

How Should Non-Experts Form Beliefs About the Safety of Vaccines?

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1 Introduction

Healthcare is an important area for laypeople, policymakers, and society to form accurate beliefs about, because so much is at stake for them, including the prevention and treatment of diseases, illnesses, and injuries. However, the challenge is that there is so much information available that it is very hard to form those beliefs. PubMed, which is a search engine for scientific studies related to life sciences and biomedicine, contains over 27 million records from approximately 7,000 journals as of year 2017 and the amount keeps growing.¹

One approach to forming beliefs about healthcare could be to rely on experts who are able to filter some of this information. However, there is some distrust of health experts in society. For example, according to a survey conducted by the Pew Research Center in 2019, only 32% of Americans think that medical scientists provide fair and accurate information.² Furthermore, only 59% of people in Western Europe think that vaccines are safe and in Eastern Europe only 40% think so³ even though scientists are confident that vaccines do not cause autism.⁴ How then should non-experts form beliefs about

¹Peace Ossom Williamson and Christian I. J. Minter, “Exploring PubMed as a Reliable Resource for Scholarly Communications Services,” *Journal of the Medical Library Association: JMLA* 107, no. 1 (January 2019): 17.

²Cary Funk et al., “Americans Often Trust Practitioners More than Researchers,” *Pew Research Center Science & Society* (blog), August 2, 2019, <https://www.pewresearch.org/science/2019/08/02/americans-often-trust-practitioners-more-than-researchers-but-are-skeptical-about-scientific-integrity/>.

³“Wellcome Global Monitor 2018,” accessed December 22, 2019, <https://wellcome.ac.uk/sites/default/files/wellcome-global-monitor-2018.pdf>, 106.

⁴Luke E. Taylor, Amy L. Swerdfeger, and Guy D. Eslick, “Vaccines Are Not Associated with Autism: An Evidence-Based Meta-Analysis of Case-Control and Cohort Studies,” *Vaccine* 32, no. 29 (June 17,

healthcare if there is too much information to filter on their own, but they also do not seem to fully trust experts?

2 Argument

In this section, I will argue that non-experts should still rely on experts for forming beliefs about the safety of vaccines. My argument is the following:

- (1) If non-experts assess evidence poorer in healthcare than experts, then non-experts should rely on experts for forming beliefs about the safety of vaccines.
- (2) Non-experts assess evidence poorer in healthcare than experts.
- (3) \therefore Non-experts should rely on experts for forming beliefs about the safety of vaccines.

Before I will defend the argument, let me define key terms for this. Someone is an “expert for a domain if and only if [they are] a respective authority who [are] competent enough to reliably and creditably fulfill difficult service-activities accurately for which [they are] particularly responsible.”⁵ This definition has the advantage that it enables a lot of different kinds of professionals to qualify for being experts according to specific responsibilities they have rather than giving that option merely to scientists.⁶

Since I am focusing on assessing evidence about the safety of vacciness, then the most likely candidates for experts can be found among the profession of medical scientists, because they are responsible for producing reliable information about the safety of vaccines. Medical scientists who specialize on the science of vaccines are the most likely source of expertise here. Everyone else is very strictly speaking a non-expert on this topic, including medical doctors, healthcare policymakers, and regular citizens. However, some of them may be responsible for other kinds of tasks that require expertise related to vaccines. For example, a medical doctor might be an expert at providing the most up-to-date information on vaccines to patients, but that information would come from medical scientists.

2.1 Why should premise (1) be accepted?

Beliefs about healthcare in general and vaccines in particular have important consequences for society and its members. Vaccines help the body fight against bacteria and

2014): 3623–29.

⁵Christian Quast, “Expertise: A Practical Explication,” *Topoi* 37, no. 1 (March 1, 2018): 12.

⁶Some authors define expertise more narrowly. For example, Michel Croce, “On What It Takes to Be an Expert,” *Philosophical Quarterly* 69, no. 274 (2019): 1–21, prefers to consider someone an expert only in the case that they can contribute epistemically to their field.

viruses to keep people safe from diseases such as measles, polio, tetanus, and many other. If non-experts are not able to form accurate beliefs about the safety of vaccines on their own, then they should rely on other sources for forming such beliefs. Otherwise, they will form uninformed, inaccurate, and harmful beliefs. Although health is not the only value people care about, it is one of the least controversial values, because it is plausibly an intrinsic value or a value instrumental to all other values.⁷ It is doubtful that someone would knowingly choose to suffer from health problems to avoid relying on medical experts.

Furthermore, if non-experts really are worse at forming these beliefs, then they do not have any other options, because relying on other non-experts means poorer performance on forming beliefs about the safety of vaccines and relying on experts through other non-experts is still basically relying on experts. In other words, they could turn to experts, non-expert or to some combination of both, but they would do worse at forming correct beliefs than if they relied on experts. Non-experts such as laypeople could rely on non-experts such as medical doctors, but in that case it would be expected that medical doctors share the information on vaccines that they have received from experts themselves. They would be more justified to attain information about the safety of vaccines from medical doctors than yoga instructors, because medical doctors are likely better at sharing the information experts have identified.

2.2 Why should premise (2) be accepted?

Firstly, in order to assess evidence in the area of vaccines, non-experts need to gain access to the necessary equipment to run experiments.⁸ Even if they could gain that access, they would not know how to use those instruments. In addition, medical scientists study various parts of doing and analyzing science for nearly a decade. Developing these complex skills may not even be open to someone who does not possess certain talents and abilities⁹, because very few people are able to get accepted to PhD programs, which is necessary for becoming a medical scientist. Hence, a non-expert could not even begin to assess evidence in the field of medicine.

Secondly, the skills required are very complex. Non-experts could not assess just one scientific study well, but would have to assess the body of evidence, because a single study may not be trustworthy. One study has a limited sample size, it might be inconsistent with other studies in terms of study design or definitions, and it may have completely different answers or effects compared to other studies. Assessing evidence on the safety of vaccines would also mean knowing how to collect single studies to create a systematic review.

⁷James Wilson, "Why It's Time to Stop Worrying About Paternalism in Health Policy," *Public Health Ethics* 4, no. 3 (November 1, 2011): 275.

⁸John Hardwig, "Epistemic Dependence," *The Journal of Philosophy* 82, no. 7 (1985): 338.

⁹*Ibid*, 339.

This requires knowledge of how to search information properly using scientific databases, creating an eligibility criteria for selecting studies, understanding the field of study, and much more. If there are existing systematic reviews, then it would still require most of this knowledge to properly assess whether the systematic review is good. Furthermore, they would need adequate understanding of statistics, programming languages, and how to interpret data. Experts also possess intuitive understanding that can only be developed in the right learning environment with a lot of experience.¹⁰

3 Objections

In this section, I will provide two objections to the argument, the first one attacking premise (1) and the second one attacking premise (2).

3.1 Objection 1: relying on experts undermines democracy and autonomy

Premise (1) says that if non-experts assess evidence poorer in healthcare than experts, then non-experts should rely on experts for forming beliefs about the safety of vaccines. This premise might not be true if relying on experts is bad for some other reason than improved health outcomes. Does relying on experts not undermine the value of democracy and people being autonomous agents who can think for themselves and choose how to live their own lives? Medical scientists need to make value judgments when they are determining whether vaccines are safe or not and they are not moral experts.¹¹

My response to this objection is that relying on experts does not necessarily have to involve losing autonomy and undermining the value of democracy. Non-experts can still engage with the health sciences by (i) asking whether the questions experts are studying are questions that they want answers to and (ii) whether particular experts share the values of non-experts when they are deciding what evidential threshold to use when accepting scientific hypotheses.¹² When it comes to vaccines, non-experts can demand that experts study side-effects of vaccines more and communicate those answers to the public, for example.¹³

A non-expert can also to some extent evaluate whether a purported expert is truly

¹⁰Daniel Kahneman and Gary Klein, “Conditions for Intuitive Expertise: A Failure to Disagree,” *American Psychologist* 64, no. 6 (2009): 520.

¹¹Richard Rudner, “The Scientist Qua Scientist Makes Value Judgments,” *Philosophy of Science* 20, no. 1 (1953): 2-3.

¹²Heather Douglas, “Science, Values, and Citizens,” in *Eppur Si Muove: Doing History and Philosophy of Science with Peter Machamer: A Collection of Essays in Honor of Peter Machamer*, ed. Marcus P. Adams et al., *The Western Ontario Series in Philosophy of Science* (Cham: Springer International Publishing, 2017), 93.

¹³*Ibid*, 92

an expert. They can evaluate the CVs of experts to see what institutions their education is from, how extensive it is, whether it is relevant for the questions at hand, and what other experts think of this expert. Assessing how deliberate the training of an expert was is more difficult. It seems that non-experts can at least make somewhat trustworthy judgments about it by thinking that an academic education is more deliberate than a mere online course, for example. Another challenge for non-experts is assessing the conflicts of interest of purported experts, because vaccines are a profitable area of medicine.¹⁴

3.2 Objection 2: experts cannot assess evidence well either

Premise (2) says that non-experts assess evidence poorer in healthcare than experts. There is some doubt that actually both are bad at assessing evidence and the expert does not really have an advantage. There are many problems with the health sciences, including studies failing to replicate¹⁵, industry biases¹⁶, issues with literature reviews¹⁷, and problems with randomized controlled trials. I will focus on randomized controlled trials for the rest of this objection, because they are often considered the gold standard of scientific investigation in the health sciences.

According to this objection, randomized controlled trials are not actually trustworthy and useful, because they lead to a lot of bias and do not actually establish causality. According to a paper from 1995, there are major problems with the methodology of randomized controlled trials: “Odds ratios were exaggerated by 41% for inadequately concealed trials and by 30% for unclearly concealed trials.”¹⁸ Other issues with randomized controlled trials are that they do not establish universal causal laws that could be used in other settings than the one they were studied in, they do not account for appropriate support teams that need to be in place for an intervention to produce the expected effect, and they do not establish all the steps in the causal chain relevant for causing the expected effect.¹⁹

¹⁴Bourree Lam, “Vaccines Are Profitable, So What?,” *The Atlantic*, February 10, 2015, <https://www.theatlantic.com/business/archive/2015/02/vaccines-are-profitable-so-what/385214/>.

¹⁵According to a 2005 paper, 32% of highly cited clinical research studies which reported that the intervention was effective either failed to replicate or found weaker effects than in the original study: John P. A. Ioannidis, “Contradicted and Initially Stronger Effects in Highly Cited Clinical Research,” *JAMA* 294, no. 2 (July 13, 2005): 218–28.

¹⁶According to a 2013 paper, “. . . the number of studies with favorable results is approximately 24% higher among industry-sponsored studies compared with non-industry-sponsored studies”: Lisa Bero, “Industry Sponsorship and Research Outcome: A Cochrane Review,” *JAMA Internal Medicine* 173, no. 7 (April 8, 2013): 580–81.

¹⁷According to a 1987 paper, none of the fifty literature reviews studied in a previous year satisfied all eight criteria set for information synthesis, only one satisfied six criteria and the rest did worse, indicating that literature reviews in the medical sciences have major methodological limitations: C. D. Mulrow, “The Medical Review Article: State of the Science,” *Annals of Internal Medicine* 106, no. 3 (March 1987): 485–88.

¹⁸K. F. Schulz et al., “Empirical Evidence of Bias. Dimensions of Methodological Quality Associated with Estimates of Treatment Effects in Controlled Trials,” *JAMA* 273, no. 5 (February 1, 1995): 408–12.

¹⁹Nancy Cartwright, “Will This Policy Work for You? Predicting Effectiveness Better: How Philosophy

My response to this objection is that it makes a good case about issues with the health sciences and the scientific community needs to continue working on these problems. Some of these problems actually make the case for premise (2) stronger. It shows that it is very difficult to conduct proper scientific experiments and assess the evidence from them. For example, randomized controlled trials need to have truly random sequence generation, allocation concealment, blinding, pre-registration of study protocols, and so on for them to be properly conducted.²⁰ Non-experts can get this wrong or misunderstand randomized controlled trials very easily. However, it is important to acknowledge challenges with randomized controlled trials conducted to study the safety of vaccines: mainly, that it is very hard to properly compare vaccinated children with completely unvaccinated children.²¹

4 Conclusion

How should non-experts form beliefs about the safety of vaccines? Non-experts should rely on experts for forming beliefs about the safety of vaccines, because they assess evidence poorer in healthcare than experts. Beliefs about the safety of vaccines have important consequences for individuals and society. If non-experts do not rely on experts for these beliefs, then they will have uninformed if not even harmful beliefs. Non-experts assess evidence poorer in healthcare, because that skill requires long and deliberate education.

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Helps," *Philosophy of Science* 79, no. 5 (December 1, 2012): 973–89.

²⁰These ideas about the proper study design of RCTs come from a course titled Evidence Review and Synthesis for Decision Making at the London School of Economics.

²¹Christopher Turville and Isaac Golden, "Autism and Vaccination: The Value of the Evidence Base of a Recent Meta-Analysis," *Vaccine* 33, no. 42 (October 13, 2015): 5494–96; Guy D. Eslick, "Answers Regarding the Link between Vaccines and the Development of Autism: A Question of Appropriate Study Design, Ethics, and Bias," *Vaccine* 33, no. 42 (October 13, 2015): 5497.

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