Cinebell, 1996), is increasingly considered an effective technique for dealing with depression, anxiety, and stress. Therefore, nature-based interventions (e.g., gardening, animal-assisted interventions, outdoor exercise, listening to birdsong, creating nature-inspired environments at home, and even viewing images depicting natural elements) may be beneficial in coping with crises such as the one caused by the COVID-19 pandemic (Chaudhury & Banerjee, 2020).

Although there is still a limited number of publications on the effects of nature contact on well-being and mental health during the COVID-19 pandemic, previous studies have shown nature contact promotes increased perception and restoration of mental health and quality of life (Lee *et al.*, 2009). Nature contact has positive effects on mood, thereby indicating relaxation and calmness (Mcallister *et al.*, 2017), happiness (Zelenski & Nisbet, 2014), emotional strength (Eisenman *et al.*, 2015; Lumber *et al.*, 2017); development of self-discipline and memory (McCormick, 2017), fulfillment and peace of mind (Clark *et al.*, 2014; Glackin & Beale, 2018), stress reduction (Lee *et al.*, 2011; McCormick, 2017), relief (Ward Thompson *et al.*, 2012), and coping skills (Meyer & Botsch, 2017). Nature contact also helps prevent and recover from the negative effects of stress (Duvall; Kaplan, 2014; Hordyk; Hanley; Richard, 2015). Beyond benefits for mental health, studies report on nature contact in various forms promotes benefits for physical health, which include positive effects on the nervous (Maesako *et al.*, 2012; Igarashi *et al.*, 2015), cardiovascular (Gascon *et al.*, 2017), respiratory (Ulmer *et al.*, 2016, Pienkowski *et al.*, 2017), gastrointestinal, and endocrine systems (Pienkowski *et al.*, 2017), thereby reducing inflammation and oxidation processes (Igarashi, *et al.*, 2015) and obesity (Gascon *et al.*, 2017; Morgan Hughey *et al.*, 2017).

Finally, according to Menatti & Casado Da Rocha (2016), the "right to landscape" is intrinsically linked to the well-being of current and future generations. Therefore, it is essential to promote the conservation of the natural environment, encourage environmental enrichment in urban areas, and reduce public health expenditures. We propose alternatives for the private and public sectors to promote contact with nature and ensure physical and visual access to natural spaces, with the aim of securing the "right to landscape." Below, we list alternatives for governmental and nongovernmental organizations based on the results of the studies cited in this review article.

Urbanization programs planning for the construction and restoration of natural environments to provide both visual and physical access to vegetation are beneficial to mental health. According to Berdejo-Espinola *et al.* (2021) e Geary *et al.* (2021), there is a positive correlation between access to urban green spaces, well-being, and coping skills. In addition, Ugolini *et al.* (2020) highlight the use of these spaces for relaxation purposes during the pandemic, while Pouso *et al.* (2020) report in areas where visits to natural public spaces were available during social distancing, there were lower rates of depressive and anxiety symptoms. In Brazil, "eight out of ten visitors to the Brazilian urban parks surveyed felt better or much better in the physical, environmental, spiritual, social, and occupational dimensions of well-being" (Cunha *et al.*, 2022, p. 7, our translation).

Environmental enrichment programs promoting various forms of nature contact, such as gardening or environmental enrichment techniques in indoor or private spaces (e.g., gardens, vegetable plots, and indoor plants) contribute to well-being by reducing the levels of cortisol (Pasieka, 2021). They act as a complementary therapy for coping with situations (Spurio, 2021), leading to greater well-being and reduced levels of distress (Ribeiro *et al.*, 2020).

Programs for conservation and reforestation aimed at creating spaces for immersion in nature, allowing for techniques such as forest bathing, have been shown to be beneficial in promoting well-being. Direct contact and immersion in natural environments are associated with improved psychological well-being in times of stress and uncertainty (Olson *et al.*, 2020) (Dzhambov *et al.*, 2020), besides reduced cortisol levels in forest environments (Roviello *et al.*, 2021).

## *5. Final considerations*

Nature contact in various forms has proven to be effective and necessary in reducing symptoms of stress, anxiety, and depression during the COVID-19 pandemic caused by the SARS-CoV-2 virus. It is therefore essential for maintaining physical and mental health during times of stress. In our view, much remains to be done to promote harmony between human health and nature, which underscores the importance of the recommendations outlined.

As a limitation of the study, we consider that there is currently a limited number of articles published during the COVID-19 pandemic to address the review question. Exploring the importance of contact with nature for maintaining well-being and mental health is a relatively new topic, coupled with the fact that the pandemic occurred recently, an unprecedented event in contemporary times.

Although the pandemic has ended, global society is still suffering from its traumatic consequences, particularly in terms of the decline in mental health and well-being. The increase in cases of mental disorders, depressive symptoms, anxiety, feelings of loneliness, increased consumption of alcohol, sugar and fats, decreased sense of well-being and sleep disorders, as discussed throughout the text, reinforce the need for new therapeutic approaches to address the stress, anxiety, trauma, and grief caused by the pandemic.

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