

RESEARCH WORKBOOK:

A guide for initial planning of clinical, social, and behavioral research projects

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Introduction

Research has often been described as organized curiosity. But the skills and techniques of organizing one's curiosity seldom come naturally. The purpose of this workbook is to provide the clinician-researcher with an explicit approach to thinking about and recording each element in the initial development of a unique research plan.

The workbook is not a do-it-yourself manual for inexperienced researchers. It will provide useful

questions, suggestions, and approaches to guide and stimulate the inventive thinking of the researcher, but it provides no answers, no assistance in making decisions, and no technical expertise. For these essentials, the clinician-researcher must rely on colleagues and competent research consultants.

An earlier version of the workbook has been used productively by numerous family practice residents, faculty, and other health science students. The current version has been included in this monograph at the suggestion of family physicians who were delighted to find that a simple, nontechnical aid, in conjunction with their own professional training, experience, and resourcefulness, could take them so far in organizing their curiosity.

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I. SELECT A RESEARCHABLE QUESTION

Begin by stating a question of great interest to you in a simple, nontechnical interrogative sentence.

As you complete the workbook exercises from this point through the development of your hypothesis (section IV), you will find it useful to rewrite your research question several times. Each revision should reflect greater precision and probably narrower scope in your search for an answer.

The research will require access to these resources.

- | | |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | 6. _____ |

Is the research feasible? Yes____ No____

Define the important terms in your statement of the research question.

<u>Terms</u>	<u>Definitions</u>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

II. SEARCH FOR RELATED WORK

List questions you hope are already answered by previous research.

List relevant theories or models.

Other background information you could use.

Likely sources of information
(not necessarily in journals).

Likely sources of information.

Likely sources of information.

III. JUSTIFYING THE STUDY

Who cares about the answer?

How is present opinion divided?

How important is it to have the right answer?

What are the implications of various possible answers?

Write a paragraph justifying your study. Consider the questions above but feel free to modify or add to them.

IV. HYPOTHESES

Hypotheses require the investigator to predict an answer to the research question based on knowledge of the field, logical analysis, and/or anecdotal observations. Purely descriptive studies do not require formal hypotheses. Even so, it is wise to commit yourself to a set of expectations regarding results.

Initial statement of hypotheses.

General relationships implied by your hypotheses.

_____ is related to _____

_____ is related to _____

_____ is related to _____

Can you identify specific alternative relationships or explanations which would serve as competing or rival hypotheses?

Revised statement of hypotheses, considering (if possible) specific competing alternatives to the hypothesized relationships.

V. INSTRUMENTS AND DATA SOURCES

Complete this inventory of measurements or counts to be made. Then list your proposed instruments or data sources for measuring or counting.

	<u>Things to be measured or counted</u>	<u>Proposed instruments or data sources</u>	<u>Available?</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

For items above for which an adequate instrument is not readily available, indicate critical characteristics of instruments to be found or developed.

<u>Proposed Instruments</u>	<u>Critical Characteristics</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Instrument reliability and validity

For each instrument, both of these questions should be addressed:

Reliability: How closely do repeated observations (by different people, at different times, etc) of the same thing agree with each other?

Validity: With what assurance do we know that the instrument is measuring what we believe it is measuring?

Mark each instrument with an (R?) if you believe reliability is a problem and a (V?) if you believe validity is a problem.

PREPARING THE RESEARCH DESIGN

The design of the study refers to the way in which relationships are to be studied.

It is wise to seek competent help in preparing a research design, since design options are numerous. Choices among designs will always require compromises between the practical and the ideal. Well-designed research, like anything else designed well, should be more efficient and better suited to your needs than a haphazard approach. Poorly designed research may be inefficient or, even worse, may make it impossible for you to analyze the data legitimately!

You can identify the issues which your design should address by considering carefully each of the items in sections VI through VIII.

VI. SAMPLING

Describe the characteristics of the people (or other subjects) who will be eligible for participation in the study.

Describe the population (beyond your sample) to which you wish to generalize conclusions.

Now review the two descriptions critically and revise either or both descriptions so that they fit together.

Sample Size

The most important considerations in determining sample size are often how much money you have to spend and how much time you can commit.

Increases in sample size increase the precision of the research. Small samples do not of themselves introduce bias. A large sample should enable you to detect more subtle (but perhaps less important) relationships. When other design features have been worked out, a research consultant should be able to help you arrive at a reasonable sample size. The most helpful information in this decision comes from the results of similar studies and your estimate of the strength of the relationships you expect to find.

VII. DEVELOPING THE RESEARCH PROTOCOL

How will you select your sample? _____

Will you divide your sample into groups? If so, how? _____

Describe what will happen to each subject. (Feel free to use a list, flow chart, or diagram.)

Who will gather the data and how? _____

VIII. ELIMINATING PROCEDURAL BIAS

Bias refers to sources of systematic error which may affect study results. Unless adequately controlled, bias may render your results uninterpretable. With a general protocol in mind, specific attention should be given to each of the following potential sources of bias. The design should evolve as you add controls for the most serious of these. Those mentioned below are adapted from "Experimental and Quasi-Experimental Design for Research," Campbell DT and Stanley JC, Chicago, Rand McNally College Publishing, 1966.

1. Effects of Historical Events—Can you anticipate events such as personnel changes, remodeling plans, interference by nonparticipants, etc, which will take place during your data collection phase and which might affect the results?

No____ Yes____ (If yes, describe problem.)

2. Effects of Maturation—If subjects are to be observed over time, are there changes which might result merely by normal development, growth, natural course of illness, etc?

No____ Yes____ (If yes, describe problem.)

3. Effects of Repeated Measurement—If the same measurements are repeated on subjects, are subjects likely to remember past responses, prepare differently for the next session, relax procedures?

No____ Yes____ (If yes, describe problem.)

4. Instrument Decay—Is it likely that test equipment will wear out, observers get bored, protocols get short-cut by investigators, etc?

No____ Yes____ (If yes, describe problem.)

5. Effects of Statistical Regression—If subjects are chosen because they lie at the extremes of a distribution (eg, high blood pressure, low compliance with therapy), subsequent measurements will tend to be more nearly average, for purely statistical reasons. Are your subjects chosen or assigned to groups on the basis of their “extremeness”?

No____ Yes____ (If yes, describe problem.)

6. Subject Selection—Is there anything in the selection of your sample or assignment of subjects to groups which makes one group of subjects unintentionally different from other groups?

No____ Yes____ (If yes, describe problem.)

7. Loss of Subjects—Subjects lost to attrition may be different from those who remain. Is your study jeopardized by this possibility?

No____ Yes____ (If yes, describe problem.)

8. Investigator Bias—Are you in a position to unintentionally “shade” results to confirm your hypotheses or to influence subjects by your attention, attitude, etc?

No____ Yes____ (If yes, describe problem.)

IX. IDENTIFY THE LIMITATIONS OF THE STUDY

After struggling to achieve a design which is feasible and provides control of the most troublesome sources of bias, you may be left with inadequate controls over other sources of bias. Use the space below to identify these.

Potential Sources of Bias Remaining

Even unbiased studies have limitations in their generalizability. To what kinds of people beyond your study sample can you justify generalizing your conclusions. (It may be easier to identify individuals for whom your conclusions do not necessarily apply.)

Limitations to Generalizability

X. DATA COLLECTION FORMS

Use the space below to sketch forms you will use to record the data of the study. Alternatively, you may list and describe the forms below and then attach specimens.

XI. REPORTING OF RESULTS

Use the space below to sketch summary data tables and/or graphs which you would expect to use in presenting your results. You may include simulated results of the kind you hope to find.

XII. STATISTICAL ANALYSIS

Design and analysis are two sides of the same inferential coin. *Always* seek competent consultation in the design phase or there may never be any analysis worth doing.

You may begin to organize the analysis by listing below all of the variables considered in your design. Separate the variables into the three categories described.

- A. Demographic variables which describe characteristics of subjects such as age, sex, race, previous hospitalizations, etc.

- B. Variables of the study under the control of the investigator, such as type of instruction given, therapy options, duration of treatment, or other exposures or treatments to which the investigator can *assign* subjects.

- C. Outcome variables or effects potentially related to or caused by A or B above, such as adherence to instructions, speed of recovery, or client satisfaction.

XIII. DISCUSSIONS, INTERPRETATIONS, OR CONCLUSIONS

No workbook exercises are included for this phase of research. Instead it is suggested that the researcher should maintain a notebook or diary in which to capture anecdotes, remarks of subjects, comments by others involved in the project, or any other facts or ideas which might help to make sense out of the phenomena under study. It is often the serendipity of the alert and curious researcher which leads to insightful interpretations and fruitful new hypotheses.

XIV. ADMINISTRATIVE ARRANGEMENTS

The most elegantly designed studies have sometimes collapsed for lack of attention to administrative details. Use the space below to outline your administrative duties.

<u>Touch Base With</u>	<u>Regarding</u>
<u>Human Subjects Review Committee</u>	<u>Protection of subjects</u>
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Describe other administrative arrangements, eg, money, equipment, supplies, space, printing, consultation, postage, telephone, computer programing.
