Caffeine is a popular aid that is commonly used in young athletes to improve performance. Energy drinks are just one of the many ways that caffeine can be consumed. Most studies that examine the effects that caffeine may have on exercise performance have mixed results, therefore making it unknown whether energy drinks are actually beneficial to sports performance. The studies that do exist focus primarily on the effects that caffeine has on males. Therefore, there is very little research on the effects of caffeine on females, especially during anaerobic exercise.

Operational Definitions

- **Caffeine** - a nervous system stimulant that manipulates the release of energy into the blood from body stores by blocking normal energy cut-off systems that would stop certain body activities (Hafen, 1981).
- **Ergogenic** - an aid that is supposed to improve physical work capacity or athletic performance. Examples include drugs, nutritional supplementation, caffeine, steroids, vitamins, sugar, etc (McArdle, Katch, & Katch, 1981).
- **Anaerobic Exercise** - oxygen independent exercise where energy is drawn from sources other than oxygen. (Mougios, 2006).
- **Aerobic Exercise** - oxygen dependent exercise where energy is drawn directly from biochemical processes involving oxygen either directly or indirectly (Mougios, 2006).

### Introduction

- 85% of the United States adult population consumes at least one caffeinated beverage per day (Mitchell, Knight, Hockenberry, Teplansky, & Hartman, 2014).
- Caffeine that is contained in energy drinks has ergogenic potential that is associated with an increase in power and aerobic activity by approximately 4% (Higgins, 2018).
- Forbes, Candow, Little, Magnus, and Chilibeck (2007) conducted a study that tested sixteen healthy participants on a bench press test and a Wingate test, both with and without the consumption of a Red Bull energy drink prior to testing. The results of the study showed an increase in bench press repetitions, but no change in the Wingate test.
- Most research on caffeine ingestion has focused primarily on aerobic exercise, therefore making anaerobic exercise an area of interest (Forbes et al., 2007).

### Purpose & Hypothesis

**Purpose:** The purpose of this study is to expand the known effects that energy drinks have on anaerobic exercise performance and explore a new population of female soccer mid-fielders through the use of a Wingate test.

**Hypothesis:** It is hypothesized that the consumption of an energy drink prior to a Wingate anaerobic test would result in overall better anaerobic performance, specifically with increased power and a lower fatigue index.

### Methods

#### 1. Introduction & Consent Forms

Participants were given an introduction to testing, a walkthrough of the protocol, and asked to sign consent forms.

#### 2. Preliminary Measurements & Caffeine Survey

A preliminary survey was taken regarding caffeine intake. Height and weight were taken from each participant.

#### 3. Ingestion of Caffeine or Placebo

Participants blindly received a caffeinated energy drink or a placebo.

#### 4. Warm-up Protocol and Wingate Test

Participants were taken through a specific warm-up and completed the 30-second Wingate test.

#### 5. Warm-up Protocol and Wingate Test

Participants were taken through a specific warm-up and completed the 30-second Wingate test again.

- **Peak power and rate of fatigue were collected for each trial and compared after testing.**
- **All data was analyzed through the use of an independent t-test.**

### Discussion

- It was assumed that the participants did not pose any major health risks due to the fact that they were all division 1 collegiate athletes.
- The main limitation of the study resulted from the small and convenient population size. More participants would enhance the results of the study because it would provide more accurate and reliable results.
- Further research could be done to improve population size and test participants in another type of fitness test, such as a muscular strength test. The addition of a strength test could improve results because it would provide results for muscular strength in addition to anaerobic fitness.

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### References