Effect sizes for paired data should use the change score variability rather than the pre-test variability.

Alex Gould

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Abstract

Full Citation

Dankel, SJ and Loenneke, JP. Effect sizes for paired data should use the change score variability rather than the pre-test variability. J Strength Cond Res 35(6): 1773–1778, 2021—

What is effect size

- Variable that provides an overall measure for magnitude of change (Dankel and Loenneke (2021))
- Differs from a T-statistic because sample size is not included
- Used in various baseline-post-treatment comparison
  - Specifically, they are looking at this comparison from the lens of meta-analyses for exercise science and sports medicine

Authors' Aims

- To convince the audience through analysis that baseline and post-test standard deviations (study sample measures of variability) don't tell the full story on the overall variability of the intervention.

Authors

Dr. Scott Dankel

- Professor at Rowan University, a public research university in New Jersey
- Attended the University of Mississippi to pursue a Masters and PhD in Exercise Science
- Research Interests include acute and chronic adaptations to blood flow restricted exercise (2024a)

Jeremy Paul Loenneke

- Professor at The University of Mississippi
- Attended Southeast Missouri State for his Bachelors and Masters in Nutrition and Exercise Science
- Eventually got his PhD in Exercise Physiology at the University of Oklahoma
- Research Discipline is in Skeletal Muscle Plasticity (2024b)

General Comments

- Regarding the disciplines of the authors, this paper was

Introduction

Specific Effect Size Measures

The author's claim that the common effect size measures listed below are used exhaustively in meta-analyses in the exercise science discipline.

- Cohen's d (Cite)
- Hedge's g (Cite)
- Glass delta (Cite)
- Each use some combination of baseline standard deviation and post-treatment standard deviation.
- Measures of variability of the study sample

Paired Data vs. Independent Data

Independent Data

- Data collected through an Independent design
  - Each subject is only measured once
  - Subjects are allocated into a baseline group and a post-treatment group

Methods

Calculations of Common Effect Size measures

$M_{change} = M_{\text{post}} - M_{\text{bsl}} =$

Difference between means of Posttreatment group and baseline group in an indepen

$SD_{bsl} =$

Standard Deviation of the baseline group in an independent design

$SD_{post} =$

Standard Deviation of the posttreatment group in an independent design

$n_{bsl} =$ The sample size of the baseline group

$n_{post} =$ The sample size of the posttreatment group

$$SD_{\text{pooled}} = \sqrt{\frac{(n_{\text{bsl}}-1)SD_{\text{bsl}}^2+(n_{\text{post}}-1)SD_{\text{post}}^2}{n_{\text{bsl}}+n_{\text{post}}-2}}$$

Cohen's $d = \frac{M_{\text{change}}}{SD_{\text{pooled}}}$

Glass's $\delta = \frac{M_{\text{change}}}{SD_{\text{bsl}}}$

Hedge's $g = C * \frac{M_{\text{change}}}{SD_{\text{pooled}}}$

Where C is a constant multiplied to account for small sample sizes

Analysis and Procedure

Discussion

References

2024b. https://hesrm.olemiss.edu/people/jeremy-paul-loenneke/.

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Dankel, Scott J., and Jeremy P. Loenneke. 2021. "EFFECT SIZES FOR PAIRED DATA SHOULD USE THE CHANGE SCORE VARIABILITY RATHER THAN THE PRE- TEST VARIABILITY." *Journal of Strength and Conditioning Research* 6 (35): 1773–78.