

The Effects of Exercise on the Short Term Memory of College Students

Daniella Bastos,
Carly McNeill,
Dr. Daniel Ceccoli & Dr.
Patrick Cooper
College of Arts and Sciences

Introduction

Short-term memory is essential for daily cognitive tasks and academic performance, driving individuals to seek cognitive enhancement. While exercise's positive effects on cognition have been well-documented, research predominantly focuses on long-term interventions, neglecting immediate effects.

This study investigates the immediate impact of a single 15-minute aerobic exercise session on short-term memory among 31 participants, males and females, aged 18-25, leading different life-styles (athletes and non-athletes). Utilizing the Digit Span (DS) memory test before and after exercise, this study assessed whether aerobic exercise and increased heart rate (HR) elevate cognitive function, offering insights into enhancing cognitive performance in diverse contexts.

Methods



Fig. 1: Participants first filled out a consent form, a survey regarding their lifestyle, and completed the DS test pre-exercise (DS 1). Participants were then screened for the following base-line data: BMI; Blood Pressure; Heart Rate/Pulse Rate. Participants were then asked to walk/run for at least 15 minutes on the treadmill in order to increase their HR above baseline. Lastly, the DS test was administered post-exercise (DS 2) as well as a second survey.

Results

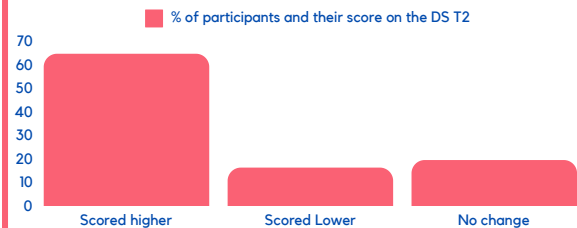


Fig. 2: From left to right, respectively, columns represent the percentage of participants that scored higher (64.5%), scored lower (19.4%), and showed no change in score (16.1%) in the post-exercise DS 2 test.

Results

	N	Mean	SD	t	df	p
DS 1	31	3.74	1.95	-3.26	30	0.003
DS 2	31	5.48	1.81			

Fig. 3: A paired samples t-test was conducted to assess change in scores on the digit span task from before to after the exercise session. The findings were significant, $t(30) = -3.26$, $p = .003$, $d = -.59$. Scores on the digit span task after the exercise session ($M = 5.48$, $SD = 1.81$) were higher than scores on the digit span task before the exercise session ($M = 3.74$, $SD = 1.95$).

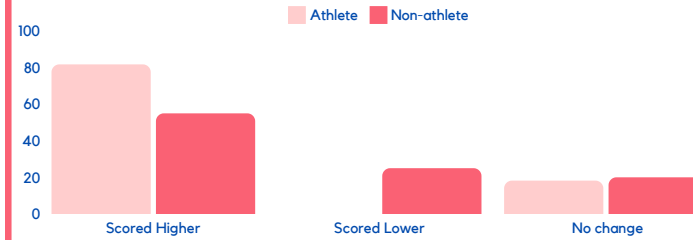


Fig. 4: Table shows the percentage of student athletes and non-athletes that scored higher (81.8% for athletes, 57.9% for non-athletes), scored lower (0% for athletes, 21.1% for non-athletes), and showed no change (18.2% for athletes, 21.1% for non-athletes) in the post-exercise DS 2 test.

	N	Mean	SD	F	df	p
A DS 1	11	3.27	1.90	3.83	1, 29	0.60
A DS 2	11	6.36	1.36			
NA DS 1	20	4.00	1.97			
NA DS 2	20	5.00	1.86			

Fig. 5: A repeated measures ANOVA was conducted to evaluate the impact of an exercise program on working memory two time points (pre-exercise and post-exercise), with athletes (A) vs. non-athletes (NA). The interaction of DS 1 and DS 2 x athletic participation on working memory was approaching significance, $F(1, 29) = 3.83$, $p = 0.060$.

Discussion

The study aimed to explore the immediate effects of a single 15-minute aerobic exercise session on short-term memory among participants aged 18-30, shedding light on the potential cognitive benefits of acute physical activity. This discussion will delve into the implications of the findings and address potential avenues for further research.

The results of this study revealed a significant improvement in short-term memory following the aerobic exercise session. Participants exhibited higher scores on the Digit Span (DS) memory test post-exercise compared to pre-exercise levels. This finding underscores the acute cognitive benefits of aerobic exercise, aligning with previous research demonstrating the positive impact of physical activity on cognitive function. The observed increase in short-term memory suggests that even a brief bout of aerobic exercise can enhance cognitive performance, offering a practical strategy for individuals seeking to optimize their cognitive abilities in various domains.

An intriguing aspect of the study was the examination of how athletic participation modulates the impact of exercise on working memory. The repeated measures ANOVA revealed a trend suggesting a differential response to exercise between athletes and non-athletes. Although it did not reach statistical significance we are statistically close to seeing a difference in working memory improvement for athletes vs. non-athletes, however this observation could be more significant if the sample population could be larger than our number (11) of athlete participants tested. This finding hints at the possibility that individuals with varying levels of physical fitness may exhibit different cognitive responses to acute exercise.

Despite its contributions, the study is not without limitations. The sample size was relatively small. Future research could address these limitations by conducting larger-scale studies. The present study highlights the immediate cognitive benefits of a brief aerobic exercise session, suggesting that even short bouts of physical activity can enhance short-term memory function. The findings underscore the importance of incorporating regular exercise into daily routines to promote cognitive health and performance. Further investigation into the interplay between exercise, cardiovascular fitness, and cognitive function holds promise for optimizing cognitive enhancement strategies across diverse populations.

References

Scan the QR code for references.

