

## MEDICINE AND SOCIETY

Debra Malina, Ph.D., *Editor***Reopening Primary Schools during the Pandemic**

Meira Levinson, D.Phil., Muge Cevik, M.D., and Marc Lipsitch, D.Phil.

For the past 6 months, policymakers and the U.S. public have weighed economic against public health considerations in debating what limits to set on individual and collective behaviors in attempting to control the Covid-19 pandemic. As fall approaches, attention has turned to a third pillar of a pandemic-resilient society: schools.<sup>1</sup> Under ordinary circumstances, about 40 million children would be entering prekindergarten through 8th-grade classrooms this year, including nearly 27 million students in grades pre-K through 5.<sup>2,3</sup> Until these children physically return to school full time, many will lose out on essential educational, social, and developmental benefits; neither the economy nor the health care system will be able to return to full strength given parents' caretaking responsibilities<sup>4</sup>; and profound racial and socioeconomic injustices will be further exacerbated.<sup>5</sup> We believe that safely reopening schools full-time for all elementary school children should therefore be a top national priority.

Many parents and educators are reasonably concerned, however, about whether any large-scale reopening plan can ensure safety for students, school staff, and household members, given high levels of community transmission in many U.S. regions.<sup>6</sup> Contagion is a particular concern in schools that serve predominantly low-income communities of color, given that such schools are often overcrowded and understaffed and that the families whose children attend them are at especially high risk from Covid-19.<sup>7-10</sup> It would be best — and evidence from many countries demonstrates that it's possible — to lower community transmission rates by means of stringent control measures this summer so that schools can reopen this fall with an acceptable level of safety.<sup>11</sup> Even under conditions of moderate transmission (<10 cases per 100,000 people),<sup>12</sup> however, we believe that primary schools should be recognized as essential services — and school

personnel as essential workers — and that school reopening plans should be developed and financed accordingly. (We also believe that fully reopening schools for middle and high school students should be a national priority, but given the more challenging transmission dynamics at older ages, we confine ourselves here to elementary schools.)

**WHY IN-PERSON SCHOOLING MATTERS**

Children miss out on essential academic and social-emotional learning, formative relationships with peers and adults, opportunities for play, and other developmental necessities when they are kept at home. Children living in poverty, children of color, English language learners, children with diagnosed disabilities, and young children face especially severe losses.<sup>1,13</sup>

Moreover, schools provide numerous additional in-person benefits. School-provided social welfare services support the health of U.S. communities made vulnerable by systemic racism, inadequate insurance, family instability, environmental toxicity, and poorly paid jobs.<sup>1</sup> More than 50% of all U.S. school-age children rely on their schools for free or reduced-price daily meals. Despite efforts by school districts to maintain these services even when school was conducted remotely, a majority of children have been unable to access the full nutritional benefits to which they're entitled.<sup>5</sup> Schools also provide physical, mental health, and therapeutic services to millions of students per year. Many of these services have proved inaccessible to children — particularly low-income children of color and children with noncitizen family members — when schools are physically closed.<sup>1</sup> Finally, safe and consistently open schools are essential for many parents and guardians (particularly women) to be able to reenter the workforce — including the health care sector.<sup>4,14</sup>

In light of these concerns, some school districts are developing hybrid learning plans for the fall that would bring alternating groups of students back into school buildings under conditions of strict social distancing.<sup>15</sup> Although some in-person schooling is preferable to none, for primary schools in particular these plans may achieve few gains over completely remote learning. Millions of children will remain excluded from learning on the days when they're assigned to virtual school, owing to digital access challenges, developmental inappropriateness, or lack of real-time adult support.<sup>16</sup> Such plans also fail to solve child-care challenges, since children will still be out of school for substantial periods. These challenges may be particularly acute for educators who are parents themselves, for other workers who lack flexibility in determining when or where they work, and for parents with multiple children on misaligned attendance schedules.

Furthermore, even when they are in the building, teachers may struggle to teach and students may struggle to learn under rigorous social distancing conditions. Young children cannot reliably maintain physical distance, and teachers cannot simultaneously enforce distancing and teach. In-person classes that require students to look straight ahead and work independently (as many proposals for distanced classrooms recommend) violate evidence-based good teaching practices.<sup>17</sup> High-quality learning is inherently relational and social, not individual and teacher-centered. Teachers also rely on physical proximity to build positive relationships with students and manage their classrooms; such tasks may be impossible if teachers are rigidly separated from students.

We therefore need to prioritize both the complete physical reopening of schools and safety protocols that are aligned with children's developmental needs and teachers' pedagogical and supervisory capacities.

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#### CLINICAL AND EPIDEMIOLOGIC PERSPECTIVES

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From a clinical standpoint, most children 1 to 18 years old experience mild or no illness from Covid-19 and are much less likely than adults to face severe consequences from the infection.<sup>18</sup> Although a small number of children worldwide have been hospitalized with multisystem inflammatory syndrome in children (MIS-C) after SARS-

CoV-2 infection, so far this appears to be a rare syndrome (affecting a reported 2 per 100,000 people under 21 years of age between March 1 and May 10, 2020<sup>19</sup>), and with early recognition and treatment, clinical outcomes in the short term have been good.<sup>19-21</sup> In contrast, adults, especially those who are over 60 or have underlying health conditions, are at higher risk for severe illness, hospitalization, and poor outcomes.<sup>18</sup>

Limited emerging evidence suggests that susceptibility to infection also generally increases with age.<sup>22</sup> Given the same exposure to infected household members, children under the age of 10 seem to become infected less frequently than adults and older adolescents; studies of both household and community transmission find that children 9 or younger are also less susceptible than 10-to-14-year-olds.<sup>22</sup> At the other end of the spectrum, adults over 60 have higher susceptibility to infection even than middle-aged adults.<sup>22</sup>

Age-related differences in infectivity are less clear. Findings from a few contact-tracing studies suggest that children may be less infectious than adults,<sup>22</sup> but the strength of this evidence is weak and some of the relevant studies were conducted when schools were closed. A recent study from South Korea of both household and non-household contacts suggests that infected children under 10 years of age are less contagious than infected adults.<sup>23</sup> The direction of transmission was not rigorously documented in the study, however, and even young children can probably still transmit the virus to others.

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#### EVIDENCE FROM THE FIELD

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These findings align with data on school and community transmission from countries that have reopened schools (or never closed them). Covid-19 outbreaks in high schools in France, Israel, and New Zealand did not extend to nearby elementary schools, which suggests that susceptibility, infectiousness, or both are lower among younger children. When schools in the Netherlands opened in April, they cut class sizes in half but did not enforce distancing among students younger than 12 — a loosening of restrictions that has now been extended to everyone under 17.<sup>11</sup> Primary schools in the Netherlands returned to full capacity and full-day teaching in early June. Though both staff and children who are high-risk or have high-risk family members have been exempted from returning to

school in person, most children and educators have returned and the case rate has thus far remained flat.

Case numbers have continued to decrease in Denmark, which reopened elementary schools in April and middle and high schools in May, albeit under strict social distancing rules. Nor have school reopenings led to increased case counts in Finland, Belgium, Austria, Taiwan, or Singapore, although, again, schools in these countries have taken substantial extra precautions and are only slowly lifting restrictions on activities and group size. Israel offers a cautionary counterexample, since a recent case resurgence there may be linked to early high school reopenings in May, with crowded classrooms and minimal precautions in place; a clear causal role for schools in this resurgence, however, has not been demonstrated.<sup>11</sup>

Notably, most locations (except Israel) whose schools are open had already achieved low community transmission rates (<1 new case per day per 100,000 people) and have remained focused on maintaining population-level infection control.<sup>24</sup> Scotland, for instance, is planning for all students' full-time return to classes in August, conditional on infection rates remaining sufficiently low, public health and testing systems being in place, and protective measures and risk assessments being implemented in schools. Taiwan successfully kept schools open throughout the pandemic by keeping infection rates at negligible levels, and the Netherlands has been successful with no masking or social distancing among children, presumably partly because of low community transmission rates.<sup>11</sup>

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IMPLICATIONS FOR U.S. POLICY

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The safest way to open schools fully is to reduce or eliminate community transmission while ramping up testing and surveillance. Adults would need to maintain social distance from each other and engage in other measures to reduce adult-to-adult transmission: for example, wearing personal protective equipment (PPE), closing school buildings to all nonstaff adults, and holding digital faculty meetings. These precautions are especially important insofar as 17.5% of teachers are 55 or older.<sup>25</sup> But we believe that schools in low-transmission settings could probably provide pedagogically sound and socioemotionally appropriate instruction to all students, in per-

son, in ways that do not put educators or families at undue risk.<sup>26</sup>

Any region experiencing moderate, high, or increasing levels of community transmission should do everything possible to lower transmission. The path to low transmission in other countries has included adherence to stringent community control measures — including closure of nonessential indoor work and recreational spaces.<sup>11</sup> Such measures along with universal mask wearing must be implemented now in the United States if we are to bring case numbers down to safe levels for elementary schools to reopen this fall nationwide.

Epidemiologic evidence suggests that death rates can be lowered by 90% within 9 to 11 weeks after stringent control measures begin (see the Supplementary Appendix, available with the full text of this article at NEJM.org). Given the lag between new infections and deaths, an equivalent effect on new infections should be apparent in less than 2 months. If such measures were adopted now, transmission in many states could probably be reduced to safe levels for mid-September or early-October school reopenings. Many school districts would be able to open even sooner — although large improvements in testing volume and speed of reporting would be needed to enable appropriate levels of community surveillance.

Districts and states that refuse to implement these essential public health measures, on the other hand, face a profound social and moral dilemma: namely, how to weigh the known risks to children, families, and society of closing school buildings or operating at reduced capacity against the unknown risks (especially to school personnel and to educators' and children's household members) of opening schools when the virus is still circulating at moderate or high levels.<sup>27,28</sup> This dilemma is exacerbated by school segregation and racial and class injustice: reopening schools that serve poorer and predominantly minority populations poses the greatest risk to families' and educators' safety — but their ongoing closure also imposes the greatest harms on children and families.<sup>14</sup>

Many families — particularly those with medically vulnerable household members — will choose to keep their children home under these circumstances regardless of whether schools are physically open.<sup>29</sup> We understand this risk calculus. Remote teaching and other school services

(including meal provision and medical and therapeutic services) should be available to all families who choose this option, with designated educators being responsible solely for remote teaching.

But educators and other school personnel cannot necessarily dictate the place or terms of their employment, even (perhaps especially) when the social compact has broken down. It is tragic that the United States has chosen a path necessitating a trade-off between risks to educators and harms to students, given other countries' success in reducing transmission and opening schools with routine control measures in place. This dilemma represents a social and policy failure, not a medical or scientific necessity.

Nonetheless, we would argue that primary schools are essential — more like grocery stores, doctors' offices, and food manufacturers than like retail establishments, movie theaters, and bars. Like all essential workers, teachers and other school personnel deserve substantial protections, as well as hazard pay. Remote working accommodations should be made if possible for staff members who are over 60 or have underlying health conditions.<sup>5,18</sup> Adults who work in school buildings (or drive school buses) should be provided with PPE, and both students and staff should participate in routine pooled testing.<sup>30</sup>

Schools' social and physical infrastructure will also need to be modified. Students and teachers may need to eat lunch in their classrooms, and staff rooms may need to be closed to discourage adult congregation.<sup>31</sup> Crowded buildings or open-plan layouts may make it impossible for adults to maintain distance from one another<sup>32</sup>; in such cases, schools may benefit from spreading out or relocating to local middle or high schools, unused college classrooms, community centers, houses of worship, or businesses whose employees are working remotely.<sup>11,12</sup> Such shifts will not be easy. Spaces and furniture will need to be retrofitted for younger children; kindergartners will need easy access to appropriate bathroom facilities; and schedules may need to be redesigned to accommodate special-education providers and specialty teachers so they can access children and classrooms at appropriate times.

Even if schools can make creative short-term use of additional space, thousands of schools — particularly those serving low-income students of color — will require significant federally funded upgrades to improve ventilation, sanitat-

ion, nurse's offices, and hand-washing and bathroom facilities.<sup>33</sup> These improvements have long been needed regardless of Covid-19; they are essential investments in educational equity and opportunity.

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## CONCLUSIONS

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Whether (and how) to reopen primary schools is not just a scientific and technocratic question. It is also an emotional and moral one. Our sense of responsibility toward children — at the very least, to protect them from the vicissitudes of life, including the poor decision making of adults who allow deadly infections to spiral out of control — is core to our humanity. Our expectations of school personnel are equally emotionally and morally fraught. It is not incidental that the majority of primary school teachers are undercompensated women who are expected to sacrifice themselves “for the sake of the children.” School closures have also brought social, economic, and racial injustice into sharp relief, with historically marginalized children and families — and the educators who serve them — suffering the most and being offered the least. For all these reasons, decisions about school reopenings will remain complex and contested.

But the fundamental argument that children, families, educators, and society deserve to have safe and reliable primary schools should not be controversial. If we all agree on that principle, then it is inexcusable to open nonessential services for adults this summer if it forces students to remain at home even part-time this fall.

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From the Harvard Graduate School of Education, Cambridge (M. Levinson), and the Center for Communicable Disease Dynamics, Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston (M. Lipsitch) — both in Massachusetts; and the Division of Infection and Global Health Research, School of Medicine, University of St. Andrews, Fife, United Kingdom (M.C.).

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## Considering inequalities in the school closure response to COVID-19

As COVID-19 is declared a pandemic and several countries declare nationwide school closures, these measures are affecting hundreds of millions of children.<sup>1</sup> More countries are entering delay and mitigation phases of pandemic control, with an urgent need for proactive and multifaceted responses addressing children's social, economic, and health needs to avoid widening disparities and honour commitments to the UN Convention on Child Rights and Sustainable Development Goals.<sup>2</sup>

Children have milder symptoms of COVID-19, and their role in transmitting the disease remains unclear.<sup>3</sup> While governments can implement proactive school closures to slow transmission (delay phase), reduce burden on health care, or protect at-risk populations (mitigate phase), both the benefits for transmission and the adverse community effects should be considered.<sup>3</sup>

School closures impede learning and compound inequities, disproportionately affecting disadvantaged children.<sup>3</sup> School closures during the 2014–16 Ebola epidemic increased dropouts, child labour, violence against children, teen pregnancies, and persisting socioeconomic and gender disparities.<sup>4</sup> Access to distance learning through digital technologies is highly unequal, and subsidised meal programmes, vaccination clinics, and school nurses are essential to child health care, especially for marginalised communities. Schools provide safeguarding and supervision, and closures increase the economic burden of families using day care or their reliance on vulnerable older relatives. Working parents might leave children unsupervised or forgo employment to stay at home with them.

The case for school closures is far from compelling. The UK's Influenza Pandemic Preparedness Strategy acknowledges that "the benefit of school closure in reducing clinically important outcomes needs to be balanced against secondary adverse effects."<sup>5</sup> This position aligns with the WHO–UNICEF–Lancet Commission's emphasis on addressing health, social, and educational factors so that children "survive and thrive".<sup>2</sup>

School closure measures should consider epidemiological evidence and avoid exacerbating inequities, providing learning without digital technologies, childcare alternatives, and health care, including nutritional programmes. Authorities should implement strategies to reduce transmission within schools before or instead of closures,<sup>3</sup> including smaller class sizes, physical distancing, and hygiene and sanitation promotion. Countries in the initial stages of mitigation measures have an opportunity to be leaders in best practice, prioritising young people and establishing strategies to proactively ensure that children are at the centre of future responses.

We call for transparent public discussion and research, incorporating the voices of children and their families on the feasibility, acceptability, and impact of closures to inform both our response now and future pandemic planning. We ask whether adequate evidence exists of transmission reduction due to school closures to outweigh the long-term risks of deepening social, economic, and health inequities for children. We must strike a balance, protecting those most at risk without sacrificing the next generation's future.

We declare no competing interests.

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\*Richard Armitage, Laura B Nellums  
msxra37@nottingham.ac.uk

Division of Epidemiology and Public Health,  
University of Nottingham, Nottingham NG7 2RD,  
UK

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> *Acta Paediatr.* 2020 Aug;109(8):1525-1530. doi: 10.1111/apa.15371. Epub 2020 Jun 17.

## Children are unlikely to be the main drivers of the COVID-19 pandemic – A systematic review

Jonas F Ludvigsson <sup>1 2 3 4</sup>

## Affiliations

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### Abstract

**Aim:** Many countries have closed schools and kindergartens to minimise COVID-19, but the role that children play in disease transmission is unclear.

**Methods:** A systematic literature review of the MEDLINE and EMBASE databases and medRxiv/bioRxiv preprint servers to 11 May 2020 identified published and unpublished papers on COVID-19 transmission by children.

**Results:** We identified 700 scientific papers and letters and 47 full texts were studied in detail. Children accounted for a small fraction of COVID-19 cases and mostly had social contacts with peers or parents, rather than older people at risk of severe disease. Data on viral loads were scarce, but indicated that children may have lower levels than adults, partly because they often have fewer symptoms, and this should decrease the transmission risk. Household transmission studies showed that children were rarely the index case and case studies suggested that children with COVID-19 seldom caused outbreaks. However, it is highly likely that children can transmit the SARS-COV-2 virus, which causes COVID-19, and even asymptomatic children can have viral loads.

**Conclusion:** Children are unlikely to be the main drivers of the pandemic. Opening up schools and kindergartens is unlikely to impact COVID-19 mortality rates in older people.

**Keywords:** COVID-19; children; coronavirus; pandemic; transmission.

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