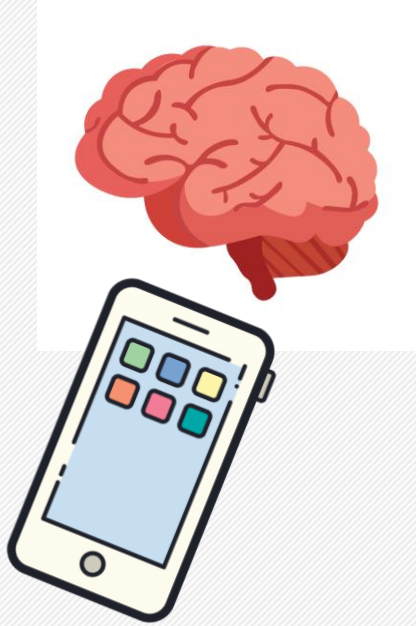
Identifying Vaccine Misinformation

Looking at All the Facts

Four Key Facts

Here are two statements that we made up…just out of thin air:



- 22 people with brain tumors state they "definitely" carried a cell phone for years.
- 61% of people with cancer were found to have arthritis, too.

Four Key Facts

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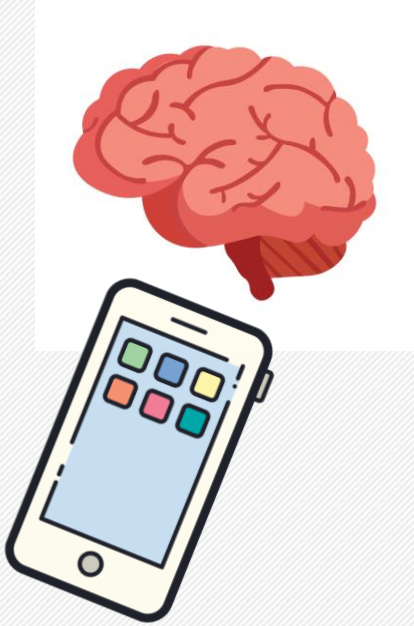


- 22 people with brain tumors state they "definitely" carried a cell phone for years.
- 61% of people with cancer were found to have arthritis, too.

Sometimes an alarming statement like this makes it into the news. Even if they were facts, these statements are not useful. They don't help us understand if a particular exposure (like a cell phone) *is at all related to* the problem.

Example

Let's use a fictional example.

Borborygmi is not really a disease, but it sounds like one. Let's imagine that in the news I read that 20 people with cell phones got borborygmi.

The Daily

Sunday, February 30, 2006

Cell phones cause borborygi

There is no longer any doubt about it! 20 people have been identified who all state that they have been carrying a cell for at least one year and they now complain of borborygmi.

Do people with cell phones have a *higher* chance of developing borborygmi than people without cell phones?

To begin addressing this question…

To begin addressing this question, we need **4 pieces of information** from a randomly selected population.

- **The green row: Among those with a cell phone, what proportions**
  - **(1) Have the disease?**
  - **(2) Do not have the disease?**

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	a Exposed and has the disease	b Exposed and doesn't have disease
Was not exposed to the thing in question	c Not exposed and has the disease	d Not exposed and doesn't have disease

To begin addressing this question…

To begin addressing this question, we need **4 pieces of information** from a randomly selected population.

- The purple row: **Among those who do not have a cell phone, what proportions**
  - **(3) Have the disease?**
  - **(4) Do not have the disease?**

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	a Exposed and has the disease	b Exposed and doesn't have disease
Was not exposed to the thing in question	c Not exposed and has the disease	d Not exposed and doesn't have disease

The news only gave us 1 fact

Disease among those "exposed" to cell phones:

20 people with cell phones got borborygmi.

Right now, only one box is complete.

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	20 Exposed and has the disease	? Exposed and doesn't have disease
Was not exposed to the thing in question	? Not exposed and has the disease	? Not exposed and doesn't have disease

Possibility #1: No difference seen

It may be that if we checked 100 (randomly selected) people, we'd find this.

Hypothesis: Exposure to the cell phone **did not make a difference** to their chance of having the disease.

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	20 Exposed and has the disease	30 Exposed and doesn't have disease
Was not exposed to the thing in question	20 Not exposed and has the disease	30 Not exposed and doesn't have disease

Possibility #2: Possible protective effect

It may be that if we checked 100 (randomly selected) people, we'd find this.

Hypothesis: People exposed to having a cell phone were **LESS likely** to have the disease.

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	20 Exposed and has the disease	60 Exposed and doesn't have disease
Was not exposed to the thing in question	10 Not exposed and has the disease	10 Not exposed and doesn't have disease

Possibility #3: Danger Signal

It may be that if we checked 100 (randomly selected) people, we'd find this.

Hypothesis: People exposed to the cell phone were **MORE likely** to have the disease.

	Has the disease	Doesn't have the disease
Was exposed to the thing in question	20 Exposed and has the disease	10 Exposed and doesn't have disease
Was not exposed to the thing in question	2 Not exposed and has the disease	68 Not exposed and doesn't have disease

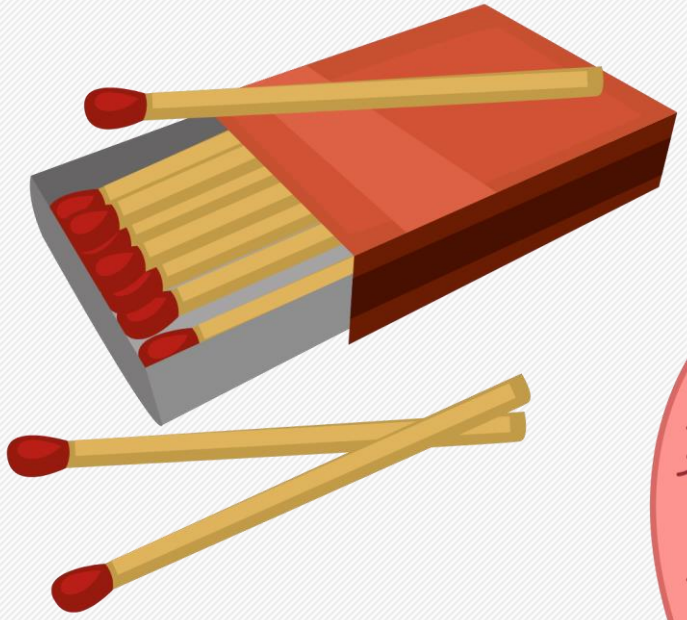
Key Point

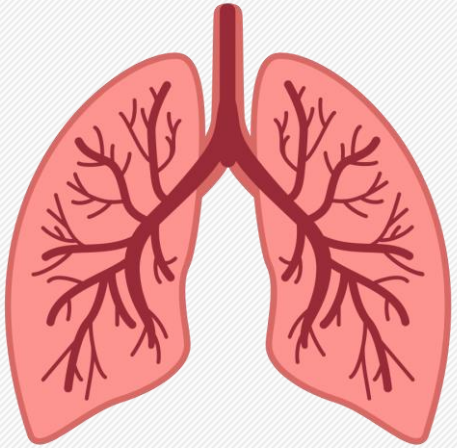
Whether or not an exposure affects the likelihood of a condition requires four key pieces of information.

If we don't have all four pieces of information, we are still in what might be called the "speculation phase."

Confounding Factors

Let's imagine that you read a story talking about a study that shows: *Men who carried matches in their pocket are more likely to develop lung cancer.*





Matches are made of an oxidizing agent, mixed with sulfur, fillers and glass powder.

The reporter implies that there might be something about one of these ingredients that causes lung cancer and concludes that the findings "are very controversial."

Consider this…

In your opinion, **which of the following is the most likely reason** that, "*Men who carried matches in their pocket are more likely to develop lung cancer*"?

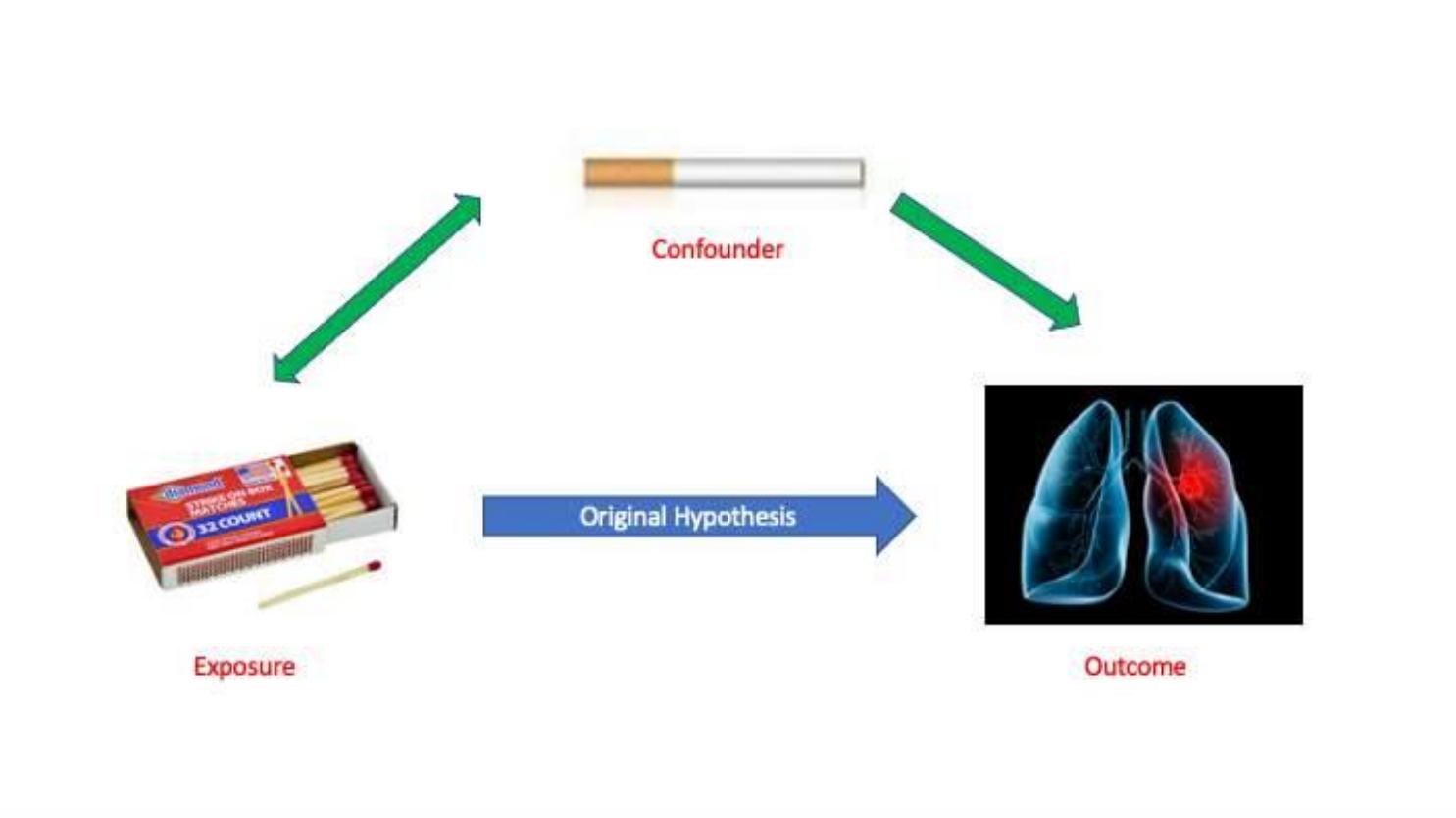
- The cancer was caused by touching the oxidizing agent
- The cancer was caused by touching the glass powder
- People who carry matches in their pocket are more likely to smoke and smoking causes lung cancer

Consider this…

In your opinion, **which of the following is the most likely reason** that, "*Men who carried matches in their pocket are more likely to develop lung cancer*"?

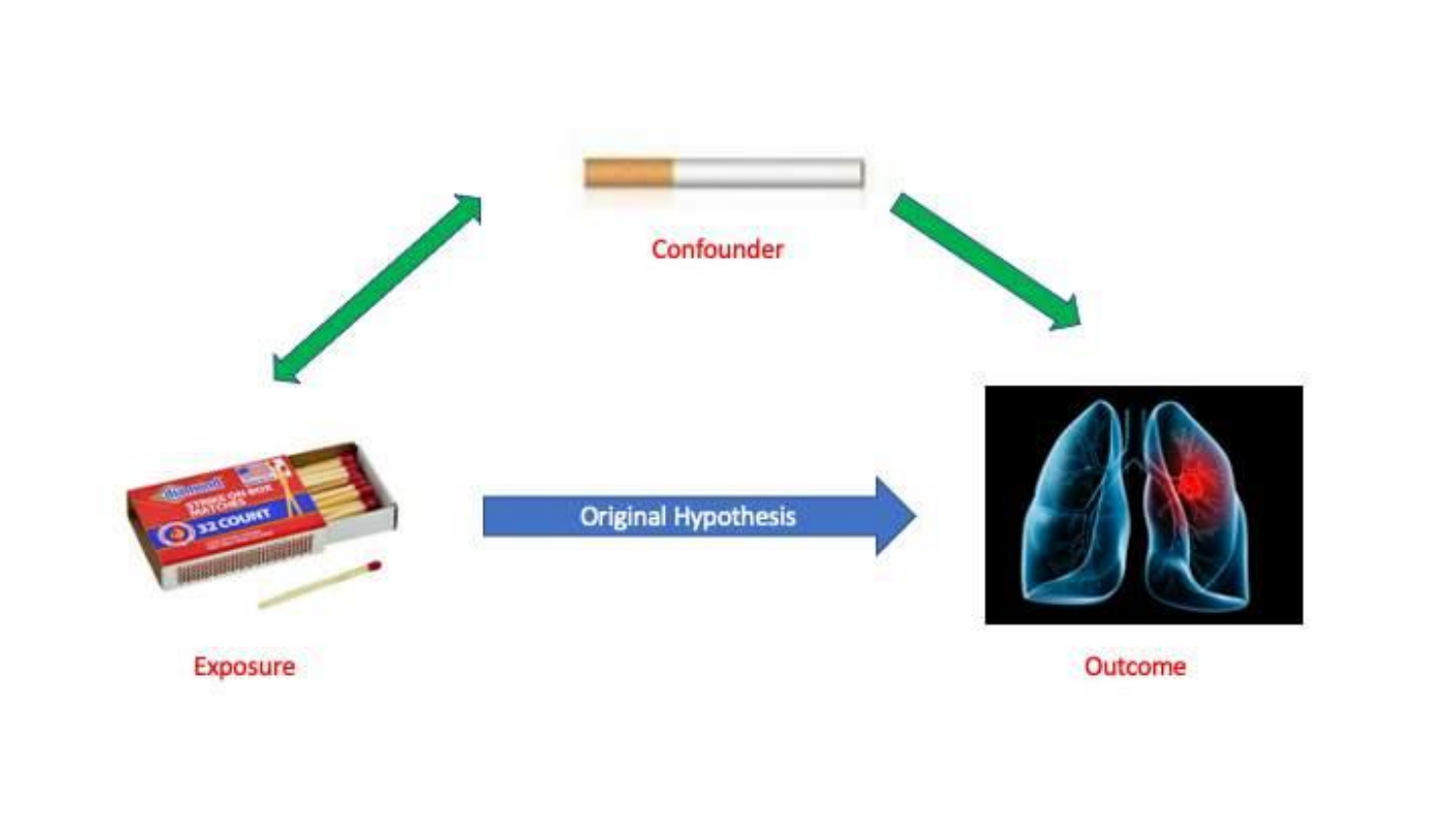
- ✗ The cancer was caused by touching the oxidizing agent
- ✗ The cancer was caused by touching the glass powder
- ✓ **People who carry matches in their pocket are more likely to smoke and smoking causes lung cancer**

Confounders



A **confounder** is a factor that influences both the exposure and the disease.

Confounders



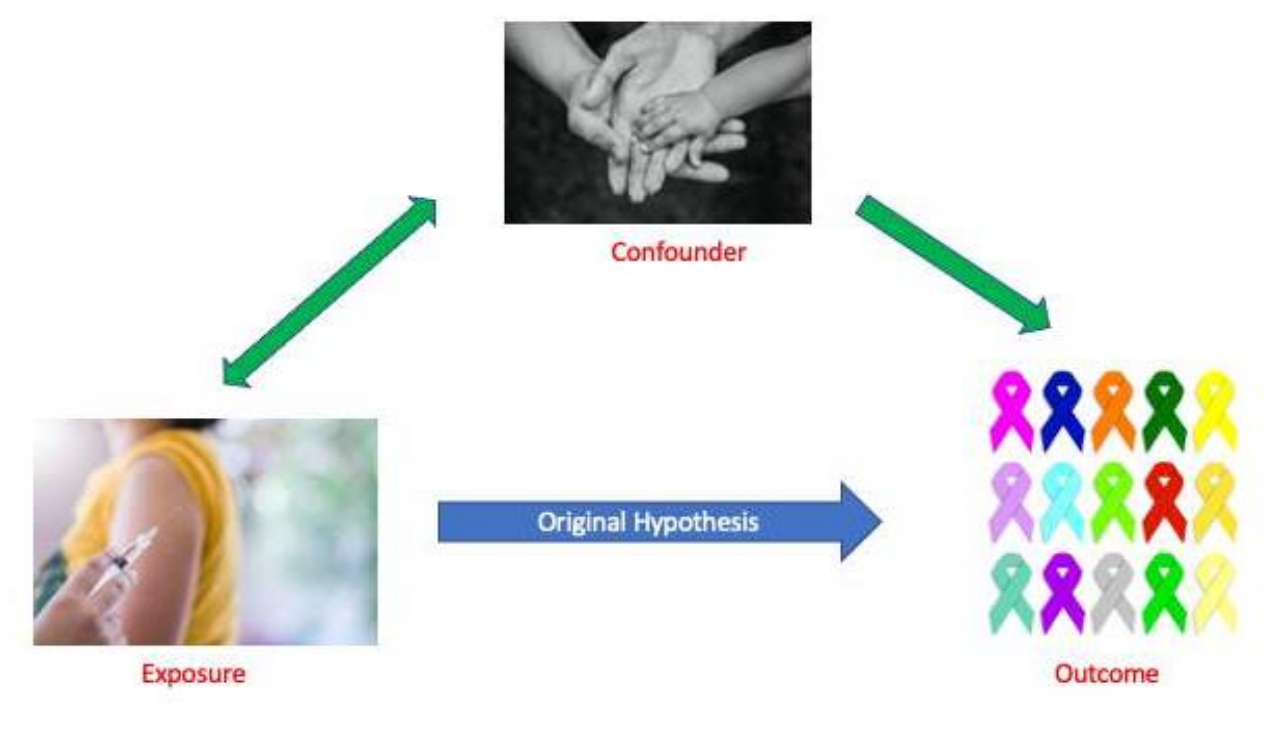
A **confounder** can fool us by making it *seem* like the exposure *causes* the disease.

Confounders

Here's a vaccine example:

A study shows that there are more cases of cancer reported now than before vaccines were first invented.

The writer concludes that vaccines cause cancer.



Can you think of another interpretation?

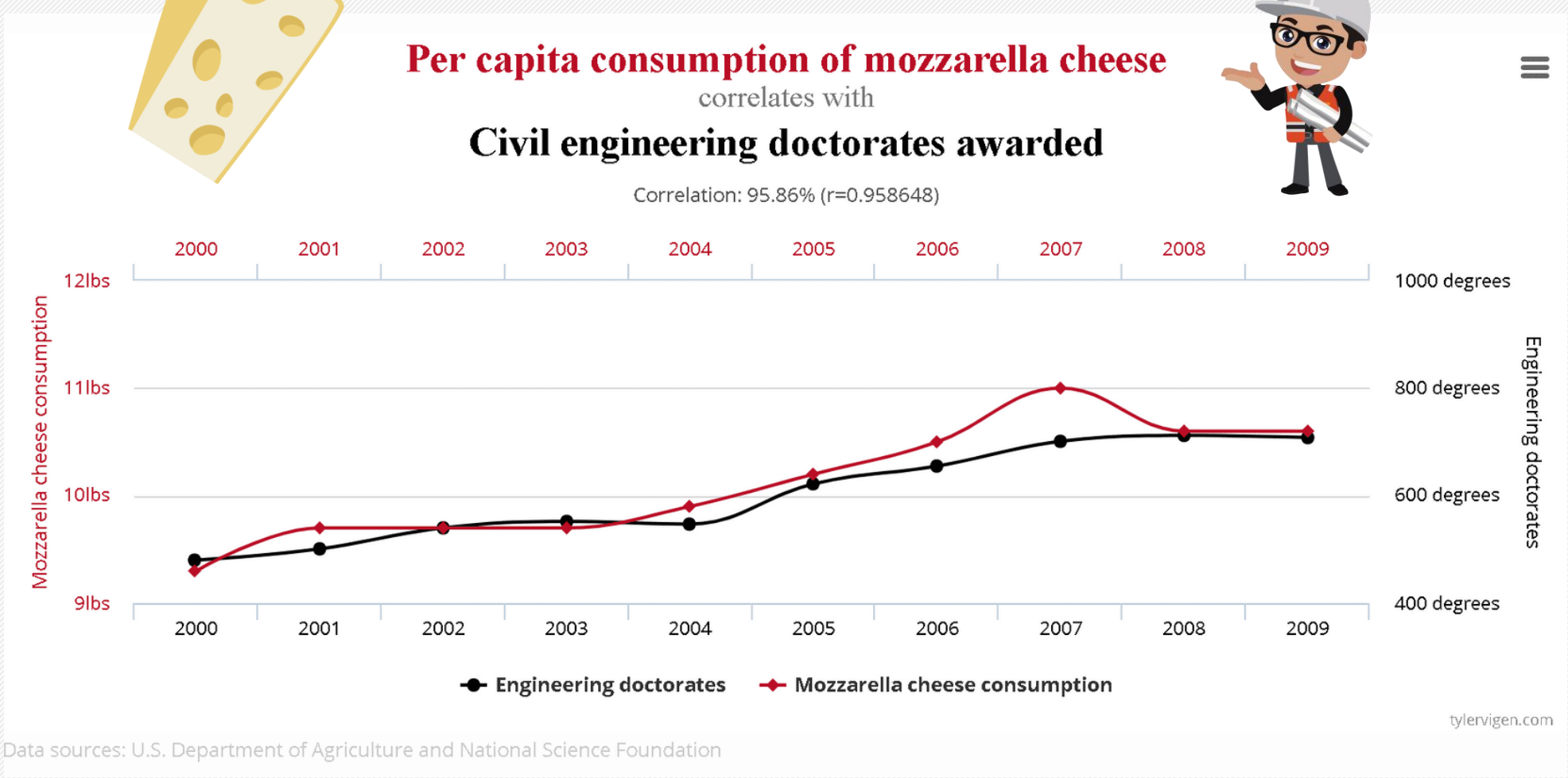
Confounding Factors with Vaccines

There is a confounding factor that has been ignored.

- Fact: Childhood vaccinations increase the chance of surviving into adulthood.
- Fact: Adults are much more likely to have cancer.

Vaccines increase the chance that our lives will be long enough to get cancer.

Some things happen by chance



Two things may change together over time without being related.

Avoiding False Dichotomies and False Balance

False Dichotomy

Definition: A situation in which two alternative points of view are presented as the only options, when others are available.

Example of a False Dichotomy

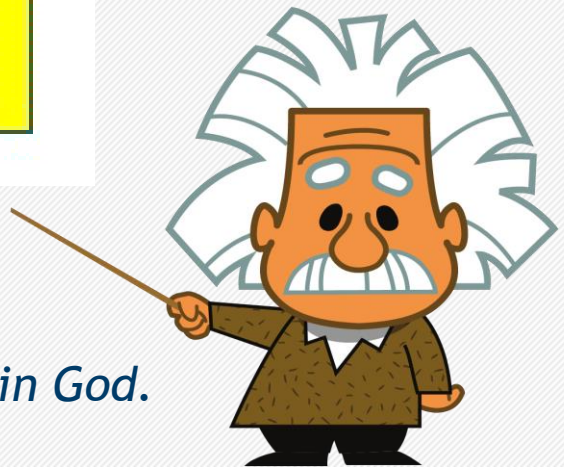
I must reject science and medicine because I am religious.

This argument presents a **false split** – as if belief in science and belief in religion are incompatible.

You don't have to make a choice between the two; they are not mutually exclusive.

Rethink False Dichotomies

In our example, it is possible to believe that God created the universe, and that the universe operates according to natural laws that are discoverable by science.



In fact, several great scientists (including Einstein) believed in God.

Francis Collins
American physician-geneticist

"One of the greatest tragedies of our time is this impression that has been created that science and religion have to be at war."

Another example of a false dichotomy?

When we live together in communities, we agree to follow certain rules for our mutual safety, such as stopping a red lights, driving on the right side of the road, and using designated places for elimination (i.e., restrooms).

The choice to have children vaccinated before they attend school is like the other community rules.

Discussion

Can you think of other false dichotomies?

Do you see either of these as false dichotomies?

- I am not having my child vaccinated because I don't want their immune system invaded by something foreign.

- The government is too big so I'm going to oppose it by not having my child vaccinated.

Who benefits from false dichotomies?

Who benefits from false dichotomies?

Often, it's people who want a controversy.

Avoiding False Balance

False Balance

Definition: False balance is a media bias in which journalists present an issue as being more balanced between opposing viewpoints than the evidence supports.

False balance has been credited with spreading misinformation.


... so we'll be talking with Dr. Jenkins of the National Institute of Health about the results of his 3-year study. And then for a different take we'll talk to Roger here, who I understand has reached the opposite conclusion just by sitting on his couch and speculating.

Harms of False Balance

When someone in a media report takes a stance on vaccines that is not based on fact, the report can do harm in two ways:

1. Giving invalid or vague ideas equal weight to verifiable scientific facts.
2. Allowing the social controversy to seem larger than it actually is.

Harms of False Balance

1. **Giving invalid or vague ideas equal weight to established and verifiable scientific facts by including both.**

Example: Interviewing movie stars who use the slogan "green our vaccines" alongside a person with a doctorate in immunology discussing the safety of vaccines. This makes it appear as though their positions are equally valid.

Harms of False Balance

2. Allowing the social controversy to seem larger than it actually is.

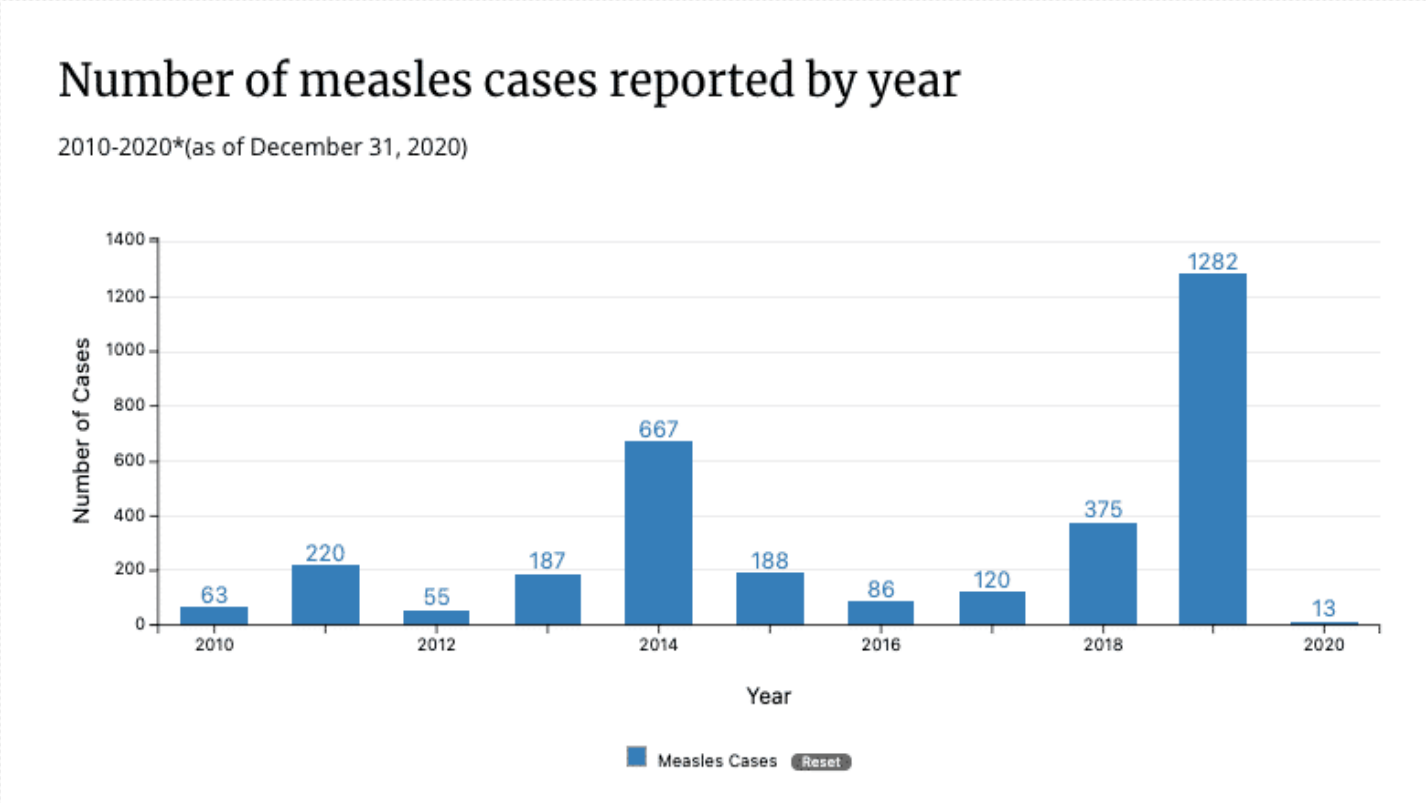
Example: Interviewing only parents who refuse vaccines for their children, even though well over 90% of parents do vaccinate their children

The cost of misrepresentation

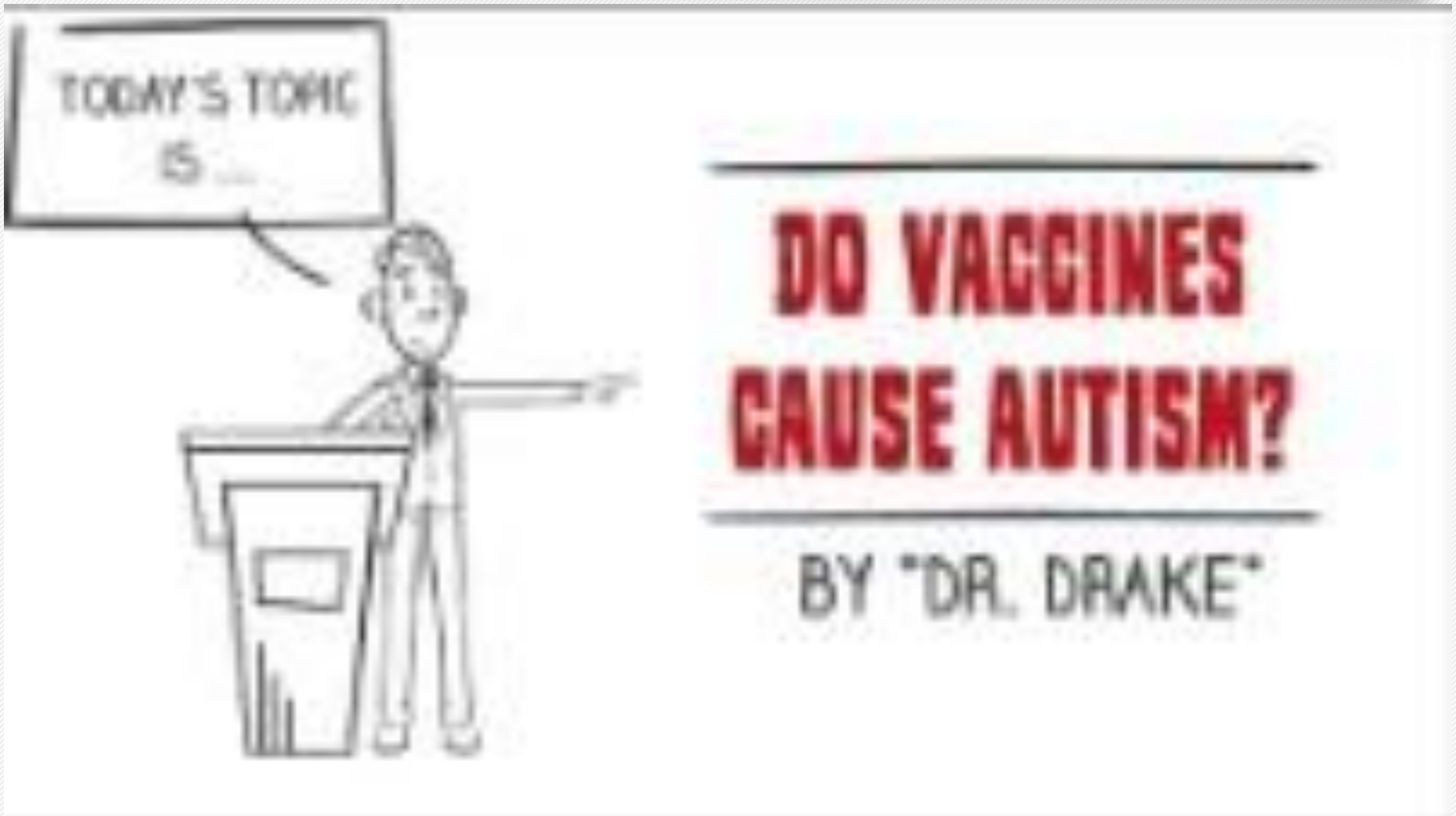
Mis-representation can have dire consequences. Here is an example.

Many people still believe false statements that autism is caused by the MMR (Measles, Mumps, Rubella) vaccine.

Sadly, this misinformation led to a decrease in MMR vaccination, which led to a surge in measles cases, which led to a lot of preventable hospitalizations.



Vaccines and Autism: How the Myth Started



When the anti-vaccine movement engages media

Human interest stories are an important facet of journalism but should not be used at the expense of verifiable fact.

False information and inaccuracies **must be clearly highlighted** by the reporter—not just by someone else featured in the piece.

When the anti-vaccine movement engages media

Anti-vaccine activists want the media's attention
because traditional and social media are the main tools they rely on to advance their ideas.

Evaluating Websites

Evaluating Websites

Anyone can start a website so it's important to evaluate websites before you rely on their information.

Many of the same considerations of media reports can be applied to online information.

Example

Let's evaluate a US immunization website, the Vaccine Education Center (VEC) at Children's Hospital of Philadelphia (CHOP).

URL: chop.edu/centers-programs/vaccine-education-center

Background on CHOP:

- CHOP is a children's hospital in Philadelphia, Pennsylvania.
- It is one of the largest and oldest children's hospitals in the world.
- It is the United States' first hospital dedicated to the healthcare of children.

Example

Let's evaluate a US immunization website, the Vaccine Education Center (VEC) at Children's Hospital of Philadelphia (CHOP).

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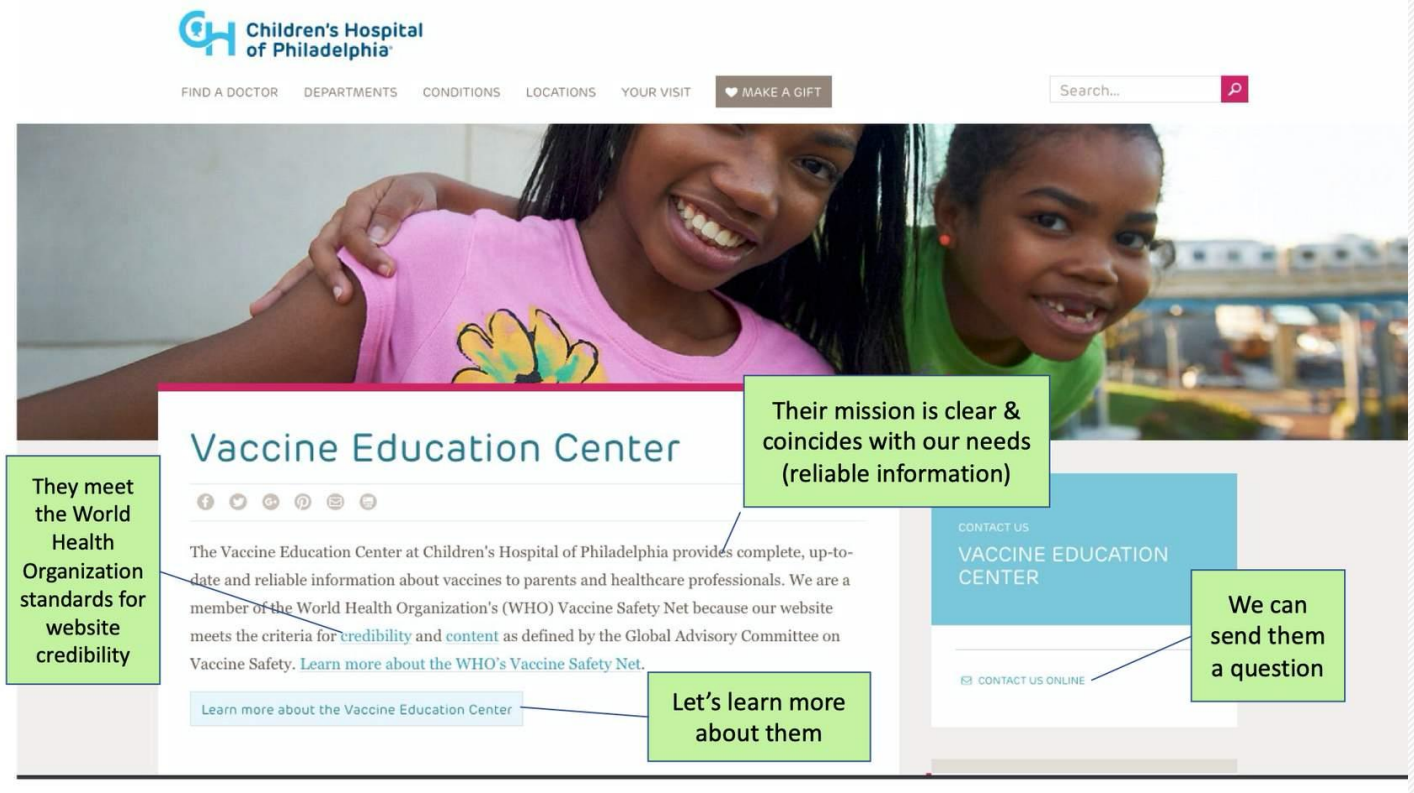
There are 5 sets of questions to ask yourself when evaluating a website.

#1 Who does this website represent?



Let's look at the VEC home page.

- Who oversees the website?
- Why are they providing the site?
- Can you contact them?

#2 Who funds the website?

Here is their funding disclosure.
We don't know which philanthropic organizations donate, but we know it's not vaccine manufacturers.

If you click on "philanthropic donations," you are asked to donate, not to buy something. It's a charity, not a business.

About the Vaccine Education Center

The Vaccine Education Center was launched in October 2000 to provide accurate, comprehensive and up-to-date information about vaccines and the diseases they prevent.

The Center, through its websites, videos, informational tear sheets, e-newsletters, webinars and speaker programs, seeks to dispel some of the common misconceptions and misinformation surrounding vaccines. The goal of our team is to communicate the facts about each vaccine as well as how vaccines are made, how and why vaccines work, who recommends them, whether they are safe, whether they are still necessary, and when they should be given. The center has also developed educational materials for elementary, middle, high school and college students.

The Vaccine Education Center is funded by Children's Hospital of Philadelphia and through philanthropic donations. The Center does not receive support from vaccine manufacturers.

The Vaccine Education Center at Children's Hospital of Philadelphia is a member of the World Health Organization's (WHO) Vaccine Safety Net because our website meets the criteria for credibility and content as defined by the Global Advisory Committee on Vaccine Safety. Learn more about the WHO's Vaccine Safety Net.

About Children's Hospital of Philadelphia

The Children's Hospital of Philadelphia, the nation's first pediatric hospital, has been a center of research, development and testing of vaccines such as those that prevent rubella (German measles), rabies, mumps, chickenpox and rotavirus. The Hospital has been the site of many pioneering research initiatives that have benefited children everywhere. It is home to one of the nation's largest pediatric research and pediatric educational programs. Learn more about CHOP.

Reviewed on April 15, 2020

CONTACT US
VACCINE EDUCATION CENTER

CONTACT US ONLINE

Their web address is chop.edu, not **.com** so this must be an educational institution, not a business.

VEC HOME
A LOOK AT EACH VACCINE
RESOURCES
VACCINE SAFETY
VACCINE INGREDIENTS
VACCINES AND OTHER CONDITIONS
VACCINE SCHEDULE
VACCINE CONSIDERATIONS FOR SPECIFIC GROUPS
VACCINES BY AGE GROUP
VACCINE SCIENCE
MAKING VACCINES

Their web site meets the World Health Organization criteria for credibility and content.

- Where does the money to support the site come from?
- If the site has advertisements, are they labeled?

Link: About the Vaccine Education Center

#3 What is the quality of the information?

The VEC team is led by a pediatric infectious disease physician-scientist. There are nurse and physician advisors, and vaccine experts on their Board of Advisors.

The VEC web site meets the World Health Organization criteria for credibility and content.

About the Vaccine Education Center

The Vaccine Education Center was launched in October 2000 to provide accurate, comprehensive and up-to-date information about vaccines and the diseases they prevent.

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CONTACT US
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VACCINES BY AGE GROUP
VACCINE SCIENCE
MAKING VACCINES

- Where does the information on the site come from?
- How is the content selected?
- Do experts review the information that goes on the site?
- Does the site avoid unbelievable or emotional claims?
- Is it up-to-date?

#4 Is the information up to date?

Timeliness matters. Medical science keeps evolving, so it's important to keep updating vaccine information.

Here we see that at the bottom of each page, VEC shows the date of its latest update.

Relative risks and benefits

Do the benefits of COVID-19 vaccination outweigh its theoretical risks?

COVID-19 can cause severe disease or even death. Some people may develop long-lasting effects following COVID-19 infection, resulting in symptoms that last for weeks or months, even when the virus can no longer be detected in the body.

On the other hand, the COVID-19 vaccine has not been shown to cause any serious side effects. Therefore, the benefits of the COVID-19 vaccine clearly outweigh the risks.

Disease risks

- Pneumonia (infection of the lungs)
- Respiratory failure
- Acute respiratory distress syndrome (ARDS)
- Sepsis (bloodstream infection) and septic shock
- Multi-organ failure
- Children can develop a rare, yet severe, inflammatory disorder weeks after infection
- Disease can be fatal

Vaccine risks

- Fatigue
- Headache
- Muscle aches

References

Coronavirus, World Health Organization

Coronavirus (COVID-19), Centers for Disease Control and Prevention

Reviewed by Paul A. Offit, MD on March 08, 2021

#5 How is the viewer's personal information used? (Privacy)

- Does the site ask for your personal information?
- Do they tell you how it will be used?
- Are you comfortable with how it will be used?

Summary of questions to ask

1. **Who** does this website represent?
2. Who **funds** the website?
3. What is the **quality** of the information?
4. Is the information **up to date**?
5. How is the viewer's personal information used? (**privacy**)

MedlinePlus Evaluating Internet Health Information: Checklist

Provider

Who is in charge of the Web site?
Why are they providing the site?
Can you contact them?

☐

Funding

Where does the money to support the site come from?
Does the site have advertisements? Are they labeled?

☐

Quality

Where does the information on the site come from?
How is the content selected?
Do experts review the information that goes on the site?
Does the site avoid unbelievable or emotional claims?
Is it up-to-date?

☐

Privacy

Does the site ask for your personal information?
Do they tell you how it will be used?
Are you comfortable with how it will be used?

☐

Find reliable health information on MedlinePlus.gov, the National Institutes of Health's site for patients, their families and friends.

MedlinePlus
Trusted Health Information for You

NIH U.S. National Library of Medicine

Quiz

Choose the statements below that would lead you to believe a website may NOT offer reliable information.

- The website has a shopping cart icon at the top of the page or multiple "add to cart" or "buy now" options.
- "This website is supported by Vitamins-R-Us, a company that produces vitamins for people everywhere."
- "We do not give, share, sell, or transfer any personal information to a third party."
- The website has a date for when the organization was established but no date for when the information was last reviewed.

Quiz

Choose the statements below that would lead you to believe a website may NOT offer reliable information.

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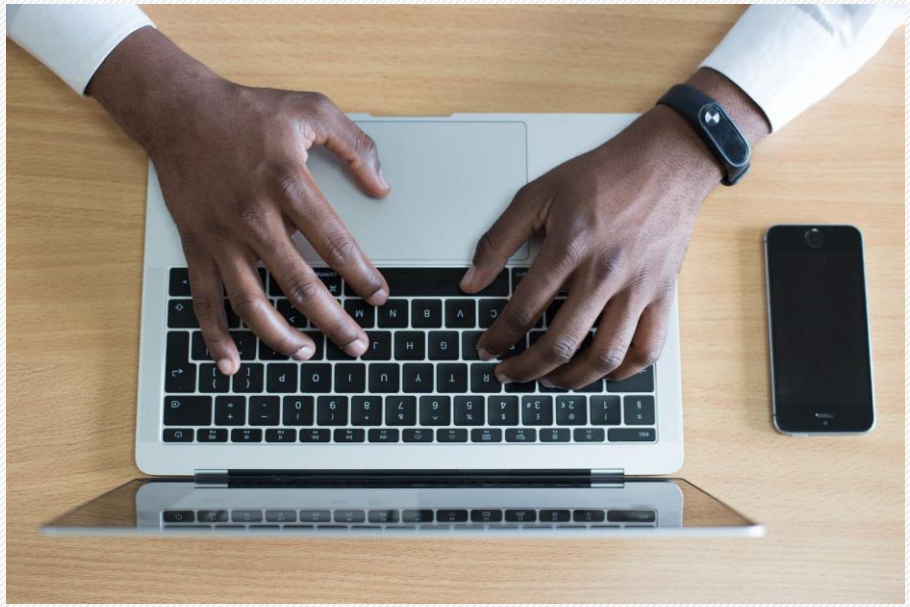
- ✓ The website has a date for when the organization was established but no date for when the information was last reviewed.

Evaluating Media Reports

Where do we get our information?

- Sometimes it can seem like new information and research study results are coming out daily, and at times they directly conflict with other reports.
- When evaluating a media report, you need to remember some **essential things…**




1
2
3
4
5

1

Who is providing the information?

Is the organization providing the information reliable?

3

4

Is the report based on science?

Is the report based on a scientific study or a personal anecdote (an individual story)?

1

2

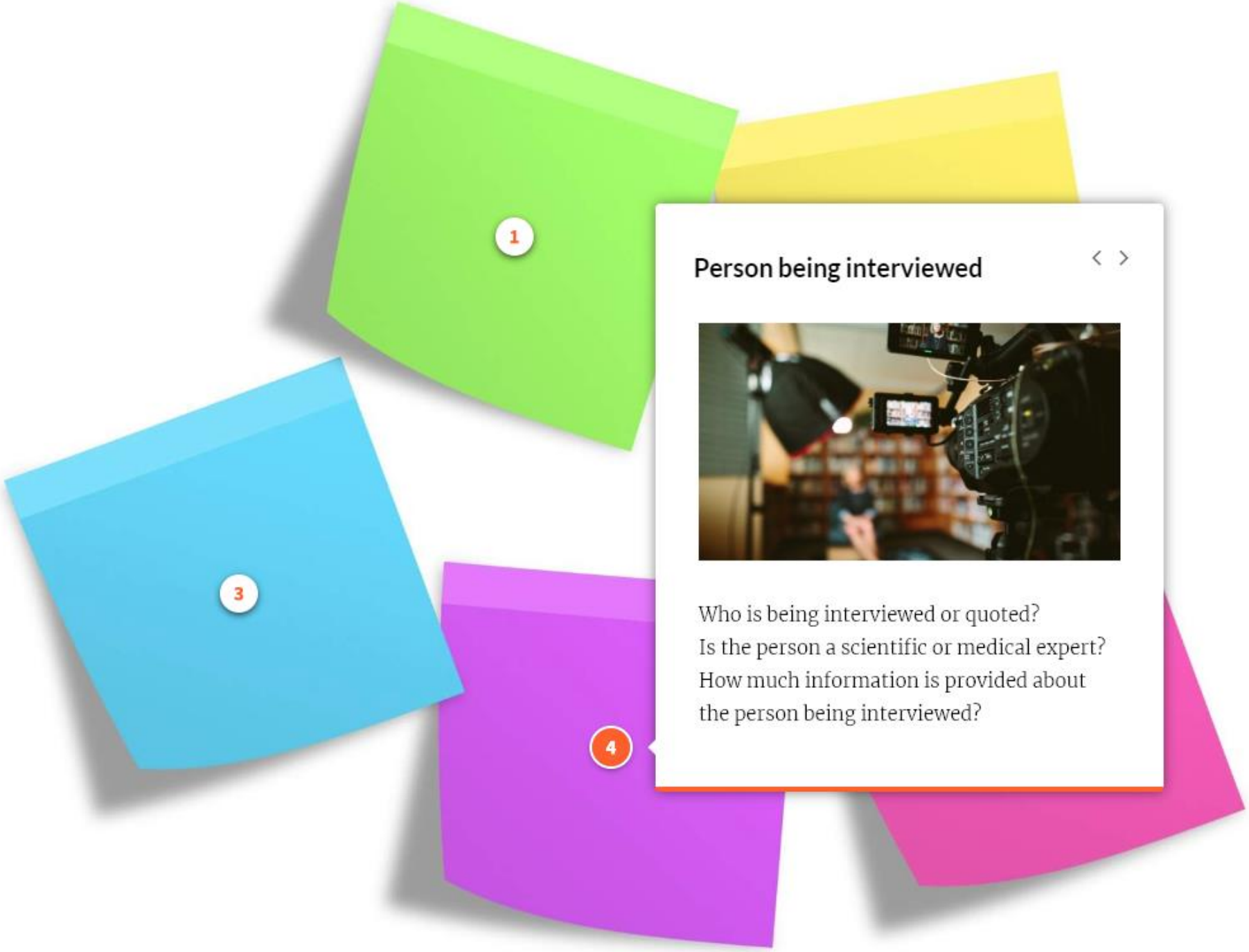
3

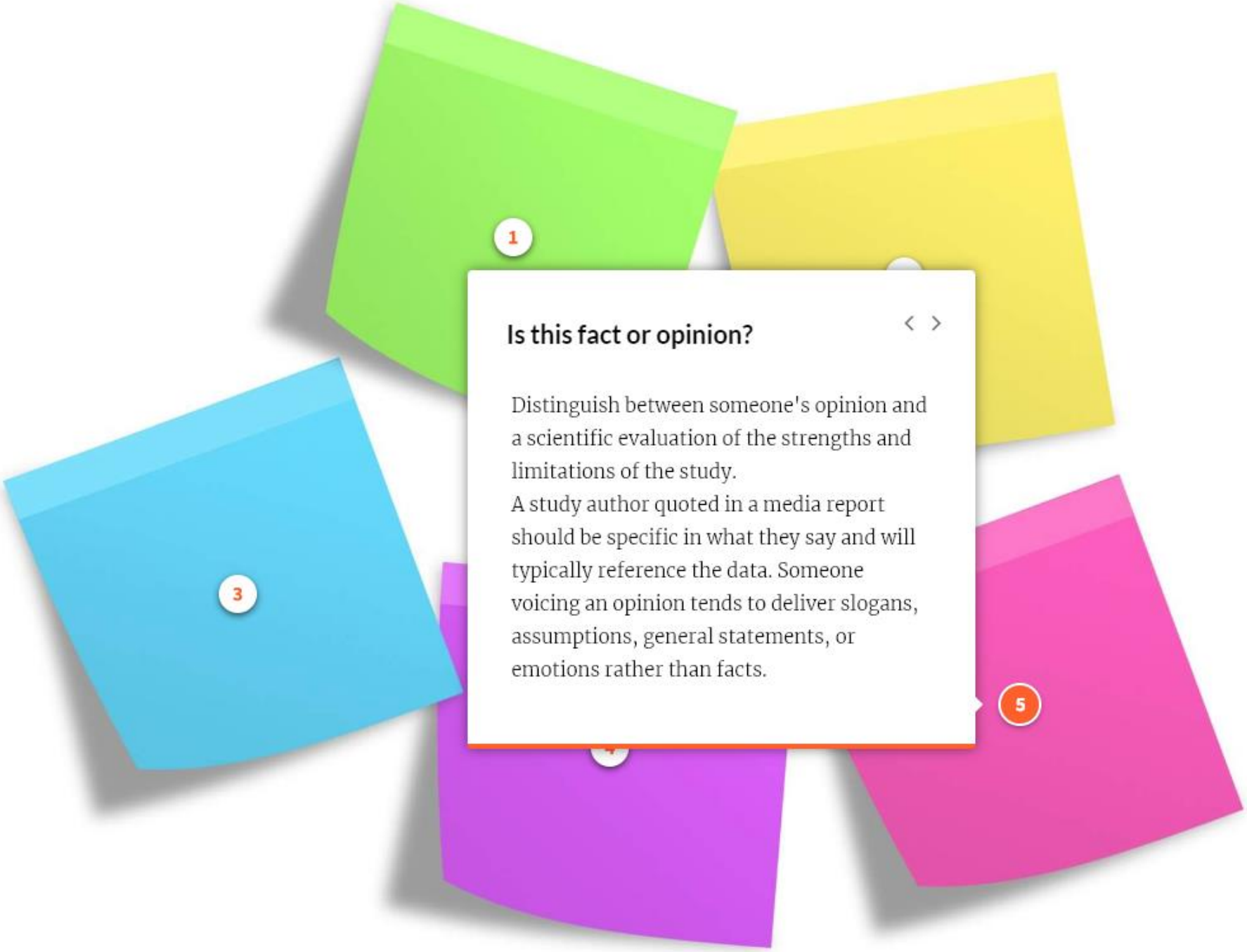
5

If the report is about a scientific study...

... evaluate the information provided about the study using the criteria outlined below (in the "Evaluating scientific studies" section). A good media report will include information about

- Where the study was published
- The way the study was done
- The size of the study


1
3
4
Person being interviewed
Who is being interviewed or quoted?
Is the person a scientific or medical expert?
How much information is provided about
the person being interviewed?


1
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5
Is this fact or opinion?
Distinguish between someone's opinion and a scientific evaluation of the strengths and limitations of the study.
A study author quoted in a media report should be specific in what they say and will typically reference the data. Someone voicing an opinion tends to deliver slogans, assumptions, general statements, or emotions rather than facts.

Evaluating scientific studies

Let's imagine a news story about drinking coffee.

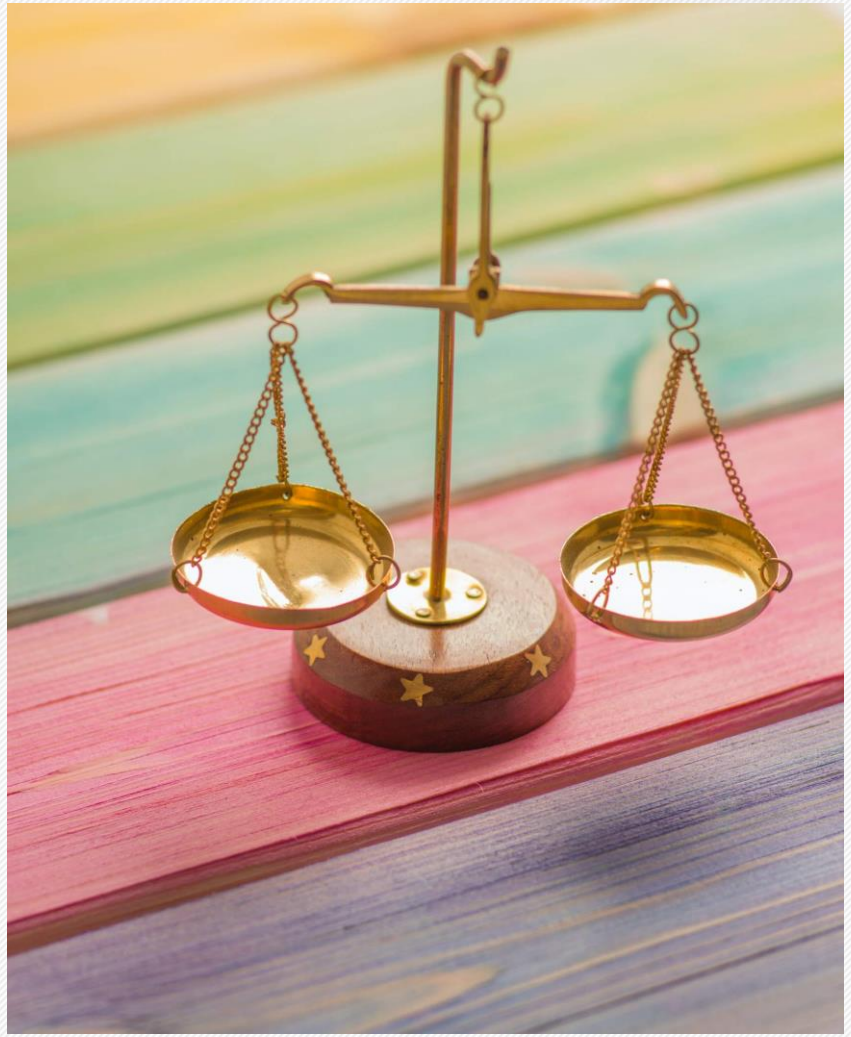
- **What the study showed:** Drinking 80 oz of caffeinated coffee every day for 10 years leads to a two-fold increase in the risk of developing stomach cancer.
- **The press release from the Tea Grower's Society:** “The study released today shows that drinking coffee can be associated with stomach cancer.”
- **The headline reads:** "Study shows coffee causes cancer!"

Journalism caveats

Journalists often talk about presenting a balanced story.

However, there are a *few caveats* that are important to remember:

1. Consider if this is scientifically-based information versus emotionally-based information.
2. Consider the size and expertise of the group supporting each side of a story.
3. Consider if the position of the story is supported by scientific bodies or other researchers in the field.



Wrap-up

Answer the questions to review what you learned!

Quiz

True or false?

At an 18-month doctor appointment, it's noticed that the child is not developing normal speech. After further tests and observation, the child is diagnosed with autism. The child had his MMR vaccine at 12 months of age. The fact that autism was diagnosed after the child got the MMR vaccine shows that autism is probably caused by MMR vaccine.

FALSE

Quiz

In respect to a health information website...

TRUE or FALSE: The sources for the information should be included.

TRUE or FALSE: It's fine for them to use your personal info without disclosing this.

TRUE or FALSE: The focus should NOT be selling you a product.

TRUE or FALSE: A section should explain who oversees the website.

TRUE or FALSE: The funding source should be kept anonymous

Quiz

In respect to a health information website...

TRUE or FALSE: The sources for the information should be included.

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TRUE or FALSE: The focus should NOT be selling you a product.

TRUE or FALSE: A section should explain who oversees the website.

TRUE or **FALSE:** The funding source should be kept anonymous.

Quiz

Match the term with the definition.

A good media or scientific report may contain this

Reporters giving both sides of a story can cause this

A bad media report may only contain this

False Balance

Where a study was done, how it was done, and size

Personal anecdotes

Quiz

True or false?

You can find reliable health information on medlineplus.gov

TRUE

Resources

Misinformation Alerts

These insights are based on a combination of automated media monitoring and manual review by public health data analysts.

Media data are publicly available data from many sources, such as social media, broadcast television, newspapers and magazines, news websites, online video, blogs, and more.

See Misinformation Alerts at:

publichealthcollaborative.org/misinformation-alerts/

Alerts are categorized as high, medium, and low risk.

- **High risk alerts**: We recommend directly addressing and debunking the misinformation
- **Medium risk alerts**: We recommend monitoring the situation but not actively engaging.
- **Low risk alerts**: Provided for informational purposes. We do not recommend additional action at the moment.