

# Effects of a Commercial Vibrating Climbing Device on Upper and Lower Extremity Flexibility.

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## Abstract

Different forms of vibration have been shown to produce beneficial effects within various populations in the form of enhanced force production, speed, and flexibility. Most commonly, the vibration is applied via an oscillating platform on which individuals either stands motionless or performs closed-chain movements. Little research has examined the application of vibration during the performance of repeated, rhythmical endurance activities. **Purpose** The purpose of this investigation was to examine the acute effects of a commercial vibrating climbing exercise device on upper and lower extremity flexibility. **Methods** Fourteen recreationally active persons (7 male, 7 female) voluntarily participated in this research study. Following familiarization, each subject participated in three testing sessions with different study conditions, in randomized order with one week between test sessions. The three study conditions included climbing for five minutes with vibration (CV), climbing for five minutes without vibration (C), and a control condition (CON). Prior to and following each study condition, each subject underwent assessment of lower extremity flexibility and upper extremity flexibility using a basic sit-and-reach test and shoulder static flexibility test. The pre- and post-treatment scores for each test were compared between conditions and time using two-way ANOVA for repeated measures. When warranted, change scores were compared pairwise between treatment conditions using paired T-tests with the level of statistical significance adjusted by Bonferonni correction ( $p < 0.0167$ ). **Results** Analyses revealed a significant main effects for time ( $p < 0.01$ ) and statistically significant time X treatment interactions for both flexibility tests ( $p < 0.05$ ). Secondary analyses revealed that the increase in sit-and-reach scores with CV (2.4cm) was statistically greater ( $p < 0.017$ ) than CON (1cm). The C condition resulted in a mean 1.6 cm increase in sit-and-reach scores which was not statistically different from CON ( $p = 0.20$ ). The sit-and-reach change scores were not significantly different between the C (1.6 cm) and CV (2.4 cm) conditions ( $p = 0.09$ ). Similarly, the shoulder reach change scores of the CV condition were significantly better than CON (3.6 cm vs. 0.3). The C condition (1.2 cm) was not significantly different from CON ( $p = 0.2$ ). **Conclusions** A modest, five minute period of climbing with vibration produces a statistically significant increase in both upper and lower extremity flexibility. **Practical Applications** Individuals may elect to use a vibrating climbing device, as an improved form of dynamic warm-up, in order to enhance upper and lower body flexibility prior to participating in more rigorous exercise training.

## Introduction and Purpose

Vibration training has been demonstrated to produce significant acute effects and chronic adaptations in a number of diverse populations. These effects and adaptations have been shown in different populations ranging from persons with cervical level spinal cord injury to elite athletes with effects including enhancements of muscular strength and power as well as improvements in range of motion. The vast majority of the studies of vibration training have examined the effects of vibrating platforms on which the individual generally stands in static position(s). Some investigations have investigated the use of such platforms for dynamic exercise in the form of squatting movements, both with and without added resistance. Very few studies have investigated other forms of dynamic exercise with superimposed oscillatory motions. The purpose of the study was to determine the acute effects of exercising with a commercial climbing device with superimposed vibration (VersaVibe) in comparison with conventional climbing without vibration and in comparison with a control condition in recreationally active persons.

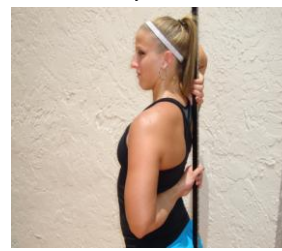
## Methods

Fourteen persons (7 male, 7 female) voluntarily participated in this research study. The subjects were aged 18.2 to 30.7 years old with mean body mass of 78.5 kg. and mean height of 170.9 cm. The subject pool was primarily composed of exercise science college students who are presumably active regularly on a recreational basis.



Following familiarization, each subject participated in three testing sessions with different study conditions, in randomized order with one week between test sessions. The three study conditions included climbing for five minutes with vibration (CV), climbing for five minutes without vibration (C), and a control condition (CON).

Prior to and following each study condition, each subject underwent assessment of lower extremity flexibility and upper extremity flexibility using a basic sit-and-reach test and shoulder static flexibility test.



The pre- and post-treatment scores for each test were compared between conditions and time using two-way ANOVA for repeated measures. When warranted, change scores were compared pairwise between treatment conditions using paired T-tests with the level of statistical significance adjusted by Bonferonni correction ( $p < 0.0167$ ).

## Results

Analyses revealed a significant main effects for time ( $p < 0.01$ ) and statistically significant time X treatment interactions for both flexibility tests ( $p < 0.05$ ).

Secondary analyses revealed that the increase in sit-and-reach scores with CV (2.4cm) was statistically greater ( $p < 0.017$ ) than CON (1cm). The C condition resulted in a mean 1.6 cm increase in sit-and-reach scores which was not statistically different from CON ( $p = 0.20$ ). The sit-and-reach change scores were not significantly different between the C (1.6 cm) and CV (2.4 cm) conditions ( $p = 0.09$ ).

### Sit and Reach Testing (cm)

Condition	Pre-Treatment	Post-Treatment	Chg
Control	33.0 ± 9.9	33.0 ± 9.6	0.0
Climbing	32.4 ± 9.4	34.0 ± 8.1	1.6
Climbing w/ Vibration	31.5 ± 9.9	33.9 ± 9.1	2.4

\* denotes statistically significant difference ( $p < 0.17$ ) between Control and Climbing w/ Vibration

Similarly, the shoulder flexibility change scores of the CV condition (-3.6cm) were significantly greater than CON (-0.3 cm) ( $p < 0.017$ ). The change scores between CV and C were not statistically different ( $p = 0.022$ ). The C condition (0.6 cm) was not significantly different from CON ( $p = 0.2$ ).

### Shoulder Rotation Flexibility Testing (cm)

Condition	Pre-Treatment	Post-Treatment	Chg
Control	12.4 ± 8.3	12.1 ± 7.8	-0.3
Climbing	12.6 ± 6.3	11.4 ± 5.9	-1.2
Climbing w/ Vibration	15.7 ± 9.2	12.1 ± 8.6	-3.6

\* denotes statistically significant difference ( $p < 0.17$ ) between Control and Climbing w/ Vibration

## Conclusions

Dynamic exercise, in the form of climbing, with superimposed vibration (60 hZ), produces significantly greater increases in upper and lower extremity flexibility compared with control conditions. These preliminary findings suggest that climbing with vibration may serve as a productive warm-up activity that provides significant acute enhancement of both upper and lower extremity flexibility.

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