Association of In-person vs Virtual Education With Community COVID-19 Case Incidence Following School Reopenings in the First Year of the COVID-19 Pandemic

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IMPORTANCE: The variability in timing of middle and secondary school reopenings during the 2020 to 2021 school year in the US presents an opportunity to examine the associations of different approaches to in-person education with changes in community COVID-19 incidence. Early studies on this topic have reached mixed conclusions and may be biased by unmeasured confounders. OBJECTIVE: To estimate the association of in-person vs virtual instruction for students at the sixth grade level or above with county-level COVID-19 incidence in the first year of the COVID-19 pandemic. DESIGN, SETTING, AND PARTICIPANTS: This cohort study included matched pairs of counties resuming school programs with in-person vs virtual instruction, drawn from 229 US counties that contained a single public school district and with county populations exceeding 100?000 residents. Counties that contained 1 single public school district and reopened in-person schooling for students at the sixth grade level or above during the fall of 2020 were matched 1-to-1 with counties whose school district reopened with only virtual instruction, based on geographic proximity, population-level demographic factors, the resumption of school district–level fall sports activity, and baseline county COVID-19 incidence rates. Data were analyzed from November 2021 to November 2022. EXPOSURES: In-person instruction for students at the sixth grade level or above resuming between August 1 and October 31, 2020. MAIN OUTCOMES AND MEASURES: County-level daily COVID-19 incidence per 100?000 residents. RESULTS: The inclusion criteria and subsequent matching algorithm led to the identification of 51 pairs of matched counties among 79 total unique counties. Exposed counties had a median (IQR) of 141?840 (81?441-241?910) residents each, and unexposed counties had a median (IQR) of 131?412 (89?011-278?666) residents each. County schools with in-person vs virtual instruction had similar daily COVID-19 case incidence within the first 4 weeks after in-person reopening, but counties with in-person instruction had higher daily incidence beyond 4 weeks. Daily case incidence per 100?000 residents among counties with in-person instruction, compared with counties with virtual instruction, was higher at 6 weeks (adjusted incidence rate ratio, 1.24 [95% CI, 1.00-1.55]) and at 8 weeks after (adjusted incidence rate ratio, 1.31 [95% CI, 1.06-1.62]). This outcome was also concentrated in counties where schools provided full rather than hybrid instructional models. CONCLUSIONS AND RELEVANCE: In a cohort study of matched pairs of counties that reopened with in-person vs virtual instruction at the secondary school level in the 2020 to 2021 academic year, counties with in-person school instructional models early in the COVID-19 pandemic experienced increases in county-level COVID-19 incidence at 6 and 8 weeks after in-person reopening, compared with counties with virtual instructional models.

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