Have you ever scanned news stories on social media? Many of the headlines make surprising, or false science claims. Some can be fairly easy to spot. But other articles are not fake; they’re just misleading. These articles may be harder to recognize.

Many articles claim that different behaviors or products affect your health. These scientific claims should be supported by scientific research and evidence. But many are not.

In 2008, the New York Daily News published an online article. It was titled “Sugar as Addictive as Cocaine, Heroin.” The article discussed a study that investigated the effects of sugar on rats. The scientists found evidence that rats on a high-sugar diet became dependent on the sugar. They also saw that the diet caused changes in brain areas related to addiction. But the study didn’t compare these changes with the effects of cocaine or heroin. It also didn’t show whether or not these changes happen in humans. The headline claim was not supported by scientific evidence.

Most science articles from reputable sources are accurate. But it’s important to think critically about what you read and where you get your information. Asking simple questions can often help you determine whether or not a health story is based on solid science.
Five Questions to Ask as You Evaluate a Science or Health Article

1) Where is the story published? Some websites publish articles that are not checked for accuracy. Any information published by trustworthy news agencies or government sites goes through strict fact-checking procedures. If you aren’t sure whether to trust a site, ask a librarian or teacher for advice.

2) Does the headline make a very surprising claim? Headlines can be exaggerated to catch readers’ attention. Read the story carefully to see if the author gives scientific evidence to support the headline. If the article suggests something very different from other studies, or doesn’t provide supporting evidence, you should be more skeptical.

3) What is the original source? Before an article is published, scientists often publish their study methods and results in scientific journals. A group of peer researchers analyze their work. This ensures that the scientific process was carried out carefully. If the research was not peer-reviewed, it may not be reliable.

4) Who conducted the research? Sometimes the people who conduct scientific studies may benefit from a certain outcome. For example, a health company may study how their product affects humans. Since the company wants to sell the product, it may affect how data are interpreted. Find out who paid for the research to help you decide whether the study is reliable.

5) Who, or what, did the scientists study? Scientists often do research on animals to develop treatments for human disease. But finding something in mice doesn’t always mean it is true in humans. Sample size is also important. The results of a medical study are more reliable if a large number of people are studied.

The ending of a URL provides clues on how to evaluate the content on a website.

.com = commercial. Often for-profit companies
.edu = educational institution. Often universities
.gov = government. Usually federal, state, and local agencies
.net = network. Could be any site
.org = organization. Could be any site

MORE INFO: For additional facts about science and your health, visit scholastic.com/headsup and teens.drugabuse.gov.

From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services
Be a Science Fact-Checker

Science literacy is an important skill for everyone. That’s especially true for teens who are inundated with stories on social media about important topics such as their health. Many of the articles found on Facebook or Twitter make claims that are not backed up by scientific evidence. By sharing the student article “Be a Science Fact-Checker” and teaching the lesson plan below, you will help students build skills that let them separate good science from misinformation. In the paired worksheet (see reverse side), students will put these tools to use by critically analyzing a story in which scientific facts were misrepresented, with some serious health consequences.

Critical Thinking

1) Many websites publish stories about science and health. Is every article you read based on scientific fact? How might you distinguish a fact-based health article from one that is not backed by scientific proof? Give reasons to support your answer. (Answers may include that every article is not based on scientific evidence. You might distinguish the two by asking questions that lead you to understand the validity of the group that conducted the research, the trustworthiness of the site in which the study was published, and whether or not the study was conducted in a scientific manner.)

2) Misleading news articles often spread over the internet faster than factual articles. Why do you think this is true? (Answers may include that misleading articles often have exaggerated headlines or make surprising claims. These articles catch readers’ attention and may cause them to be shared more often.)

3) “Fake news” has been used to describe many different types of news. According to most media experts, “fake news” contains false or inaccurate information. What are some reasons a science article might be labeled “fake news”? Cite evidence from the text to support your answer. (Answers may vary but may include an article that describes research from a biased source, an article with a surprising headline that isn’t supported by the study, etc.)

Paired Reading

• Writing Prompt: What is replication? How does it help prevent misleading or inaccurate science stories from being published? Use text evidence from “Say What? ‘Scientific Method’” and “Be a Science Fact-Checker” to support your answers.

Student Worksheet

The worksheet on the reverse side includes a news story about a study on drugs and addiction. Students will read and analyze the story using the critical-reading tips they learned in the student article. They then will answer questions to explain ways in which the story may be misleading, and they’ll cite evidence to support their arguments.

Answers: 1. Answers will vary but may include the following points as supporting evidence: The headline exaggerates the findings of the study; the research was published as a one-paragraph letter to the editor and was not a peer-reviewed article.

2. Answers will vary but may include that the study did not include enough data to support the claim that opioids are not addictive. Some limitations in the study are as follows: a) The study did not include patients who were given opioid prescriptions to use at home. These patients may be more likely to develop addiction than those using the drugs only while in the hospital. b) The study assumed that patients with no record of addiction treatment did not develop the disease. Patients could have developed addiction but it was never reported in their records.
In the article “Be a Science Fact-Checker,” you learned that news articles are sometimes misleading. If false news spreads, it can have serious results.

For example, a paragraph written by two researchers appeared in the letter to the editor section of a scientific journal in 1980. The scientists presented data about how often addiction developed in hospital patients who had been given opioid drugs. Opioids are powerful pain medications that are highly addictive. But the letter stated that few hospital patients developed addiction.

The letter has been cited in many articles. It has been used as evidence that opioids are not addictive. But it is now known that this conclusion was misleading. Drug companies that make opioids used the letter to convince doctors that the drugs had a very low risk of addiction. In the following years, the number of opioid prescriptions increased dramatically. This misleading interpretation has led to the growing misuse of opioids. It has also led to a deadly overdose crisis.

**FROM SCHOLASTIC AND THE SCIENTISTS OF THE NATIONAL INSTITUTE ON DRUG ABUSE, NATIONAL INSTITUTES OF HEALTH, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**

**ACTIVITY**

**DIRECTIONS:** In this activity, you’ll use the tools you learned in “Be a Science Fact-Checker” to analyze a misleading news article about the letter described above. Read the article “Drugs Don’t Cause Addiction” (at right). Identify ways in which it is misleading. Then answer the questions below on a separate piece of paper.

**QUESTIONS**

1. **How is this article misleading?**
   As you read, use the five critical-reading questions from the article “Be a Science Fact-Checker” to guide you. What information is misleading in this article? Give reasons to support your answer.

2. **What evidence is missing?** In the article, the claim that opioids are not addictive is not backed by sufficient evidence. Think critically about how the study was conducted. Did the scientists collect enough data to support the conclusion? Describe one limitation of the study. Cite evidence from the text to support your answer.

**DRUGS DON’T CAUSE ADDICTION**

January 17, 1980

You’ve probably heard that certain drugs are addictive. Opioids are a type of powerful prescription pain medication. Many scientists warn that if you take opioids, you can develop an addiction. That’s why most doctors prescribe the drugs only for severe pain. But these precautions are probably not necessary. Scientists from the Boston University Medical Center in Massachusetts state that addiction is very rare when people take these drugs.

Two researchers looked over the medical records of nearly 12,000 hospital patients. They wrote a one-paragraph letter to the editor of *The New England Journal of Medicine* describing what they found. All of the patients were treated with opioid pain medications while staying in the hospital. The patients’ treatments were overseen by medical staff. Patients who were given prescriptions to treat pain at home were not included in the study.

The researchers searched the records to find out if any of the patients who took opioids at the hospital were later treated for addiction. They found that only four patients had developed an addiction. Their conclusion: Opioid addiction is rare in medical patients.

www.notrealnews...
Dear Teacher,

The vocabulary list on the following pages is drawn from the “Be a Science Fact-Checker” student article and the “Can You Spot Misleading News?” worksheet. It can be previewed with students prior to reading or reinforced with students afterward. Encourage students to incorporate these words into their discussions and writing about the student article and worksheet.

This list integrates vocabulary words that would be used across several content areas, such as *analyze*, *legitimate*, and *misleading*, as well as domain-specific words, such as *addiction*, *dependence*, and *method*.

**Some suggestions for students to help their understanding include:**

- organizing concept maps that include word parts, synonyms, antonyms, and examples;
- composing memory aids that explain the words or use them in a meaningful context;
- employing the words to create newspaper articles, stories, or poems.

Sources: Unless otherwise noted, definitions are sourced or adapted from: *Merriam-Webster Collegiate Dictionary* and *Scholastic Children's Dictionary.*
accurate (adjective): free from mistakes or errors
drug (noun): a brain disorder or illness associated with compulsive (uncontrollable) behavior, such as drug use, despite negative consequences
addiction (adjective): something, such as a drug, that causes changes to the brain that results in compulsive (uncontrollable) behavior despite negative consequences
addictive (adjective): something, such as a drug, that causes changes to the brain that results in compulsive (uncontrollable) behavior despite negative consequences
analyse (verb): to study or examine something closely or carefully in order to understand it
benefit (noun): something that produces good or helpful effects
bias (noun): an attitude that always favors one way of thinking or feeling
cited (adjective): referred to
claim (verb): to state something as true; (noun): something that is stated as true
cocaine (noun): an addictive illegal drug that produces a temporary increase in alertness and feelings of pleasure
compare (verb): to examine one or more things in order to find similarities or differences
conclusion (noun): a final decision based on reasoning
conduct (verb): to direct or take part in the management of
consequence (noun): something caused by a set of conditions
contribute (verb): to play a part in an end or result
crisis (noun): a situation that has reached an unstable point and that has a high chance of having a negative outcome
critical (adjective): important or necessary
critically (adverb): using careful judgment
data (noun): information such as measurements that are used as a basis for making conclusions
dependency (noun): the quality of having a need for a drug because of repeated use so that physical withdrawal symptoms are experienced if the drug is removed
develop (verb): to grow or cause something to grow larger or more advanced
documentation (noun): records or materials used to prove or show something
evaluate (verb): to determine the importance, value, or condition of something by carefully analyzing it
evidence (noun): something that gives proof or a reason to believe something
exaggerated (adjective): overstated beyond the truth
heroin (noun): an illegal opioid drug that has no medical use
inaccurate (adjective): containing mistakes
interpret (verb): to explain or tell the meaning of
investigate (verb): to study closely
journal (noun): a magazine or periodical that reports on things related to a specific topic
legitimate (adjective): being exactly as described, not false
limitation (noun): something that controls how much of something is possible or allowed
method (noun): a process, way, or technique for doing something
misleading (adjective): giving the wrong idea; making you believe something that is not true
misuse (verb): to use something in a way that is unintended or harmful, such as misuse of a prescription drug

navigate (verb): to make one’s way over or through; to steer through

opioid (noun): one of a group of drugs that produce relaxation, pleasure, and pain relief. Opioids can be addictive and potentially deadly due to overdoses.

opposed (adjective): completely different from

outcome (noun): something that comes about as an effect or end

overdose (noun): a lethal or toxic amount of a drug; (verb): to take a lethal or toxic amount of a drug

oversee (verb): to watch over or direct

peer (noun): one belonging to the same group based on age or status

persuade (verb): to win over to a certain belief or position

physical (adjective): of or relating to the body

precaution (noun): an action taken to avoid a dangerous situation or to lead to a positive result

present (verb): to bring to one’s attention

procedure (noun): a particular way of doing something

provide (verb): to supply or make available

publish (verb): to produce or prepare for the public to see

related (adjective): having a close connection

relevant (adjective): having something to do with the matter at hand

reliable (adjective): able to be believed

reputable (adjective): respected and trusted by most people

research (noun): a careful study, experiment, or collection of information that has the goal of finding and reporting new knowledge

result (noun): something determined by an investigation or calculation

review (verb): to go over or examine carefully

rigorous (adjective): done carefully with a large amount of attention to detail

scan (verb): to look over quickly

scroll (verb): to move up or down or across a display screen

skeptical (adjective): relating to or marked by doubt

source (noun): a person, book, or document that is used as a reference

support (verb): to provide proof or evidence for

treat (verb): to care for or deal with medically

treatment (noun): the act or matter of caring for or dealing with medically

ultimately (adverb): in the end