Background
A number of nutritional strategies have been developed to optimize nutrient delivery for recreational and competitive athletes prior to, during, and post exercise, and many nutritional interventions were used by coaches, trainers, and athletes over the various sport fields. Current literatures have reported a combination of creatine, beta alanine, caffeine, and amino acid as effective supplements for improving performance. Caffeine supplementation prior to exercise has shown to counter the cognitive and physiological degradation associated with an overnight period of sustained wakefulness for military and athletes. The ergogenic effects of caffeine have been reported to decrease the perception of pain and effort. As a result, a number of pre-workout supplements have been developed to increase energy availability, promote vasodilation, and/or positively affect exercise capacity. Some studies regarding pre-workout supplement ingestion have reported enhanced performance, shortened reaction time, improved strength and power, and delayed fatigue. Our previous study have also shown pre-workout supplement ingestion prior to exercise promoted modest thermogenic response, enhanced perceptions of readiness to perform and cognitive function. The purpose of this study was to examine the effects of 8 weeks ingestion of pre-workout supplement with and without synephrine on cognitive function, and perceptions of readiness to perform.

Methods
In a double-blind, crossover, randomized and placebo-controlled manner, 78 apparently healthy and recreationally active men (21.7±3.59 yr, 15.29±6.19% fat, 25.6±0.43 kg/m²) were recruited for the study participation. Participants then were stratified in a blind and placebo-controlled manner a dextrose flavored placebo (P), a pre-workout supplement (PWS) containing 3.0 g of beta alanine, 2.0 g of creatine nitrate, 2.0 g of arginine AKG, 300 mg of N-acetyl tyrosine, 270 mg of caffeine, 15 mg of Mucuna pruriens; or, the PWS with 20 mg of synephrine (PWS+S). At baseline (0 week), CF and perception of readiness to perform test were administered. We used a GLM covaried for respective baseline measures to assess changes in CF and RTP.VAS at weeks 4 and 8. Data are presented as mean ± SD and mean change ± 95% CI when appropriate.

Results
We observed a significant increase in CF for the word test at 4 weeks for PWS+S (5.64 count; 2.09, 9.19) and PLA (3.9 count; 0.39, 7.45), and 8 weeks for PWS (7.55 count; 4.14, 10.97), PWS+S (9.93 count; 6.48, 13.37) and PLA (6.74 count; 3.31, 10.16). Similar patterns in CF for the color test were noted at 4 weeks for PWS (5.05 count; 2.72, 7.38), PWS+S (5.65 count; 0.24, 4.88), PLA (2.76 count; 0.43, 5.09) and 8 weeks for PWS (6.3 count; 5.76, 10.65), PWS+S (5.07 count; 2.51, 7.63) and PLA (4.89 count; 2.32, 7.4)). Decrease ratings of feelings about “I am optimistic about my future performance” were observed in all groups at 4 & 8 weeks.

Conclusion
Ingesting a PWS containing beta alanine, creatine nitrate, arginine AKG, N-Acetyl Tyrosine, caffeine, and Mucuna pruriens improved cognitive function at 4 week and 8 week in comparison to a placebo. Results indicate that the pre-workout supplement can promote cognitive function and have a positive effect of exercise performance.