

Design, Analysis, and Critical Evaluation of Research

Quiz 3: Study Designs, Measurement, Validity, Reliability, Bias and Error

Part 1 General terms and definitions

1. Describe the major difference between quasi experimental and true experimental design. In other words, what criterion separates the two? (2 points)

Answer;

The major difference between quasi-experiment and true experiment research design is on randomization of the subjects involved in the study. In a quasi-experiment, the subjects or rather the participants are not selected randomly for treatment. On the other hand, in a true experimental research design, the participants involved in the study are randomly selected for the respective treatment so that comparison can be conducted.



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2. Briefly describe single blinding versus double blinding. Why is blinding a valuable tool when conducting a clinical trial? (3 points)

Answer;

In a single blinding, the participants involved in the given study are not aware if they are part of the treatment or control group. On the other hand, in a double blinding, both the experimenter and the participants are not aware of which participants are included in the treatment or control group. The aim of blinding in a study is to eliminate errors. There is a possibility of the subject to change their conduct once they are aware that they are being studied and also the experimenter may exercise bias on a specific subject in order to manipulate the results.

3. Contrast internal vs external validity of a study. (2 points)

Answer;

Internal validity of a study focuses on the soundness of the research methodology to provide accurate findings (Black, 2002). Therefore, it assesses the robustness of the research methods in generating findings that will lead to the conclusion of the study. On the other hand, external validity is focused on the application of the study's finding into the real world (Black, 2002).

3. A researcher wishes to conduct an experiment in which he wishes to measure the efficacy of a nutritional protocol for lowering LDL levels. His budget allows him to only assemble and study two groups.

a. What would be the best study design based on this constraint? (1 point)

Answer;

The best research design for this study would be experiment research design where one group would be considered as the control group and the other one as the treatment group.

b. Suppose 5 individuals cannot tolerate the study and drop out. **What is the term given to subjects dropping out?** Suggest a way in which this might threaten the validity of the study. (2 points)

Answer;

The term given to the subjects that drop out of an experiment is subject/participation attrition. Participant attrition has a great impact on the internal validity of the study. The fact that this study is long-term there is a possibility of other participants dropping out. Participant attrition will force a researcher to replace the subjects that drop out of the research. However, the replacement may not have the same features as the existing subjects hence affecting the accuracy of the research. For instance, the replacement of participants in the treatment group may cause the results gathered to have errors since the participants will not have been subjected to the same duration for the respective study.

4. Please consider the following link to assist you in answering question 4:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2917255/>

Researchers interview the parents of children diagnosed with a hyperactivity disorder for the potential efficacy of a nutrition intervention. Following unfavorable results to the study, the researchers (as well as their trial sponsors) decide not to publish. What is the most likely type of bias introduced in the above scenario? (1 point)

Answer;

The type of bias that is evidenced in this specific case is citation bias which occurs when the researcher decides not to publish the findings of the given study simply because the findings does not support whatever the researcher aimed to achieve (Pannucci, and Edwin, 2010). In this case, the researcher wanted a positive efficacy of the nutritional intervention to the children diagnosed with hyperactivity disorder but the findings of the study did not prove that.

5. Contrast unsystematic (random) vs systematic variability. How are they different? (2 points)

Answer;

Systematic variability refers to changes or variations that occur repeatedly in a given pattern and are associated with flaws in the research design that a researcher employed in the given study (Black, 2002). Unsystematic variability, on the other hand, refers to those variations that occur randomly and do not follow any given pattern.

6. Describe two types of bias that may present in research. You may use the link from question 4, but do not use the same example. Then, describe how one would control or minimize these two types of biases. (4 points)

Answer;

Selection bias; this type of bias occurs when identifying the population for a given study and researcher may end up selecting a population that will lead to errors in the outcome (Pannucci, and Edwin, 2010). Therefore, to avoid selection bias a researcher should develop criteria for selecting the population for the given study.

Recall bias; this type of bias occurs when a subject used in a given study is able to recollect a previous event that is related to the study being conducted hence interfere with the outcome

(Pannucci, and Edwin, 2010). Researchers can avoid this type of bias by conducting prospective studies that will be able to identify subjects that could cause this type of bias.

7. Please refer to the following study for question 7.

Kroke, A, et al. Validation of a self-administered food-frequency questionnaire administered in the European Prospective Investigation into Cancer and Nutrition (EPIC) Study: comparison of energy, protein, and macronutrient intakes estimated with the doubly labeled water, urinary nitrogen, and repeated 24-h dietary recall methods. The American journal of clinical nutrition 1999; 70(4): 439-447.

You can find the study here:

<http://ajcn.nutrition.org/content/70/4/439.full>

a. What specific study design was employed? (1 point)

Answer;

The research/study design that was employed is quasi experimental research design as the participants for the study were not randomly selected.

b. Please read the three paragraphs of the Introduction. In your own words, describe the type of bias that the author introduces. Be as specific as possible. (1 point)

Answer;

The bias that can be noted is misclassification of outcome. This bias occurs when the researcher classifies the participants into respective groups based on the nutrient under study.

The researcher relies on the reported dietary intake of a participant which may be the reported but not actually taken by the participant.

b. With regards to this study, how does self-reporting of energy intake using questionnaires correlate with the validated biomarker methods used in the study. You do not need to cite specific data, but rather summarize the studies' findings. (1 point)

Answer;

The study found out that energy intake was underreported by the participants as compared to the results using biomarker methods. On that note, there is no correlation between self-reporting of energy intake using the questionnaires and the validated biomarker method.

References

Black, Thomas R. *Understanding Social Science Research*. Sage, 2002.

Pannucci, Christopher J., and Edwin G. Wilkins. "Identifying and Avoiding Bias in Research." *Plastic and Reconstructive Surgery*, vol. 126, no. 2, 2010, pp. 619-625.

Kroke, A, et al. Validation of a self-administered food-frequency questionnaire administered in the European Prospective Investigation into Cancer and Nutrition (EPIC) Study: comparison of energy, protein, and macronutrient intakes estimated with the doubly labeled water, urinary nitrogen, and repeated 24-h dietary recall methods. *The American journal of clinical nutrition* 1999; 70(4): 439-447.