

# LOGICAL FALLACIES AND VACCINES

## WHAT YOU SHOULD KNOW

Have you ever heard someone say, “You have your facts, and I have mine?” In this time of “alternative facts,” it is easy to forget that scientific facts can’t simply be chosen based on convenience or beliefs. Even more difficult, is sorting through a series of statements to ascertain what the facts actually are. Sadly, the result is that *myths*, or false ideas, can be considered as truths. In many cases, the arguments that support myths are based on fallacies. *Fallacies* are errors in reasoning that make an argument unsound. In the case of vaccines, fallacies have been used to intentionally mislead parents seeking information to make sound decisions for their children and families. This sheet describes some common types of fallacies as well as examples of how they have been used to argue that vaccines are not safe.

### AD HOMINEM ATTACK

Ad hominem attacks criticize the messenger in the absence of counter-arguments related to the facts being discussed.

**Example:** When vaccines are suggested to be unsafe because of a conspiracy between government officials and pharmaceutical companies, this is an example of an ad hominem attack because it does not address vaccine safety but rather groups that state vaccines are safe.

**Reality check:** Vaccine safety is not established by who says vaccines are safe, but rather the result of thousands of studies and years of experience.

### STRAW MAN ATTACK

Straw man attacks address a position or fact that was not actually put forth. Exaggeration of a position with which one disagrees is an example of this.

**Example:** When someone states that a person who promotes vaccination against influenza is in favor of all vaccines even if they don’t work, this is an example of a straw man attack because the position of the person defending influenza vaccine is exaggerated.

**Reality check:** A person arguing in favor of influenza vaccination may or may not support the use of all other vaccines. Their support of influenza vaccine does not provide information about their opinion of other vaccines.

### CIRCULAR ARGUMENT

Circular arguments use the preliminary assumption as the basis for arriving at the same conclusion.

**Example:** When someone says MMR vaccine causes autism and their child got autism because he got the MMR vaccine, this is an example of a circular argument.

**Reality check:** Multiple well-controlled studies on several continents involving hundreds of thousands of children have not identified a link between the development of autism and receipt of the MMR vaccine. Likewise, the notion that a child is harmed by receiving too many vaccines has also been studied and is not supported by the findings.

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## APPEAL TO IGNORANCE

Appeals to ignorance take advantage of what is not known. Sometimes, they focus on the notion that something has never been, or can never be, proven definitively.

**Example:** When someone argues against vaccine mandates because we don't know if certain individuals have genetic predispositions that can cause them to be harmed by receiving the vaccine, this is an example of an appeal to ignorance.

**Reality check:** Science offers a way to understand the world in which we live. However, it does not allow us to definitively rule out that something will never happen. For this reason, many people arguing against scientific facts that they do not believe (or agree with) rely on this fallacy. It is a way to leverage the fear of the unknown. While genetic predisposition can increase risks associated with certain diseases, vaccines present a weakened or partial form of a potentially harmful pathogen. Therefore, even if a genetic predisposition would be found in the future, it is more likely that someone would be harmed by the disease than the vaccine to prevent it.

## FALSE DICHOTOMY

False dichotomy arguments incorrectly suggest an “either/or” situation when the options are not mutually exclusive or when more than two options exist.

**Example:** When someone argues against vaccine safety by stating they are “pro-information,” they are suggesting that to believe vaccines are safe means being against information and vice versa. Another example of a false dichotomy related to vaccines occurs when people say that vaccines don't work because fully vaccinated people get sick during vaccine-preventable disease outbreaks.

**Reality check:** Believing vaccines are safe does not mean a person disregards information; these are not mutually exclusive understandings. Likewise, while vaccines work for most, they do not work for all. We also know that often when a vaccinated person gets the disease, their infection tends to be less severe than that of someone who was not immunized at all. So arguing that vaccines do not work because a vaccinated person got a disease presents a false “all or nothing” situation.



## SLIPPERY SLOPE

A slippery slope fallacy argues against a fact or situation by suggesting unlikely, extreme outcomes.

**Example:** When someone suggests that a vaccine mandate will lead to a state takeover of parental rights, this is an example of a slippery slope fallacy.

**Reality check:** Vaccine mandates are not an attempt by the government to control parental decision-making but rather to keep communities safe by ensuring that more people are vaccinated. Mandates increase immunization rates and ensure a vaccine supply for those who couldn't otherwise afford vaccinations.

## HASTY GENERALIZATION

Hasty generalizations involve jumping to conclusions without reviewing all available evidence.

**Example:** When someone uses anecdotes of a small group of individuals as evidence for a link between vaccines and autism, this is an example of a hasty generalization.

**Reality check:** It is reasonable to observe a group of individuals who got vaccinated and were subsequently diagnosed with autism and hypothesize that a causal relationship could exist. However, it is not enough to stop with the observation. To know if there is a causal relationship, controlled studies need to compare people who did and did not get vaccinated to see if those who got vaccinated were more likely to be diagnosed with autism. The good news is this has been done — repeatedly — and no causal relationship has been found.

## APPEAL TO AUTHORITY

The appeal to authority fallacy occurs when something is considered to be true simply because a perceived authority said it is so (without evidence) or because it was said to be true by authority figures who are irrelevant or not qualified based on the topic being discussed.

**Example:** When someone suggests that vaccines cause autism because an actor believes it to be the case, this is an example of appealing to authority.

**Reality check:** Facts should never be based on who does the studies or who reports on them. The data, how the studies were done, and whether they are reproducible are what is important.

## CAUSAL FALLACY

Causal fallacies occur when two things are incorrectly identified as being causally associated without enough evidence to do so (false cause); solely based on one occurring before the other (*post hoc*); or because they were found together (correlational fallacy).

**Example:** When someone argues that aluminum adjuvants in vaccines must cause autism because aluminum adjuvants cause inflammation and inflammation causes autism, this is an example of a causal fallacy.

**Reality check:** While it would be reasonable to consider whether aluminum adjuvants lead to inflammation that causes autism, the notion that aluminum adjuvants cause autism because of inflammation is not sufficient by itself for establishing causality. And to date, no clear evidence supports the notion that autism is caused by inflammation.

## APPEAL TO PITY

Appeals to pity rely on evoking emotion to deter or replace the discussion of facts.

**Example:** When someone points out the challenges or stress related to having a child with autism as a way to suggest that vaccines are not safe, this is an example of an appeal to pity fallacy.

**Reality check:** The challenges that may come from having a child with autism, or any other condition or disease, are worth consideration, and supporting these families is essential. However, this notion has nothing to do with whether or not vaccines are safe.

## BANDWAGON APPROACH

The bandwagon approach suggests something is true because it is a popular belief; it is accepted by authorities or large numbers of people; or because someone specific, based on their reputation, agrees.

**Example:** Suggesting many parents are concerned about vaccine safety so vaccines must be unsafe is an example of using the bandwagon approach.

**Reality check:** While it is reasonable to be concerned about vaccines safety, concern doesn't mean that vaccines are unsafe. Scientific studies determine vaccine safety, not the number of people who believe something might be a problem.

## APPEAL TO HYPOCRISY

Appealing to hypocrisy occurs when someone suggests deception or insincerity of the messenger as a way to neutralize or distract from the message.

**Example:** When a scientist explains that the immune system is capable of responding to 10,000 vaccines at one time during a discussion about too many vaccines, and someone argues that because the scientist won't take 10,000 vaccines, his message is invalid, this is an appeal to hypocrisy.

**Reality check:** Some have been concerned about whether children receive too many vaccines that overwhelm their immune system leading them to develop chronic diseases. So, explaining the theoretical quantity of vaccines that the immune system could handle provides evidence that the currently recommended schedule is not "too much." Whether or not the scientist making the claim would take that many vaccines is irrelevant and is just meant to distract from the explanation.



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## EQUIVOCATION OR AMBIGUITY

Equivocation occurs when someone takes advantage of the fact that a word has more than one meaning to mislead.

**Example:** When someone claims that vaccines are not safe because they are not “natural,” it is an example of equivocation.

**Reality check:** The use of the word “natural” in this manner implies that vaccines are not safe because they are manmade or because they are introduced in a way that is different from exposure in the community. However, vaccines actually protect us from pathogens, which are not manmade and can cause severe disease and death. Vaccines are typically made from disease-causing agents, so that our immune systems can recognize an exposure if it occurs in nature. Further, the manner by which our immune systems are exposed to any foreign agent does not alter its ability to respond. So suggesting that when it comes to vaccines, natural is better is not only misleading, it is dangerous.

## RED HERRING

A red herring fallacy uses a parallel or seemingly relevant argument to distract from the original point being discussed.

**Example:** When someone is discussing genetic mutations, such as the MTHFR mutation, and then describes how the “poisons” in vaccines provoke an immune response in genetically susceptible children, this is an example of a red herring because the original point related to the mutation, but moved to a discussion of vaccine ingredients as the problem rather than explaining why the genetic mutation is problematic.

**Reality check:** People with the MTHFR mutation can be vaccinated since the mutation has not been found to be problematic when it comes to vaccinations. Likewise, vaccine ingredients have been studied and are safe in the quantities presented in vaccinations.



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