Chapter 1 **Before you start**

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CHAPTER OVERVIEW

This chapter highlights some of the things to take into account when the student has a choice over whether to take a research project or not. It then covers how to select a project based on the potential supervisor and the student's own skills and abilities. There are suggestions about what to do in advance of starting the project.

Introduction

Doing a piece of research is an opportunity to flex your intellect and showcase your talents in a manner that is not always possible in other parts of a medical or healthcare curriculum. Much is made of integrating knowledge in other parts of your course, but in a research project you will have to integrate knowledge with different skills and abilities that may not have been assessed previously. These may include seeking out and reviewing original research papers, designing your own experimental work, solving problems as they arise, managing your time (and your supervisor!), finding new ways of analysing and presenting data, and writing an extensive report. Research is always a challenge, but one that can be immensely fulfilling for those who engage fully with the process. The rewards of a research project are not limited to any grade or mark you may be assigned at the end, but extend into the less tangible but more long-lasting areas of personal development, independence and a taste for research that may last a lifetime. As with most challenges, preparation is the key. The aim of this manual is to help you rise to the challenge and excel.

How to do your Research Project: A Guide for Students in Medicine and the Health Sciences, First Edition. Caroline Beardsmore.
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What constitutes a research project?

One dictionary definition of 'research' is that it is '. . . systematic investigation towards increasing the sum of knowledge' (Chambers Concise Dictionary, 1991). Within the context of medicine and healthcare, research may evoke images of white-coated scientists working at a laboratory bench, or of doctors administering a new medication to a sick patient. While this may constitute the popular understanding of research, it can encompass other things, including explorations of human attitudes, understanding and behaviour. This illustrates two divisions of research that are commonly recognised: quantitative and qualitative. Quantitative research usually involves something that can be measured (e.g. change in heart rate in response to exercise, proportions of adults in different age categories taking prescribed medications, impact of an added nutrient on growth of cells in culture). The outputs of quantitative research are usually numerical and frequently subjected to statistical analysis. Qualitative research, in contrast, often aims to describe or explain something, and the data are more likely to comprise words than numbers. The outputs may include notes, transcripts or other written records. Qualitative research has its roots in the social sciences and complements quantitative research in many healthcare settings. Discoveries from one type of research may prompt studies in the other; for example, a qualitative study might show that teenage girls are ignorant of the potential health risks of a tattoo, which might then be usefully followed up by a quantitative investigation into the frequency of skin infections and allergic reactions in people going to a tattoo studio. Similarly, a finding that vaccination rates in infants had fallen in a particular area (quantitative research) might prompt a qualitative investigation aiming to explain this. Both types of research are equally valid, although individuals might find they are better suited to one or the other type.

The research projects available for students will vary according to what their educational institution offers. For some, they may have the chance to spend a whole academic year on a research project, whereas others may be of shorter duration and are expected to be done in parallel with other modules or course work. Some students will have the opportunity to learn advanced laboratory techniques that may require considerable practice before meaningful data can be acquired; for others, the time available for the project may mean this is not a possibility. Not all institutions will offer qualitative research. Depending on the institution, projects may not necessarily involve acquiring new data but instead consist of combining data from existing sources and synthesising new information. Such projects are sometimes described as 'analytical' or 'library' projects. While they may not provide the full range of opportunities for maximising impact (see Chapter 6), they still demand

the same skills of acquiring information and presenting work as any other research project.

Should I take the research project option or not?

A research project is a requirement for some students and an option for others. Whether it is a requirement or not, it is worthwhile spending some time considering why you might be doing research and what you can do beforehand to ensure that you get the best experience and outcome possible. For some, the initial decision will be whether to take a research option or not. The next step, assuming that you have a choice in the matter, is to think about what sort of project you would like to do and what will best fit with your personal strengths. Where possible, you should explore your options concerning your project and the implications for your career and personal development well in advance of starting.

If your research is optional and involves an extension to your course then you may have several things to consider.

Financial implications

An extra year, as a student, will involve some expense, unless you are fortunate enough to have a full scholarship or bursary and is likely to postpone your opportunity to earn a professional salary for a year. Can you afford to do this? The extra year, however, might well give you an advantage over other applicants when you come to apply for a job so that if you want to work in a very competitive specialty, the research could be a big advantage. The personal and financial circumstances of every student are different and only you can decide if any financial sacrifice is possible or worthwhile. If you have an opportunity to carry out a research project that does not require a full year, such as something extending over the summer vacation, then the financial aspects are less significant.

Timing

The timing of an extra year can be significant. This may be outside your control but not necessarily so. If you take the extra year late in your course (e.g. between years 4 and 5 of medical school) you can find that you are facing your final examinations soon after returning to the main curriculum, and you may not have had much time to revise and practise your clinical skills. Organising some extra sessions for yourself may pay dividends.

Taking an extra year will mean that you fall behind your peer group and will graduate later than they do. This may be offset by having friends who

are likely to want to take the extra year, but in any case you will quickly settle into another cohort of students when you return to the main curriculum.

Motivation

Consider carefully your motivation for wanting to do a research project. Many students see it as advantageous to their career, and few would disagree with this. There is nothing wrong with wanting to advance your career; many people do this throughout their working lives and in many ways. If your sole motivation is career advancement, however, you will find your research project very tough going and you might be better advised to look for other routes. If you want the opportunity to try your hand at research, with a possible view to having a research element in your future career, then an early chance to experience research at first hand is invaluable. If there is something that has sparked your professional interest during the early stages of your course then you may be able to explore this in your research project.

Some students, particularly medical students with a very full curriculum, like the idea of 'stepping off the treadmill' of relentless lectures, tutorials, clinical sessions, ward rounds, frequent assessments and so on for a year to do something very different. A research project will certainly enable you to do this. Do not, however, regard it as a 'soft option'. Almost without exception, project students will report afterwards that they never realised how hard they would have to work. You may be considering taking an additional role or commitment (e.g. being an officer in the student's union, or being your university's representative on a national student organisation, or participating at a national level in a particular sport that requires a heavy commitment to training) and you might think that a year, as a project student, will allow you to do this. This may indeed be the case, as you could find yourself with a more flexible schedule than you have previously experienced, but do not imagine that you can complete a good research project without putting in the necessary time, effort and energy.

Occasionally, a student will be considering whether their original choice of course or career was the correct one for them. Under these circumstances, an extra year (or a period of several months) will provide an opportunity to reflect on matters. If it becomes clear that a change of career is in the student's best interest, then he or she will have additional experience and possible qualifications to help them move to the next stage of their professional journey.

Involving others in your decision

Students sometimes agonise over the decision about whether to take a research project option. If you are in this category, draw a line down a piece of paper and

write two lists – the advantages and disadvantages of doing a research project. Be completely honest: the list is for your eyes only unless you decide to share it. Then think about any other people who might be directly affected by your decision. Students planning to marry often wait until after graduation; how will your fiancé(e) feel if you extend your course? If someone else is providing financial support, are they able (and willing) to cover the additional costs? Talk about the advantages and disadvantages with others who will be affected by your decision.

Whether or not there are other people likely to be affected by your decision, or those who are affected support you (whatever decision you make), you would be well advised to talk to a range of other people to ascertain their views. These are likely to include your personal tutor, professionals at different stages of their career and senior students. Find out why they did (or did not) take the opportunity to do a research project themselves, and what they perceive as the strengths and weaknesses of taking the extra time. You are likely to find a range of opinions, but what you must think about is the reasons behind the different views and how these relate to your own thinking and circumstances. For example, a senior clinician may say 'the research experience may be valuable, but when I am short-listing candidates for a job I pay more attention to the extent of clinical experience'. Such a comment would have more impact on a student whose motivation is geared towards career advancement than on a student who is driven to explore a particular topic in more depth. Ultimately, the decision may be yours alone but is likely to be even more difficult if you cannot be assured of your research topic or supervisor.

What if your institution is selective?

If your institution selects or invites certain students to undertake a research project, and you have received the flattering e-mail or letter asking you to consider this option, then obviously those who oversee your academic performance consider that it would be in your interests to do so. Go and talk to the course convener or other responsible person to ask about the various options that might be open to you. If you are concerned about the financial implications, be completely open about this. You may find that there are bursaries available, or you could be put forward for an award or scholarship. Do not be embarrassed to ask about funding or financial costs for the individual.

If your institution selects students to consider a research project but you have not been included among them, you may want to ask if the opportunity could be extended to you. If the research project is something you feel you really want to do, speak to the people responsible for the scheme at your institution and ask if you could be included. Be prepared for the answer to

be 'No', but you might be lucky! If the guidelines are being strictly followed and you are not given the opportunity for a formal research project, then you might consider whether you could offer to assist in some ongoing research, perhaps over a summer vacation, in order to gain some research experience.

How should I choose what I do for my project?

Some institutions may not give you a choice of project, and others may allow you to express a preference but on the understanding that you may not be allocated your first choice. In other places you might find that you can play a part in designing the project from scratch. If you have a choice you will want to spend some time considering it.

When students who have completed their projects have been asked what advice or recommendations they would give to a student considering an intercalated BSc year, the most important factor has been that of choosing the supervisor carefully! The choice of an interesting topic for the research project was considered to be of secondary importance. Topics that initially seemed unappealing often became much more interesting when the students started to get involved in the work. Now it is rather tricky to suggest that students should evaluate the supervisory styles and personalities of their academic staff, but – in essence – this is what you need to do.

How should I choose a supervisor?

Chapter 3 discusses different working relationships, but at this stage you need to find out about the type of supervision you might expect. The potential supervisor may be somebody you already know as a lecturer or tutor, in which case you might have a view about how easy it would be to work under his or her direction. Do not assume that someone who gives excellent lectures would also be a great supervisor, because the skills for lecturing and supervision are not the same. Having said that, someone who is clearly interested in helping students to progress (evidenced by their willingness to handle student queries, run revision sessions, give thoughtful feedback) is likely to be conscientious in supervising their students. You should not be embarrassed to ask a potential supervisor how often he or she meets their students, nor how much time they generally take to return written work – with feedback – to a student. Ultimately, however, the best guide to their supervisory capabilities is likely to be from their current or previous students, so do make every effort to talk to them before committing yourself.

Do not assume that the more senior members of the academic staff will necessarily be the best supervisors. While it may be tempting to work with someone of international standing, you might find that you see very little of them if they spend a lot of time travelling. Senior staff may also be heavily

involved in policy and administration at the institution and their time is at a premium. None of this may matter if the necessary support is available, for example, from postdoctoral assistants, but try and establish this in advance. In contrast, working with a supervisor who is relatively junior may be to your advantage – if they have not supervised many students in the past, they may feel highly committed and especially anxious to ensure their students do well. You may therefore find that you get closer supervision from a junior member of staff. The feedback from previous students will guide you here.

What sort of project will suit my skills and abilities?

You may have a clear idea about what type of project you want to do. This might be something requiring a lot of practical laboratory work, or you may prefer something that is very much 'people based'. If you enjoy statistics and data handling, you may be looking for something epidemiological. If you get satisfaction from delving into literature and synthesising a well-crafted review, then you might opt for a library or analytical project. An important part of selecting a project is choosing something where the type of work will allow you to play to your strengths. You may think you have a fair idea of your own skills and the type of things for which you show particular aptitude, but sometimes it is worth seeking external input. A student may know that he is mathematically gifted, is something of a perfectionist and pays great attention to detail, all of which would make him suited to a project that required a lot of data handling and analysis. If, however, he was someone that got frustrated if he had to rework something several times, then the project he thought would be ideal for himself might prove to be somewhat tedious.

It may be that you have already undertaken some aptitude tests as part of your course, or for other reasons. Aptitude tests are generally designed to assess abilities such as verbal reasoning, numerical reasoning, spatial reasoning and mechanical reasoning. These may provide some guidance in your choice of project. Personality tests, in contrast, provide information about such things as whether you tend to work by logic or intuition, if you prefer a structured framework or like the freedom to adapt to a changing work environment, whether you like to bounce ideas off other people, or work things out for yourself in the first instance. While these may not seem critical for your choice of **subject**, they may guide your choice of **project**. Consider the following examples:

Melanie had always been interested in endocrinology but had never particularly enjoyed histology. She had won a prize for an essay on oestrogen, and her ultimate ambition was to work in some aspect of reproductive medicine. She knew that she got on well with people and that

she worked best in an environment where things were well ordered and not left to chance. Which of the following two projects would be the one where she would be most likely to flourish?

- Dr Black's project was based in a maternity hospital and the aim was to compare levels of progesterone in the serum of women at different stages of pregnancy. The role of the student was to collect the blood samples after the medical research fellow had taken written consent, take them to the laboratory for analysis, enter the results onto computer and relate them to questionnaire data that had been collected by the research midwife (provided that she had been available at the time of the relevant clinic visit).
- Dr Green's project was designed to look for tumour markers for bowel cancer on previously collected preserved specimens. The specimens were all available and the protocol for preparing and staining the slides, and detecting the tumour markers, was already established. The associated clinical data had been collected and was available on a computer spreadsheet.

Although Dr Black's project was in a subject area that matched Melanie's interests, she would be dependent on both the clinical research fellow and the research midwife with no certainty that the data she needed would be available. In contrast, the project offered by Dr Green had all the material available, and Melanie would not be dependent on others. Which project would best match her personal strengths?

Philip was studious and rather quiet, but could work well under pressure and planned a career in surgery. His practical skills were good and he wanted a project that would enhance his chances of a foundation year job appropriate for his ambitions.

- Dr White's project was based in a busy general practice and focused on finding out why patients sought medical advice or intervention following day-case surgery. The project included patient interviews, including assessment of their levels of satisfaction, and reviews of hospital case notes. Philip would have a lot of responsibility for the project and would have a substantial degree of independence.
- Professor Brown's project was laboratory based and looked at gastric motility in a guinea pig model. Philip would need to have an animal licence and would have a lot of 'hands-on' laboratory experience but no patient contact or overt clinical application. Professor Brown's research group was small

but close-knit, and his previous project student had enjoyed the project and done well.

Dr White's project would supply a lot of patient contact but would not provide an opportunity for using Philip's practical skills. In complete contrast, Professor Brown's project would develop these skills but the patient contact would be missing. What would you recommend Philip should do or ask about, to help him decide which project to take?

How can I know what I am letting myself in for?

Students for whom the research project is a choice rather than an integral part of their course may wonder what life will be like as a project student. Taster sessions are not likely to be available! In some ways it can be looked upon as taking a trip to a foreign land. Certain things will be strange to start with, and you will make some mistakes and get a bit lost from time to time. You may miss the comfort of a fixed routine that you share with other students, but things will gradually become familiar and at the end of the trip you will have learned a lot and have a new perspective. It is very unusual for students to withdraw from a research project once they have started: this demonstrates that almost everyone learns to cope with the transition. Talk to students who have already completed their projects and find out about their initial concerns, and ask whether their worries were unfounded. Ask about any unexpected benefits of being a project student. Try and picture yourself in the role and see if you can imagine yourself living 'a day in the life of a researcher'.

What should I do before I start?

When you know that you will be taking a research project, whether by choice or not, you can begin to prepare for it. You should familiarise yourself with all the information available to you about the research project at an early stage, from handouts, the college website and the course prospectus. The documentation about the course may be rather dry and boring, but it will answer some of the questions you may have. If anything is unclear then be prepared to ask – if you are not sure about anything, then your fellow students will probably be in the same situation! If your research project programme is one where you have spent time talking to your supervisor as part of the preliminary planning then you will already know him or her and the topic of your research. If you are assigned a supervisor, as opposed to making a choice, you will probably want to meet up before beginning work so that at least you know what he or she looks like! This may seem trivial but it can be important: someone of my acquaintance once mistook a senior member

of staff for the plumber who was expected to come to fix the radiators! By meeting up with your supervisor in advance of starting your project, you can ask if there is any preparatory work you should do, such as background reading, and agree the date and time when you are expected to begin. It is also an excellent opportunity to check whether you are going to need any special permissions or documentation for your project, such as whether you need to be named on Research Ethics forms or (if you will be working with children or vulnerable adults) you need a Criminal Records Bureau (CRB) check. These can take some time to arrange, so ensuring that all is in place before you start may avoid delays when time is at a premium. Furthermore, your supervisor can be reassured that their project student is enthusiastic, forward-thinking and organised, all of which bodes well for a fruitful collaboration.

SUMMARY

Where you have a choice about taking up a research project or not, weigh up all the advantages and disadvantages, bearing in mind that your decision may affect others.

Do not assume that the project that seems (by its title) to be an ideal choice for you will necessarily be the one for which you are best suited.

Read all the guidance provided by your institution, however boring, so that you know exactly what is expected of you.

Before the project starts, meet up with your supervisor and see what preparations you can make to ensure you can 'hit the ground running'.

WHAT PROJECT CHOICES WOULD YOU RECOMMEND FOR MELANIE AND PHILIP?

There is not a crystal-clear answer to either of these dilemmas, so I can only provide a personal view. For Melanie, Dr Green's project seems a safe bet, because the material is all available and she would not be dependent on others. However, Dr Black's project may give more opportunity for Melanie to explore a range of factors affecting the serum progesterone levels – in other words, perhaps to have more 'ownership' of the project. I would advise Melanie to meet with the Medical Research Fellow and the Midwife associated with Dr Black's project. If they seemed enthusiastic, totally committed and welcomed Melanie as part of their team, then I would recommend Dr Black's project in the maternity hospital. If there were any doubts at all, I would say she should choose Dr Green's project and take the opportunity to become a proficient histologist, focus on completing the

work in a timely manner and take the initiative in preparing the work for presentation and/or publication.

Philip's choice is equally difficult. The topic of Dr White's project would bring a new insight into the patient's view of surgery, and this would be valuable for the future career he planned. However, Philip is a quiet individual and, in a busy setting in General Practice, someone with an outgoing personality may be better at gaining collaboration from staff in the practice and the patients, which would be essential. I would suggest Professor Brown's project would better play to Philip's strengths (his practical skills), and he could focus on possible clinical applications of the work in his background reading, literature review and suggestions for ongoing research.