

No. Vaccines do not cause autism.



Deconstructing the myth.

You have probably heard the myth that vaccines cause autism. While there is absolutely *no evidence* that vaccines cause autism, it remains one of the most persistent myths surrounding vaccines to date. But where did this myth begin? Who started it? Finally, why is the claim that vaccines cause autism completely unfounded? We will answer these questions in this factsheet.



The origin of the myth

The myth that vaccines cause autism can be traced back to a small study conducted in 1998 by the now discredited former doctor Andrew Wakefield. The study described 12 children in the United Kingdom (UK) who had developmental delays and who had also received the measles, mumps, and rubella (MMR) vaccine. Eight of these children had already been diagnosed with autism when the study took place.

Wakefield and his colleagues published the study's findings in a paper in the prestigious medical journal *The Lancet*, claiming that the MMR vaccine was linked to autism. [The problem with Wakefield's study, however, is that it was completely fraudulent.](#)



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Falsified data and a fraudulent paper

After the release of Wakefield's paper, it became apparent that there were numerous serious problems with how the study was conducted, including that:

- Of the 12 children involved in the study, five had a reported history of developmental delay *before* they had been given the MMR vaccine.
- The data documenting when the children reportedly began showing signs of behavioural change were *misrepresented* in the study to falsely support Wakefield's hypothesis.
 - Wakefield made the claim that the children showed signs of developmental delay/changes in behaviour within six days of receiving the MMR vaccine. This was not the case. In some cases, there were weeks or months between the beginning of changes in behaviour and the receipt of the vaccine. As previously mentioned, five children had shown signs of developmental delay before receiving the MMR vaccine. Wakefield manipulated the data – extensively.
- When the paper was written, the MMR vaccine was – and still is – given to children in the UK around the same age at which many children are diagnosed with autism.
 - *As these timeframes overlap, it is expected that some children who receive the MMR vaccine will also coincidentally be diagnosed with autism, even though these events are not related.* In other words, *correlation does not equal causation* (please see the section *Correlation versus causation: What's the difference?* below for more information).



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It was revealed that Wakefield was being paid by a lawyer to help find a link between autism and the MMR vaccine to help sue the vaccine manufacturer. Eight months before the release of his study in *The Lancet*, he also filed a patent for his own single measles vaccine, which he deemed would be “safer” than the MMR vaccine. These were both massive conflicts of interest not disclosed in the paper.

The paper was later *retracted*. This means that the paper is no longer recognized as evidence. Further, Wakefield had his medical license revoked for using falsified data as evidence. [No other well-performed studies have ever found a link between the MMR vaccine and autism.](#)

For a more in-depth look at how Wakefield’s study was scientifically flawed, please visit the Children’s Hospital of Philadelphia’s webpage, [Vaccines and Autism](#).

For a deep dive into the history of the 1998 paper and the subsequent fallout, please see [this series of articles](#) by Brian Deer, published in the medical journal *The BMJ*.

Correlation versus causation: What’s the difference?



Correlation is how two variables *relate* to one another. Causation is when a change in one variable *directly influences* the other variable.

Two variables are correlated when they change in similar ways. For example, if ice cream sales go up and sunburns also increase, we would say that ice cream sales and sunburns are correlated.

However, does ice cream *cause* sunburns? Of course not! The relationship we are seeing between ice cream sales and sunburns can be better explained by the fact that as the weather gets warmer and sunnier, people tend to buy more ice cream. As well, people tend to spend more time outside in this type of weather, meaning they are more likely to get sunburnt.

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As we can see from the above example, the increase in sun exposure was causing more people to get sunburnt; it was not because they were eating more ice cream. **Just because two things are correlated does not mean that one variable is affecting the other.** Sometimes when two things are correlated, they are also causally related, but this is often not the case.

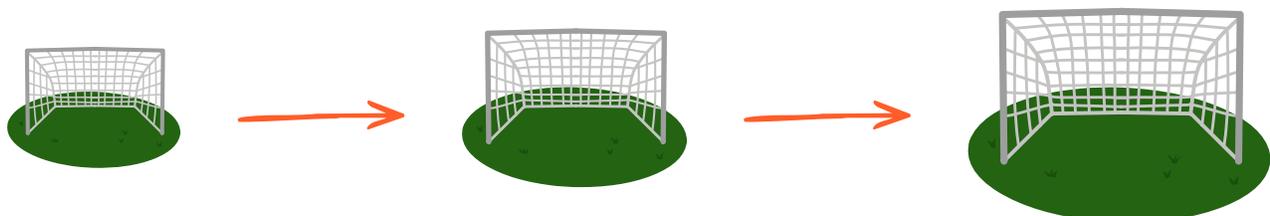
For more information on correlation versus causation, please see ScienceUpFirst's resource [Misinformer Tactic: Causal Fallacy](#).

How the myth has grown

Although Wakefield's paper was retracted, the damage it has done has been long-lasting.

After the paper's initial release in 1998, scientists around the world rushed to complete similar and larger-scale studies to see if they could replicate Wakefield's findings. **No other high-quality studies found that MMR vaccines cause autism.** However, it took more than a year after the release of Wakefield's paper for this evidence to be published. In that time, the myth that vaccines cause autism had time to fester and spread to a more global audience.

Parents searching for reasons for their child's autism understandably latched onto the idea that vaccines could cause autism. So, when researchers were finally able to disprove the claim that MMR vaccines cause autism, many people had already made up their minds and believed vaccines and autism were linked. Instead of the myth dying off in the face of this new evidence, people began looking for other explanations for how vaccines could cause autism. In other words, the "goalposts" were moved, and the myth grew (for more information on what "moving the goalposts" entails, please see [ScienceUpFirst's post](#)).



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The next line of questioning focused on the vaccine ingredient thimerosal. Thimerosal is a vaccine ingredient used as a preservative that contains a type of mercury that your body rids itself of quickly. Preservatives are added to vaccines to help prevent the buildup of fungi and bacteria once the vaccine's vial has been punctured/opened. Once again, scientists conducted many large studies and the evidence was clear: *thimerosal in vaccines does not cause autism*. The goalposts then shifted again, and the question became whether the number of childhood vaccines given around the same age were causing autism. That line of thinking was also disproven by researchers. The goalposts were moved yet again, and continue to be shifted as demands for new studies to find a link between vaccines and autism arise. [Throughout it all, no evidence has ever been found that vaccines cause autism.](#)

Where we are now: An unfalsifiable hypothesis

On the surface, it may appear to be good science to continue looking for evidence that vaccines are linked to autism. Should we not look at all the possibilities? In fact, you may have heard the sentiment that “Vaccines do not cause autism’ is not a valid statement, because studies have not ruled out that vaccines cause autism.” However, rather than good science, what we are actually dealing with is something called an *unfalsifiable hypothesis*.



Unfalsifiable hypotheses: Hypotheses that can never be proven wrong

To understand what an unfalsifiable hypothesis is, we first need to understand what a hypothesis is.

A hypothesis is a question that can be tested to help explain the world around us. Hypotheses must be testable and falsifiable, meaning we must be able to test if a hypothesis is correct or incorrect. When a hypothesis is studied, the results will generally either:

1. **support the hypothesis, or**
2. **reject the hypothesis (the hypothesis is incorrect).**

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The problem with unfalsifiable hypotheses is that you cannot test if they are wrong. **Therefore, they can never be proven wrong** (i.e., study results will never reject/not support the hypothesis).

Let's look at an example of an unfalsifiable hypothesis: the claim that fairies exist. The hypothesis that fairies exist is impossible to disprove, because there is no amount of evidence that scientists could collect to say that fairies do not exist. People could explain away any refuting evidence through statements such as, "Well, fairies can become invisible. That's why you can't find them!" or "Fairies are smart and know how to hide from us. We need to be smarter with how we look for them!" This framing ensures that the claim "fairies exist" lives on because any evidence to the contrary is never accepted. It is unfalsifiable.

For a more in-depth look into what an unfalsifiable hypothesis is, please see [this post](#) written by Kristen Panthagani, MD, PhD.



How is the myth that “vaccines cause autism” an unfalsifiable hypothesis?

Let's take another look at the fairies example above. In that example, we can see that even though there is no proof that fairies exist, the myth lives on. This is because some people argue that there is no proof that they *do not* exist. This is the same thinking and framing that applies to the claim that vaccines cause autism.

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No high-quality study has ever found that vaccines cause autism, and yet the rumour that they do is still prevalent. No amount of studies conducted or evidence produced will be able to quash the myth when the widespread belief is that “Vaccines cause autism; we have just not discovered how yet.” When studies fail to find a link, goalposts will keep being moved as people try to find another explanation for how vaccines could cause autism, despite the mountain of compelling evidence showing they do not. This is not good scientific practice. Science cannot address every single possibility about a topic, as we would never run out of possible questions to test. [The belief that vaccines cause autism has evolved into a myth that can never die.](#)

For more information on how the claim that vaccines cause autism is an unfalsifiable hypothesis, see [this post](#) by Kristen Panthagani, MD, PhD, titled *Do Dogs Cause Autism?*

Moving forward

The myth that vaccines cause autism has stuck around for decades, and has led many people to avoid getting themselves or their children immunized. But it is important to remember that the myth that vaccines cause autism is just that: a myth. [There is no evidence that vaccines cause autism.](#)

Vaccines are the best way to protect yourself – and your loved ones – against preventable diseases. Talk to your doctor, nurse, pharmacist, or local public health office about the immunizations you and your family need.



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A note on autism

The clinical definition of autism is “a lifelong neurodevelopmental condition that affects the way a person communicates and relates to people and the world around them” (Autism Ontario, n.d.). Immunize Canada affirms that all autistic lives are equal in worth to any other life. Autism is not a disease or an illness to be treated or cured. **All autistic lives matter.**

For more information

- To read about the history of Andrew Wakefield’s fraudulent 1998 paper and the subsequent fallout, please see [this series of articles](#) by Brian Deer, published in the medical journal *The BMJ*.
- If you would like information about the most up-to-date research on autism, please visit the Children’s Hospital of Philadelphia’s webpage [Vaccines and Autism](#).
- For more information about how to spot false and misleading information, please see ScienceUpFirst’s posts on the misinformer tactics [The Galileo Gambit](#) and [Cherry Picking](#).
- To know more about the ingredients in vaccines approved for use in Canada, please see our factsheet [What’s in vaccines? A look at vaccine ingredients](#).

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