There is limited information on the effectiveness of the booster doses of COVID-19 vaccines among children and adolescents. We evaluated nationwide information surveillance systems in Brazil to estimate vaccine effectiveness (VE) against outcomes of COVID-19 in children and young persons.

Methods | We used a test-negative case-control design to analyze data between December 2021 and August 2022 during Omicron variant dominance. Cases and controls were defined as individuals with a positive and negative test result for SARS-CoV-2 infection enrolled in the systems in the same time frame, respectively. The primary exposure of interest was vaccination status. The main outcomes of interest were symptomatic SARS-CoV-2 infection and COVID-19-related death. VE was estimated using the binary logistic regression, calculated after immunization with 2 doses and a booster of BNT162b2, ChAdOx1 nCoV-19, and CoronaVac. All models were adjusted for age (5-11, 12-17, 18-25 years), sex, region, and comorbidities (eMethods in Supplement 1). Results were expressed as VE (%) using the formula VE = 100 × (1 – adjusted odds ratio) and 95% CIs. We accessed all data from publicly available databases with deidentified cases. Data on race and ethnicity were not available. Data collection and analysis were carried out under ethically agreed principles on open data in Brazil, for which ethics board approval waiver were obtained from Federal University of Minas Gerais. This study followed the STROBE reporting guideline.

Results | Overall, 5 787 547 individuals aged 5 to 25 years were included in the analysis (2 080 867 with positive test result and 3 706 680 controls). VE against symptomatic SARS-CoV-2 infection after 2 doses achieved was 49.4% (95% CI, 48.8%-50.0%), 26.0% (95% CI, 25.2%-26.7%), and 7.2% (95% CI, 6.5%-7.8%) for children, adolescents, and young adults, respectively. For children and adolescents, BNT162b2 had the highest VE (62.3% [95% CI, 60.7%-63.9%] and 30.8% [95% CI, 28.9%-32.6%], respectively). For young adults, ChAdOx1 nCoV-19 achieved the highest VE (29.5% [95% CI, 27.1%-31.8%]). Among adolescents and adults who received the booster dose, VE against symptomatic infection was similar for all vaccine types, with overlapping CIs (Figure 1).

Of 2 031 819 individuals with SARS-CoV-2 infection, 904 died. After 2 doses, VE against death was 42% (95% CI, 31.0%-51.4%), achieving 64.5% (95% CI, 43.3%-77.8%) for
individuals who had booster doses. This protection level was nominally higher for children (65.7% [95% CI, 34.5%-82.0%]) than adolescents (43.4% [95% CI, 19.4%-60.3%]) and young adults (32.5% [95% CI, 15.8%-45.8%]) but with overlapping CIs. After the booster dose, there was a significant increase in VE against death for adolescents (80.8% [95% CI, −21.2% to 97.4%]) and young adults (61.7% [95% CI, 37.5%-76.6%]). For all age groups, VE against death of all vaccine types was similar with overlapping CIs (Figure 2).

Discussion | We assessed the effectiveness of the different vaccine regimens for young people in Brazil. In this real-world analysis, including a substantial populational sample, despite the relatively low effectiveness against symptomatic Omicron infection, all vaccines offered significant protection against COVID-19–related death, especially after the booster dose. Our findings agree with a meta-analysis of children aged 5 to 11 years that reported protection against SARS-CoV-2 infection of 47% (odds ratio, 0.53; 95% CI, 0.41-0.70). The protection against COVID-19–related death in our study was similar to data reported for children aged 5 to 11 years in other populational studies. A limitation of our study is a possible underestimated VE against Omicron infection due to omitted vaccination time for most participants.

Regardless of vaccine schedule, we observed low effectiveness in preventing Omicron infection in young people. However, VE against death was still effective after 2 doses for children and the booster dose for adolescents and young adults. Although there were variations among the age groups, all vaccine regimens had comparable effectiveness against the outcomes.

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