



The Effects of Exercise on the Hippocampus

Nathan Harmych, Brandon Matheis, Brad Isabella

INTRODUCTION

It is understood that physical activity has positive effects on the body, but research shows that there are also positive effects on memory. Support has grown of the idea that physical activity such as walking or running can prevent the decline of cognitive function with age. In this literature review, we analyzed the role of exercise with the growth of the hippocampus in the brain. Our goal was to determine whether positive growth was found compared to sedentary individuals.

OBJECTIVES

This literature review examined if physical activity had an effect on the hippocampus. Two case studies were reviewed to assess the impact that exercise has on neurological functions and the prevention of diseases.

METHODS

Google Scholar and the Cleveland State Michael Schwartz library databases were used to identify relevant case studies.

Key search terms included " exercise, hippocampus, brain function, prevention, and neurology".

We narrowed our searches down to two case studies because they both obtained a strong correlation between physical activity and positive effects on the hippocampus.

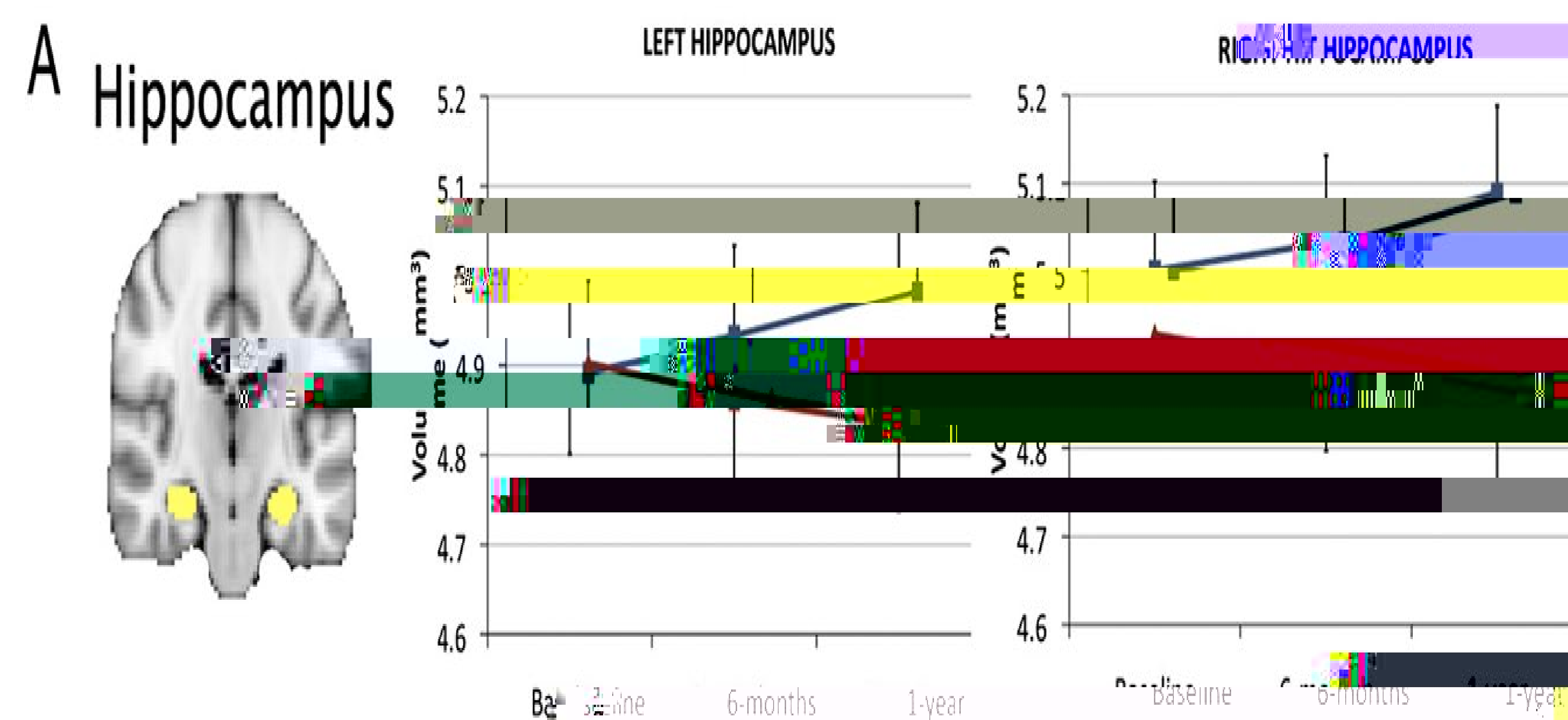
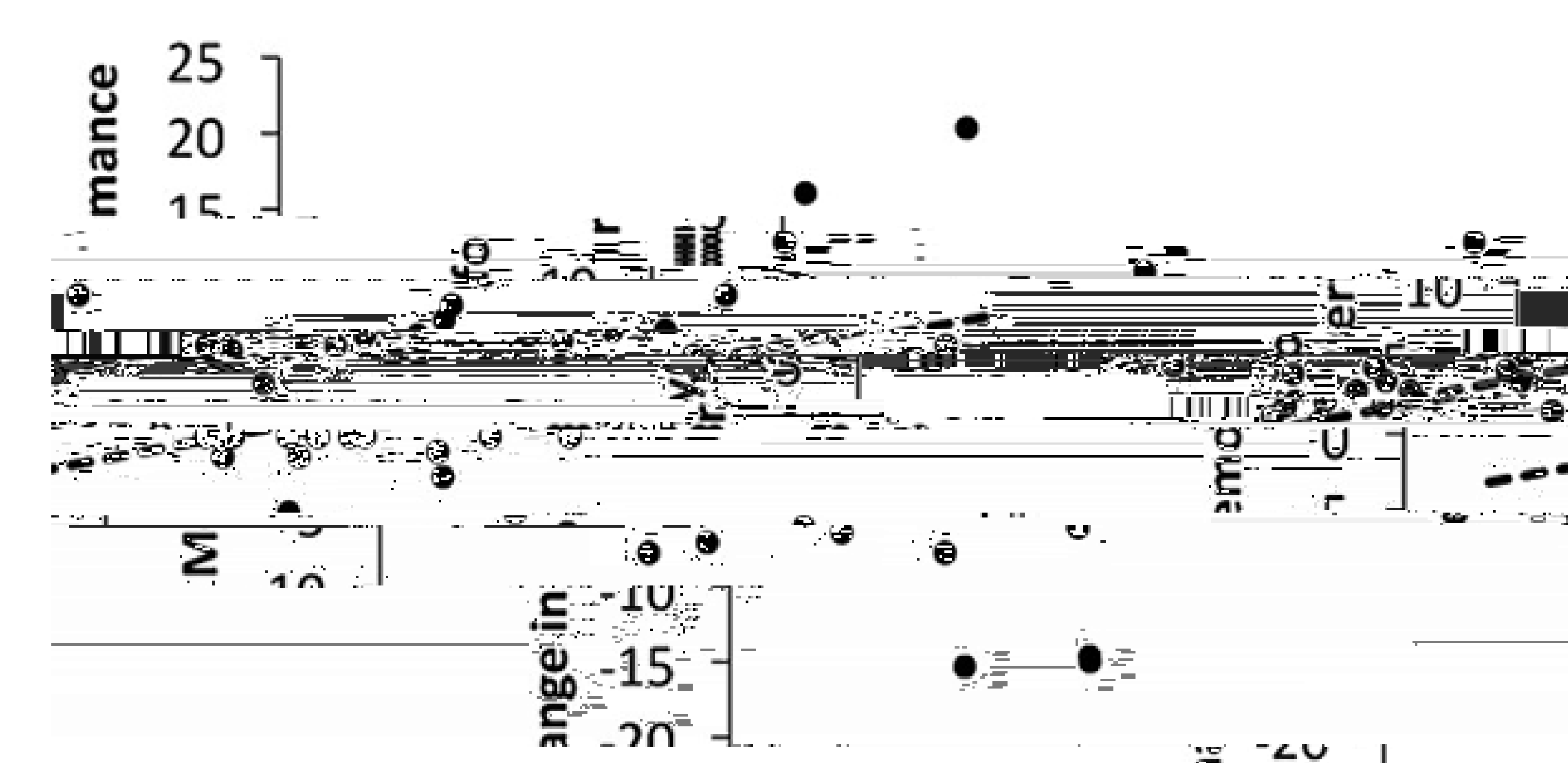
RESULTS

Case study 1 was done with voluntary wheel running of rats. This was to simulate human choice in exercise as the rats choose when, how long, and for how far they would run. The greatest change in the brain from this exercise was in the hippocampus which showed upregulation in neurotrophic factors. Certain degenerative diseases like Alzheimer's attack the hippocampus giving motivation to strengthen this part of the brain as much as possible. (Cotman)

Our review of case study 1 showed a 20% increase in mRNA (messenger RNA) in the hippocampus after 2-7 days. MRNA is extremely important in the process of protein synthesis. These increases in mRNA lasted up to 6 weeks after the volunteer running displaying a relatively long-term effect of exercise. (Cotman)

Case study 2 examined the correlation with exercise and the brain. In this study, 120 participants with a ages ranging from 60-71 completed a computerized spatial memory task at baseline MRI data, after 6 months, and au (R)1.-m0(7 (R)1.1 (l)2.3 (-)5.5 (d)0.8 (a)9.3 (t)10.9m1.1.9 (.m00.9m1.10)0.7 (i)1(s741 Tms/Tw (7)2w (76-w (76 Retrieved January 29, 2023, from <https://pubmed.ncbi.nlm.nih.gov/21282661/>

Cotman, C. W., and C. Engesser-Cesar. "Exercise Enhances and Protects Brain Function." *EXERCISE AND SPORT SCIENCES REVIEWS*, vol. 30, no. 2, Jan. 2002, pp. 75–79. *EBSCOhost*, search.ebscohost.com/login.aspx?direct=true&db=edsbl&AN=RN112530988&site=eds-live&scope=site.



Acknowledgments

We would like to thank our advisor, Dr. Manuella Crawley, for her guidance and support in this research.