# Meet a Physiologist

**Steve Ingham is Head of Physiology at the English Institute of Sport (EIS). The EIS work with Olympic athletes from all over the UK, helping them train and perform at their best.**

**Steve studies elite athletes – some of the best in the world – including swimmers, runners and rowers. He says elite athletes are in a class of their own.**

"These people are MUCH better than ordinary people who do sport as a hobby – even if they are pretty good. For example, at long distance running, people win county championships running a mile in about 4 minutes. The people who win Olympic Gold run it in about 3 min 50 secs. It's only ten seconds faster, but because you are fighting air resistance and so on, your muscles need to be a lot more powerful to do it."

"Elite sportspeople are exceptional – that's why they win medals in the Olympics! We study what makes them special and how best to train them. We try to understand how their bodies work and look at the effects of things like different diets, exercises or training schedules."

Normally when scientists study humans they like to look at a lot of people, so their sample is representative. But Steve can't just get a bigger sample.

**"There aren't many people who are this good who you could study."**

Because elite athletes are so special, Steve says you can't apply the things you find out from studying 'normal' people to the athletes. Although the scientific method says it's better to have a bigger sample, if Steve did that, he'd have to include some people who just aren't as good.

**"I'm not trying to study the physiology of 'quite good' athletes. I'm trying to study the very best. I don't want to water that down."**

(cont. overleaf)

**Bigger samples** give **more accurate results**. But **cost more** money and time.

**Smaller samples** are **quicker and easier**, but may **not be very accurate.**

## Steve's CV

**Current Job:**
Head of Physiology, English Institute of Sport (EIS)

**School:**
Oakmead Secondary School; Bournemouth College of FE; University of Brighton; University of Surrey

**Qualifications:**
BSc Sports Science; PhD in Exercise Physiology

**Work history:**
Sports Performance Officer, English Sports Council; Sport Physiologist, British Olympic Association; now Head of Physiology at EIS

## Sample size

**Sample size** means the **number of measurements** you make.

Let's say you wanted to know the average running speed of people in your school.

You could time every person in the school running a race. Then you could work out a very accurate average. But it would take a long time.

You could time one person running a race. That would be quick and easy. But you don't know if they are fast or slow compared to everyone else. So it probably doesn't help much.

It's most practical to do something in between.

What scientists do is take a **sample**. You might find out the speed of 10% of pupils. If there were 1000 pupils in your school, you would measure 100 students, picked at random.

10% is quite a big sample for most things. The average of that will probably be very close to the average for everyone. **If** the sample is **representative**.

The Physiological Society

This information sheet is sponsored by The Physiological Society.

Steve published one study with a sample of just one person – a four times Olympic medal winner in rowing.

"We looked at the effect of training and rest on his fitness. It told us something about how a sportsperson **that good** responds to training. It may be quite different to other people."

"In my research we are trying to help our athletes win Olympic medals. It would be perfect if we could study a big population of elite athletes, but we can't. If I use a small sample it's not as reliable as a big study, but it focuses just on the best athletes and gives us an indication."

**"Sometimes, in science, we have to compromise, just to try to get some useful information."**

## Steve's Interview

**Favourite singer or band:**
My wife, she wails!

**What did you want to be when you left school?:**
I had no real idea, as I didn't do very well. I wanted to work in sport and was curious about sciences. The two matched up nicely.

**X-box or Playstation?:**
Neither! I prefer working in my veg garden. If I have to choose... Wii just dance - with my little girls.

## Representative sample

Scientists have to be very careful how they **pick** their sample, to make sure it is **representative**.

If the 100 students you picked were all from year 7, would the average running speed be close to the average running speed for the whole school? Or would it be slower?

What if the 100 students were all from the sixth form?

What if the 100 students were all really into sports and were very fit?

This is called **sampling bias**. This means your sample is **not very representative** of the whole population.

To make sure the **sample** is **representative**, scientists come up with ways of picking them that are **random**. For example, you could put all the students' names in alphabetical order, and use every tenth person.

**Activity:**

## Sample picking puzzle

**1.** Where does Steve work?

**2.** In your own words, explain what he studies.

**3.** How fast can the very fastest people run a mile?

**4.** Why is it difficult to study elite athletes?

The Physiological Society

This information sheet is sponsored by The Physiological Society.