



# The Placebo Effect of the Power Balance Band on Muscle Strength, Agility, Power and RPE.

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## Abstract

**Introduction:** Power Balance advertises that its hologram bracelet improves exercise performance by harnessing the belief in the harmony of mind and body. There is no credible scientific evidence to support these claims. Previous research has shown that any increase in performance is due to the placebo effect. The mind-set of an individual is crucial in determining whether a placebo will cause a physiological response. **Purpose:** The purpose of this study was to examine the placebo effect of the power balance band on muscle strength, agility power and RPE on believers and non-believers of the Power Balance bracelet. **Method:** Fifteen male and female students from the University of Texas at Arlington voluntarily participated in this study. Age, height, weight, and body fat % were collected. Each subject completed two separate trials for 3 different tests while wearing and not wearing the power balance band. Subjects performed a Wingate Test of Anaerobic Power (WAnT), a 70% 1 repetition maximum (1RM) until exhaustion, and an agility drill (L-Drill). The rate of perceived exertion (RPE) was taken after each test. A survey was administered to each subject to determine whether he/she was a believer or non-believer in the efficacy of the power balance band. The  $\alpha$  level was set at a significance level of  $p < 0.05$ . **Result:** From the statistical analysis it was concluded that the main effects interaction between believe, not believe/ with, without band for the WAnT was significant ( $F[1,13]=5.14, p=.041, \eta_p^2=.28$ ). Also the 70% 1RM leg press repetitions main effects interaction between believe, not believe/ with, without band showed a marginally significant difference ( $F[1,13]= 3.749, p=0.075, \eta_p^2=0.224$ ). **Conclusion:** Trends in mean differences suggest a placebo effect in the believer group. Results in this study suggest that those who believe in the power balance band may show improvement in performance while wearing the band. Also, those who do not believe in the power balance band may show a decrease in performance while wearing the band.

## Purpose

The purpose of this study was to determine the placebo effect of the Power Balance band on muscle strength, agility, power, and RPE on believers and non-believers of the Power Balance bracelet. It was hypothesized that 1) participants who believed in the power balance band's claims would show an improvement in performance, eliciting a placebo effect response, and 2) participants that do not believe in the power balance band's claims should show no significant difference in performance.

## Methods

### Participants

15 male and female, healthy, students at the University of Texas at Arlington (UTA) voluntarily chose to participate in this study. Participants were recruited from workout facilities in the Maverick Activities Center and several UTA Department of Kinesiology undergraduate classes. Only those students who answered "NO" to all questions on the Physical Activity Readiness Questionnaire (PAR-Q) were eligible to participate in the study.

## Methods (cont'd)

### Instrumentation

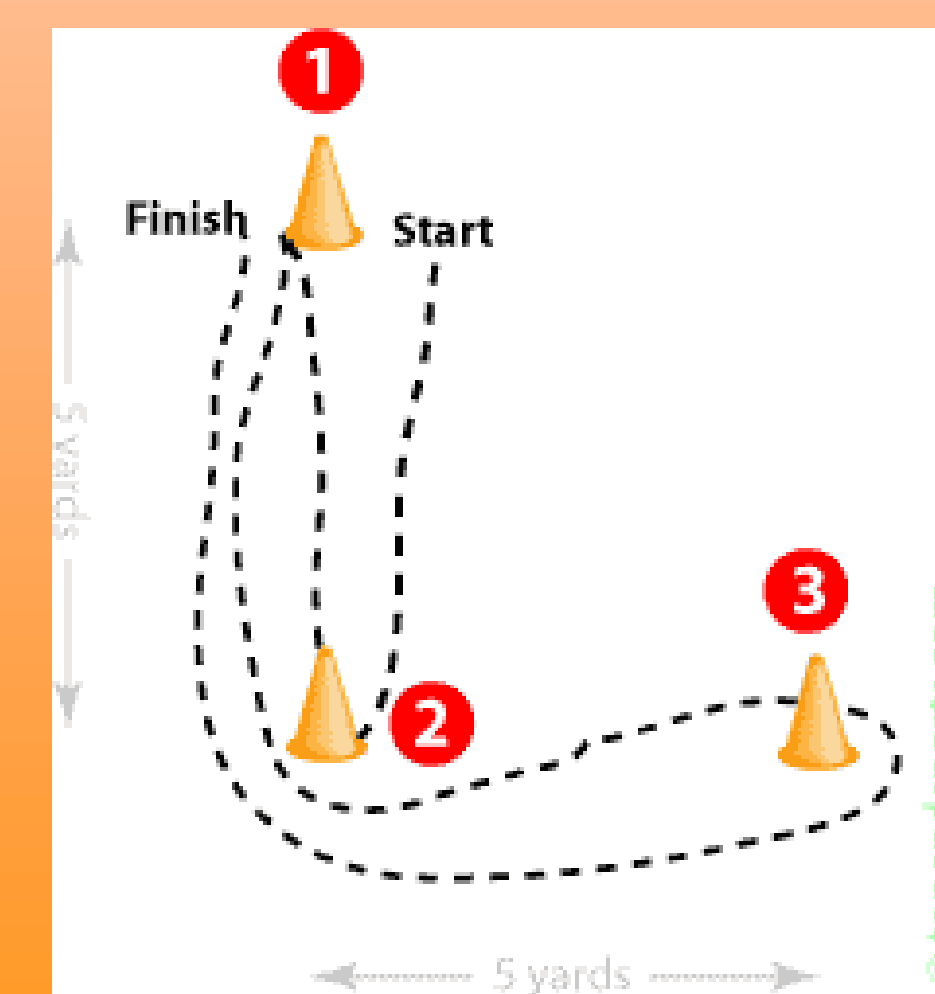
A PAR-Q was used to determine subject's physical eligibility. The initial and exit surveys were created specifically for this study. A seated leg press was used for strength testing, also a Monark cycle ergometer was used for the Wingate Test of Anaerobic Power. A stop watch and three plastic cones were used during agility testing A Borg Scale of RPE was used to determine rate of perceived exertion after every exercise. Power Balance bracelets (PB band) were worn by the participants 2 out of the 4 days of testing.



### Procedure

Participants signed consent form documents explaining the testing and the possible risks associated with exercise. Each subject completed a PAR-Q to determine eligibility. Subjects also received a survey covering their current knowledge of the PB band. Subjects' demographic information was collected; information included: age, height, weight, and body fat %. Subjects performed 3 different exercises that measured leg strength, lower body power, and agility. RPE was taken after each exercise by using the Borg RPE scale. Participants performed exercises on two back to back days with either a PB band or no PB band with one rest day and repeated the exercises again on two back to back days with the opposite of what they wore on the previous exercise days (with or without the band). On the first two days of exercise, the order of exercises was randomly assigned; one day was solely devoted to the 30 second Wingate test of anaerobic power; as it was very strenuous on the participants. The other tests, 70% 1-RM seated leg press until exhaustion and the L-Drill were measured on the same day. Each subject performed the Wingate test on a Lode cycle ergometer to determine peak power. Subjects completed a light warm-up with no resistance, then, 3 seconds prior to the actual testing the participants were instructed to pedal "all out" with no resistance. The verbal cue of "Start" was announced when testing began, subjects were instructed to continue to pedal all out for 30 seconds with the determined resistance applied. The subjects then recovered with a 2 minute cool down while lightly pedaling with no resistance. The Wingate testing was performed again for the second trial with the opposite of what the subject wore in trial 1 (with or without the band). To determine strength subjects performed a 70% 1-Repetition Maximum (1-RM) leg press until exhaustion. Each subject was instructed on the standard protocol of the 70 % 1-RM until exhaustion on a seated leg press (Body Masters LXp 740 40°). 1 RM was estimated by subjects' sex, and body weight. Two trials were conducted to determine a difference in leg strength. Each subject performed 70% 1-RM until exhaustion or until the subject could no longer complete a repetition with correct form. During the second trial, at least 48 hours after the first trial, subjects performed the test again with the opposite of what they used in trial one (with or without the PB band).

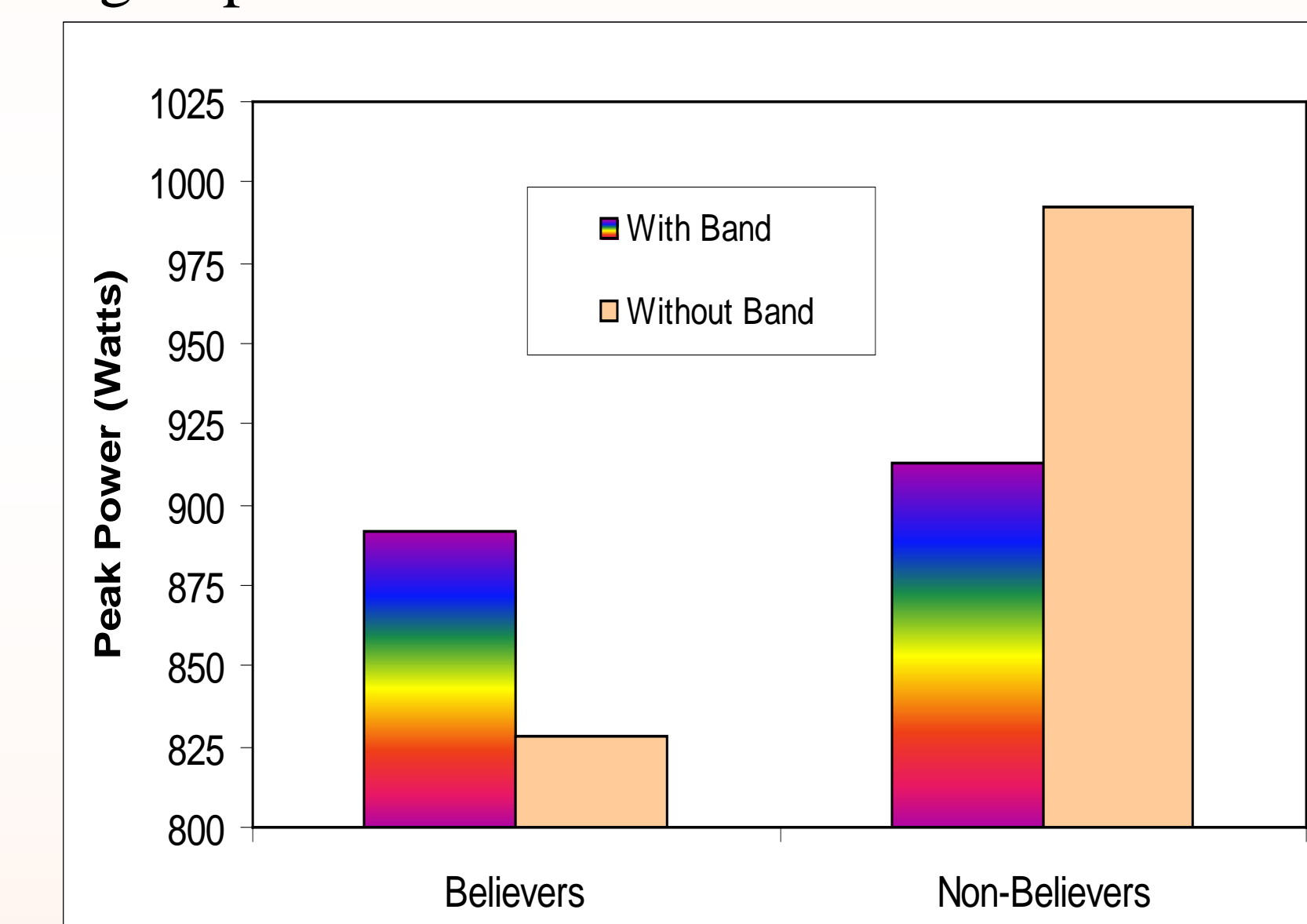
To determine agility subjects performed the L-Drill. The L-Drill is designed to time how fast participants could maneuver around 3 cones arranged in a 90 degree angle to each other, 5 meters apart, while changing directions. The participants were instructed to complete the test as fast as they could. For visual explanation of the L-Drill see diagram. The L-Drill was performed by the subjects again in trial 2, with the opposite of what they wore for trial 1. Following the second trial each subject was given an exit survey to determine whether he/she was a believer or non-believer in the efficacy of the power balance band.



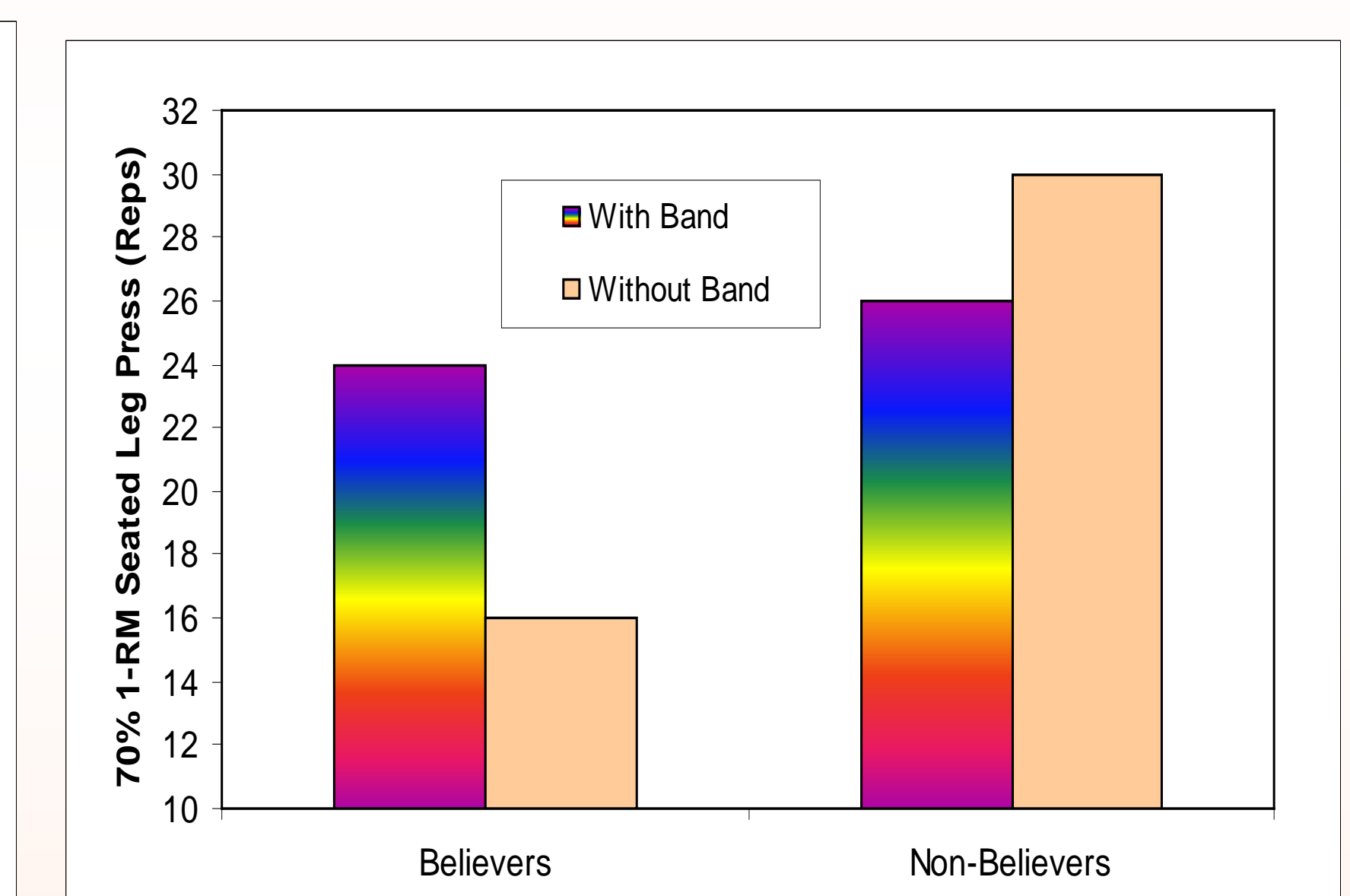
## Results

A mixed factorial ANOVA was run on all variables using SPSS. The results of the analysis found the Wingate power main effects (believe, not believe and with, without band)  $F[1,13]=0.647, p=.436, \eta_p^2=.047$  and  $F[1,13]=0.061, p=0.809, \eta_p^2=0.005$  respectively, showed no significant difference. However, the interactions between believe, not believe/with, without band  $F[1,13]=5.14, p=.041, \eta_p^2=.28$  show a significant difference. Post-hoc analysis revealed that the non-believers did better when they didn't wear the band.

Also Leg press main effects (believe, not believe and with, without band)  $F[1,13]= 1.529, p=.238, \eta_p^2=0.105$  and  $F[1,13]= 0.569, p=.464, \eta_p^2=.042$ , respectively, showed no significant difference. However, the interactions between believe, not believe/with, without band  $F[1,13]= 3.749, p=0.075, \eta_p^2=0.224$  showed a marginally significant difference. Post-hoc analysis revealed that the non-believers group did significantly better than the believers when both groups did not wear the band.



**Figure 1:** Estimated marginal means of peak power during Wingate testing for believers and non-believers, with and without the band. Results show Believers decrease in power without the band and the non-believers decrease in power with the band.



**Figure 2:** Estimated marginal means of leg press repetitions for believers and non-believers, with and without the band. Results show that the believers increased in repetitions with the band. Non-believers decreased in repetitions with the band.

Other factorial ANOVAs were run to test mean differences between main effects and their interactions on Wingate RPE, L Drill, L drill RPE and Leg press RPE, however these analysis found no significant differences.

## Conclusions

### Discussion

Trends in mean differences suggest a placebo effect with the believer group. Results in this study suggest that those who believe in the power balance band may show improvement in performance while wearing the band. Results confirm previous research summarizing any physiological effect of the Power Balance band was solely because of the placebo effect.

Trends in this study also suggest that those who do not believe in the power balance band may show a decrease in performance while wearing the band. Research regarding the negative effect of the Power Balance band on non-believers has not yet been completed.

### Recommendations

Significance is sensitive to sample size, in future studies a larger number and variety of participants would be ideal. Replication of this study by other investigators is recommended.