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The development of adolescent health and medicine in Europe as a multidisciplinary community of practice mirrors the timespan of this dataset; for example, the International Association for Adolescent Health was inaugurated in 1987 and can be seen as a milestone in the field. In the past 30 years, societies for adolescent health and special interest groups within national paediatric societies have been created, advocating for a unique approach to the adolescent population and ensuring the need for a smooth and safe transition from paediatric to adult medicine.⁹ Recognition of the need to implement tailored interventions in different life settings, including schools, to prevent future development of NCDs has led to innovative global, regional, and national policies,¹⁰ and we need to enhance this focus.

A critical mass of advocates is needed across Europe to ensure that adolescents who live with NCDs build long-term, trusting relationships with their health-care team, and receive the best possible prevention and management strategies. Central to these goals are the voices of adolescents living with NCDs, through their genuine participation in the development of relevant policies and services. The next 30 years will hopefully see further improvement of adolescent health in Europe, with health systems that protect and empower this unique population in their transition from childhood to adulthood living with long-term health-care needs. This can only be achieved if we have comprehensive and reliable data disaggregated by sex, age, socioeconomic status, and ethnicity to underpin research, policy, and the training of health-care workers. Studies such as the current contribution from Armocida and colleagues provide a sobering analysis of trends that European Governments cannot afford to ignore.

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Importance of understanding the reinfection risk of COVID-19 in children

The Article by Anna A Mensah and colleagues¹ addresses the important question of COVID-19 in children and the risk of reinfection over time in England. These data were collected before the emergence of the omicron variant

of concern in England, but provide helpful insights into the overall picture of COVID-19, which has been quite different in children when compared with adults. Notably, with every decade of life there is an increasing



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risk of severe disease, including admission to hospital and death.

This study also reinforces that the SARS-CoV-2 infection incidence in children is reflective of the trends observed in the community. The authors concluded that the risk of SARS-CoV-2 reinfection was strongly related to exposure due to community infection rates (particularly during the delta variant wave). They also noted that children had a lower risk of reinfection than did adults, but reinfections were not associated with more severe disease or fatal outcomes.

Children live with families or guardians and their school attendance and engagement in social networks are crucial to their development. The indirect effects of the pandemic on children, including the impact of COVID-19 on household family members, schooling, and mental health, are important to note.² Hence, understanding the risk of reinfection in children is paramount, including the study finding that the reinfection rate was lowest in those not yet able to access a vaccine in most countries (ie, those younger than age 5 years). The lowest reinfection rate of 0.9 per 100 000 population was found in children younger than age 5 years, compared with 1.9 per 100 000 population in those aged 5–11 years and 5.5 per 100 000 population in those aged 12–16 years. These rates were 23, 11, and four times lower than in adults aged 20–29 years, who were unvaccinated and had the highest reinfection rate during that time period.

The methodology used in the study establishes a framework to review the effect of vaccines on reinfection by age groups, noting that countries such as Australia, Canada, and the USA have all commenced an mRNA vaccination programme in children aged

5–11 years, as have the UK as per advice from the Joint Committee on Vaccination and Immunisation (JCVI) on Feb 16, 2022.³ The JCVI recommendation is for children aged 5–11 years who have a clinical risk condition or are living with someone who is immunosuppressed.

A limitation of this paper was that it did not capture the impact of reinfection on paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2, also known as multisystem inflammatory syndrome in children (MIS-C). This condition is a post inflammatory complication, occurring in children with a median age of 9 year and presenting about 2–6 weeks after SARS-CoV-2 infection.⁴ A single COVID-19 vaccine dose has reduced the number of MIS-C cases according to publications from France and the USA, and further study is required to investigate if this complication also occurs after reinfection.^{5,6}

The study's finding that reinfection might not have been the reason for hospital admission (ie, patients might have been admitted to hospital with COVID-19, not because of COVID-19) is not unexpected. The medical history of paediatric readmission cases requires a detailed review of underlying co-morbidities and the final ICD-10 diagnoses. However, severe symptoms with COVID-19 are more common in those with a past medical history; in the study, the four children who had been admitted to an intensive care unit (ICU) following reinfection had also required intensive care during their primary infection. All four children had multiple and severe multisystem comorbidities and the authors could not ascertain the contribution of SARS-CoV-2 infection to the illness that eventually led to ICU admission. A publication by Ward and colleagues found that in the first year of the pandemic (2020), 51 children and adolescents in the UK were admitted to a paediatric ICU with COVID-19, and 91% of these children or adolescents had a pre-existing health condition.⁷ However, an important key finding of Mensah and colleagues' study is that reinfection with SARS-CoV-2 was not associated with fatal paediatric cases.¹

A potential area for future research is the role that rapid antigen testing might play in identifying cases of reinfection, especially as many countries have introduced routine screening (eg, in schools). Many of these reinfection cases will be asymptomatic, so their role in transmission at household, school, and

community levels will be important to monitor, particularly if new variants of concern emerge.

Finally, investigation of the role that multiple reinfections will have on the immune system in vaccinated individuals will be important, with a particular focus on the development of B cell and T cell immune memory.⁸ The interplay between infection and vaccine will be crucial throughout 2022 and 2023 and will hopefully optimise protection across the life course and minimise the risk of reinfection (particularly that associated with severe disease), hospital admission, intensive care, and death.

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Gamblification: risks of digital gambling games to adolescents



Gamblification is the insertion of gambling mechanics into digital entertainment activities, including video games. Although the distinction between gambling, game playing, and consumer purchasing has traditionally been clear cut, diverse and new digital products increasingly blur these lines. Many products have strong gambling components that might not be perceived as such by adolescents—eg, virtual casinos and computer games with randomised rewards. Is such gamblification exposing a generation of adolescents to heightened risks of harm?

In one generation, adolescents' entertainment activities have shifted towards digital games, many with gambling components. Although probably fewer in low-income and middle-income countries, up to two-fifths of adolescents in high-income countries reported past-year engagement in simulated gambling games.^{1,2} These include loot boxes (in-game containers with randomised virtual rewards), chance-based mini-games, social casino, and demo games that replicate gambling but reward players with virtual credits or items (eg, skins).^{2,3} These virtual items and cash can be gambled on gambling websites and e-sports (ie, competitive

video game-play). One analysis of 551 adolescents aged 12–17 years in Australia found that popular gamblified digital activities are purchasing loot boxes (36.5% in the past-year), games with mini gambling components (31.7%), demo games (14.2%), social casino games on apps (14.2%) or social media (11.8%), and skin gambling (14.5%), including on e-sports (6.2%).²

Adolescents who play gamblified games have elevated rates of problematic gambling and problematic gaming, which are linked to decrements to their health and wellbeing in numerous life domains.^{4–6} Health concerns include behavioural addiction, characterised by persistent, recurrent engagement in the activity that leads to clinically significant impairment or distress. Even at non-clinical levels, diminished control over gambling or gaming can impair important areas of functioning, including mental and physical health, family and social relationships, school and occupational performance, and financial situation. These harms have legacy effects into later life, but it is not yet known whether adolescents who play gamblified games face higher risks of gambling problems in adulthood. Research is nascent, and any causality and gateway

