BALTIC JOURNAL OF SPORT & HEALTH SCIENCES
5(Supplement); 2025; p. 159; eISSN 2538-8347
DOI: https://doi.org/10.33607/bjshs.v5iSupplement.1916

The Brain on the Run: Preliminary Longitudinal Findings on Benefits of Mood and Brain After Regular Running

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Purpose: Physical activity has consistently shown positive effects on psychological functioning and brain structure – particularly within the hippocampus, a region implicated in both exercise and mood regulation. Clinical findings suggest reduced hippocampal volume in individuals with depression compared to healthy controls. However, longitudinal intervention studies on young, healthy populations remain scarce. This preregistered study aimed to investigate the biological and social mechanisms driving structural brain, affective, and fitness-related changes during a running intervention, with a novel comparison between individual and group-based running formats.

Methods: A four-week longitudinal intervention included 129 participants aged 18–35 who engaged in less than the WHO-recommended 150 minutes/week of aerobic activity. Participants were randomly assigned to one of three groups: (1) individual running, (2) small group running, or (3) waiting control. The running route, frequency, and duration were identical across intervention groups. Assessments were conducted at three timepoints and included magnetic resonance imaging (MRI), psychometric evaluations, electrocardiography (ECG), and estimated $\dot{V}O_2$max via the UKK Walking Test.

Preliminary Results: Previous intervention studies conducted in our laboratory have demonstrated significant volumetric changes in subfields of the hippocampus, which were associated with a reduction in depressive symptoms. In this study, we will follow up on these results by not only examining intervention-related volumetric changes in the hippocampus subfields but also by taking into account a broad range of psychometric measures and cardiac responses to gain insights into various facets of wellbeing induced by physical activity. It is anticipated that the study presented here, with a larger sample and a more rigorous methodological design, will more specifically bolster the results from previous research.

Conclusion: Taken together, the findings of our laboratory suggest that regular running induces beneficial changes in brain and mood in previously rather inactive young adults. This work highlights the holistic benefits of running and supports its promotion as a tool for maintaining mental and brain health.

Support/Funding Source: This research was funded by the Austrian Science Fund (FWF).