HEALTH & WELLBEING IN TIMBER BUILDINGS

Insights & Research Needs

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Technical Working Group Building

Forest Fund
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About WoodPoP

The European Wood Policy Platform (WoodPoP) is a collaborative initiative that fosters exchange and collaboration between administration, industry and research stakeholders.

WoodPoP is a country-driven process that brings together government representatives from 27 countries, 45 stakeholder organisations, including research and regional organisations, to advance evidence-based wood policy and sustainable wood-based solutions in building a greener, fairer, and more innovative future for Europe.

Acknowledgements

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Disclaimer

The views expressed in this information product reflect those of WoodPoP's Technical Working Group 'Building' and do not in any way represent the opinions of the Austrian Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management.

Key Messages

1. Current research shows promising results that indoor wood use contributes to a variety of psychological and physiological benefits in addition to contributing comfort via the materials relationship with moisture.

2. Wood use indoors fits well with current policy initiatives like New European Bauhaus (NEB) and the Clean Industrial Deal, amongst others.

3. Significantly more research is needed to validate these results. Various considerations can be made to improve quality in future studies.

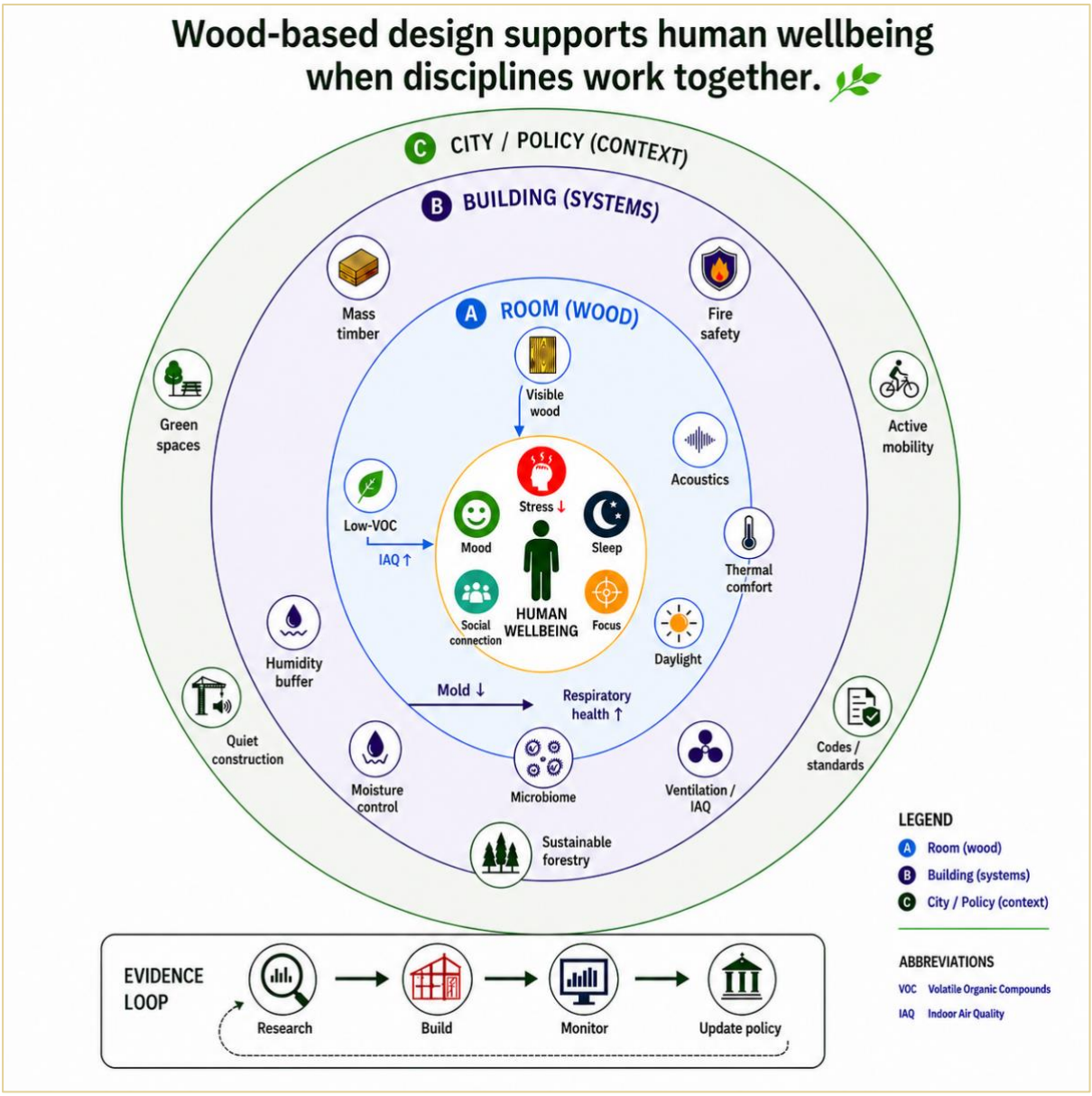
4. Access to research funding is a key limitation to robust, larger studies and studies in real environments, greater interdisciplinary and international cooperation.

Purpose and Scope

Health and Wellbeing are important topics for social cohesion, happiness, and a functional economy in Europe. Urbanisation and changing work paradigms have led to increased time spent indoors; approximately 85 percent of our time is spent indoors in urbanised regions (Klepeis *et al.*, 2001). Indoor environmental quality then becomes a critical factor in supporting citizens in obtaining and maintaining healthy living and working conditions that lead to improved wellbeing (González-Lezcano, 2021). Improving indoor environmental quality aligns closely with the NEBs initiative to provide value beyond function, increase interior quality, and improve the health and wellbeing of citizens.

Design strategies like biophilic design intend to link building occupants to the natural environment to stimulate satisfaction, comfort, and wellbeing while also meeting sustainability goals (Kellert, Heerwagen and Mador, 2008). To do this, designers use varying strategies that make nature and natural materials visible and interactable to occupants. Using bio-based materials like wood can satisfy aspects of biophilic design, triggering positive wellbeing impacts (Burnard and Kutnar, 2015). Moreover, using timber in buildings provides benefits for managing temperature and humidity due to its ability to absorb and release moisture from the environment (Nore *et al.*, 2017), while potentially playing an important role in antimicrobial activity (Kettunen *et al.*, 2026). Recognising the important role of timber in sustainable construction as both a structural and decorative material highlights its potential to create lasting health and wellbeing impacts for occupants.

Research relating wood use in buildings with health and wellbeing outcomes has been underway for more than 25 years. Nonetheless, the scientific results are sparse and insufficient to provide reliable guidelines across cultural, social, and geographic contexts. This brief therefore attempts to summarise the current state of the art in this research field as well as highlight the steps needed to develop more robust findings.



Health and Wellbeing with Wood Indoors: What We Know

Several literature reviews have synthesised previous studies to examine and report on the state of knowledge relating wood to health and wellbeing outcomes indoors. Most recently, a robust study published in February 2026 in the journal *Buildings and Environment* (Cavaliere *et al.*, 2026) highlighted the positive relationship found between wood and psychophysiological indicators, as well as cognitive function and an increase in research interest in this field. However, the study noted the need for a more rigorous study design, varied participant demographics, and interdisciplinary collaboration between wood scientists, health researchers (e.g., psychology, physiology, cognitive neuroscience, medicine), designers, and building experts.

A positive outlook for wood

Researchers from Europe, China, Japan, North America, and other regions have consistently found a positive relationship between psychological and physiological indicators of health and wellbeing and exposure to various sensory experiences of wood. Researchers have investigated how exposure to wood affects stress responses and recovery (Burnard and Kutnar, 2020), cognition (Ojala *et al.*, 2023), mood (Demattè *et al.*, 2018), attention (Shen, Zhang and Lian, 2020), comfort (Guo *et al.*, 2025), and related responses (Cavaliere *et al.*, 2026). Findings generally indicate modest benefits during the experimental period, with the expectation that prolonged exposure would make these modest benefits cumulatively important.

Topics of concern

Studies in this field have generally used limited sample sizes that lacked diversity, raising concerns about generalisability. Although studies have reached similar conclusions across the world, geographic concerns such as wood species used, combined with cultural contexts and regulatory environments, leave much to be explored.

Interdisciplinary research is required to properly investigate a complex topic that combines wood science, design and architecture, and health sciences and economics. Studies that engaged this expertise from the beginning would provide a more robust methodology that is readily interpretable.

Consistent reporting and more carefully selected psychological and physiological indicators would improve comparability between studies and allow for robust meta-analyses of the subject.

Research gaps

Robust evidence for the prolonged effects of indoor wood use remains limited, as do observational or intervention studies conducted in real environments outside the laboratory. Studies have addressed a variety of environment types, like offices, residences, accommodations, care facilities, and learning environments (cf. Cavaliere *et al.*, 2026). Studies are uneven across these environments, and they all deserve further investigation. Cultural and geographic context remain under-investigated as international collaboration.

Most previous research on this topic has focused on one type of sensory exposure at a time, while multisensory experiences are likely to shape both our psychological and physiological responses. Recent studies have, for example, reported the importance of the visual context of wood on both odour (Butter *et al.*, 2025; Jyske *et al.*, 2026) and thermal sensations (Guo *et al.*, 2025) finding that visual context changes perceptions of odours and thermal comfort.

The effects of long-term exposure remain largely unknown as neither observational studies nor intervention studies have been carried out at scale with reliable methodology.

Closing The Gap

Resolving research gaps and providing reliable guidance to designers on wood use indoors to improve occupant health and wellbeing requires researchers to adapt, share best practices, take a broader view of the topic. However, structural support from funding agencies and institutions is needed to ensure researchers have the resources to improve study design and deliver robust results. Several issues should be addressed, while more efforts towards the most promising and impactful outcomes are needed.

Reliability and validity through methodological improvement

- Interdisciplinary collaboration between material experts, design experts, building experts, and health experts ensures a range of relevant factors are considered
- Sound experimental design and analysis provide robust and replicable studies
- Best practices followed in reporting allow comparison between studies and support the replicability of experiments

Promising research directions

- Expanding multisensory investigations combining visual, aural, haptic, olfactory, and thermal sensations
- Investigate the effects of prolonged exposure to indoor wood (weeks, months, years)
- More studies conducted in diverse care (hospitals, rehabilitation centres, retirement homes, mental health facilities) and learning environments, both formal and informal
- The interplay between sensory environment, building physics, comfort, and energy performance should be considered
- Investigating how people perceive wood and why many, but not all, people perceive wood positively will provide fundamental knowledge about the link between wood exposure and the health and wellbeing effects revealed in future studies.
- Studies investigating both the technical aspects of wood use indoors (i.e., its capacity to moderate temperature and humidity, or wood use in hospitals that require extra care for cleaning and sanitising) should be linked with the health and wellbeing factors.

Scaling for impact

- The current state-of-the-art reveals many promising small studies, but these must be expanded beyond the minimums derived from statistical power analyses
- Diversity in study populations will help with the generalisability of the results and account for differences between vulnerable groups that are otherwise overlooked in homogenous samples
- Randomisation is an important factor in linking cause and effect; efforts should be made to have greater randomisation and avoid convenience sampling
- Various strategies can be employed to acquire diverse random samples
- Replication of studies across regions will provide stronger evidence and ensure local context is respected in eventual guidelines

Moving to real-world case studies

- Conducting studies in real environments, outside the laboratory, is needed to validate laboratory investigations
- Longer-term studies in real environments will reveal the effects of prolonged exposure to indoor wood
- Applying epidemiological approaches to study design can help achieve these goals

Policy and funding support to improve wellbeing indoors with wood

Although the topic is receiving more research interest, policy and funding support remain inconsistent and sporadic.

- National-level funding opportunities arise, but support across the EU is varied. Likewise, these opportunities are subject to political direction.
- Topic-oriented calls provide limited opportunities. For example, many in Horizon Europe address related topics, but where health and wellbeing it is often linked with the Safe and Sustainable by Design initiative. A broader approach to health and wellbeing is needed, and calls within the NEB show promise. Nonetheless, this topic only fits as a minor component of these funding opportunities.
- Open topic calls are often difficult to fit wood and health research as interdisciplinarity is complicated in these opportunities, which often address basic and fundamental research. For example, research into wood and health is difficult to fit into any existing ERC panel.
- Funding initiatives that emphasise providing generalisable guidelines overlook the necessary lower TRL research that must be conducted to reach that objective.
- Policy initiatives, like the NEB, that address the built environment holistically are welcome. Nonetheless, research funding related to it is largely limited to the NEB Facility, which remains minor in comparison to the core clusters in Pillar II.
- Policy initiatives that push for measurable health and wellbeing impacts in building design (for new construction or renovations) can be an important driver linking environmental sustainability goals to societal impacts for health and wellbeing.
- Events like the WoodPoP Prologue (Innsbruck, 2025) provide an opportunity to share information about the topic, including recent findings, best practices, and applications.

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