Effect of Biomechanical Muscle Stimulation using the swisswing®:
Low back flexibility and perceived low back stiffness in college-aged students, college-aged athletes, and active elderly participants

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Brief Description of the Study

The purpose of this study was to determine whether biomechanical muscle stimulation therapy is an effective tool to increase back flexibility. The machine used in this study was the swisswing® which rotated at 20 hertz to provide biomechanical muscle stimulation (via vibration) to the body tissue. More specifically, this device is used to transfer mechanical vibrations to nerve and muscle tissue at frequencies that are similar to the natural muscle tone. The goals for this study were to determine if biomechanical muscle stimulation increases flexibility as measured by a pre and post sit and reach test. The subject rated perceived back stiffness as measured by a pre- and post- (0-10) likert scale.

The groups of participants were used for this study. Kent State University athletes, physically active college students, and a physically active elderly population were the subject groups for this study. A control group also was used.

Each participant completed a pre test sit and reach test and a pre test back stiffness rating. This standardized, valid and widely accepted means of testing low back flexibility involved the participant sit with legs straight out and to lean forward from the hips to obtain a specific measurement. Three measures were taken then averaged. The Back Stiffness Rating scale was a simple paper/pencil rating of 0-10 with 10 equaling the most stiffness.

The treatment protocol consisted of the following BMS positions on a swisswing® machine for two minutes each at 20 hertz: standing gluts (participant leans with their buttocks pressing on the swisswing® drum), standing hamstrings (participant leans against the machine with the belly of the hamstrings – mid upper leg posteriorly – resting on the drum), standing and seated low back (participant leans against the drum of the swisswing® with their left then right low back musculature – Erector Spinae group collectively – resting on the drum while standing then seated on a stool positioned to the appropriate height to contact desired musculature). Immediately following the treatment the subject completed the post test stiffness scale and the post sit and reach test.

Summary of Study Findings

The following are figures with captions outlining the objective (sit-and-reach) and subjective effects of the swisswing® treatment on college-aged athletes (N=10), non athletes (N=20) and senior citizens (N=15) relative to a group of college aged adults that received no treatment (N=19). There were main effects of time (pre, post) for both variables however only the group by time interactions are presented as this information supersedes the less informative main effect of time. There is a main effect of gender for sit-and-reach and a gender by group by time interaction for stiffness. Figures 1 and 2 reflect the significant findings relative the low back flexibility and perceived stiffness, respectively.
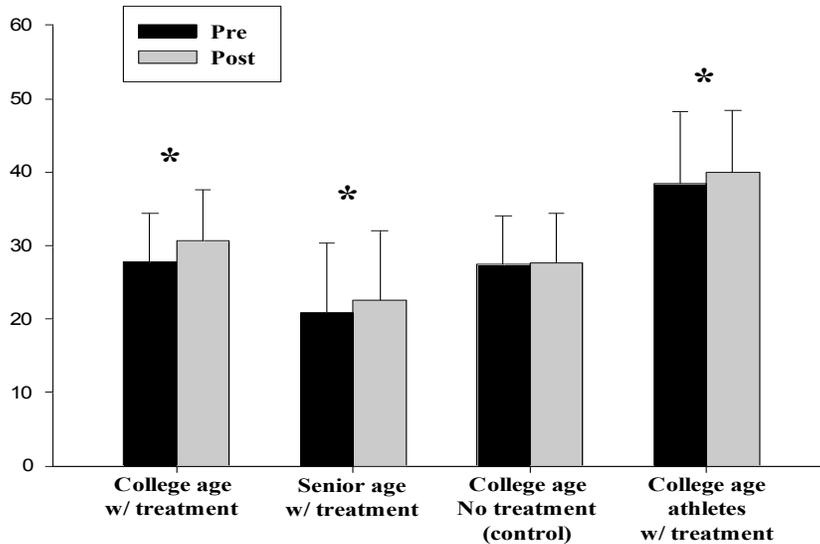
Figure 1. Sit and reach performance

Figure 1. Sit and reach before and after treatment or a period of no treatment (control) in college age athletes and non athletes and senior citizens. Group (college age w/ treatment, senior age, control, athletes) by gender (male, female) by time (pre, post-treatment) ANOVA, with repeated measures on time, demonstrated a significant group by time interaction ($P < 0.007$). The interaction was due to significant increases ($P < 0.045$) in sit-and-reach performance after treatment (pre to post) in each group except for control. *Indicates a significant increase in sit and reach performance from pre- to post-treatment.

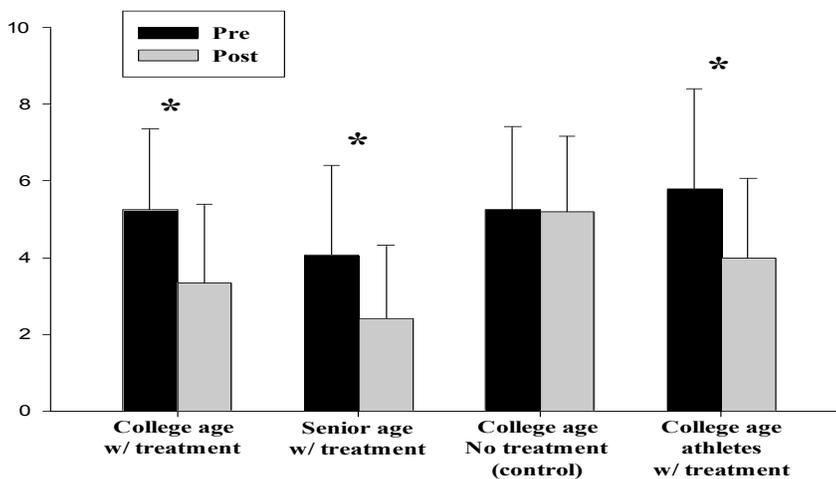**Figure 2: Perceived Stiffness (Likert)**

Figure 2. Back stiffness, assessed via Likert scale, before and after treatment or a period of no treatment (control) in college age athletes and non athletes and senior citizens. Group (college age w/ treatment, senior age, control, athletes) by gender (male, female) by time (pre, post-treatment) ANOVA, with repeated measures on time, demonstrated a significant group (college age w/ treatment, senior age, control, athletes) by time (pre, post-treatment) interaction ($P < 0.001$). The interaction was due to significant decreases ($P <$

0.001) in back stiffness after treatment (pre to post) in each group except for control. *Indicates a significant decrease in back stiffness from pre- to post-treatment.