

Ethics in research: From science fairs to clinical trials, the same golden rules apply

Principles of ethics in research

Social value: Your research must provide meaningful results that you can share with others. Design your research carefully and think about how you are going to analyse the results before you ask people to participate.

Scientific validity: Your research must follow a scientific method that is carefully planned and worthwhile for the people who are giving up some of their time to assist you.

Fair participant selection: You must choose the people who will be involved in your research fairly.

Risks and benefits: The research burden felt by the people helping you with your research must be reasonable. You must make sure that there is minimal risk to them, for example no discomfort or physical harm. For the most part, school science fair projects, specifically surveys and some taste tests of non-toxic substances (in someone without allergies) involve minimal risk. However, when projects require someone to drink a herbal mix, apply a newly-concocted cream, or swallow a capsule filled with dried plant matter, these risks increase.

Informed consent: The people who will participate in your research must be told about the details of your study, including the risks (which you should know) and understand that they will volunteer and not be forced to participate. You must give the volunteer an information sheet explaining your study and they must sign a consent form.

Respect for participants: You must keep the information you collect from participants confidential, which means you cannot link personal information to a person's specific name, age, sex etc. You must tell them that they can leave the study at any time. After the study, you should share your results with the people who took part in your study.

Data integrity: You must collect, accurately record and store the data from your experiments in the best possible way. It is not appropriate to fabricate (make up) data that is not real. Plagiarism is also not appropriate. Plagiarism is when a person takes someone else's work, data or writing and pretends that it is their own. This includes a parent in a professional role performing an experiment, such as a laboratory experiment, and their child presenting the results as their own work in their science fair project.

Independent review: An appropriate person must read through your research plan and approve your plan. For a science fair project, this could be a science teacher (not your own teacher but another one), a school administrator or a regional judge. For professors, a formal application must be made to a Research Ethics Committee at a University, Science Council or National Health Research Ethics Council.

There is more to research than simply putting a proposal together and starting work. **Caradee Wright** tells *QUEST* about the importance of ethics when planning and carrying out research.

From the moment we are born, we learn about the right and wrong ways of doing things in society. Using simple phrases such as 'please' and 'thank you' and abiding by more complicated 'golden rules' such as respecting another person's opinion and not causing anyone physical harm. Similar 'golden rules' apply when you do research and these are called *research ethics*.

When you decide to do a research project that involves humans or animals, whether you are at school, at university or a professor, there are important steps and rules that you need to follow. Why? Most importantly the steps and rules are there to protect

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Some useful definitions

Bias: something that happens, or that you do, when you carry out the study that will skew the results and not be a true reflection of reality.

Epidemiological studies: studies that try to understand the frequency, distribution and control of a disease.

Research ethics: moral rules or principals to consider when doing research.

you, the researcher, from making a mistake that may harm a person or an animal. There are important principles that you must consider before you can decide that your project which involves humans or animals will be ethically sound.

Science and technology innovation does not happen without research. Some of the best science has come from young scientists who are passionate, hardworking and determined to succeed. Research ethics are vital to the planning and execution of their research. □

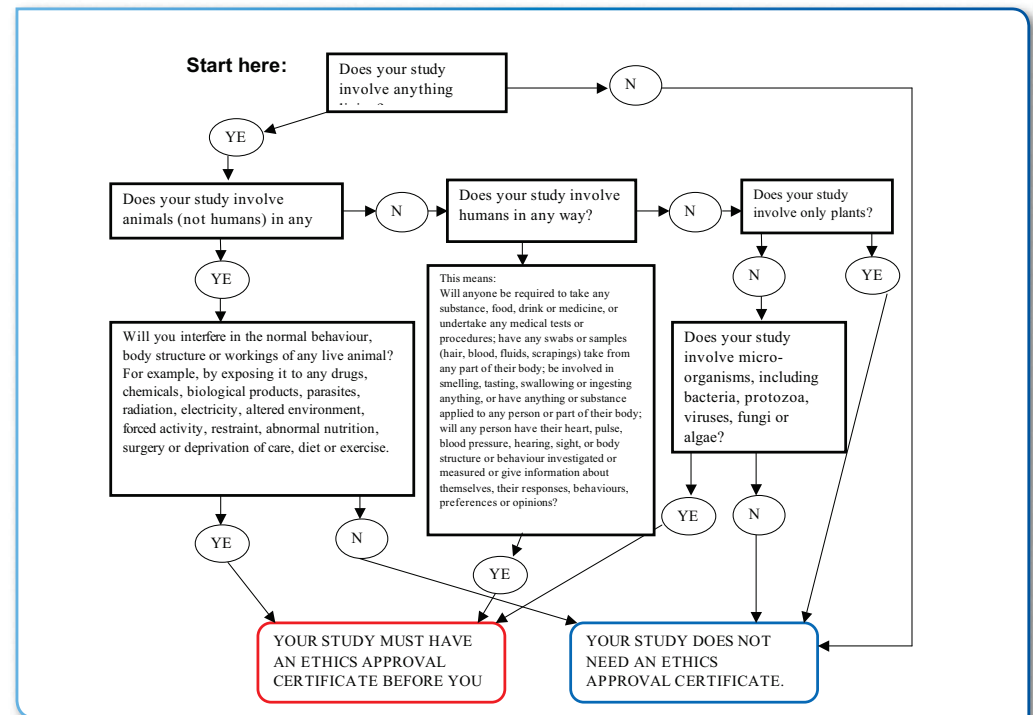
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Recommended reading

SPCA Auckland. *A student's guide to ethics and science and technology projects.*

Ethics guidelines for Science Fair Participants.
<http://www.spcanet.org.nz/education/SecondaryWorksheetsPDF/SecondarySchoolTeacherNotesPDF/TeacherrefEthics.pdf>

National Institute of Health. *Research Ethics: How to Treat People who Participate in Research.*
http://www.bioethics.nih.gov/education/FNIH_BioethicsBrochure_WEB.PDF



Case study

The best way to understand how research ethics are applied is to look at a case study. Here is an example of an acceptable science fair project that involves people and has taken research ethics into account from the very first step of the project planning.

Thandi's Project: run your brain fit

Thandi will compare running versus not running as preparation for improved performance during a class test.

Hypothesis

The group of learners who run at least 500 m before the class mathematics test will perform better in the test compared to the group who do not run at all before the class test.

Participants

Thandi will ask members of her school class to participate in his project.

Method

Thandi prepares a research plan for her project and an information sheet with consent form that explains her project for participants to read and sign. She asks her teacher to review these documents and if her teacher is uncertain, they send these documents to the science fair committee for review. When the research plan is approved, Thandi begins her project.

Thandi will explain to her class what his project is about and what it is trying to achieve. She explains why she thinks her project is important and how the results may help people. Thandi will ask whether there is anyone in the class who does not want to participate. Perhaps they dislike running or have a health condition that stops them from running and they will be excused. Thandi should try to have at least 25 learners in total for the results to be meaningful.

The learners who participate must read an information sheet about the project, which Thandi has prepared. This information sheet explains what the project is about. It describes how half of the group will be asked to

run 500 m and the other half will be asked to sit for the same amount of time it takes the runners to complete 500 m. They will also be told that if they feel discomfort or pain during running they should stop running, and if they do not want to be involved in the project any longer, they may be excused. Then they will sign an informed consent form. Thandi will randomly select an equal number of learners for the running and non-running groups. She will assign every learner a number or code and not use their names in her study.

Results

Thandi will use the final score of each learner's mathematics test result to compare the average result of the running group versus the average result of the non-running group.

Research ethics in Thandi's project

There is social value in the topic which Thandi has chosen for her science fair project. It will be useful for her school to know whether or not running before a class test improves academic performance. There is scientific validity in this project with a clear hypothesis, method, control group, random selection and sound way to measure the results, using average group mathematics scores. The risk of running is considered minimal, as long as people with a health condition prohibiting them from running are excused at the beginning of the study. Thandi allows the participants to stop running at any time and she monitors them throughout the study to make sure that no one gets hurt. When Thandi presents her results at the science fair, she does not use anyone's real name to protect their privacy. She also makes a one-page poster that explains the results of the study and presents it to the class including the learners who participated in his study. Thandi does not take part in the study. It is not good science to carry out experiments on yourself. This is unprofessional and may introduce bias, for example you might act in a different way to get the results you want.