## EXPERIMENTAL REASEARCH DESIGNS

An experiment involves manipulation of an independent variable and the observation of its effects. We manipulate an independent variable to answer the question of causality. If we observe a correlation between social supports and psychological disorders, which are two variables, we can change the extent of social supports and see its effect on prevalence of psychological disorders. So, we are carrying out an experiment or a test. What will this experiment tell us about the relationship between these two variables? If we increase social supports and find no change in the frequency of psychological disorders, it can mean that lack of social support does not cause psychological problems. If we find that psychological disorders decrease or diminish with increase social supports, we can be sure that non-support does contribute to them.

**Experiment**

Experiment is a deliberate manipulation of a variable to see if corresponding changes in behavior result, allowing the determination of cause-and-effect relationships.

Independent variable (IV) is variable in an experiment that is manipulated by the experimenter. Dependent variable (DV) is variable in an experiment that represents the measurable response or behavior of the subjects in the experiment.

An experiment is a research procedure in which a situation or a behavior or both are manipulated and the effect of the manipulation is observed. Most of us perform experiments throughout our lives without knowing that we are actually behaving in a scientific manner of conducting an experiment. (Manipulation is introducing and withdrawing a variable that would not have occurred naturally).

**Research by Experiment**

An experiment involves manipulation of an independent variable and the observation of its effects. We manipulate an independent variable to answer the question of causality.

If we observe a correlation between social supports and psychological disorders, which are two variables, we can change the extent of social supports (independent variable) and see its effect on prevalence of psychological disorders (dependent variable).

So, we are carrying out an experiment or a test. What will this experiment tell us about the relationship between these two variables? If we increase social supports there is decrease in prevalence of psychological disorders (negative correlation) or decrease in social supports increase in prevalence of psychological disorders( negative correlation). Take another example exposure to violent television develops aggression in children

Following are the Experimental Designs to be studied

1. Group Experimental Designs
2. Single Experimental Designs

**Group Experimental Designs**

In group experimental designs, an independent variable is changed to see how the behavior of the people in the group is affected.

**Example:** Suppose we design a treatment to help reduce insomnia in older adults, (Mellinger, Balter, 1985). The experimenters treated twenty individuals and followed them for ten years to see whether their sleep patterns improved. So the treatment is independent variable and the sleep pattern is dependent variable.

The researchers found that the adults, who were treated for sleep problems still sleep less than eight hours per night. Is the treatment a failure? May be not. The question that cannot be answered is what would have happened to group members if they had not been treated. May be their sleep patterns would have been worst. We do not know. We cannot go back in time.

The goal of every experiment is to isolate and identify the true or primary cause from host of other possible causes. The major obstacle to isolating the true cause is the confounding variables. We can control the confounding variable effect by using following methods.

**Control Groups**

One answer to this problem is that we can use control groups. In the same experiment on study of sleep a control group consists of people who are similar to experimental group in every way except that they are not exposed to the independent variable. This group of people can be assessed ten years later and their sleep patterns can be observed over time. The researchers may observe that control group people sleep few hours less as they get older as compared to experimental group. The control allows the researchers to see that the treatment did help the experimental group subjects.

Control group subjects match with experimental group in age, gender, socio-economic background and problems they are reporting. The only difference between both the groups is of treatment variable (independent variable).

* Experimental group are subjects in an experiment who are subjected to the independent variable.
* Control group are subjects in an experiment who are not subjected to the independent variable and who may receive a placebo treatment.

**Placebo Control Groups**

People in the experimental group often expect to get better. So when behavior changes, as a result of people’s expectations rather than due to independent variable we label the phenomenon as placebo affect. The word placebo means “I Shall Please” in other words placebo means inactive medications such as sugar coated empty pills. The placebo is given to the members of control group to make them believe that they are getting treatment. (Parloff, 1986). A placebo control in a medication study can be carried out because people in the control group receive something that “looks like” medicine that the experimental group is getting. If the therapists want their clients to expect improvement, this placebo affect helps strengthen the treatment.

* Placebo effect is the phenomenon in which the expectations of the participants in a study can influence their behavior.
* Experimenter effect is the tendency of the experimenter’s expectations for a study to unintentionally influence the results of the study.

**Single Blind Control Group Technique**

Single blind control group technique is a kind of placebo control group procedure where the participants in the study (are) blind or un-aware of what group they are in or what treatment they are given. This type of control eliminates participant’s bias which may affect the results.

**Double Blind Control Group**

Technique In this technique, which is a type of placebo control group where the participants in the study (are) blind or unaware of what group they are in or what treatment they are given and so are the researchers or therapists who are providing the treatment or manipulating the independent variable. This type of control eliminates the participant’s bias and the researcher’s bias as well. So when both the researchers and participants blinds, there is less chance that bias will affect the results.

**Triple Blind Control Technique**

In a triple blind control technique study, suppose we want to study the effects of a target drug with placebo were being compared the patients, the administrators and the judges on the administrators, were unaware of the fact which patients belonged to the control group and which patients belonged to the experimental group .

**Comparative Treatment Research**

In this type of design, the researcher gives different treatments to two or more comparable groups of people with the same disorder and then measure how the independent variable helped the people, who received it.

This is called comparative treatment research. In the example of the study on sleep with older adults, two groups of older people can be selected. One group given medication for insomnia and the other group given cognitive behavioral therapy and the results are compared. In every treatment, the process and outcome are two important issues to be studied.

Process focuses on the mechanism and outcome on the result. There is an old joke that someone went to a physician for common cold problem. The physician prescribed the new drug and said it’s a miracle drug and the cold will be gone in seven to eight days. As we all know, that cold typically improves in seven to ten days. So seven to ten days is the process of testing the miracle drug and cure of the cold is the result.

Outcomes can be positive or negative. In a research by Francis and Hart, (1992) who worked with depressed in patient in hospital setting and they used the strategy that the activity level of the depressed should be increased. Francis and Hart noted improvement and decrease in their depression levels of patients whose activity level was increased but this improvement disappeared outside the hospital environment. If you look at their outcomes in the hospital, you see improvement, if you follow them home after being discharged from the hospital; the treatment was not affective at all.

 **Randomization**

When researcher assigned participants to a condition in an experiment purely by chance i.e. by flipping a coin or using a table random numbers, they employ randomization to assign subjects to experimental and control groups or to matched groups. One can use the technique of randomization to assign subjects to experimental or control groups, to be sure that all the characteristics of the population are fully represented in the two groups. In all experiments of psychology random sampling procedures are used to form the experimental and control groups.

**Matching**

Matching is an attempt to ensure that the participants in all conditions are comparable. First by defining the important ways that people could differ from one another and then placing an equal number of persons of each type in each group.

Example

If we are studying depression among both the genders then we would assign people of both genders and almost same characteristics of both the genders in the two groups.

When ever different aspects of an experiment are sequentially presented to participants, it is important to consider the order of presentation because the sequence of events could influence the dependent variable and it needs to be controlled. One way to control unwanted sequence of events is by counter balancing.

Example

When we use medication and supportive therapy with depression patients then be sure that sequence of experiment first demands medication and then supportive therapy.

**Quasi- Experimental Design**

In this design the researchers do not assign subjects to control or experimental groups rather they make use of groups which already exists in world. Suppose we want to study the relationship between child abuse and depression among children so we select children with history of abuse.

**Natural experiments**

In this type of experiment it is nature rather then experimenter who manipulates the independent variable and the experimenter studies its effects. This design is used in studying the psychological effects of unpredictable events such as earthquakes, plane crashes and fires. On 8th October 2005 earthquake hit Pakistan and it caused huge loss to life and property. It leads to the development of Post Traumatic Stress Disorder (PTSD) in surviving women, men and children. A Fokker flight in July 2006 from Lahore to Multan crashed killing all on board created fear in all people traveling in Fokker flights.

**Analogue experiments**

Researchers demand subjects in laboratory to behave in ways they believe, to be analogous to real life abnormal behavior. Example M. Seligman has worked on a pattern of behavior he calls it learned helplessness that he believes it to be analogue to human depression. He exposed humans to unpleasant and unavoidable stimuli (such as noise, failures on cognitive tasks). The subjects displayed sadness, passivity, pessimistic, behavior pattern similar to learned helplessness. The limitation of this design is that laboratory phenomenon is superficially similar to depression.

**Single Case Experimental Designs**

Skinner gave us the concept of single case experimental design. This method involves the systematic study of one individual under a variety of experimental conditions. The experimenter manipulates the independent variable in ways that reduce the likely hood of confounding the explanations. Skinner thought, it was better to know a lot about the behavior of one individual then to make only a few observations of a large group and then average the response.

Psychopathology is involved with the suffering of specific people and its methodology has greatly helped in understanding factors involved in individual psychopathology. Following are the single case experimental designs.

1. **Repeated Measurements.** One of the most important strategies, used in single case experimental design is Repeated Measurement in which a behavior is measured several times instead of only once before you change the independent variable. The researcher takes the same measurement over and over to learn how variable the behavior is (how much it changes day to day) and whether it shows any obvious trend (is it getting better or worst?)

Example: A young woman labeled ‘A’ comes into her office complaining about anxiety. Anxiety is a feeling of being restless, uncomfortable and uneasy. When she is asked to rate her feelings of anxiety on a rating scale of 0 to 10. She gives her anxiety a score of 9 whereas 10 is the worst. After several weeks of treatment, client A rates her anxiety at 6. Can we say that the treatment has reduced her anxiety? Not necessary. Using the repeated measurement techniques, we can measure client A’s anxiety each day during the week before her visit to the office and observe that the ratings differ greatly.

On a good day she rated her anxiety 5 and on a bad she rated her anxiety at 8. Repeated measurement techniques helps to identify how a person is doing before and after treatment. We can conclude that client A had good and bad days both before and after treatment and doesn’t seem to have change much. There are important parts of repeated measurements:

1. The degree of behavior change with different interventions.
2. The degree of behavior change over time.
3. The trend and direction of behavior change.
4. **Withdrawal Designs.** The withdrawal design or the reversal design assesses the effects of an intervention on problem behavior, the problem behavior changes systematically with the provision and removal of treatment. So ‘A’ refers to the baseline conditions and ‘B’ to the treatment. In this design, the baseline and the treatment conditions are alternated. A simple withdrawal design has three parts.
5. A person’s condition is evaluated before the treatment to establish a baseline ‘A’.
6. Then comes the independent variable ‘B’
7. And last the treatment is withdrawn (return to the baseline).

Example: In case of client A having anxiety problem, first we measure the client A’s anxiety level before the treatment to establish a baseline, then in the second step, we give the independent variable (treatment) and in the third step, treatment is withdrawn and client A returns to step one i.e. baseline level. Some psychologists support the use of withdrawal designs because it means drug holiday i.e. a period of time when medication is withdrawn for two reasons:

1. All medications have negative side effects and therefore, unnecessary medication should be avoided.
2. Whether change in behavior is due to the treatment effect or not.
3. **Multiple Baseline**: Another single case experimental design, strategy is multiple base line designs. Unlike the reversal design, the multiple baseline design doesn’t require removing treatment. In a multiple base line design, two or more baselines of different durations are recorded simultaneously and the intervention is applied for one baseline at a time.

The multiple baselines can be different behaviors by a single person (anxiety and depression), the same behavior by different persons or (depression among two persons) or one behavior (depression) in different situations. The logic this design is that if the treatment is responsible for changes, then these changes will be evident on the baselines that are treated and not evident on the untreated baselines.

Example: A researcher wants to know whether a treatment is effective for child behaviors such as crying and fighting with siblings so crying is one baseline where as fighting is another baseline. Treatment could first focus on crying and then on fighting with siblings. This is multiple baseline across behaviors. The researcher can start treatment at different times across different settings. The young woman, who was experiencing anxiety at office, could get treatment at office and when this treatment is effective at office, same intervention could be used at home. This is multiple baseline across settings.

**Shortcomings of single subject designs**

Single subject designs has disadvantage such as:

1. Their results cannot be generalized.

Research by experiment takes into account:

1. The concept of experiment.
2. Independent variable, dependent variable and the confounding variable.
3. It studies group experimental designs (Placebo control groups, single blind control group, double blind control group, comparative treatment group)
4. Single case experimental design (Reversal Design, multiple baseline design).
5. In both these designs, a variable or variables is manipulated and the effects are observed in order to determine the nature of a casual relationship.