

## Addendum to: Children are not COVID-19 super spreaders: time to go back to school

Since publication of our original article,<sup>1</sup> additional evidence has come to light providing further support for our viewpoint. Several high-quality studies of contact tracing (including household transmission) have demonstrated a significantly lower attack rate in children than adults,<sup>2-3</sup> including in New York state and Israel where all household members had nasopharyngeal swabs tested with rt-PCR regardless of symptoms. Children were infected at around half the rate of adults within the same household.<sup>4-5</sup> A household contact study from The Netherlands using serology in addition to rt-PCR showed similar findings.<sup>6</sup> Suggestions that children in these studies have been protected from transmission by school closures do not appreciate that a significant proportion of community transmission occurred prior to the closing of schools, after which a large burden of transmission was within households, from which children would not be shielded. This would not affect relative household contact attack rates. Further data from Iceland<sup>7</sup> (where schools for young children have remained opened) and The Netherlands<sup>8</sup> have confirmed extremely low levels of child-to-child or child-to-adult transmission, with the majority of transmission occurring between adults. A public health report from Norway found no evidence of children acting as disease reservoirs.<sup>9</sup> The most comprehensive seroepidemiology to date from Spain has found a significant difference in the rate of COVID-19 infection according to age (1%–3% of children compared with >5% of adults).<sup>10</sup> These findings have been replicated in sero-surveillance from Switzerland where young children were less frequently infected than adults, with similar rates of infection compared to the elderly despite children having significantly more household contacts with positive serology.<sup>11</sup> A pre-print study from Lombardy, Italy, also found increasing rates of sero-positivity with age.<sup>12</sup> A study in Ireland of 6 positive cases within a school (3 staff, 3 student) resulting in over 1000 contacts led to only 2 additional cases; both from adults, to adults outside of the school environment.<sup>13</sup> A contact tracing study

in schools from Singapore found very limited spread amongst children.<sup>14</sup> An additional pre-print study from primary schools in a high incidence area in France demonstrated sero-positive pupils were most likely to be infected in the home, and there was no evidence of spread within the schools.<sup>15</sup> It should be noted an equivalent study in a high school setting from the same area found very high levels of positivity among pupils aged 14 years and above,<sup>16</sup> highlighting the need for increased vigilance and infection prevention measures in teenagers compared to younger children.

Schools cannot remain closed indefinitely, and there is very little controversy among child health professionals of the collateral damage being done to children (particularly those most vulnerable) as a result of the lockdown.<sup>17</sup> Schools will not reopen as they were prior to the pandemic, but the community must work collaboratively and across stakeholders and agencies to achieve a 'new normal', which includes risk mitigation balanced against potential harms to our children and young people. As suggested by the WHO, countries' implementation of comprehensive track and trace systems is fundamental to ensuring that school reopening does not pose a threat to wider community transmission of SARS-CoV-2. Young people and their parents are technologically adept and provide an ideal cohort for use of phone/app-based solutions to transmission monitoring. Unlike workplaces, schools provide a highly regulated environment which is well suited to investigation of potential disease exposure. On the other hand, institutions and national guidelines should be cautious about instituting overly aggressive or invasive social distancing measures within schools, which could be psychologically isolating or harmful to young children, and may not be required given the much smaller risk children pose in transmission compared with adults.

Some transmission within schools of SARS-CoV-2 is inevitable. However, unlike adult workplaces, transportation or leisure activities, the risks of severe illness or widespread transmission are greatly reduced, and the potential for rapid control of an outbreak is much better. Early signs from European countries where children have been allowed back to school appear promising, but detailed monitoring of school and wider societal transmission must continue for the foreseeable future to ensure outbreaks remain local and well contained.

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