Effects of TRX versus Traditional Training Programs on Core Endurance and Muscular Strength

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Abstract

Few studies have been conducted evaluating possible benefits and effectiveness of TRX training when compared to traditional resistance training. **PURPOSE**: Therefore, the purpose of this study was to examine the effects of TRX and traditional training on designated variables. **METHODS:** Fifty-four younger (19-25 yrs) and middle-aged/older adults (44-64 yrs) were randomized into a TRX (younger n = 15; older n = 8) or traditional (younger n = 14; older n = 7) program within their respective age group. A control group was selected from the younger population (n = 10). Prior to and after completing the 7-wk program the participants were evaluated using the following measures: 5RM strength testing, flexibility, abdominal skin fold, waist circumference, core endurance, and Biodex fall risk balance tests. **RESULTS:** Within the young adult population there were significant ($p < .05$) improvements pre- to post-training in Abdominal Flexor, Back Extensor, LSB and RSB, Balance, Flexibility, and Lower Body Strength following training for both the TRX and traditional groups. The older adult population showed significant ($p< .05$) improvements pre-to post-training in Back Extensor, LSB and RSB, and Lower Body Strength following training for both the TRX and traditional groups. **CONCLUSION:** TRX training methods are just as beneficial for increasing core endurance, flexibility and measures of functional movement compared to a more traditional training program.

Introduction

- Functional training/fitness has been defined by Tomljanovic et al (2011) as emphasizing upper and lower body activities that require the use of multiple muscle groups and joints.
- There are several proposed benefits of functional training including increases in core muscle activation (Weiss et al 2010), improvements in postural control and precise coordination (Tomljanovic et al 2011), upper and lower body strength, agility, plus dynamic balance, and shoulder flexibility (Milton et al 2008).
- Traditional resistance training utilizes fixed machines or movements that isolate body parts, joints, and muscles, and are often the first exercises incorporated in any resistance training program because of the established gains that these programs have regarding specific training adaptations such as increases in upper and lower body strength (MacDonald et al 2012; Solberg et al 2013; Weiss et al 2010).
- Whitehurst and colleagues (2005) believe that it is impractical for older adults to use machines and free weights when resistance training as they do not represent everyday movements.
- TRX Training is a form of functional training that has recently increased in popularity but there is little to no information on the benefits or effectiveness of this training technique.

Are functional based TRX programs as effective as traditional based for improving the variables of upper and lower body strength, core endurance, flexibility, balance, and body composition?

Purpose and Hypothesis

The purpose of this study was to determine possible differences between TRX and traditional training on measures of upper and lower body strength, core endurance, flexibility, balance, and body composition. A secondary aim of this study was to compare TRX training adaptations within younger and older populations. The hypothesis of the study is that TRX training yields greater gains in core endurance, balance, and flexibility with no difference in upper and lower body strength and body composition compared with traditional training. Also, within each population, there will be a relative increase in upper and lower body strength, core endurance, flexibility, and body composition but older adults will achieve greater gains in balance.

Methods

Subjects

- 54 recreationally active men and women, ages 19-64,participated in this study
- 44 participants were divided into categories based on age (19-25 and 44-64).
- 10 young adults served as the control group
- Randomly assigned to one of two groups: Functional n=12 or Traditional n=12

Participant Requirements

- Complete pre- and post-testing
- Attend 19 of 21 training sessions in 7 weeks
- Train no more than two consecutive days
- Complete ONLY assigned lifts
- No limiting injuries

Procedures

- Pre-testing was completed over 4-day period. Tests included:
  - Height, weight, abdominal skinfold, and waist circumference
  - Timed flexion, extension, RSB, and LSB endurance
  - Balance and flexibility measurements
  - 5 RM tests for upper and lower body strength
- Orientation to specific resistance program was held within 1 week after pre-testing
- Researchers were each assigned ~6 participants to meet with once per week to progress participants, observe/correct lifting technique, and answer questions
- Functional training group exercises (refer to Figure 1):
  - **Chest Press, Suspended Lunge, 2-arm row, Squat, Y-T-W, Hamstring curl, Tricep Extension, Single leg stiff leg dead lift, Front plank, Isometric side hold with pallof press**
- Traditional training group exercises (refer to Figure 2):
  - **Bench Press, Lunge, 2-arm row, Squat, Y-T-W bench, Hamstring curl, Tricep Extension, Single leg stiff leg dead lift, Front plank, Isometric side hold**

Statistical analyses

- 1-way ANOVA to determine group differences at pre-testing
- Descriptive Statistics
  - Mean and standard deviation
- 2-way ANOVA with repeated measures
  - IVs: Time vs. Group
  - Mean percent change pre- to post-training within groups
  - Alpha level set at $p < .05$
- SPSS Inc. Version 19.0

Figure 1. TRX Training Exercises

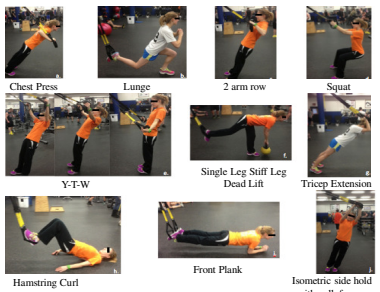
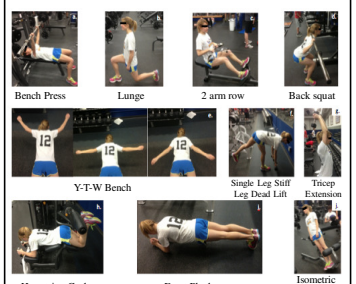


Figure 2. Traditional Training Exercises



Results

- **Adherence:**
  - 22 younger adults,10 older adults, and 10 controls met the requirements and completed post-testing
- **Between groups:**
  - No significant differences in FMS measures between groups for the young adult or older adult population
- **Within groups:**
  - Significant ($p < .05$) improvements pre- to post-training in Abdominal Flexor, Back Extensor, LSB and RSB, Balance, Flexibility, and Lower Body Strength following training for both the TRX and Traditional groups within the young adult population.
  - Significant ($p< .05$) improvements pre-to post-training in Back Extensor, LSB and RSB, and Lower Body Strength following training for both the TRX and Traditional groups within the older adult population.

Table 3. Descriptive values for balance (means and standard deviations)

Variable	Age Group	TRX Pre- Mean±SD	TRX Post- Mean±SD	% Change Pre-Post	RT Pre- Mean±SD	RT Post- Mean±SD	% Change Pre-Post
Balance	College-Aged	1.3±0.4	1.1±0.5*	-15.4%	1.8±1.1	1.4±0.7*	-22.2%
	Older Adults	3.4±2.1	3.0±1.8	-11.8%	2.6±1.4	2.6±1.6	0%
Flexibility	College-Aged	37.0±8.1	37.7±8.2*	1.9%	37.5±5.8	38.9±4.4*	3.7%
	Older Adults	25.7±8.9	27.2±9.8	5.8%	27.3±7.5	26.8±6.4	-1.8%
Side Bridge Left	College-Aged	64.1±16.6	68.0±17.1*	6.1%	68.9±12.0	86.9±30.2*	26.1%
	Older Adults	54.7±23.1	72.3±28.7*	32.2%	64.3±18.7	77.4±19.9*	20.4%
Side Bridge Right	College-Aged	63.7±10.5	73.3±24.6*	15.1%	73.4±18.8	85.0±32.1*	15.6%
	Older Adults	63.5±28.7	73.9±29.9*	16.4%	66.6±16.4	80.5±9.4*	20.9%
Abdominal Flexor	College-Aged	232.2±161.1	419.1±263.1*	80.5%	275.2±226.5	420.8±179.1*	52.9%
	Older Adults	87.8±41.4	99.7±52.1	13.6%	141.5±84.5	138.3±70.9	-2.3%
Back Extensor	College-Aged	117.8±37.2	154.4±39.7*	31.1%	126.4±47.4	138.3±32.9*	9.4%
	Older Adults	56.1±47.9	93.2±50.7*	66.1%	68.4±40.1	110.6±51.0*	61.7%

Table 4. Descriptive values for upper and lower body strength (means and standard deviations)

Variable	Age Group	TRX Pre- Mean±SD	TRX Post- Mean±SD	% Change Pre-Post	RT Pre- Mean±SD	RT Post- Mean±SD	% Change Pre-Post
Upper Body	College-Aged	67.7±24.4	72.7±20.7	7.4%	84.1±26.3	89.5±26.7	6.4%
	Older Adults	119.0±65.3	123.0±50.1	3.4%	97.0±45.9	118.0±53.3	21.6%
Lower Body	College-Aged	114.5±22.9	129.5±29.4*	13.1%	120.0±41.0	151.8±53.0*	26.5%
	Older Adults	128.4±52.8	166.0±80.7*	29.3%	125.6±64.3	160.0±85.9*	27.4%

Table 5. Descriptive values for body composition variables (means and standard deviations)

Variable	Age Group	TRX Pre- Mean±SD	TRX Post- Mean±SD	% Change Pre-Post	RT Pre- Mean±SD	RT Post- Mean±SD	% Change Pre-Post
Weight	College-Aged	64.5±8.1	65.6±8.6	1.7%	72.3±13.9	72.0±14.1	-0.4%
	Older Adults	103.2 ±32.7	102.0±36.7	-1.2%	83.6±25.2	85.7±24.3	2.5%
Waist girth	College-Aged	74.4±8.0	76.6±8.1	3.0%	82.9±11.6	84.0±12.5	1.3%
	Older Adults	108.7±22.6	108.4±22.0	-0.3%	89.0±12.9	90.2±11.8	1.3%
Abdominal SF	College-Aged	17.2±5.0	19.3±4.9	12.2%	24.8±9.0	22.9±8.3	-7.7%
	Older Adults	26.1±17.9	23.9±14.7	-8.4%	21.0±4.8	21.2±3.1	1.0%

*Significant difference ($p<.05$) from pre-post training

Summary and Conclusions

- The results suggest that TRX training methods are just as beneficial for increasing core endurance, flexibility and measures of functional movement compared to a more traditional training program.
- Changes in upper body endurance performance were not program specific despite the different modality use between groups.
- Measurable gains were observed after 7 weeks of TRX or traditional exercise training in the majority of fitness parameters.

Limitations

- Small sample size of 22 young adults and 10 older adults
- Each training session was not monitored; intensity was self reported.
- Different researchers tested individuals pre and post testing, leading to potential inter-rater variability.
- Only a 7-week training period limits conclusions on long-term effects of TRX training.

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