



You are what you eat

Commentary

This lesson is about drawing of conclusions from data, and how secure those conclusions might be. The research quoted is from an observational study; the important distinctions between this and an intervention study are made. The lesson also explores if it's possible to identify single factors that affect people's well being.

Before this lesson, students should understand the concept of a balanced diet and healthy eating.

This lesson could lead in to work on nutrition and health.

Resources

bs_eat_worksheet_01 'Stimulus sheet' • bs_eat_worksheet_02 'Sun protection on a plate' • bs_eat_worksheet_03 'Summary of conclusions from research paper'

Learning objectives

- To understand the difference between observational and intervention studies
- To consider how strong a conclusion can be drawn from research findings
- To consider how diet affects life expectancy and how evidence may change behaviour

Learning outcomes

By the end of the lesson students will understand:

- the difference between observational and intervention studies
- why media reports about health outcomes associated with different aspects of diet need careful scrutiny
- that the decision to change lifestyle is often dependent upon a range of factors

Key vocabulary

diet • nutrition • variable • observational study • intervention study

Starter

Ask students to imagine that they have decided to emigrate. They are going to live and work in one of the following: Sweden / rural Greece / Melbourne, Australia.

Show students images of these regions – some are provided on the stimulus sheet (bs_eat_worksheet_01).

Ask students to work in small groups and discuss all the things that might be different about living in these situations. Encourage discussion and ideas about a wide range of factors, such as pollution, diet, healthcare, pace of life, prosperity, types of employment, and climate.

Now say to students that, after a number of years, the wrinkling of their skin was going to be measured, quite scientifically. Ask them which of the factors they had identified might have made a difference to the amount of wrinkling. Establish that there are could be a number of causes.

It is often hard to find out which of many possible causes has produced a particular outcome, such as skin wrinkling, especially if some of the possible causes are interlinked with each other. In a scientific study we like to try and change only one thing at a time. This may sometimes be difficult, and we need to think of a way to account for that shortcoming, or consider conducting a different kind of study.

Main activity

Formally introduce the objectives, relating back to the starter.

Ask students to imagine that they are working as scientists and have been asked to conduct research into the use of olive oil in people's diets as a way of reducing skin wrinkling. The hypothesis is that 'more olive oil consumed leads to fewer wrinkles'. Ask students to decide how they could set up such an investigation. Get them to think about such factors as:

- the size of the groups
- how to make it a fair test
- how to control the variables

Bad Science for schools

Take feedback and ask what problems there are with conducting such research.

Explain that there are two main types of study scientists could use to answer this question, an 'observational study', and an 'intervention study'.

Explain that observational studies are when scientists find people who have already brought the change they are studying into their lives (Who has been using olive oil in their diet and who hasn't?). Ask students to consider the advantages and disadvantage of this kind of study. Draw out that observational studies use existing behaviours, so are cheap and easy to do, but may struggle to isolate single variables. People in the study group may well use different amounts of olive oil in their diets but there are almost certainly going to be lots of other differences as well. As a result it may be extremely difficult to clearly identify the extent to which the presence of olive oil is the significant factor in preventing the wrinkling of skin.

Explain that intervention studies ('trials') are when the scientists control the variables (You are going to have olive oil in your diet, but he is not.). Again, ask students what they think the advantages and disadvantages of this type of study are. Ideas should include that intervention studies involve a much better control of variables and the groups can be balanced to eliminate other variables. However, they are more expensive to run and may be unethical: imagine researching smoking in this way. They may also take longer: if you want to examine the effect of a lifetime of eating olive oil on life expectancy, you would have to start your experiment with children, but wait perhaps up to 70 years until you had your answer.

Return to the investigations proposed by the students and ask them to try to say which type of study they used.

Explain that in 2001 a detailed scientific study was conducted into the wrinkling of skin on people who lived in Sweden, Greece and Australia, and that you're going to share the findings. Depending on the age and ability of the students you could do this in one (or more) of three ways:

- explain verbally, making key points on the board
- give students copies of the edited findings (bs_eat_worksheet_03)
- you could give students copies of the original research findings

Ask students to work in groups and explore what the research showed.

- Was this an observational or an intervention study?
- The study found an association between features of peoples' diets and the amount of wrinkling they had. That might be because different diets cause wrinkles to different extents. But what alternative explanations are there? Are there factors which might be independently associated with both diet and wrinkles, like social class, outdoor working, sunlight exposure, smoking, and so on? (In this situation, scientists would call these alternative explanations 'confounding variables').
- Did this study prove that changing your diet will help you get fewer wrinkles?

Ask the students to work in small groups. Each group has to write a short piece of text (no more than 50 words) for a local newspaper using this report as the basis. The editor has made it clear that they want something engaging about how readers can enjoy the summer sun without being affected by it. Keeping the editor happy might be difficult because the research has shortcomings and does not give a clear answer. The pieces should be written in large writing on sugar paper and displayed around the room.

Then ask students to assess each other's' work. They have to give each piece two marks, each out of five. One mark is for 'how engaging it is' and the other is for 'how accurate it is'.

Now show the students the extract from the Daily Mirror on the resource sheet 'Sun protection on a plate' (bs_eat_worksheet_02). This is part of a longer article with a series of tips about improving diet. Ask students to discuss and consider the extent to which the article's conclusion is reasonable. Emphasise that we're not saying that olive oil isn't good for you, but whether this conclusion is entirely justified. Take feedback.

Some students may be of the opinion that the news stories make good advice in a rather dry research report accessible to a wide range of people. Others may feel that it's not quite as simple as that, and that if you want smoother skin in old age you might have to do a bit more than consume more olive oil. Some may feel that simplifying the story to make it accessible, and leaving out the caveats, has also made it misleading

Draw attention to the abstract from the report which said that "This study illustrates that skin wrinkling in a sun-exposed site in older people of various ethnic backgrounds may be influenced by the types of foods consumed." Remind students of the confounding variables they identified earlier in the lesson and ask them the extent to which either their report or the one from the Mirror recognised these.

Plenary

Ask students to work in pairs to list the pros and cons of observational and intervention studies.

Take a show of hands – if students saw the newspaper headline tomorrow: *SCIENTIFIC STUDY SHOWS BUTTER CAUSES SKIN CANCER* would they stop eating butter immediately? Take feedback on their decisions.

You are what you eat worksheet 01

Stimulus sheet

Rural Greece



Melbourne, Australia



Sweden





You are what you eat worksheet 02

Daily Mirror article

SUN PROTECTION ON A PLATE!

By Angela Dowden 13/06/2006

WITH TEMPERATURES SOARING TO RECORD LEVELS, IT'S VITAL TO PROTECT YOURSELF FROM THE SUN'S RAYS. HERE ARE THE FOODS THAT CAN HELP...

BY making a few simple changes to your diet, you can help protect your skin from sunburn, ageing and even cancer.

Of course, you also need to keep wearing your sun lotion and a hat and stay in shade during the heat of the day, but here's how to get some of your SPF's on a plate...

Olive oil

AN Australian study in 2001 found that olive oil (in combination with fruit, vegetables and pulses) offered measurable protection against skin wrinkling. Eat more olive oil by using it in salad dressings or dip bread in it rather than using butter.



You are what you eat worksheet 03

Summary of conclusions from research paper

Full paper is at: Journal of the American College of Nutrition, Vol. 20, No. 1, 71–80 (2001)
www.jacn.org/cgi/reprint/20/1/71.pdf

This study was set up to see if there was a correlation between the intake of various foods and nutrients with the wrinkling of skin in places with significant amounts of sunlight.

The study included four groups:

Group 1 177 people who were born in Greece but now living in Melbourne, Australia

Group 2 69 people who were born in Greece and living in rural Greece

Group 3 48 Anglo-Celtic Australians living in Melbourne

Group 4 159 people who were born in and still living in Sweden

They were participating in the International Union of Nutritional Sciences “Food Habits in Later Life” study and had their dietary intakes measured and their skin assessed.

The results showed that Group 4 had the least skin wrinkling in a sun-exposed site, followed by groups 1, 2 and 3. Analysis of the data and identifying correlation with food groups suggested that there may be less skin damage amongst people with a higher intake of vegetables, olive oil, fish and legumes, and lower intakes of butter and margarine, milk products and sugar products.

High intakes of vegetables, legumes and olive oil seemed to offer protection against wrinkling whereas a high intake of meat, dairy and butter appeared to have the opposite effect.

This study illustrates that skin wrinkling in a sun-exposed site in older people of various ethnic backgrounds may be influenced by the types of foods consumed.