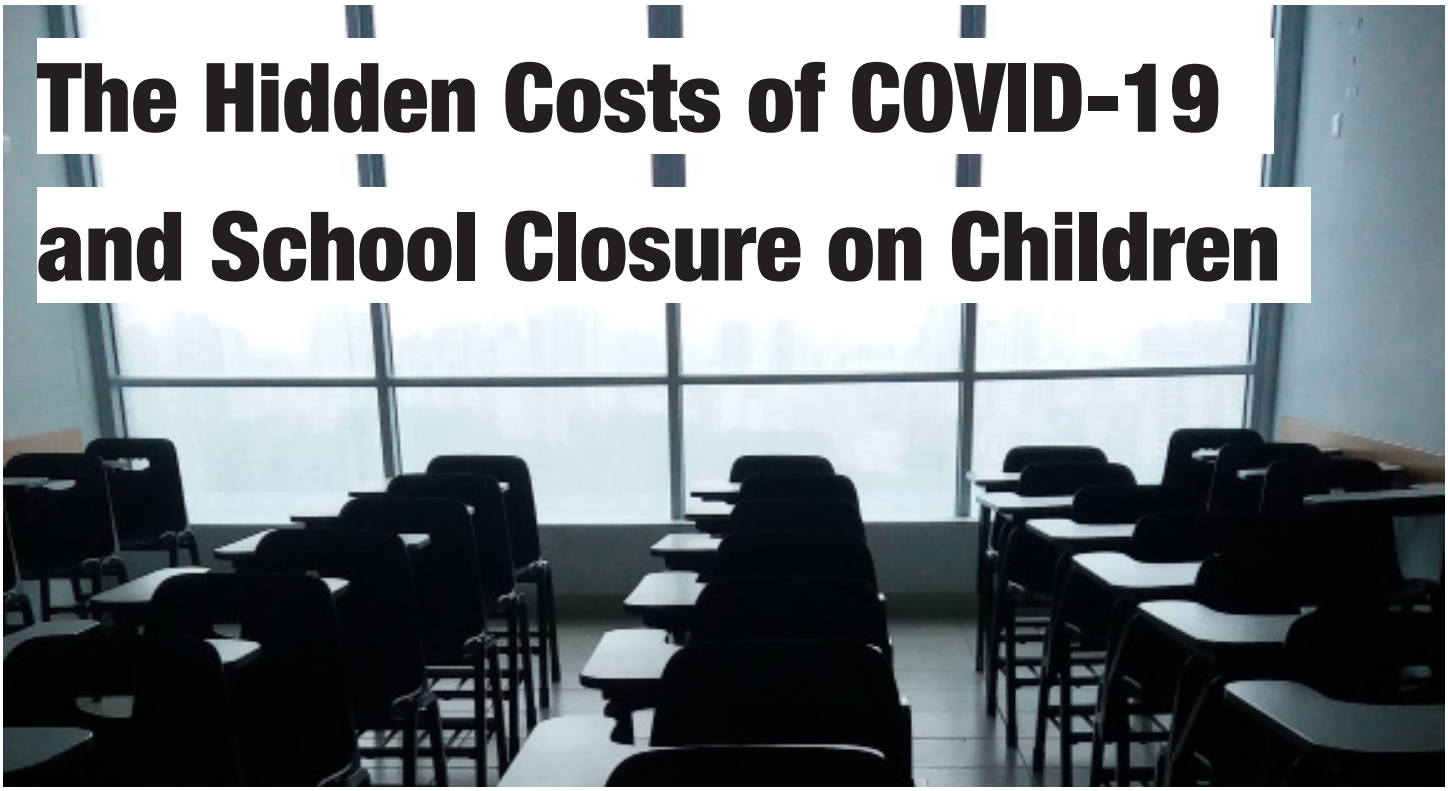
The Hidden Costs of COVID-19 and School Closure on Children



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An initial public health measure enacted in response to the COVID-19 pandemic was the closure of schools.[1] This action was motivated by previous observations regarding school closure and prevention of pandemic flu transmission.[2,3] In response to periodic school closure, many schools in Ontario have adopted a hybrid model of schooling with both in-person and remote learning. However, due to the emerging SARS-CoV-2 variants, considerable concern has been raised regarding in-person learning.[4,5] This is an important discussion to have as additional variants and waves are likely to arise, and school closure poses a substantial burden to the well-being of children —especially those from marginalized populations.

Schools are essential to the well-being of children. From all of the socioeconomic status (SES) measures, education has been the strongest predictor of future health.[6] Educational attainment has even been implicated in the risk of Alzheimer's disease.[7] But schools are not only a source of education, they allow for social interventions as well. One essential social intervention is lunch programs. Many countries provide free meals which are crucial for addressing food insecurities in children living in poverty.[8] When schools were closed, many of these programs ceased.[9] The lack of these services in combination with economic hardship and unemployment has exacerbated food insecurities in vulnerable children.[10] Furthermore, school is an important component of a child's social ecology (i.e. the social milieu in which a child is raised).[11] Without adequate schooling, a child is devoid of the positive impacts of both the educational and social aspects of school. This has already manifested in meaningful mental health consequences in children; wherein, increasing levels of anxiety and depression have been found in children during the lockdown.[12] School closure has further been

associated with increasing amounts of domestic violence.[13] When schools are open, they provide a safe harbour for vulnerable children and mediate the trauma and sequela of domestic violence; their closure deteriorates the quality of life of already vulnerable children.[14] Children with disabilities are additionally impacted by school closure. Such children are reliant on educational and rehabilitation programs to ensure their physical and mental health needs are cared for. Consequently, school closure creates additional mental and physical health challenges for both these children as well as their caregivers.[15,16] Therefore, the benefits of school closure in reducing SARS-CoV-2 transmission needs to markedly outweigh the harms school closure will have on child well-being.

In determining whether to close schools, those making such decisions should consider the specific impact that SARS-CoV-2 has on the health of children and the degree of its transmission in schools. Individual school data should ideally inform such a decision, however, a generalized approach may be helpful as well. Relative to adults, a smaller percentage of reported SARS-CoV-2 infections appear to occur in individuals under 18 years of age. According to data collected by Health Canada as of January 29, 2021, 16.8% of COVID-19 cases are in those who are 19 and under. From these, 1.5% were hospitalized, 1.3% were admitted to ICU, and there have been 4 reported deaths (0.0%).[17] The European Union (EU), provides additional information regarding the distribution of cases in those under 19 years of age vis-à-vis the European Surveillance System (TESSy).[1] According to the TESSy database, children aged 1-11 are under-represented among COVID-19 cases in the general population. Concerning school transmission of COVID-19, the TESSy database can be of further use. Clusters of COVID-19 cases have been reported, largely, in secondary schools, but also primary and preschools. Notwithstanding, it is currently not possible to determine if these cases were a consequence of school or community spread; more robust tracking is required. When reviewing further literature, the evidence suggests that school-based SARS-CoV-2 transmission is rare —although a major limitation of this research is a lack of asymptomatic testing.[18] It is additionally important to consider the risk for teachers in working in an in-person environment. Fortunately, current literature does not suggest educational workers are at an increased risk for being diagnosed with COVID-19.[18] In general, it appears schools minimally contribute to SARS-CoV-2 transmission and even though there is correlational data suggesting school closure may prevent community spread, this research is limited by the co-occurrence of additional public health measures with school closures.[18]

There are many non-pharmaceutical interventions (NPI) that have been suggested and implemented to reduce the spread of SAR-CoV-2.[18] Such interventions which can and have been implemented include limiting classroom size, peer-to-peer distancing and peer-to-teacher distancing, hybrid curricula, utilizing cohorts, staggered arrival times, cancellation of certain crowding activities, etc. (this list is not exhaustive). Unfortunately, there is little evidence to support the effectiveness of such initiatives in school; though the studies which do exist appear to suggest reduced transmission.[18] To address this lack of data, schools should start implementing standardized and rigorous data collection processes. Screening, testing, and contact tracing need to be recorded in a standardized matter. To this end, the development of software to aid in the collection and analysis of data would be invaluable. This software could connect schools and serve as means for schools to coordinate. Schools or public health officers could use this data to understand the impact of various NPI strategies on transmission and implement iterative new strategies to deter transmission. Deep learning software could be further adopted to help make better predictive models of transmission which could assist in advising and perhaps even predicting whether an individual school should be closed. This information tracking system would be essential to help governments and physicians to act appropriately and make informed decisions in response to future outbreaks and variants.

Schools are an essential resource for children and their closure, in reaction to possible futures waves and variants, needs to be carefully considered. Governments and physicians and other stakeholders need to collaborate to identify creative and effective solutions in reducing transmission of SARS-Cov-2 transmission and safeguarding school operations. We further need to implement processes of data collection regarding school transmission to help better inform future decision-making.

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