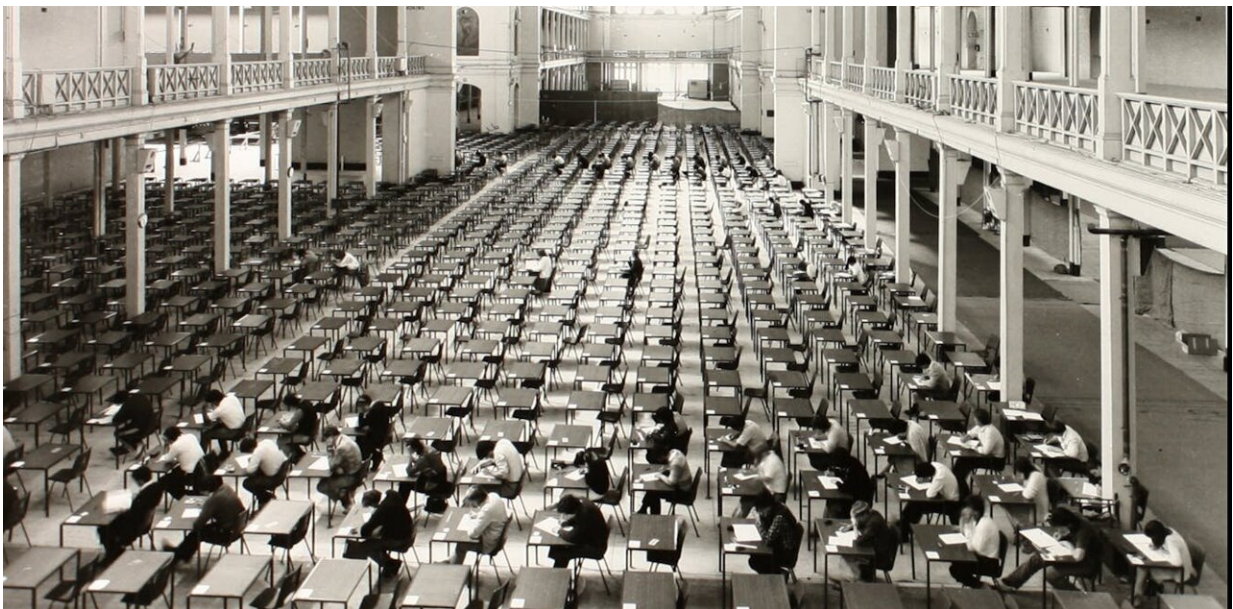


# Should we ditch big exam halls? Research shows how high ceilings are associated with a lower score

July 5 2024, by Isabella Bower and Jaclyn Broadbent

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Royal Exhibition Building, Melbourne, 1984. Credit: [Museums Victoria](#), [CC BY](#)

Can you remember your last in-person exam? You're waiting outside the venue with your identification, pens and back-up pens. Everyone is nervously looking at their notes or avoiding eye contact.

The doors open and you enter a cavernous space of numbered tables in rows. You find your seat and, waiting to start, glance around the vast

space that surrounds you.

Our research suggests this environment may have an effect on your ability to perform at your best.

In [our new study](#), we looked at the impact of ceiling heights on the [exam](#) performance of Australian students.

## Exams have a long history

Exams [date back more than 1,300 years](#) and are still one of the most common forms of assessment for school and university. They are often conducted in large spaces for efficiency in supervision and space use. This often includes gymnasiums, auditoriums, showgrounds, halls and exhibition buildings.

While the pandemic led a shift to online exams, growing concern over AI and other forms of cheating has seen a renewed emphasis on [this traditional style of in-person assessment](#) (even if research shows "high stakes" exams are not good for learning or the prevention of cheating).

## Our research

In our previous [2022 lab-based study](#), we found if rooms were larger, there was an impact on [brain activity](#) associated with our ability to concentrate.

This led us to wonder whether, in everyday life, large rooms have an impact on cognitive performance (or how well our brains can perform tasks)—and therefore whether traditional large exam halls have an impact on students' results.

To test this, in [our new study](#), we compared students' exam results across different sizes of rooms.

We looked at the results from 15,400 psychology undergraduates at one Australian university over eight years (2011–19), and across three campuses.

We matched exam scores and the room dimensions where the examinations were held. This included rooms with ceiling heights between 2.79 meters to 9.50m, and internal floor areas between 38m<sup>2</sup> to 1,562m<sup>2</sup>.

As we relied on non-experimental data (things in their natural state), we were careful to account for other variables that might account for the results.

We factored in students' coursework scores as well as variables such as their gender, age, past exam experience and the unit of study. We also looked at geographic location, as admission requirements were different across campuses. All of these helped us understand what might affect our results.

To do our analysis, we used a statistical model called a "[linear mixed model](#)." This meant we could add these different variables to try and understand the extent to which they predict something (in this case, exam performance).

## What we found

The "significance" score for coursework was less than 0.001 and for ceiling height it was 0.002. A score below 0.05 means the result is unlikely to happen by chance, so we can be confident there's a real effect.

This means a students' prior coursework scores had a bigger impact on their exam score. But we still found ceiling height was a significant predictor of their results. In other words, even after accounting for other factors, higher ceiling heights were a significant predictor of the students' exam scores.

This suggests study habits matter but so too do the dimensions of the room in which you sit the exam.

## Why is this?

Our fresh findings suggest several questions ripe for further research. These include:

- is room insulation and [climate control](#) (which affect the air temperature, quality and circulation) a reason for room size making a difference? Research shows [factors such as temperature affect cognitive performance](#).
- does room context have an impact? If we know big halls and gyms are usually designed for large social gatherings and [sporting events](#), does this make us feel less comfortable or bring back past memories, and therefore make us less likely to perform at our best?
- does being in a space with more people sitting close by means you are more or less likely to cheat? How does this affect your score?
- what happens when students are randomly allocated to rooms of different sizes? At present there are other factors such as special consideration which will determine exam room allocation and conditions.

We also need to consider what is happening now for online exams. This has introduced new variability around the environmental conditions for

students. Here, a student may have an advantage if they feel cozy and relaxed at home, or perhaps they may struggle to concentrate due to other environmental and social factors at home.

Given we only studied students in one discipline (psychology) we also need to replicate these findings in different areas and groups of students.

## What else?

This work also feeds into our broader research about how building design can effect what our brains need to do.

There is already significant community awareness of how buildings can impact upon our [physical health](#)—and building codes and regulations to make sure they meet these standards.

But as our research shows, the way spaces are designed can have an impact on the way we think and how well we perform a task. This could be applied beyond exams to how we learn or do our jobs in the broader world.

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