

# Does the Direction of Application of Kinesio®Tape Have an Effect on Time to Peak Muscle Torque of the Concentric Contraction of the Quadriceps Muscle in Healthy Young Adults?

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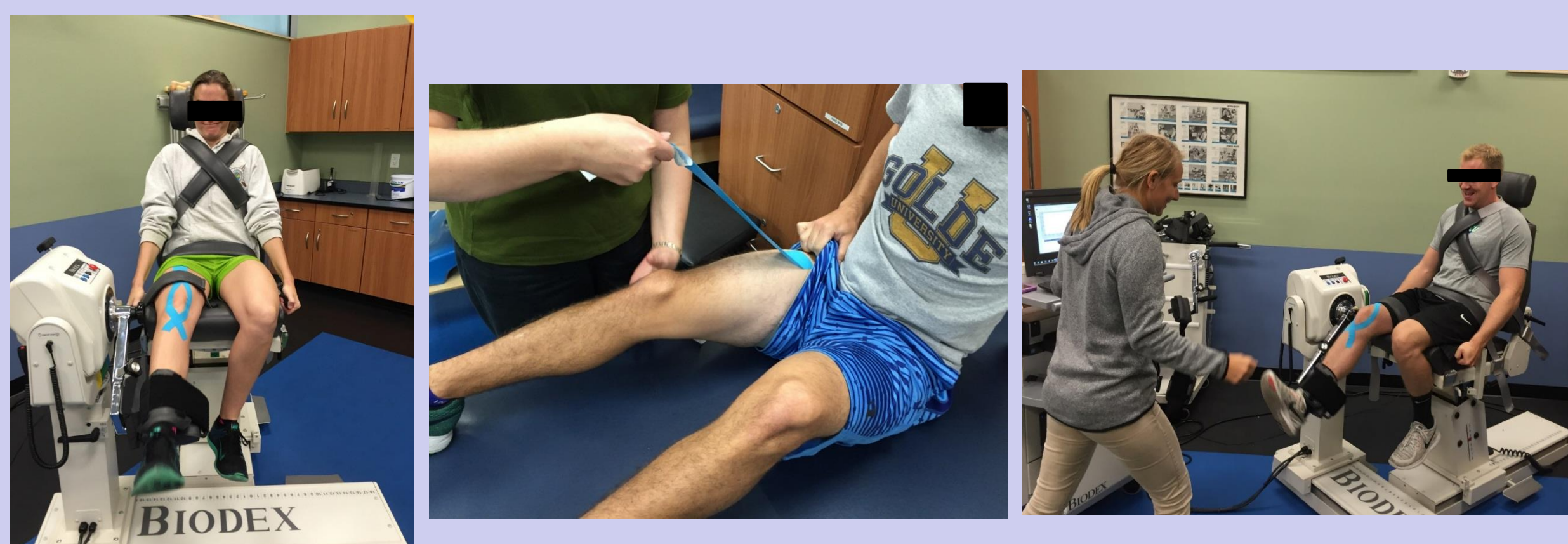
## Introduction

Kinesio®Tape is a well-known adhesive tape among many healthcare professionals and athletes around the world. Kinesio®Tape is commonly used for injury prevention, rehabilitation, and performance enhancement. Kinesio®Tape claims to improve the localized effect of fluid circulation, decrease pain, provide anatomical support, enhance muscle and joint range of motion, and assist proprioception.<sup>1</sup> Due to the increased familiarity and popularity of this taping method, it is important to understand the true effects it has on normal healthy muscle function. Previous studies<sup>2,3,4</sup> have shown that when the tape is applied from muscle origin to insertion with 25-50% tension on the tape, the time to peak muscle torque is decreased. There have been very few studies investigating the inhibitory effect that Kinesio®Tape claims to have by applying the tape from muscle insertion to origin.

Numerous studies have looked at the effect Kinesio® taping has on muscle strength and performance on healthy subjects with mixed results. However, current research is starting to show a common trend in results, that Kinesio® taping from muscle origin to insertion does not increase the peak torque in an individual's concentric contraction, but it does reduce the time it takes to reach it. Kinesio®Tape claims to have both a muscle facilitative effect and a muscle inhibitory effect depending on the method of application, although little research has analyzed the effect inhibitory taping has on muscle performance. In a study by Cai, Au, An, & Cheung,<sup>5</sup> findings concluded, that with the placebo effect of Kinesio®Tape eliminated, Kinesio®Tape did not facilitate or inhibit muscle activity and change the functional performance in healthy adults. While this study showed similar results with previous research that the facilitatory effect did not enhance muscular performance, it did not examine the effect the Kinesio® taping method had on the time it took to reach peak muscle performance. There is currently no research published that has investigated the time it took to reach peak torque in both facilitatory and inhibitory Kinesio® taping methods..

## Purpose/Research Question

- Previous studies<sup>2,3,4</sup> have shown that when the tape is applied from muscle origin to insertion with 25-50% tension on the tape, the time to peak muscle torque is decreased.
- There have been very few studies investigating the inhibitory effect that Kinesio®Tape claims to have by applying from muscle insertion to origin.
- Further research is necessary to explore the true effects that the directionality of application of the tape has on healthy muscle function.
- Research question: **“Does the direction of application of Kinesio® tape have an effect on time to peak muscle torque of the concentric contraction of the quadriceps muscle, in healthy young adults?”**



## Methods

- Randomized clinical trial consisting of 21 participants who performed 10 repetitions of maximum effort concentric quadriceps at 60 degrees/second, 120 degrees/second, and 180 degrees/second in a randomly assigned order of three taping conditions over three testing days.
- Each participant performed 10 repetitions of maximum effort concentric quadriceps contractions with one of the three taping conditions and without tape on each of the three testing days.
- The order of taping versus no taping was randomly assigned in addition to the order of the three taping conditions: facilitory application, inhibitory application, and no tension “placebo” application.
- The Biodex system 4 Pro Isokinetic dynamometer was used to measure the force production of concentric knee extension.

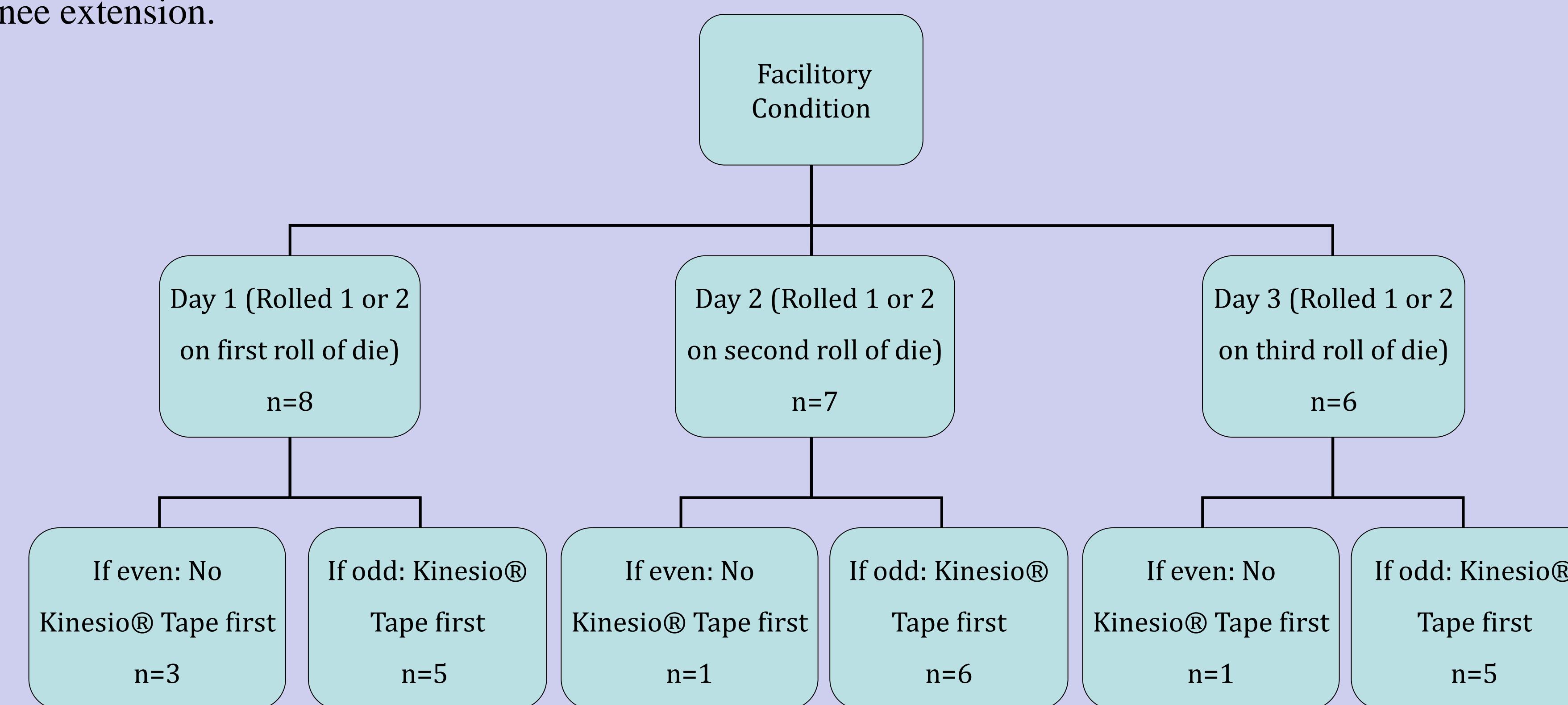


Figure 1. Example of randomization of taping condition. This process was replicated for “Inhibitory” and “Placebo” applications

## Results

- The 21 participants (mean ± SD age, 25.0 ± 3.63) completed all three testing days of the study.
- Data analysis displayed no statistically significant differences in maximum peak torque across all 4 taping conditions at all 3 velocities (60 deg/sec, 120 deg/sec, 180 deg/sec)
- Analysis of the time to peak muscle torque across all four taping conditions at the three velocities tested revealed no statistically significant differences with p values of 0.056, 0.835, and 0.264 respectively.
- A pairwise comparison among the taping conditions revealed that facilitory taping (from muscle origin to insertion) had the most impact on the decrease in time to peak torque (decrease of 49.52 milliseconds).

Table 1. Three pairwise comparison statistics of time to peak torque between conditions at 60 deg/sec

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of Diff.		t	df	Sig. (2-tailed)
				Lower	Upper			
<b>Pair 1:</b> Avg. time to peak torque at 60°/sec NT facilitory – (minus) avg. time to peak torque at 60°/sec facilitory tape	-.04952	.08500	.01855	-.08821	-.01083	-2.670	20	.015
<b>Pair 2:</b> Avg. time to peak torque at 60°/sec NT facilitory day – (minus) avg. time to peak torque at 60°/sec inhibitory tape	-.01952	.13332	.02909	-.08021	.04116	-.671	20	.510
<b>Pair 3:</b> Avg. time to peak torque at 60°/sec NT facilitory day – (minus) avg. time to peak torque at 60°/sec placebo (no stretch) tape	.02524	.12258	.02675	-.03056	.08104	.943	20	.357

References: See Handout with Reference List

## Results

- Analysis of the torque per body weight across all four taping conditions of the three velocities revealed no statistically significant differences with p values of 0.577, 0.894, and 0.691 respectively.
- Neither facilitory nor inhibitory effects were observed between various directions of application of Kinesio®Tape in the healthy young adult population when analyzing peak muscle torque.
- However, the present study suggests that the facilitory application of Kinesio®Tape decreases the time required to generate peak torque at the velocity of 60 deg/second during a concentric quadriceps contraction.
- This finding can have important implications for athletes that utilize Kinesio®Tape to improve their sports performance.

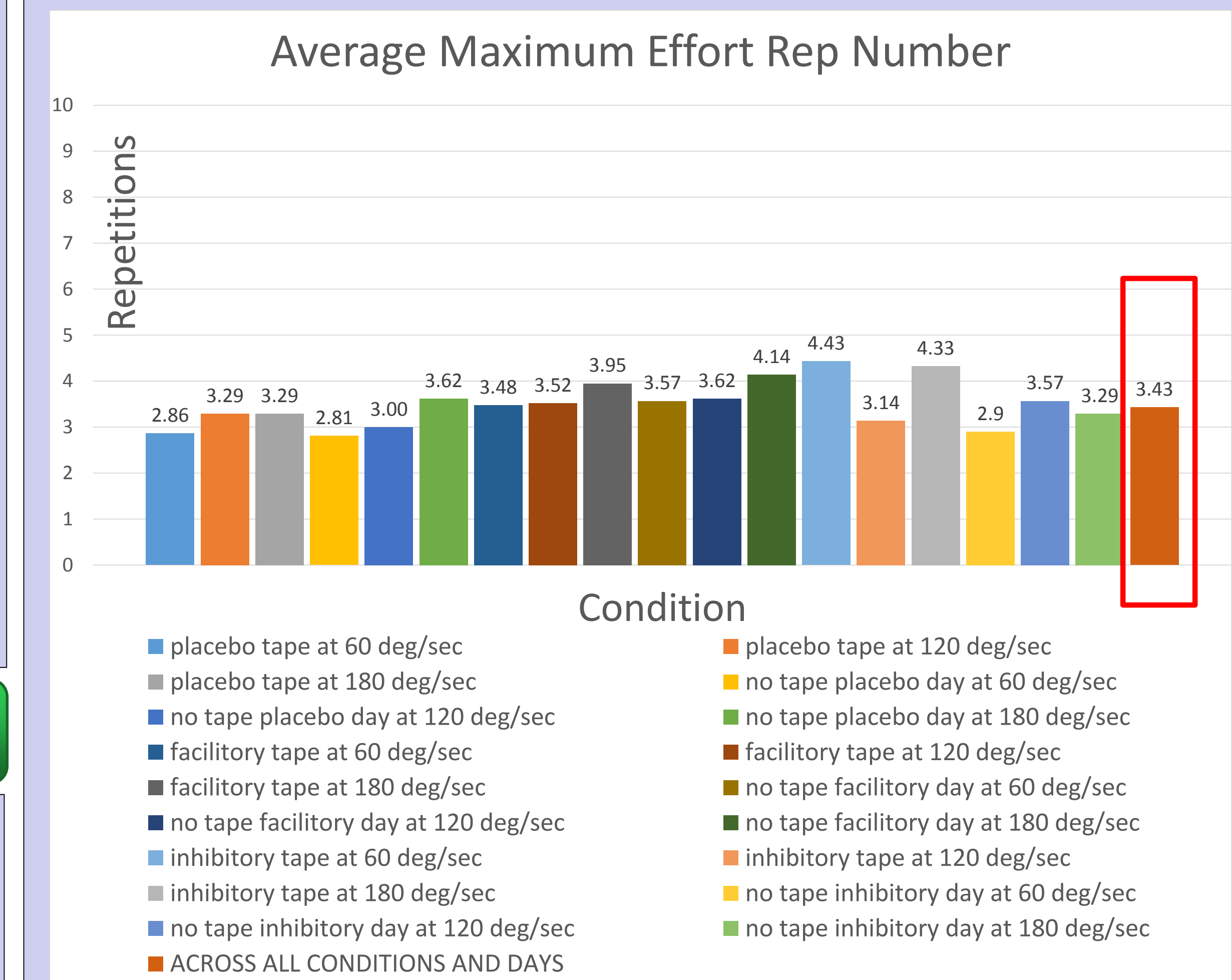


Figure 2. Average maximum effort repetition number for all conditions across all days. Average across all days and conditions was 3.43 repetitions.

## Conclusions

- This study demonstrated that direction of application of Kinesio®Tape did not have a significant positive or negative impact on maximal force production in concentric quadriceps contractions in healthy, un-injured adults.
- The time it took to reach peak muscle torque displayed a statistically significant decrease when Kinesio®Tape was applied in a facilitory pattern from muscle origin to insertion for the 60 deg/sec condition when compared to the no tape condition.
- The time it took to reach peak muscle torque was reduced by 49.52 milliseconds with facilitory Kinesio® Tape application.
- The average maximum effort repetition across all variables and testing days was 3.43 reps, suggesting that Kinesio® Tape application can be most beneficial in functional activities that require muscle power versus muscle endurance.

Note: This study was approved by the FGCU IRB Protocol #2013-11