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Differences in static stretching vs dynamic stretching in the vertical jump

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DIFFERENCES IN STATIC STRETCHING VS DYNAMIC STRETCHING IN THE VERTICAL JUMP

by

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CHAPTER 1

INTRODUCTION

The vertical jump has been used by many sports, such as football, baseball, basketball, and volleyball, to understand better how much power an individual produces in the lower body. Many researchers over the years have studied vertical jumping. For example, a study by (Marián et al., 2016) examined how to jump squat training over eight weeks affected vertical jump and sprint performance. Although that is one example, there are many more examples of researchers looking into what affects the vertical jump, and one thing to look at when discussing what affects, the vertical jump would be stretching precisely dynamic and static stretching.

Today stretching is essential before and after doing any physical activity. Although there are many stretching techniques, only four are the most common (static, dynamic, ballistic, and proprioceptive neuromuscular facilitation) (Chaabene et al., 2019). However, this paper will focus specifically on dynamic and static stretching. Static stretching involves holding a muscle group for a prolonged period (fifteen seconds), and dynamic stretching involves stretching a muscle group while moving.

Dynamic and static stretching have been around for ages, and plenty of studies discuss the effects of dynamic and static stretching. Although static and dynamic stretching can be a detriment to athletic performance if not done correctly, both stretching techniques can have immense benefits. Dynamic and static stretching benefits include increased range of motion, injury prevention, and improved performance (Behm et al., 2016). After discussing what dynamic and static stretching is and what the benefits are, I want to shift focus to how static and dynamic stretching affects the vertical jump.

Whether or not static or dynamic stretching helps the vertical jump is a highly debated

subject. Many studies indicate that dynamic and static stretching before the vertical jump will decrease (Holt & Lambourne, 2008; Power et al., 2004), other studies suggest that stretching before performing the vertical jump will increase the vertical jump (Montalvo & Dorgo, 2020; Palaniappan & Pasupatham, 2013), and some studies suggest that there is no effect of dynamic or static stretching on the vertical jump (Dalrymple et al., 2010; Robbins & Scheuermann, 2008). Therefore, the study's purpose was to test the difference between reasonable static and dynamic stretching before vertical jump performance.

CHAPTER 2

METHODOLOGY

INTRODUCTION

This section will provide all the procedures that were used in this study. The sections include a) Selection of Participants, b) Data Collection Procedures, c) Independent Variables, d) Dependent Variables, e) Statistical Analysis Procedures

SELECTION OF PARTICIPANTS

Ten healthy adults, eight males, and two females, between the ages of eighteen and thirty-five, were recruited to participate in this study. The researcher recruited the participants via email, a flyer, and word of mouth. Before participating in the study, each participant was given a consent form. Participants read and signed the consent form and then started the study. Participants did a walk-through of all the movements performed in the study to show and teach them what to do. Participant's height, weight, age, and sex were measured and recorded before each participant began the study.

DATA COLLECTION PROCEDURES

The researcher instructed the participants on what they would be doing. Participants began with a warm-up. Participants skipped up and down the basketball court for 30 seconds. After skipping, participants completed the three no stretch vertical jumps. Participants rested for 30 seconds and then completed the dynamic stretch followed by three vertical jumps. Participants rested for 30 seconds and then completed the static stretch followed by three vertical jumps. Finally, the participants rested for 30 seconds and completed the extended static stretch followed by three vertical jumps. Participants were allowed as much time as they wished to complete the vertical jumps. In the no stretch condition, the participants rested for 30 seconds. In

the dynamic stretch condition, the participants did a walking hamstrings stretch for 30 seconds. In the static stretch condition, the participants did a standing pullback quadriceps stretch. Each leg was held in a stretch for 30 seconds. In the extended static stretch condition, participants did a standing pullback quadriceps stretch and held the stretch on each leg for one minute. After completing the condition, the participants completed three standing vertical jumps. The vertical jump height was measured to the nearest half an inch with a Vertec. After each vertical jump, the participants rested for 15 seconds. After completing the three vertical jumps, the participants completed a self-selected cool down in the gym.

INDEPENDENT VARIABLE

The independent variable for this study was the four conditions that were completed prior to the vertical jump. They were no stretch, dynamic stretching, static stretching, and extended static stretching.

DEPENDENT VARIABLE

The dependent variable for this study was vertical jump height as measured with the Vertec after each of the independent variables was completed.

STATISTICAL ANALYSIS

The data were analyzed with a one-way repeated measures analysis of variance. The average of the three vertical jumps after each condition was used for the analysis. When a main effect of treatment was found Bonferroni post-hoc was performed to determine the difference between the mean jump heights. An alpha level of $p < .05$ was used to determine the statistical significance.

CHAPTER 3

RESULTS

There were 10 participants in this study. There were 8 male and 2 female participants. The average age of the participants was 25 years. The average height of the participants was 174.8 centimeters with a standard deviation of 10.1. The average mass of the participants was 77.5 kg with a standard deviation of 13.3.

Vertical jump height was measured three times during four conditions. The average vertical jump for the no stretch condition was 20.9 inches with a standard deviation of 6.1 inches. The average vertical jump for the dynamic stretch condition was 23.5 inches with a standard deviation of 8.4 inches. The average vertical jump for the static stretch condition was 24.0 inches with a standard deviation of 8.6 inches. The average vertical jump for the extended static stretch condition was 23.9 inches with a standard deviation of 8.0 inches.

The repeated measures analysis of variance revealed a significant effect of the conditions $F(3, 27) = 4.648$, $p = .0096$. Four single degree of freedom contrasts were done to examine the mean differences: Dynamic stretch vs. Static stretch, Dynamic stretch vs. Extended Static stretch, Static stretch vs. Extended static stretch, and No stretch vs. the average of the three other conditions. There were no significant differences between Dynamic stretch and Static stretch, $F = .204$, $p = .6550$. There were no significant differences between Dynamic stretch and Extended static stretch, $F = .151$, $p = .7005$. There were no significant differences between Static stretch and extended static stretch, $F = .004$, $p = .9502$. There were significant differences between No stretch and the average of the Dynamic stretch, Static stretch, and Extended static stretch, $F = 13.705$, $p = .0010$.

CHAPTER 4

DISCUSSION

This study aimed to test the difference between static and dynamic stretching before vertical jump performance. The findings of this study showed that stretching before a vertical jump increased the vertical jump. The type of stretch did not matter as a dynamic stretch, or a static stretch, or an extended static stretch all resulted in greater vertical jump heights.

When comparing the stretching techniques (i.e., Dynamic stretch vs. Static stretch, Dynamic stretch vs. Extended Static stretch, Static stretch vs. Extended static stretch), there were no significant differences in the jump height between the stretching techniques. However, when comparing no stretch to the dynamic, static, and extended static stretches, there was a 2.9-inch increase in jump height among the participants. A factor that could have contributed to this result was warm-up. It could be the added warm-up of the light stretching lead to an increase in jump height.

One of the observations during this study was an apparent motivational factor between the males during this study. Whenever male participants were in a group, they jumped higher than males being tested by themselves. A group situation seemed to motivate the male participants to jump higher due to competition between the participants.

This study had limitations in the number of participants and the group testing of participants. There was a significant increase in jump height with light stretching before jumping. This is a unique and different finding. This increase may be an artifact of the small number of participants and the constant order of testing. More participants and a randomized testing order for each participant would help us further understand the effects of light stretching before jumping. Also, group testing of participants resulted in competition between participants.

Competition is not bad but without a randomized testing order it may have led to the present results.

CHAPTER 5

CONCLUSION

In conclusion, this study aimed to test the difference between static and dynamic stretching before vertical jump performance. Based on this analysis, stretching before the vertical jump will increase an individual's jump height. Future research needs to address the limitations of this study, but the effects of light stretching seems to increase performance and this is worth further exploration.

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APPENDIX

Statistical Analysis

Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-Value	P-Value	G-G	H-F
Subject	9	2095.405	232.823				
Treatments	3	63.149	21.050	4.648	.0096	.0418	.0358
Treatments * ...	27	122.274	4.529				

Dependent: Jump Height

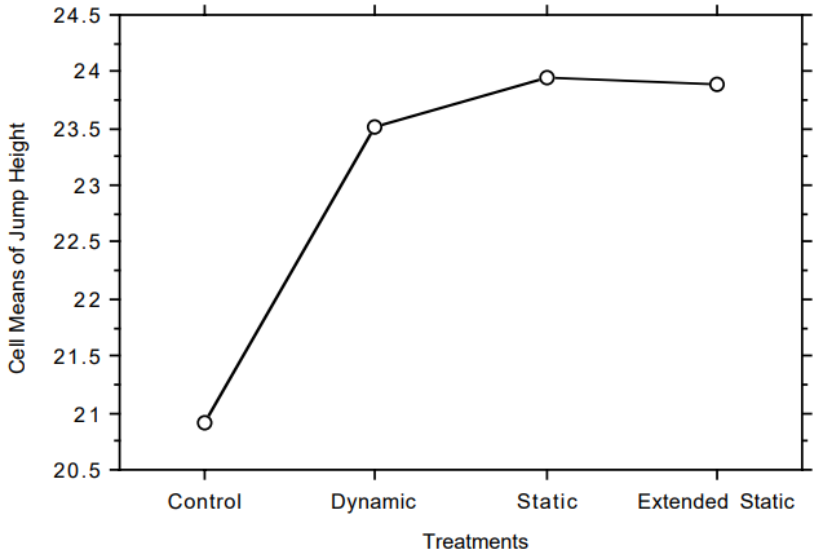
Table of Epsilon Factors for df Adjustment
Dependent: Jump Height

	G-G Epsilon	H-F Epsilon
Treatmen...	.459	.515

Means Table
Effect: Treatments
Dependent: Jump Height

	Count	Mean	Std. Dev.	Std. Error
Control	10	20.910	6.139	1.941
Dynamic	10	23.520	8.433	2.667
Static	10	23.950	8.609	2.723
Extended Static	10	23.890	7.968	2.520

Interaction Plot
Effect: Treatments
Dependent: Jump Height



Dynamic vs. Static
Effect: Treatments
Dependent: Jump Height

	Cell Weight
Dynamic	1.000
Static	-1.000

df	1
Sum of Squares	.925
Mean Square	.925
F-Value	.204
P-Value	.6550
G-G	.4690
H-F	.4953

Dynamic vs. Extended Static
Effect: Treatments
Dependent: Jump Height

	Cell Weight
Dynamic	1.000
Extended Static	-1.000

df	1
Sum of Squares	.684
Mean Square	.684
F-Value	.151
P-Value	.7005
G-G	.5032
H-F	.5316

Static vs. Extended Static
Effect: Treatments
Dependent: Jump Height

	Cell Weight
Static	1.000
Extended Static	-1.000

df	1
Sum of Squares	.018
Mean Square	.018
F-Value	.004
P-Value	.9502
G-G	.7832
H-F	.8151

Control vs. Warm up
Effect: Treatments
Dependent: Jump Height

	Cell Weight
Control	1.000
Dynamic	-.333
Static	-.333
Extended Static	-.333

df	1
Sum of Squares	62.064
Mean Square	62.064
F-Value	13.705
P-Value	.0010
G-G	.0094
H-F	.0074

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