# The Effects of Caffeine on Aerobic Exercise Performance in College Student Females

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## INTRODUCTION

Caffeine is the most consumed ergogenic aid among college athletes. In relevant research it was shown that consuming caffeine before exercise has positive effect on exercise by decreasing rate of perceived exertion and increased exercise performance (Doherty & Smith, 2005).

Since college students consume large amounts of coffee everyday, we wanted to explore how coffee affects students while exercising. We are interested on the effect of caffeine, specifically coffee, on exercise performance in college-aged females, in order to determine whether it may be beneficial or harmful to consume coffee before exercising. The results we find can benefit the population study in the future to decide whether or not to drink coffee before exercising based on our data. We specifically chose female college students to narrow the population being studied. The purpose of our research is to explore the relationship of caffeine on aerobic exercise performance in college-aged females, utilizing the Rec Plex. The caffeine consumed by the participants will be an 8oz donut shop coffee from a Keurig cup. This will be consumed one hour before exercise and we will measure aerobic exercise performance using a cycle ergometer. There will be a total of 12 female college-aged participants of both coffee and non-coffee consumers. In this single blind study, 6 students will consume caffeinated and six students consume decaffeinated in order to compare our results. We are interested in looking at the positive effects coffee has on heart rate, blood pressure, rate of perceived exertion, and exercise performance (based off of a survey). The results can be drawn once our research is concluded.

## METHODS

- Examined the effects caffeine has on heart rate, BORG scale of perceived exertion, and exercise performance.
- Twelve college-aged (22 years old) female students from the University of Dayton were chosen by non-probability sampling. Specifically, we utilized purposive sampling and convenience sampling. Each participant signed an informed consent before conducting the study.
- In this single-blind study, six participants consumed 1 cup of decaffeinated coffee and the other six participants consumed caffeinated coffee 1 hour before exercise.
- After 1 hour of time passed, the subjects cycled for 10 minutes on a cycle ergometer, with an additional 2-minute warm-up and a 2-minute cool down.
- During the 10 minutes of cycling, the heart rate was measured in beats per minute (bpm) and RPE was measured on a scale from 6-20 of each participant. These results were recorded every 2 minutes.
- At the end of the exercise protocol we recorded the total distance travelled on the cycle ergometer.
- Additionally, each participant completed a pretest survey prior to the experiment and a post-test survey after the exercise in order to gauge how the caffeine versus non-caffeine affected their physical state subjectively. The validated questions were taken from a previous related study.
- For the data analysis, we used IBM SPSS Statistics instrument. We used inferential statistics to analyze the correlation between the variables. We used the paired sample t-test on each participant to compare their decaffeinated heart rate, RPE, and distance to their caffeinated results.

## RESULTS

**1**

| Paired Samples T-Test | | | | | 95% Confidence Interval of the Difference | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Variable | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | Sig. (2-tailed) |
| Pair 1 | Caf. & Decaf. HR | -6.51 | 15.21 | 4.39 | -16.18 | 3.14 | 0.17 |
| Pair 2 | Caf. & Decaf. Distance | 0.77 | 1.54 | 0.44 | -0.20 | 1.75 | 0.11 |
| Pair 3 | Caf. & Decaf. RPE | -0.76 | 1.60 | 0.46 | -1.78 | 0.25 | 0.13 |

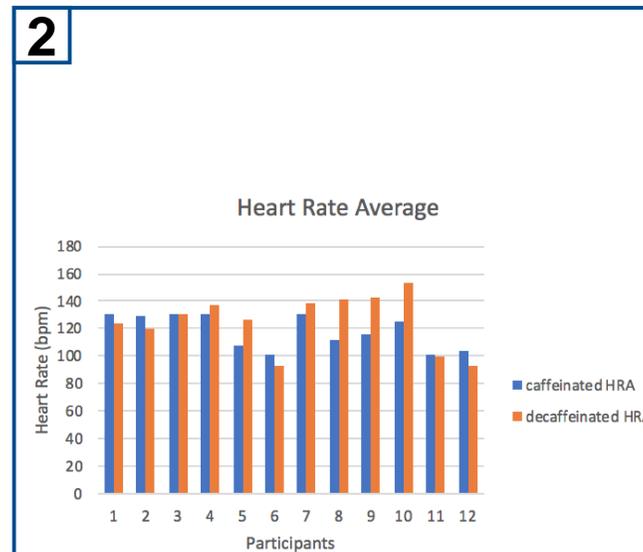*Table 1. Results of paired-samples t-test.*
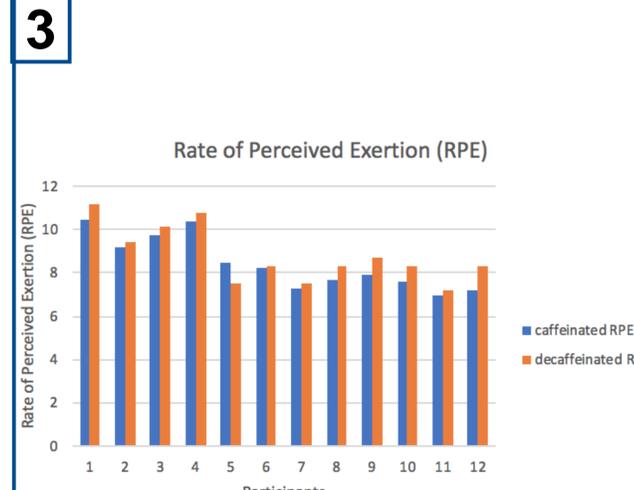
**2**



*Table 2. Heart Rate Average*

**3**



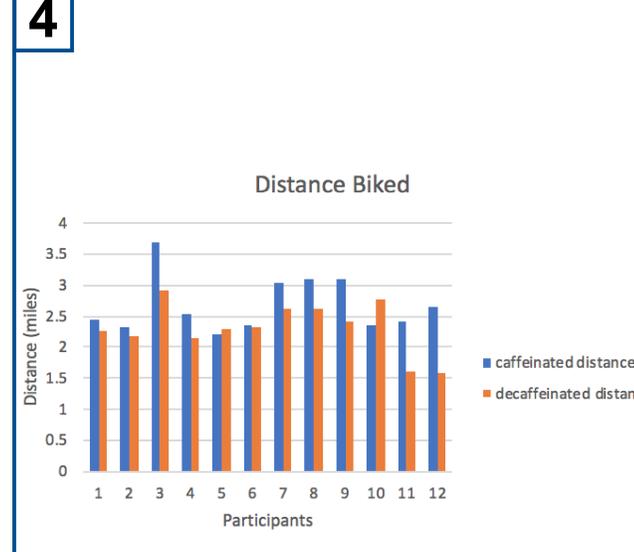*Table 3. Rate of Perceived Exertion*

**4**



*Table 4. Distance Biked*

## DISCUSSION OF RESULTS

- Based on what we found in our results, the p-values for the rate of perceived exertion, heart rate and the distance were insignificant.

- The p-value determines the significance of the data collected and a p-value less than .05 tells us the results are significant (Albrecht & Andrade, 2018). Since all of our p-value results for the RPE, HR, and distance were above .05, and they were therefore insignificant.

- This tells us that there was no relationship in giving the participants caffeine versus no caffeine when they exercised. We wanted to find the difference between giving our participants caffeine and decaf coffee; however, we did not find a difference in our variables we measured (Yeragani et al., 2005).

- We can conclude this may be due to several reasons; the main reason being over half of our participants are considered to be coffee drinkers, where they drink at least one cup of coffee at least 5 days of the week. This means they would not be as affected by caffeine compared to the participants who do not drink coffee as often. Not having an effect from caffeine means they may not have an effect on their heart rate, their RPE or the distance they traveled while exercising which is what we conclude contributed to our final results.

## REFERENCES

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