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Bryna B's Tips for Finding Good Data and Thinking Critically

- More often than not, we get our information from major news outlets, social media, or word of mouth.
- However, none of these have to prove that the information that they are sharing is true, or accurate, and some do not even intend to spread inaccurate information.
- Going to the original source of the data can be really helpful!

Quick Questions to Check Info

- Who is the information from? What is their connection to the topic?
- Is it a personal opinion, or backed up with fact?
- Do they have a bias? Who benefits from the sharing of this information?
- Are they providing sources to back up their information? Can you easily fact check?
- Is this word of mouth? Was causation proven in this personal experience?
- Can you find research to back up what you were just told?

Causation VS Correlation

Proving a the Cause of something:

- Humans are experts in finding patterns, finding out why things happen, and understanding the cause of things. This is part of what has made us such a successful species
- Sometimes we get a little over excited when we notice a pattern, and assume what we observed is the cause. But there can be other factors at play in the situation that we didn't notice!
- A pattern is when two different sets of data go up or down in similar ways over time.
- When Event A happens often, we see lots of Thing B. When Event A happens rarely, we almost never see Thing B. Just because Event A and Thing B go up and down at the same time, does not prove that A is the cause of B or B is the cause of A, this observation is a correlation until it can be proven to be related, then the relationship would be an example of causation!

- When we observe a pattern, and we can prove that one thing causes another, this is called causation
- When we observe a pattern, but we can't prove that one thing causes another, this is called correlation
- It is very difficult to prove causation in science! When data is analyzed by scientists, they have to take into account all of the other possibilities that could have caused the pattern. Some things may just happen at the same time (correlation), but not be directly caused by each other.
- When looking at information, make sure they have proved the cause, and not just published a correlation. Think about other factors that could have caused the pattern.

Some examples of Correlation VS Causation:

- You are more likely to drown if there is ice cream in your freezer.
 - Is the ice cream in your freezer the cause of drowning? No, you are just more likely to both be swimming, and have ice cream during the summer. This is a correlation.
- The more time you spend exercising, the more likely you are to get Skin Cancer
 - Does exercise cause skin cancer? Not that could be proved. What was proved was that people who live in sunnier climates exercise more, and get more exposure to the sun. This is a correlation.
- When the average amount of cheese eaten per person in the US goes down, less people die from getting tangled in their bedsheets
 - Can nationwide cheese sales impact the chances of people suffocating in bed? No. Sometimes it's just a weird coincidence!

An example of a correlation based paper:

Vaccine rates don't impact the rate of Covid-19 spread:

The article: Subramanian, S.V., Kumar, A. Increases in COVID-19 are unrelated to levels of vaccination across 68 countries and 2947 counties in the United States. *Eur J Epidemiol* (2021). This article claims that having more vaccinated people in an area does not reduce the number of Covid 19 cases in that area. However, not all areas are the same, there are many factors that influence the rate of transmission outside of just vaccination. More than just the levels of transmission need to be looked at to get a real understanding of how the vaccine is working!

- Testing rates and access to medical attention - The article says South Africa and Vietnam have less transmission despite low vaccination rates compared to some first world countries. I argue that many of the cases in countries such as these are not confirmed or reported.
- How long ago people were vaccinated- Israel has a high reinfection rate even though they have a high vaccination rate. Israel was so effective at vaccinating its adults that many of them were vaccinated over a year ago now. The immuno response from the vaccine is no longer as effective. In areas where vaccine rollout was smooth and fast, boosters are needed.
- The data reported- Some countries are not sharing accurate info, either due to infrastructure issues that make it impossible to collect it all, or for other reasons. For example, Costa Rica was on the UK red list for months, while its neighbour Nicaragua

was not. All of the first-hand information coming from Nicaraguan said the covid situation was very serious, but the reports leaving the country did not match.

- Population mobility- What percentage of the population moves, how often, how far? With limited mobility there is less risk of transmission. Mobility is related to wealth, poorer populations in the US and in other countries have had less access to vaccines, but also move around less. They don't travel as far or often, and have fewer people coming into their populations from outside.
- Population density- How closely do people live together? When people live closely together and have more contact with one another you will have more transmission.
- Government mandates and their enforcement- Populations who wear masks and social distance, work from home, avoid seeing family who don't live in your home etc... have less transmission. This is another variable that needs to be taken into account.

Tips for finding reliable info that's up to date

- Search keywords in Google Scholar to find primary sources about what you want to know.
- When reading a news article, click the link to the original study to make sure they represented or interpreted the facts properly.
- Ask an academic friend if they will help you find or interpret studies that help you answer your questions.
- Remember, there may not be an answer yet! Reading peoples' guesses is not reliable, especially if they are not experts in the field.
- Always check the date of publication! Information is coming fast, there may be new data that proves what you are reading wrong.
- Journal articles provide a list of sources for the information they provide. Checking the sources can lead you to more info
- When reading a scientific journal article, you can often see if other authors have cited this article in their work. This usually means those papers are related and newer, be sure to check them out as well.

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