

Vaccine hesitancy in adolescents: a review article

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Introduction:

Vaccine hesitancy (VH) in adolescents continues to be a major health concern in communities. It has not been widely studied and continues to be a challenge to community well-being. This article aims to review the major causes of VH and possible strategies to address it.

The concept of vaccination dates to the 18th century. The first true vaccine was developed in 1796 by the English physician Edward Jenner. Adolescence includes the years of life that bring changes in emotional, physical, and psychological development, typically ranging from 10 to 19 years of life[2].

Tdap, Meningococcal Conjugate (MenACWY), Human Papillomavirus (HPV), Influenza, Meningococcal B (MenB), and COVID-19 are the recommended vaccines by the Advisory Committee on Immunization Practices (ACIP) during these years [3]. Vaccination in adolescents plays a very important role in the overall well-being of a community. When people get immunized, it slows the spread of disease in the community; this phenomenon is called herd immunity [4]. If there are many non-vaccinated and susceptible people, even though they may not suffer from the disease themselves but can also facilitate transmission to others who are not immunized, thus breaking the protective barrier that herd immunity provides. This break in herd immunity was one of the important reasons for the spike in measles in the United States in 2019, which had once been eradicatedⁱ [5]. Focusing on adolescents for preventable diseases is also very important since they can make a big difference in disease spread. High school, being a closed environment where frequent interactions occur, is at high risk of spreading disease. In these situations, vaccination can prove important in preventing transmission of serious disease. The impact of vaccination in adolescents can be long-lasting. For example, HPV vaccination can decrease the risk of cervical cancer later in life [6]. VH likely serves as a surrogate marker of poor preventive health in the later years of life, probably because of shared barriers such as low health literacy, poor access, etc. [7].

Discussion:

Adolescent vaccine hesitancy has been between 19-23% [8]. VH rates for HPV were noted to be 30.1% and 55.9% for the COVID-19 vaccine among parents of > 9-year children in a recently conducted survey [9].

We tried to take a deeper dive into the causes of vaccine hesitancy. The Strategic Advisory Group of Experts on Immunizations (SAGE) of WHO gave a model, which was known as the 3C model. The 3 Cs stand for complacency, convenience, and confidence. Complacency is defined as vaccination being thought of as unnecessary or not needed since the perceived risk of contracting disease is low. The availability, affordability, and accessibility of vaccination was categorized under the 2nd C- Convenience. The 3rd C, Confidence is defined as the trust in the safety and effectiveness of vaccines, and health care services.

VH in this age group is multifactorial. The thought of being young and healthy and hence not needing vaccinations has been one of the important reasons for this reluctance; safety concerns of vaccines and systemic distrust are emerging as a post-pandemic amplifier [10]. There is also misinformation about vaccination available on social media and platforms like TikTok and YouTube, which are not reliable sources for health information. Social media platforms also create a lot of misinformation about vaccine side effects, which can also deter adolescents from getting it. There have been studies done on parental vaccine hesitation, and in general, the mindset of adolescents can be highly influenced by their parents [11]. Cultural, political atmosphere at home can influence a teenager's belief in the health care system and vaccination success [10].

We need interventions and changes to health education to provide more information and awareness amongst adolescents towards the importance of vaccination and to create more trust towards health care systems. Public high schools can reduce adolescent VH by implementing school-based vaccination clinics and educating students through science curricula to combat misinformation. Effective strategies also include leveraging trusted community leaders for education, implementing school-located vaccination (SLV) clinics to improve access, and providing clear, proactive communication about vaccine benefits.

Health education programs in schools to explain risks vs benefits of vaccination, how vaccines work, will help improve vaccination rates and reduce mistrust, as well as misinformation. School education programs can include group discussions, peer discussions, and bringing in guest speakers like physicians and other medical personnel. Dorell et al reported provider recommendation to be the most important factor in family's decision about whether an adolescent or young adult will be vaccinated [12]. Creating more online awareness by providing correct information on social platforms will create

more awareness in students as well as parents. Esposito et al studied the impact of a website based educational program on vaccination coverage among adolescents; According to this article, use of the website plus the lesson significantly increased the overall awareness of the benefits of vaccinations against diseases ($p < 0.01$), knowledge on vaccine-preventable disease (i.e., potential severity, $p = 0.001$; transmission route of meningitis, $p < 0.01$), and reduced the fear of vaccines ($p < 0.001$) [13]. Odone et al after a systematic review of the available literature, concluded that even though media-based programs probably can affect the vaccination rates, but currently scant data is available, and further rigorous research is warranted - including cost-effectiveness assessments [14].

Many schools also host on site vaccination clinics where health care providers come in to give vaccinations. Even if the school does not provide vaccination, proof of vaccination is required to attend in-person school. Expanding availability of vaccination at school improve vaccination rates, and help avoid cost of travel, appointments, avoid days of missed school. However, we will still need to integrate parental consent, education initiatives, and resources available to improve the vaccination rates amongst adolescents.

Conclusion:

Vaccination in young age group has great advantages for any country. Reluctance to vaccination in adolescents has multiple reasons like poor education, lack of parental consent and awareness, poor access to vaccination clinics. Our review article finds there needs to be more emphasis on ways to improve school education, easy access to vaccines to improve the health of next generation. There also needs to be more studies on overall acceptance of vaccination in population, especially among adolescents since educated, well informed people will likely approve of preventive medicine and vaccinations for their families in future. Given social media has a big impact on adolescents, there needs to be an effort to create more online resources to fight misinformation about vaccinations and address misinformed concerns.

1. World Health Organization. Summary WHO SAGE conclusions and recommendations on vaccine hesitancy (2015).

Available: <https://cdn.who.int/media/docs/default-source/immunization/demand/summary-of-sage-vaccinehesitancy-en.pdf>

2. Sawyer, S.M. (2012). Adolescence: A Foundation for Future Health. *Lancet*, Apr 28;379(9826):1630-40. doi: 10.1016/S0140-6736(12)60072-5.
3. O'Leary, S. T. (2026). Recommended Childhood and Adolescent Immunization Schedule: United States, 2026: Policy Statement. *Pediatrics*, 157 (3):e2025075754.
4. Ashby, B. (2021). Herd immunity. *Curr Biol*, Feb 22;31(4):R174-R177.
5. Patel M, L. A. (2019). *National Update on Measles Cases and Outbreaks - United States, January 1-October 1, 2019*. MMWR. Morbidity and Mortality Weekly Report.
6. Henschke, N. (2025). Effects of human papillomavirus (HPV) vaccination programmes on community rates of HPV-related disease and harms from vaccination. *Cochrane Database of Systematic reviews*.
7. Ilango SM, H. R. (2025). Gaps in Care Among Adolescents and Young Adults in the United States. *American Journal of Preventive Medicine*.
8. Vashist, K. (2024). Changes in vaccine hesitancy among parents of children aged 6 months - 17 Years, National Immunization Surveys, 2019-2022. *Vaccine*, Aug 13;42(20):125989.
9. Santibanez, T. A. (2024). Parental hesitancy about COVID-19, influenza, HPV, and other childhood vaccines. *Vaccine*, Nov 14;42(25):126139.
10. Boakye, E. A. (2023). Trends in Reasons for Human Papillomavirus Vaccine Hesitancy: 2010-2020. *Pediatrics*, Jun 1;151(6):e202206041.
11. English, A. (2023). Adolescents, Young Adults, and Vaccine Hesitancy: Who and What Drives the Decision to Vaccinate? *Pediatr Clin North Am*, Apr;70(2):283-295.
12. Christina Dorell, D. Y. (2013). Factors that influence parental vaccination decisions for adolescents, 13 to 17 years old: National Immunization Survey-Teen, 2010. *Clin Pediatr (Phila)*, Feb;52(2):162-70. doi: 10.1177/0009922812468208. Epub 2012 Dec 6.
13. Esposito, S. (2018). Impact of a website based educational program for increasing vaccination coverage among adolescents. *Hum Vaccin Immunother*, Apr 3;14(4):961-968.
14. Anna Odone, A. F. (2015). Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage. *Hum Vaccin Immunother*, 11(1):72-82. doi: 10.4161/hv.34313. Epub 2014 Nov 1.