Do Energy Drinks Affect Your Reaction Time?

Abstract

This Project was designed to see if energy drinks affect mental performance and more specifically, if it does or doesn't increase reaction time. The Energy product that was used to create this project was a Monster Energy Drink. Monster has been considered one of the biggest energy drink retailers in the world and takes huge pride in the performance of their products. Various theories & projects exist around this topic and suggest that there is an 18% increase in mental performance when someone drinks an energy product. Combination of other stimulants such as Taurine & Ginseng were also investigated and shown how they could have an increase in mental stimulation. After the tests were completed by my colleague, results matched my hypothesis and showed that **Energy Drinks Do Increase Reaction Time**.

Acknowledgements

I would just like to thank my colleague for participating in my test as it was totally by his own will and performed consistently th roughout the tests. I would also like to extend my gratitude to my supervisor for monitoring my project. Lastly, I would like to thank the drinks company 'Monster™' for allowing me to use their product to test the increase in Reaction Time with. Without t his, I wouldn't have been able to complete my project.

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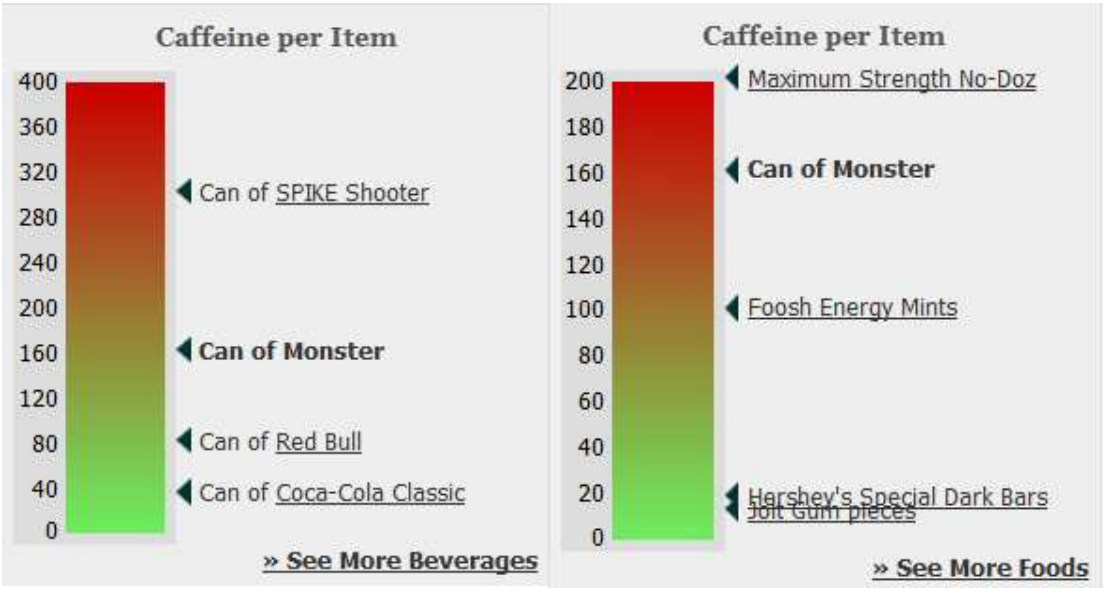
Introduction

'Monster™ Energy has been considered one of the most consumed energy drinks in the world. A 16.91 ounce can of Monster contains precisely **160 milligrams of caffeine**. Monster Energy isn't like any other ordinary energy drink; it also contains the t stimulant ingredients Taurine, Ginseng & L-Carnitine.

'Taurine' is an amino acid that your body naturally produces. It helps regulate heartbeat, muscle contractions, and energy levels. Usually your body makes enough that you don't need to supplement. It's thought, but not proven, that under "stress conditions" like illness, physical exertion, or injury, the body does not create enough and supplements can help. Taurine might be a "mild in hibitory neurotransmitter", some studies show it helps with excitable brain states. While this isn't exactly what we want, maybe it helps level us out so we function better with elevated levels of other stimulants.

Ginseng, an adaptogenic herb, is known t o increase energy, has some anti -fatigue components, supposedly relieves stress, and increase memory. Right now it's suspected that ginseng helps stimulate the hypothalamic and pituitary glands, which then secretes something called adrenal corticotropic ho rmone. With a name like that, it can't possibly be bad. Ginseng is nothing that's naturally created by your body, so having this in your drink certainly won't hurt. 200mg/day seems to be the standard dose, but you can safely take up to 2700mg. Rare side ef fects such as diarrhea and headache have been reported.

L-Carnitine is an amino acid usually created by your liver and kidneys, this stuff helps up your metabolism and energy levels. Because of the way it interacts with your body, it may act as a thermoge nic and help increase weight loss and endurance during exercise. The jury's still out on whether or not you need to supplement unless you have an unusual diet, but you can take 2 -6 grams without worry. Make sure you get L-Carnitine, which is the type your body creates and can use. D -Carnitine is "inactive" and may actually hurt endurance levels. Rare side effects include include nausea, vomiting, abdominal pain, and diarrhea.



All the stimulants that are associated in this drink combine together to temporarily enhance physical and mental performance. As I am looking into how energy drinks affect one's mental performance, it has come to my attention that the stimulants that I will be focusing on will be more to do with the combination of Taurine & Caffeine as they are the main chemicals that exert mental performance.

Seidl, et al (2000) did a study to determine whether caffeine and taurine containing energy drinks stimulate cognitive performance and well-being. Seidl, et al (2000) performed a double blinded, placebo controlled study using 10 graduate students. The experimental group ingested a capsule containing caffeine, taurine, glucuronolactone, and the placebo group received a control capsule. The measurements were taken at night, prior to and starting one hour after consumption of energy drink ingredients or placebo. The results showed motor reaction times were significantly longer compared to the baseline measurements for the placebo group but remained unchanged in the energy drink group. Additionally, the evaluated feelings for well being, total scores, vitality scores and social extrovertedness scores were again unchanged for the energy drink group but significantly decreased for the placebo group. The researchers concluded the caffeine, taurine, and glucuronolactone had positive effects on human mental performance and mood. There are other studies by Alford, et al. (2001) and Warburton, et al. (2001) in which caffeinated taurine drinks improved information processing and increased subjective alertness, concentration, and physical endurance compared to the placebo group (no caffeine or taurine). Again, the same problems are encountered. The sample size is too small (36 and 42 respectively), and possibility of the positive effects being solely due to caffeine are not accounted for.
(http://healthpsych.psy.vanderbilt.edu/Taurine.htm)

As tests showed from Seidl, Alford & Warburton; results suggested that energy drinks that included Taurine & Caffeine had a positive effect on the enhancement of mental performance and mood and they also suggested that mental performance is increased by 18% when the energy drink has been consumed. During my project, I will hope to also add further statistics to this suggestion when I complete my project. I am going to be looking at a very specific but critical part of mental performance, Reaction Time. I am interested to look into this part of mental performance as there has always been speculation about if energy drinks actually do more harm than good. Companies like Monster, Lucozade & Rockstar strive to use lab technology as a form of proof to scientifically support their products and use mass participation questionnaires etc as a form of Qualitative evidence. During this project, i will conduct a very simple reaction time test that can be easily conducted and produced in college circumstances. If all goes well, I should get some reliable and valid statistics that i can compare and contrast to make an adequate outcome.

Hypothesis

Based from the research I have done on this to pic, I believe that after I had gathered the results from my Ruler Grab Test for Reaction Time. It will show that reaction time is increased when taking an energy drink and therefore sh ow a positive correlation compared to when the participant has not had an energy beverage.

Methodology

The test I conducted was a typical Ruler Grab Test which is a very simplistic but effective test. The equipment that was required for this test was:

- A 30cm Ruler
- A colleague (which did the test 3 times without energy drink, then 3 times after 5 minutes digestion from the energy drink.
- A 500ml Can of Monster Energy

My colleague I used in my test was measured and weighed just in case it could be use to correlate with the data I now have. He measured in at 176cm and 77 Kgs.

Research Design

1. Asked for his permission to conduct the test and made sure he hadn't taken any other sedatives that would have affected the test before hand.
2. Made my colleague sit down but upright so he could focus all his attention on the catching the ruler.
3. Told him to make a 'Pincer' type shape with his strongest hand. (as this is the easiest way to catch something as thin as a ruler)
4. Hold the ruler in line with his thumb line at 0cm; I made sure the ruler measurement was facing me so I could see what the measurement was as soon as he caught it again.
5. Dropped the ruler at any time so he couldn't predict when it was going to happen to make it a fair & reliable test.
6. Took the readings from him 3 times and wrote it in my table that had been designed for this test.
7. Made him drink a 500ml can of Monster Energy and allowed a 5 minute digestion rest as sources have told me that that is the length of time it takes for energy drinks to start taking effect.
8. Applied the same step 2-5 so there was no difference in the outline of the test.
9. Took the readings down 3 times and wrote (with energy drink) next to the results.

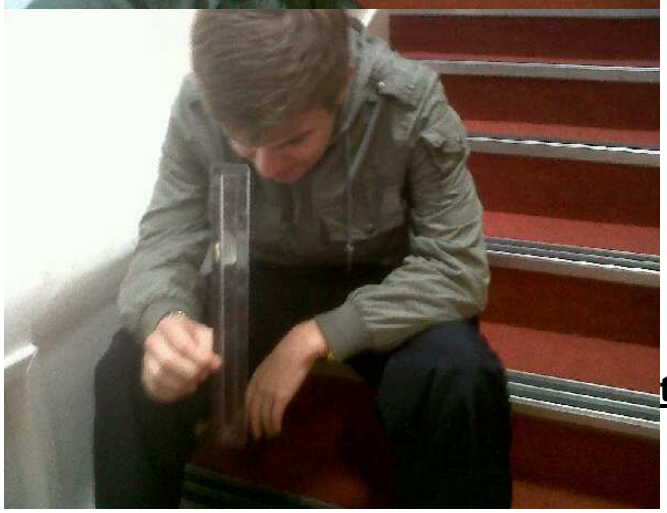
Procedures that were considered during the test:

- Finding a good area where the participant wouldn't be distracted by the surroundings so he could focus totally on the test on hand.
- Took the 'Hawthorne Effect' into consideration and tried to make it as casual as possible.
- Made sure there were no alcoholic substances taken before the test otherwise it would affect the reaction time of the participant.

Evidence Of Test Being Conducted:

Evidence of the equipment I used to conduct the test.

Evidence of my colleague consuming the beverage when appropriate for th e test

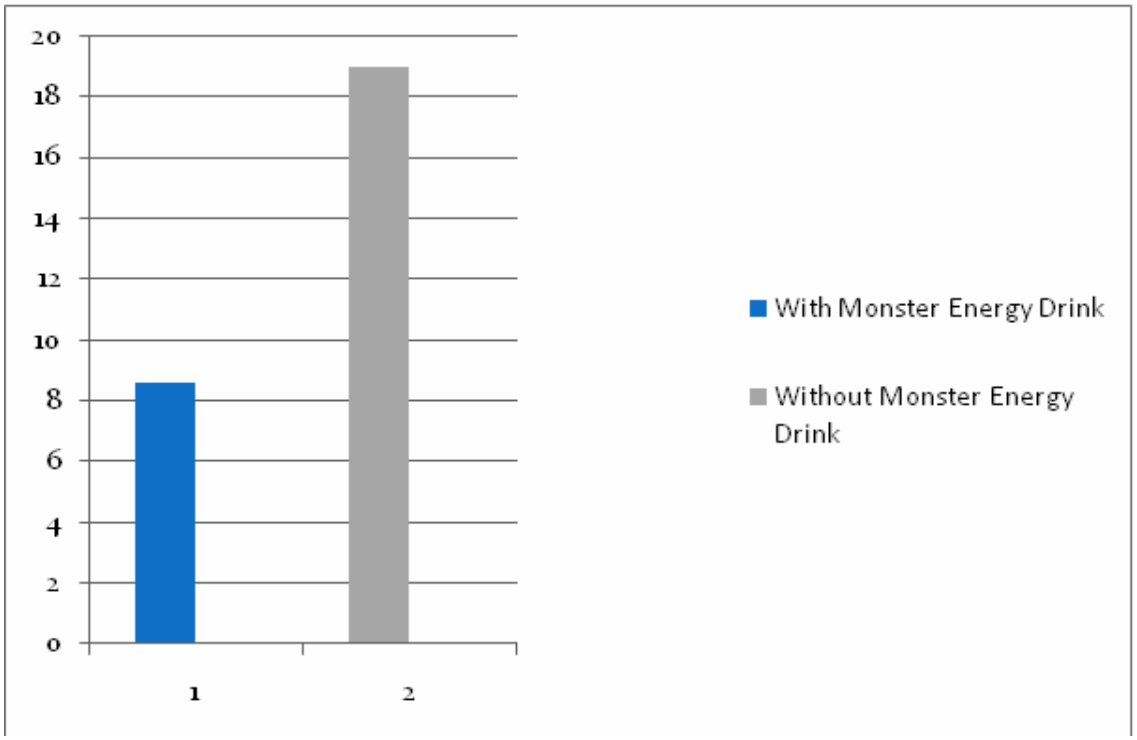


Evidence of my colleague using the correct technique in order to create valid results for my test.

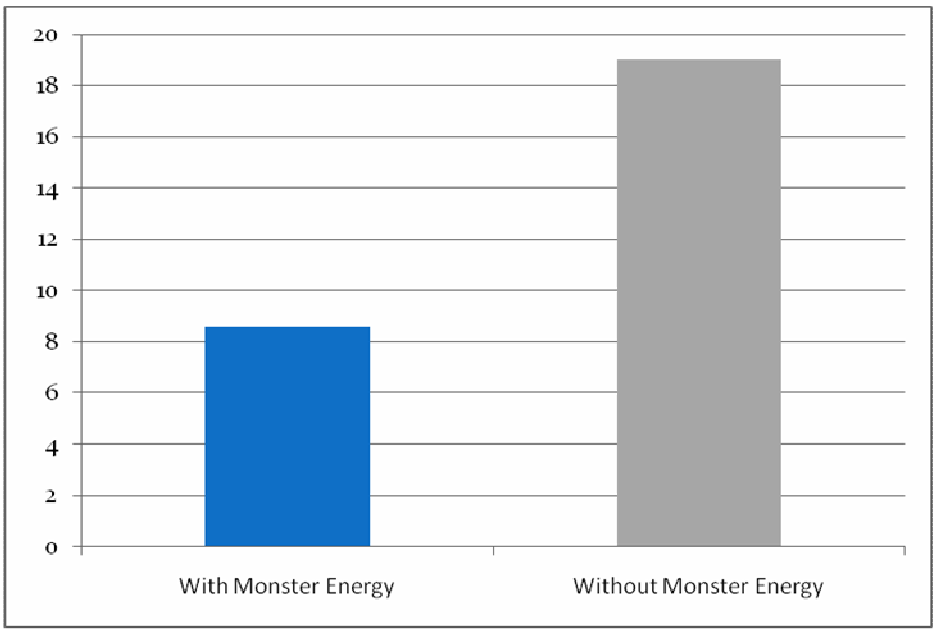
ts

Excellent	Above Average	Average	Below Average	Poor
<7.5cm	7.5 - 15.9cm	15.9 - 20.4cm	20.4 - 28cm	>28cm

(This is a table showing the national norms for 16-19 year olds in Reaction Time)



(This is a graph to show the results from the Ruler Grab Test.)



(This shows the Averages of the two tests)

Based from the results had I had gathered, it is clear to see that there is a very obvious pattern going on between the two tables. Table one is a table that is representing the results I gathered from the ruler grab test. It shows that the time taken to catch the ruler is heavily decreased by about 10cm when the participant had drunk the energy drink. Table 2 is still based on the same data but has been calculated to show the overall averages of the two types of test. Once again as table one shows; when the participant had consumed the energy drink, his time to catch the ruler had decreased to an overall average of approximately 8.5cm. Whereas when the participant hadn't consumed the Monster Energy Drink, his overall average was at 18.5cm. From earlier studies by Seidl, Alford & Warburton, they had came to conclusion that once their participants had consumed the energy product, mental performance from all areas had been increased by 18%. During my test, my participant's mental performance had increased by an incredible 48% after he had consumed the energy drink. A possibility for this increase could be due to the other combinations of stimulants within the Monster Energy drink like the addition of Ginseng which is designed to combine with the other stimulants such as Taurine and Caffeine and provide extra energy to the consumer and prevent fatigue during concentration, especially memory.

From comparing my results to my hypothesis I had set at the beginning at my project, I can officially say that it was correct as the results show a positive correlation towards the results from consuming the energy drink. I believe with the surroundings and opportunities I had at the time of this project. I had done well to create the test to at its highest potential given the circumstances. Using a bar graph to show my results was the best way to show a clear comparison between the two tests rather than using something like a pie chart as it is a lot harder to accurately compare the results to acute measurements. I used a participant who I trusted in performing the test with a clear mind and wouldn't affect the readings by seeing the project as a joke so it made the whole experience enjoyable but more importantly made the results a bit more reliable.

Because I was testing energy drinks, I had to make sure I was using a well known product that people can relate to and is known worldwide as a well designed energy drink. Choosing Monster to provide me with their product was a really good decision on my behalf, along with companies like Red Bull & Lucozade; Monster has its own laboratory where they test their products and find out ways to improve. This not only reassured me that i was dealing with a professionally accredited product, but I could use information from what they

have found and illustrated, but use the information and compare it to the data I received from my test.

However during the test there were some limitations that could have been improved during the tests and can be considered for an upcoming project. For instance, even though I tried to prevent the Hawthorne Effect from occurring during the project, the participant knew that it was a test as I had to ask him for his permission to do it for ethical reasons etc so the results may be slightly unreliable as the data might have been better than if he wasn't aware of the test.

Apparatus could definitely be improved as I was using a standard 30cm ruler which has limitations to the length and acute measurements to show the reaction time. If I were to redo this product or create future projects, I would make sure I use the correct equipment to record the results so they are more accurate.

Using a controlled area to do the test would have helped the reliability of the results due to having to use the side of a classroom to do the test which could have affected the participant's vision and therefore not pay 100% attention to the task in hand. If i were to conduct this test again I would make sure that I am in a secure environment and will not have any distractions throughout the procedure.

If I wanted to get the most valid set of results, I would have also formed a diet plan which would strictly be monitored and designed so that he/she doesn't have any forms of mental stimulation products before the exercise so that I know when going into the test that the only product that will be affecting his mental performance would be the Monster Energy Drink. I could even consider testing out a mental stimulation food at any point as well and compare the products in terms of effectiveness, cost, and availability.

I felt that although I had received a successful amount of quantitative data, it may have been a more of an investigating project if I had included some Qualitative data like an interview of the participant before he has drunk the Monster Energy Drink, and after he has drunk the Monster Energy Drink as there might be a possibility of comparing the Qualitative data with Quantitative data.

With the results that I have gathered, I would say it has linked well with my hypothesis and supported Seidl, Alford & Warburton's theories about energy drinks having a adequate effect on mental performance. With this project, I have shown that energy drinks do affect reaction time.

Conclusion

From looking at the overall view of the project. I am happy to say the results met the hypothesis aims. When my participant drunk the energy product, there was a 47% increase in mental performance, especially the concentration side of it. In terms of the positive increase in mental stimulation, this also supported Seidl, Alford & Warburton's theories which gave me extra evidence to prove that Energy Drinks do affect Reaction Time. Although the test was a success, I have learnt a lot throughout the project and limitations that need to be considered for when I do another project, once these limitations and improvements have been considered, i wil l then be able to receive more valid and reliable information and be able to compare and contrast it to other professionally exist projects.

Bibliography

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www.energyfiend.com

www.google.com