



Effect of a Suspension-Trainer Based Movement Program on Performance and Functional Movement in Youth

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ABSTRACT

Suspension-training is a physical activity modality that may have potential to improve fitness and athletic performance in children. However, the efficacy of this training method has not been studied among youth. **Purpose:** To assess the efficacy of a suspension-training movement program on performance and functional movement in youth athletes, compared to a control group. **Methods:** Participants (n=28) participated in at least one organized sport (46% male; mean $\pm$ sd: age 9.3 $\pm$ 1.5 yrs; BMI percentile 68.6 $\pm$ 27.5). Outcome variables were measured at baseline and one week after the last session. Standing long jump (SLJ, cm) and the 4x10 meter shuttle run (SR, sec) assessed performance. The Functional Movement Screen™ (FMS) measured functional movement by evaluating stability and mobility (maximum possible score=18). Following baseline assessments, participants were randomly assigned to intervention (INT; n=16) and control (CON; n=12) groups. The INT group participated in a six-week suspension-training movement program, adapted from TRX Training For Schools (Fitness Anywhere, LLC, San Francisco, CA) for two one-hour sessions per week. Pre- and post-performance and FMS measurements within INT and CON groups were compared using paired *t*-tests. Repeated measures analyses of variance were used to assess mean variable changes between INT and CON. **Results:** The mean SR time was significantly slower for INT compared to CON (INT: 0.46 $\pm$ 1.2, CON: -0.73 $\pm$ 1.2; *p*=0.01). A significant group by time interaction indicated that the FMS scores for INT increased significantly more than the scores for CON (INT: 4.0 $\pm$ 2.6, CON: -0.42 $\pm$ 2.9; *p*<0.01). No significant effects were detected for the SLJ. **Conclusion:** The suspension-training based movement program used here may be beneficial to improve functional movement in children. These improvements, however, did not translate into performance gains. Results of this study suggest that youth fitness and performance program designers may want to incorporate suspension-training to improve stability and mobility.

INTRODUCTION

- The 2008 Physical Activity Guidelines for Americans recommend that children and adolescents, ages 6-17, include muscle- and bone- strengthening activities as part of their daily physical activity on at least three days per week (1).
- In addition to health and fitness benefits, resistance training may improve athletic performance related skills in children (2).
- In the 2014 International Consensus on youth resistance training, Lloyd et al. indicated that a variety of modalities may be appropriate and effective for children. The authors also noted that children should demonstrate competence with basic bodyweight techniques before progressing to other forms of training involving external resistance (3).
- Suspension-training is a physical activity modality that may have potential to improve fitness and athletic performance in children. This muscle-strengthening training modality allows for a variety of modifications and progressions of basic bodyweight movements. However, the efficacy of this training method has not been studied among youth.
- One of the aims of this study was to assess the efficacy of a suspension-training movement program on athletic performance skills (i.e. power, speed, and agility) and functional movement (i.e. stability and mobility) in youth athletes, compared to a control group.

METHODS

Participants / Procedure

- Twenty-eight children (46% male; mean $\pm$ sd: age 9.3 $\pm$ 1.5 yrs; BMI percentile 68.6 $\pm$ 27.5) that participated in at least one organized sport were randomized into an intervention (INT) or control (CON) group.
- Outcome measurements were assessed in all participants at baseline and immediately post-intervention (i.e. within two weeks).

Measurement of Outcomes

- Speed and agility were assessed via the 10-meter shuttle run (SR, sec).
- Muscular power was assessed using the standing long jump test (SLJ, cm).
- Functional movement (stability and mobility) were measured with the Functional Movement Screen™ (FMS), which consisted of seven movements (i.e. deep squat, hurdle step, inline lunge, shoulder mobility, active straight-leg raise, trunk stability pushup, and rotary stability).

Intervention

- INT participants selected one of two study sites: Continuum Performance Center in East Longmeadow, MA (n=9) or the University of Massachusetts Amherst in Amherst, MA (n=7).
- The INT group participated in a six-week suspension-training movement program, Adapted from TRX Training For Schools (Fitness Anywhere, LLC, San Francisco, CA) for two one-hour sessions per week.



Statistical Analysis

- 2-sample *t*-tests (age, BMI percentiles, and performance variables) and a Fisher's exact test (gender) were used to assess baseline differences between treatment groups.
- Repeated measures analyses of variance were used to assess mean pre- and post-performance changes between INT and CON.

RESULTS

Table 1. Baseline Descriptive Statistics Between Treatment Groups

	Intervention (n=16)	Control (n=12)	P-value
Age	9.88 $\pm$ 1.36	8.58 $\pm$ 1.51	0.02
Gender	62.5% male	25.0% male	0.04
BMI Percentile	59.5 $\pm$ 32.6	80.7 $\pm$ 11.0	0.06
Shuttle Run (sec)	12.1 $\pm$ 0.3	12.8 $\pm$ 0.6	0.73
Standing Long Jump (cm)	148.8 $\pm$ 4.5	139.0 $\pm$ 4.3	0.14
FMS (score)	14.3 $\pm$ 0.8	15.5 $\pm$ 0.5	0.26

Figure 1. Mean Pre-Post Difference in Shuttle Run Time Between Treatment Groups

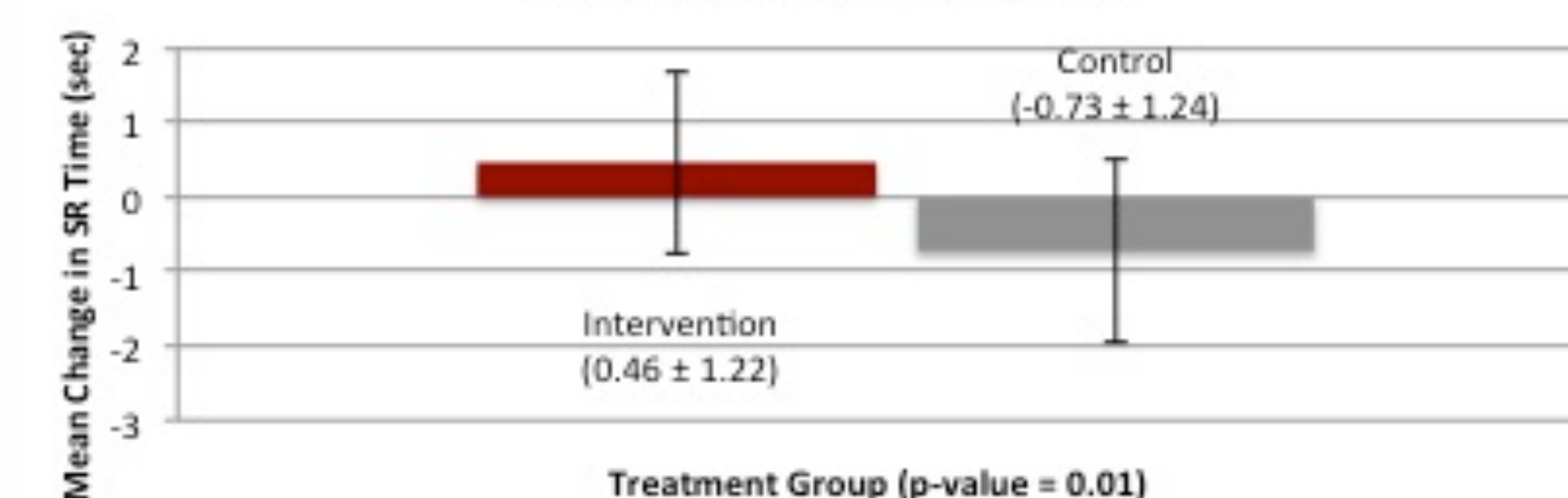
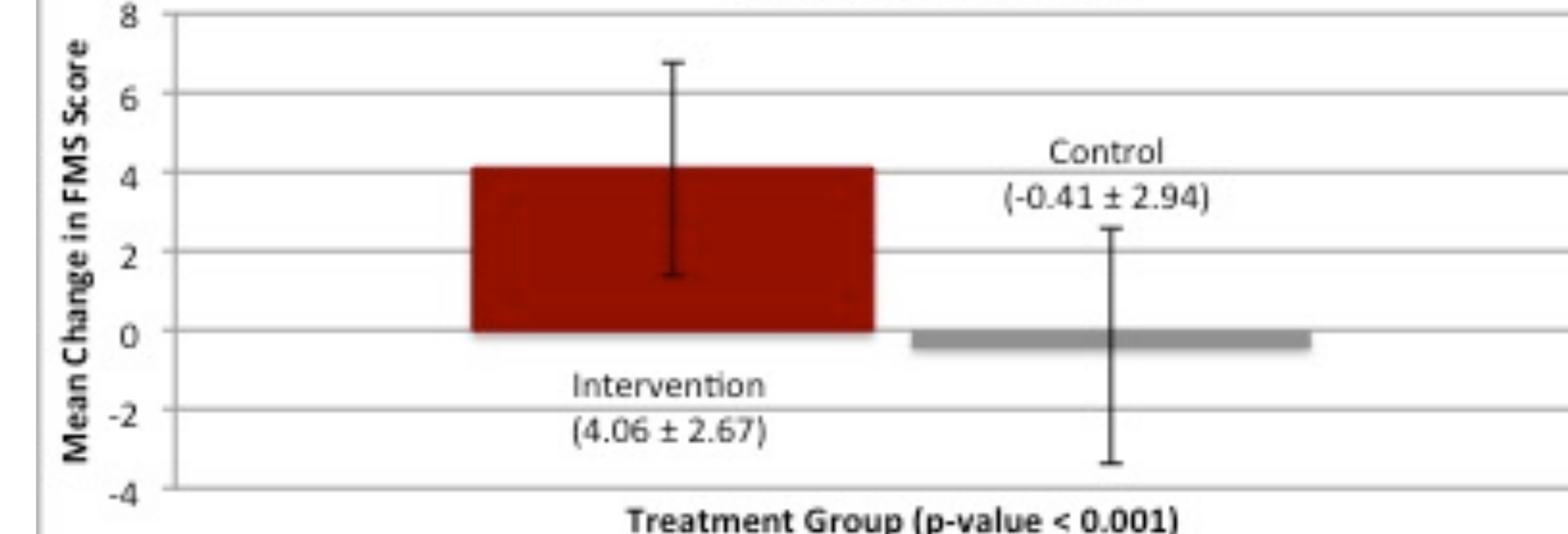


Figure 2. Mean Pre-Post Difference in FMS Scores Between Treatment Groups



DISCUSSION

- The suspension-training based movement program used may be beneficial to improve functional movement in children. These improvements, however, did not translate into performance gains.
- Results of this study suggest that youth fitness and performance program designers may want to incorporate suspension-training to improve stability and mobility.
- A negative association between BMI and FMS scores exists in children (4). However, in a 4-week body weight and elastic resistance movement program, FMS scores did not improve in a study by Wright et al. (5).
- Suspension-training may benefit the functional movement of children who are classified as overweight or obese. Future research is needed to examine the health benefits of suspension-training in the general youth population.

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