PARACELSUS MEDICAL UNIVERSITY

Institute of Ecomedicine

Forest Fund
Republic of Austria

An initiative by the Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management Republic of Austria

How strong is the evidence that indoor wood affects public health?

Lessons learned while conducting a Systematic Review

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Why a Systematic Review?

A systematic review is needed to evaluate a diverse body of research fairly and transparently.

Preregistration

- *Does exposure to wood in indoor environments impact human health?* https://doi.org/10.17605/OSF.IO/KMH6J

Search and screening

6 databases

~30,000 records identified

~600 studies for title-abstract-screening

~110 publications for full text screening

~ **60** publications for synthesis

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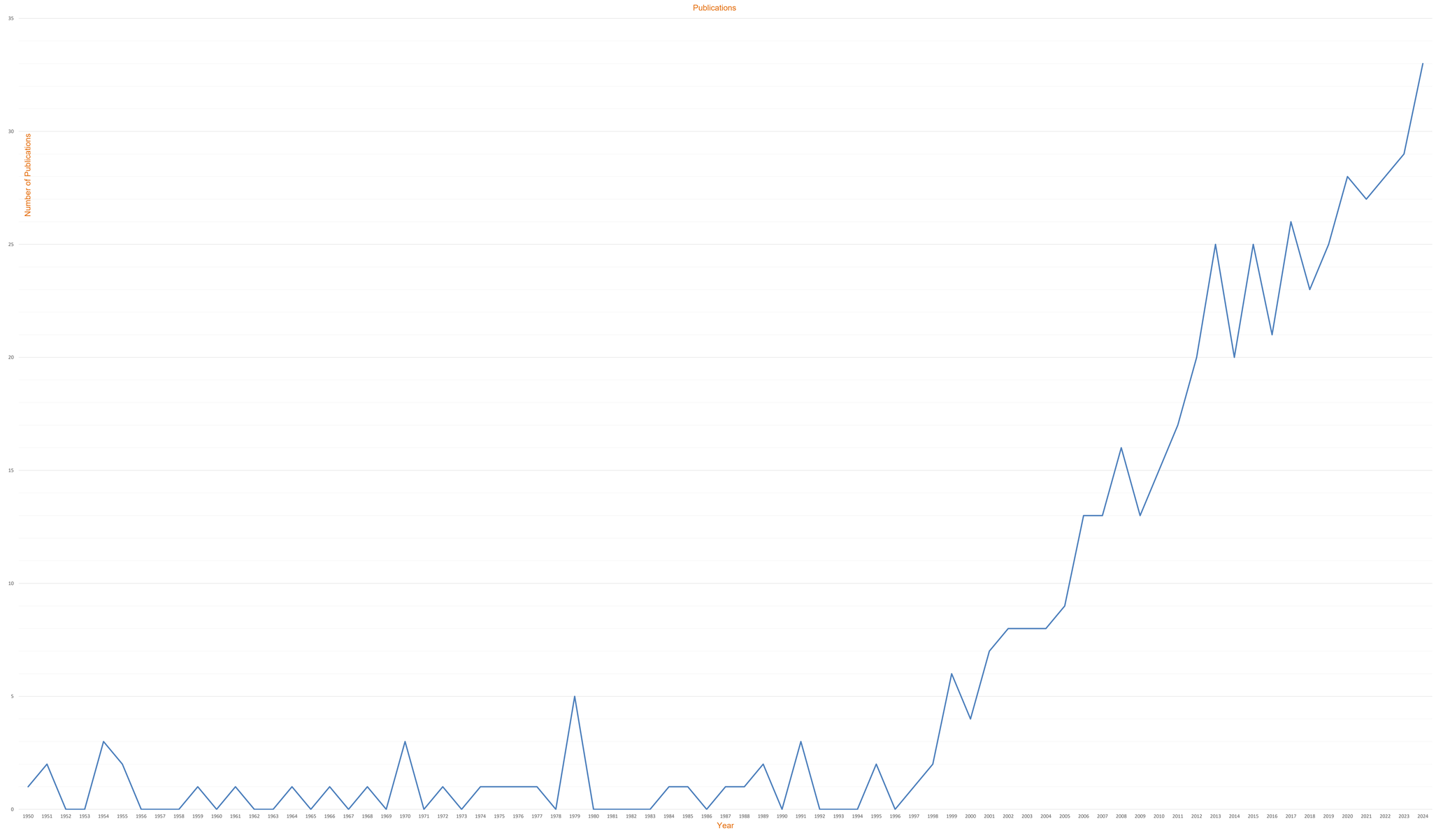
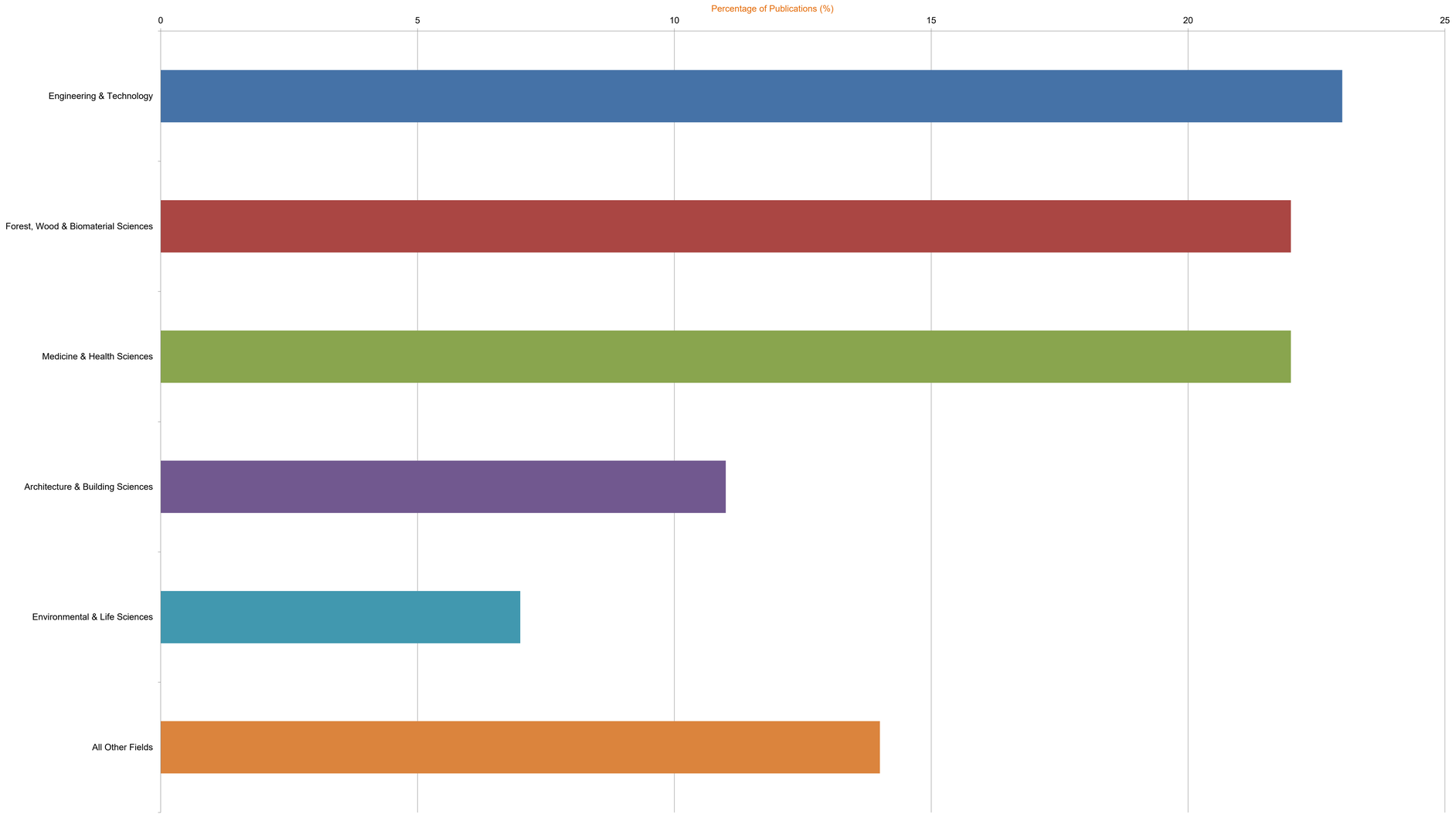
Research on Wood & Health (1950-2024)



Source: Own macro-analysis of ~ 600 studies identified during the title–abstract screening.

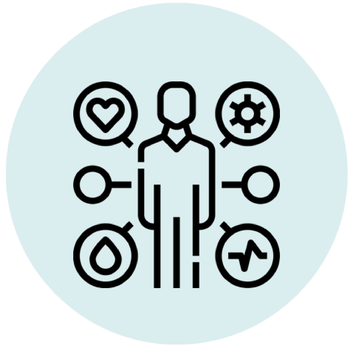
A Transdisciplinary Field

Disciplines Studying Wood and Health



Source: Own macro-analysis of ~ 600 studies identified during the title–abstract screening.

How Does Wood Indoors Affect Our Health?



Physically: Effects on respiratory, allergic, and physiological responses

Mentally: Impacts on mood, stress, cognition, and perceived comfort

Public health: Relates to health outcomes that go beyond transient or short-term effects and that may concern groups or populations

Why This Matters?

- **Basic research** (lab studies): short, small, tightly controlled → shows *immediate* reactions but not long-term health effects.
- **Field, observational and applied research**: larger populations and/or everyday settings → shows *real-world* associations and essential context.

For building decisions: we need evidence from long-term, real-life exposure—supported by well-controlled intervention studies.

Evidence that could translate into public health

Chronic Disease			
HDM allergy	hygiene/a: wood mattress topper - none	↓ allergy symptoms	Koburger 2010
Pediatric asthma	IAQ/VOCs: wood - other materials	↔ diagnoses/incidence	Junge 2021
Musculoskeletal Health			
Injuries in elderly	floor/m: wood (+carpet) – other (+/- c)	↓ hip fractures per fall	Simpson 2004
Injuries in sports	floor/m: wood – artificial	↓ acute sports injuries	Pasanen 2008
Healthy Behaviours			
Food consumption	odour/o: warm (wood) – cold (eucalyptus)	↑ healthy choices ↓ unhealthy intake	Lefebvre 2019
Sleep	furniture/u: solid wood - particleboard	↑ autonomic sleep quality ↔ subjective sleep quality ↑ subj. morning well-being	Grote 2021
Quality of Life			
Stress in patients	odour/o: wood – no scent/control	↓ anxiety & depressive symptoms	Itai 2000
Activity in elderly	furniture/u: wood enriched - standard	↑ activity levels / engagement	Anme 2012

/a = hygiene/allergen pathway.
/m = mechanical exposure pathway.
/o = olfactory exposure pathway (odour only).
/u = unclear/combined pathway (e.g. effect may involve VOCs, visual, tactile, etc., not isolatable).

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Quality assessment

It is about methodological rigor.

Risk of Bias asks:

👉 Could the **study design** or **implementation** have **distorted** the results?

- Were participants blinded?
- Was the control condition equivalent?
- Was the sample size adequate?
- Was exposure defined clearly?
- Was all data reported?

All of these factors can make wood look more effective—or less effective—than it really is.

Quality Assessment (study-level)

	Chronic Disease		MS Injuries		Healthy Behaviours			Quality of Life	
OHAT Rik of Bias Domains	Koburger 2010	Junge 2021	Simpson 2004	Pasanen 2008	Lefebvre 2019a	Lefebvre 2019b	Grote 2021	Itai 2000	Anme 2012
Selection Bias									
Randomization of exposure	– –	NA	NA	NA	–	+	+	– –	– –
Allocation concealment	NR	NA	NA	NA	NR	NR	NR	NR	NR
Comparable groups	NA	+	–	+	NA	NA	NA	NA	NA
Confounding Bias									
Analysis of confounding / co-exposures	NA	+	–	+	NA	NA	NA	NA	NA
Performance Bias									
Blinding of personnel and subjects	– –	NA	NA	NA	+	+	+	–	–
Attrition Bias									
Completeness of outcome data	– –	+	+	++	++	++	+	++	–
Detection Bias									
Confidence in exposure characterization	+	+	++	+	+	+	++	+	+
Confidence in outcome assessment	–	–	+	+	+	+	++ / +	+	+
Reporting Bias									
All outcome measured reported	+	+	+	+	+	+	+	+	–
Other Source of Bias									
Other threats to internal validity *	– –	+	–	+	–	+	+	–	–
SUMMARY	high	some	some	low	some	some	some	high	high

* e.g., statistical methods and researchers adhered to the study protocol
high= high risk of bias
some= some concerns
low= low risk of bias

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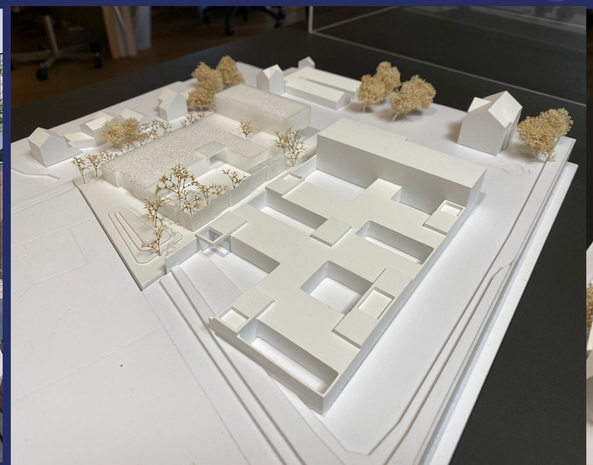
Impact of Wooden Architecture on Staff and Patients in Psychiatry

A Stratified Matched-Pair Cluster RCT Comparing Timber-Frame/Cross-Laminated-Timber (CLT) and Solid Construction



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