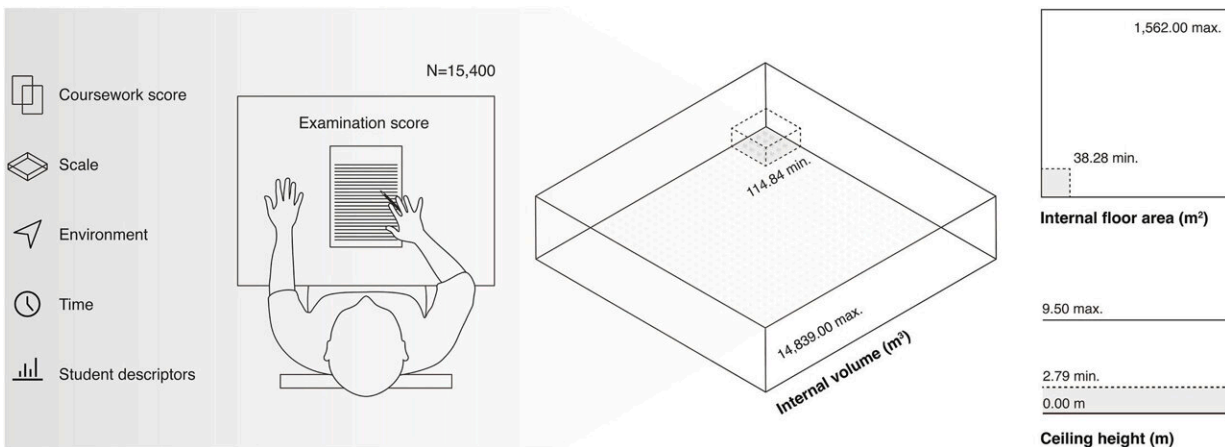


# High ceilings linked to poorer exam results for uni students

July 3 2024



Graphical abstract. Credit: *Journal of Environmental Psychology* (2024). DOI: 10.1016/j.jenvp.2024.102367

Ever wondered why you performed worse than expected in that final university exam where you sat in a cavernous gymnasium or massive hall, despite countless hours, days and weeks of study? Now you have a genuine reason—high ceilings.

[Research](#) from the University of South Australia and Deakin University has revealed a link between rooms with high ceilings and poorer examination results.

The study, published in the *Journal of Environmental Psychology* and led by architecture and psychology-trained UniSA researcher Dr. Isabella Bower in collaboration with educational psychology researcher Associate Professor Jaclyn Broadbent from Deakin University, demonstrates that building design impacts our ability to perform tasks.

Dr. Bower and her team analyzed data from 15,400 undergraduate students between 2011–2019 across three campuses at an Australian university, comparing students' exam results with ceiling heights of the room in which they sat the examination.

After considering individual student differences and their prior performance in coursework, they found that students had lower scores than expected when sitting exams in rooms with an elevated ceiling.

The researchers factored in the students' age, sex, time of year when sitting the examination, and whether they had prior exam experience in the courses investigated.

Dr. Bower says it is difficult to identify whether this is due to the scale of the room itself, or factors such as student density or poor insulation, which in turn lead to fluctuating temperatures and air quality—all factors that can affect the brain and body.

"These spaces are often designed for purposes other than examinations, such as gymnasiums, exhibitions, events and performances," Dr. Bower says.

"The key point is that large rooms with high ceilings seem to disadvantage students and we need to understand what brain mechanisms are at play, and whether this affects all students to the same degree."

The results support experiments that Dr. Bower has done using [virtual](#)

[reality](#) (VR), measuring brain activity of participants exposed to different rooms, while controlling for other factors such as temperature, lighting and noise.

Using a technique called electroencephalography (EEG), where electrodes are attached to the scalp to measure brain cell communication, her team altered room sizes, while recording the brain's response. They also measured [heart rate](#), breathing and perspiration, revealing if someone could unconsciously detect a change to the environment.

In these VR experiments, they found that simply sitting in a bigger room resulted in brain activity associated with concentrating on a difficult task. This led them to question if task performance in large spaces is reduced.

"Based on these results we were curious to apply our lab findings to a real-world dataset and see if being in a large space like a gymnasium while having to concentrate on an important task would result in a poorer performance," Dr. Bower says.

"Examinations have been a key part of our education system for over 1,300 years, shaping students' career paths and lives," says Assoc Prof Jaclyn Broadbent.

"In Australia, many universities and schools use large indoor spaces for exams to streamline logistics and costs. It's crucial to recognize the potential impact of the physical environment on student performance and make necessary adjustments to ensure all students have an equal opportunity to succeed," she says.

"These findings will allow us to better design the buildings in which we live and work, so we can perform to the best of our ability."

Dr. Bower has recently returned from Zurich, where she was the first Australian to receive a NOMIS and Science Young Explorer Award for her ongoing research into [building design](#) on brain functioning and mental health.

**More information:** Isabella S. Bower et al, Elevated ceiling heights reduce the cognitive performance of higher-education students during exams, *Journal of Environmental Psychology* (2024). [DOI: 10.1016/j.jenvp.2024.102367](#)

Provided by University of South Australia

Citation: High ceilings linked to poorer exam results for uni students (2024, July 3) retrieved 23 July 2024 from <https://phys.org/news/2024-07-high-ceilings-linked-poorer-exam.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.