

## Copper Run Test vs. Sit and Reach

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## **BACKGROUND & LITERATURE REVIEW**

The purpose of my research paper is to examine how the effects of flexibility training vary on the Cooper Run Test and the Sit and Reach Test. This information will give a better understanding on the importance of flexibility training before and after workouts. As a researcher, I intend to study 30 subjects of any BMI, height, and weight ranges and track their pre-flexibility training averages and their post training averages. All subjects will be both male and female so that any differences between sex can be determined. Before participating in the flexibility training the subjects will do the Cooper Run Test and run 1.5 miles as fast as they can, and their times will be recorded. In addition, the subjects will also test their flexibility with the Sit and Reach test. Subjects will then be given a six-week flexibility training program and be retested after it concludes. The post test will evaluate the results of the flexibility training with the Cooper Run Test and the Sit and Reach. With the Cooper Run Test subjects can fall anywhere between 10 and 20 minutes. The sit and reach ranges from 10 to 20 inches.

In his article about dynamic flexibility, Allen Hedrick evaluates the importance of flexibility. When a sport is dynamic and demanding, flexibility training is almost always important. He states that there are many factors that come into play when dealing with flexibility. Some non-modifiable factors would be gender and age. Women tend to be more flexible than men as well as younger people tend to be more flexible than older. Dynamic flexibility provides a more sport specific mode of stretching. This article will help us create the perfect flexibility training program by adding exercises like lunges and knee tucks

Unlike the last article, the research study done by Tamra Trehearn and Robert Buresh explains that there is a negative relationship between flexibility and good Sit and Reach scores. The sit and reach test has been proven through research to be an accurate test of hamstring

flexibility and each subject had three attempts. In this study the researchers found that if the sit and reach score was lower, the runners tended to be more economical. Researchers are suggesting that when a stiff muscle is stretched during running it creates greater tension than a previously stretched muscle. This research study can provide insight onto why I could possibly get an inverse relationship or no change at all between the pre and post sit and reach measurements.

In the journal written by Juan Carlos Santana, he goes onto describe that yes, flexibility is good, but having too much flexibility can be bad too. Having too much mobility can cause the body to not have enough stability and can cause issues with the affected area. For example, too much flexibility of the knee can cause hyperextension or other knee problems because there is not enough stability. The author also explains that just because we practice flexibility statically, does not mean we will have the same range of motion when we take away the control and speed factor. Only using dynamic range of motion exercises can help create a range of motion that can be used during exercise. This article can also be used on deciding what exercises to use and to stay away from static exercises.

## **METHODS**

First the subject's sex, BMI, height and weight were recorded before beginning the six-week flexibility training program. Also, the 30 subjects conducted the Cooper run test and the sit and reach to receive their baselines for the study. The six-week flexibility training consisted of 8 stretches three days a week. The stretches were standing hamstring stretch, piriformis stretch, 90/90 stretch, butterfly stretch, side bends, lunge stretch, knee to chest stretch, standing quad stretch. On the last day of the six-week program, the subjects were then tested again on the Cooper Run Test and the sit and reach to see if the flexibility training helped improve the

outcomes of both tests. Each subject was closely monitored to make sure the flexibility training was done correctly.

## RESULTS

The results of this research study, after the six-week flexibility training concluded that the mean of the pre cooper run test was 15 and the post test was 14.96. The mean results for the pre sit and reach test were 15.5 and the post were 16.1.

Table 1: Gender, height, weight, BMI, Cooper Test, and sit and reach.

Subject	Gender	Height (Inches)	Weight (Lbs)	BMI	1.5 Mile Cooper Test Pre/Sec	1.5 Mile Cooper Test Post/Sec	Sit & Reach (Pre/Inches)	Sit & Reach (Post/Inches)
1	F	66	132	21	15.3	15.1	16.5	17
2	F	64	145	25	17.15	17.1	16	17
3	F	64	134	23	15.24	15.25	16	17
4	F	63	134	24	16.33	16.35	17	17
5	F	66	156	25	15.35	15.33	18	18
6	F	67	134	21	12.33	12.35	16	17.5
7	F	65	128	21	13.4	13.4	17	18
8	F	66	137	22	13.3	13.27	15	16
9	F	65	146	24	13.46	13.4	16	16
10	F	65	149	25	15.28	15.25	15.5	16
11	F	65	141	23	14.3	14.3	17.5	18
12	F	67	130	20	14.25	14.2	16	17.5
13	F	66	140	23	14.5	14.42	16	16
14	F	65	133	22	14.47	14.45	17	17.5
15	F	67	138	22	15.3	15.23	17.5	18
16	M	70	160	23	14.31	14.3	14	15
17	M	65	150	25	16.5	16.45	15	15
18	M	69	155	23	15.22	15.25	15.5	16
19	M	68	159	24	15.3	15.28	14	15
20	M	67	165	26	14.3	14.25	12	13
21	M	69	166	25	14.3	14.32	16	16
22	M	68	164	25	18.45	18.23	16.5	17
23	M	69	162	24	12.53	12.51	14.5	15
24	M	70	160	23	15.22	15.15	18	18
25	M	67	158	25	13.23	13.25	15.5	16
26	M	68	170	26	15.42	15.4	13.5	15

27	M	69	175	26	18.4	18.35	12.5	14
28	M	70	159	23	16.21	16.18	14.5	14.5
29	M	67	162	25	16.2	16.12	13	13
30	M	68	180	27	14.55	14.5	13.5	14

Table 2: Means, standard deviations, and p values.

<b>Overall</b>	<b>Mean</b>	66.83	150.73	23.72	15	14.96	15.5	16.1
	<b>SD</b>	1.93	14.58	1.7	1.48	1.45	1.59	1.49
	<b>p value</b>					0.000770344		5.68192E-07
<b>Female</b>	<b>Mean</b>	65.4	138.47	22.73	14.664	14.63	16.47	17.1
	<b>SD</b>	1.183	7.75	1.62	1.24	1.23	0.834	0.784
	<b>p value</b>					0.934843392		0.04090338
<b>Male</b>	<b>Mean</b>	68.27	163	24.67	15.34	15.30	14.53	15.1
	<b>SD</b>	68.267	7.59	1.291	1.65	1.612	1.598	1.365
	<b>p value</b>					0.946931241		0.305278409

Chart 1: Pre/Post Cooper Run Test

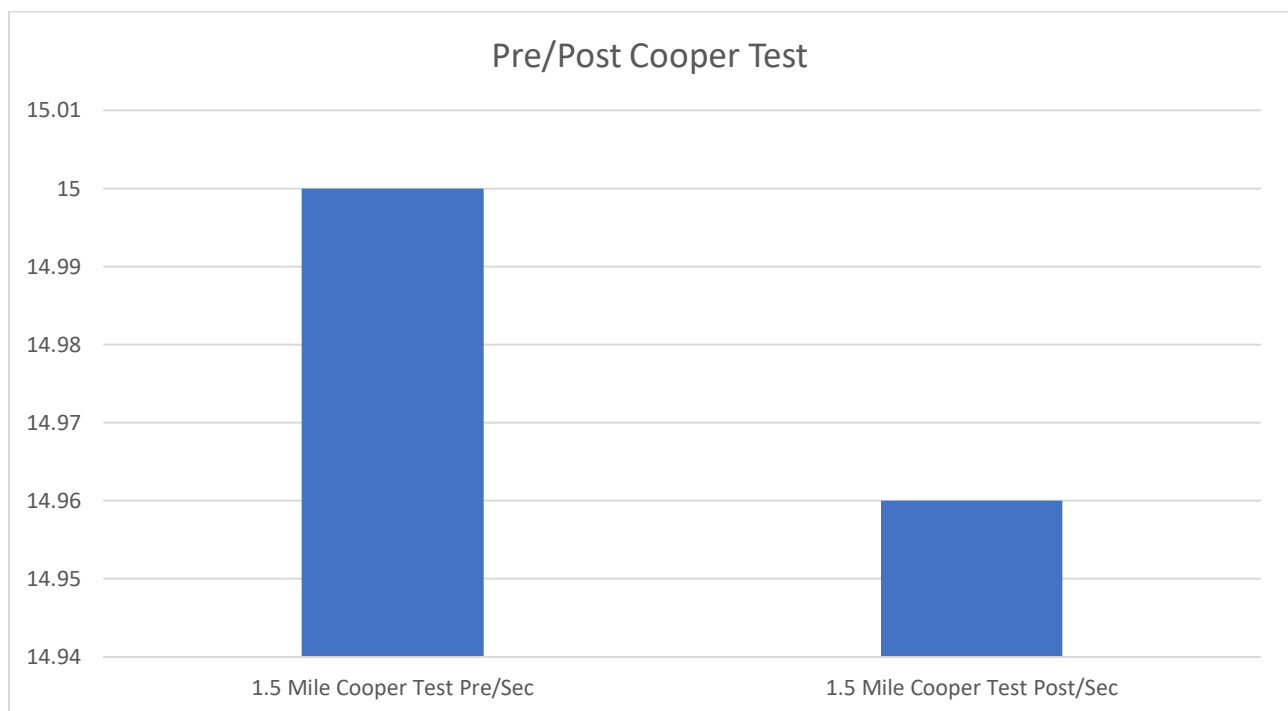
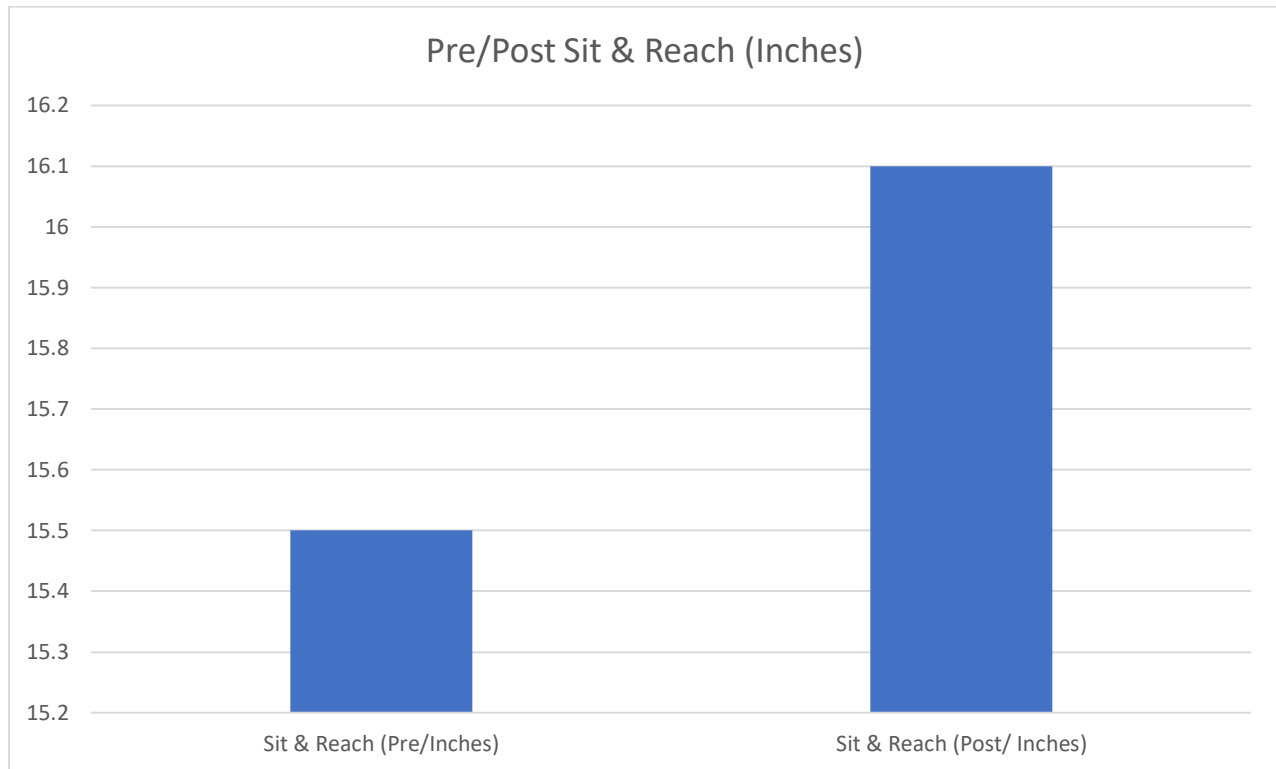


Chart 2: Pre/Post Sit &amp; Reach Test



## DISCUSSION

Given the results of the study, it can be concluded that there is no correlation between flexibility training and the Cooper Run Test. The mean statistic from the posttest had actually diminished slightly to the pretest. No correlation suggests that the flexibility training program did not have any positive effects on the cooper run test at all. However, with the sit and reach test, there was slight improvement between the pre and posttest. The small improvement could suggest that further studies on flexibility training could support a link between the two variables. Overall, more research needs to be conducted to find a better link between flexibility training and fitness assessments.

**REFERENCES**

- Hedrick, A. (2000). Dynamic Flexibility Training. *Strength and Conditioning Journal*, 22(5), p.33.
- Trehearn, T. and Buresh, R. (2009). Sit-and-Reach Flexibility and Running Economy of Men and Women Collegiate Distance Runners. *Journal of Strength and Conditioning Research*, 23(1), pp.158-162.
- Santana, J. (2004). Flexibility: More Is Not Necessarily Better. *Strength and Conditioning Journal*, 26(1), p.14.