

# Les Mills Lab: The Effect of Squat Load and Depth in BODYPUMP



## Introduction

Squat training in BODYPUMP™ has two key variables: depth and load. This study looked at the effect of these parameters on muscle activation in the lower limb during a typical BODYPUMP squat condition.

A greater understanding of the effects of squat load and depth will help instructors coach participants to execute their squat track in a way that maximizes effectiveness.

## Hypothesis

The aim of this study was to establish the effect of squat load and squat depth on the EMG activity of vastus lateralis, gluteus maximus, biceps femoris and lateral gastrocnemius in BODYPUMP participants.

## Method

Ten female BODYPUMP participants (age  $41 \pm 9$  years) performed 1 set of 7 squats under four conditions, representing every combination of two depths ( $90^\circ$  knee angle and  $125^\circ$  knee angle) and two loads (23% bodyweight and 38% bodyweight).

EMG readings were collected from the quadriceps (vastus lateralis), gluteus maximus, hamstrings (biceps femoris) and calf muscles (lateral gastrocnemius).

## Results

Depth of squatting had a significant effect on mean and peak activity of the quadriceps and gluteus maximus, and peak activity of biceps femoris and lateral gastrocnemius. More

specifically, activity of quads and glutes is greater in a  $90^\circ$  (deeper) squat than in a  $125^\circ$  (shallower) squat. Mean activity of vastus lateralis was 1.3–1.4 times greater at  $90^\circ$  than at  $125^\circ$ . Peak activity was 1.8–1.9 fold greater at  $90^\circ$ .

The effect of load was significant for mean and peak activity of gluteus maximus and lateral gastrocnemius.

## Conclusion

BODYPUMP is a high repetition, low weight, resistance training class which is popular across a wide range of participants, many of whom do not participate in any other types of strength training.

The effectiveness of the class is dependent on reaching a state of fatigue at the end of each track.

The squat track is the major focus for the legs. Participants are encouraged to select a weight and adopt a range of motion that will significantly challenge the target muscles (glutes and quads).

This investigation highlights the importance of weight selection and range which combine to increase muscle activation and ultimately generate a fatigued state in the target muscle groups. It is this level of fatigue that determines the physiological response to the class.

Instructors can be confident that encouraging a challenging weight selection and coaching full range squats will significantly increase the likelihood of delivering the changes of improved strength and developing lean muscle mass that people seek when coming to class.

To access the full report – [click here](#).