

Immediate effect of high-intensity exercise on brain-derived neurotrophic factor in healthy young adults: A systematic review and meta-analysis

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Abstract

Background: Although brain-derived neurotrophic factor (BDNF) has been identified as a molecular biomarker of the neurophysiological effects induced by exercise, the acute effects of high-intensity exercise (HIE) on BDNF levels are inconclusive. This study aims to estimate the immediate effects of HIE on BDNF levels in healthy young adults.

Methods: A systematic search was conducted in the MEDLINE, Scopus, Cochrane CENTRAL, and SportDiscus databases up to December 2020. Randomized controlled trials (RCTs) and non-RCTs reporting pre–post changes in serum or plasma BDNF after an acute intervention of HIE compared to a control condition were included. Pooled effect sizes (p-ESs) and 95% confidence intervals (95%CIs) were calculated for RCTs using a random effects model with Stata/SE (Version 15.0; StataCorp, College Station, TX, USA). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed. PROPERO registration number: CRD42020221047. **Results:** A total of 22 studies with 552 individuals (age range: 20–31 years; 59.1% male) were included. The meta-analysis included 10 RCTs that reported valid outcome data. Higher BDNF levels were observed when HIE interventions were compared with non-exercise (p-ES = 0.55, 95%CI: 0.12–0.98; $I^2 = 25.7%$; n = 4 studies) and light-intensity exercise (p-ES = 0.78, 95%CI: 0.15–1.40; $I^2 = 52.4%$; n = 3 studies) but not moderate-intensity exercise (p-ES = 0.93, 95%CI: –0.16 to 2.02; $I^2 = 88.5%$; n = 4 studies) conditions.

Conclusion: In comparison to non-exercise or light-intensity exercises, an immediate increase in BDNF levels may occur when young adults perform HIE. Given the benefits obtained maximizing circulating BDNF when performing HIE and its potential effects on brain health, our findings suggest that HIE could be recommended by clinicians as a useful exercise strategy to healthy adults. © 2021

Author keywords

Cognition; Exercise; Neurogenesis; Neuroplasticity