



## ABSTRACT

In recent years, the number of commercially available energy drinks has skyrocketed. They seem to market directly to a younger audience, including students, athletes, and those interested in fitness or performance. These drinks imply promises of enhanced energy and performance in sports and everyday tasks. Some research exists as to the validity of these implications, but much of it has been conducted on the active ingredients, such as caffeine, rather than a specific energy drink. **PURPOSE:** To examine the effects of an energy drink (Monster®) on specific human performance measures of muscular strength, muscular fatigue, and running speed. **METHODS:** Fifteen male students (age 20.5±1.3) were recruited for this single blind study. Three tests were administered: muscular strength via Maximal voluntary isometric contraction (MVIC), measured using a load cell; muscular fatigue as measured through time taken from MVIC to 80% MVIC (TTF); and running speed (T) on a 30-yd. sprint. The MVIC test required subjects to grasp a bar attached to a load cell, with knees bent to 90 degrees, then exert force straight up to achieve maximal force. The TTF was measured in a second test in which the subject achieved MVIC and held the contraction, and time was measured to the point at which the subject could exert only 80% of MVIC. The 30-yd sprint was accomplished in a gymnasium. Each subject was given an orientation session, in which all three procedures were attempted. At least two days following the orientation subjects returned and were randomly assigned either the treatment (TRT) of 8-oz of Monster® energy drink, or 8-oz of placebo (PLC). The tests were performed after a 15 minute wait period to allow the energy drink to enter the circulatory system. Height and weight were measured during the wait period. At least 48 hours following the initial trial, subjects returned and were administered the remaining session, either TRT or PLC. Results were analyzed using paired t-tests. **RESULTS:** There were no significant differences ( $p>0.05$ ) between those who ingested Monster® energy drink and those who ingested the placebo on any of the performance measures. **CONCLUSION:** Monster® energy drink does not enhance the examined measures of muscular strength, muscular fatigue, or running speed.

## INTRODUCTION

In this century, energy drinks have become very popular, marketing themselves as stimulating an energy boost. Their marketing strongly implies that these drinks help to improve physical performance in both daily activities and sport activities. Some research has been conducted as to the efficacy of these assumptions, but there are still questions as to whether the effects are from a combination of ingredients or solely from sugar and caffeine. Most of these beverages contain caffeine in varying amounts, as well as small amounts of taurine, guarana, ginseng, sucrose, B vitamins, glucuronolactone, inositol, vitamin B-12, sodium, and other ingredients.<sup>1</sup> These commercial energy drink manufacturers say that the combination of all their proprietary formulas are what make for a great burst of physical and mental energy rather than any specific ingredient. The companies that make these claims also state that it is not just a product of caffeine, but a special blend that does more than what caffeine and sugar alone would do.<sup>2</sup> One very popular example of these drinks and their marketing implications is Monster®.

## PURPOSE

The purpose of this study was to examine the effects of an energy drink (Monster®) on specific human performance measures of muscular strength, muscular fatigue, and running speed.

## METHODS

**IRB Approval:** The study was approved by the Institutional Review Board (Human Subjects) at Texas A&M University-Kingsville.

**Subjects:** Fifteen male subjects ( $N=15$ , 20.5±1.3 yr, 81.6±12.0 kg, 173.4±7.4 cm, 27.3±4.7 kg·m<sup>-2</sup>) were recruited from the student population at Texas A&M University-Kingsville and were required to review and sign a consent form before participation of the experiment.

## METHODS, cont.

**Pre-participation Screening/Testing:** All subjects underwent a health screening according to the American College of Sports Medicine's guidelines for exercise testing and prescription. Only subjects classified as low or moderate risk for untoward events during exercise, based on these guidelines, were allowed to participate. Prior to exercise testing subjects were assessed for body mass utilizing a standard physician's scale and body stature utilizing a stadiometer. Subjects were oriented to the experimental tests, which included an isometric strength test, a rate of fatigue test, and a test for running speed. The subjects were allowed 3 practice trials on each test.

**Experimental Design:** A single blind balanced cross-over design was utilized. The first experimental trial was scheduled a minimum of two days following the orientation session. Each subject participated in two experimental trials [Monster® energy drink treatment (TRT) and similarly flavored Mio Fit®/water placebo (PLC)] on separate days at least 48 hr apart. For each trial the subjects ingested 8 oz of the TRT or PLC beverage and rested for 15-minute to allow absorption of the drink ingredients. After that, the following measurements were made for each experimental trial: isometric strength, time to fatigue, and running speed.

### Measurements (in order):

**Isometric Strength-** An isometric force recording apparatus comprised of a platform, chain, hand bar, and electronic load cell with a digital recorder was used to measure leg strength. Subjects were required to reach between their legs and grasp a bar attached to a load cell, with knees bent to 90 degrees, then exert force straight up to achieve a maximal voluntary isometric contraction for 3 sec. Maximal force was measured in kilograms.

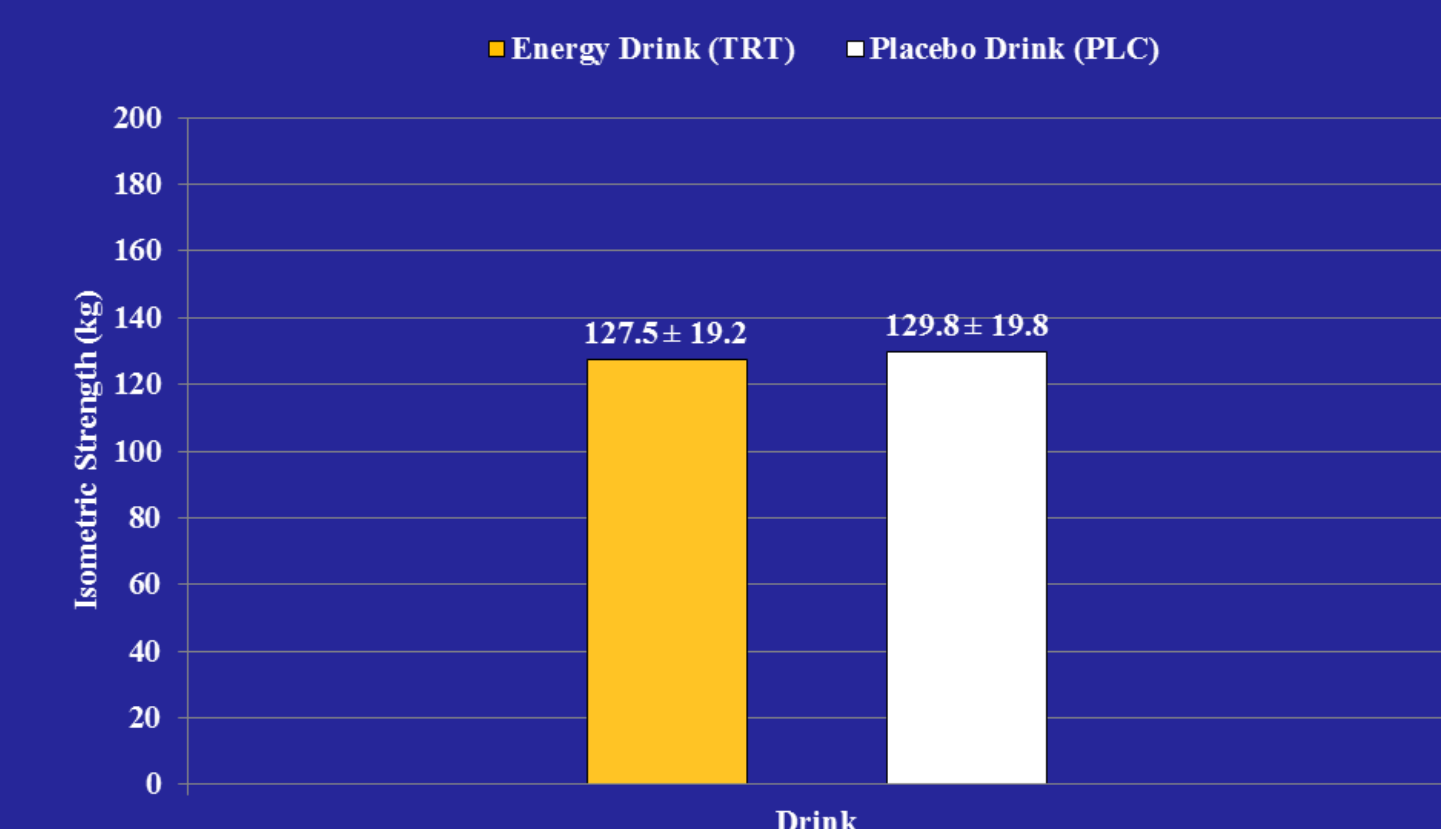
**Time to Fatigue-** Subjects performed the same isometric strength test again, but were required to hold their maximal voluntary isometric contraction for an extended period of time. Rate of fatigue was measured as the time (s) it took for the subjects' force production to drop 20% from their maximal voluntary isometric contraction.

**Running Speed-** Subjects moved to an adjacent gymnasium and were asked to sprint a 30 yd. course. Time was measured in seconds.

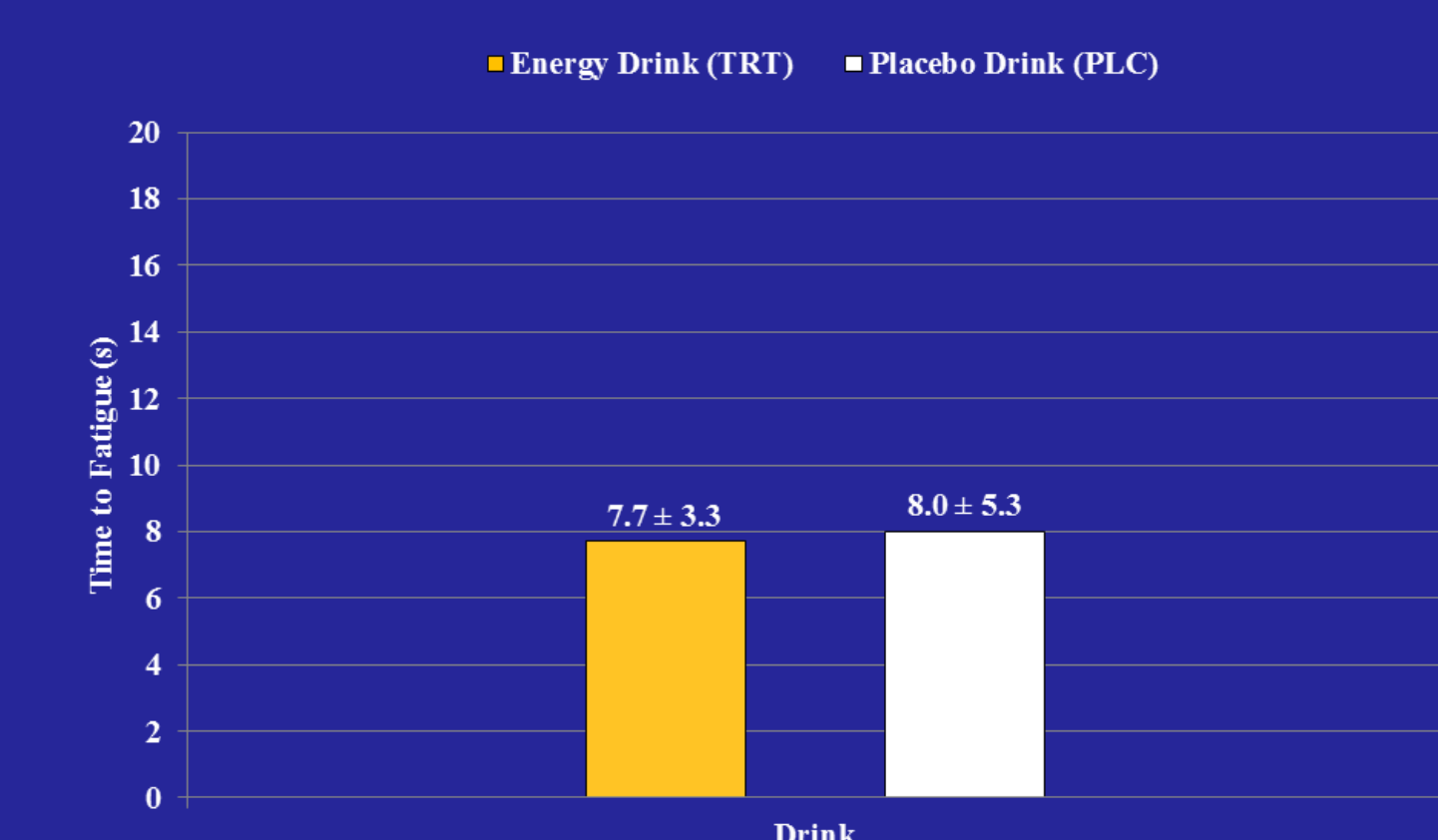
**Statistical Analysis:** Differences between TRT and PLC for the three dependent variables were analyzed using paired t-tests, ( $\alpha=0.05$ ).



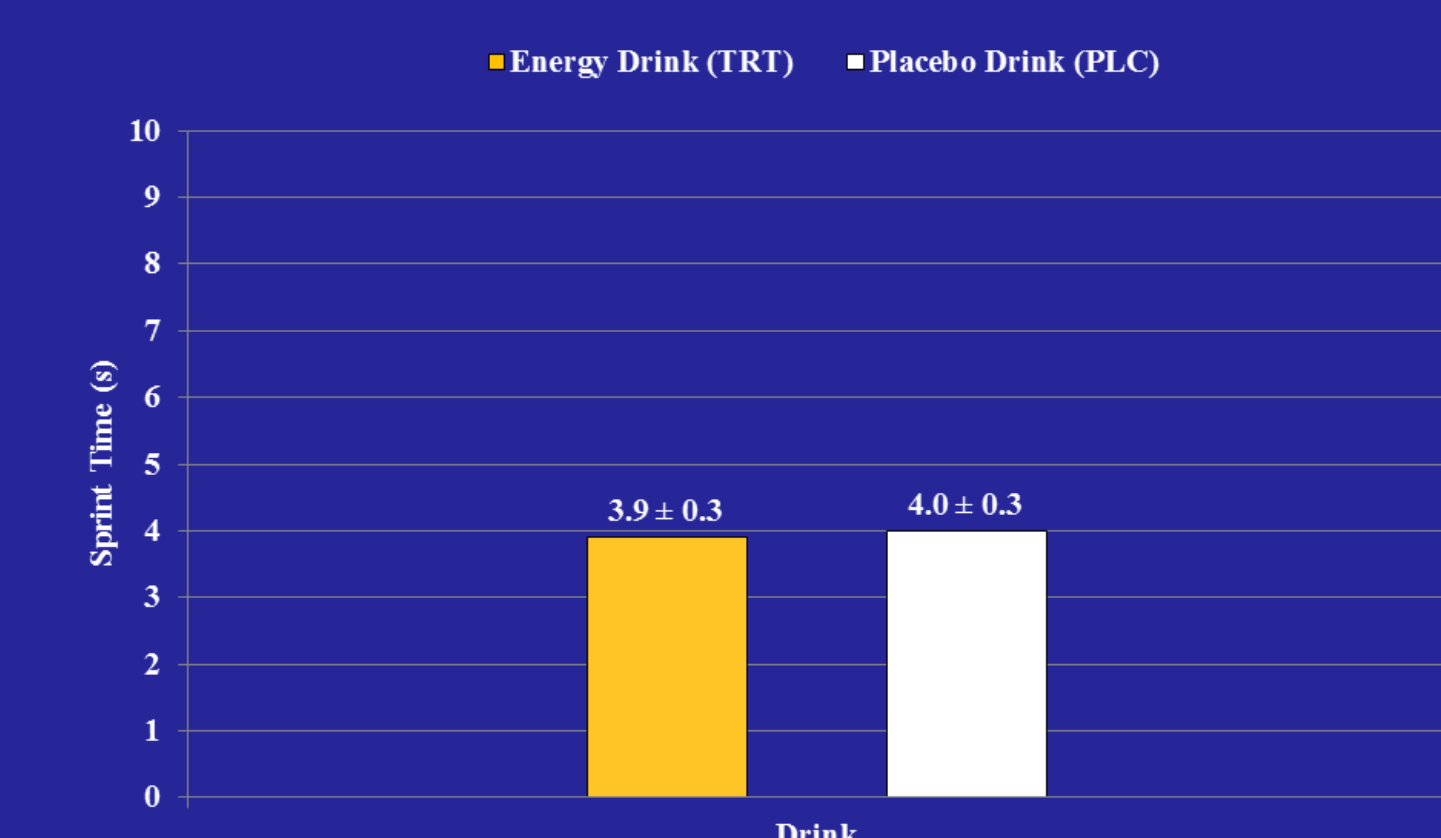
## RESULTS, cont.



**Figure 1: Energy drink effect on isometric strength.** Maximal voluntary isometric force production was not different between the treatment (TRT) and placebo (PLC) trials ( $p>0.05$ ).



**Figure 2: Energy drink effect on time to fatigue.** The time it took for a 20% force reduction during a sustained maximal voluntary isometric contraction was not different between the treatment (TRT) and placebo (PLC) trials ( $p>0.05$ ).



**Figure 3: Energy drink effect on running speed.** Sprint (30 yard) time was not different between the treatment (TRT) and placebo (PLC) trials ( $p>0.05$ ).

## CONCLUSIONS

Monster® energy drink does not improve performance on the assessed physical measures. According to the nutrition label on the Mio Fit® used to flavor and color the placebo drink, no sugars or caffeine were ingested via that product. Consequently, if there was a placebo effect it was entirely psychological. However, use of a control group in future studies is suggested in order to better understand that affect. More research is needed in this arena, utilizing other brands of energy drink, to better understand the effects these drinks might have on human performance.

## REFERENCES

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