

Assessing the “Evidence” in Evidence-Based Practice

Aaron Roman, Au.D. & Ryan McCreery, Ph.D.

Disclosures: Aaron Roman

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How to read a scientific paper



Derived from Rodriguez (2018). Infographic can be found here: <https://www.dissoc.com/connect/infographic-how-to-read-a-scientific-paper>

What is PICO/PECO ?

- Patient/Problem/Population
- Intervention (or Exposure)
- Comparison/Control/Comparator
- Outcome

Do patients diagnosed with COVID-19 experience more intrusive tinnitus compared to those not diagnosed with COVID-19?

□ Patient/Population/Problem
□ Intervention/Exposure
□ Comparison/Control
□ Outcome

Do hearing aids improve performance on the Mini Mental-State Examination?

□ Patient/Population/Problem
□ Intervention/Exposure
□ Comparison/Control
□ Outcome

Do children with auditory processing disorders (APD) demonstrate lower reading scores than those without APD?

□ Patient/Population/Problem
□ Intervention/Exposure
□ Comparison/Control
□ Outcome



Population Considerations

- Sample Size (or n) refers to the entire number of people that are assessed in a study
- Small sample sizes:
 - Increase chances of finding a false premise as true
 - Lack generalizability
- Overly large sample sizes:
 - May have ethical implications
 - Can result in statistical significance that is clinically negligible (Faber & Fonseca, 2014)



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Population Considerations – Watch for Bias

Selection Bias	- Criteria used to recruit participants is different for each study cohort - Prospective studies (especially randomized) less prone to selection bias
Channeling Bias	Participants' current medical status dictates the study cohort
Interview bias	- Systematic differences in how information is obtained or interpreted - More common when disease status is known to interviewer
Confounding	When an association is due to three factors: the exposure, the outcome of interest, and third factor that is related to be the outcome and the exposure

Types of bias in clinical research (adapted by Perreault & Wilkie, 2010)

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Let's Evaluate!

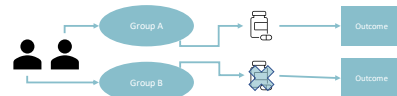
I am conducting a study to see if long-term hearing aid use correlates with lower perceived stress scores on a stress questionnaire:

- The study has a sample size of 33 hearing aid users between 33 – 85
- Participants are grouped into two groups: (1) long-term hearing aid user (greater than five years) and (2) short term hearing aid user (less than five years)
- All participants complete a face-to-face interview and fill out an eight-item questionnaire regarding perceived stress.

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Study Designs and What They Mean

- Randomized Control Trial
 - Participants are placed, randomly, into either an experimental or control group
 - Randomization allows for blinding of both the participant and researcher
 - Also balances out differences in individual characteristics between groups



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Study Designs and What They Mean

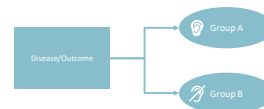
- Cohort Studies (aka Prospective Observational Studies)
 - Groups consist of a population with an impairment/characteristic being studied and another without



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Study Designs and What They Mean

- Case Control Study
 - Retrospectively compares risk factors of a certain outcome between a group with a certain characteristic (case) against a group without (control)



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Let's Evaluate!

- Think back to my original study...
 - What type of study best describes the study design in my proposal?
 - How could I alter the study design to make it a randomized control trial?

- I am conducting a study to see if long term hearing aid use correlates with lower perceived stress scores on a stress questionnaire.
- The study has a sample size of 33 hearing aid users between 33 = 88.
- Participants are grouped into two groups: (1) long-term hearing aid user (greater than five years) and (2) short-term hearing aid user (less than five years).
- All participants complete a face-to-face interview and fill out an eight-item questionnaire regarding perceived stress.

Interpreting Results – What is a p -value?

- First, some terminology:
 - Null hypothesis (H_0) = there is no significant difference between variables being studied
 - Alternative hypothesis (H_A) = there is a significant difference between variables being studied
- p -values refer to the probability that the null hypothesis is correct
- Most clinical research sets p -values at .05 (5%)
 - Meaning that a p -value < .05 indicates that the chance of the H_0 being correct is less than 5%.
- Beware: p -values may suggest a statistically significant, but clinically insignificant difference (or vice versa)

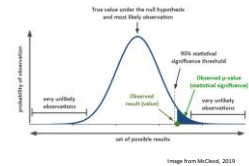
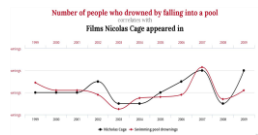


Image from McLeod, 2019

Interpreting Results – Be wary of correlations

- Correlation is used to find the relationship between two factors (A+B)
- Causation is used to determine the effect of factor A on factor B



Interpreting Results – Factors to Consider

- You do not need to be a statistical mastermind to follow a results section!
- First, look at the variables being compared:
 - Independent variables – variables that are not influenced by study design (group, time, etc.)
 - Dependent variables – variables being manipulated/measured in the study
- Assess whether comparison makes sense:
 - Between-subject/group – comparison is made between two independent groups
 - Within-subject/group – comparison is made between two timepoints/conditions on the same subject/group

Let's Evaluate!

- Think back to my original study...
 - What is the independent/dependent variables of this study?
 - Is this a between-subject design or a within-subject design?

- I am conducting a study to see if long term hearing aid use correlates with lower perceived stress scores on a stress questionnaire.
- The study has a sample size of 33 hearing aid users between 33 = 88.
- Participants are grouped into two groups: (1) long-term hearing aid user (greater than five years) and (2) short-term hearing aid user (less than five years).
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