



# DOES EATING CHOCOLATE IMPROVE LEARNING?

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Al-Zahra School 2023

# INTRODUCTION

Harvard study published online July 28, 2021

Flavonoids are various compounds found naturally in many fruits and vegetables. They're also in plant products like wine, tea, and **chocolate**.

People with the highest daily **flavonoid** intakes were 19% less likely to report trouble with **memory** and thinking, compared with people who had the lowest daily flavonoid intakes.



**WHY?**

Cocoa's flavonoids enter the brain and accumulate in regions involved in learning and memory, especially the hippocampus.

A range of possible mechanisms through which flavonoids might reduce cognitive decline have been identified, in particular their ability to interact with the neuronal intracellular signalling pathways mediating neurodegeneration and neuroinflammation

Seniors who consume foods high in flavonoids, including chocolate, score better on standardized cognitive tests.

# HYPOTHESIS

Consuming 60 % + cocoa before a lesson will help pupils improve their learning by improving their cognitive processes (e.g., memory)





Independent : Consumption of hot chocolate, high in flavonoids. Or hot milk



Dependent : Score on memory test



Control : volume of chocolate consumed, % cocoa, mass of sugar, volume of milk, type of milk, type of test to assess learning, age, time of test, no food to be consumed 1 hour prior to the test.

# VARIABLES



## METHOD

1. Select 20 pupils from the same cohort.
2. Split into two groups, Group A and Group B.
3. Pupils complete an online memory test as a baseline.
4. Group A will be given 250 ml of 60% cocoa drinking hot chocolate (+1 tsp sugar + full fat milk) before lunch.
5. Group B will be given 250 ml hot milk (+1 tsp sugar).
6. After 30 minutes pupils will complete the same type of memory test for a second time.

# MEMORY TEST ONLINE - TEST YOUR MEMORY RECALL AND RETRIEVAL (TOTALBRAIN.COM)



[Platform](#)

[Solutions](#)

[Resources](#)

## Memory Test

Understand your capacity to store, retain, and recollect information

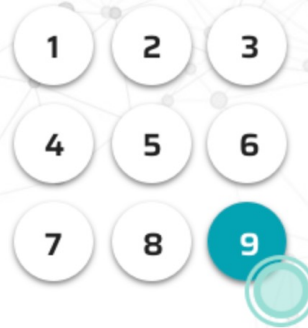
Memory is the capacity to recall and use information to make decisions. This test will assess the utilization of your working memory, and the capacity to recall previous outcomes for optimal decision making.

[Start Test](#)



# MEMORY TEST

## COGNITION Digit Span



1. You will be shown a series of **numbers**.
2. Use the **number pad** to repeat the numbers in the same order they're shown.
3. **Respond** as quickly and accurately as possible.

Start



Continue





Group	Average Memory score (percentile)		Overall Improvement in memory %
	Before	After	
Cocoa	24 <sup>th</sup>	33 <sup>rd</sup>	<b>37.5</b>
No Cocoa	24 <sup>th</sup>	30 <sup>th</sup>	<b>25.0</b>

# RESULTS

# CONCLUSION

Our results showed a marked enhancement in memory with the cocoa group seeing an improvement of 37.5 %.

There was also an enhancement in memory seen for the non-cocoa group. However, it was not as high with an improvement of just 25.0 %.





## EVALUATION

### How can we improve the investigation?

1. Repeat with a larger study group size.
2. Investigate across different age groups.
3. Increase the duration of the study to ensure other factors are not impacting the results e.g., hormonal issues / external social factors.

# IMPACT OF THE STUDY

Moving forward how can our results be of any benefit?

Pupils should be offered dark chocolate in different forms in either vending machines or by the school canteen, it will no doubt help promote cognitive processes and memory.





**THANK YOU FOR LISTENING**

We hope you enjoyed it!