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Common colds at school a primary driver of asthma hospitalizations for children



Children with asthma tend to have the worst symptoms at the same times each year. Illustration based on 7 years of asthma hospitalization data from across Texas. Credit: Rosalind Eggo

The most dangerous times of year for children with asthma are soon after their schools reopen after a break, and a new study finds that cold viruses are largely to blame.

Health experts have observed that children with asthma tend to have the worst symptoms at the same times each year—when school starts in the



fall and after extended breaks such as Spring Break. Researchers previously speculated that environmental factors such as air quality in schools might be to blame, but the new study confirms that the primary driver of seasonal waves of worsening asthma symptoms, which can lead to hospitalizations, is the prevalence of common colds.

"This work can improve <u>public health strategies</u> to keep asthmatic children healthy. For example, at the riskiest times of year, doctors could encourage patient adherence to preventative medications, and schools could take measures to reduce cold transmission," says Lauren Meyers, professor of integrative biology and statistics and data sciences at The University of Texas at Austin and senior author of the paper published this week in the journal *Proceedings of the National Academy of Sciences*.

Exacerbations, the medical term for worsening <u>asthma symptoms</u>, result in millions of missed work and school days and \$50 billion in direct health care costs in the United States each year.

Earlier studies into the cause of exacerbations involved swabbing individual patients to detect viruses, but Meyers, a mathematical biologist, and her team investigated population-wide patterns of how common colds circulate among adults and children throughout the year to learn about the role of the viruses. The researchers built a computer model that incorporated possible drivers of asthma exacerbations and compared the output of the model to a large set of real-world health data: the timing and locations of about 66,000 asthma hospitalizations from cities across Texas during a seven-year period. By testing each driver independently, the researchers could determine the relative impact of each and find the weighted combination of factors that best fit the data. They determined that the spread of cold viruses, which is heavily influenced by the school calendar, is the primary driver of asthma exacerbations.



"The school calendar predicts common cold transmission, and the common cold predicts <u>asthma</u> exacerbations," says Meyers. "And this study provides a quantitative relationship between those things."

The authors speculate on the mechanism behind this relationship: When children are out of school, they tend to spend less time with other children and are exposed to fewer viruses. As a result, their viral immunity decreases. When they return to school, they are exposed to viruses at much higher rates, and this is also the time when they are most susceptible.

The researchers also found that for adults, unlike children, the primary driver of <u>asthma exacerbations</u> is prevalence of the flu virus.

Finally, the team developed more accurate rates of transmission of cold viruses than have been produced by previous studies. That information might help shed light on how common colds spread, and how we can protect people who are most vulnerable to them.

The paper's first author is Rosalind Eggo, a former postdoctoral researcher at UT Austin who is currently a research fellow at the London School of Hygiene & Tropical Medicine. She conducted the primary analyses in the study.

More information: Respiratory virus transmission dynamics determine timing of asthma exacerbation peaks: Evidence from a population-level model, *Proceedings of the National Academy of Sciences*, <u>www.pnas.org/cgi/doi/10.1073/pnas.1518677113</u>

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