



# 10 reasons why wooden buildings are good for you

and the scientific research  
to back it up



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In the developed world, we spend about 90% of our time indoors. It's important then to get the indoor climate right. This means looking at everything from air quality, hygiene, humidity, temperatures and even the touch and feel of the materials that surround us. All of these aspects affect us in our day to day indoor lives.

An increasing amount of evidence shows that wood has beneficial effects in almost all parts of the indoor climate. It helps reduce stress, blood pressure and heart-rate as well as allowing for more creativity and productivity in the workplace. Wood is also an important part of what's called biophilic design; our desire to be connected with the natural environment.

Below is a summary of the main health and wellbeing benefits for those living and working within wooden environments.

*The content in this paper is based on data gathered by a research team from the Chair of Timber Structures and Building Construction at the Technical University of Munich. The team conducted a literature review gathering existing and available scientific research results on this topic. Their findings include some 116 relevant articles and publications from various sources such as scientific journal databases, science portals and Google Scholar. Below is a sample of their findings.*



## 1. Creativity boost

In the past ten years, different research groups have come up with the same conclusion: wood grain as a texture positively influences creativity. The most recent evidence comes from a 2019 Slovakian study<sup>1</sup> where people were tested in different simulated living room environments.

The surroundings that had the most positive effect on creativity were the ones using both warm and cold colours as well as natural materials such as wood and textiles. These surroundings also had the most positive effect on problem-solving capability, understanding and thinking ability.

On the other hand, the environment with strong colours, artificial wood imitations and synthetic textiles, triggered stress in the participants.

The same study also tested people by putting them in front of three different walls and allowing them to touch the wall. Brain activity increased when looking at the wooden wall compared to looking at walls made from chipboard or white laminate.

Back in 2010, a different study<sup>2</sup> examined creative performance in different environments and this also showed how exposed wood or stone surfaces have a higher potential for creativity. This was compared to artificially produced surfaces such as drywall, plastic laminate, glass, carpet or synthetic fibres.

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1. Vavrinsky, Kotradyova, Svobodova, Kopani, Donoval, Sedlak, Subjak, Zavodnik 2019: *Advanced Wireless Sensors Used to Monitor the Impact of Environment*

2. *Design on Human Physiology McCoy and Evans, 2010: The Potential Role of the Physical Environment in Fostering Creativity*





## 2. Stay focused

Just a few minutes of looking at a natural environment can have significant benefits. A study in 2014<sup>3</sup> investigated people's ability to control their own impulses. They were given three minutes to look at a natural environment and then given a variety of tests. The results showed that participants had faster reaction times and lower heart rate variability after looking at a natural environment compared to an urban environment.

Another study conducted in 2015<sup>4</sup> tested people in four different types of interior spaces. Each space was furnished in exactly the same way but the structure and surface itself was made from different materials. The spaces were made from CLT (cross-laminated timber), clay, steel and steel retrofitted with clay elements. Those in the CLT and clay spaces had better attention and better reaction times. Participants also evaluated their wellbeing. The spaces with natural elements performed better than the steel container.

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3. *Beute and de Kort, 2014: Natural resistance: Exposure to nature and self-regulation, mood, and physiology after ego-depletion*
  4. *Zingerle P., Beikircher W., Philippe M., 2015: Endbericht BIGCONAIR Holzforschung Austria*

### 3. Better mood

Most of us feel that wood creates a sense of warmth. The smell, touch and feel are regarded as pleasant and many people have generally positive associations with wood. That's the result of a 2017 study<sup>5</sup> of both building experts and members of the public in five different countries.

In a separate Finnish study<sup>6</sup>, natural and smooth wooden surfaces were found to be more pleasant than coated ones.

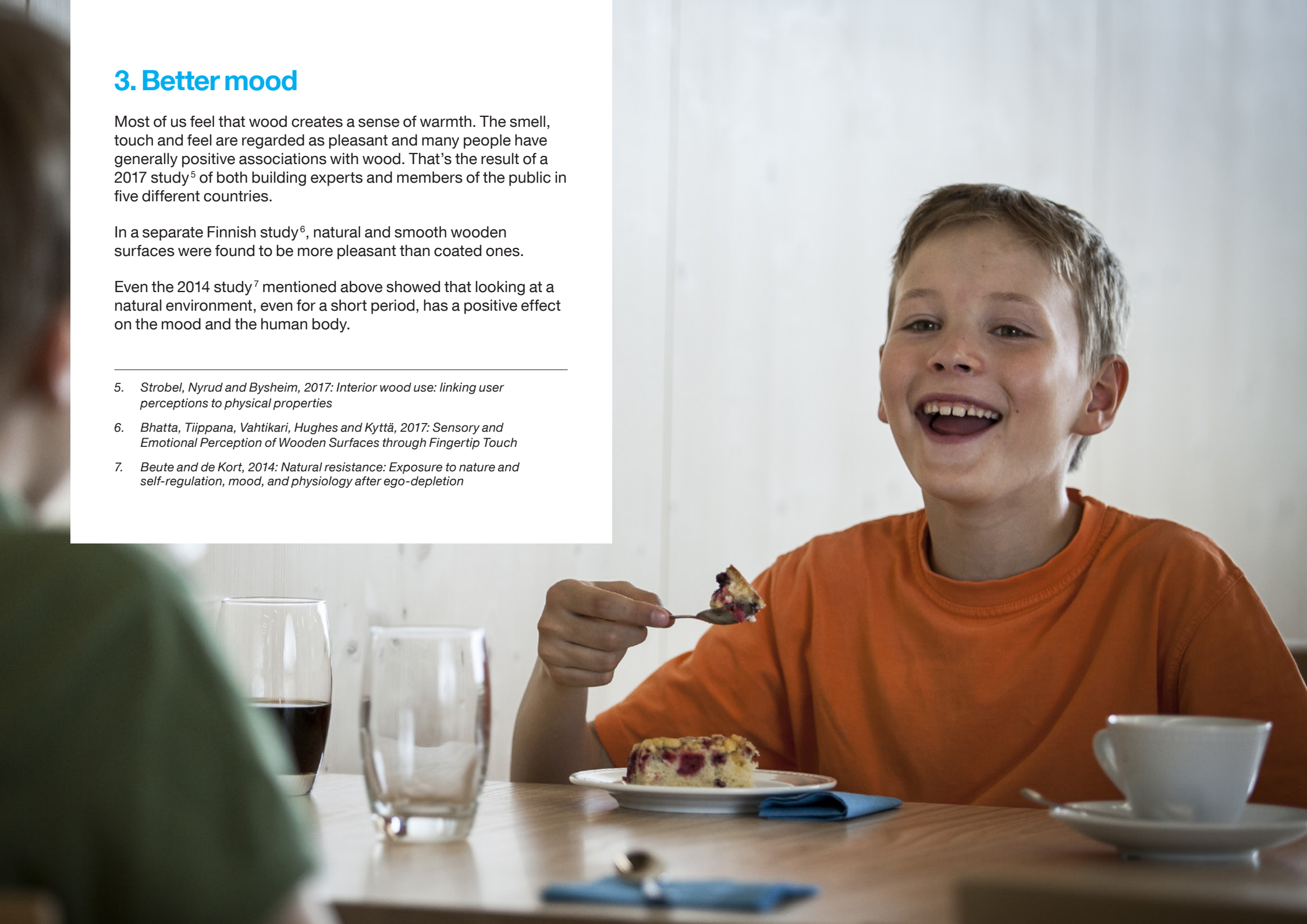
Even the 2014 study<sup>7</sup> mentioned above showed that looking at a natural environment, even for a short period, has a positive effect on the mood and the human body.

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5. *Strobel, Nyrud and Bysheim, 2017: Interior wood use: linking user perceptions to physical properties*

6. *Bhatta, Tiippana, Vahtikari, Hughes and Kyttä, 2017: Sensory and Emotional Perception of Wooden Surfaces through Fingertip Touch*

7. *Beute and de Kort, 2014: Natural resistance: Exposure to nature and self-regulation, mood, and physiology after ego-depletion*



## 4. Less stress

Perhaps one of the areas with the most comprehensive research is within stress. In short, natural environments and wood in particular help reduce stress and improve wellbeing. Over the past ten years, several studies have come to the same conclusion.

One study<sup>8</sup> showed that adding plants or even posters of plants into hospital waiting rooms had the potential to reduce patients' feelings of stress. Another study<sup>9</sup> put 119 students into four different rooms,

- a room with wood and plants
- a room with wood and no plants
- a room with no wood but with plants
- a room with no wood and no plants

The plants had no influence on the result but the wood did. Students had lower stress levels in the wooden rooms.

Similarly, the newly refurbished National Oncology Institute waiting room in Bratislava, Slovakia was the location for a 2019 study.<sup>10</sup> Visitors were measured for respiration, heart rate, cortisol level and blood pressure before, during and after their stay in the wooden room.

The participants described their emotions as predominantly satisfied or very satisfied and their cortisol levels decreased by 7.5%, implying a stress-reducing effect.

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8. *Beukeboom et al 2012 Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room*, online source: [https://www.researchgate.net/publication/223971340\\_Stress-Reducing\\_Effects\\_of\\_Real\\_and\\_Artificial\\_Nature\\_in\\_a\\_Hospital\\_Waiting\\_Room](https://www.researchgate.net/publication/223971340_Stress-Reducing_Effects_of_Real_and_Artificial_Nature_in_a_Hospital_Waiting_Room) [access Jul 18 2020]

9. *Fell D., 2010: Wood In the Human Environment: Restorative Properties Of Wood In The Built Indoor Environment*. Vancouver: Faculty of Graduate Studies, University of British Columbia

10. *Kotradyova, Vavrinsky, Kalinakova, Petro, Jansakova, Boles und Svobodova, Helena, 2019: Wood and Its Impact on Humans and Environment Quality in Health Care Facilities*



## 5. Lower blood pressure and heart-rate

The studies on stress and wellbeing are also in line with additional studies on blood pressure and heart-rate. Several studies show that blood pressure and heart-rate go down for people living and working in wooden buildings.

For example, a one-year Austrian study<sup>11</sup> compared 52 high-school students in a school fitted with two kinds of classrooms. One of the classrooms had linoleum floors and plasterboard walls while the others were wooden classrooms. The students in the wooden classrooms had significantly lower heart rates and a lower perception of stress.

Other studies have shown lower blood pressure and higher concentration levels in wooden schools.

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11. Grote, V. et al *Gesundheitliche Auswirkungen einer Massivholzausstattung in der Hauptschule Haus im Ennstal*. Österreich: Human Research Institut.





## 6. Virus-free surfaces

It turns out that if you want to avoid contracting the coronavirus, then you have a better chance in wooden environments than others. Coronaviruses (SARS -CoV-2) applied to wooden surfaces can only be replicated for 12 hours. On surfaces made of plastic, stainless steel, glass and masonry, the viruses remains multipliable for up to 96 hours.

However, the 2020 study<sup>12</sup> that discovered these findings also noted that ‘fresh contamination can also lead to smear infections on wooden surfaces and should therefore be disinfected and generally, applicable hygiene regulations should be considered.’ In other words, just because the virus doesn’t last as long on these surfaces, doesn’t mean there is no risk of catching the virus on wood.

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12. Domig and Wimmer, 2020: Coronavirus on wood surfaces- Is there a risk?, [https://www.timber-online.net/wood\\_products/2020/03/coronavirus-on-wood-surfaces-is-there-a-risk.html](https://www.timber-online.net/wood_products/2020/03/coronavirus-on-wood-surfaces-is-there-a-risk.html)





## 7. Stronger immune system

People exposed to the forest environment have enhanced human natural killer (NK) cell activity. In Japan, the Nippon Medical School carried out a test exposing people to the essential oils from the Hinoki cypress tree.<sup>13</sup> Test persons were exposed to the oils with a humidifier for three nights in a hotel room. This resulted in a significant increase in NK activity.

This activation of the NK cells is regarded as an indicator of a strengthened immune system. NK cells are cells of the immune system that recognise and destroy altered body cells.

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13. Li, Q. et al. 2009: *Effect of phytoncide from trees on human natural killer cell function*. Nippon Medical School Tokio; [rbb-online.de](http://rbb-online.de); Baumkunde



## 8. Greater productivity

An online survey of 1,000 Australian employees working in buildings showed that employees were better able to focus when they were surrounded by wood.<sup>14</sup> Their mood and productivity improved also.

When the building included other parts of the natural environment, satisfaction went up even more. This included using plants, natural light and tables or chairs made of wood. Visible wood led to a connection with nature and triggered positive associations in the workplace. With an increasing amount of visible wood surfaces, the subjects stated that they could think more clearly and deal better with problems. Their stress levels also decreased.

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14. Knox and Parry-Husbands, 2018: Pollinate Health Report #3

## 9. Better air quality

Wood-based materials can reduce the amount of volatile organic compounds (VOCs) from interior spaces. VOCs are gases that are emitted from all kinds of different materials. Some of these VOCs can be bad for your health. They can also be up to ten times higher in indoor environments compared with outdoor ones.

Wood, like other materials can emit VOCs, but a 2013 study<sup>15</sup> showed that wood-based materials such as MDF, OSB and particle board adsorb at least 50% of these compounds. Adsorption is where a material acts as an adhesive and holds the gas molecules on its surface.

The study concludes that *“the gained results demonstrate their (wood-based materials) potential to reduce VOCs in indoor air.”*

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15. Adsorbing VOC's Niedermayer, Fürhapper, Nagl, Polleres und Schober, 2013: VOC sorption and diffusion behavior of building materials





## 10. Stable humidity

There is an ideal range for air humidity in indoor environments. Staying within these ranges (40% – 70% relative humidity) is important for health reasons. Allergies, respiratory infections and even the spread of bacteria and viruses are kept to a minimum if humidity is kept within the correct range.

Wood paneling can help in this regard, providing better moisture buffering compared with interior plaster. It means the air humidity can be kept in the ideal range for a longer period of time.

This was the result of a study<sup>16</sup> that compared two identical rooms, one covered with gypsum plaster and the other with various wooden surfaces. It was found that air humidity fluctuation was reduced by up to 70% in a room with untreated flat cladding boards, compared to the gypsum plaster.

For cladding with round timber planks, the reduction was between 44% and 63%.

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16. Lenz, Krus and Holm, 2005: *Feuchtepufferverhalten von Innenraum*

## Conclusion

Wooden buildings appear to be better if you want to be more creative, more productive and stay healthy. They are also better if you want to have lower stress levels, lower blood pressure and a lower heart-rate.

One study<sup>17</sup> has even shown that people in wooden buildings can boost their NK blood cells. These are the ones used to improve the immune system. On top of that, wood as a material is also good at preventing viruses from multiplying.

The evidence is wide-ranging and has been going on for more than 20 years but it all points in the same direction. People feel better, work better and perform better when they are living and working in wooden buildings.

17. Li, Q. et al. 2009: *Effect of phytoncide from trees on human natural killer cell function*. Nippon Medical School Tokio; [rbb-online.de](http://rbb-online.de); [Baumkunde](http://Baumkunde)





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