Summary of Evidence on Masks and Children

Updated October 5, 2021

1. Evidence on Masks in Schools

Numerous studies and reports indicate that masking students is unlikely to have a major effect on COVID-19 cases in schools. Many European countries have decided to forego restrictions such as masks and quarantines due to the low risk to children from COVID-19 weighed with the evidence of harms of prolonged masking.[1] [2] To date, the United Kingdom, Norway, Denmark, Iceland, Austria, Switzerland, Finland and Sweden are not requiring masks either for all children or for children <12 in school.

The CDC published a report on May 28, 2021 finding that ventilation improvements resulted in a 35-48% reduction in cases, and mask requirements for teachers and staff resulted in a 37% reduction in cases[3] But mask requirements for students did not result in a statistically significant reduction in case rates.

Another study from Catalan, Spain, found the unmasked, youngest children had lower rates of COVID-19 in-school transmission than the older masked children.[4]

A pre-print study entitled *COVID-19 Mitigation Practices and COVID-19 Rates in Schools: Report on Data from Florida, New York and Massachusetts*, published May 21, 2021, analyzed case rates and three primary mitigation strategies: in-person student density, ventilation improvements and student and staff mask mandates, as reported to the COVID-19 School

[1] Peeters, Carla. Psychosocial, biological, and immunological risks for children and pupils make long-term wearing of mouth masks difficult to maintain, BMJ 2020;370:m3021, Sept. 9, 2020. https://www.bmj.com/content/370/bmj.m3021/rr-6.

[2] Spitzer M. Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic. Trends Neurosci Educ. 2020;20:100138. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7417296/.

[3] *Mask Use and Ventilation Improvements to Reduce COVID-19 Incidence in Elementary Schools – Georgia, November 16-December 11, 2020*; Gettings J, Czarnik M, Morris E, et al. MMWR Morb Mortal Wkly Rep 2021;70:779–784. DOI: http://dx.doi.org/10.15585/mmwr.mm7021e1.

[4] Age-dependency of the Propagation Rate of Coronavirus Disease 2019 Inside School Bubble Groups in Catalonia, Spain, The Pediatric Infectious Disease Journal: July 27, 2021 - https://journals.lww.com/pidj/Abstract/9000/Age_dependency_of_the_Propagation_Rate_of.95714.aspx

Response Dashboard created by Brown University.[5] The report found *higher* case rates in schools with *lower* in-person density, no correlation between ventilation improvements and case rates, and no correlation between mask mandates and COVID-19 rates among students.

A letter published in the New England Journal of Medicine on January 6, 2021, titled *Open Schools, Covid-19, and Child and Teacher Morbidity in Sweden*, reported that in the spring of 2020, when COVID-19 was prevalent in Sweden, schools remained open but masks were not required.[6] Out of 1.95 million children, only 15 were hospitalized in the ICU and none died. The rate of infections among teachers was 19 per 100,000, similar to that of other professions.

There are numerous flaws in the recent CDC studies attempting to correlate mask use with lower rates of COVID-19 in schools. For example, in the first CDC report published on September 24, 2021[7] claiming that mask requirements in K-12 schools limited COVID-19 outbreaks, the report did not account for differences in community case rates during the study period or differences in community vaccination rates when comparing schools in two neighboring counties. Since 95% of school cases come from the community, these rates are much more likely to influence the number of in-school outbreaks.

Similarly, in the second CDC report published on September 24, 2021[8] claiming pediatric cases were higher in counties without school mask requirements, the report failed to account for the fact that cases were already rising in counties without school mask mandates prior to school starting, failed to exclude case rates in non-school age children from the calculations, failed to account for vaccination rates, and failed to measure case rates past the first two weeks of school. The authors themselves acknowledge that causation cannot be inferred from the observed

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[5] *COVID-19 Mitigation Practices and COVID-19 Rates in Schools: Report on Data from Florida, New York and Massachusetts*; Emily Oster, Rebecca Jack, Clare Halloran, John Schoof, Diana McLeod; medRxiv 2021.05.19.21257467; doi: https://doi.org/10.1101/2021.05.19.21257467

[6] *Open Schools, Covid-19, and Child and Teacher Morbidity in Sweden*, N Engl J Med 2021; 384:669-671; DOI: 10.1056/NEJMc2026670.

[7] Jehn M, McCullough JM, Dale AP, et al. *Association Between K–12 School Mask Policies and School-Associated COVID-19 Outbreaks — Maricopa and Pima Counties, Arizona, July–August 2021*. MMWR Morb Mortal Wkly Rep. ePub: 24 September 2021. DOI: http://dx.doi.org/10.15585/mmwr.mm7039e1.

[8] Budzyn SE, Panaggio MJ, Parks SE, et al. *Pediatric COVID-19 Cases in Counties With and Without School Mask Requirements — United States, July 1–September 4, 2021*. MMWR Morb Mortal Wkly Rep. ePub: 24 September 2021. DOI: http://dx.doi.org/10.15585/mmwr.mm7039e3

correlation. For this study and the above, the effects of school mask mandates or requirements alone on the cases numbers could not be determined.

2. Ineffectiveness of Masks Against COVID-19

CDPH acknowledges that "SARS-CoV-2, the virus that causes COVID-19, is transmitted primarily by aerosols (airborne transmission), and less frequently by droplets." However, cloth and surgical masks are ineffective at blocking aerosols.

The Cal/OSHA Aerosol Transmissible Diseases Standard (ATD) requires workers in environments with aerosolized pathogens like COVID-19 to wear a minimum of N95 respirators, and specifically states "surgical masks cannot be used for respiratory protection because they do not protect the user; instead, they prevent the release of potentially infectious aerosols when the user talks, coughs, or sneezes. Even wearing multiple surgical masks at the same time is not equivalent to wearing a respirator."

The primary factors which determine the efficacy of a mask are filtration efficacy and duration of exposure. According to the American Conference of Government Industrial Hygienists ("ACGIH"), surgical masks have approximately 50% inward and out leakage, while cloth face coverings have about 75% inward and outward leakage.[9] Therefore, if an infected person and a receiver are both wearing cloth masks, the time it takes for the receiver to receive an infectious dose is approximately 27 minutes, as opposed to 15 minutes if neither party were wearing a mask. In a school environment where children spend hours next to other students, a cloth or surgical mask – even if perfectly fitted – would be ineffective after only a few minutes.

Studies demonstrate the accuracy of the aforementioned estimates of time to exposure when wearing a cloth or surgical mask. A recent study by the University of Waterloo found that primarily due to leakage around the edges of the masks, cloth masks have a filtration efficiency

[9] ACGIH, *COVID-19 Fact Sheet: Workers Need Respirators* (2021), available at https://www.acgih.org/covid-19-fact-sheet-worker-resp.

of only 10%, while surgical masks have an efficiency of only 12%.[10] Other studies demonstrate that mask efficiency decreases by 66% with a leak area of only 2%.[11]

The practical consequences of these percentages for a masked classroom are clear in the CDC's report from the classroom outbreak in Marin County: even if the symptomatic teacher had been masked the entire time, up to 90% of the exhaled viral particles in every breath would be escaping into the room. Over the course of a school day, even masking, ventilation, and filtration were unable to prevent half of the class from becoming infected.

A randomized control trial study of over 350,000 people in Bangladesh published on September 1, 2021, touted as evidence of the benefits of masks, actually confirmed that cloth mask usage in the community had no effect on case rates,[12] while surgical mask usage only reduced case rates in individuals over 50 years old.[13]

Virginia Tech Professor Linsey Marr, one of the preeminent experts on aerosol transmission, testified before Congress on March 11, 2021, that "a good cloth mask might have a filtration efficiency of 50%, but there are some that have an efficiency of only 10%. The actual protection afforded to the wearer may be further degraded if the mask does not fit well. Most cloth masks are not sufficient to protect, for example, a worker in a grocery store who spends 8–12 hours surrounded by unmasked shoppers. [¶] Surgical masks fit loosely and are not designed to protect the wearer from inhaling aerosols."[14]

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[10] Shah et al., *Experimental investigation of indoor aerosol dispersion and accumulation in the context of COVID-19: Effects of masks and ventilation* (July 21, 2021) vol. 33, Physics of Fluids 073315, available at https://aip.scitation.org/doi/pdf/10.1063/5.0057100.

[11] F. Drewnick, J. Pikmann, F. Fachinger, L. Moormann, F. Sprang, S. Borrmann, "Aerosol filtration efficiency of household materials for homemade face masks: Influence of material properties, particle size, particle electrical charge, face velocity, and leaks." Aerosol Sci. Technol. 55, 63–79 (2021). https://www.tandfonline.com/doi/full/10.1080/02786826.2020.1817846

[12] Abaluck et al., *The Impact of Community Masking on COVID-19: A Cluster-Randomized Trial in Bangladesh* (Aug. 31, 2021) 57, table A10, available at https://www.poverty-action.org/sites/default/files/publications/Mask_RCT____Symptomatic_Seropositivity_083121.pdf.

[13] *Id.* at 28, fig. 3.

[14] Testimony of Linsey C. Marr, Ph.D., Subcommittee on Workforce Protections, Committee on Education and Labor, U.S. House of Representatives (March 11, 2021) 6, available at https://edlabor.house.gov/download/marrtestimony03112021.

3. Masks Are Harmful to Children in School

Children are at risk of harm from continued mask mandates. It is a general principle of medicine that every treatment which has an effect also has a side effect, and masks are no different.

Repeated exposure to mandatory mask wearing over longer periods of time – especially in schools, where children are expected to learn – can be psychologically harmful for children.[15] Studies have found clear impacts of facemasks on processing emotions and identity.[16] Another review of the benefits and burdens of masks in schools concluded "recognition of, and response to, the outward emotional displays of one's peers' faces is a critical and necessary component of social interaction in schools," and that face masks inhibit this recognition, leaving primarily negative emotions.[17]

Mask use also is not physiologically benign. A review of 44 studies revealed a "statistically significant correlation in the quantitative analysis between the negative side effects of blood-oxygen depletion and fatigue in mask wearers with $p = 0.0454$."[18] A study of healthcare workers during the COVID-19 pandemic found 80% reported headaches one to four times a day during a 30-day period of mask use,[19] and face masks are known to cause perioral dermatitis (an infection of skin around the mouth) with rashes and redness due to saliva, sweat and moist vapor between the mask and the skin.

While CDPH has consistently required everyone, including children over the age of 2, to

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[15] Kisielinski et al., *Is a Mask That Covers the Mouth and Nose Free from Undesirable Side Effects in Everyday Use and Free of Potential Hazards?* (Apr. 2021) vol. 18, No. 4344, Int. J. Environ. Res. Public Health, available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8072811/.

[16] Marini et al., *The impact of facemasks on emotion recognition, trust attribution and re-identification* (Mar. 10, 2021) vol. 11, No. 5577 Sci. Rep., available at https://www.nature.com/articles/s41598-021-84806-5.pdf; Carbon, *Wearing Face Masks Strongly Confuses Counterparts in Reading Emotions* (Sept. 25, 2020) vol. 11, No. 566886, Front. Psychol., available at https://doi.org/10.3389/fpsyg.2020.566886.

[17] Spitzer, *Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic* (Sept. 2020, published online Aug. 11, 2020) vol. 20, No. 100138, Trends in Neuroscience and Educ. 5, available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7417296/pdf/main.pdf.

[18] Kisielinski, *supra*, at 5.

[19] Ong et al., *Headaches associated with personal protective equipment – a cross-sectional study among frontline healthcare workers during COVID-19* (Mar. 30, 2020) vol. 60, No. 5, Headache 864, available at https://pubmed.ncbi.nlm.nih.gov/32232837/.

wear masks in schools since early in the pandemic, the World Health Organization ("WHO") and UNICEF both state that children 5 years and under should not be required to wear masks to protect others from COVID-19. Further, the WHO and UNICEF advise that decisions whether to impose a mask requirement upon children ages 6 through 11 should be made only after weighing the harms and benefits, including the impact of wearing a mask on a child's psychosocial development.[20]

The above referenced study of schools in Wales found not only that masking staff had no effect on infection rates, but also that face coverings on staff created negative impacts on the learning environment, including "having to stand closer to pupils and raise their voices to be heard,"[21] concluding "primary school staff found teaching challenging during COVID-19 restrictions, especially for younger learners and those with additional learning needs."

Teachers often report difficulties teaching with masks, including issues speaking, breathing, teaching social and emotional learning, and teaching language and phonics.[22]

When facial expressions are inhibited by face masks, a child's ability to communicate effectively is reduced and they are primarily left with mimicking negative emotions.[23]

Masks frequently cause anxiety and psycho-vegetative stress reactions in children. Children who are required to wear masks frequently and for extended period often experience an increase in psychosomatic and stress-related illnesses. They also tend to exhibit depressive self-experience, reduced participation, social withdrawal and lowered health-related self-care.[24]

More than 50% of mask wearers experience mild depressive feelings.[25] Mild depressive

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[20] World Health Org., *Mask use in the context of COVID-19* (Dec. 1, 2020), available at https://www.who.int/publications-detail-redirect/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak; World Health Org., *Coronavirus disease (COVID-19): Children and masks* (Aug. 21, 2020), at https://www.who.int/news-room/q-a-detail/q-a-children-and-masks-related-to-COVID-19.

[21] Marchant, supra, at 25.

[22] E.g., Connolly, *A year behind the mask: As this school year draws to a close, educators reflect on teaching without face time* (June 4, 2021) Chalkbeat, at https://www.chalkbeat.org/2021/6/4/22510381/teaching-in-masks.

[23] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7417296/.

[24] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8072811/.

[25] *Ibid.*

feelings can lead to more significant depression which can then lead to suicidal ideation, which is far more harmful to children than COVID-19.

Mask wearing disproportionately impacts children who are attempting to learn English as a second language, as it impedes their ability to process their non-native language. One study of language processing patterns found that "non-native speakers attended more to the mouth than native speakers, regardless of their level of [second language] expertise."[26]

Attention to a speaker's mouth increases whenever speech-processing becomes more challenging, even when an individual is highly competent in that language.[27] Further, facial expressions often help to convey the meaning and/or intent of a speaker's words.

Masks also cause adverse physical changes, including significant increases in heart rate, decreased oxygen saturation, headaches, increased skin temperature, difficulty breathing, dizziness, listlessness, impaired thinking, and concentration problems. Masks interfere with temperature regulation and impair the field of vision and of non-verbal and verbal communication.[28]

[26] Birulés et al., Highly proficient L2 speakers still need to attend to a talker's mouth when processing L2 speech (2020) vol. 35, No. 10 Language, Cognition and Neuroscience 13214, available at https://doi.org/10.1080/23273798.2020.1762905.
[27] *Ibid.*

[28] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8072811/