



Can peppermint
improve your
reaction time?

Research Question

The consumption of peppermint has been believe to decrease or improve an individual's reaction time. So does peppermint really lesson or increase a person's reaction time?

Introduction

Teachers often hand out peppermint candies to students before big tests or demanding tasks, a practice that many of us have likely experienced. This tradition hints at a belief that peppermint might offer some form of advantage. Furthermore peppermint is believed to enhance cognitive functions and reduce stress. Building on these ideas we want to conduct an investigation to explore whether or not the consumption of peppermint can truly affect a person's reaction time, a skill that can be crucial for both academic and athletic performance.

Background Information

Peppermint is made up of a compound named menthol that gives a cooling sensation that is found in mint leaves. This compound activates the cold receptors in your body's nerve cells that then improves brain function and enhances properties such as attention and memory. Factors like age, gender, handedness (usage of your dominant hand over the other) can also be affected when testing reaction time.



Hypothesis

Does Peppermint truly affect your brain's focus and reaction time?

We predict that the peppermint will affect the brain's focus and reaction time based on the fact that peppermint contains the ingredient menthol in it. Menthol has many properties that can affect areas of the brain such as gamma/alpha waves.



Investigation methods and procedures

- I. In order to insure that we had similar variables, the night before we conducted our experiments we each received 8 full hours of sleep
- II. Before taking any peppermint we each took our initial reaction time in order to see if there would be any improvement after we took the peppermint
- III. On our first trial we all took the peppermint at the same time and let it sit in our mouth for 1 minute then chewed it until it was completely dissolved in our mouths before taking our new reaction time.
- IV. We tested our reaction time 3 times waiting 1 hour in between each trial and recorded it.
- V. After 3 trials we subtracted our new times from the average and saw how much time we shaved off of the original

Materials:

- Brach's Soft Peppermint Candy
- Online Reaction Time Test (humanbenchmark.com)
- One minute timer

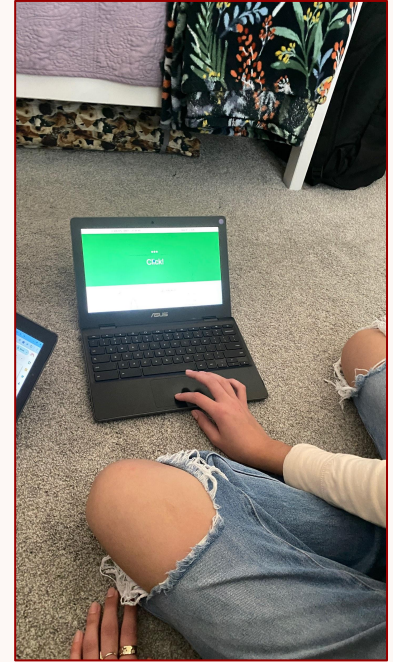
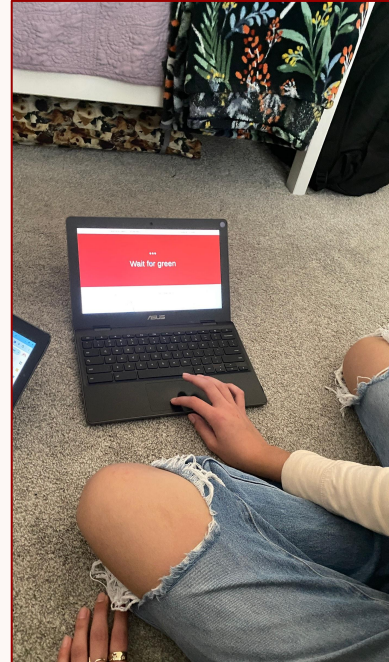
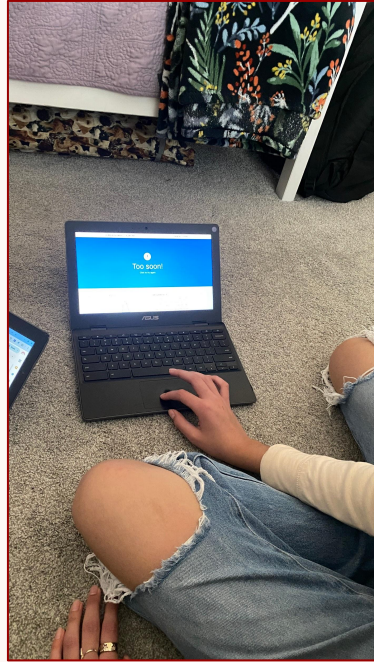
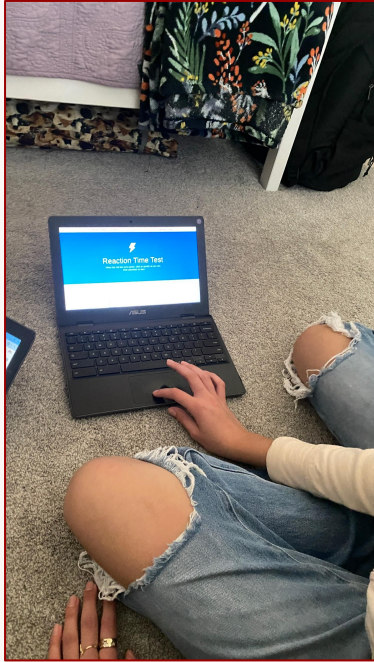
Independent Variables:

- Amount of sleep
- Age
- Gender
- Peppermint

Dependent Variables:

- Reaction time

Pictures and Visuals



Results

Based on our data before we took our the peppermints our reaction time averaged out to be 276.67 ms. With person one's reaction time being 303 ms, person two's reaction time being 273 ms, and lastly person three's reaction time being 254 ms. We then took the peppermint letting it sit in our mouths until it was completely dissolved then tested our reaction time one time counting as one trial. Each trial that was taken we waited 1 hour in between before performing another trial. Then taking a new peppermint repeating the same process. After trial one, one person's reaction time was 279 ms, the second person's reaction time was 266 ms, and the third person's reaction time was 242 ms. Trial two's results were person one's reaction time was 270 ms, person two's reaction time was 277 ms, and person three's reaction time was 236 ms. Trial three's results were person one's reaction time was 261 ms, person two's reaction time was 260 ms, and person three's reaction time was 240 ms. Based on the data we can see that there was a major decrease in the time that it took us to react. Meaning that our reaction time got better by the end of the third trial. From the initial trial to the third try there was a 23.33 ms difference between the two.

Data Visualization (initial)

Name	Initial trial
Person 1	303ms
Person 2	273 ms
Person 3	254 ms

<u>Average</u>	<u>276.67 ms</u>
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Data Visualization (after peppermint)

Name	Trial 1	Trial 2	Trial 3
Person 1	279 ms	270 ms	261 ms
Person 2	266 ms	277 ms	260 ms
Person 3	242 ms	236 ms	232 ms

<u>Average</u>	<u>262.34 ms</u>	<u>261 ms</u>	<u>251.34</u>
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-12.33 MS

-13.67 MS

-23.33 MS

* - (minus) _____ from initial average

Discussion and Interpretation

Since we saw there was a decrease in the time it took us to react we can come to the conclusion that peppermint does indeed affect a person's reaction time. Based on prior knowledge, we know that peppermint contains a vital ingredient called menthol. According to onlinelibrary.wiley.com “menthol could lead to positive cerebrovascular changes, increasing levels of oxygenated blood in the brain (Doss and Nagarajan 2023; Jasira et al. 2013; Silva 2020). Indeed, increased cerebral blood flow (CBF), by making oxygen and glucose more readily available, would likely facilitate the synthesis of neurochemicals such as acetylcholine, positively impacting cognition (Brekke et al. 2015; Dukart et al. 2018). This effect might be particularly salient in the prefrontal cortex (PFC), an area known to regulate executive functions such as working memory and attention”. In short peppermint can wake up the brain leading it to have more oxygen to the prefrontal cortex. The “Dorsolateral prefrontal right cortex is considered as the region most involved in time perception.” ([pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)) Considering the fact that the menthol coming from the peppermint increases blood flow and alertness in that part of the brain, we can conclude that the menthol in the peppermint is what helped our reaction times improve. Based on our data we can see that the even throughout the three trials with peppermint our reaction times and focussedness got progressively better as the trials went on. With each trial we took a new mint and that accumulated menthol in our bodies which would explain why our times got better with the more mints we took.

Discussion and Interpretation

We also know based on research from [sciencedirect.com](https://www.sciencedirect.com) that alpha and gamma waves are waves in your brain that are responsible for problem solving, decision making and information processing. According to a study done by the National Library of Medicine “Peppermint essential oil had various effects on the brain when subjected to different visual stimuli. Alpha waves increased in the prefrontal area in the white-sniffing group, which facilitated learning and thinking.”. This study helps us to conclude the fact that the alpha and gamma waves in your brain that help problem solving and thinking are more engaged. We also know that “the aroma of peppermint - primarily the menthol component - triggers you to wake up and pay attention.” ([scentfill.com](https://www.scentfill.com)) this furthermore helps to shows that the menthol in peppermint is what is causing all the side effects.

Conclusions and Ideas for Future Research

In conclusions the findings of this study indicates that peppermint does improve reaction time. Across all trials, the participants who took the peppermint demonstrated a faster average reaction time compared to before they took the peppermint. This suggests that peppermint may act as a stimulant, enhancing alertness and cognitive processing speed, which directly translates to quicker reactions. Some ideas for our future research is if gender matters when testing reaction time, if the participants eat the same food before doing the experiment will the results be different, if you use your dominant hand over the other will that also affect your time, would higher amounts of peppermint affect your times, different forms of peppermint like peppermint oil etc, and lastly how different ages might affect your reaction time.



References/Citations

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