# Nature Exposure for Chronic Pain: A Systematic Review of Analgesic Effects Across Exposure Modalities

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## Introduction

### Chronic Pain

- Pain persisting or recurring for >3 months is classified as chronic pain by ICD-11.[2]

### Epidemiology

- According to the CDC, 24.3% of U.S. adults experience chronic pain, with 8.5% reporting that it limits work and daily life.[1]

### Nature Exposure Therapy

- Nature is defined as the animals, flora, landscape, or natural products of the Earth that individuals can perceive or interact with through their senses.[3]
- Exposure to nature has been linked to improvements in several health outcomes, including pain intensity and anxiety.[3–5]
- Green light from natural scenery is hypothesized to induce positive emotions and alleviate pain and pain-associated psychological symptoms.[4]

### Objective

**To systematically review the effect of nature exposure interventions on pain in adults with chronic pain, and to compare findings across exposure modalities.**

### Exposure Modalities Reviewed

**Immersive outdoor (3 studies)**
Forest therapy, mountain hiking, outdoor exercise

**Sensory / virtual (3 studies)[6]**
Landscape video, natural soundscapes, natural materials

**Horticultural (1 study)**
Therapeutic gardening

## Methods

- **Design:** Systematic review reported per PRISMA 2020; protocol registered in PROSPERO (CRD42021226949).
- **Search:** MEDLINE, Embase, and CINAHL databases using pre-specified search strategy
- **Eligibility:** Chronic pain populations; any nature-exposure intervention (immersive, sensory, or virtual); a comparator condition; a reported pain outcome.
- **Screening:** Title/abstract then full-text review in Covidence.
- **Risk of bias:** Cochrane RoB 2, with the crossover-trial extension where applicable.
- **Synthesis:** Narrative synthesis grouped by exposure modality.

## Study Selection

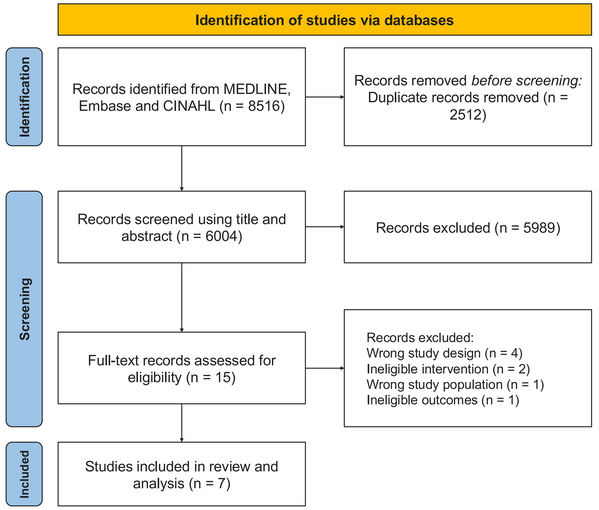



**Figure 1.** *PRISMA 2020 flow diagram.*

## Results

**6,004** Records screened | **7** Studies included | **356** Participants | **5** Chronic pain conditions

**Table 1.** *Characteristics of included studies (7 studies, N = 356).*

| Study | Population (N) | Design | Nature Intervention | Comparator | Key Pain Finding |
|---|---|---|---|---|---|
| **Al Shrbaji et al. 2023** | Chronic neck pain (n = 60) | RCT | Natural-landscape video viewing | Action observation | No between-group difference (p = 0.460) |
| **Güngörmüş et al. 2024** | Fibromyalgia (n = 42) | RCT, double-blind | Multisensory plants/stones/soil | Synthetic imitations | Between-group difference (p = 0.008), driven by worsening in the control condition |
| **Güngörmüş & Pérez-Mármol 2026** | Fibromyalgia (n = 88) | Crossover RCT, triple-blind | Natural acoustic environment | Urban / broadband / silence | Urban sounds increased pain; natural sounds similar to controls |
| **Han et al. 2016** | Chronic widespread pain (n = 61) | Non-randomized controlled | 2-day forest therapy program | No intervention | Reduced pain (p = 0.001) |
| **Huber et al. 2019** | Chronic low back pain (n = 80) | 3-arm RCT | Mountain hiking ± balneotherapy | No intervention | Reduced pain (p = 0.002–0.035) |
| **Navalta et al. 2024** | Chronic migraine (n = 9) | Crossover RCT | Outdoor exercise | Indoor exercise | No difference in migraine load (p = 0.660) |
| **Rören et al. 2024** | Chronic low back pain (n = 16) | Crossover pilot RCT | Horticultural therapy | Handiwork | Descriptive pain improvement; no formal between-condition comparison |

## Discussion

- **Small, heterogeneous evidence base:** 7 studies, sample sizes 9–88, across five pain conditions and three exposure modalities (immersive outdoor, sensory/virtual, horticultural).
- **Immersive outdoor programs** (forest therapy, mountain hiking) reduced pain versus no-intervention controls.
- **Against active or matched controls,** nature showed no clear advantage: landscape video vs. action observation, outdoor vs. indoor exercise, natural sounds vs. silence.
- **Comparator effects matter:** urban sounds increased pain, and the Güngörmüş 2024 effect reflected control-group worsening.
- **Limitations:** small samples, one non-randomized study, and varied pain measures precluded pooling.

## Conclusions

- Nature exposure shows a possible analgesic signal in chronic pain, strongest for immersive outdoor programs.
- Benefit over active controls is not established.
- Larger RCTs with active comparators and standardized pain outcomes are needed.

## References

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3. Repke MA, Berry MS, Conway LG III, Metcalf A, Hensen RM, Phelan C. How does nature exposure make people healthier? Evidence for the role of impulsivity and expanded space perception. *PLoS One* (2018) 13:e0202246.
4. Jimenez MP, DeVille NV, Elliott EG, Schiff JE, Wilt GE, Hart JE, et al. Associations between nature exposure and health: a review of the evidence. *Int J Environ Res Public Health* (2021) 18:4790.
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6. Li H, Zhang X, Wang H, Yang Z, Liu H, Cao Y, et al. Access to nature via virtual reality: a mini-review. *Front Psychol* (2021) 12:725288.

*Included studies are cited by first author and year in Table 1. PROSPERO CRD42021226949.*