

# Eccentric Flywheel Training and its Effect on Club Speed in Golfers

*A 6 Week Study*



## Background

We at Par4Success pride ourselves on remaining at the cutting edge of training techniques and want to make sure we are providing the highest quality training to our athletes. Our golfers undergo standardized testing three times per year to make sure our programs are effective, efficient, and customized to the needs of each athlete in order to maximize their performance on the course and in life.

Triphasic training is a periodization method which utilizes specific blocks of emphasis on the three parts of a movement in order to maximize performance. The first is a block of training focused on the eccentric, or muscle-lengthening under tension portion, of a movement. The second block focuses on the isometric portion of the movement at the muscles most disadvantageous position, forcing the athlete to pause and hold a static position without joint angle change while still under tension at a specific range. Finally, in order to transfer strength into power, the emphasis is placed on the muscle-shortening, or concentric, portion of the movement, and speed of movement is prioritized.

In our prior research, we have seen this style of training produce about a 50% better-than-average improvement in our adult golfers' club head speed compared to previous training blocks which utilized a Classic Periodization model. A Classic Periodization model first emphasizes hypertrophy or muscle size, then strength, and then power. This is achieved by manipulating sets and reps of each exercise.



As was reported at the World Golf Fitness Summit in October of 2018, adults undergoing Classically Periodized training gained an average of 0.9 mph of Club Head Speed in 12 weeks, whereas those who underwent Triphasic Training gained an average of 1.5 mph of Club Head Speed. While this is not statistically significant, we believe that further investigation is warranted because of the importance that distance plays in the game of golf as is evidenced in the positive relationship between driving distance on the PGA Tour and Money List standings.

Our goal with all of our research is that it is useful and realistic to help as many golfers around the world as possible. Armed with the knowledge that triphasic training has demonstrated larger club speed gains than traditional training in adult golfers, and that there is equipment widely available that might further enhance this positive club speed result, our natural curiosity led us to test the KBox and KPulley devices. These are unique, safe, and effective devices that provide athletes and coaches with a way to overload the eccentric portion of almost every movement you can perform in a gym safely. Their website has compiled much of the relevant research on flywheel training ([www.exxentric.com](http://www.exxentric.com)).

Eccentric flywheel training is nothing new, but has become increasingly more popular in recent years as a way to overload the eccentric portion of a movement safely and effectively. The company behind Kbox and Kpulley, Exxentric, has made this technology more accessible than ever. The relatively affordable price point and portability (the kbox) of the equipment is allowing coaches, clinicians and individual athletes to utilize this type of training more frequently than ever. This has made it a viable option for smaller training facilities, clinics and even home gyms.

In full disclosure to maintain the integrity of our research, the researchers did not receive any monetary compensation for completion of this study or any other arrangement with Exxentric.

## Purpose

Our goal was to determine how effective the Excentric KBox and KPulley were on increasing club head speed over a 6-week training block compared to eccentric-focused barbell movements and cable/band pulleys for rotation.

## Methods

We recruited 29 participants from our existing golf fitness membership to participate in the study, and randomly assigned them to one of three groups:

KBox Group (KB), which performed all squat and hinge lifts on Kbox and all press and pull lifts on Kpulley. KB performed all rotary power movements with the Keiser cable machine.

KPulley Group (KP), which performed rotary power movements on the KPulley and all squat, push, pull and hinge movements with barbells with an eccentric focus.

Control Group (CG), which performed all compound movements with barbells with an eccentric emphasis, and all rotary power movements with the Keiser cable machine.

The following table details both the twice a week workout and the progressions through the 6-week study.

			Week 1-2	Week 3-4	Week 5-6
Day 1: Squat & Press	Day 2: Hinge & Row	Applications to Study	All Lifts: 3 x 12	Compound: 4 x 8 Auxiliary: 3 x 8	Compound: 4 x 5 Auxiliary: 3 x 6
1a.) Squat	1a.) Deadlift	KB Group Squat and Hinge on KBox, KP/CG both on barbells	KB Load Females: .025mr2	KB Load Females: .05mr2	KB Load Females: .075mr2
2b.) Chop low/high	1b.) Rotation with Bar	KP Group on KPulley, KB/CG on Keiser	KB Load Males: .075mr2	KB Load Males: .1mr2	KB Load Males: .125mr2
1c.) SA KB TRX Rows	1c.) One arm DB press on SB		KP Load Females: .025mr2	KP Load Females: .05mr2	B Load Females: .075mr2
2a.) Bench Press	2a.) Bent Over Row	KB Press on KPulley and Row on KBox, KP/CG both on barbells	KP Load Males: .05mr2	KP Load Males: .075mr2	KP Load Males: .1mr2
2b.) MB Chest Pass	2b.) Landmine Anti-Rotation				
2c.) KB SLRDL	2c.) Walking lunge				
3a.) BB Rollout	3a.) Slider plank				
3b) Bike interval	3b) Row/bike interval				
3c.) Suitcase Carry	3c.) Farmer Carry				

## Results

Results for each group are listed in the table below.

Due to relatively small sample sizes, no statistically significant differences exist between the groups.

	Sample Size	Avg. Change in Club Head Speed (mph)	Avg. % Change in Club Head Speed (%)
KBox	11	1.3	1.61%
KPulley	9	2.6	2.80%
Control	3	1.2	1.36%

## Conclusion

Based on these preliminary findings, the KBox and KPulley systems are a very effective way to increase club head speed in adult golfers over a 6-week time period. This is bolstered by the fact that this study was completed towards the tail-end of the golf season. Our previous in-house data on over 600 golfers generally shows a decrease in club head speed during the season (April - October in North Carolina) due to decreased training volumes and increased playing time. Comparing that data to the participants in this study, which took place during the middle of this time frame, we saw 65% of our participants increase their club head speed during this 6-week study.

Further interesting insight comes when you compare these current findings to our larger sample of data over the past 4 years which can be downloaded [here](#). The average increase in club speed for an adult golfer in a 12 week period is 1.5 mph at best in a triphasic program (did not include rotary eccentric training) and 0.9 mph in a classic periodization model (no eccentric training in any plane).

In this 6 week study, both the control and the kbox groups beat the classic training periodization and approached the 1.5 mph gains of the full triphasic program. One could reasonably assume that with another 6 weeks and continued progression through triphasic programming, that they would come close to matching the 1.5 mph gains and possibly surpassing them. Both of these groups' results seem to lend support to the finding that triphasic training is a very effective means to increase club speed in adult and senior golf populations.

The Kpulley group at 6 weeks had already beaten the 1.5 mph gains seen in a 12 week triphasic program by over 1 mph or 73%. The addition of eccentrically focused rotary training appears to have a hugely important effect on club speed in golfers. This likely has been an under focused area of training for many rotary athletes despite the plethora of concentric rotary exercises such as medicine balls, cable rotations and banded rotations. These findings would seem to support the idea that you need to train an athlete's ability to slow down and harness their energy efficiently. Eccentric overloading appears to be a very efficient and effective way to train this skill in rotary athletes.



While the data is not statistically significant, it is the authors' opinion that an addition of 2.6 mph (1 mph more than either other group and 1.1 mph more than the established 12 week average) in 6 weeks is extremely significant in the golf performance world. Every 1 mph gained is equivalent to just under 3 yards of distance gained (assuming launch conditioning remain consistent).

This means 2.6 mph is between 6-9 yards of distance depending on what reference you use.

When looking to create the most effective program for increasing rotational power, the researchers believe it wise to consider both the findings from this study and our prior work. These initial results show improved gains in swing speed when rotational eccentric training is focused on compared to when it is not. It is therefore reasonable to suggest that specifically including rotational training into the triphasic periodization model as a fifth element of strength training focus beyond just squat, push, pull and push would maximize the already improved speed gains seen in traditional triphasic training focused on the push, pull, squat and hinge.

One noted qualitative "finding" of the study was the feedback from participants on their golf games. Throughout this 6-week training block, users of the KBox and KPulley reported feeling much more stable and in control, especially on the tee box. Many participants qualitatively noted better and more consistent ball striking, although this was not specifically measured in this study.

Limitations of this study include relatively small sample sizes due to a loss of participants due to travel and not completing the minimum number of workouts, as well as the short length of the study. For true Triphasic Training to occur, the eccentric-focused or overloaded phase must be followed by both an isometric and a concentric training block in order to translate strength and potential hypertrophy via eccentric training into power expression.

Because of this, the authors believe that the results would have been even greater if the length of the study was increased. This is an ongoing aspect of our data collection, training, and future testing.

Future research should be directed towards further understanding how to incorporate eccentric overload training devices and this type of training into a year-long periodization schedule to maximize club head speed gains in adult trainees, as well as understand when and how these tools can be used for junior golfers to improve their performance. To make loading more customized, we will also look at what levels of inertia and what size of flywheel is optimal for each athlete based on various physical characteristics and the timing of their training in regards to year-long periodization.

The authors of this preliminary study believe these results warrant further research done in this capacity to measure more fully and clearly just how more effective flywheels and eccentric training may be to golfers looking to increase their clubhead speed safely. As such, we are currently looking at more targeted designs with larger sample group sizes to improve our ability to relate to the greater golfing public and elite.

Finally, the authors also want to emphasize the observational importance that was noticed when coaching athletes on the Kpulley and other rotational exercises as to proper cues and education on efficient use of ground reaction forces. When training athletes while using the blue tooth technology in the Kpulley, the authors noticed improved max power outputs and speeds when the athletes used the ground more efficiently as opposed to just “spinning” around. Depending on the attachment used (bar, rope, rotary sling) and the angle of the pulley, altering cues made a noticeable difference in the athlete’s ability to produce increased power. These numbers were not measured as a part of this study and we did not use force plate technology, but we did want to share this observation as a point for potential future research.

For instance, with the low to high chop with a rotational sling, when cues were given to drive from the trail foot instep in the line of vertical thrust with torsional drive, power and speed outputs increased greatly. One future study that would be of extreme value would be a combined study looking at ground reaction forces with different rotational exercises to understand optimal force generation rates in different kinetic vectors which is what we believe we were seeing the end results of.

With the idea of kinetic power profiles in golf swings and the increasingly available technology available to measure them in training, this is an exciting front to continue to push towards understanding and proving viable training methodologies and outcomes.

We would like to acknowledge and thank all of our members and golfers here at Par4Success who made this study possible and continue to put up with all of our curiosity and constant strive to learn something new every day!

[www.par4success.com](http://www.par4success.com)

Copyright Par4success - 2019

