برنامج مهارات البحث العلمي

لتعزيز قدرات البحث العلمي لدي طالبات الدراسات العليا في أقسام العلوم و الدراسات الطبية

الفصل الدراسي الأول 1434-1435 هـ

محاضرة

تصميم و طرق البحث

"إستراتيجة البحث العلمي و إنجازة"

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TABLE 1-1 Steps of the Research Process and Journal Format: Qualitative Research

Research Process Steps and/or Format Issues	Usual Location in Journal Heading or Subheading
Identifying the phenomenon	Abstract and/or in introduction
Research question study purpose	Abstract and/or in beginning or end of introduction
Literature review	Introduction and/or discussion
Design	Abstract and/or in introductory section or under method section entitled "Design" or stated in method section
Sample	Method section labeled "Sample" or "Subjects"
Legal-ethical issues	Data-collection or procedures section or in sample section
Data-collection procedure	Data-collection or procedures section
Data analysis	Methods section under subhead "Data Analysis" or "Data Analysis and Interpretation"
Results	Stated in separate heading: "Results" or "Findings"
Discussion and recommendation	Combined in separate section: "Discussion" or "Discussion and Implications"
References	At end of article

See Chapters 4, 5, and 6.

TABLE 1-2 Steps of the Research Process and Journal Format: Quantitative Research

Research Process Steps and/or Format Issue	Usual Location in Journal Heading or Subheading	Text Chapter
Research problem	Abstract and/or in introduction (not labeled) or in separately labeled heading: "Problem"	2
Purpose	Abstract and/or in introduction or at end of literature review or theoretical framework section, or labeled as separate heading: "Purpose"	2
Literature review	At end of heading "Introduction" but not labeled as such, or labeled as separate heading: "Literature Review," "Review of the Literature," or "Related Literature"; or not labeled or variables reviewed appear as headings or subheadings	3
Theoretical framework (TF) and/or conceptual framework (CF)	Combined with "Literature Review" or found in separate heading as TF or CF; or each concept or definition used in TF or CF may appear as separate heading or subheading	3
Hypothesis/research questions	Stated or implied near end of introductory section, which may be labeled or found in separate heading or subheading: "Hypothesis" or "Research Questions"; or reported for first time in "Results" section	3
Research design	Stated or implied in abstract or in introduction or under heading: "Methods" or "Methodology"	7, 8, and 9
Sample: type and size	"Size" may be stated in abstract, in methods section, or as separate subheading under methods section as "Sample," "Sample/Subjects," or "Participants"; "Type" may be implied or stated in any of previous headings described under size	10
Legal-ethical issues	Stated or implied in labeled headings: "Methods," "Procedures," "Sample," or "Subjects"	11
Instruments (measurement tools)	Found in headings labeled "Methods," "Instruments," or "Measures"	12
Validity and reliability	Specifically stated or implied in headings labeled "Methods," "Instruments," "Measures," or "Procedures"	13
Data-collection procedure	Stated in methods section under subheading "Procedure" or "Data Collection," or as separate heading: "Procedure"	12
Data analysis	Stated in methods section under subheading "Procedure" or "Data Analysis"	14
Results	Stated in separate heading: "Results"	14, 15
Discussion of findings and new findings	Combined with results or as separate heading: "Discussion"	15
Implications, limitations, and recommendations	Combined in discussion or presented as separate or combined major headings	15
References	At end of article	4
Communicating research results	Research articles, poster, and paper presentations	1, 17, 18

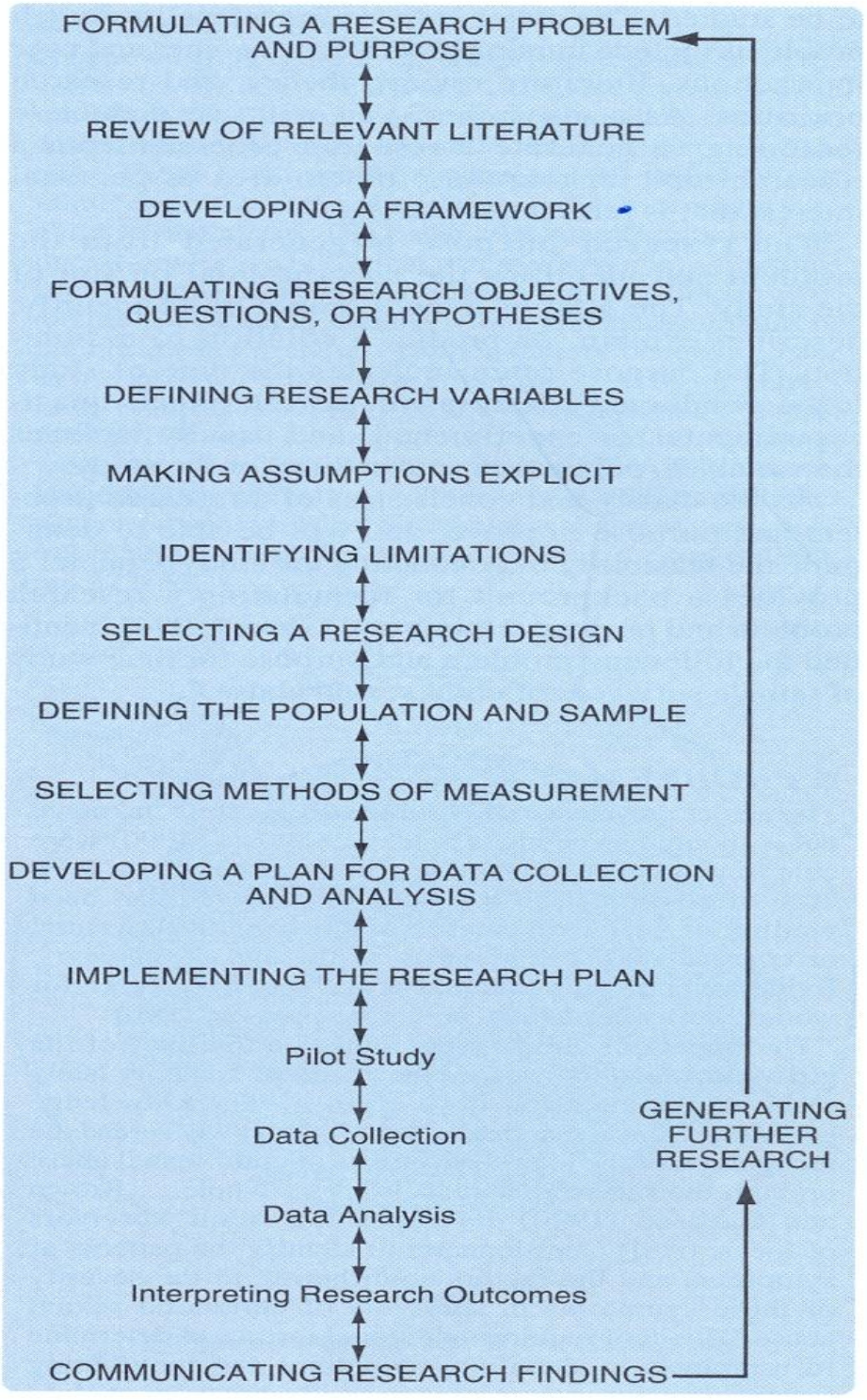

Figure 3-1 Steps of the quantitative research process.

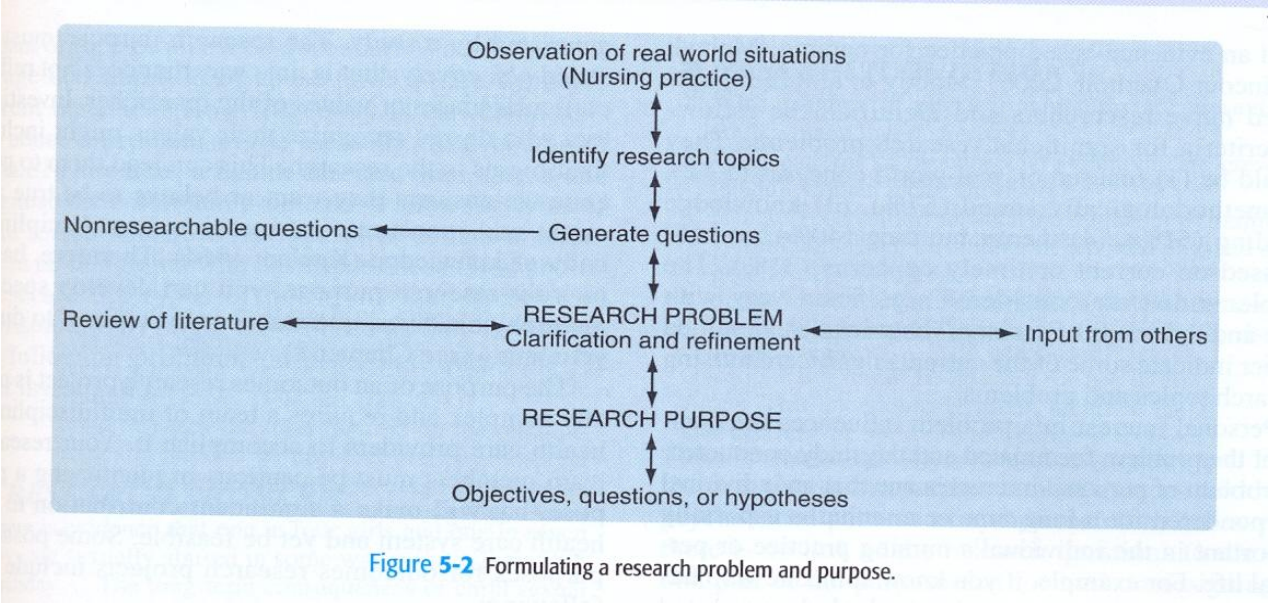

Figure 5-2 Formulating a research problem and purpose.

Example reflecting the relation between dependent and independent variables:

Does	**smoking**	Cause	*Lung cancer ?*
Does	**Nursing care**	Cause	*Rapid recovery ?*
Does	**Drug (a)**	Cause	*Improvement ?*
	↓		↓
	Cause		*Effect*
	Independent variable		*Dependent variable*

TABLE 11-1 Research Designs

- Descriptive study designs
  - Typical descriptive study designs
  - Comparative descriptive study designs
  - Time-dimensional designs
    - Longitudinal designs
    - Cross-sectional designs
    - Trend designs
    - Event-partitioning designs
  - Case study designs
- Correlational study designs
  - Descriptive correlational designs
  - Predictive designs
  - Model-testing designs
- Quasi-experimental study designs
  - Nonequivalent comparison group studies
    - One-group posttest-only designs
    - Posttest-only designs with comparison group
    - One-group pretest-posttest designs
    - Pretest and posttest designs with a comparison group
    - Pretest and posttest designs with two comparison treatments
    - Pretest and posttest designs with two comparison treatments and a standard or routine care group
    - Pretest and posttest designs with a removed treatment
    - Pretest and posttest designs with a reversed treatment
  - Interrupted time-series designs
    - Simple interrupted time-series designs
    - Interrupted time-series designs with a no-treatment comparison group
    - Interrupted time-series designs with multiple treatment replications
- Experimental study designs
  - Classic experimental design
  - Experimental posttest-only comparison group designs
  - Randomized block designs
  - Factorial designs
  - Nested designs
  - Crossover or counterbalanced designs
  - Randomized clinical trials

THE ELEMENTS OF RESEARCH DESIGN

A good research design includes several elements:
i. Description of subjects (who) (ii) Observations of variable (what) (iii) Measures of time (when) (iv) Selection of setting (where) and (v) Role of the investigator.

Subjects

Subjects are the individuals who take part in the study, who will be recipients of the experiment or who will be observed in a descriptive survey. Designs specify-who the participant will be and what the unit analysis (elements of the sample) will be. Subjects in nursing research studies may be individual human beings, couples, families, groups, communities or animals.

Variables

Variables are the focus of the study and reflect the empirical aspects of the concepts being studied, the investigator measures variable. Research designs are univariate or multivariate. Univariate designs address only one variable. Nursing investigators more commonly study two or more variable, which is not surprising in view of the complexity of human health.

Time

The time element of design is the frequency (how often) and the order (when) in which observations are made. In some designs variables are observed at only one point of time. And in the way, an observation or event will be measured.

Setting

Setting may be natural setting or laboratory setting depending upon study topic and researcher's choice.

Availability of Subjects

The researcher need to determine whether a sufficient number of eligible subjects will be available and willing to participate in the study. If one has captive audience, like students in a classroom, it may be relatively easy to enlist their cooperation. When a study involves the subjects independent time and effort, they may be unwilling to participate, when there is no apparent reward for doing so. Other potential subjects may have fears about harm or confidentiality and may be suspicious of the research process in general. Subjects with unusual characteristics are often difficult to locate. In general, people are fairly cooperative about participating, but a researcher must consider needing a larger subject pool that will actually participate. At times, when reading a research report, the researcher may note how the procedures were liberalised or the number of subjects was altered. This was probably a result of some unforeseen pragmatic consideration.

Availability of Facility and Equipment

All research projects require some kind of equipment. The equipment may be questionnaires, telephones, stationery, stamps, technical equipment or other apparatus. Most research projects require the availability of some kind of facility. The facility may be a hospital site for data collection or laboratory space or a computer center for data analysis.

Validity of Data

Validity of data is another important concern in selecting a research design.

Precision

An additional dimensions that researchers consider when choosing a research design is precision. Precision refers to the ability to obtain the most accurate estimate of a single variable or of the effect of treatment variable on an outcome variable. Accuracy means that all aspects of a study systematically and logically follow from the identified problem statement. A design that allows researcher to account for or to control many other factors known to influence the variable of interest maximises the precision of the estimates (e.g., orientation of patient helps in adjustment in hospital).

Researchers' Experience

The selection of the research problem should be based on the nurses realm of experience and interest. It is much easier to develop a research study related to a topic that is either theoretically or experimentally familiar. Selecting a problem that is of interest to the research is essential for maintaining enthusiasm when the project has its inevitable ups and downs.

Cost

Research projects require some expenditure of money. Before embarking on a Study, the researcher probably itemises the expenses and projects the total cost of the project. This provides a clear picture of the budgetary needs for items like books, stationery, postage, printing, technical equipment, telephone and computer charges and salaries.

Investigator's Role

In some studies, the investigator remains unobtrusive, attempting not to influence the variables being studied. In other studies the investigator imposes control on many variables, actively manipulates some of the variables being studied, and allocates the participants to different conditions.

Selecting a Research Design

While selecting a research design the researchers has to weight many considerations. The prime importance is the purpose and theory development aim of the study. Theory development usually reflects the current level of knowledge about the phenomenon and thus has guided determination of the specific research purpose. Additional influences on the study design include ethical issues related to the phenomenon, feasibility, validity, and availability of data, precision and cost etc. The brief explanations of these factors influence on the research design are given below.

Level of Knowledge

Our level of knowledge about the phenomenon affects our design choices. When little is known about a phenomenon, the investigator may undertake a careful description of a single concept rather than attempt to determine the relationship of several factors.

Nature of the Phenomena

It is an important concern in choosing how to study it. Investigator consider whether the phenomenon can be studied in a naturalistic or non-naturalistic way. For example, certain disasters have helped to health scientists to gain better understanding of how human beings respond to crisis.

Nature of the Purpose

The nature of the research purposes sometimes implies the choice of a specific design.

Ethical Consideration

Research problems that place unethical demands on subjects may not be feasible for study. Researchers must take ethical considerations seriously. The considerations of ethics may affect the choice between an experimental design and a non-experimental design.

Feasibility

In some instances feasibility is a key concern in selecting a research design. Many research designs are elegant but not feasible. One of the feasibility considerations is the amount of time the investigator can devote to the study. The research problem must be one that can be studied within a realistic period of time. All researchers have fixed a particular time for completion of a project. It is essential that the scope of the problem be circumscribed enough to provide ample time for the completion of the entire project. Research studies generally takes longer than anticipated to complete.

Control

A researcher attempts to use a design to maximise the degree of control over the tested variables. An efficient design can maximise results, decrease errors, and control preexisting or impaired conditions that may affect outcome. To maximise efforts the researcher should maximise control. To accomplish these tasks the research design and methods should demonstrate the researcher's efforts at control. Control is accomplished by ruling out extraneous variables that compete with the independent variable as an explanation for a study's outcome. The means of controlling extraneous variables include the following:

- Use of a homogenous sample
- Use of consistent data collection procedures
- Manipulation of the independent variable
- Randomisation.

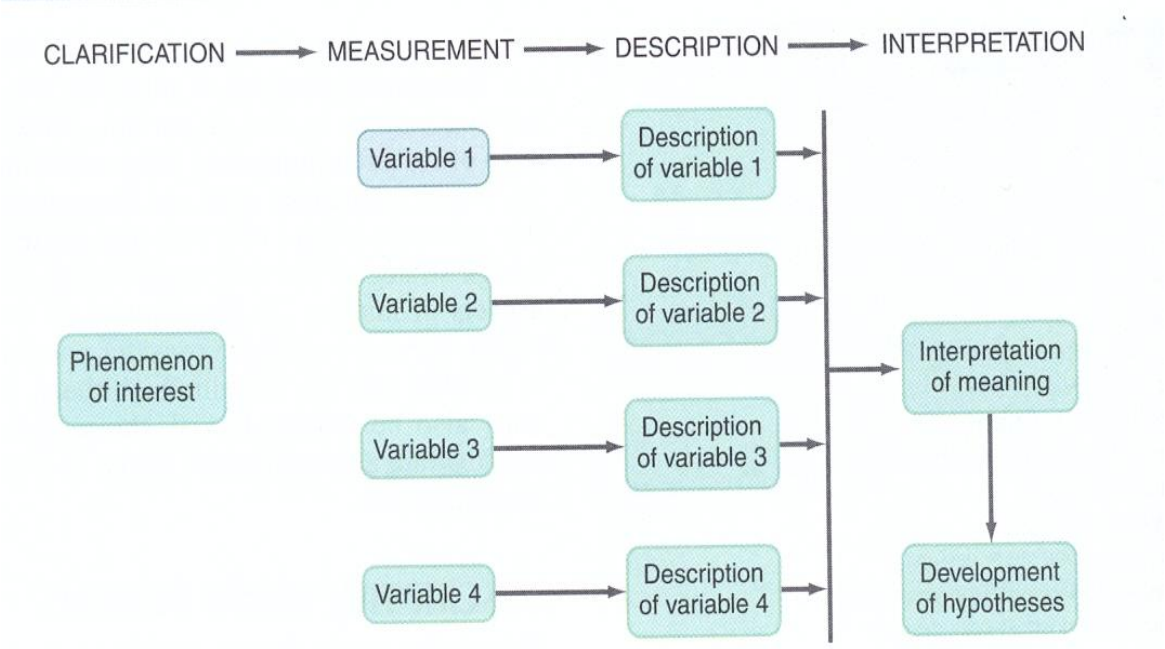

Figure 11-1 Typical descriptive study design.

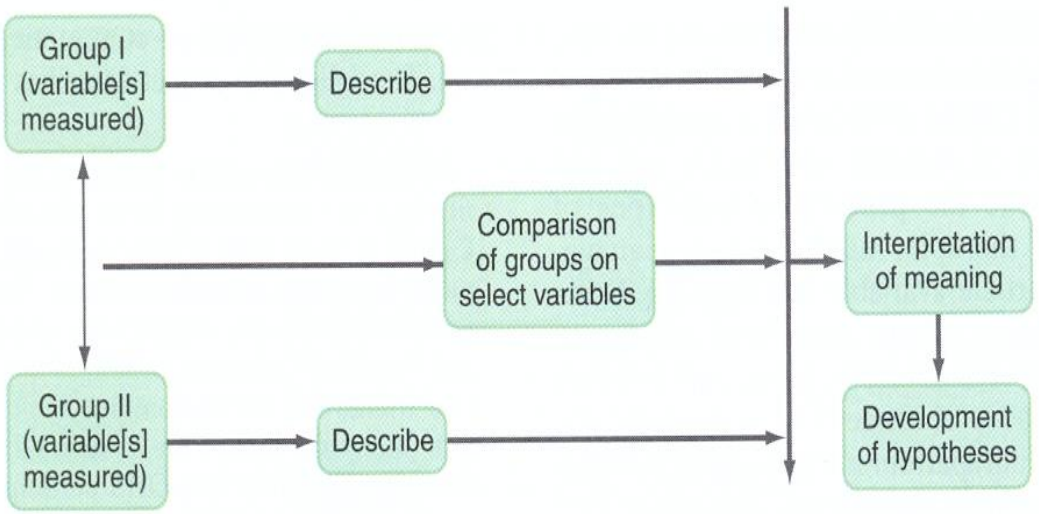

Figure 11-2 Comparative descriptive design.

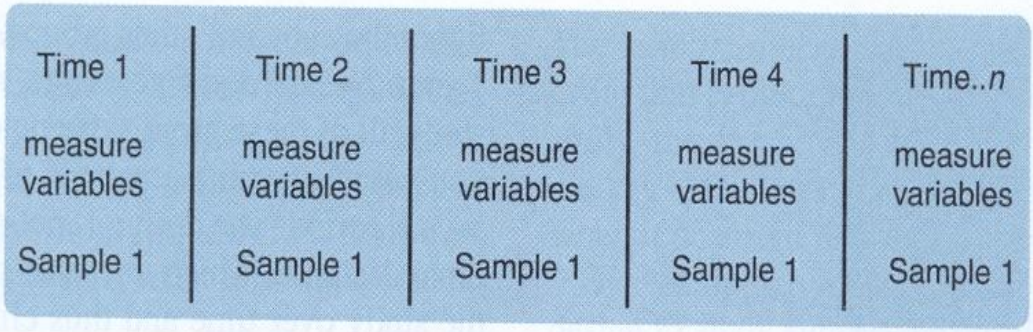

Figure 11-3 Longitudinal design.

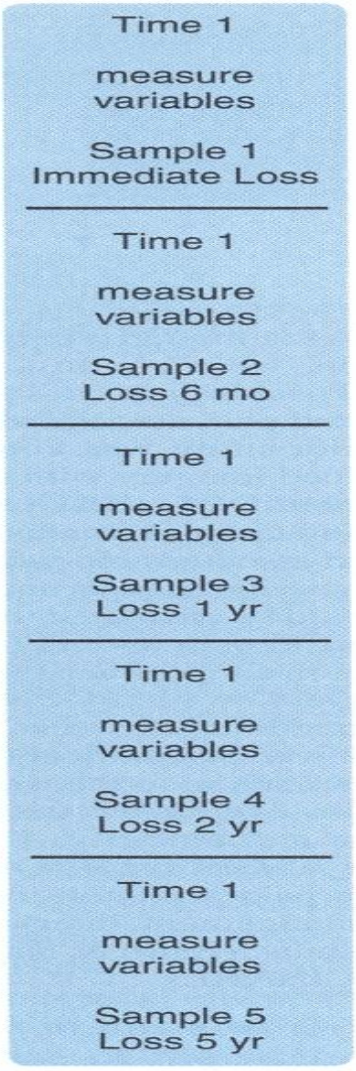

Figure 11-4 Cross-sectional design.

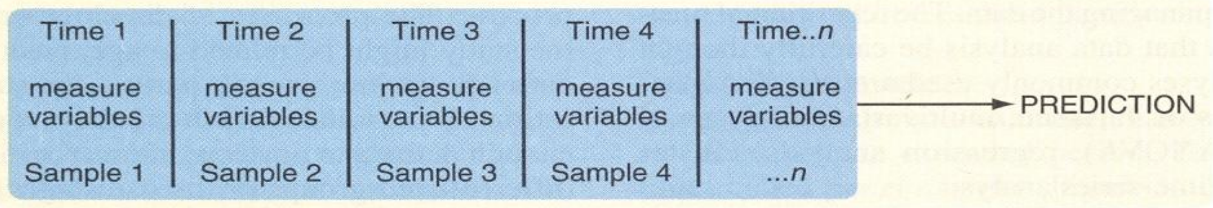

Figure 11-5 Trend design.

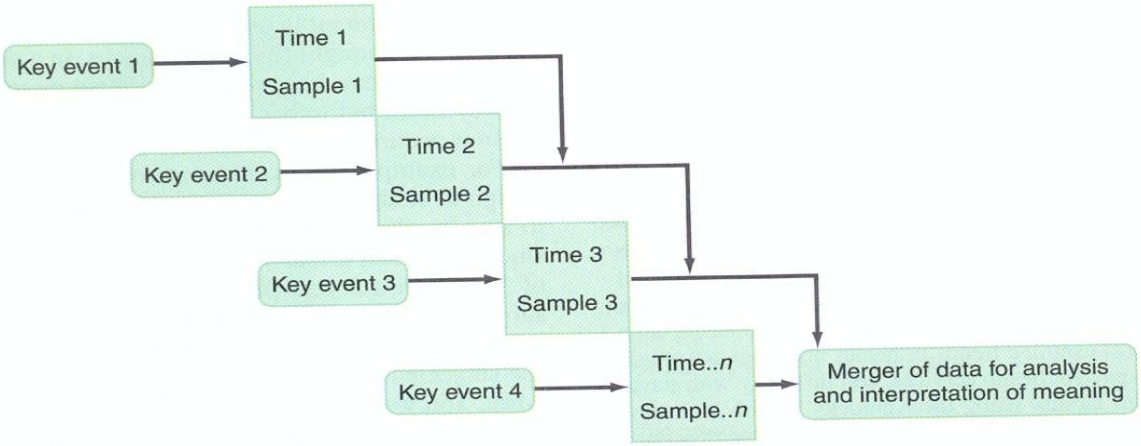

Figure 11-6 Cross-sectional study with treatment partitioning.

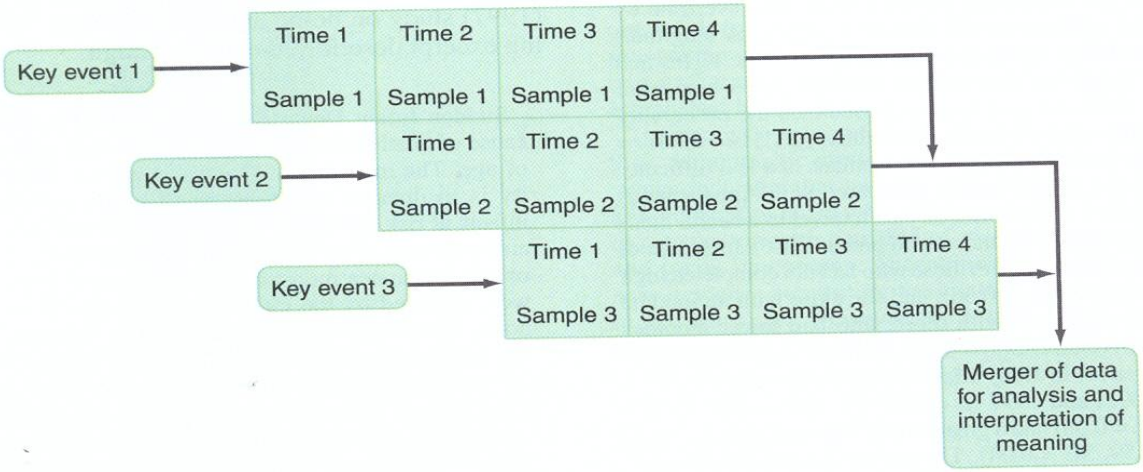

Figure 11-7 Longitudinal design with treatment partitioning.

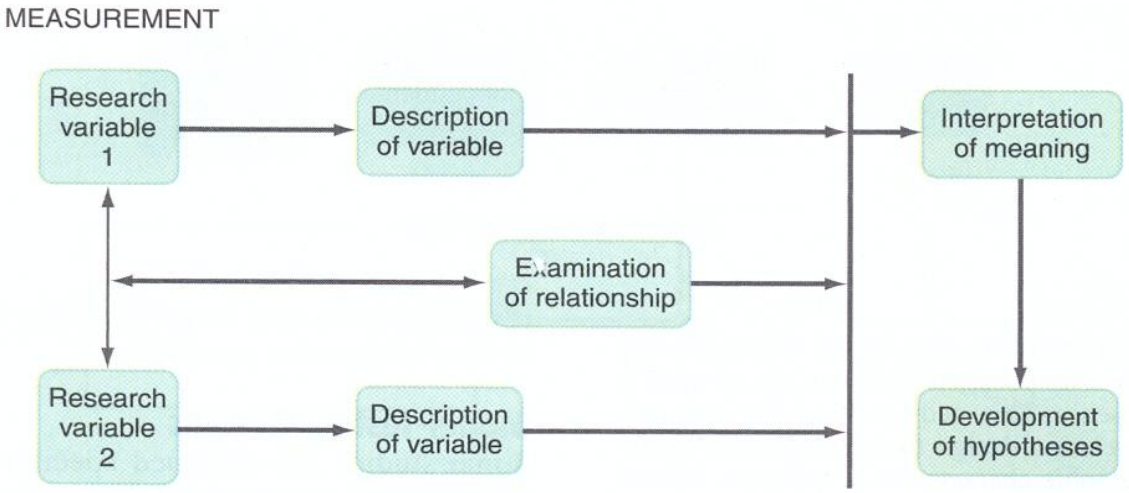

Figure 11-8 Descriptive correlational design.

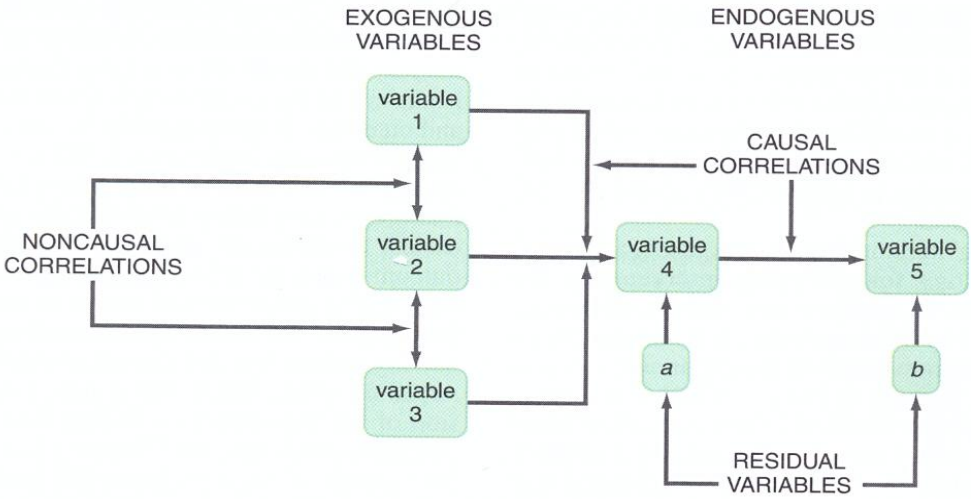

Figure 11-10 Model-testing design.

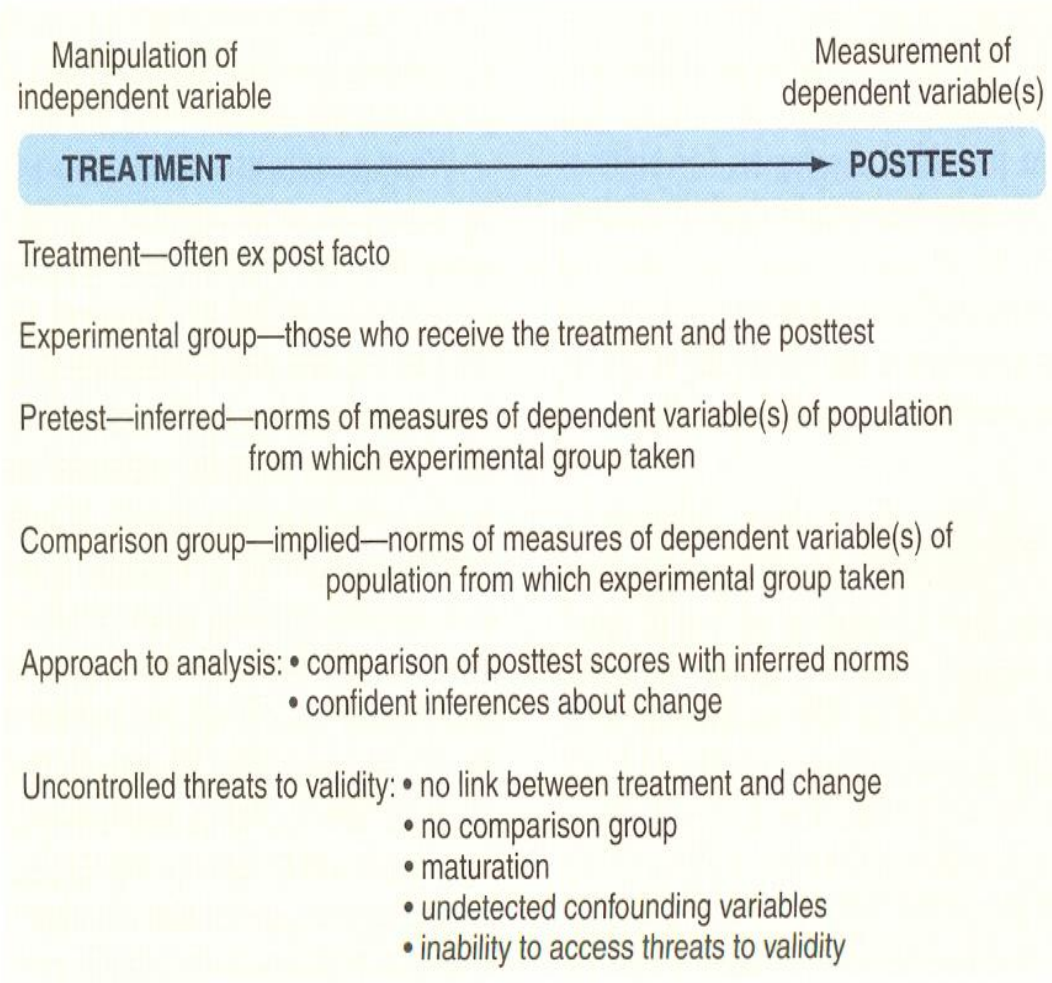

Figure 11-11 One-group posttest-only design.

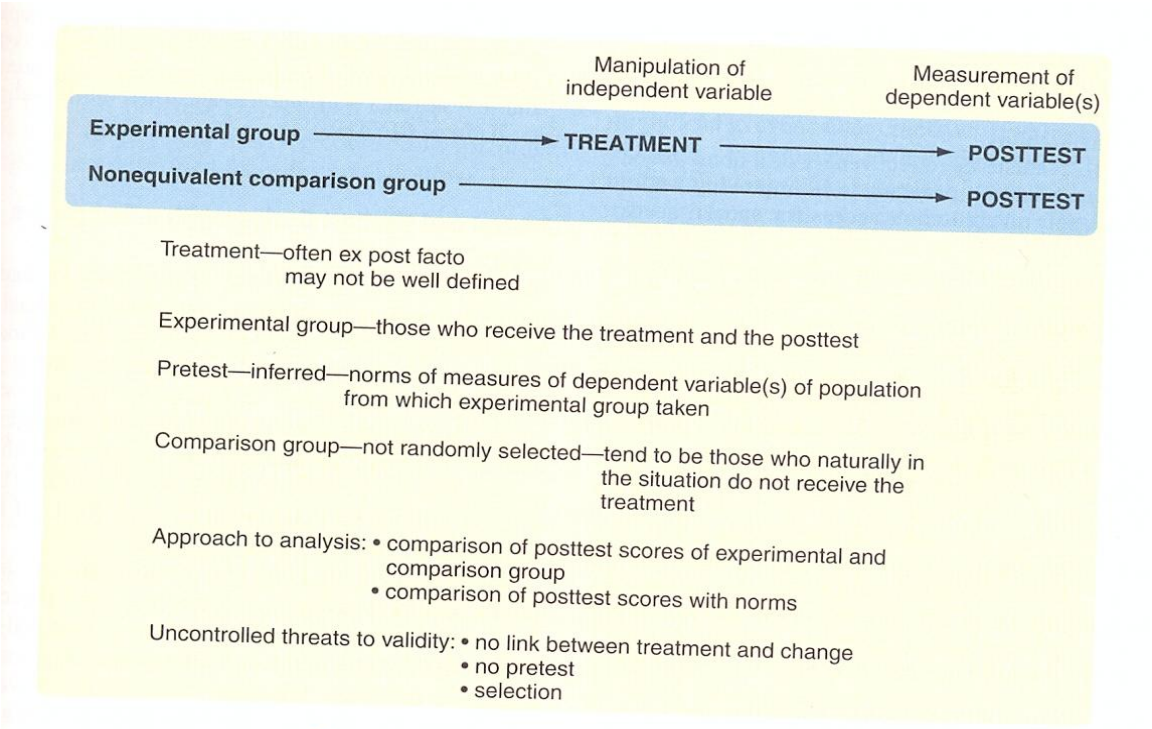

Figure 11-12 Posttest-only design with a comparison group.

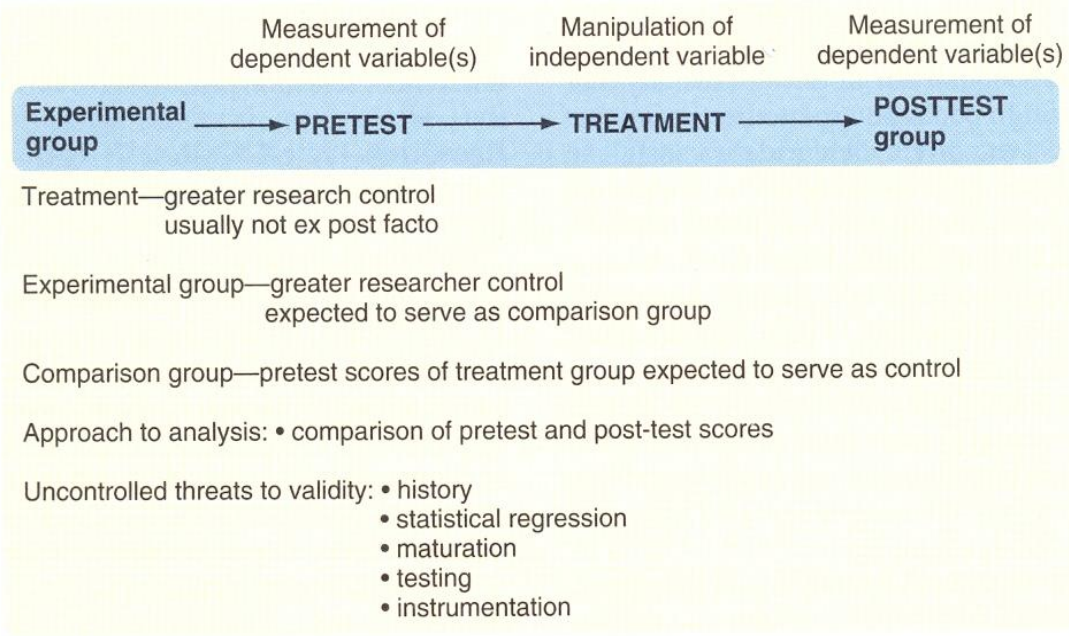

Figure 11-13 One-group pretest-posttest design.

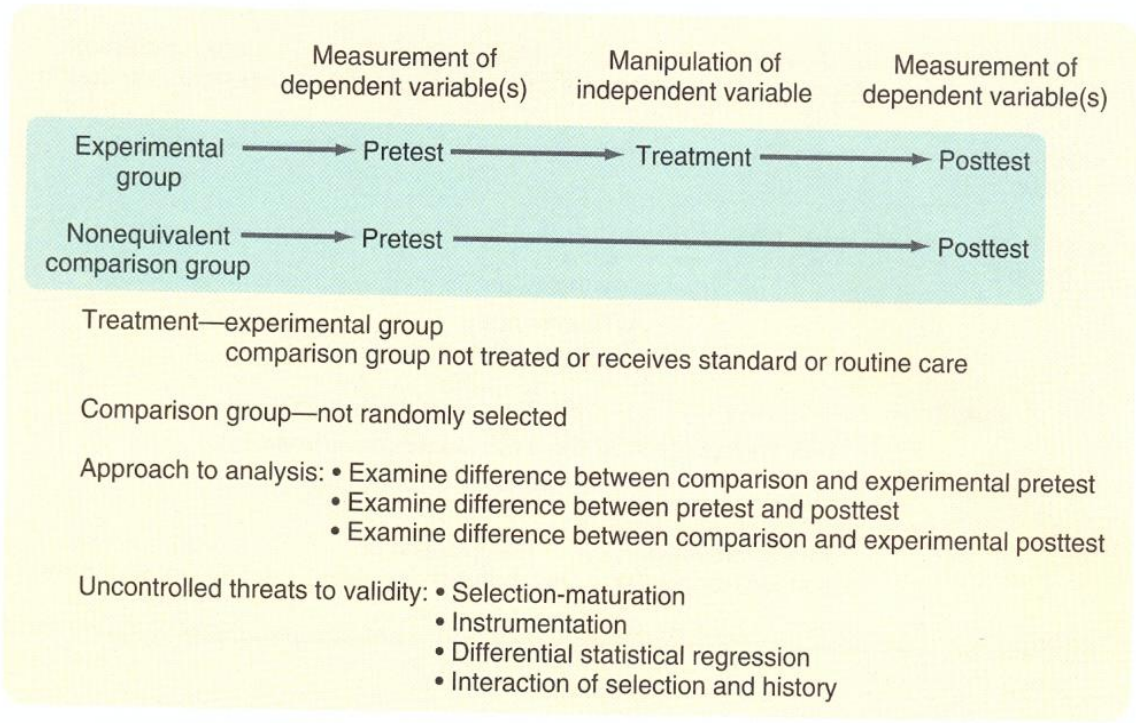

Figure 11-14 Pretest and posttest design with a comparison group.

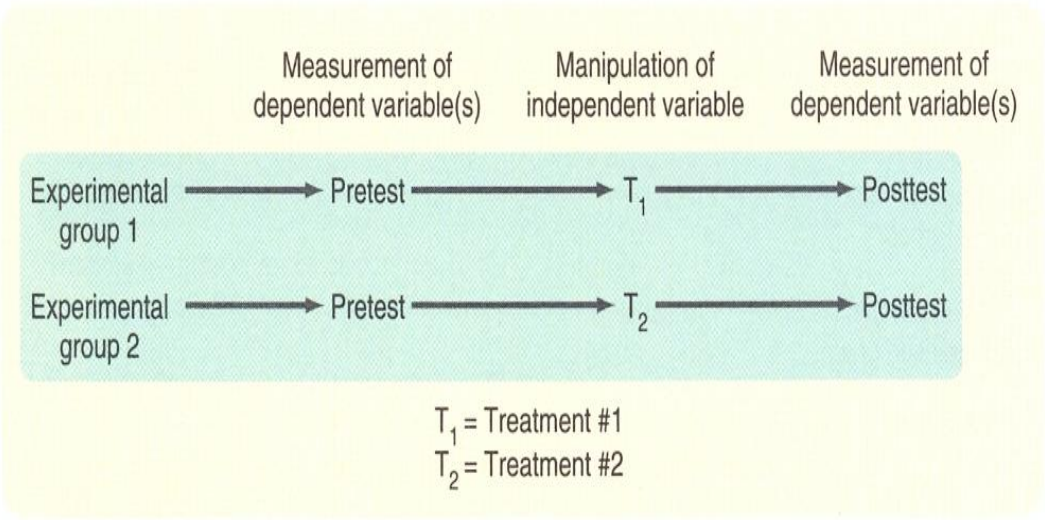

Figure 11-15 Pretest and posttest design with two comparison treatments.

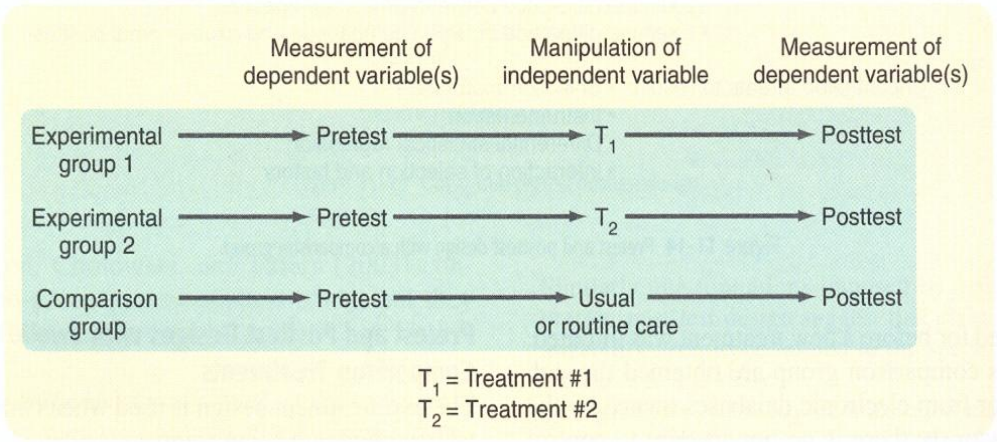

Figure 11-16 Pretest and posttest design with two comparison treatments and a standard or routine care group used as a comparison group.

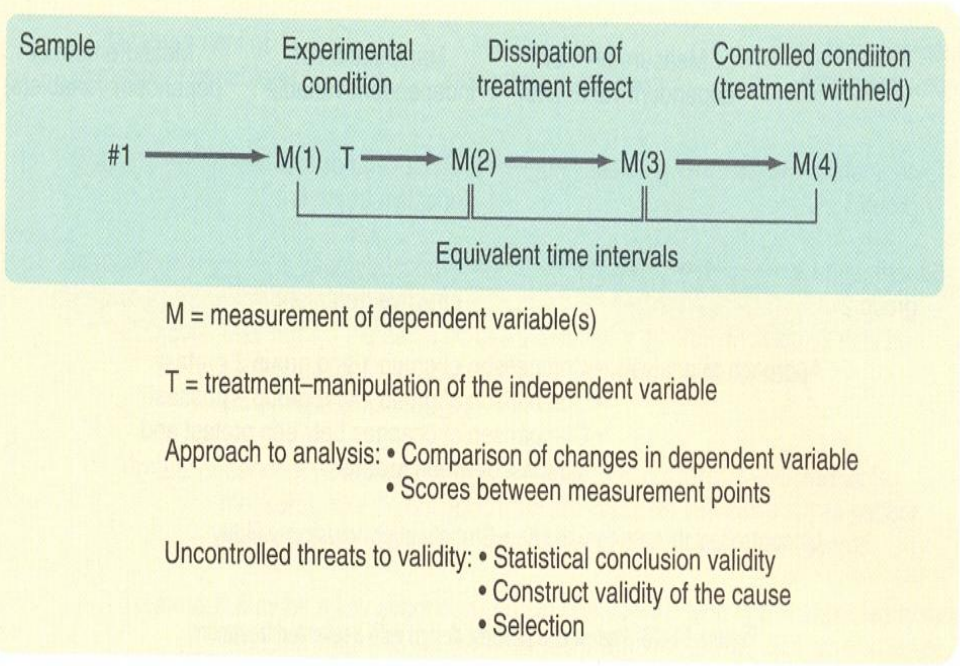

Figure 11-17 Pretest and posttest design with a removed treatment. *M(1)*, pretest; *M(2)*, posttest; *M(3)*, pretest of controlled condition; *M(4)*, posttest of controlled condition.

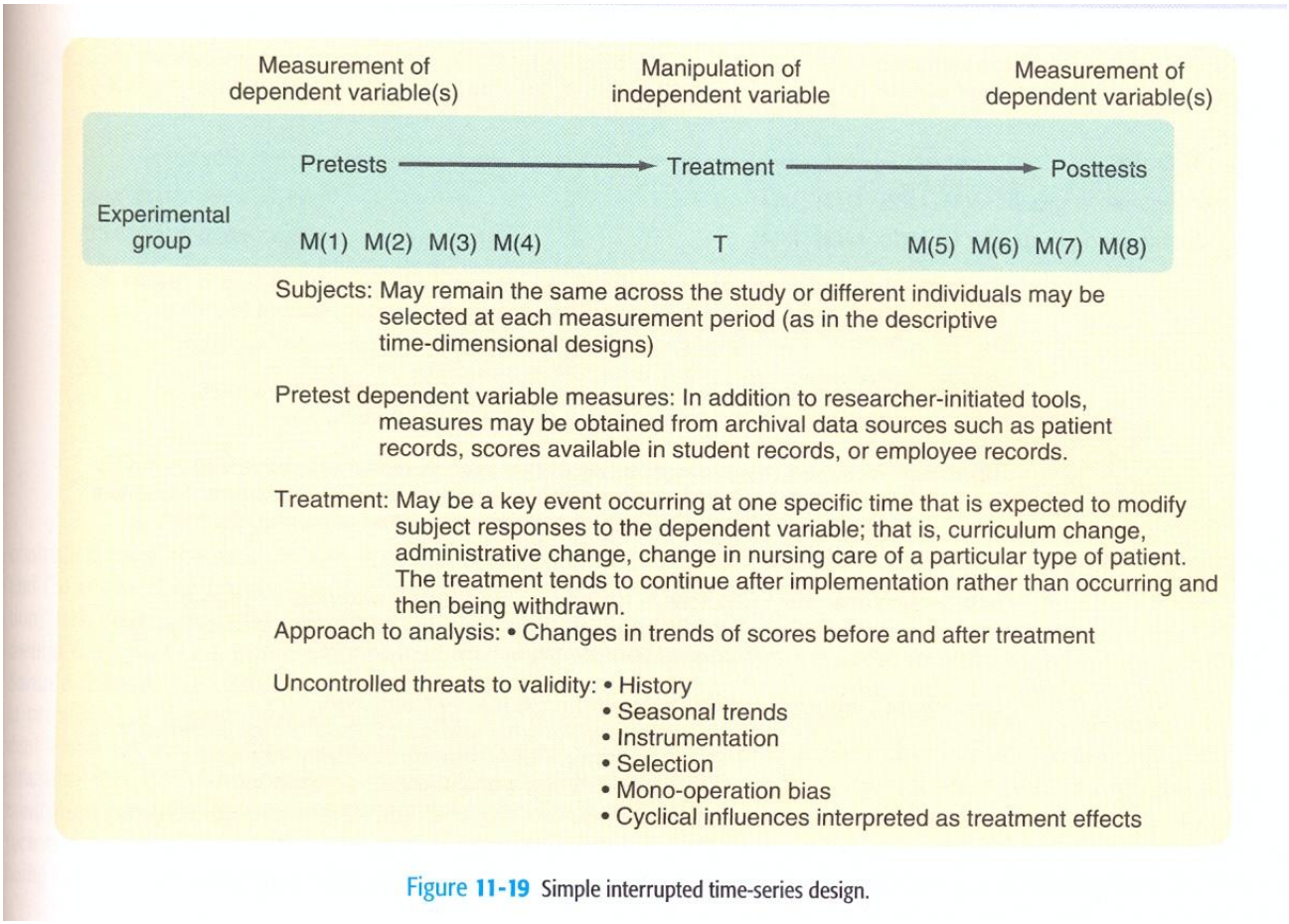

Figure **11-19** Simple interrupted time-series design.

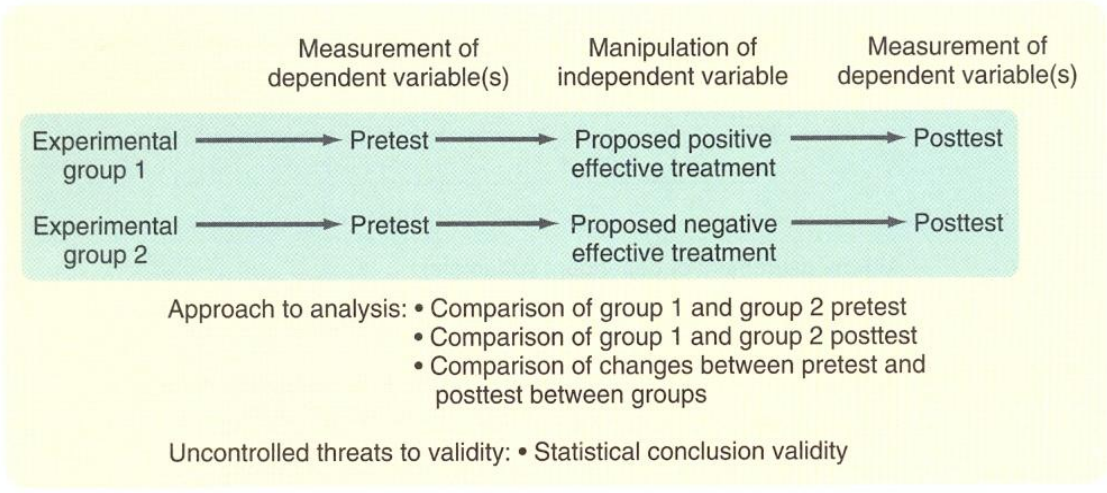

Figure **11-18** Pretest and posttest design with a reversed treatment.

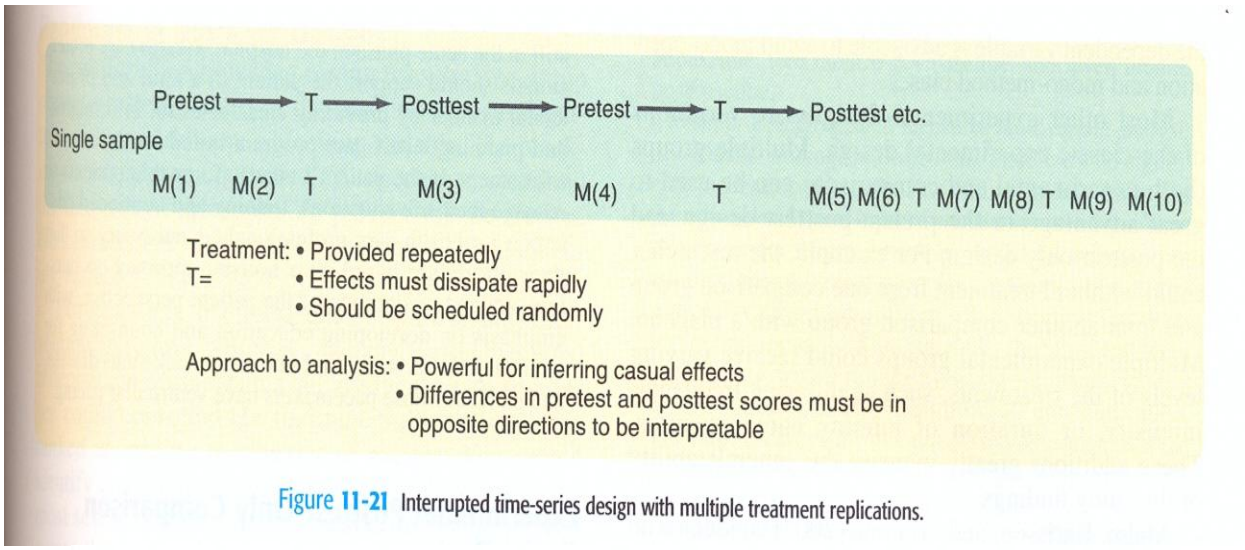

Figure 11-21 Interrupted time-series design with multiple treatment replications.

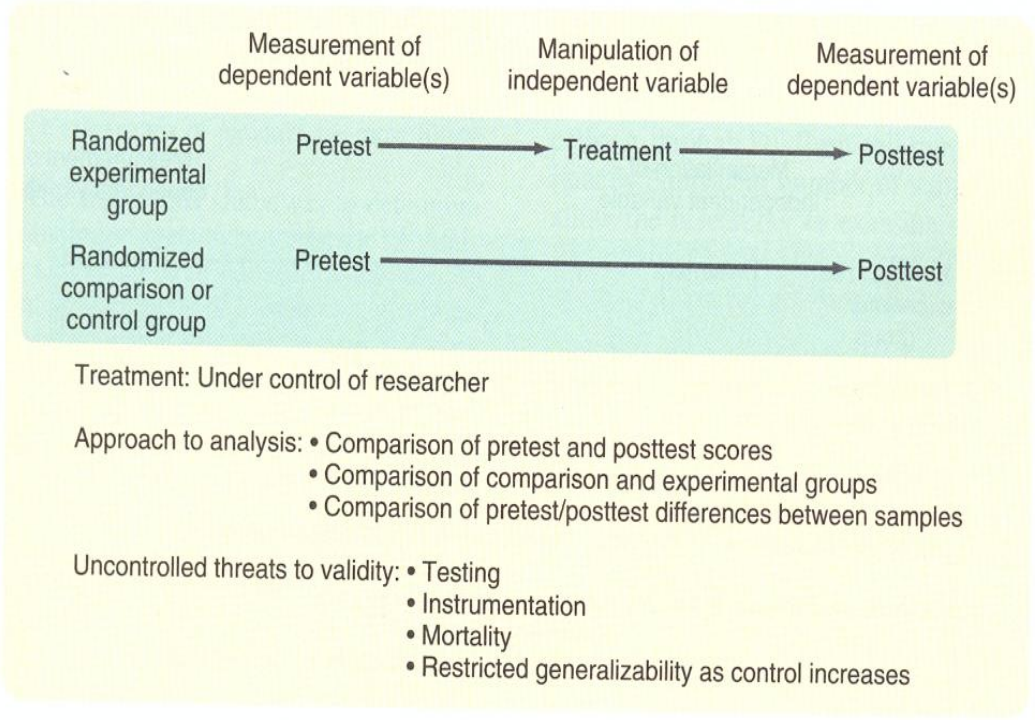

Figure 11-22 The classic experimental design; pretest-posttest control group design.

	Measurement of dependent variable(s)	Manipulation of independent variable	Measurement of dependent variable(s)
GROUPS	Pretests →	Treatment →	Posttests
Experimental group	M(1) M(2) M(3) M(4)	T	M(5) M(6) M(7) M(8)
Comparison group	M(1) M(2) M(3) M(4)		M(5) M(6) M(7) M(8)

Subjects: May remain the same across the study or may be part of a group in which some individuals may change (e.g., class, work group, patient teaching, or patient care group)

Pretest dependent variable measures: In addition to researcher-initiated tools, measures may be obtained from archival data sources.

Treatment: May be a key event occurring at one specific time that is expected to modify experiment subject's responses to dependent variable measures. Treatment tends to continue after implementation rather than occurring and then being withdrawn.

Approach to analysis:
- Changes in trends of scores before and after treatment
- Comparison of trends in experimental and comparison groups
- Temporal persistence of treatment effects

Uncontrolled threats to validity:
- Selection and history interaction
- As experimental and comparison groups increase in noncompatibility, threats to validity increase
- Interaction of populations and treatment
- Cyclical influences interpreted as treatment effects

Figure 11-20 Interrupted time-series design with a nonequivalent no-treatment comparison group time series.

Pretest → T → Posttest → Pretest → T → Posttest etc.

Single sample

M(1) M(2) T M(3) M(4) T M(5) M(6) T M(7) M(8) T M(9) M(10)

Treatment: T=
- Provided repeatedly
- Effects must dissipate rapidly
- Should be scheduled randomly

Approach to analysis:
- Powerful for inferring casual effects
- Differences in pretest and posttest scores must be in opposite directions to be interpretable

Figure 11-21 Interrupted time-series design with multiple treatment replications.

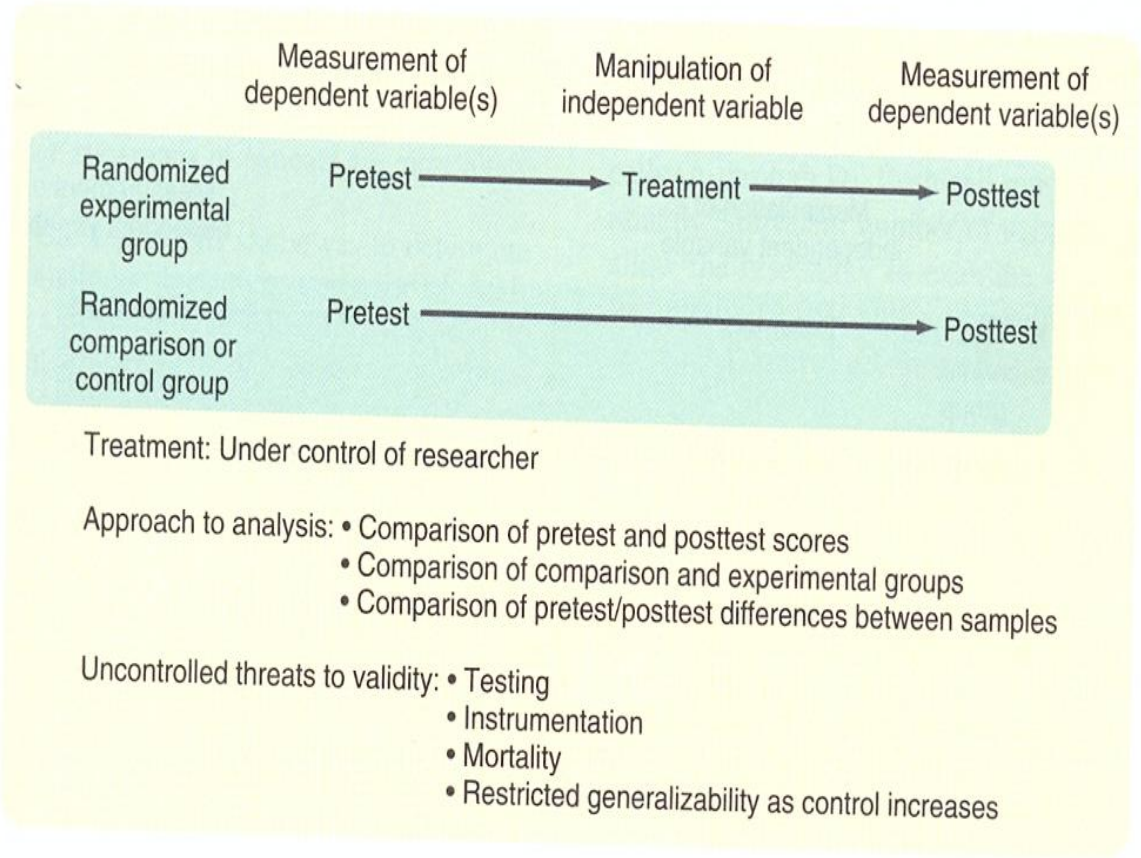

Figure 11-22 The classic experimental design; pretest-posttest control group design.

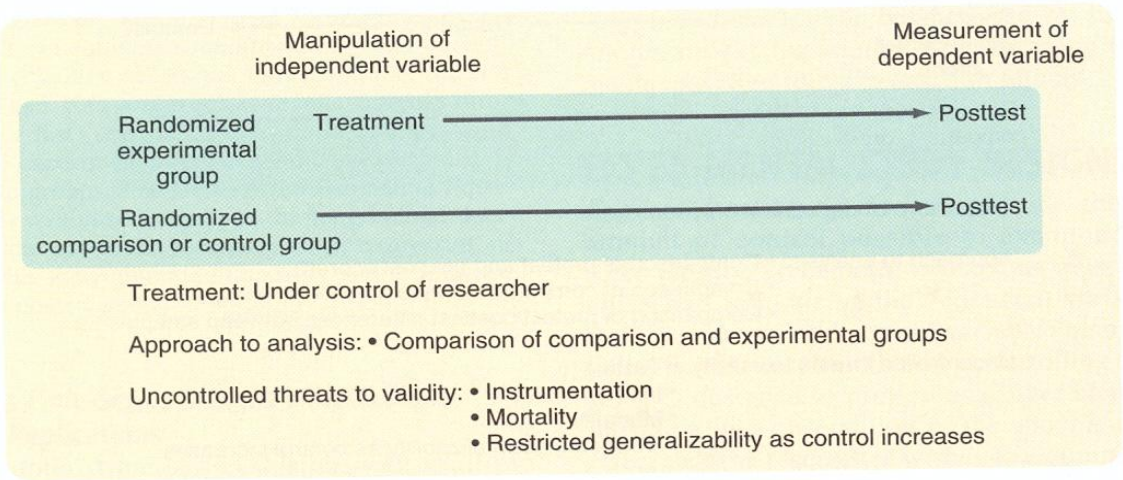

Figure 11-23 Experimental posttest-only comparison group design.

TABLE 11–1 Probability Sampling Chart

Type of Sampling	Description of Methodology	Advantages	Disadvantages
A. Simple random	Assign a number to each member of the population. Select the sample through a table of random numbers.	1. Little knowledge of population is needed 2. Most unbiased of probability methods 3. Easy to analyze data and compute errors	1. A complete listing of population is necessary 2. Time consuming 3. Expensive
B. Stratified	Divide population into strata. Determine number of cases desired in each stratum. Random sample these subgroups.	1. Increases probability of sample being representative 2. Assures adequate number of cases for subgroups	1. Requires accurate knowledge of population 2. May be costly to prepare stratified lists 3. Statistics more complicated
1. Proportionate	Determine sampling fraction for each stratum that is equal to its proportion in the total population.		
2. Disproportionate	Sample is drawn in manner to ensure that each stratum is well represented. Used when strata are very unequal.		
C. Cluster	Groups rather than people are selected from population. Successive steps of selection are done (state, city, county). Then sample is randomly selected from clusters.	1. Saves time and money 2. Arrangements made with small number of sampling units 3. Characteristics of clusters as well as those of population can be estimated	1. Larger sampling errors than other probability samples 2. Requires assignment of each member of population uniquely to a cluster 3. Statistics are more complicated
D. Systematic	Obtain listing of population. Determine sample size. Determine sampling interval ($k = N/n$). Select random starting point. Select every kth element.	1. Easy to draw sample 2. Economical 3. Time-saving technique	1. Samples may be biased if ordering of population is not random 2. After the first sampling element is chosen, population members no longer have equal chance of being chosen