

STUDY PROTOCOL WITH STATISTICAL ANALYSIS PLAN

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The Effects of Different Dual-Task Exercises on Motor and Cognitive Functions in Children with Mild Mental Retardation

Background and Rational

Children with mild intellectual disability (MID) often experience delays in cognitive, language, and motor development compared to their peers. These deficits affect balance, coordination, daily functional activities, and quality of life. Literature indicates that dual-task training—performing motor and/or cognitive tasks simultaneously—can enhance balance, functional mobility, walking performance, and executive functions in various populations. However, to date, there is no study examining the effect of motor-motor and motor-cognitive dual-task exercises specifically in children with MID. This study aims to fill that gap.

Objectives

To investigate the effectiveness of motor-motor and motor-cognitive dual-task training on improving motor and cognitive functions in children diagnosed with mild intellectual disability.

Hypotheses

- **H0:** Dual-task exercises have no effect on motor and cognitive functions in children with mild intellectual disability.
- **H1:** Dual-task exercises improve motor and cognitive functions in children with mild intellectual disability.

Participants

Inclusion Criteria:

- Age between 8–12 years
- Diagnosed with mild intellectual disability (IQ: 51–70)
- Able to understand and follow Turkish instructions
- Parental informed consent obtained

Exclusion Criteria:

- Vision/hearing impairments
- Metabolic or systemic disease
- Regular participation in structured exercise programs

Sample

Size:

Based on a priori power analysis (effect size: 0.849, power: 95%, alpha: 0.05), 27 participants are required. With a 20% drop-out margin, 33 children (11 per group) will be recruited.

Study Design

Randomized controlled trial with three groups:

1. **Motor-Motor Dual-Task Group**
2. **Motor-Cognitive Dual-Task Group**
3. **Control Group**

Each intervention group will receive supervised training twice a week for 6 weeks (40 minutes per session). The control group will perform home-based balance and walking exercises with parental monitoring.

Outcome Measures

Motor Functions:

- Timed Up and Go Test (TUG)
- Tandem Walking Test (TWT)
- Pediatric Balance Scale (PBS)

Cognitive Function:

- Stroop Test – TBAG Form

Secondary Outcome:

- PedsQL – Pediatric Quality of Life Inventory

Pre- and post-intervention assessments will be conducted for all participants. (6 weeks)

Statistical Analysis Plan

All statistical analyses will be performed using **SPSS version 20.0**.

- Descriptive statistics (mean, SD, percentages) will summarize demographic and baseline data.
- Normality of data will be assessed using Kolmogorov-Smirnov or Shapiro-Wilk tests.
- Between-group comparisons:
 - Parametric data: *One-Way ANOVA* (post-hoc: Tukey)
 - Non-parametric data: *Kruskal-Wallis test* (follow-up: Mann-Whitney U)
- Within-group comparisons:
 - Parametric: *Paired t-test*
 - Non-parametric: *Wilcoxon signed-rank test*
- Demographic data:
 - Numerical: *Independent Samples t-test*
 - Categorical: *Chi-square test*
- Significance level: $p < 0.05$
- Effect size (Cohen's d , Eta 2) will be reported where applicable.