

CrossFit Training Improvements in Sport Performance and Body Composition in Young Healthy Adults

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ABSTRACT

Purpose: CrossFit training, which includes a variety of exercise training modes (e.g., aerobic endurance training; strength, power, and speed training; and flexibility, agility, balance, and coordination training) merged into a single high intensity, short duration workout, has gained significant popularity recently but there is limited data on its potential health and fitness benefits. Therefore, the purpose of this study was to determine if four weeks of CrossFit training will improve sport performance and body composition in young healthy adults. We hypothesized that four weeks of CrossFit training would significantly improve muscular strength and endurance, measures of speed and power, and various aspects of sport performance in young healthy adults. **Methods:** Twenty-one moderately fit young participants were recruited to participate in 14, 30-40 minute CrossFit training sessions over a 4-week time period. Anthropometric (i.e., height, weight, percent body fat) and performance (i.e., speed, power, agility, muscular strength, muscular endurance, and flexibility) were assessed before and after the 4-week training program using various equipment, which included but was not limited to, kettlebells, barbells, plates, plyometric boxes, medicine balls, and jump ropes. **Results:** CrossFit training resulted in significant decreases in time for the 1-mile run from an average of 7 minutes 42 seconds to 7 minutes 11 seconds; Benchmark workout from an average of 4 minutes 14 seconds to 3 minutes 27 seconds; and the Pro-agility test from an average of 4.89 to 4.72 seconds. There was also significant increases in squat strength (before: average 258 pounds; after: 282 pounds), and bench press strength (before: 185 pounds; after: 193 pounds). **Conclusion:** A 4-week CrossFit training program resulted in statistically significant improvements in cardiorespiratory endurance, muscle strength, muscle endurance, and agility performance. Our research supports the significant benefits of high intensity, short duration CrossFit training that combines all aspects of fitness.

BACKGROUND

- CrossFit is an advanced method of exercise training that combines aerobic endurance training; strength, power, and speed training; and flexibility, agility, balance, and coordination training into one exercise session.
- Typically, CrossFit training is performed with limited rest at high intensities for 15-45 minutes per session.
- Although anecdotal evidence suggests that CrossFit training markedly improves measures of fitness, there is no scientific research to support such claims to date.
- Because CrossFit training is designed to use all of the energy systems in the same workout, it would be reasonable to suggest that a chronic training program over several weeks will substantially improve cardiorespiratory fitness and muscle endurance.
- However, the potential improvements in maximal muscle strength, anaerobic power, agility, flexibility, and body composition are less predictable.

EXPERIMENTAL AIM AND HYPOTHESIS

Our aim was to investigate if CrossFit training for 4 weeks will result in a significant improvement in sports performance variables such as power, agility, speed, muscular endurance, strength as well as body composition in young adults.

We hypothesized that 4 weeks of CrossFit training would improve exercise performance and body composition in young recreationally active adults.

METHODS

Subjects

- Twenty-one moderately fit Caucasian young adults between the ages of 19 and 25 years participated in this study (16 males, 5 females).
- Participants were included in the study if they were recreationally active, had a history of exercising at least three times a week, and who had expressed interest in improving their sport performance and/or body composition.
- Participants were excluded if they were hypertensive and had known pulmonary, cardiovascular or metabolic disease determined through baseline assessments.
- All subjects were informed of the research study and its potential risks and benefits before providing written informed consent in accordance to the University of Wisconsin – Eau Claire guidelines.

4-week CrossFit Training Program

- **Frequency:** 3 days per week
- **Intensity:** Moderate to vigorous
- **Duration:** 15-35 minutes
- **Warm-up and cool down:** 5 minutes each
- **Measurements:** Aerobic endurance, maximal strength, muscle endurance, explosive power, agility, and body composition were completed before and after the 4 week CrossFit exercise program.
- **Benchmark Workout:** Each subject completed a prescribed CrossFit workout as quickly as possible before and after the training program. Time was recorded to indicate performance improvements.

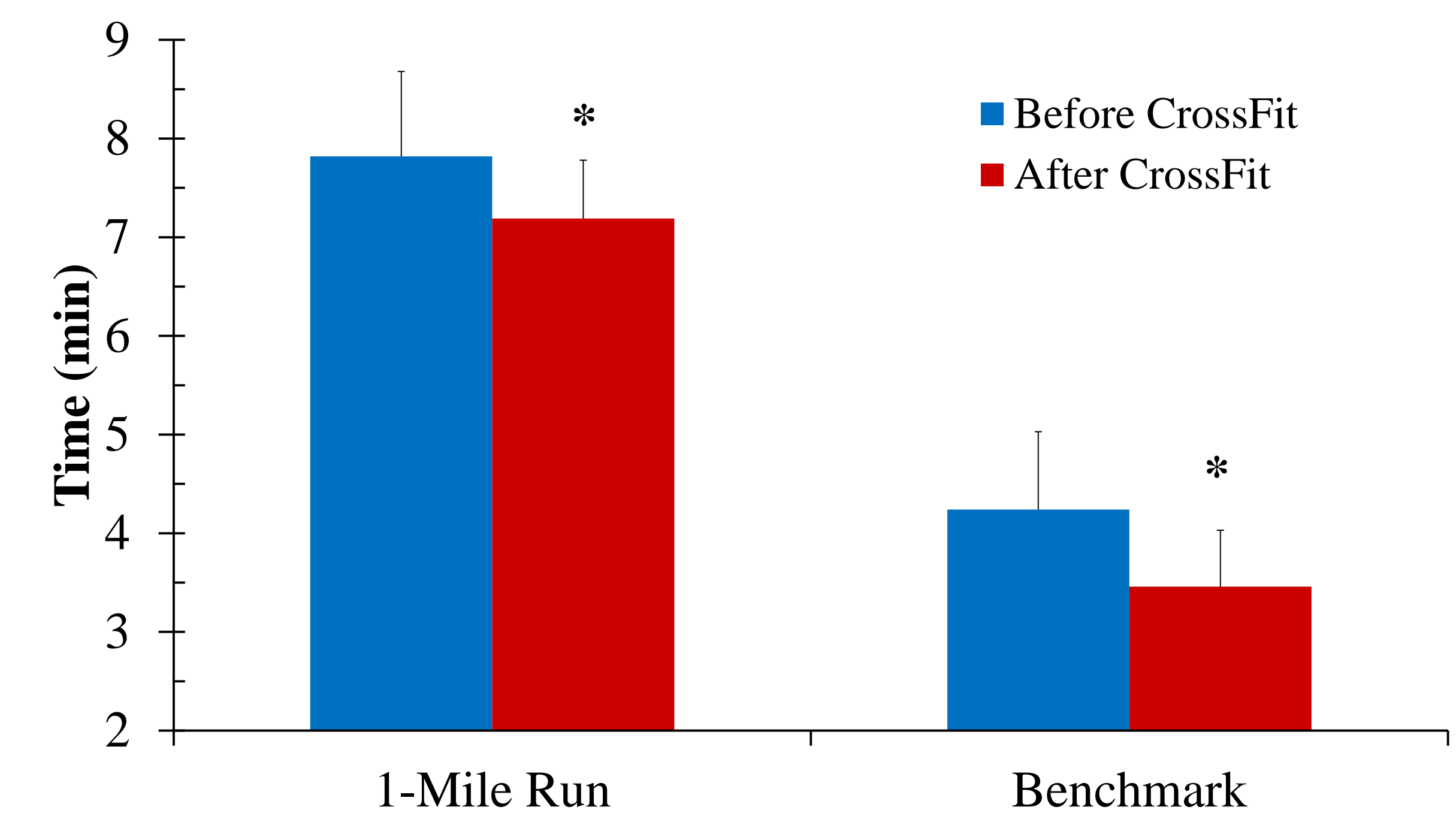
RESULTS

I. Before and After CrossFit Training data. *P<0.05 versus before CrossFit

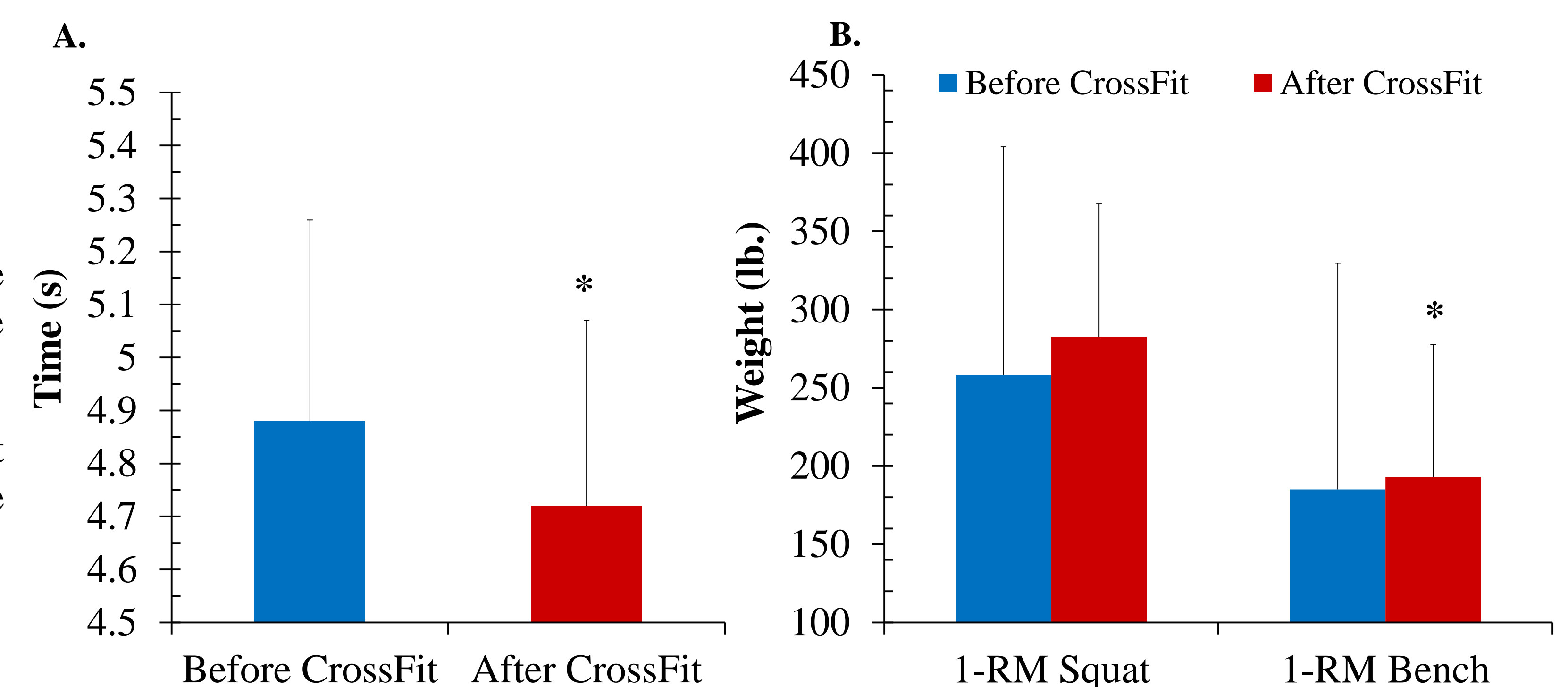
Variable	Men (n = 13)		Women (n = 6)	
	Before CrossFit (n=15)	After CrossFit (n = 13)	Before CrossFit	After CrossFit
Age (yrs)	20.9 ± 1.6	20.9 ± 1.7	21.0 ± 1.3	21.0 ± 1.3
Height (cm)	71.0 ± 2.2	70.9 ± 2.4	65.8 ± 1.5	65.8 ± 1.5
Weight (lbs)	182.8 ± 27.3	184.6 ± 28.5	138.8 ± 14.0	138.8 ± 13.8
HR (bpm)	73 ± 9	72 ± 9	76 ± 8	67 ± 8
Systolic BP (mmHg)	121 ± 7	120 ± 8	114 ± 10	117 ± 4
Diastolic BP (mmHg)	79 ± 8	76 ± 6	75 ± 9	74 ± 8
Flexibility (cm)	32.7 ± 7.9	32.8 ± 7.5	35.0 ± 4.6	35.4 ± 4.6
Bicep Girth (cm)	32.0 ± 3.8	32.3 ± 3.1	25.1 ± 3.7	25.3 ± 2.9
Thigh Girth (cm)	56.2 ± 6.1	56.0 ± 4.8	53.2 ± 5.5	52.4 ± 5.6
Waist Girth (cm)	82.4 ± 7.5	82.7 ± 6.4	69.9 ± 5.9	68.1 ± 4.7*
Hip Girth (cm)	100.0 ± 7.7	101.3 ± 6.1	99.4 ± 5.3	97.0 ± 4.9
Vertical Jump (in)	23.5 ± 2.7	24.2 ± 3.5	14.5 ± 1.3	14.7 ± 2.1
Broad Jump (in)	102.0 ± 6.6	103.4 ± 6.5	74.4 ± 5.5	75.9 ± 5.9
40-yd Dash (s)	5.3 ± 0.1	5.2 ± 0.2	6.5 ± 0.3	6.4 ± 0.3
Pro-Agility (s)	4.8 ± 0.3	4.5 ± 0.2*	5.4 ± 0.2	5.1 ± 0.2*
1-RM Bench (lbs)	226.3 ± 53.7	242.3 ± 50.4*	77.5 ± 14.1	87.5 ± 12.9*
1-RM Squat (lbs)	323.9 ± 116.5	349.2 ± 126.1*	105.8 ± 36.9	138.3 ± 24.4*
1-Min Sit-ups (reps)	54.0 ± 7.3	55.0 ± 9.1	44.5 ± 9.1	46.3 ± 93.3
1-Min Push-ups (reps)	46.8 ± 15.0	53.5 ± 10.0*	17.5 ± 6.6	20.8 ± 4.8
1-Mile Run (min)	7.7 ± 0.9	7.1 ± 0.6*	8.1 ± 1.1	7.3 ± 0.5*
Benchmark (min)	4.0 ± 0.6	3.2 ± 0.2*	4.9 ± 0.9	4.0 ± 0.7*

RESULTS (Continued)

II. The time to complete the 1-mile run and Benchmark workout was markedly reduced after CrossFit training. *P<0.05 versus before CrossFit via Paired T Test.



III. Pro-Agility exercise test (A) decreased in time after CrossFit training. 1-RM Squat and 1-RM Bench exercise tests (B) increased in weight following CrossFit training. *P<0.05 versus before CrossFit via Paired T Test.



SUMMARY AND CONCLUSIONS

- A four week CrossFit training program resulted in statistically significant improvements in various sport performance components.
- Of the components evaluated, the timed one mile run, benchmark workout, 1-RM bench, 1-RM squat, pro agility, and 1 minute endurance pushup test yielded the greatest improvements.
- Our research supports the significant benefits of high intensity, short duration exercise that combines all aspects of fitness and suggests more research should be conducted comparing CrossFit to other styles of training.

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