

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; not externally peer reviewed.

Accepted 12 May 2010

Published Online First 24 September 2010

Occup Environ Med 2010;**67**:798–799.
doi:10.1136/oem.2010.058008

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High carbon dioxide concentrations in the classroom: the need for research on the effects of children's exposure to poor indoor air quality at school

Air quality and its effect on health have received recent attention from the House of Commons Environmental Audit Committee.¹ While outdoor air pollution is clearly important and contributes to indoor air quality, indoor air pollution sources and the time spent in indoor environments are key to understanding exposure. Children in the UK spend an average of 6–7 h a day inside the school classroom during most weekdays, yet there is very little data on air quality within these environments in the UK. The Health Effects of the School Environment study found poor ventilation, high presence of particulate matter, moulds and allergens to be associated with an increase in respiratory diseases in school-children throughout Europe.² Carbon dioxide (CO₂) concentrations are a good marker of

ventilation, with a recommended limit of 1500 ppm averaged over the school day.³ Increased CO₂ concentrations will generally indicate raised concentrations of a range of other air pollutants such as volatile organic compounds, fine particulate matter and biological contaminants. We report here on a small study of CO₂ concentrations in six schools in Aberdeen city measured in spring 2009.

We used a Telair 7001Di instrument (Telair, Goleta, California) to measure and log temperature, relative humidity and CO₂ continually over a 7-day period in a total of 11 classrooms. Averaged over the 11 classrooms, the measuring device logged concentrations greater than 1500 ppm for approximately 31% of the school week. In one classroom, a total of 72% of time exceeded 1500 ppm.

We note two recent studies from the USA that have suggested a relationship between raised CO₂ concentrations in schools and poorer pupil academic attainment and poorer pupil attendance at school^{4 5}

In summary, our small study suggests that CO₂ concentrations in UK schools may exceed the guidance limits for a substantial proportion of the time children spend in class. Poor ventilation may lead to exposure to elevated concentrations of other air pollutants. Future studies should be designed to assess the potential for indoor air quality in the classroom to influence student health and learning performance.

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Competing interests None.

Contributors JM collected the data. SS and ST were involved in the development of the project protocol. All were involved in drafting the letter.

Provenance and peer review Not commissioned; not externally peer reviewed.

Accepted 26 April 2010

Occup Environ Med 2010;**67**:799.
doi:10.1136/oem.2010.057471

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CORRECTIONS

doi:10.1136/oem.2008.044727corr1

Mattioli S, Zanardi F, Baldasseroni A, *et al.* Search strings for the study of putative occupational determinants of disease. *Occup Environ Med* 2010;**67**:436–43. The figures in this article were inverted. The proportional Venn diagram should have been Figure 1 and the bar chart should have been Figure 2. The legends were correct.

doi:10.1136/oem.2008.051714corr1

Pattenden S, Armstrong B, Milojevic A, *et al.* Ozone, heat and mortality: acute effects in 15 British conurbations. *Occup Environ Med* 2010;**67**:699–707. In Figure 1B, the scale on the x axis was incorrect. The scale should have read 0.80, 0.90, 1.00, 1.10, 1.20.