

Some Scientific Studies of Effectiveness of Face Masks

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The webpage linked below of the U.S. Centers for Disease Control provides links to three peer-reviewed scientific studies that found that use of face masks by students in schools was associated with lower incidence of COVID-19 infection.

<https://www.cdc.gov/media/releases/2021/p0924-school-masking.html>

This is an excerpt from that webpage:

[One report from Arizona](#) revealed that schools in two of the state's most populous counties were 3.5 times more likely to have COVID-19 outbreaks if they did not have a mask requirement at the start of school compared with schools that required universal masking on day one. Universal masking is an important component in the recommended layered prevention strategy for schools, and this study continues to demonstrate that facemasks when used as part of the larger strategy can reduce spread of COVID-19 and prevent outbreaks in schools.

[Another report](#) found that during the two weeks following the start of school, the average change in pediatric COVID-19 case rates was lower among counties with school mask requirements (16.32 per 100,000/day) compared with counties without school mask requirements (34.85 cases per 100,000/day). This highlights the impact that universal masking policies can have on the communities that surround these school districts, as the impact of the policies can reduce the burden on the health care systems that support these school districts.

[A third report](#) studied COVID-19-related school closures and found that despite an estimated 1,801 school closures so far this school year, 96% of public schools have been able to remain open for full in-person learning. The continued focus on providing students with a safe environment for in-person learning is one of the main priorities for CDC's guidance, and can be best achieved by following a layered prevention strategy.

These studies continue to demonstrate the importance and effectiveness of CDC's [Guidance for COVID-19 Prevention in K-12 Schools](#) to help districts ensure safer in-person learning and stop the spread of COVID-19. Promoting vaccination of eligible persons, mask wearing, and screening testing are all proven methods to continue to work towards the end of the COVID-19 pandemic.

*** End of excerpt from CDC website ***

Here is a citation of a study of the effectiveness of different types of face masks. Indeed, the effectiveness varies considerably for different types of masks.

Clapp PW, Sickbert-Bennett EE, Samet JM, et al. Evaluation of Cloth Masks and Modified Procedure Masks as Personal Protective Equipment for the Public During

the COVID-19 Pandemic. *JAMA Intern Med.* 2021;181(4):463–469.
doi:10.1001/jamainternmed.2020.8168

Here is a web link to access this article:

<https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2774266>

If you would like to view this article and have difficulty accessing it please notify me so I can help.

Here is a link to a webpage of the New York Times that explains how face masks reduce the transmission of viral diseases:

<https://www.nytimes.com/interactive/2020/10/30/science/wear-mask-covid-particles-ul.html>

Here is a citation of an article published in the Proceedings of the National Academy of Sciences (PNAS) in 2020 reporting that air transmission was the primary route of spread of COVID-19 infection and at that time, prior to the availability of vaccines, face mask use was the most effective protective method. PNAS is widely considered by scientists to be one of the very most authoritative scientific journals in the world, definitely in the top 10. The National Academy of Sciences members are some of the very most respected and accomplished scientists in the country and this is the journal that they publish.

Zhang, Renyi, Yixin Li, Annie L. Zhang, Yuan Wang, and Mario J. Molina. 2020. 'Identifying airborne transmission as the dominant route for the spread of COVID-19', *Proceedings of the National Academy of Sciences*, 117: 14857.

Abstract: We have elucidated the transmission pathways of coronavirus disease 2019 (COVID-19) by analyzing the trend and mitigation measures in the three epicenters. Our results show that the airborne transmission route is highly virulent and dominant for the spread of COVID-19. The mitigation measures are discernable from the trends of the pandemic. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the trends of the pandemic. This protective measure significantly reduces the number of infections. Other mitigation measures, such as social distancing implemented in the United States, are insufficient by themselves in protecting the public. Our work also highlights the necessity that sound science is essential in decision-making for the current and future public health pandemics. Various mitigation measures have been implemented to fight the coronavirus disease 2019 (COVID-19) pandemic, including widely adopted social distancing and mandated face covering. However, assessing the effectiveness of those intervention practices hinges on the understanding of virus transmission, which remains uncertain. Here we show that airborne transmission is highly virulent and represents the dominant route to spread the disease. By analyzing the trend and mitigation measures in Wuhan, China, Italy, and New York City, from January 23 to May 9, 2020, we illustrate that the impacts of mitigation measures are discernable from the trends of the pandemic. Our analysis reveals that the difference with and without mandated face covering represents the determinant in shaping the pandemic trends in the three epicenters. This protective measure alone significantly reduced the number of infections, that is, by over 75,000 in Italy from April 6 to May 9 and over 66,000 in New York City from April 17 to May 9. Other mitigation measures, such as social distancing implemented in the United States, are insufficient by themselves in protecting the public. We conclude that wearing of face masks in public corresponds to the most

effective means to prevent interhuman transmission, and this inexpensive practice, in conjunction with simultaneous social distancing, quarantine, and contact tracing, represents the most likely fighting opportunity to stop the COVID-19 pandemic. Our work also highlights the fact that sound science is essential in decision-making for the current and future public health pandemics.

Here is a summary excerpted from the Conclusion of an article in the **Proceedings of the National Academy of Sciences (PNAS)**, which reported the findings of a critical review of the peer-reviewed reports of well-regarded research studies of face mask use that were available at the time this review was conducted. Here is the article citation:

Howard, Jeremy, Austin Huang, Zhiyuan Li, Zeynep Tufekci, Vladimir Zdimal, Helene-Mari van der Westhuizen, Arne von Delft, Amy Price, Lex Fridman, Lei-Han Tang, Viola Tang, Gregory L. Watson, Christina E. Bax, Reshama Shaikh, Frederik Questier, Danny Hernandez, Larry F. Chu, Christina M. Ramirez, and Anne W. Rimoin. 2021. 'An evidence review of face masks against COVID-19', *Proceedings of the National Academy of Sciences*, 118: e2014564118.

*** Excerpt from the Conclusion of this PNAS article ***

Our review of the literature offers evidence in favor of widespread mask use as source control to reduce community transmission: Nonmedical masks use materials that obstruct particles of the necessary size; people are most infectious in the initial period postinfection, where it is common to have few or no symptoms (**45, 46, 141**); nonmedical masks have been effective in reducing transmission of respiratory viruses; and places and time periods where mask usage is required or widespread have shown substantially lower community transmission.

The available evidence suggests that near-universal adoption of nonmedical masks when out in public, in combination with complementary public health measures, could successfully reduce the R_e to below 1, thereby reducing community spread if such measures are sustained. Economic analysis suggests that mask wearing mandates could add 1 trillion dollars to the US GDP (**32, 34**).

Models suggest that public mask wearing is most effective at reducing spread of the virus when compliance is high (**39**). We recommend that mask use requirements are implemented by governments, or, when governments do not, by organizations that provide public-facing services. Such mandates must be accompanied by measures to ensure access to masks, possibly including distribution and rationing mechanisms so that they do not become discriminatory. Given the value of the source control principle, especially for presymptomatic people, it is not sufficient for only employees to wear masks; customers must wear masks as well.

*** End of PNAS article excerpt***

Here are the references cited in the above excerpts. These references are extracted from the full list of 141 references that are provided in this article. I will provide that full list upon request.

32. J. Hatzius, D. Struyven, I. Rosenbery, Face masks and GDP. <https://www.goldmansachs.com/insights/pages/face-masks-and-gdp.html>. Accessed 3 July 2020. Google Scholar
34. J. Abaluck et al., The case for universal cloth mask adoption and policies to increase supply of medical masks for health workers. <http://dx.doi.org/10.2139/ssrn.3567438> (6 April 2020). Google Scholar
39. L. Tian et al., Calibrated intervention and containment of the COVID-19 pandemic. arXiv:2003.07353v4 (2 April 2020). Google Scholar
45. K. K. W. To et al., Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: An observational cohort study. *Lancet Infect. Dis.* 20, P565–P574 (2020). Google Scholar
46. L. Zou et al., SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N. Engl. J. Med.* 382, 1177–1179 (2020). CrossRefPubMedGoogle Scholar
141. N. van Doremalen et al., Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N. Engl. J. Med.* 382, 1564–1567 (2020). CrossRefPubMedGoogle Scholar

Here is another article, this one published in one of the most respected scientific journals in the world, “Science”, also reporting the effectiveness of face masks for reducing the transmission of COVID-19 infection.

Cheng, Yafang, Nan Ma, Christian Witt, Steffen Rapp, Philipp S. Wild, Meinrat O. Andreae, Ulrich Pöschl, and Hang Su. 2021. 'Face masks effectively limit the probability of SARS-CoV-2 transmission', *Science*, 372: 1439-43.