
COMMENTARY

Vaccine Confidence and the Importance of an Interdisciplinary Approach

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Keywords: Public Health, Preventive Medicine, Pediatrics, Interdisciplinary Research, Vaccines

Abstract: Parental confidence in vaccines is waning. To sustain and improve childhood vaccine coverage rates, insights from multiple disciplines are needed to understand and address the socio-cultural factors contributing to decreased vaccine confidence and uptake.

Vaccination is the safest and most effective means to prevent communicable disease.¹ Not only are serious adverse events after vaccination extremely rare,² but the benefits are also immense: children vaccinated against 13 diseases will experience an estimated 20 million fewer cases of those diseases and 42,000 fewer early deaths during their lifetimes.³ In part due to the safety and effectiveness of vaccines, childhood vaccination programs have been remarkably successful. In the US, vaccination coverage levels for many vaccines in 2019 were $\geq 90\%$.⁴ In the UK, the percentage of children who had received the routinely recommended vaccines by their first or second birthday in 2019–20 was $\geq 90\%$.⁵ Globally, nearly two-thirds of all countries have reached the Global Vaccine Action Plan 2011–2020 target of $\geq 90\%$ national cov-

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erage with the third dose of a diphtheria and tetanus toxoids and pertussis-containing vaccine and the first dose of a measles-containing vaccine.⁶

This success, however, is increasingly tenuous. As Benbow⁷ implies, the success of childhood vaccination programs is threatened by several socio-cultural factors that have the potential to undermine confidence in the science and truths that are foundational to vaccination programs. It is worth emphasizing two such factors: the democratization of scientific and medical knowledge — a contributor to the “dizziness of freedom” — as well as the embrace of a postmodern medical paradigm among anti-vaccine advocates. These factors are synergistic. Health information is increasingly exchanged through social media sites without the involvement of “traditional gatekeepers such as health professionals and organizations” such that “anyone can contribute, easily and often quasi-anonymously.”⁸ This openness, in turn, can elucidate the complexity and uncertainty in the state of the science around medical interventions, like vaccinations (and it is worth noting that this complexity and uncertainty can also be perpetuated by conventional media, such as when, for instance, new theories regarding vaccine safety are featured before there is scientific consensus on their validity). It is this complexity and uncertainty that is leveraged to advance an agenda designed to locate truth outside of objective, scientific evidence. Whereas the focus of past anti-vaccine movements had been to undermine the role of scientific experts in making decisions about health,⁹ the current anti-vaccine movement has intensified this focus to question the legitimacy of science and the biomedical enterprise itself.¹⁰

Concerning trends in the acceptance of childhood vaccines have consequently emerged. The proportion of 19–35 month old US children who received no vaccinations nearly doubled from 2013 to 2017.¹¹ Among UK adults surveyed, 55% agreed with or were undecided about the statement “Vaccines are not needed for diseases that are not common anymore.”¹² Perhaps most concerning is a growing uncertainty about what constitutes the truth. Nearly one-third of UK adults surveyed do not think the information they receive above vaccines is reliable and trustworthy.¹³ Among US adults, 15% of 18–29 year-olds don’t trust medical scientists to provide full and accurate information on the health effects of the measles-mumps-rubella vaccine, compared to only 6% of ≥65 year-olds.¹⁴

Given this landscape, it is increasingly apparent that vaccination strategies informed by the disciplines of vaccinology, public health, medicine, law and epidemiology — the disciplines that have been most

ground it in empirical research. We cannot simply be content with arguments for one strategy to promote and sustain vaccine uptake over another. We must ultimately ground the vaccination strategies we pursue on data supporting their effectiveness. In this way, though Benbow may be right that educating the public about the verbal maneuvers used within anti-vaccination discourse will be effective in making them less prone to their influence, this is only a hypothesis that must be tested.

The article by Benbow is also a cue to the importance of trust in the vaccine enterprise. A study of vaccine mis- and dis-information is, in essence, a study of trust.¹⁷ After all, we can't achieve vaccine confidence without trust: between the public and the scientists that develop vaccines, between the public and pharmaceutical companies that produce vaccines, between the public and federal agencies that approve vaccines, and between patients and their clinicians who recommend and deliver vaccines.¹⁸ Mis- and dis-information thrive where trust in these relationships have deteriorated.

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has reminded us of the importance of trust in these relationships. The politicization of the processes to develop and approve a SARS-CoV-2 vaccine exposed the fragility of these processes and the agencies that endorse them,¹⁹ compromising public trust and confidence.²⁰ The pandemic was also yet another reminder that the social contract is not reciprocal for many in society.²¹

The success in producing a vaccine as a medical countermeasure within months of the start of the pandemic has been diminished by the failure to fulfill the social and moral values central to ethics and global health, such as prioritizing the disadvantaged.

Over the last two decades, the field of vaccine confidence has produced incredible insights into what motivates people to get vaccinated and how to leverage those motivations to improve vaccine uptake. To continue these advances, researchers in the field must move beyond working in parallel and seek to integrate disciplinary skills and perspectives. And researchers must seek the development and evaluation of new strategies to address long-standing issues such as trust and equity. Post-pandemic, these are not simply opportunities, but responsibilities.

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responsible for the progress to date in sustaining and improving vaccine uptake — are no longer sufficient.¹⁵ Rather, vaccination strategies need to incorporate expertise from disciplines such as anthropology, ethics, behavioral economics, history, and political science. These disciplines are critical to understanding and addressing socio-cultural factors that challenge acceptance of childhood vaccines. Indeed, the World Health Organization has recommended that a post-2020 immunization strategy must have “greater collaboration and integration within and beyond the health sector,” should promote a “wide-ranging view of collaboration and integration, at all levels and across all functions,” and needs to include “the use of implementation science, operational research, delivery science, behavioral and social research, and data science to develop, pilot and evaluate improvements to national programs.”¹⁶

The article by Benbow appeals to this type of interdisciplinary approach and illustrates the need to

Note

Dr. Larson reports grants and other from GSK, grants from Merck, outside the submitted work. Dr. Opel reports grants from US National Institutes of Health, outside the submitted work.

References

1. US Centers for Disease Control and Prevention, *A CDC Framework for Preventing Infectious Diseases: Sustaining the Essentials and Innovating for the Future*, 2011, available at <<https://www.cdc.gov/ddid/docs/ID-Framework.pdf>> (last visited October 5, 2021).
2. M. A. Maglione, L. Das, and L. Raaen, et al., "Safety of Vaccines Used for Routine Immunization of U.S. Children: A Systematic Review," *Pediatrics* 134, no. 2 (2014): 325-337; Institute of Medicine, *Adverse Effects of Vaccines: Evidence and Causality* (Washington, DC: National Academies Press, 2011).
3. F. Zhou, A. Shefer, and J. Wenger, et al., "Economic Evaluation of the Routine Childhood Immunization Program in the United States, 2009," *Pediatrics* 133, no. 4 (2014): 577-585.
4. H. A. Hill, D. Yankey, and L. D. Elam-Evans, et al., "Vaccination Coverage by Age 24 Months Among Children Born in 2016 and 2017 — National Immunization Survey-Child, United States, 2017-2019," *Morbidity and Mortality Weekly Report* 69, no. 42 (2020): 1505-1511.
5. Nuffield Trust, "Vaccination Coverage for Children and Mothers: This Indicator Looks at Vaccination Coverage for Children and Mothers in the UK and Internationally," 2021, available at <<https://www.nuffieldtrust.org.uk/resource/vaccination-coverage-for-children-and-mothers-1#background>> (last visited October 5, 2021).
6. M. Peck, M. Gacic-Dobo, and M. S. Diallo, et al., "Global Routine Vaccination Coverage," *Morbidity and Mortality Weekly Report* 68, no. 42 (2018): 937-942.
7. D. I. Benbow, "The Dizziness of Freedom: Understanding and Responding to Vaccine Anxieties," *Journal of Law, Medicine & Ethics* 49, no. 4 (2021): 580-595.
8. H. O. Witteman and B. J. Zikmund-Fisher, "The Defining Characteristics of Web 2.0 and Their Potential Influence in the Online Vaccination Debate," *Vaccine* 30, no. 25 (2012): 3734-3740.
9. J. Colgrove, "Science in a Democracy': The Contested Status of Vaccination in the Progressive Era and the 1920s," *Isis* 96, no. 2 (2005): 167-191.
10. A. Kata, "A Postmodern Pandora's Box: Anti-Vaccination Misinformation on the Internet," *Vaccine* 28, no. 7 (2010): 1709-1716; P. J. Hotez "Anti-Science Extremism in America: Escalating and Globalizing," *Microbes and Infections* 22, no. 10 (2020): 505-507.
11. H. A. Hill, L. D. Elam-Evans, and D. Yankey, et al., "Vaccination Coverage Among Children Aged 19-35 Months — United States, 2017," *Morbidity and Mortality Weekly Report* 67, no. 40 (2018):1123-1128.
12. J. Luyten, L. Bruyneel, and A. J. van Hoek, "Assessing Vaccine Hesitancy in the UK Population Using a Generalized Vaccine Hesitancy Survey Instrument," *Vaccine* 37, no. 18 (2019): 2494-2501.
13. *Id.*
14. Pew Research Center, "Vast Majority of Americans Say Benefits of Childhood Vaccines Outweigh Risks," 2017, available at <https://www.pewinternet.org/wp-content/uploads/sites/9/2017/02/PS_2017.02.02_Vaccines_FINAL.pdf> (last visited October 5, 2021).
15. American Association of Arts and Sciences, *Public Trust in Vaccines: Defining a Research Agenda* (AAAS Press, Cambridge, Mass, 2014); The Lancet, "Looking Beyond the Decade of Vaccines," *Lancet* 392, no. 10160 (2018): 2139.
16. Strategic Advisory Group of Experts on Immunization, "The Global Vaccine Action Plan 2011-2020: Review and Lessons Learned," 2019, available at <www.who.int/immunization/en/> (last visited October 5, 2021).
17. H. J. Larson, R. M. Clarke, and C. Jarrett, et al., "Measuring Trust in Vaccination: A Systematic Review," *Human Vaccines & Immunotherapeutics* 14, no. 7 (2018): 1599-1609.
18. H. J. Larson, *Stuck: How Vaccine Rumors Start — And Why They Won't Go Away* (New York, NY: Oxford University Press, 2020).
19. D. J. Opel, D. A. Salmon, and E. K. Marcuse, "Building Trust to Achieve Confidence in COVID-19 Vaccines," *JAMA Network Open* 3, no. 10 (2020): e2025672.
20. Pew Research Center, *U.S. Public Now Divided Over Whether To Get COVID-19 Vaccine*, 2020, available at <<https://www.pewresearch.org/science/2020/09/17/u-s-public-now-divided-over-whether-to-get-covid-19-vaccine/>> (last visited October 5, 2021).
21. The Lancet, "COVID-19: Remaking The Social Contract," *Lancet* 395, no. 10234 (2020): 1401.