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## Frequentist, Bayesian Analysis and Complementary Statistical Tools for Geriatric and Rehabilitation Fields: Are Traditional Null-hypothesis Significance Testing Methods Sufficient?

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**We use this protocol and it's working**

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**Keywords:** complementary statistical tools for geriatric, combination of secondary statistical analysis, other statistical analysis approaches as bayesian analysis, scientific data interpretation in rehabilitation, secondary statistical analysis, dominant statistical approach in the geriatric, bayesian statistical analysis, findings from clinical trial, hypothesis significance testing methods sufficient, null hypothesis significant testing, efficacy of an intervention, bayesian analysis, focus on bayesian analysis, other statistical analysis approach, evidence of no effect, complementary statistical tool, results of clinical trial, clinical trial, rehabilitation, rehabilitation field, significant testing, null hypothesis, real intervention effect, analysis, efficacy, interpretation of the finding, improving scientific data interpretation, geriatric field, based inference

## Abstract

Null hypothesis significant testing (NHST) is the dominant statistical approach in the geriatric and rehabilitation fields. However, NHST is routinely misunderstood or misused. In this case, the findings from clinical trials would be taken as evidence of no effect, when in fact, a clinically relevant question may have a "non-significant"  $p$ -value. Conversely, findings are considered clinically relevant when a significant difference is observed between groups. To assume that  $p$ -value is not an exclusive indicator of an association or the existence of an effect, researchers should be encouraged to report other statistical analysis approaches as Bayesian analysis and complementary statistical tools alongside the  $p$ -value (e.g., effect size, confidence intervals, minimal clinically important difference, and magnitude-based inference) to improve interpretation of the findings of clinical trials by presenting a more efficient and comprehensive analysis. However, the focus on Bayesian analysis and secondary statistical analyses does not mean that NHST is less important. Only that, to observe a real intervention effect, researchers should use a combination of secondary statistical analyses in conjunction with NHST or Bayesian statistical analysis to reveal what  $p$ -values cannot show. This paper provides potential insights for improving scientific data interpretation in rehabilitation and geriatric fields by utilizing Bayesian and secondary statistical analyses to better scrutinize results of clinical trials where a  $p$ -value alone may not be appropriate to determine efficacy of an intervention.



## Supplementary materials

1



SUPPLEMENTARY\_FILE.xlsx



INDEPENDENT\_BAYESIAN\_T-TEST....



JASP\_BAYESIAN\_ANOVA.jasp



SPSS\_INPUT.sav



OUTPUT\_SPSS.spv