

STATISTICAL ANALYSIS PLAN (SAP)

Title

Statistical Analysis Plan for:
Effects of a 12-Week Isometric Core Training Program on Trunk Endurance and 50-m Freestyle Performance in Adolescent Amputee Swimmers

Date

18 May 2026

Ethics Approval

Istanbul Gelisim University Ethics Committee

Decision Number: 2024-03-73

Approval Date: 29 February 2024

1. Introduction

This Statistical Analysis Plan (SAP) describes all statistical procedures planned for the randomized controlled trial investigating the effects of isometric core training in adolescent amputee swimmers.

2. Analysis Population

All participants completing baseline and post-intervention assessments will be included in the analysis.

Primary analyses will be conducted according to the per-protocol principle.

No participant replacement is planned.

3. Sample Size

An a priori power analysis was performed using G*Power 3.1.

Parameters:

- Effect size (f): 0.25
- Alpha level: 0.05
- Statistical power: 0.80
- Correlation among repeated measures: 0.60

Required sample size:

- 28 participants

A total of 30 participants will be recruited to compensate for possible dropout.

4. Outcome Variables

Primary Outcome

- 50-m freestyle performance time (seconds)

Secondary Outcomes

- 20-s sit-up repetitions
- 20-s reverse sit-up repetitions
- supine bent-knee leg hold duration (seconds)
- prone trunk-extension hold duration (seconds)

5. Statistical Software

All analyses will be conducted using:

- IBM SPSS Statistics Version 25.0
- G*Power Version 3.1

6. Descriptive Statistics

Continuous variables will be presented as:

- mean \pm standard deviation,
- median,
- minimum–maximum values.

Categorical variables will be presented as:

- frequencies,
- percentages.

7. Assumption Testing

Normality assumptions will be evaluated using:

- Shapiro–Wilk test,
- histograms,
- skewness and kurtosis values.

Homogeneity of variance will be assessed using:

- Levene's test.

8. Statistical Comparisons

Within-Group Comparisons

For normally distributed variables:

- paired-samples t-test

For non-normally distributed variables:

- Wilcoxon signed-rank test

Between-Group Comparisons

For normally distributed variables:

- independent-samples t-test

For non-normally distributed variables:

- Mann–Whitney U test

9. Effect Size Calculations

For parametric analyses:

- Cohen's d

Interpretation:

- 0.2 = small
- 0.5 = medium
- 0.8 = large

For nonparametric analyses:

- $r = Z/\sqrt{N}$

Interpretation:

- 0.1 = small
- 0.3 = medium
- 0.5 = large

10. Missing Data

No imputation procedure is planned.

Participants with incomplete post-test data will be excluded from final analyses.

The amount of missing data will be reported.

11. Multiplicity

No multiplicity adjustment is planned because the study is exploratory in nature.

However, interpretation of secondary outcomes will be performed cautiously.

12. Significance Level

Statistical significance will be accepted at:

$p < 0.05$

All tests will be two-tailed.

13. Data Presentation

Results will be presented using:

- tables,
- figures,
- effect size estimates,
- confidence intervals where appropriate.

14. Deviations from SAP

Any deviations from this Statistical Analysis Plan will be documented and justified in the final manuscript.