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"Putting Kids First: Addressing COVID-19's Impacts on Children"
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**The Risks to Children from COVID-19 and the Disproportionate Price they have Paid**

I am a Danish American and have observed over the last year and a half strikingly different strategies between Denmark and the United States when it comes to prioritizing the overall well-being of children. Denmark reopened schools after six weeks of initial lockdown before the rest of the economy in April of 2020 and, almost without exception, kept them open and have only had two pediatric deaths in the entire country. Sports and extra-curricular activities have also been kept open and normalcy to the greatest extent possible in children's lives has been a national priority in Denmark since the start of the pandemic. In the United States, unfortunately prolonged school closures have led to learning loss, isolation, obesity and mental health problems in children disproportionately affecting socioeconomically disadvantaged children. None of this appears to have spared them from the negative impacts of COVID-19 either. In my view, the United States' single-minded, myopic approach to the pandemic has created a myriad of public health problems for children beyond that of COVID-19. I feel that our country's failure to do a risk-benefit analysis as well as good scientific studies of the interventions we imposed upon children to mitigate one disease has created numerous additional and avoidable public health crises in our youth. For a disease that relatively spares them, this generation has suffered an incredible amount during the pandemic and, unfortunately, the effects of this will likely travel with them for the rest of their lives.

**The risks to children from SARS-CoV-2**

If infected with COVID-19, children ages 0-9 have on average a chance of 0.1% or 1/1000 of being hospitalized and, for ages 11-19 a 0.2% or 1/500 chance of being admitted to the hospital (Herrera-Esposito, 2021). This is based on seroprevalence data from eight locations around the world: England; France; Ireland; Netherlands; Spain; Atlanta, USA; New York, USA; Geneva, Switzerland. The infection fatality rate for 0–9-year-olds is estimated to be <1/200,000 (<5/million) and 1/55,000 for 10–19-year-olds.

Collapse inline | View popup

| Age | ISR % (CrI) | ICR % (CrI) | IFR % (CrI) |
|---|---|---|---|
| 0-9 | 0.094 (0.049-0.167) | 0.0080 (0.0038-0.0147) | 0.00048 (0.00021-0.00091) |
| 10-19 | 0.20 (0.11-0.33) | 0.021 (0.012-0.036) | 0.0018 (0.0009-0.0031) |
| 20-29 | 0.42 (0.26-0.67) | 0.057 (0.035-0.088) | 0.0067 (0.0038-0.0107) |
| 30-39 | 0.90 (0.57-1.35) | 0.15 (0.11-0.22) | 0.025 (0.016-0.038) |
| 40-49 | 1.9 (1.2-2.8) | 0.41 (0.29-0.57) | 0.097 (0.065-0.137) |
| 50-59 | 4.0 (2.6-5.9) | 1.1 (0.8-1.5) | 0.37 (0.25-0.53) |
| 60-69 | 8.2 (5.3-12.2) | 3.0 (2.0-4.3) | 1.4 (0.9-2.1) |
| 70-79 | 16.1 (10.1-24.0) | 7.7 (4.8-12.0) | 5.2 (3.1-8.2) |
| 80+ | 29.1 (18.2-42.0) | 18.5 (10.8-29.3) | 17.3 (9.7-27.5) |

(Herrera-Esposito, 2021)

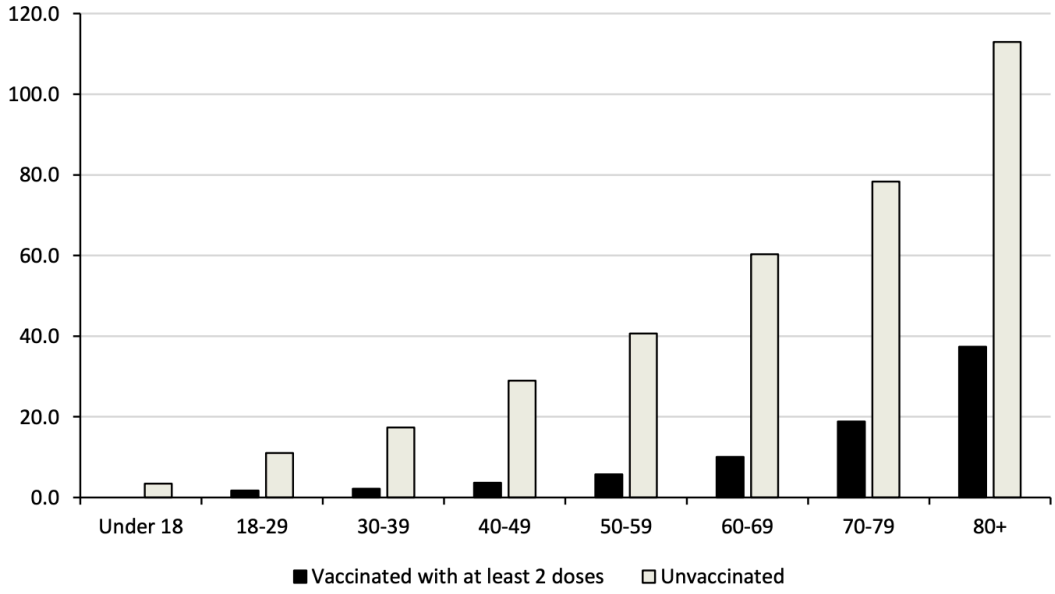
A separate analysis using data from the United States shows 5/million population deaths attributable to SARS-CoV-2 in the US since the start of the pandemic (Ioannidis, 2021).

The overall pediatric hospitalization risk from COVID-19 is currently estimated by the CDC to be 0.78% per case (CDC, Estimated COVID-19 Burden, 2021). But this was not based on seroprevalence data, so is an overestimate by 4-8 fold based on the above seroprevalence data. Consistent with this, a recent estimate found only 18.1% of children with SARS-CoV2 have symptoms (Poletti, 2021) and most of these would not have been identified as cases if seroprevalence studies were not done. This highlights why it would be useful for the US to use seroprevalence data in their estimates of risk in children. Research in the US has also found rates of pediatric hospitalization reported to the public may represent a 40% overestimate, based on COVID being an incidental diagnosis on hospitalization approximately 40% of the time (Webb, 2021; Kushner, 2021, Beck, 2021), which has given a consistent overestimate to Americans of what the pediatric hospitalization rates and number are for COVID-19.

Recent data from Public Health England (PHE, 2021) also found that unvaccinated children have a decreased risk of hospitalization unvaccinated when compared with fully vaccinated 40–49-

year-olds (3.4/100,000 vs 3.6/100,000 during this 2-week study period)

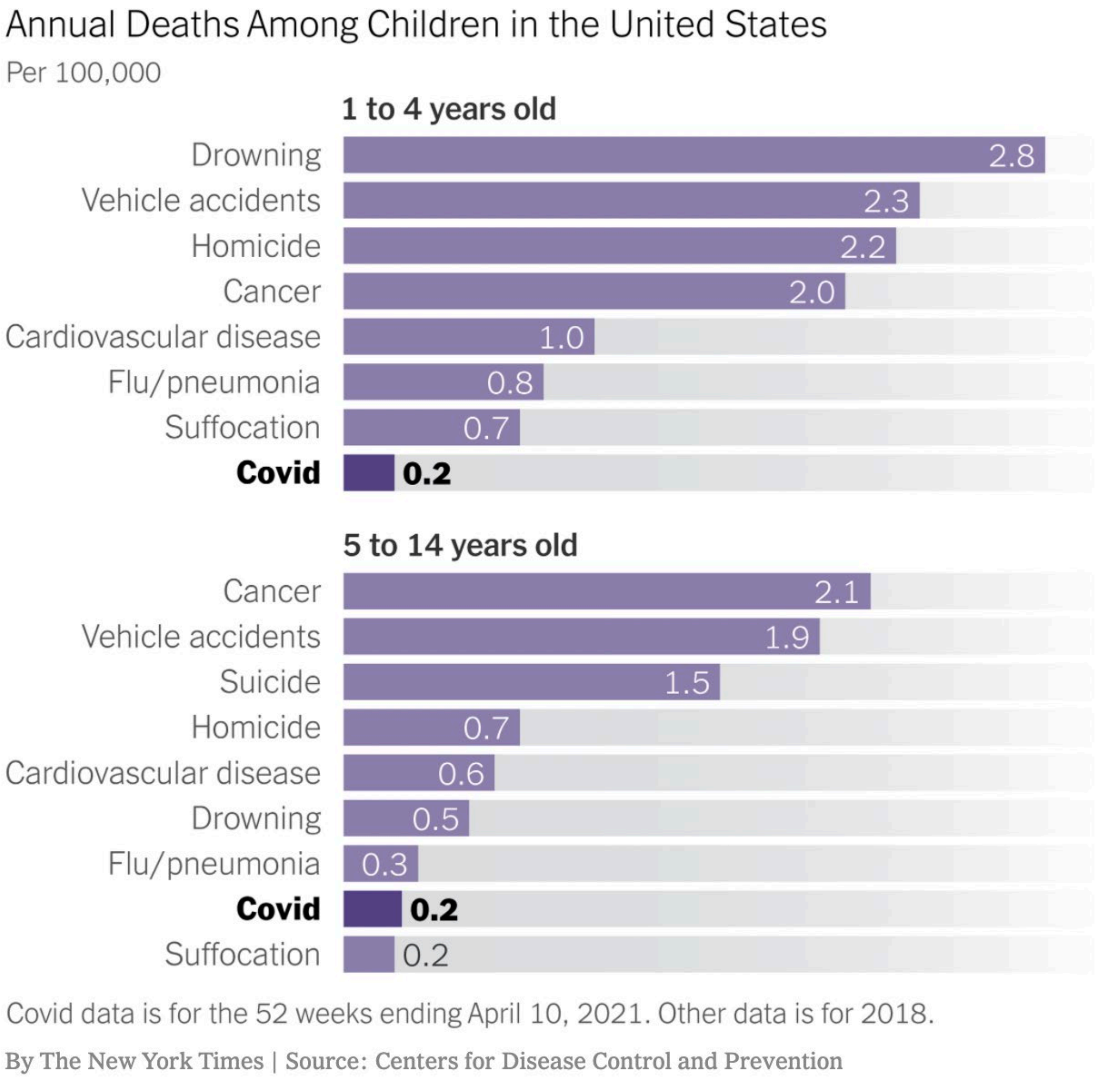
(d) COVID-19 cases whom presented to emergency care (within 28 days of a positive specimen) resulting in an overnight inpatient admission




(PHE, 2021)

This is important perspective for developing public health policy if unvaccinated children should be viewed as similar in risk to unvaccinated adults in their forties.

In terms of mortality risk to children, COVID-19 should also be put in the context of other risks. COVID-19 has a lower annual mortality risk to children than motor vehicle accidents, influenza (by this estimate) and, perhaps most importantly for the 5-14 year olds, suicide (Leonhardt, 2021).




During 2019-2020, for example, 199 influenza deaths in children were reported to CDC but their own statistical modeling suggests approximately 434 deaths may have occurred (CDC, Flu & Young Children) compared with 439 deaths due to covid over 18 months of the pandemic (CDC, Weekly Updates, 2021).

Two studies recently reported on by the AAP found that, though delta has resulted in increased case numbers in children, the severity of the disease per case does not appear to have increased (AAP, 2021).

Long-COVID in children has also been a significant concern. Our understanding of Long-COVID in this age group has continued to evolve. It has become increasingly apparent that when studying this condition, it is essential to include a control group and a large enough number of subjects. In this recent report from the Office of National Statistics (ONS, 2021) in the UK, the prevalence of persistent symptoms 12-16 weeks after COVID were no different between those with a COVID infection and controls. One should, in particular, note that in the 2-11 year old age

group, there were *fewer* symptoms reported in the 2-11 year olds that had *had* COVID than those who hadn't (though this was not significant).

Table 1: Percentage of study participants (with 95% confidence intervals) reporting any of 12 symptoms four to eight weeks or 12 to 16 weeks after COVID-19 infection
UK: 26 April 2020 to 1 August 2021

| Group | 4 to 8 weeks after infection | | 12 to 16 weeks after infection | |
|---|---|---|---|---|
| | Participants with COVID-19 | Control participants | Participants with COVID-19 | Control participants |
| All people | 9.4 (9.0-9.9) | 4.1 (3.8-4.4) | 5.0 (4.6-5.4) | 3.4 (3.1-3.8) |
| Males | 8.1 (7.5-8.8) | 3.7 (3.3-4.1) | 4.5 (4.0-5.1) | 3.3 (2.9-3.8) |
| Females | 10.7 (10.0-11.4) | 4.4 (4.0-4.9) | 5.4 (4.9-5.9) | 3.6 (3.1-4.0) |
| Age 2 to 11 years | 3.3 (2.5-4.5) | 3.6 (2.7-4.8) | 3.2 (2.3-4.5) | 4.1 (3.0-5.5) |
| Age 12 to 16 years | 4.6 (3.5-6.0) | 2.9 (2.1-4.0) | 3.0 (2.1-4.3) | 1.3 (0.8-2.3) |
| Age 17 to 24 years | 5.6 (4.4-7.1) | 3.6 (2.6-4.8) | 3.6 (2.5-5.1) | 3.6 (2.5-5.1) |
| Age 25 to 34 years | 7.6 (6.5-9.0) | 5.8 (4.8-7.1) | 4.5 (3.5-5.7) | 3.5 (2.7-4.7) |
| Age 35 to 49 years | 11.3 (10.2-12.4) | 5.0 (4.3-5.7) | 5.5 (4.7-6.4) | 4.5 (3.8-5.4) |
| Age 50 to 69 years | 12.5 (11.6-13.4) | 3.8 (3.3-4.4) | 5.8 (5.1-6.5) | 3.1 (2.7-3.7) |
| Age 70 years | 9.3 (8.1-10.8) | 2.8 (2.1-3.6) | 5.3 (4.3-6.5) | 3.1 (2.3-4.1) |
| Without health conditions | 8.6 (8.1-9.1) | 3.9 (3.6-4.3) | 4.5 (4.1-4.9) | 3.1 (2.8-3.5) |
| With health conditions | 13.9 (12.6-15.4) | 4.9 (4.1-5.8) | 7.4 (6.3-8.6) | 5.0 (4.1-6.0) |
| Cycle threshold <23 | 12.0 (11.1-13.0) | N/A | 5.5 (4.9-6.3) | N/A |
| Cycle threshold 23 to <30 | 10.7 (9.8-11.8) | N/A | 5.2 (4.5-6.0) | N/A |
| Cycle threshold 30 | 6.8 (6.2-7.4) | N/A | 4.4 (3.9-5.0) | N/A |

Source: Office for National Statistics – Coronavirus Infection Survey

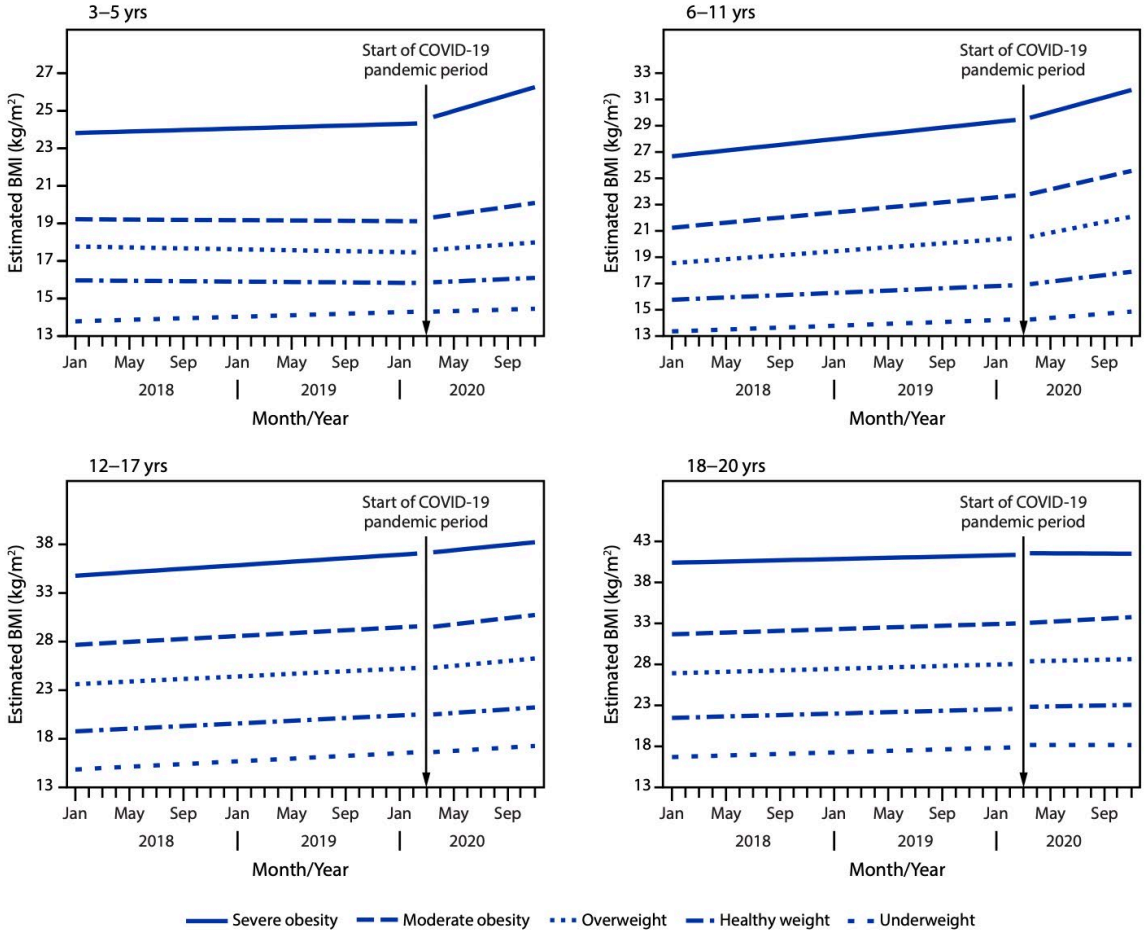
According to the CDC, there have been 4661 cases of multi-inflammatory syndrome in children (MISC) since the beginning of the pandemic out of 74 million children, with likely >40% of children in the United States being infected, based on CDC estimates from May (CDC, Health Department, 2021).

**Other Public Health Problems are Growing in Magnitude among Children**

Given the risks above and the access to all adults of highly-effective vaccinations against hospitalization for and death from COVID-19, we should agree to start focus on minimizing the collateral damage from prolonged school and sports closures and other restrictions on normal life for our youth. The below are downsides to restrictions that should be considered in risk benefit analyses.

Obesity

A recent study published by the CDC (Lange, 2021) found "Of 432,302 persons aged 2–19 years […] the monthly rate of increase in BMI nearly doubled during the COVID-19 pandemic compared with a pre-pandemic period." This appeared to most severely impact the 3-11-year age group.




From Lange et al, 2021.

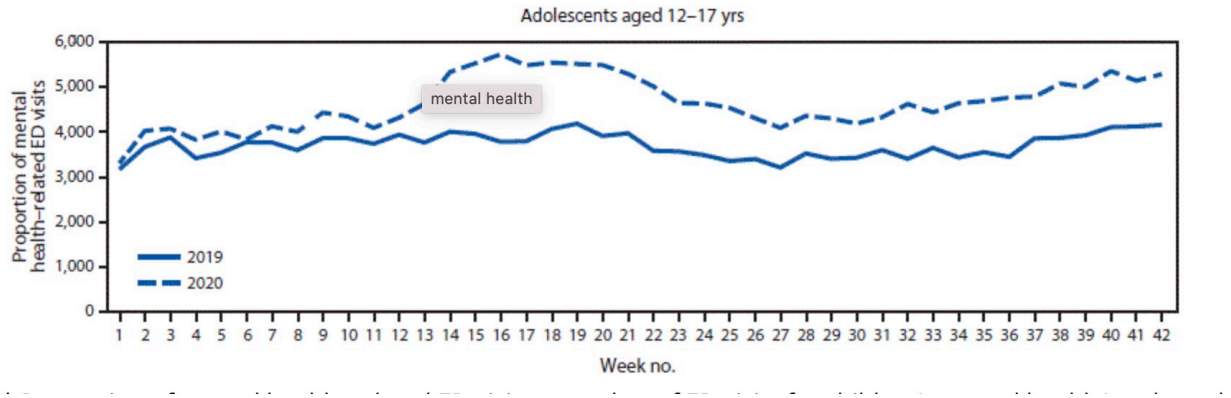
Accelerated weight gain, especially among children who are overweight or obese, can cause long-lasting metabolic changes that put children at risk for serious and costly co-occurring conditions, such as type 2 diabetes, hypertension, and depression (Bacha, 2016; Morrison, 2015).

Diabetes

Preliminary results from a study from Louisiana also found over a doubling of new Type 2 diabetes diagnosis in children during the pandemic compared with the previous year (Basen, 2021)

Mental Health

Data published by the CDC (Leeb, 2020) found that, from April to October of 2020, Emergency Room visits for mental-health related visits for children aged 5-11 and 12-17 years increased approximately 24% and 31%, respectively.



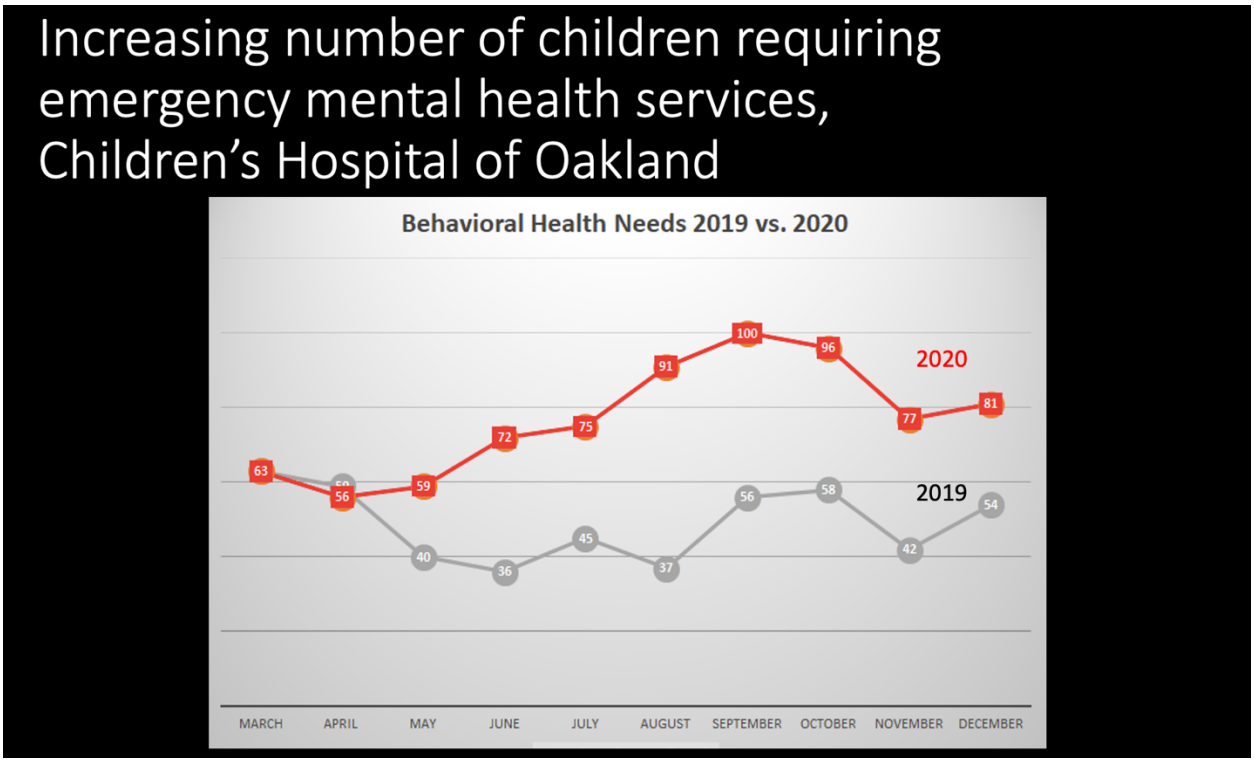

From Leeb et al 2020.

Another CDC-published study (Adjemian, 2021) found a relative 2.6x increase in Emergency Department visits for suicidal idea ideation/attempt/intentional self-harm among children <18 years.

**TABLE 2. Prepandemic to pandemic* changes in the number of weekly emergency department (ED) visits† among children aged <18 years and prevalence ratios (PRs),§ by diagnostic categories¶ with the highest and lowest PRs** — National Syndromic Surveillance Program (NSSP), United States,†† December 15, 2019–January 16, 2021**

| Diagnostic category | Absolute change in mean no. of weekly ED visits | PR (95% CI) |
|---|---|---|
| Highest PRs | | |
| Exposure, encounters, screening, or contact with infectious disease | 6,175 | 9.22 (9.01–9.43) |
| Calculus of urinary tract | 18 | 2.70 (2.44–2.98) |
| Open wounds to limbs, subsequent encounter | 9 | 2.67 (2.34–3.06) |
| Suicidal ideation/attempt/intentional self-harm | 174 | 2.64 (2.57–2.72) |
| Sexually transmitted infections (excluding HIV and hepatitis) | 5 | 2.57 (2.26–2.94) |
| Socioeconomic/Psychosocial factors | 22 | 2.56 (2.41–2.72) |
| Lifestyle/Life management factors | 12 | 2.55 (2.36–2.76) |
| Schizophrenia spectrum and other psychotic disorders | 6 | 2.55 (2.27–2.86) |
| Feeding and eating disorders | 2 | 2.52 (2.18–2.92) |
| Open wounds of head and neck, subsequent encounter | 4 | 2.51 (2.26–2.79) |

Below are Data from Children's Hospital Oakland courtesy of Jeanne Noble, MD, which show a similar trend in increasing amounts of children needing emergency care for mental health reasons.




Learning Loss

A McKinsey Report found minority children to be falling further behind, but all children experiencing learning loss during the pandemic compared with prior gains (Dorn, 2020). We need to keep this in mind in our quarantine policies and ensure that quarantining students actually has enough effect to rationalize further exacerbating learning loss, not to mention the mental and physical health issues discussed above. The below Figure shows how math scores

have decreased the most in schools with >50% students of color.

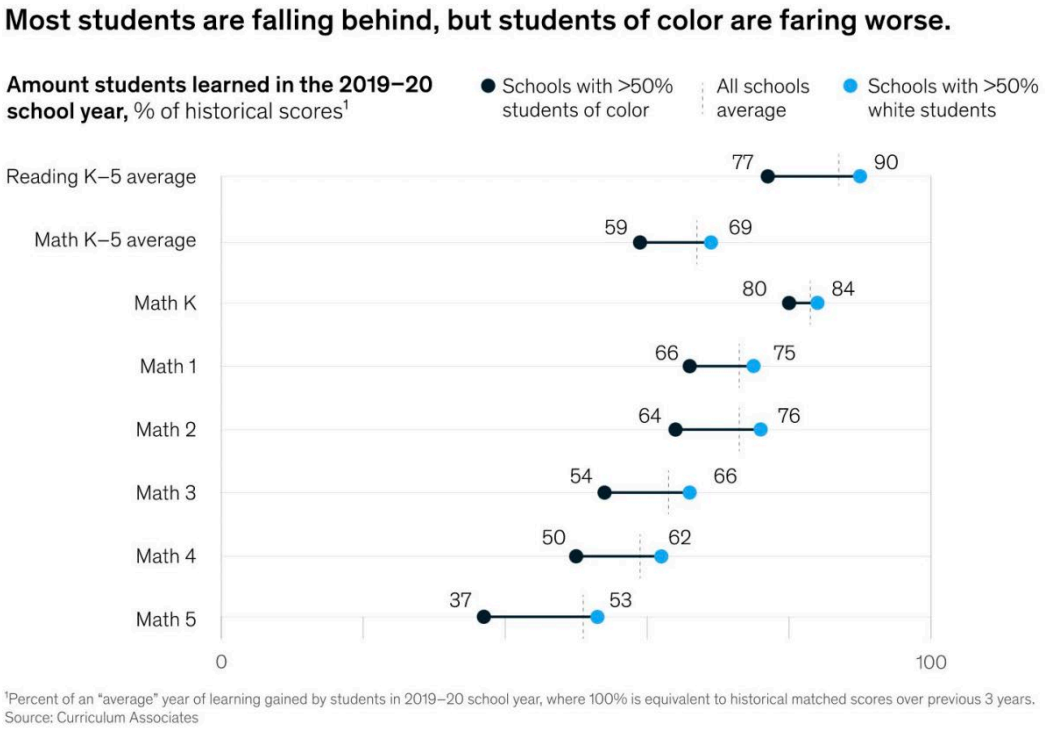
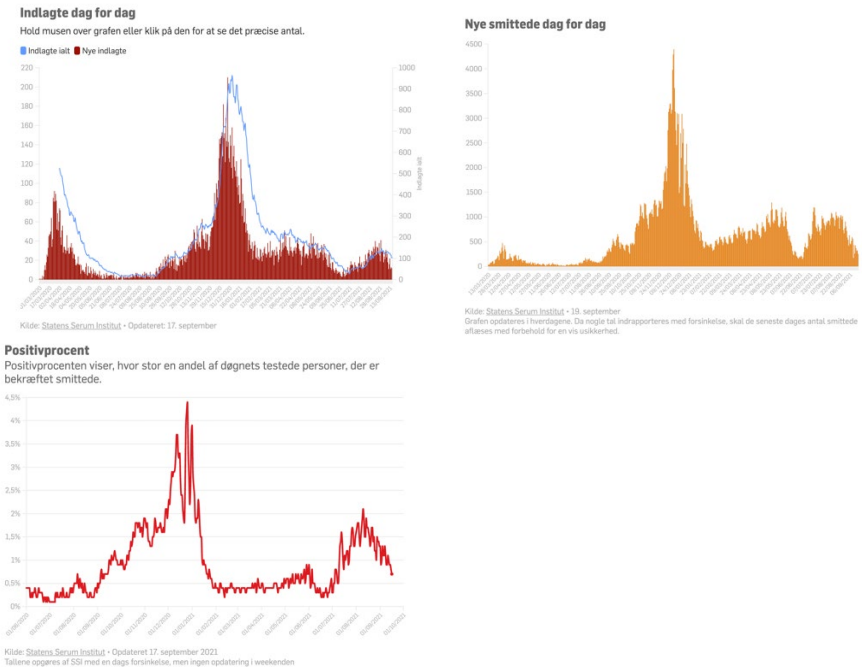


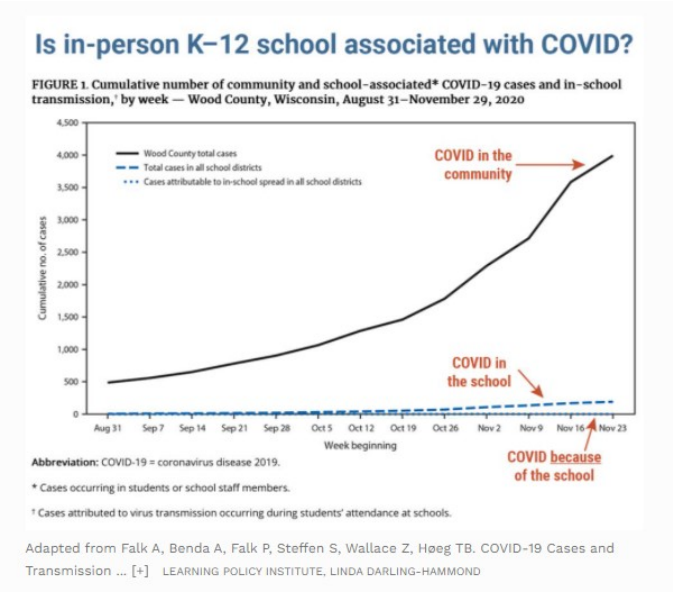

*Exhibit from "COVID-19 and learning loss – disparities grow and students need help", December 2020, McKinsey & Company.*


We should all share the goal of minimizing overall harm to children. In this we should look at the overall risk to children in context as the UK, and Northern Europe have done in keeping schools open unless absolutely needing to close them, implementing test-to stay programs for children who are exposed at school and looking at metrics for removing masks, distancing and other school restrictions. In Denmark, for example, all school restrictions have now been lifted and they, like the rest of Scandinavia kept school open with very few exceptions. Denmark provided free child care during brief school closures for essential workers and paid sick leave. Vaccinations for all have been by choice but the adult vaccination rate, for example, in Denmark is very high vaccination rate at 74% and dropped all restrictions in schools and for the entire country on September 10th and has had falling cases and hospitalizations since that time (Politiken, 2021).




Hospitalizations, new cases and test positivity in Denmark as of 9/19/2021 (Politiken, 2021).

There have been a number of American studies documenting low rates of COVID-19 transmission in schools. These studies from North Carolina (Zimmerman, 2021), Wisconsin (Falk, 2021) and Utah (Hershow, 2021) all saw that less than 5% of COVID cases in schools came from *within* the school, while over 95% of the time kids were infected in the community or at home and then came to school already infected. I was senior author (listed last by tradition) of the Wisconsin study (Falk, 2021) published by the CDC and the amount of in-school transmission and cases identified at school are shown below. Only 7 of the 191 (3.7%) cases among the students were transmitted *in* the school.



Scandinavian schools saw a very similar pattern (Brandal, 2020) despite lack of distancing and masking for children <12; only around 1% of COVID cases in school spread further among the students there as well.

Recent September 2021 data out of Los Angeles have shown an even lower secondary attack rate of only around 1/500 or 0.2% of school contacts for this school year. "As of last week, among the almost 30,000 people that ended up quarantined, 63 tested positive." This was reported to KTLA by Los Angeles County Public Health Director Barbara Ferrer (Habeshian, 2021) Of note, there was no information included on severity of these cases among the children or vaccinated teachers. The downsides of continued quarantines include more learning losses, more time out of sports, recess and physical education, isolation and disruption of relationships.

Coming together to do the best thing for our nation's children should involve an honest and apolitical look at the science including both the risks to children from COVID-19 as well as the risks from our disease mitigation. The latter *also* pose serious short and numerous long-term health risks, which are unfortunately already apparent as described above. We should minimize overall harms where possible, keeping in mind restricting access to school and sports most greatly impact children with special needs and children from socioeconomically disadvantaged backgrounds. All adults have access to vaccines that are highly effective at preventing severe disease and rapid testing can be utilized to keep children in school and extra-curricular activities. Equal access to education, youth sports and human interaction have an enormous value which we should not lose sight of as we emerge from this pandemic and consider the overall well-being of our nation's children.

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