

The Effects of Using Starting Blocks on Short Distance Sprints

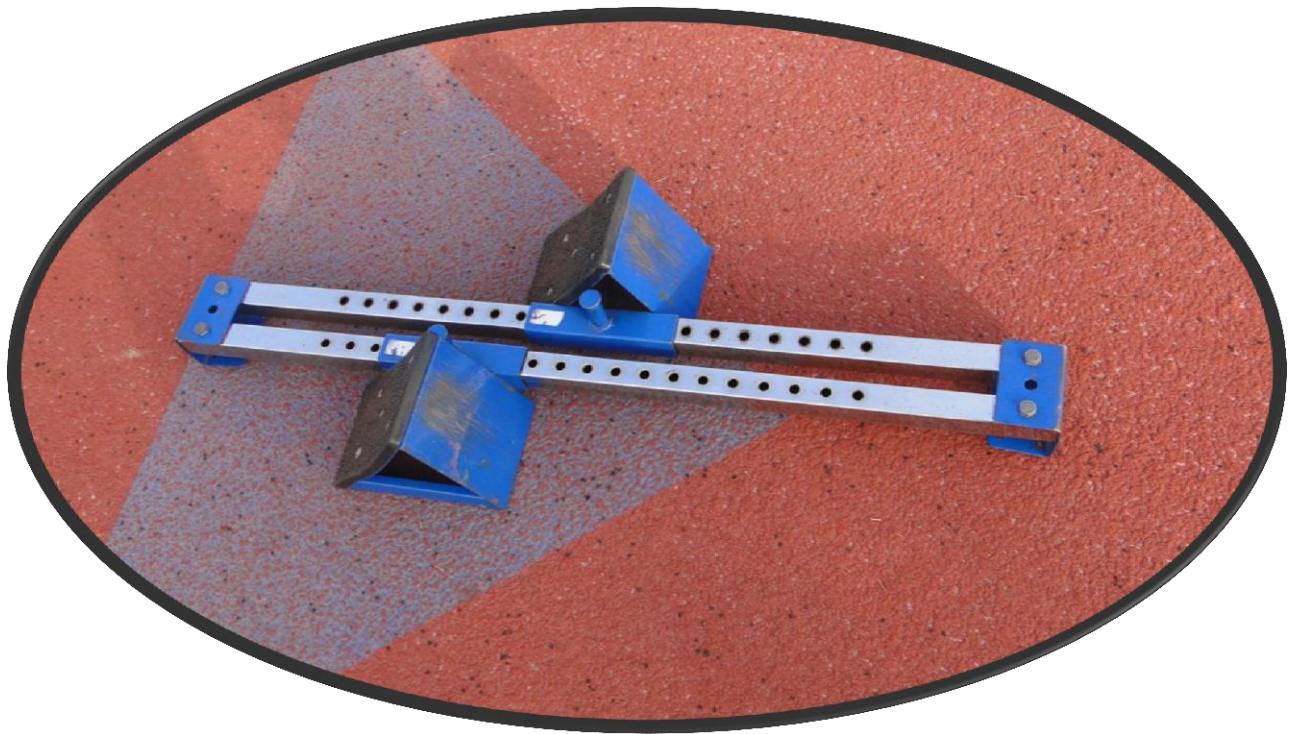


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Introduction

This project was created to find out if using starting blocks in short distance sprints is helpful or harmful to a runner's performance. In the experiment, there were six different test subjects that ran both a 45 and 85 meter sprint with and without starting blocks. The research question created was "Do starting Blocks improve a sprinter's time in a race?"

The hypothesis made was "I think that if a runner uses starting blocks in either sprint, their time would be faster compared to if they ran without it."

Research Paper

Starting blocks have been officially required in races 400 meters and under since 1937, according to the USATF rules (livestrong). Starting blocks are equipment in track that are used to help sprinters carry out a better start and starting position. Since sprinting races are so fast and over very quickly, a good start makes all the difference (Gutman). But do starting blocks truly affect how sprinters perform in a race? This experiment will determine whether or not starting blocks actually benefit the runner with a better start, and faster time in a race.

There are some terms needed to know in order to understand this experiment. Starting blocks are metal blocks that provide foot support and allow sprinters push off of to have a better start and or faster time (Gutman). Short distance sprinting is an event in the sport of track and field. "The sprint start is a complex motor task characterized by large forces exerted in the horizontal direction and by the ability to generate these forces in a short time period" (Fortier). Speed and velocity play an important role in this experiment; in order to be successful, sprinters

obviously need these abilities. Speed is the rate at which an object travels (The Physics Classroom). Velocity is similar to speed, but it is the rate at which an object changes (The Physics Classroom). Momentum is one of the biggest reasons why starting blocks help a runner's start. Momentum is "the quantity of motion of a moving body, measured as a product of its mass and velocity" (The Physics Classroom). Starting blocks are on an angle, so they possess potential energy. Potential energy is the stored energy of position possessed by an object (The Physics Classroom). Starting blocks were created in the 1920's, and were an alternate of digging holes in the ground (SpeedEndurance). Not many people have executed similar experiments to this one, but experimenters in the Journal of Sports Science and Medicine have tested levels of kinetic energy in different sprinting starts. They used elite and very experienced sprinters in their tests. In the end they concluded that starting blocks did in fact improve the time in which their test subjects ran their races (Fortier, et al.).

This topic will influence short distance sprinters, generally 100 meter runners. It might also affect track coaches. The purpose of this experiment is to affect how sprinters may want to look at their starting technique. Runners will consider the results of the experiments and change or test out if starting blocks will help improve or delay *their* run. Coaches will want to help improve their runners' records, and if they consider the results of this experiment, they can be able to help them by converting them over to either, depending on how the results end up. This experiment may potentially improve many sprinters' approaches to their best race, and then possibly enhance their overall performances.

The experiment will involve having six at least semi-experienced runners as test subjects: three males and three females. Each person will run two 100 meter dashes, and a two 45 meter

sprints, with about a two minute break in between the each. The 100 meter sprint will be run because starting blocks are the most crucial to the shortest races. The 45 meter sprints will be run because an improvement in the start alone is being tested, and testing times in the 100 meters alone can leave a large margin of error that would change the results of the experiment. Each test subject will first run the 100 meter dash without starting blocks, starting down on the ground. The second 100 meter dash will be run **with** starting blocks. The first 45 meter sprint will be run without starting blocks also on the ground, and the other 45 meter sprint will be run **with** starting blocks. The results of these different sprints will be recorded and compared to establish whether or not starting blocks improve or delay a sprinter's performance.

Methods and Materials

Materials:

- One *PORT a PIT* brand Starting Block (CB West)
- One *Flinn Scientific* brand Stopwatch (School)
- Humans (*Homo sapiens*)

Independent Variable- Starting blocks used in half of the sprints

Dependent Variable- Time (in seconds) of each sprint

Control Group- Sprint without starting blocks

Controlled Variables- Previous Night's sleep (8+ hours)

Food Intake (normal 3 meals a day)

Stretching Time (Required 4 minutes and warm up lap)

Weather Conditions (no rain or snow)

All events will be run out of order for each test subject

Experimental Procedure:

- 1.) A day prior to experiment, make sure test subjects get over 8 hours of sleep, and eat a regular 3 meals a day.
- 2.) Before starting, make sure weather conditions are fair-there is no precipitation (rain, snow etc.)
- 3.) Give test subject 4 minutes to stretch and jog one lap (to reduce the risk of an injury)
- 4.) Time the test subject running the 100 meter dash without starting blocks and record in notebook (running without starting blocks will be the control group)
- 5.) Give test subject a 3 minute break
- 6.) Time test subject running the 100 meter dash using starting blocks and record in notebook
- 7.) Give test subject a 3 minute break
- 8.) Time test subject running 45 meters without starting blocks and record in notebook
- 9.) Give test subject 3 minute break
- 10.) Time test subject running 45 meters using starting blocks and record in notebook
- 11.) Give test subject 10 minutes before repeating steps 1-10 again

Conduct experiment on all six test subjects.

Results

This experiment was conducted to show the effect of using starting blocks when running in the 85 meter sprint, and a 45 meter sprint. When the first test subject ran the 100 meter dash in the experiment, the incorrect distance was run. To keep all data consistent, the experiment was modified so all other test subjects ran the same distance. Instead of 100 meters, test subjects really ran 85 meters.

Data Table one displays the various times that six test subjects ran in the 85 meter sprint, with and without starting blocks. The information collected establishes that five out of the six test subjects ran a slightly better sprint when not using the starting blocks in the 85 meters. It is evident that all times were close, though. For example, Test Subject three (3) only showed a better time by 0.01 of a second. Test subject one(1) showed a 0.25 second improvement, test subject two (2) showed a 0.04 second improvement, and last, test subject six (6) showed a 0.22 second improvement. Test subject four (4) showed a significant improvement without the starting blocks: by 2.08 seconds. The only test subject that benefitted the starting blocks was test subject five (5). They ran the sprint without the starting blocks 13.51 seconds and with starting blocks in 13. 38. These outcomes illustrate that for the majority of the time, the starting blocks were not as beneficial for 85 meters.

Data Table two illustrates the different times that the same six test subjects got when running a 45 meter sprint with and without starting blocks. The data collected was unique for each test subject. Half of the test subjects benefited from the starting blocks, while the other half did not. Test subject one (1) ran the distance better with the starting blocks by 0.47 of a

second, and test subjects four (4) and six (6) ran it better with starting blocks as well, by 0.27 of a second and 0.4 of a second. Test subjects two (2), three (3) and five (5) also ran the 45 meter sprint, and their performances lessened with the starting blocks. Test subject two (2) ran a better time without the starting blocks by 0.17 of a second. Test subject three (3) and five (5) also ran the 45 meters better without the starting blocks by 0.08 of a second, and 0.22 of a second.

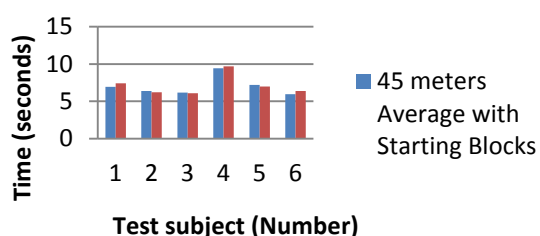
In the end, the data collected for the 85 meter sprint in data table one showed that the majority had improved times without using starting blocks. Data table two proved that there was no specific outcome for the 45 meter sprint. Exactly half the test subjects had enhanced performances with starting blocks, while the other half of the runners had the opposite result.

	<i>100 meters Average with Starting Blocks</i>	<i>100 meters Average without Starting Blocks</i>	<i>45 meters Average with Starting Blocks</i>	<i>45 meters Average without Starting Blocks</i>
1	11.79	11.54	6.96	7.43
2	11.76	11.72	6.39	6.22
3	11.58	11.57	6.16	6.08
4	17.3	15.22	9.42	9.69
5	13.38	13.51	7.21	6.99
6	14.55	14.33	5.97	6.37
Average	13.39	12.98	7.01	7.13



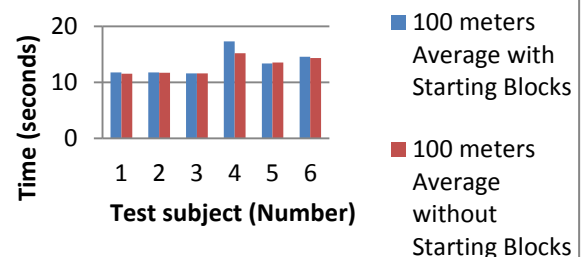
Test Subject 6 preparing for the 85 meter sprint with starting blocks

Graph #2- The Effect of Running With and Without Starting Blocks in a 45 Meter Sprint (Sec)



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Graph #1- The Effect of Running With and Without Starting Blocks in the 100 Meter Dash (Sec)



Discussion of Results

The purpose of this experiment is to find out if starting blocks improve a runner's performance in a 45 meter sprint and an 85 meter sprint. The experiment included six different test subjects, three of them males, and three females, randomly ordered 1-6. Each test subject ran both distances with and without starting blocks, and was timed. The tests all took place at the CB West High school Track in the months of December of 2012 and January of 2013. The data did not indicate one precise conclusion of whether or not starting blocks enhanced or worsened a runner performance, although one distance had different results from the other. In the 45 meter sprint, half of the test subjects showed a better time with the starting blocks, while the other half showed a worse time. In the 85 meter sprint, the majority, five of the six test subjects, showed a better result when not using the starting blocks. No verdict was reached on the 45 meter sprint because the results were neutral, and in the 85 meters, not using starting blocks was most effective overall.

The hypothesis was that if a sprinter used starting blocks on either sprint, their overall time will be better than if they didn't use them. The data collected proves that for the 85 meter distance, the majority of runners did better without starting blocks, so this disproves the hypothesis. For the 45 meter distance, half and half did better and worse with the starting blocks, so this neither proves nor disproves the hypothesis made.

There are a few reasons why the data worked out how it did. First of all, starting blocks are meant to improve a runner's *start*, which explains why the starting blocks were more beneficial and worked better in the shorter distance. The most important rationale behind the data is that a starting block's effectiveness is all based upon running experience (slideshare.com). Some test subjects have not used starting blocks frequently in their past. For example, test subject five who has had very limited experience with starting blocks, did not benefit by them in either trial. Test

subject one, on the other hand, has had a significant amount of running experience, and the starting blocks benefited him. Professional runners such as Usain Bolt use starting blocks in races, and they have measurable improvement from them because they train with starting blocks in their practices (livestrong.com). It all depends on the level of experience a runner is apt to have an improvement. A beginner might not want to use starting blocks because misuse due to lack of practice may delay their time. For experienced runners on the other hand, using starting blocks are a necessity.

This experiment could be improved in one main way. Test subjects could be selected based on experience with track running and using starting blocks and their performance would be associated with this. Rather than a general 'majority rules' deciding if starting blocks are useful, it could be decided for two categories- experienced and inexperienced.

This experiment had an unexpected event. When the first trial was going on, instead of running the full 100 meters, the test subject accidentally used the wrong marks on the track and ran 85 meters instead. This mistake went unnoticed until the first trial was already done. To keep all data consistent, the experiment was modified so all other test subject would also run the same 85 meters.

Based on the results of the experiment and the reasons behind it, runners of all levels should look at the outcomes of this research for a tip their own start. Experienced runners should definitely consider using starting blocks, and runners with limited experience should practice using them before applying them in a real race. Overall, starting blocks are valuable tools that will provide a benefit if used correctly.

Works Cited

- Copeland, Abi. "Why Do Sprinters Use Starting Blocks?" *Livestrong*. Demand Media Inc., 14 June 2011. Web. 5 Nov. 2012. <<http://www.livestrong.com/article/225233-why-do-sprinters-use-starting-blocks/>>.
- Gutman, Bill. *Track and Field*. Vero Beach: Rourke Corp. Inc., 1994. Print.
- Lee, Jimson. "Track and Field Starting Blocks Evolution." *SpeedEndurance.com*. Sport Sites, n.d. Web. 30 Oct. 2008. <<http://speedendurance.com/2008/12/29/track-and-field-starting-blocks-evolution/>>.
- Fortier, Sylvie, et al. "STARTING BLOCK PERFORMANCE IN SPRINTERS." *Journal of Sports Science and Medicine* 4 (2005): 134-43. PDF file.
- The Physics Classroom*. The First in the World Consortium of Schools, 2012. Web. 23 Oct. 2012. <<http://www.physicsclassroom.com/class/momentum/u4l1a.cfm>>.
- Lake, Stephen. "Cofa Blog Get Put of the Starting Blocks Now." *Cofa Blog Get Put of the Starting Blocks Now*. Slideshare Inc., 18 Oct. 2012. Web. 20 Feb. 2012
- Lohrey, Jackie. "Tips for Starting Blocks." *LIVESTRONG.COM*. Demand Media Inc., n.d. Web. 20 Feb. 2011