COVID-19 in the UK: Policy on children and schools

Deepti Gurdasani[1,2], Christina Pagel[3], Martin McKee[4], Susan Michie[3], Trish Greenhalgh[5], Christian Yates[6], Gabriel Scally[7], Hisham Ziauddeen[8]

KEY MESSAGES

- Pandemic policy on children and schools reflected particular UK-based scientific narratives that did not align with global scientific consensus
- In particular, government relied on evidence reviews which appeared to downplay the seriousness of covid-19 in children, under-estimated the benefits of precautionary measures, and over-estimated the harms of vaccination
- Return to school in September 2020 with minimal emphasis on masking and air quality, and inadequate support for isolation may have accelerated community transmission
- We recommend that the public inquiry explore why UK was an international outlier in its approach to protecting children and making schools and communities safer

Introduction

Children in the United Kingdom have suffered greatly in the COVID-19 pandemic. The closure of schools, necessary at a time when infections were spreading rapidly and it seemed that the NHS would soon be overwhelmed, deprived them of access not only to education but to the many other things that schools provide, from emotional support and life skills to, for some, school meals. Some schools, especially those attended by children from more affluent families, were able to compensate to some extent by moving lessons online but many could not, not least because many of their pupils were in families that were digitally excluded. The impact of COVID-19 was compounded by bereavement as some children lost parents/carers, with those already disadvantaged with breadwinners in jobs that placed them at high risk of infection and death disproportionately affected. Then, as restrictions lifted, a growing number of children became infected. Some would become seriously ill and even die. Although deaths were relatively uncommon, they still exceeded those from many other childhood illnesses in recent years. Many lost parents and carers to COVID-19. Over time increasing numbers experienced Long Covid, in some cases with profound consequences for them and their families who have struggled to obtain support. As the pandemic progressed, so did our understanding of the nature of COVID-19 and, in particular, its predominantly airborne mode of transmission. Yet, once again, the needs of children seemed to be overlooked, with a failure to put in place measures to protect them and their families, in particular monitoring of indoor

[1] Queen Mary University of London, London, UK
[2] Alan Turing Institute, London, UK
[3] University College London, London, UK
[4] London School of Hygiene and Tropical Medicine, London, UK
[5] University of Oxford, Oxford, UK
[6] University of Bath, Bath, UK
[7] University of Bristol, UK
[8] University of Cambridge, UK

air quality and effective ventilation. Then, when vaccines became available, there were long delays before recommending them for children and, when they did, the messaging was confused. But worst of all, to an extent not seen in most other countries, children in the United Kingdom were being weaponised, exploited in an ideological battle by those who viewed any restriction on individual liberty as an unacceptable attack on their freedom.

Our message to the Public Inquiry

We take it as given that there are enormous educational and social benefits to children from attending school, particularly for children who may be vulnerable in the home environment.[1] We also accept that covid-19 has had a disproportionately severe impact on older people and was initially believed to be a mild and inconsequential disease in children. This led the governments at Westminster and in the devolved administrations to reopen schools as soon as possible after the initial closures. Yet this decision, which was laudable on educational and social grounds, was not accompanied by a comprehensive package of measures to protect children returning to school. This might have been justifiable if three assumptions were true, namely: that children played a minimal role in community spread, by passing the disease to vulnerable family members, especially in crowded intergenerational households; that schools were not loci of transmission; and that children really were not harmed by infection. As we now show, none of these assumptions is true and, worse, this was knowable early on, when key decisions were made (Table 1). Indeed, policies on children and schools (especially in England but to a lesser extent in devolved nations too) diverged in many ways from those implemented by other governments (including many in Western Europe, Southeast Asia, the Middle East) and were contrary to advice from the World Health Organization (WHO), European Centres for Disease Control (ECDC) and US Center for Disease Control and Prevention (CDC). We ask that the Public Inquiry examine how these decisions came to be made and what lessons can be learned from the decision-making process from which they emerged.

The United Kingdom was an international outlier

The response in the United Kingdom at each step was out of line with that in many other countries. Portugal and Austria required masks for all children 6 years and above in school as early as May 2020,[2] and Italy, Greece, Spain, Austria, France and several states in Germany by August-October required masks in primary and secondary schools. Germany invested substantially in ventilation in public buildings including schools during this period. [3] Denmark and Greece reduced class sizes. Israel, Spain, Denmark and Italy increased physical distancing within classrooms. Several regions in Spain invested in hiring more teaching staff in order to maintain smaller bubbles, and began using facilities like canteens and libraries to allow physical distancing. Masks in schools were maintained across Italy, France, Spain, Portugal and Austria, and several states in Germany for the entire school year, until autumn 2021, when measures were briefly eased, before being re-instituted following the resurgent delta wave.

The different approach adopted in the United Kingdom might not be a surprise to those familiar with comparative educational policy. Class sizes in England are among the highest across Western Europe,[4] and chronic underfunding of schools and education, and pre-existing

social inequalities, played a role in magnifying the impact of the pandemic on children and families, exacerbating inequalities. The UK provided inadequate practical and financial support for those with symptoms or testing positive to isolate, with the UK having the lowest sick pay across the Organisation for Economic Co-operation and Development (OECD) countries and providing minimal additional funds with strict eligible criteria and many applications turned down. It also did not provide adequate practical support for parents or carers, likely disincentivising voluntary testing.[5] In Germany, for example, child sickness benefit was offered to parents when looking after children.[6] School attendance was mandatory for all children in the UK, with families choosing to remote-school being put at risk of prosecution. Threats of fines and not making school environments safer disproportionately impacted clinically vulnerable households and families.[7]

When the vaccine roll-out to 12-15 year olds began in the UK in the US, Canada, Israel, and much of Western Europe, the majority had already received vaccines, with 10 million children vaccinated in the US alone. Over 8.7 million 5–11-year-olds had been vaccinated in the US by the time JCVI recommended the roll-out of vaccines to this group. The vaccination rate for primary school children remains far lower than the European average currently (two dose uptake 0.3% vs a median of 15% in 5-9 yr olds across the EU/EEA). To date no booster recommendations have been made for children under 16 years of age, in contrast to many other countries, including Israel, USA, Germany, France, Italy, Portugal and Austria.

Our questions for the Public Inquiry

Why was preventing covid-19 in children deemed low priority?

Early pandemic policy rightly prioritised protecting those at greatest risk of severe acute disease and death, such as older people. As the pandemic progressed, protecting children continued to be seen as low priority for two main reasons. First, it was believed that children rarely became ill and were often asymptomatic when infected. Second, the wider impact of transmission from children and schools into the community was not considered in policy. Thirdly, some sources assumed that infection of a large proportion of the population would result in herd immunity and hence help stem the pandemic.

Impact on children was underestimated consistently, as severe disease in children was compared with that in adults, rather than against other childhood illnesses. Death in children is rare from any cause, but is a tragedy nonetheless. Although deaths from COVID-19 are rare in children, these are more common than many other childhood illnesses (e.g. mumps, measles, varicella, rubella) (Table 2). Furthermore, death rates for children were calculated using population denominators, which indicated they were static. This ignored the fact that infection rates changed markedly during the pandemic in children. For example, in the 5 months since December 2021 ~50% of 8-11 year olds in the UK were exposed compared to an estimated 40% over the previous 20 months.[8] This meant rapid infection of children in a very short period of time, leading to increase in absolute numbers hospitalised, and deaths over time. The impact of long Covid on children was also largely ignored in policy on the basis this was uncertain. This was despite early evidence from the ONS that significant number of children reported persistent symptoms post-infection. Indeed, these numbers tripled over in 5 months between July ’21 and December ‘21,

reflecting rapid spread of the delta variant spread among children.[61] It must be noted that despite 'control' comparisons likely diluting the prevalence of any syndrome, the UK CLoCk study, which included children without known infection, also showed 1 in 7 children had an excess of persistent symptoms even at 3 months post-infection.[9] Given >90% of young children have been estimated to have been exposed to date, even if a small proportion of children were considered at risk of developing persistent infection, this would have meant significant impact at population level.[8] Indeed, the ONS school survey estimated that 1.8% and 4.8% of all primary school and year 7 to 13 pupils had had persistent symptoms for at least 12 weeks that affected their daily life following infection since March 2020.[10] Given this, it is unfortunate that there was more focus on debating prevalence of long COVID in children, rather than following the precautionary principle to prevent this, while waiting for evidence to accrue.

Despite the government's stated prioritisation of in-person education in children, surprisingly the impact of spread in schools on educational disruption was also not considered in policy. Rather than mitigating spread of infection in schools to minimise educational disruption, government policy prioritised attendance at all costs. Expectedly, this did not reduce educational disruption, which continued throughout the pandemic, with high levels of absences in children due to COVID-19, even after requirements for isolation of contacts were removed.[11] Government policy also did not consider the wider impact of community transmission on children, including the impact of bereavement due to loss of carers or long COVID in carers.[12]

Why was the transmission risk within schools consistently underestimated?

Despite repeated recognition and warnings by SAGE[13,14] (Table 1) of the significant role schools played in transmission, policy decisions subsequently drew on an implicit or explicit narrative that schools were not major sites of transmission of the virus and that the harms of remote schooling outweighed the benefits of in-person schooling. This created a false dichotomy between schools being closed to in-person schooling, or being open but without robust mitigations in place. Policy ignored the fact it was the lack of mitigations in schools and failure of pandemic policy leading to high levels of spread in schools and back into the community that led to educational disruption. Rather it focused on getting children to attend schools at all costs, regardless of whether they were from vulnerable households, or if their household members had COVID-19 (after August 2021), increasing the risk of transmission in classrooms.

This is not just clear in hindsight. It was clear very early on in the pandemic. During summer 2020, evidence accumulated that schools *were* important sites of transmission.[15-18] Several ecological studies, assessing the impact of different non-pharmaceutical interventions on pandemic growth across the world identified school closures as one of the most effective interventions in modifying epidemic growth.[15-18] Large-scale studies across the UK,[19] US,[20] Denmark[21] and Sweden[22] have also showed a higher risk of infection in household members living with children compared to those not living with children, and teachers undertaking in-person teaching, highlighting the impact of transmission within schools and back into the community. In June 2020, SAGE warned that re-opening schools would likely lead to a surge in transmission and spread into the community (SPI-M-O repeated in February 2021).[13,14]

Why did some key decision-makers believe that transmission of covid-19 did not occur to a significant extent in schools? Documents from government advisory groups seem to have consistently warned about the significant role schools played in community transmission since early in the pandemic, and the need for mitigations.[13,14,23] However, the UK Health and Security Agency's (UKHSA) own research,[24] conducted at a time between waves when attendance and infection prevalence was very low predictably showed few outbreaks within schools, which were interpreted as showing that significant in-school transmission does not occur. Similarly, the ONS School Infections Survey (SIS) which showed infection rates in school children were lower than in the community was interpreted by the UKHSA to mean that schools were not contributing significantly to transmission, when this was almost certainly because many COVID-19 infected children and their contacts were not attending school (due to isolation policies at the time), so were not sampled. Another reason appears to have been increased focus on a systematic review of the evidence base undertaken by a UK team (including members of SAGE)[25,26] that suggested reduced susceptibility to infection in children – with policy makers ignoring that children often have one of highest exposure rates because of contact rates in school environments.

There were key flaws in the primary evidence included in the review, as has been highlighted before[27]—in particular the failure of many studies to take account of the fact that infected children are often asymptomatic or have atypical symptoms.[28-32] If case ascertainment is based on symptoms or symptom-based testing (which it was in many studies), many infections in children will be missed, making it difficult to identify networks of transmission. The vast majority of studies either did not test all contacts, or tested contacts only if/when they developed symptoms. Furthermore, studies that focus on seroprevalence data[33] and also underestimate infection and transmission in children. This is because seroconversion is known to occur at a lower rate in children,[34] with waning of antibodies and seroreversion occurring more rapidly than in adults. Attendance data[35] was also interpreted to re-inforce these narratives. Attendance is a function of identifying cases in children via symptom-based testing, thereby also underascertaining infection. Another key flaw of several studies examined was that they were carried out under conditions of lockdowns and/or school closures when adult contacts would be expected to be higher (e.g. due to travel/work) than for children. During such periods a lower prevalence or seroprevalence of infection would not necessarily suggest a lower susceptibility (just lower exposure). Additionally, studies from periods of spread of less transmissible variants would not reflect spread from schools during the delta and omicron waves.

Another systematic review (including some of the same authors) which synthesised studies on the impact of school openings and closures[26,27,36,37] concluded that the role schools play an in transmission is uncertain. This also suffered from major flaws, including exclusion of critical studies, and misinterpretation of evidence that was included (see response to reviewers Box Panel).

Apart from the multiple lines of evidence that confirm the role of schools in transmission (ecological studies of interventions, observational studies of infection in teachers and household members of children, genomic surveillance studies[29,38,39]), the SARS-CoV-2 infection survey conducted by the UK Office of National Statistics (ONS) through random community household surveillance (hence avoiding the biases described above) indicated

that infection rates among children were often the highest across all age groups when schools were open. Increases, and declines mirrored closely the opening and closing of schools[40]. This was evident even during half-terms, where drops in infection prevalence among children often preceded those in parental and other age groups (Figure 1).

Why was so little attention paid to air quality?

As noted in Table 1, SARS-CoV-2 is an airborne disease;[41] schools are high-risk settings for airborne spread;[42] and reducing transmission requires attention to air quality by three means:[43] ventilation (e.g. opening windows, fans, and monitoring the CO_2 level to assess adequacy of efforts), filtration (with inbuilt or portable filters) or sterilisation (e.g. with UV light). Outdoor air has a CO_2 level of around 440 parts per million (ppm). The more exhaled air is present in indoor air, the higher the CO_2 levels will be. The CDC recommends supplementing ventilation at 800ppm, while REHVA stipulates a target of below 1000 ppm [44-46]. The UK government's own Health and Safety Executive (HSE) recommends a lower threshold of 800ppm in areas where continuous talking occurs.[47]

Despite recommendations by international public health bodies, and SAGE committees to improve ventilation early in the pandemic,[46,48] very little was done to measure or supplement this until September 2021. Above 90% of schools reported opening windows periodically to ventilate or even for most of the day, but the adequacy of these measures is hard to quantify without data on monitoring of air quality.[49] Even after promises for provision of CO_2 monitors to all schools were made,[50] delivery to schools was considerably delayed,[51] and their utility limited by inadequate supply of monitors and barriers to ventilation (e.g. temperature, limited window opening)[49,51] and a much higher cut-off (CO2 above 1,500pm) compared to international standards applied by the DfE. It is unclear why the English DfE and Public Health Scotland[52] recommended a much higher cutoff of 1500 ppm, especially given the negative impact of high CO_2 levels on concentration[53] and learning. To date, only 3% of schools have been considered eligible for air purifiers.[54] Many English schools are still unable to use CO_2 monitors,[51] and a significant number report consistently high values of CO_2 despite actions taken to improve ventilation.[51] There has been no policy introduced to require ventilation standards in new school buildings.

Why was masking in schools undervalued and de-emphasised?

Policy on masking in schools must considered in the context of UK policy on masking more generally, which was characterised by competing scientific narratives, policy inertia and public conflict (especially around government-mandated encroachments on individual 'freedoms').[55] Masks for the lay public were depicted by libertarians—and also, initially, by leading policymakers from Public Health England (PHE) (now UKHSA)—as having unproven efficacy for preventing transmission and as potentially harmful fomites from which droplet transmission could be passed on. Powerful pressure groups including the parent group 'Us for Them' actively campaigned against masking of children.[56]

Against this background, PHE expressed concerns about mask wearing by school children, particularly those in primary school, and the English Department for Education (DfE) stated in August 2020 that masking in school "should be avoided", as the DfE felt it would lead to a "negative impact on learning and teaching".[57] Masking within classrooms was not recommended in England, Northern Ireland and Wales throughout 2020. Masks were only

introduced in communal areas/corridors for secondary school students in November 2020. In Scotland, masks were introduced only in communal areas in schools for secondary school students in August '20, but later extended to classrooms as well in November 2020. The impact of lack of masking was compounded by the large class sizes, lack of caps on bubble sizes ('bubbles' often being hundreds of children), and crowded classrooms making physical distancing impossible to maintain in many schools, likely playing an important role in the growth of the second wave, as the alpha variant spread within schools, and into communities in late 2020.[58-60]

Policies across all nations contrasted starkly with policies in comparable European countries. In February 2021, for example, the US CDC recommended the wearing of masks in school by all children,[61] and the WHO recommended masks for all children above the age of 12 years where physical distancing could not be maintained, advising a risk-based approach for 5-11 year-olds, based on local transmission rates and other factors. Both organisations highlighted the need for ventilation, physical distancing, and multi-layered mitigations in schools.

Mask use remained low in classrooms in England, with secondary school headteachers reporting only 32% of secondary school children wearing masks in classrooms in December 2021.[49] In January 2022, nearly two years into the pandemic, UKHSA and DfE[62] acknowledged the large and accumulating body of observational evidence showing that masks were effective in reducing transmission, including in school.[63-66] However, their evaluation of risks and benefits of mask wearing continued to be skewed in England, where masks were re-introduced only in secondary schools and for just 3 weeks during the omicron wave (Table 1). Far more weight was given to limited DfE surveys showing that although secondary school age children understood the need for masks, a significant proportion reported difficulty with communication.[62] These negative impacts of masks were presented, without acknowledging or modelling the additional educational benefits a child would have if masking reduced the high number of school days lost as a result of covid-19 infections (including staff absences, and impacts from long COVID).

By contrast, the Scottish working group highlighted strong support among young people for mask wearing, and identified no negative impacts of face coverings in their qualitative research.[67] In Scotland mask wearing was recommended in secondary schools for a much longer period than in England. However, for significant periods, it was recommended in communal areas only rather than classrooms (Table 1) and was never recommended for primary school children.

According to the U.S. Centers for Disease Control and Prevention, limited available data indicates "no clear evidence that masking impairs emotional or language development in children." Another study examining 7-13 year olds showed that while there may be some loss of emotional information due to mask wearing, children can still infer emotions from faces, and likely use many other cues to make these inferences, and that mask wearing unlikely to have any major impact on social interactions of children in their daily lives.[68-70] The impact of masking on particular groups (e.g. hearing impaired, special needs), and very young children (e.g. toddlers) was rightly acknowledged but the evidence from around the world that millions of children without such characteristics are routinely masked in class without an adverse impact on their wellbeing or learning was ignored.

In setting UK policy on masking in schools, a great deal of emphasis was placed on a small, highly flawed and non-peer-reviewed study which the DfE conducted over a two-week period in October 2021.[62] This study was underpowered and had too short a follow-up period to test the effectiveness of masking. It did not distinguish between mask wearing in classrooms and masking only in communal areas, and no participants were masked during lunch breaks. The negative finding (no statistically significant difference between masked and unmasked arms) was interpreted as evidence that the effectiveness of mask wearing was limited or inconclusive. [62,71,72] The report failed to fully acknowledge the limitations of the study design and largely ignored the breadth of global evidence which had demonstrated a significant positive impact of masking on school-based transmission.[20,64,65]

Because masking in schools was undervalued and downplayed, very little attention was paid to the type or quality of mask that might be worn by children, or when masking might be particularly effective (or ineffective). Whereas cloth and medical masks protect others against droplet emission by the wearer, a well-fitting, high-grade ('respirator') mask protects the wearer against virus in the air, hence may have an important role in protecting clinically vulnerable children (or children with clinically vulnerable household contacts) even when others in the classroom are unmasked. When children are working silently in a classroom, the emission of viral-laden aerosols is low, but exercise (especially prolonged and strenuous) and vocalisation (especially singing) greatly increases such emission. The removal of masks for indoor physical education, singing and communal assemblies makes no scientific sense but was rarely flagged as high-risk practice.

Why was so little attention paid to testing and support for isolating?

Given the importance of pre-symptomatic transmission, and the high levels of asymptomatic infection in children, rapid, frequent testing was an important measure to reduce spread. However, many parents caring for children at home faced potentially unaffordable costs as there was limited financial[73] and practical support for isolation, providing little incentive for voluntary routine testing. The initial roll out of asymptomatic testing was very poorly planned with little involvement of key stakeholders.[74] Uptake of testing reduced steadily to only 21% of secondary school children registering tests in May/June '21.[75] Testing was never made available to primary school children, unlike in other European countries (e.g. Austria), where accessible testing (e.g. saliva tests) for young children was prioritised. Free testing even for secondary school age children ended in April 2022.

Why was vaccination offered late to children and considered low-priority?

The flawed narrative that children were not very impacted by COVID-19 led to delays in vaccination offered to children in the UK compared with other countries. When the minutes of JCVI meetings were released belatedly in November 2021,[76] they revealed that the modelling by PHE and Warwick university had suggested a substantial benefit of vaccinating these age groups but the committee chose not to recommend them. By the time children were offered vaccination in several age groups, a substantial proportion of children had been infected. This also led to the idea that vaccination was low-priority, and infection was desirable to develop natural immunity in children, and 'boost' parents. None of this appears

to have been evidenced in the literature. Even UKHSA's own work has shown that not only do children sero-revert rapidly,[33] but infection even within 3 months is not uncommon in children.[77] Not only has global evidence suggested that children have lower levels, and faster waning of antibodies compared with adults, [77,78,34,79] but recent evidence also suggests that vaccine elicited neutralising antibody titres are higher than infection-acquired immunity in children.[80]

While underplaying the benefits of vaccination, minutes suggest that JCVI gave much more weight to the potential long-term effects of the vaccine than to the known acute and potential long term effects of infection, with the latter known to be more common and concerning than any adverse events from the vaccine even at the time of these meetings. Long Covid does not appear to have been considered at all beyond a short mention of the uncertainty around this syndrome.[76] Further the JCVI, in contrast to other countries, recommended a 12-week wait between doses for adolescents, and the same wait between infection and dosing, which meant substantial delays in vaccination for many children who were infected before, or during the vaccination schedule. These JCVI positions and recommendations went against the extant evidence and the policies and recommendations of many other countries and organisations.[81-84]

As most countries move to providing 3rd doses to children, the UK remains well behind, with no discussions around boosters for under 16s or vaccination for children under 5. Vaccine uptake remains very low (lower than the European average) among children.

Why was more not done to support learning?

It is widely agreed that headteachers and their staff worked tirelessly to provide as much support for their pupils as possible. However, as with the NHS which entered the pandemic greatly weakened by a decade of austerity, they were struggling to cope. The government's scheme to purchase laptops for schools, as with so many of its procurement exercises during the pandemic, fell far short of what was promised.[85] Lack of appropriate remote schooling provision and technological barriers affected children unequally.[86] The most deprived students and students in state schools and colleges were less likely to experience online learning and have interactions with teachers, students and peers than less deprived students and students in independent schools.[86] Inequalities in loss of learning in reading and numeracy predictably continued well into 2021 due to lack of support, particularly for disadvantaged students. Stripping back of catch-up funding for children has left schools, children and families struggling as the vast majority of primary headteachers report lack of funding.[87] Despite repeated recommendations by the SPI-B committee advising government to engage with key communities and stakeholders, little was done to address this.

Broader issues

We have catalogued a series of areas in which the response by governments at Westminster and in the devolved nations let children down. We trust that the Public Inquiry will examine these in more detail to inform the specific lessons that arise, some of which, such as those related to air quality, are covered in more detail in other papers in this series. However, there are some broader issues that must be examined.

First, why was there a failure to recognise the spectrum of problems faced by children? No-one disputes that keeping schools open should be a high priority, but they should be safe, with measures to minimise transmission among children and to their families. Some children did die and others have been left severely disabled. Others have been orphaned. For those affected, this is a high cost to bear.

Second, why was serious illness and death of children so easily dismissed? Of course these severe outcomes were much less frequent than in older people but this is the wrong comparison. Cancer in children is also rare but that does not mean it can be ignored. The appropriate comparison is with other childhood illnesses.

Third, why was so much of the evidence that was generated and used so problematic. Many of the studies that should have been able to inform policy were poorly designed and inadequate to answer the question posed. Key reviews misinterpreted some of the evidence examined.

Above all, what was it about the decision-making process in the United Kingdom that, while claiming to act in the best interests of children, let them down so badly? As has been described elsewhere, the delayed decision in recommending vaccination for children and younger people defied logic.[84] However, in many cases it seems that there was a failure to update guidance on, for example, school transmission, efficacy of masks, importance of airborne spread or the direct impact on children. The debate on children and covid has become particularly polarised (Wang et al., unpublished) but it is possible that structured and predetermined processes to review evidence, both domestic and international, might have facilitated translation of evidence into policy, and incorporated learning from mistakes into future policy-making.

Competing Interests

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Authors' contributions

DG wrote the first draft. CP, TG, SM, GS, MM, KY, HZ and AM contributed to re-structuring, re-writing, editing and shaping the manuscript.

Figure 1

Infection prevalence of SARS-CoV-2 (ONS Infection Survey) – regular testing from March 2021 to February 2022

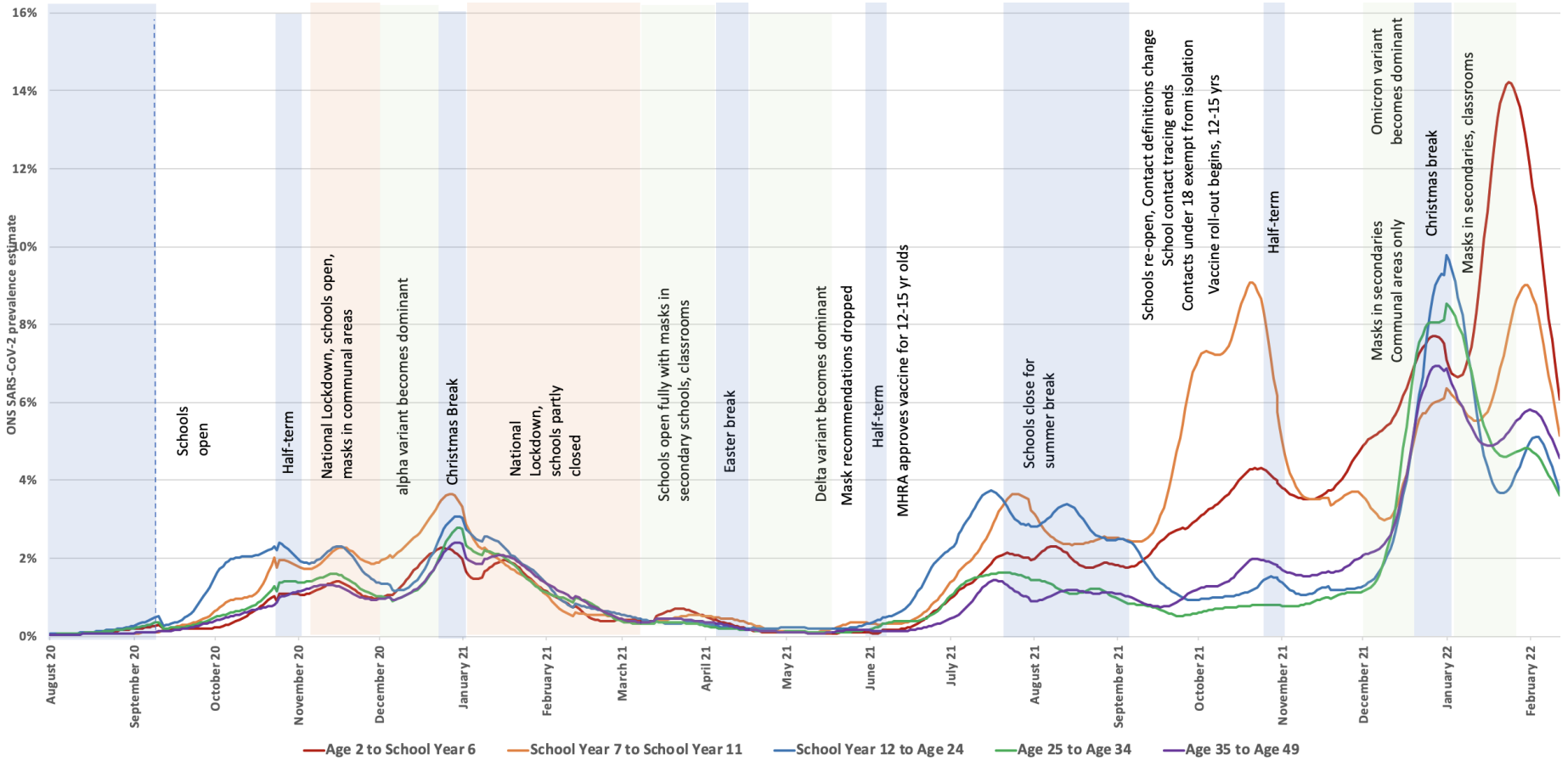

Figure 1 represents SARS-CoV-2 positivity (prevalence) as per the ONS Infections survey. Data for above 50 years not shown for ease of readability, but prevalence was lower than school age children consistently throughout. Blue highlighted regions show periods of school closure. Green highlighted areas show periods during which masks were required in school either in communal areas or classrooms. Orange highlighted areas show periods of lockdown

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