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Schools should still be the last to close and first to open if there were any future lockdown

As schools in England return for the start of the new term this week, these authors argue why schools should be provided with resources to remain open amid rising covid cases

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As cases of the omicron variant rise rapidly across the UK we are faced with possible new restrictions to curb its transmission. This raises questions about whether there will be any extended closures of schools.

During the first pandemic wave in 2020, to reduce the number of social contacts and therefore transmission events that occur in schools, many countries, including the UK, closed schools for lengthy periods as part of broader social lockdowns.[1]

There is now clear evidence that pandemic related school closures harm children. Prolonged school closures bring high risk of poor mental health, obesity, and child abuse, as well as loss of learning.[2] The National Mental Health of Children and Young People study showed that likely mental health disorders in English children and young people increased from 1 in 9 to 1 in 6 during the pandemic.[3] The National Child Measurement Programme found that childhood obesity in England increased by 4.5% from 2019 to 2020/21.[4] School closures reduce the visibility of children at risk, with medical referrals for child protection falling 36%-39% during the pandemic.[5 6] Due to sensitive periods of brain and cognitive development, this generation of children's loss of learning during the pandemic cannot simply be compensated for by catch-up work at a later date and will contribute to poorer health and lower life expectancy in the long term.[7]

Given this catalogue of harms, we must carefully examine the evidential case and balance of risks related to closing schools.

For previous variants of SARS-CoV-2, the evidence that closing schools reduces community transmission is surprisingly weak.[8 -10] A systematic review found mixed evidence that school closures and reopenings affected community transmission, with a number of higher quality studies finding few or no associations.[8 -10] Within households, children and young people transmit SARS-CoV-2 infection at similar levels to adults.[11] However, studies have found that secondary attack rates from children are lower in school settings than in households,[12] particularly when mitigations are in place.

Evidence from the largest known schools study, the School Infection Study, suggested that prevalence of antibodies among teachers in England in Autumn 2020 was similar to comparable adults in other professions.[13] The study also provided evidence that SARS-CoV-2 infection prevalence was lower among children tested on the school site than in the community in the summer term of 2021, when, as well as a policy of isolation of "bubble contacts" of those with identified infection, in secondary schools regular home-based testing was available and recommended for both staff and students.[14] Studies have also found that schools successfully implemented a range of preventive measures with high fidelity.[15]

Some of these mitigations have stopped, but when they were in place these included effective Test-Trace-Isolate strategies, increased ventilation (via open windows and doors and/or carbon dioxide monitors and air filtration) and face coverings.[16 17] On the 2 January 2022, the Department of Education announced that masks should be worn indoors in secondary schools. Alongside good hygiene and social distancing measures, these mitigations have been shown to reduce transmission risk and allow schools to remain open despite circulating infection.[18 19]Despite uncertainty regarding the value of non-pharmaceutical measures to limit the transmission of omicron, the re-institution of established mitigations in schools would be a sensible precaution.

We currently lack robust data supporting the effectiveness of closures in controlling transmission. It is likely that schools have become significant sites of infections recently because of the relaxation of preventive measures and the low level of vaccination of children and teenagers compared to adults. Both of these factors need to be addressed. The effectiveness of school preventive measures could be improved by increased funding for carbon dioxide monitors and air filtration as well as for the additional heating costs associated with natural ventilation. While clear evidence on the effectiveness on specific mitigations in school settings has also been difficult to accrue, a rational approach to prevention would prioritise keeping schools open ahead of other settings, accelerate the vaccination programme for 12-17 year olds, reintroduce some interventions to reduce social mixing on school sites and strengthen the testing programme including screening all children before being back on site. Education and mental health harms should be part of forthcoming decisions on vaccination of all 5–11-year-olds as they were for 12-15 year olds. Finally, schools urgently need support and resources, including measures to offset staff absences due to covid-19 and the substantial pressure and increased workload that school staff have endured throughout the pandemic.

School closures are a blunt epidemiological tool to control SARS-CoV-2 transmission that cause

considerable harm. They provide limited direct protection from harm for children and young people themselves, aside from the indirect benefits of reduction of infection risk to their families. Children and young people largely have asymptomatic infection and their risk of severe illness or death from covid-19 is low.[20] Further data are needed on post-covid syndromes in children and young people. Data remain uncertain although a recent systematic review found that the majority of persistent symptoms are between 0% and 14% more common in covid-positive than in uninfected children in controlled studies.[21]

The certainty of resulting harms to children together with the uncertainty that school closures will be highly effective in combatting the current spread of the omicron variant suggest that we should contemplate school closures only as a last resort. We contend that the evidence supports the policy that "schools should be last to close and first to open" and we urge governments to provide schools with the resources and support to put the appropriate mitigations in place to enable this. Not doing so would reflect a failure of policy that will cause harm to this generation of children and young people.

Competing interests: JH and CB are investigators on the Schools Infection Survey funded by the Department of Health and Social Care. CB and RV have attended meetings of SAGE and the Scientific Pandemic Influenza Group on Behaviours Subcommittee. SJB is a member of The Times Education Commission, Rethinking Assessment. JPG regularly undertakes modelling to support the work of the UK Health Security Agency and the Scientific Pandemic Influenza Group on Modelling (SPI-M).

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1 Survey on National Education Responses to COVID-19 School Closures. UNESCO Institute for Statistics; 2021 http://tcg.uis.unesco.org/survey-education-covid-school-closures/.

2 Viner R, Russell S, Saulle R, etal. Associations of school closures with and without social lockdown on physical and mental health of children and young people during the first COVID-19 wave: A systematic review. *JAMA Pediatr* 2022. doi: 10.1001/damapediatrics.2021.3221.

3 Vizard T, Sadler K, Ford T, et al. Mental Health of Children and Young People in England, 2020: Wave 1 follow up to the 2017 survey: NHS Digital, Health and Social Care Information Centre, 2020, https://files.digital.nhs.uk/AF/AECD6B/mhcyp_2020_rep_v2.pdf

4 National Child Measurement Programme. England 2020/21 School Year: NHS Digital, 2021, http://digital.nhs.uk/pubs/ncmpeng2021

5 Bhopal S, Buckland A, McCrone R, etal. Who has been missed? Dramatic decrease in numbers of children seen for child protection assessments during the pandemic. *Arch Dis Child* 2020. doi: 10.1136/archdischild-2020-319783:archdischild-2020-319783. pmid: 32554510

6 Garstang J, Debelle G, Anand I, etal. Effect of covid-19 lockdown on child protection medical assessments: a retrospective observational study in Birmingham, UK.*medRxiv* 2020doi: 10.1101/2020.08.09.20170977

7 Christakis DA, Van Cleve W, Zimmerman FJ. Estimation of US Children's Educational Attainment and Years of Life Lost Associated With Primary School Closures During the Coronavirus Disease 2019 Pandemic. *JAMA Netw Open* 2020;3:e2028786-86. doi: 10.1001/jamanetworkopen.2020.28786. pmid: 33180132

8 Ertem Z, Schechter-Perkins EM, Oster E, etal. The impact of school opening model on SARS-CoV-2 community incidence and mortality. *Nat Med* 2021;27:2120-6. doi: 10.1038/s41591-021-01563-8. pmid: 34707317

9 Fukumoto K, McClean CT, Nakagawa K. No causal effect of school closures in Japan on the spread of COVID-19 in spring 2020. *Nat Med* 2021;27:2111-9. doi: 10.1038/s41591-021-01571-8. pmid: 34707318

10 Walsh S, Chowdhury A, Braithwaite V, etal. Do school closures and school reopenings affect community transmission of COVID-19? A systematic review of observational studies. *BMJ Open* 2021;11:e053371. doi: 10.1136/bmjopen-2021-053371. pmid: 34404718

11 House T, Pellis L, Pouwels KB, et al. Inferring Risks of Coronavirus Transmission from Community Household Data. 2021, https://ui.adsabs.harvard.edu/abs/2021arXiv210404605H.https://ui.adsabs.harvard.edu/abs/2021arXiv210404605H

12 Viner RM, Waddington C, Mytton O, etal. Transmission of SARS-CoV-2 by children and young people in households and schools: a meta-analysis of population-based and contact-tracing studies. *J Infect*2022, https://www.medrxiv.org/content/medrxiv/early/2021/12/15/2021.12.14.21267713.full.pdf:In press.

13 COVID-19 Schools Infection Survey Round 2, England: December 2020. England: Office for National Statistics, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/covid19schoolsinfectionsurveyround2england/december2020#comparison-with-the-coronavirus-covid-19-infection-survey

14 COVID-19 Schools Infection Survey, England: Round 6, June 2021: Office for National Statistics, UK, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/covid19schoolsinfectionsurveyengland/round6june2021

15 Sundaram N, Bonell C, Ladhani S, etal. Implementation of preventive measures to prevent COVID-19: a national study of English primary schools in summer 2020. *Health Educ Res* 2021;36:272-85. doi: 10.1093/her/cyab016. pmid: 33860299

16 Panovska-Griffiths J, Kerr CC, Stuart RM, etal. Determining the optimal strategy for reopening schools, the impact of test and trace interventions, and the risk of occurrence of a second COVID-19 epidemic wave in the UK: a modelling study. *Lancet Child Adolesc Health* 2020;4:817-27. doi: 10.1016/S2352-4642(20)30250-9. pmid: 32758453

17 Panovska-Griffiths J, Kerr CC, Waites W, etal. Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK. *Sci Rep* 2021;11:8747. doi: 10.1038/s41598-021-88075-0. pmid: 33888818

18 Krishnaratne S, Pfadenhauer LM, Coenen M, etal. Measures implemented in the school setting to contain the COVID-19 pandemic: a scoping review. *Cochrane Database Syst Rev* 2020;12:CD013812. doi: 10.1002/14651858.CD013812. pmid: 33331665

19 Di Gilio A, Palmisani J, Pulimeno M, etal. CO2 concentration monitoring inside educational buildings as a strategic tool to reduce the risk of Sars-CoV-2 airborne transmission. *Environ Res* 2021;202:111560. doi: 10.1016/j.envres.2021.111560. pmid: 34224708

20 Smith C, Odd D, Harwood R, etal. Deaths in children and young people in England after SARS-CoV-2 infection during the first pandemic year. *Nat Med* 2021;20211111. doi: 10.1038/s41591-021-01578-1. pmid: 34764489

21 Behnood SA, Shafran R, Bennett SD, etal. Persistent symptoms following SARS-CoV-2 infection among children and young people: a meta-analysis of controlled and uncontrolled studies. *J Infect* 2021;S0163-4453(21)00555-7. doi: 10.2139/ssrn.3940260. pmid: 34813820