VIEWPOINT

School Closure During the Coronavirus Disease 2019 (COVID-19) Pandemic

An Effective Intervention at the Global Level?

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Viewpoint and Editorial

In most countries, attempts to reduce severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) circulation and new coronavirus disease 2019 (COVID-19) development have been mainly based on restrictive measures, including the avoidance of social interactions, the prohibition of movements within the national territory, and the closure of all nonessential activities, including schools. While the closure of factories and the avoidance of other social interaction together with proper hand washing remain the best measures to reduce the total burden of COVID-19, the usefulness of school closure can be debated.

It is highly likely that the most important reason leading governments to close schools was the evidence that the early introduction of this restrictive measure had been effective in reducing influenza incidence rates and related clinical, social, and economic problems during both seasonal and pandemic influenza outbreaks.[1] However, it is not at all certain that the same advantages can be expected in the case of the COVID-19 pandemic. It is even possible that school closure may have negative effects and lead to greater medical, economic, and social problems. Modeling studies seem to indicate that school closure can be significantly effective for infection control only when the outbreaks are due to viruses with low transmissibility and attack rates are higher in children than in adults. This applies to influenza viruses and influenza infection but does not seem valid for coronaviruses, including SARS-CoV-2, which have different transmission dynamics, or for COVID-19, which affects mainly adults and elderly individuals. It has been calculated that the expected number of cases directly generated by 1 case of SARS-CoV-2 infection (R_O) is high and not lower than 2.5.[2] Moreover, children younger than 10 years account for only 1% of COVID-19 cases,[3] and although a certain number of them can experience an asymptomatic infection, the total number of children with SARS-CoV-2 infection seems lower than expected. Although no official data are available, to our knowledge, on the effectiveness of school closure during the COVID-19 epidemic, the poor relevance of this restrictive measure seems confirmed by the evidence that in Taiwan, the spread of COVID-19 was minimized without widespread planned school closures.[4] On the other hand, using UK population and school data together with data on SARS-CoV-2 transmission dynamics calculated in the early COVID-19 pandemic in China, it was predicted that school closure would be insufficient to mitigate the pandemic. Finally, the poor effect of school closure during coronavirus epidemics has already been evidenced in some studies carried out during the SARS epidemic. In China, it was found that school closure for 2 months was not significantly effective for disease prevention mainly because of the very low incidence of symptomatic disease among school-aged children.[5] Moreover, in Taiwan, it was evidenced that the risk of transmission of infection among children in a classroom was very low, with an R_O less than 1, clearly highlighting that school closure could be only marginally effective.[4] In a 2020 systematic review, Viner et al[6] showed that there are no data on the relative contribution of school closures to SARS-CoV-2 transmission control. Data from the SARS outbreak in mainland China, Hong Kong, and Singapore suggest that school closures did not contribute to the control of the epidemic. Recent modeling studies of COVID-19 from the United Kingdom using data from the Wuhan province, China, outbreak predicted that school closures alone would prevent only 2% to 4% of deaths, much less than other social distancing interventions.[7]

While the efficacy of school closure is debatable, the potential negative consequences of this measure cannot be ignored. Some consequences regard the family. To take care of the youngest children when daycares and schools are closed, parents must remain at home, with inevitable economic consequences. In addition, when parents are health care workers, this can have relevant medical effects. In the US, it has been calculated that the absence from work of 15% of health care workers may be associated with a significant increase in COVID-19 mortality.[8] If parents must work and grandparents must become the primary caretakers of children, the risk significantly increases that these persons, who are per se at the greatest risk of serious illness, may become infected, and this is what happened in Italy in the first 2 weeks when school closure was decided but other work activities were not stopped. Moreover, school closure can cause risks of deepening social, economic, and health inequities, particularly in limited-income countries. In the countries where the Ebola epidemic took place in 2014 to 2016, school closure was associated with increased child labor, violence, and socioeconomic problems.[8] Finally, the distance learning through digital technologies that has been planned by several countries to replace traditional school can be difficult to implement even in some industrialized countries. In Italy, a 2015 survey carried out by the National Institute of Statistics[9] showed that in the poorest areas of the country, 41% of the households did not have a tablet or a personal computer and that among families with at least 1 child, only 14.3% could guarantee distance learning. This means that a relevant group of children may remain substantially excluded not only from learning but also from any form of socialization with peers and with the surrounding world.

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All these limitations explain why some experts suggest that the potential advantages of school closure, if any, have to be balanced against the secondary adverse effects. Instead of total school closure, alternative strategies to contain transmission, such as reducing class size, physical distancing, and hygiene promotion, could be implemented.

Another important but unsolved problem strictly related to school closure is how and when school can be reopened. During influenza outbreaks, reopening has been associated with the risk of epidemic resurgence. The best solution for the COVID-19 pandemic is not known. It has been suggested that children who test positive on serologic tests that identify IgG against SARS-CoV-2 could be admitted to school. It is supposed that positivity could allow the identification of children who have already been infected, can be considered protected, and can attend school without posing risks per se to other children. However, the use of this procedure can be strongly criticized. The sensitivity of the presently available antibody tests is suboptimal. Most children have an asymptomatic infection, and as the immune response to SARS-CoV-2 infection has been found to be greater the more serious the disease is, it seems likely that most children will have a low antibody titer that is inadequate for obtaining positivity on tests with relatively low sensitivity.[10] Moreover, even when IgG levels are measured, it is not possible to state whether children are protected or how long the protection may last. The antibody protective level and secondary immune response to SARS-CoV-2 are not known. Taken together, these factors seem to indicate that most children with IgG positivity cannot be identified and, even if identified, cannot be considered protected for the long term. Other criteria, such as a systematic adoption of face masks with some lessons on this issue and on all hygiene measures for COVID-19 prevention, screening with temperature measurements, or closing classrooms with infected students, must be followed when school is resumed.

ARTICLE INFORMATION

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