**METHODS**

Empirical research includes "quantitative" and "qualitative" methods are the types of tangible data assessed using the evidence of our senses.

While these kinds of data collection methods are not the only way in which we "know" things, they have particular utility for testing research hunches and hypotheses in a variety of fields.

Research Methods are most often used for two major purposes:

1. To establish "facts" or recurring regularities in the environment.

Examples of facts include:

* The incidence of violence on high school campuses.
* The percentage of adult Indians with access to the Internet at least once a week.
* How many American adults over 18 engage in physical exercise?
1. To test (and, more surreptitiously, establish) causal explanations for established facts. Most theories address explanations for factual material. Explanations typically assert causal relationships among variables of interest.

For example:

* Students who engage in explosive violence on high school campus have been bullied at that school.
* Science or technology professionals have greater access to the Internet at work than other workers do.
* Men more often engage in physical exercise than women.

Establishing facts is hard enough and there are possible areas where there can be errors;

1. Questionnaire result bias where many people tend to agree with any general statement. As a result, you may not know whether your scale measures the desired construct--or "agreement response set.”
2. Generalizability/Population bias - a relatively small or with unique characteristics that are not typical of your true population of interest. For example, it is risky to generalize from studies of college undergraduates to corporate workers.
3. Not measured what you thought (example: you *thought* you were measuring positive attitudes toward performance--but *instead* you measured emotions about competition).

**METHODS AND CAUSE: A *PRELIMINARY* STATEMENT**

As soon as we try to establish causal precedence, things become even more difficult. For every pair of factors that we see locked in a causal relationship:

**We could mistake the direction of causality.**

For example, recent work on parents who physically discipline (spank!) their children found that nearly 19 out of every 20 parents use some form of physical discipline. The rare children whose parents never spanked them were found to have exemplary behaviour. The assumption was that parental discipline patterns influenced children's behaviour. **BUT**, isn't it possible that "exemplary children" never even tempted their parents to use physical discipline in the first place? That is, the true causal variable here was the behaviour of CHILDREN, rather than parents.

**Any apparent causal relationship occurs because a third factor caused both the original "cause" and also the "effect." In other words, the relationship is "spurious," and not a "true" or "real" causal relationship.**

For example, several decades ago, researchers found that American high school students who smoked cigarettes had lower grades. Their conclusion was that something about smoking caused lower grades. Leaving aside the reversed causal possibility (your grades were so awful, you began smoking to relieve the stress), later scholars found that the "true cause" was parental social class. High school students who came from poorer backgrounds were both more likely to smoke cigarettes *and* also had lower grades. Once parental background was controlled, student cigarette smoking no longer predicted grade point average. Spurious relationships appear in experimental studies too; for example, your results may be due to anxiety aroused by being in a testing situation or an artifact of a particular treatment manipulation.

A very recent example of misapplied causal inference is that of Hormone Replacement Therapy (HRT) in postmenopausal women. Early studies reported that women taking estrogen/progesterone hormone supplements had lower rates of heart attacks and lower odds of osteoporosis than women who did not take these hormones. The data appeared so impressive that many doctors did not wait for more conclusive experimental results in their recommendations, so that by early 2002, over SIXTEEN MILLION U.S. WOMEN were on HRT. However, in the early 2000s, a massive experimental study was begun. Half the U.S. women received HRT and the other half received a sugar pill placebo. The women were followed longitudinally. To the researchers' shock, the experimental data indicated that women on HRT, in fact, had HIGHER rates of heart attacks and strokes. Although the incidence was still low, the data were convincing enough the experiment was immediately terminated and millions of postmenopausal women are now uncertain of what medication course to follow.

How could this happen? Women who took very good care of themselves: (A) were more likely to see their doctors and thus receive HRT in the observational studies and (B) women who take good care of themselves have a lower incidence of heart attacks in general. The TRUE causal factor, apparently, is the level of responsibility that individual women take for their physical well-being. Although the data are still far from all in, it appears that this is one case where incorrect causal inferences in observational data were literally lethal.

**Your results were caused by alternative causal variables, leaving your original causal explanation suspect.** For example, recently discovered that the level of basic science knowledge in American adults was somewhat higher among men than among women. People who have read this material conclude that women are just less knowledgeable about science**. HOWEVER**, later it was discovered that much of the difference occurred *not* only because women gave more *incorrect* answers than men, but also because women gave more "I don't know" responses than men did. Issues such as self-efficacy become more important in giving "I don't know" responses than incorrect ones.

A considerable amount of scholarship consists of formulating and testing alternative causal explanations for "factual material," that is, teasing out how and why regularities occur. Methodology is critical in the research enterprise. Some alternative explanations are methodological artefacts: for example, a limited population; an unrepresentative sample; biased questionnaire items or tests; or incomplete experimental treatments. Others are conceptual issues that can only be tested using thorough methods of data collection.

Losh, S (2009) Adapted from http://mailer.fsu.edu/~slosh/MethodsGuide1.html accessed 18th October 2012.