

Vaccines are safe. Why are some people afraid of them?

How do we know whether they are safe or not?

- A. Oprah says they are dangerous, so they must be dangerous
- B. Celebrities like Jenny McCarthy and Jim Carey say they are dangerous, so they must be dangerous
- C. Political activists like Robert Kennedy say they are dangerous, so they must be dangerous
- D. We conduct controlled scientific studies and weigh the evidence



<http://www.youtube.com/watch?v=Zc9cfgB1Xrk>

Hypothesis: Vaccines cause autism

A Denmark study looked at kids that were vaccinated and those that weren't

What is the independent variable?

The vaccine (or lack of)

What is the dependent variable?

Autism rate

What is the experimental group?

Vaccinated children

What is the control group?

Unvaccinated children

Based on the hypothesis above, predict the outcome of the Denmark study

The kids that got the vaccine will have a higher autism rate than the control group (the kids that did not get vaccinated)

What was the result of the study?

No difference in autism rates between the control group and the experimental group

Was the hypothesis supported?

No

Hypothesis: too many vaccines given too early in development and too close together causes autism

In Japan, they changed their vaccine schedule from the MMR (measles, mumps, and rubella) “triple shot” to 3 separate vaccinations given over time

What is the independent variable?

Timing of vaccines

What is the dependent variable?

Autism rate

What is the experimental group?

The children that got the MMR “triple shot”

What is the control group?

The children that got the extended vaccine schedule

Based on the hypothesis above, predict the outcome of the Japanese study

The kids that got the extended vaccine schedule will have a lower autism rate than the experimental group (the kids that got the MMR “triple shot” vaccine)

What was the result of the study?

The autism rate was higher in kids that got the extended vaccination schedule

Was the hypothesis supported?

No

Hypothesis: The preservative thimerosal, which contains ethyl mercury, causes autism

Thimerosal was taken out of a vaccine in Denmark and the same vaccine was given without thimerosal

What is the independent variable?

Amount of thimerosal

What is the dependent variable?

Autism rate

What is the experimental group?

The children that got vaccines that contained thimerosal

What is the control group?

The children that got vaccines without thimerosal

Based on the hypothesis above, predict the outcome of the Denmark study

The kids that got the vaccine that DID NOT have thimerosal will have a lower autism rate than the experimental group (the kids that got the vaccine with thimerosal)

What was the result of the study?

The autism rate of kids that were given vaccines without thimerosal were no different than the kids that got vaccines with thimerosal

Was the hypothesis supported?

No



Andrew Wakefield is a liar. Even if he wasn't a lying liar of lies, his single study is outweighed by more than 18 studies that find no correlation between vaccines and autism or any other neurological illness



Andrew Wakefield lost his license to practice medicine because of an unethical study he published that resulted in massive personal financial gain and public fear of vaccines leading to a decrease in vaccination rates, which was followed by an increase in vaccine preventable illnesses and deaths

He didn't lose his license
for being wrong

Scientists get things wrong
all the time



He lost his license because it was proven he manipulated his data to get a result that he was paid in advance to find by a lawyer that wanted to sue the pharmaceutical companies

<http://briandeer.com/mmr/lancet-summary.htm>

What was wrong with Andrew Wakefield's study?

- 1) It was small (12 people)
- 2) He was paid by a lawyer that wanted to bring a class action lawsuit against the vaccine maker
- 3) He had a patent on a vaccine that was competing with the MMR vaccine
- 4) The 12 people were referred by the lawyer that wanted to sue the vaccine maker (nonrandom sample)
- 5) There was no control group
- 6) The study wasn't blinded or double blinded
- 7) The data was falsified!

There's nothing wrong with

this per say. Medical

studies are extremely

expensive, so small pilot

studies are an important

PRELIMINARY,

EXTREMELY TENTATIVE,

FIRST STEP.



<http://www.youtube.com/watch?v=wuvn-vp5InE>

<http://www.youtube.com/watch?v=dZ5jf-5MobE>

<https://www.youtube.com/watch?v=VX98aiYpmW4>

Teenagers and adults may experience pertussis as a somewhat persistent and annoying cough. Occasionally, we get very sick.

So just let nature take its course, that's how our species has survived for millennium

This is how our species existed
before vaccines

Adults and teenagers are the
main reservoir for the
bacterium that causes
pertussis



Do you want to be the one that
infects the next baby?

What Barbara Fisher, Jenny McCarthy, and other concerned parents that need an answer for why their child is sick are doing is a logical fallacy called moving the goal posts



Vaccines cause autism

Too many vaccines at one time cause autism

The mercury in vaccines causes autism

No difference in autism rates in vaccinated and unvaccinated children

No difference in autism rates in children with extended vaccine schedules

No difference in autism rates in children after mercury was taken out of vaccines



Aluminum
adjuvants cause
autism

I just know I'm
right

Exhaustive
studies show
aluminum in
vaccines to be
harmless and
to improve
immune
response

I just know
you have no
clue about how
science works



Correlation DOES NOT equal causation

Why does the media make the correlation equals causation mistake?

They promote pseudoscience and anecdotal evidence



The plural of anecdote is NOT data; it is anecdotes!

The relationship between vaccines and autism is a correlation just like ice cream sales and drowning

Propaganda by people that would fail my class

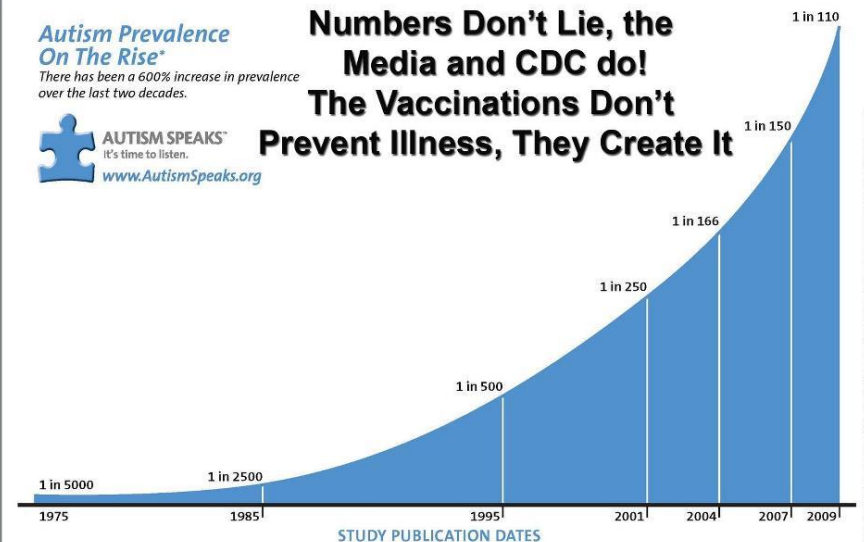
Awareness of autism, and therefore autism diagnosis, has coincided with increased vaccines. It's exactly like ice cream sales and drowning.

Increase in childhood autism rates coincides with sharp uptick in vaccination schedules

*Autism Prevalence On The Rise**
There has been a 600% increase in prevalence over the last two decades.



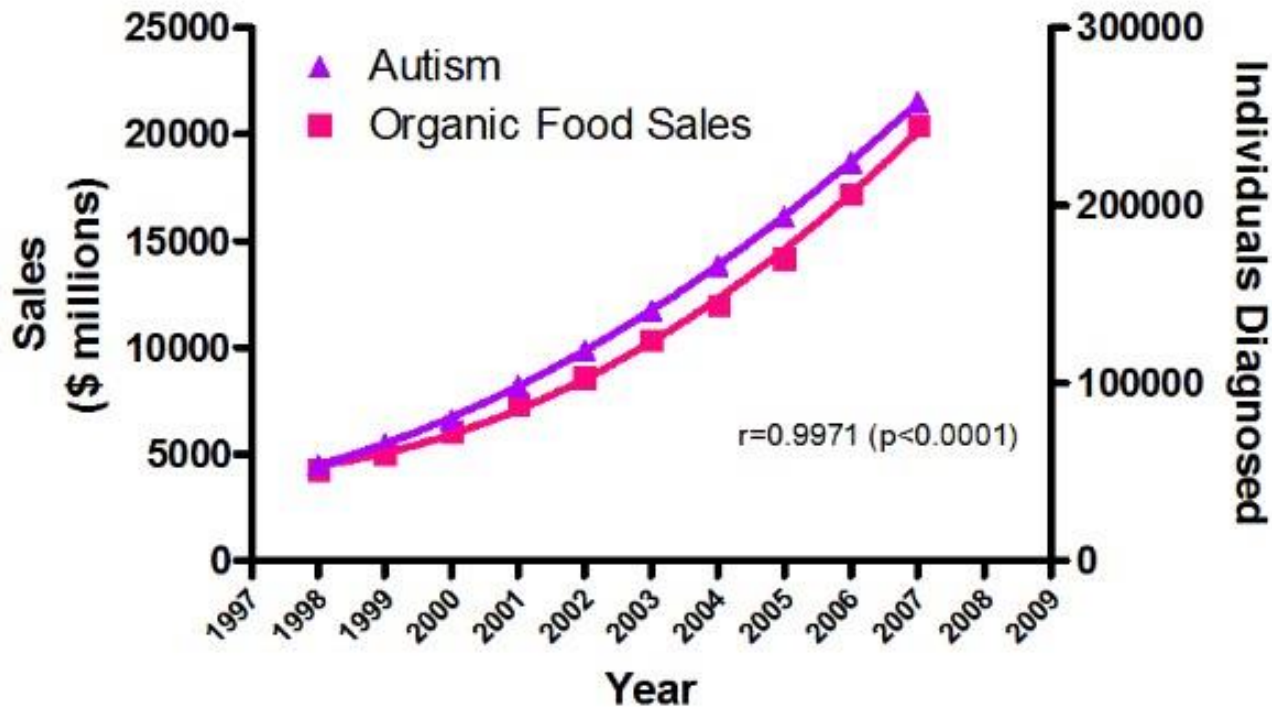
Numbers Don't Lie, the Media and CDC do!
The Vaccinations Don't Prevent Illness, They Create It



*Recent research has indicated that changes in diagnostic practices may account for at least 25% of the increase in prevalence over time, however much of the increase is still unaccounted for and may be influenced by environmental factors.

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The real cause of increasing autism prevalence?



Sources: Organic Trade Association, 2011 Organic Industry Survey; U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB# 1820-0043: "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act"



<http://www.youtube.com/watch?v=xOsCnX-TKIY&feature=related>





What did this experiment control for?

Unconscious or conscious manipulation of the dowsing rod by the dowser (the ideomotor effect)

What is the control group?

The guy when he was dowsing over an empty box

What is the experimental group?

The guy when he was dowsing over a box with iron ore

What is the thing Randi is testing?

Dowsing
ability

What is the thing of
interest to a scientist
called?

The independent
variable



Just in case you all thought dowsing and crystal power are what crazy people in the 60's used to believe

The ADE 651
sells for
\$16,500 to
\$60,000

The Iraqi
government
purchased
more than
1,500



The suicide bombers that killed 155 people in 2009 passed a check point where the ADE 651 was used





The British Government has arrested Jim McCormick for suspicion of fraud

20 countries have
purchased Jim
McCormick's device

The Iraqi government
has spent 85 million on
bomb dowsers!

Their defense minister
was still claiming the
devices work as late as
2010



In medical studies, small test trials are necessary because of the enormous cost of large scale double-blind randomized trials

The MMR vaccination scare is a good example of how spectacularly wrong the media gets scientific research

Dinosaurs 'gassed' themselves into extinction, British scientists say

Published May 07, 2012 / NewsCore



Mighty steps forward in computational power and computer-rendering ability allowed Discovery's artists to depict dinosaurs as never before, letting viewers see realistic skin and views deep inside their bodies, for the series "Clash of the Dinosaurs." (DISCOVERY CHANNEL)

Actually, the study never included the word extinction. All it said was sauropods contributed a lot of methane to the atmosphere, which could have resulted in a warmer, wetter Mesozoic climate than it otherwise would have been.

Featured Videos

Did dinosaurs fart themselves into extinction?

May 8, 2012 - 2:33 - New study suggests methane from prehistoric beasts warmed the Earth



<http://video.foxnews.com/v/1628196334001/did-dinosaurs-fart-themselves-into-extinction/>

There are limits to what science can do

You can't prove a negative

I can't prove acupuncture doesn't work, but I can show that it is highly unlikely that it does

Can science inform morality?

Is it OK to burn cats alive for fun?

The discovery that cats have a limbic system and therefore feel emotions as we do informs our morality



Be aware of the naturalistic fallacy

Just because something is natural does not mean it should be tolerated, accepted, promoted, etc.



About certainty and the tentative nature of science

We say science is tentative

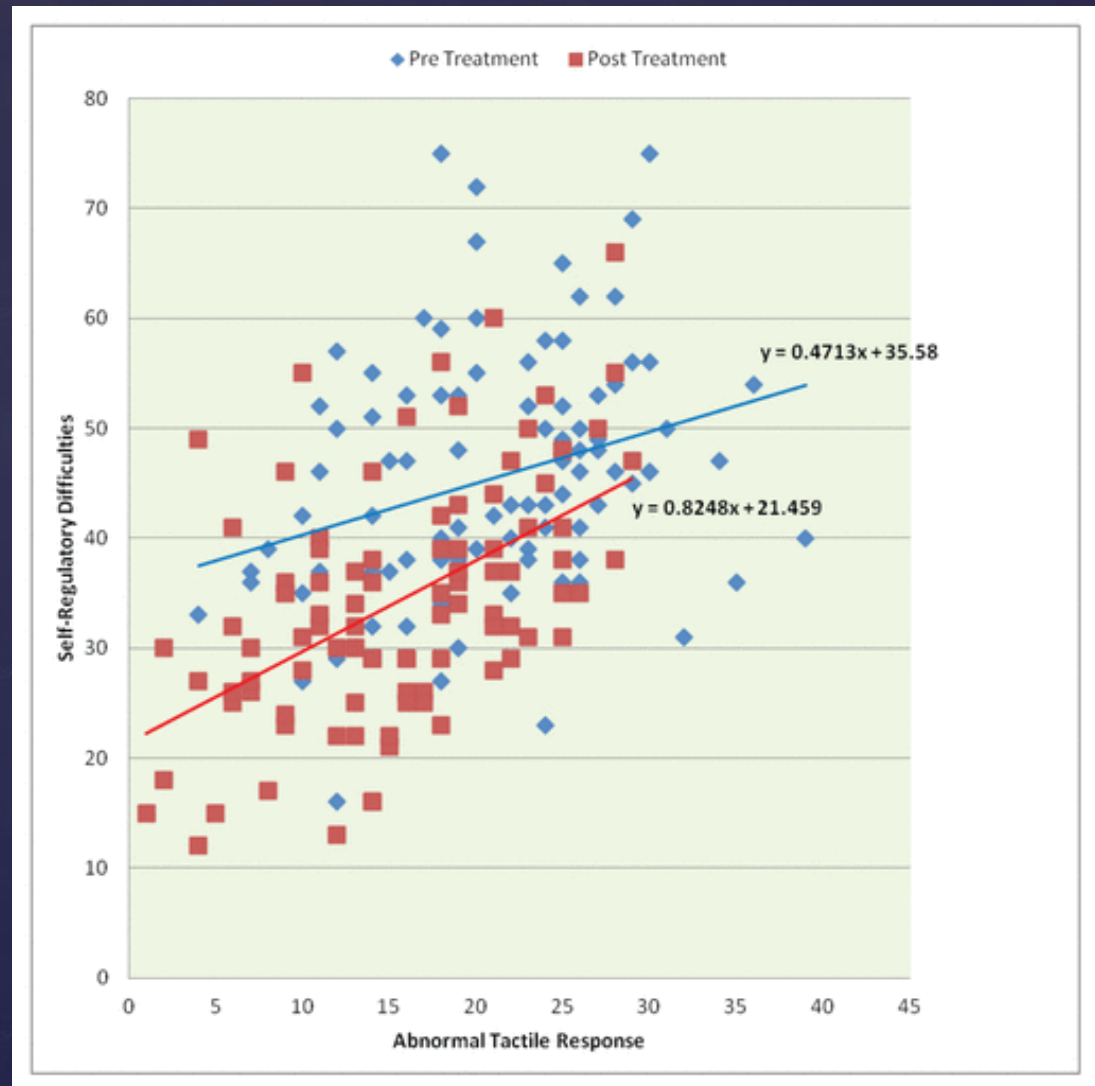
The tentative nature of science is why it is such a successful investigative and explanatory paradigm

But what does tentative mean?

There is a known correlation between tactile abnormalities (sensitivity to touch) in children with autism and self-regulatory difficulties

Data is often messy, so our interpretation of data is often suspect

The best fit lines are determined by a complicated equation, but a best fit line roughly means an equal number of data points above and below the line



Where would you place the certainty of a scientific theory on the scale below?

A theory in science is as close to absolute certainty as we can get



Absolutely
certainly
wrong

Absolutely
certainly
right

