

Tips and Tricks when doing Research Family Medicine Resident Project

Conducting research for your resident project can be rewarding and challenging. The following is intended to provide guidance and suggest resources to help with the research endeavor so you can competently complete your project with the time and resources you are prepared to expend. This guide is divided into 5 Steps:

Step 1: Select a topic, identify the research problem, and state a clear research question.

Step 2: Choose a research method.

Step 3: Find an appropriate supervisor.

Step 4: Write a research proposal.

Step 5: Ask the expert.

Step 1: Select a topic, identify the research problem, and state a clear research question.

Topic requirements are:

- It needs a strong relationship to family medicine
- You need to be curious/passionate about it
- It needs to address a gap in the research literature
- It needs to be doable within the allotted time and your skill set

Identifying your research problem/research question:

Selecting your research question can be one of the most agonizing and critical steps in developing a solid research study. It defines your whole process, from what background literature you need to read, guiding what method you should use, analysis required, and the findings to report in order to answer the question. Your question should be clear, focused, concise, complex and arguable. This will take time. Step away from your computer; consider what drew you to your topic. What about it animates and matters to you? Listen to yourself and start formulating your question by following your own interests. Remember, you will spend a lot of time researching and writing about the proposed project: if it does not interest you in the beginning, it will certainly become very difficult to write about in the end.

Next, extensively research your topic. What have experts published in peer reviewed journals? How have they framed their research? What gaps, contradictions, or concerns arise for you as you read, talk to people, and visit places? Would doing a local project using existing studies enhance knowledge? Consult the literature! If you aren't sure how to do this, consult a subject librarian:

<http://util.library.dal.ca/Subspecialists/>

More on research question formulation:

Source: Practical Advice on how to formulate your research question: (edited from source <http://www.chsbs.cmich.edu/fattah/courses/empirical/03.htm>)

Keeping the Research Process in Focus:

- heart of the research project is the problem
- must articulate an acceptable problem
- formulate a problem that is carefully phrased and that represents the single goal of the research effort

State the Problem Clearly and Completely

- "Always state the problem in a complete grammatical sentence in as few words as possible."
- be specific
- limit areas studied so that the study is of manageable size

Think, Consider and Estimate

- be sure of the feasibility of your study

Edit Your Writing

- choose your words carefully
- rewrite, rewrite, rewrite
- keep your sentences short

Every Problem Needs Further Delineation

- eliminate any possibility of misunderstanding
- give full disclosure of what you intend to do and not do
- give the meanings of all terms used
- state the assumptions
- state the hypotheses and/or research question

Sample Research Questions (source: <http://writingcenter.gmu.edu/?p=307>)

Too simple: *How are doctors addressing diabetes in the U.S.?*

Appropriately Complex: *What are common traits of those suffering from diabetes in America, and how can these commonalities be used to aid the medical community in prevention of the disease?*

The simple version of this question can be looked up online and answered in a few factual sentences; it leaves no room for analysis. The more complex version is written in two parts; it is thought provoking and requires both significant investigation and evaluation from the writer. As a general rule of thumb, if a quick Google search can answer a research question, it's likely not very effective.

Step 2: Choose a research method.

There are several methods to choose from for conducting research.

Qualitative/Exploratory Research

- Qualitative research focusses on the interpretation of a situation, set of behaviors, or a setting.
- Analysis must take place within a context.
 - Note: Different researchers may view the same situation and obtain different results.
- Qualitative research answers "how" and "why."
 - E.g.: How do patients perceive?

Quantitative/Explanatory Research

- Focuses on causal relationships and their impact (outcomes).
- Quantitative Research answers “what” questions.

Descriptive Research

- Descriptive research describes data and characteristics about the population or phenomenon being studied.
- Descriptive research answers the questions "who", "what", "where", and "when."
- The research cannot describe what caused a situation. Thus, Descriptive Research cannot be used to create a causal relationship, where one variable affects another.
- Descriptive research classifies phenomena.
 - E.g.: We may simply wish to describe the participants in a study and how they act, believe, perceive the world, or look.
- Examples of research questions for descriptive studies:
 - What is the clients' degree of satisfaction with the services provided through the clinic's open access model?
 - What percentages of people living in Cairo have incomes below the poverty line?

Step 3: Find an appropriate supervisor.

A supervisor should be interested in your project and available to guide you. If you are having trouble finding one, talk to your resident project site coordinator.

Step 4: Write a research proposal. This will also be required for ethics REB approval.

A research proposal is a study plan that is to be followed in the course of a research study. It is important for you to understand your objectives, method, analysis plan, any budgetary requirements, as well as how prepared you are to do the work required and if you have the needed skills. From this you can identify where you will need assistance.

Research proposal sections:

1. One paragraph **introduction** to your research question/problem, why this is important to study, relevance to family medicine. A good first line of a research proposal begins: “The research objective of this proposal is...”
2. Write a **more in depth introduction**. After you have identified a pertinent problem and framed a purpose statement, then you need to craft an introduction. Among other things, the introduction to the proposal will include:
 - a. The problem statement
 - b. A brief summary of the literature
 - c. A brief description of any gaps in the literature

- d. A Purpose statement as to why you are proposing the study and why others should care about the subject matter of your research proposal.

3. Background/literature review. Frame your project around the work of others. Remember that research builds on the extant knowledge base, that is, upon the **peer reviewed published work of others**. Be sure to frame your project appropriately, acknowledging the current limits of knowledge and making clear your contribution to the extension of these limits. Be sure that you include references to the work of others. Also frame your study in terms of its broader impact to the field and to society. Ex. "If successful, the benefits of this research will be..."

4. Methods. Determine the Method of Investigation. The method section is the second of the two main parts of the research proposal. In good academic writing it is important to include a method section that outlines the procedures you will follow to complete your proposed study. Many scholars have written about the different types of research methods in articles and textbooks. It is a good idea to cite the method and provide a reference. The method section generally includes sections on the following:

- a. Research design;
- b. Sample size and characteristics of the proposed sample;
- c. Data collection and data analysis procedures

5. Determine the Research Design

- a. The next step in good academic writing is to outline the research design of the research proposal. For each part of the design, it is highly advised that you describe two or three possible alternatives and then tell why you propose the particular design you chose. For instance, you might describe the differences between experimental, quasi-experimental, and non-experimental designs before you elaborate on why you propose a non-experimental design.
- b. Determine the Sample Size and the Characteristics of the Sample. There are several free online sample size calculators, though you will need a basic understand of statistics to know how to use and interpret them. Some sites include:

<http://www.stat.ubc.ca/~rollin/stats/ssize/>

<http://www.raosoft.com/samplesize.html>

<http://homepage.stat.uiowa.edu/~rlenth/Power/>

- c. In this section of your research proposal, you will describe the sample size and the characteristics of the participants in the sample size. Describe how you determined how many people to include in the study and what attributes they have which make them uniquely suitable for the study.

6. Determine the Data Collection and Data Analysis Procedures

- a. In this section you will describe how you propose to collect your data e.g. through a questionnaire survey if you are performing a quantitative analysis or through one-on-one interviews if you are performing a qualitative or mixed methods study.
- b. After you collect the data, you also need to follow a scheme as how to analyze the data and report the results. In a quantitative study you might run the data through Mintab, Excel or

better yet SPSS, and if you are proposing a qualitative study you might use a certain computer program like ATLAS.ti to perform your analysis using a specific qualitative approach such as a narrative study, grounded theory study, or framework analysis, that exposes the main themes from the proposed interviews (see Tips and Tricks on Statistics).

7. Software and analysis: There are several options for creating a database, cleaning your data and conducting your analysis.

- a. The only free software for quantitative data analysis through Dalhousie is Minitab, found here: <https://software.library.dal.ca/index.php> . Note, Minitab is only available for PC (not Macs). User guides and tutorials can be found here: <http://www.minitab.com/en-CA/training/> . Additionally, students familiar with conducting statistics in Excel can download the free add-on package to a windows suite. However, reviews demonstrate that Excel has many issues handling data correctly for analysis and is not as user-friendly as Minitab. If you can afford to buy, or find access to SPSS, it is user friendly and has a good tutorial, though it is not provided to students via Dal.
- b. The top qualitative software programs are Atlas.ti, NVivo, and MAXQDA. Atlas and MAXQDA have a student version for about \$99. Atlas.ti is \$199 for 12 months for students. Dedoose is available on 6 month (\$12.95) and 9 month (\$10.95) contracts for students.

8. Ethics. You will need to address any ethical considerations and how they will be dealt with including confidentiality, data storage etc. If Research Ethics Board (REB) approval is required for your study, you should check the website for the relevant REB review. Each site has its own REB process.

Step 5: Ask the experts.

Review your proposal with your supervisor and resident project site coordinator. Depending on your research needs, you may also consult with the Research Methods Unit (RMU) at Dalhousie University. An initial consultation is free, though to use their services for data analysis is \$100 an hour. Consultation early can help you avoid costly mistakes.

Tips and Tricks when applying to a Research Ethics Board (REB) Family Medicine Resident Project

- When collecting data for a resident (research) project involving human beings, an ethics review from a recognized **Research Ethics Board (REB)** is required.
- This application requires a proposal with a brief background, methods and data analysis section. In addition, the REB is particularly interested in the **consent process** regarding research participants. It is paramount that research participants are volunteers, who are fully aware to what they consenting.
- The Tri-Council - Canadian Institutes for Health Research (CIHR), Social Science and Humanities (SSHRC) and National Science and Engineering Research Council (NSERC) – has developed a joint research ethics policy. See this link for the entire policy:
http://www.pre.ethics.gc.ca/pdf/eng/tcps2/TCPS_2_FINAL_Web.pdf

The Tri-Council states:

REBs shall consider whether information is identifiable or non-identifiable. Information is identifiable if it, alone or when combined with other available information, may reasonably be expected to identify an individual. The term “personal information” generally denotes identifiable information about an individual.

However, there are some exceptions. The Tri-Council states:

Research that relies exclusively on publicly available information does not require an REB review when: (a) the information is legally accessible to the public and appropriately protected by law; or (b) the information is publicly accessible and there is no reasonable expectation of privacy.

- Chart reviews, or chart audits, also require REB approval when the resident is planning to discuss the results publicly (Resident Project Day). If a Chart audit is only used to improve the practice, no REB approval is required.
- A REB application adds time to the resident project; however, the work for the REB will be used for the final project.
- Many resident projects are considered “minimally invasive” and they may qualify for an “expedited review.” An expedited review usually takes between 3 to 4 weeks, while a full review may take up to 2 months.
- After REB approval has been obtained, no changes to the research instruments or recruitment strategy can be made. If that is required, the REB needs to be informed.
- Each family medicine resident, who requires REB approval, needs to obtain it in the province, or hospital, of their residency (Dalhousie University recognizes the REB certificate from Horizon Health Network (HHN) for New Brunswick residents and vice versa).

- Here are some links for REB websites in various provinces that residents can access for a specific REB application information and forms (each institute has a different process).

New Brunswick

<http://www.horizonnb.ca/home/research.aspx#>

<http://www.mta.ca/reb/Vitalite%20Guide%20Feb%202011%20English.pdf>

Nova Scotia

<http://www.dal.ca/dept/research-services/services/ethics-research-reviews/research-ethics-board-approval.html>

Prince Edward Island

<http://www.healthpei.ca/reb>

- Please consult with your **resident project site coordinator** regarding the need for an REB application and how to go about it.

Tips and Tricks when doing Statistics Family Medicine Resident Project

If you want to do a resident project that involves collecting data and requires statistical analysis, here are some tips of how you can go about that. Keep in mind that you are responsible for doing the work, and should be prepared to know how to collect data, enter data, run your own analysis and interpret your findings, though some resources are available to assist you.

ASSISTANCE RESOURCES:

BEFORE you start collecting data, find somebody you can discuss your plan and statistical needs with. It could be your project supervisor, your resident project site coordinator and/or somebody else who can help you who is experienced with statistics. Resident project site coordinators can help you find someone to assist you. Also the Dalhousie University Research Methods Unit (see below) can be consulted. There will likely be a cost associated with receiving assistance, and these should be appropriately budgeted. Each resident has access to \$50 towards their resident project. Additional funds would require an application with proposal and budget to your resident project site coordinator. Funding is at the discretion of the Department.

Dalhousie Research Methods Unit

If you need more sophisticated help you can consult with the Dalhousie Research Methods Unit <http://www.cdha.nshealth.ca/discovery-innovation/research-methods-unit>. The initial consultation with them is free.

Software Resources

Several software packages are available to assist with statistical analysis and they often have helpful tutorials. Here are some examples:

MINITAB

Minitab is likely the easiest solution to your statistical software needs. You can directly enter your data in Minitab or import from excel. This program is free of charge from the Dalhousie website; <http://its.dal.ca/helpdesk/licences.html> (not for MAC users). Minitab is useful for basic statistics, regression, ANOVA, reliability and survival analysis.

Here is a youtube getting started video: <http://www.youtube.com/watch?v=QI88ytNBNgw>
Or tutorials from Minitab: <http://www.minitab.com/en-GB/training/tutorials/default.aspx>

SPSS

Statistical Package for Social Sciences (SPSS) is a popular statistical analysis program that is fairly easy to learn with several resources available. Only Dalhousie University faculty can download SPSS programs. Resident project site coordinators can sometimes assist in finding access to a computer with SPSS.

Microsoft Excel

Microsoft Excel is included in most MS office suites and can be used to conduct some basic statistics and creates attractive charts and graphs. However, a quick Google search will provide concerns as the reliability of its statistical analysis accuracy, so use with caution. You can use Microsoft Excel sheets to enter data. These Excel sheets can be easily imported to the statistical package Minitab. In theory you can

also import the Excel data sheet in SPSS but it has caused some problems in the past.

Here are some videos that may help with Excel sheets:

<http://noether.uoregon.edu/~dps/243/EXCEL.pdf>

<http://people.umass.edu/evagold/excel.html>

<http://office.microsoft.com/en-us/training/excel-statistical-functions-RZ001091922.aspx>

<http://www.youtube.com/watch?v=OTz2PQ-CdJU>

Statistical Analysis Software (SAS)

If you require more advanced statistical techniques than the above options provide, you may want to use SAS or STATA, and unless you have advanced training and experience, you will likely need to hire assistance. It is recommended you consult with your supervisor, resident project site coordinator and/or the Research Methods Unit.

R

R is free software for statistical computing and graphics. It compiles and runs on a wide variety of platforms such as Windows and MacOS. You can download from <http://www.r-project.org/>

Tips and Tricks when creating an Educational Tool Family Medicine Resident Project

Before you start thinking about developing an educational tool, you need to consult the literature to find out the following:

- Does a tool already exist?
- Could you revise an existing tool?
- Could you adopt an existing tool to local conditions?

If no educational tool exists for what you want to do, go back to the literature. Remember, an educational tool's information has to be grounded in the scientific literature.

Also, if you select an educational tool as your resident project, it needs to be accompanied by a literature review paper. The purpose of this is that the reviewer can assess that the information in the educational tool is scientifically sound.

Once you have determined that you want to create your own educational tool, you need to consider the following:

- Who is your audience?
- What is the message you want to provide?
- What is the medium you want to use for the educational tool?
 - Paper, Internet, Video etc.
 - Do you have easy access to such mediums?
- What reading level should you aim for? (readability)
- Should the tool be interactive, passive?
- Consider the cost of an educational tool?
 - Do you need professionals to help with the design and what is the cost?
 - Are you going to distribute the tool and how many copies and what is the cost?

Also, you need to consider if you will test your tool on the target audience. Even a small pilot test may inform you about the readability and validity of the educational tool.

An educational tool should be

- Fun
- Visually compelling
- Use images
- Limit text
- Make your material easy to understand
- Create a "story" plot

Some references that may be of interest: <http://www.ncbi.nlm.nih.gov/pubmed/23044857>

<http://www.ncbi.nlm.nih.gov/pubmed/22720382> and
<http://www.ncbi.nlm.nih.gov/pubmed/21070533>

Tips and Tricks when doing a Literature Review Family Medicine Resident Project

When doing a literature review, you need to adhere to some conventions. Before you start you may find it helpful to consult with a university/hospital librarian on how best to access resources for the literature review.

- 1) Research question has to be relevant to family medicine.
- 2) Assess the level of evidence of the studies you are reviewing (page 2).
- 3) Focus of literature review (page 3).
- 4) Create a table that is the focus of your review (page 4).
- 5) Do not repeat word for word what you have in the tables in the text.
- 6) Use the same outline as a regular scientific study.
 - a. Introduction: why did you want to do this project
 - b. Background: set up the research question with some general literature.
 - i. Finish the section with a clear research question.
 - c. Methods need to include the following:
 - i. Search terms
 - ii. Inclusion and exclusion criteria
 - iii. Grey literature, if used
 - iv. Data sets used - e.g. PubMed
 - v. Number of articles pulled and ultimately reviewed
- 7) In the discussion describe the strengths and weaknesses of each article and synthesize the data. Use headings to help the reader. Answer the research question.
- 8) In the conclusion pull it all together, no new information should be added.
- 9) Acknowledgments: supervisor and others that may have helped you.
- 10) Use a standard bibliography format and do not mix bibliography styles.

LEVELS OF EVIDENCE

Level of Evidence	Study Design	Definition	<i>How does sleeping with a bottle of juice versus a bottle of water affect children's dental hygiene?</i>
1	Randomized Control Trials (RCTs)	<p>RCTs are considered the most reliable form of scientific evidence.</p> <p>They involve the random assignment of participants to interventions and controls.</p>	<p>A group of children are randomly selected from the general population (each child has the same likelihood of being selected as all the others). This group is then randomly divided into two groups (A and B). Again, each child has an equal chance of being placed in either group. Group A is given a bottle of juice to sleep with at night. Group B is given a bottle of water to sleep with at night. The effect on the children's teeth is monitored for a set amount of time.</p>
2	Cohort Studies	<p>A Cohort Study is a study in which participants who presently have a certain condition and/or receive a particular treatment are followed over time. They are then compared with another group who are not affected by the condition.</p>	<p>A group of children who have poor dental health are followed across time. The habit of sleeping with a bottle of juice or water of the poor dental health group is compared to the sleep habits of a control group.</p>
	Ecological/ Epidemiological Studies	<p>Ecological studies look for associations between the occurrence of disease and exposure to known or suspected causes. The unit of observation is the population or community and may be defined in various ways.</p>	<p>Children with poor dental health are identified. Then correlations are made between (a) sleeping with a bottle of juice and dental health and (b) sleeping with a bottle of water and dental health.</p>
3	Case-Controlled Studies	<p>Case-control studies are a frequently used in epidemiological studies. Case-control studies compare participants who have a specific condition with participants who do not have the condition. Otherwise similar in order to identify factors that may contribute to the condition of interest.</p>	<p>Comparing children with poor dental health, with those who have good dental health who are the same age, ethnicity, socio-economic background, number of dental check-ups, etc.</p>
	Non-Randomized Control Trials	<p>The participants and interventions are not randomly assigned.</p>	<p>The first 50 to volunteer are instructed to have their child sleep with a bottle of juice, with the last 50 volunteers are instructed to have their child sleep with a bottle of water.</p>
4	Case-Series	<p>A number of individual cases of a particular condition are identified and followed individually over time.</p>	<p>Ten cases of poor dental hygiene in children are identified and intensely followed for a set amount of time.</p>
5	Expert Opinion	<p>The opinion of a professional who is considered an expert in their field.</p>	<p>The advice/opinion of a dentist who specializes in children's oral health and who has worked in the field for a long period of time.</p>

SAMPLE PAPER OUTLINE

A review of evidence in support of school-based health promotion programs¹

Introduction (1/2-1 page)

Background (1page)

Obesity

Why school-based programs?

Research Question: What are the features of a successful school based health program?

Methods (1/2-1 page)

Results (4-5 pages):

Features of successful programs

Peer-led

Collaborative – community

Dedicated school health coordinators

Incorporates national/provincial/regional guidelines

Parents as integral part of program and source of support for children

Role of family doctors in the school-based health program model

Gender and other subgroup analysis

Discussion (4-5 pages)

Conclusion (1 page)

Acknowledgement

Bibliography

Tables: the table becomes the central piece of your review. Do not repeat what is in the table in the text, but describe it in general terms.

¹ Dr. Kappagantula provided permission to use her resident project as a sample project outline and literature review table.

Sample Table for a Literature Review

Author	Design	n	Variables	Results	Limitations
Bjelland et al.	RCT	1465	Sugared beverage intake, sedentary behaviour	Preventive initiatives more effective in girls, need to study gender subgroups	Crude estimates of sedentary behaviours, sampling bias, social desirability in data
Brown T, Summerbell C.	Literature Review	38	Weight outcome	School based interventions may have benefit but inconsistent, may be short-term, girls/younger children have more benefit, physical activity must be combined with diet interventions	Heterogeneity of studies evaluated, therefore difficult to generalize any findings.
Bryn Austin S et al.	Qualitative	9	Effectiveness of <i>School Health Index</i> , Role of external facilitator	Presence of external facilitator influenced effectiveness of <i>SHI</i> and ability of schools to implement health promotion initiatives	Most schools in one geographical location (New England), reliance on self-reported data, did not include an objective data source
Card A, Doyle E.	Qualitative	40	Effectiveness of School Health Coordinator in implementing health promotion strategies in Nfld.	School health coordinator can change the approach of health promotion in schools to involve social, environmental as well as physiological health determinants	Vague descriptors regarding effectiveness of school health coordinators, results very preliminary in nature
Crawford PB et al.	Position paper	n/a	n/a	Using a bioethics framework further justifies the promotion of nutritional health through schools	n/a
Groft JN et al.	Survey	288	Identify areas of concern and interest regarding health practices of rural adolescents	Weight management, nutritional concerns, physical activity were all expressed as health goals, and student involvement leads to creation of successful strategies	Use of existing adolescent health survey, inability to compare results. Only one school studied therefore results not generalizable, rely on self-reporting of students).