

What is the relationship between CO2 levels and cognitive performance?

Research has shown that elevated levels of carbon dioxide ([CO2](#)) can negatively impact cognitive performance. In the UK, studies reveal that reducing CO2 concentrations from 5000 ppm to 1000 ppm improves cognitive abilities by up to 15% in tasks like word recognition and reaction time. Enhanced ventilation is key to maintaining optimal CO2 levels for better mental performance in schools, offices, and homes.

The Science Behind CO2 and Cognitive Performance

Carbon dioxide (CO2) is a natural by-product of human respiration, but when it accumulates in enclosed spaces, it can significantly affect cognitive functions. Studies conducted in the UK provide compelling evidence of this relationship, particularly in educational and workplace settings.

How CO2 Affects the Brain

When CO2 levels rise, the brain's ability to process information slows down. This is because CO2 alters the pH balance of the blood, reducing oxygen delivery to the brain. As a result, tasks requiring focus, memory, and decision-making become more challenging.

Key Findings from UK Studies

1. Primary Schools in England:
 - Reducing CO2 levels from 5000 ppm to 1000 ppm led to:
 - 2.2% faster choice reaction times.
 - 2.7% improvement in colour word vigilance.
 - 8% better picture memory.
 - 15% enhanced word recognition.
 - Increasing ventilation rates from 0.3-0.5 to 13-16 L/s per person boosted work rates in addition and subtraction tasks by 7%.
2. Office Environments:
 - A 315 ppm increase in CO2 levels resulted in:
 - 0.85% longer Stroop response times.
 - 7.88% longer interference times.
 - Declines of 1.32% in Stroop throughput and 0.72% in addition-subtraction throughput.
3. Bedroom Environments:
 - Lower CO2 levels (835 ppm vs. 2395 ppm) improved next-day logical thinking performance by 3%.

The Role of Ventilation

Ventilation plays a critical role in managing indoor CO2 levels. In UK schools, improving ventilation rates significantly reduced CO2 concentrations, leading to measurable cognitive benefits. Similarly, in offices and residential settings, better [airflow](#) helps maintain optimal CO2 levels, enhancing productivity and mental clarity.

Practical Implications for the UK

The findings from these studies have important implications for indoor environments in the UK:

- Educational Settings: Schools should prioritise ventilation to create a conducive learning environment. This not only improves academic performance but also supports overall student well-being.
- Workplaces: Employers can enhance productivity by ensuring adequate ventilation in office spaces. Simple measures like opening windows or installing [mechanical ventilation systems](#) can make a significant difference.
- Homes: Households should consider ventilation solutions, especially in bedrooms, to improve sleep quality and next-day cognitive performance.

What Can You Do?

To maintain healthy CO2 levels and [boost](#) cognitive performance, consider the following steps:

1. Monitor CO2 Levels: Use [CO2 monitors](#) to track [indoor air quality](#).
2. Improve Ventilation: Open windows regularly or invest in mechanical ventilation systems.
3. Use Air Purifiers: These can help reduce CO2 levels and improve overall air quality.
4. Educate Others: Raise awareness about the importance of ventilation in schools, workplaces, and homes.

Take action today to ensure cleaner air and sharper thinking—your cognitive performance depends on it.