



Review

Face masks and protection against COVID-19 and other viral respiratory infections: Assessment of benefits and harms in children



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Abstract

Mask mandates for children were implemented at schools and childcare centers during the COVID-19 pandemic, and the US continues to recommend masking down to the age of two in certain settings. Medical interventions should be informed by high-quality evidence and consider the possibility of harm (i.e., include harm-benefit analyses). In this review, we weigh the existing evidence for the effectiveness of mask mandates to protect against COVID-19 and other viral respiratory infections and the harms associated with face mask wearing in children.

There is a lack of robust evidence of benefit from masking children to reduce transmission of SARS-CoV-2 or other respiratory viruses. The highest quality evidence available for masking children for COVID-19 or other viral respiratory infections has failed to find a beneficial impact against transmission. Mechanistic studies showing reduced viral transmission from use of face masks and respirators have not translated

to real world effectiveness. Identified harms of masking include negative effects on communication and components of speech and language, ability to learn and comprehend, emotional and trust development, physical discomfort, and reduction in time and intensity of exercise.

Effectiveness of child masking has not been demonstrated, while documented harms of masking in children are diverse and non-negligible and should prompt careful reflection. Recommendations for masking children fail basic harm-benefit analyses.

Educational aims

The reader will come to appreciate:

- The evidence landscape of potential benefits and harms of mask use by children for COVID-19 and other viral respiratory infections.
 - The diversity of concerns that have arisen about mask requirements for children.
 - The importance of prompt and transparent information accrual and communication by public health officials about the known benefits and potential harms of medical interventions, particularly for vulnerable populations.
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Introduction

Child mask mandates were one of the most controversial public-health policies used during the COVID-19 pandemic. In many locations in North America, children as young as two years of age were required to wear face masks daily for multiple consecutive hours, both indoors and outdoors, in school and childcare settings [1], [2]. This stood in stark contrast to European countries where masking was never recommended for children under the age of six and, in many countries, never under age twelve [3]. The United States Centers for Disease Control and Prevention (CDC)'s child masking recommendations deviated substantially from international guidelines [3], [4], [5]. The CDC continues to recommend masks for children down to age two in certain settings [1], [6], and this is in the absence of strategies for exiting these restrictions. In the event of a future public health threat, clear and consistent communication from public health officials about the criteria that will be used to withdraw temporary public health recommendations while data are gathered could

serve to ease public anxiety, lessen distrust, and facilitate a return to a more normal life wherein ineffective recommendations are promptly discarded.

To date, there is no robust evidence demonstrating that masking reduces the likelihood of respiratory infections in children [7], [8], [9]. A recent randomized study in adults found those assigned to community masking were significantly less likely to complete a survey about their symptoms precluding the ability to draw conclusions about differences in reported symptoms; this study was also underpowered to determine if there was a difference in documented infections [10]. There continues to be a lack of reliable data to support recommendations for children to wear masks to prevent respiratory infections. At the same time, there are numerous potential harms associated with mask wearing, especially in young children, some readily apparent and others more subtle and challenging to quantify.

In this review, we consider the reported harms and theoretical concerns about masking children in the context of the lack of high-quality evidence of protection against transmission of respiratory infections, including COVID-19.

Section snippets

Medical ethics and public health interventions: Scientific evidence and harm-benefit analyses

Medical interventions and public health policies, especially those directed at vulnerable populations, should be informed by high-quality evidence and consideration of possible harms, (i.e., include harm-benefit analyses). More than four years after the COVID-19 pandemic began, recommendations to mask, by both public and private institutions, remain in some countries, including the US, Spain, Japan, Taiwan, and Singapore. Individuals worldwide may choose to wear a face mask for various reasons.

Benefits of child masking are unproven

In a systematic review assessing the evidence of benefit from child masking for protection against COVID-19, it was found that no high-quality evidence demonstrating the real-world effectiveness of child mask mandates exists and no RCTs have been performed to assess the effectiveness of mask wearing in children for COVID-19 prevention [7]. One subsequent RCT in Guinea Bissau included children and

failed to find evidence of benefit but, due to widespread population masking at the time of the

Evidence of harms of child masking

1) Speech, language, and learning: Humans rely on visual information provided by a speaker's face to decode speech. Seeing mouth movements and facial gestures accelerates recognition of words and enhances speech comprehension [12], [19], [20], [21]. The integration of audio and facial information is crucial to speech perception and development. Visually impaired children often have delays in speech and language development [22], which may be due, at least in part, to reduced ability to perceive

Public-threat responses: Lack of exit strategies and the disproportional restriction of children

Disease mitigation strategies implemented to temporarily protect a population from threats are relatively easy to implement but notoriously difficult to remove; clear and consistent strategies for removing restrictions are often absent [61]. During the Ebola outbreak in 2014, some West-African countries closed their school systems for prolonged periods and banned some students from attending school for five years, with devastating consequences [62]. In the US, some public-transportation

Future outbreaks of viral respiratory infections

During future respiratory virus seasons or other periods of increased viral transmission, any reintroduction of public health mitigation recommendations should be evidence-based. Transparency regarding evidence of benefit and whether potential harms have been thoroughly assessed must be clearly communicated to the public, to inform individual decision making regarding the masking of children and other vulnerable groups. Considering the documented and potential negative impacts of masking

Conclusions

There is a lack of robust evidence of benefit from masking children to reduce transmission of SARS-CoV-2 or other respiratory viruses. In this review, we have, however, identified multiple studies, both randomized and observational, which report that masking may lead to a variety harms in children of all ages.

Recommendations for masking children, therefore, fail even the most basic harm-benefit analyses. The current evidence does not support the recommendation of masks for children to prevent

Future research

- Medical interventions and public health recommendations should be informed by high-quality evidence considering both potential benefits and harms.
- Any new intervention should not be assumed to work but be tested expeditiously with randomized controlled trials and recommendations promptly updated accordingly.
- Cluster randomized trials of recommendations to mask vs not mask could be run in different schools within the same district or county to assess for pre-specified relative reductions in cases

Consent for publication

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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