

What is the role of children in transmission of SARS-CoV-2?

Deepti Gurdasani¹ and Christina Pagel²

1. William Harvey Research Institute, Queen Mary University of London, London, UK
2. Clinical Operational Research Unit, University College London, London, UK

Emails: d.gurdasani@qmul.ac.uk, c.pagel@ucl.ac.uk

There is now unequivocal evidence that children play an important role in the transmission of SARS-CoV-2, particularly within school and household settings. The role that a person or group plays in transmission is dictated by a combination of exposure (how likely they are to get exposed to infection), susceptibility (how likely they are to get infected if exposed), and transmissibility (how likely they are to transmit to others if infected). Although the different contributions of these are difficult to disentangle,^{1,2} the important role of children in SARS-CoV-2 transmission is likely due to higher levels of exposure in schools. Early studies likely underestimated susceptibility in children¹⁻³ by not considering both lower relative exposure in children during periods of lockdown and school closures, and that children are less likely to be symptomatic than adults^{4,5}, and so are less likely to be identified as cases.

School exposure is high for two main reasons. Schools involve hundreds of children mixing daily in crowded indoor spaces that are often poorly ventilated, facilitating transmission. Additionally, infection in children is easily missed because they are more likely to have asymptomatic, relatively mild or atypical symptoms compared to adults^{4,5}; and they can be harder to test if COVID-19 is suspected. Studies have also shown that SARS-CoV-2 infection may go undetected among children, who can be “silent” asymptomatic spreaders in school outbreaks, which then spread into the community.⁶ Contemporaneous surveillance data from the UK Office for National Statistics (ONS, based on random COVID-19 testing of households in England),⁵ showed that symptom-based testing vastly underestimated actual case incidence and prevalence in children.

The clearest findings about the role of children in community transmission come from studies that showed substantial reductions and increases in pandemic growth (R_t , the expected number of new infections caused by an infectious individual in a population where some are no longer susceptible) when schools were closed and opened, respectively.⁷ Random survey data from the ONS⁵ indicates repeated increases in, and spread from, school-age children into parental age groups, with increases in infection rates in children pre-dating increases in other age groups following school opening. Very large studies of adults living with children in the US,⁸ UK⁹ and Denmark¹⁰ have shown a higher risk of infection among households with children. More recently, genomic studies have also confirmed superspreading events within schools that then spread infections back into the community.⁶ Fortunately, studies also show that robust multilayered mitigation measures within schools can greatly reduce school outbreaks and are associated with lower community prevalence.⁸

To reduce the role that children play in transmission of SARS-CoV-2, and to limit the impact of COVID-19 on children’s health and that of their families, it is important to reduce exposure and transmission through safer school environments (improving air quality through investing in better ventilation and air cleaning), using N95/FFP2 masks during high

or growing prevalence, vaccination, accessible case ascertainment (e.g. saliva testing), and public information on how to make homes safer environments. Key areas of future research include understanding reinfections in children (how often do they occur? Are they less likely to be picked up? What are the risks of long COVID or severe disease?); variant-specific effects on immune escape, re-infection and transmission, and developing vaccines/boosters that are safe for children but provide longer protection against infection, particularly for under 12s; quantifying the long-term benefits of reduction in airborne disease, and better air quality, through investment in cleaner air in schools

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