

By Len Kravitz, PhD

## resistance and flexibility training: an ambiguous relationship clarified

Nóbrega, A.C.L., Paula, K.C., & Carvalho, A.C.G. 2005. *Interaction between resistance training and flexibility training in healthy young adults*. *Journal of Strength and Conditioning Research*, 19 (4), 842–46.

Flexibility training has been promoted for decades as an integral part of fitness that may help decrease the risk of injuries; release pain associated with musculoskeletal stiffness; and improve sport-specific performance when range of motion (ROM) is essential. While the efficacy of such claims has yet to be clearly elucidated, another popular assertion endorsed by some personal trainers is that properly executed resistance training exercise negates the need for flexibility training. In fact, the chronic effects of muscular fitness training on flexibility are fundamentally unknown. Although numerous opinions on this topic prevail

### 2006 ACSM flexibility guidelines

- Warm up to elevate muscle temperature before stretching.
- Use a static stretching program that exercises the major muscle groups.
- Focus special attention on muscle groups or joints that have limited range of motion.
- Do stretching exercises a minimum of 2–3 days per week and preferably 5–7 days per week.
- Hold each stretch for 15–30 seconds.
- For optimal flexibility, repeat stretches 2–4 times.

Source: Adapted from American College of Sports Medicine. 2006. *ACSM's Guidelines for Exercise Testing and Prescription* (7th ed.). Philadelphia: Lippincott Williams & Wilkins.

throughout the fitness industry, relevant research to date is quite limited due to study design limitations such as lack of a control group, short length of investigation and methodology flaws. The study presented here undertook a very applied and comprehensive approach and used a valid research design in an effort to unravel questions about the flexibility–strength interaction on muscle performance and joint ROM.

### Method

Forty-three healthy subjects (15 women and 28 men, who were sedentary for at least 6 months prior to the start of the investigation) volunteered for this 12-week study. Researchers conducted two training sessions per week (24 overall); each session was separated by 2 days of rest. Subjects were assigned (by personal preference to enhance study adherence) to one of four different groups: Flexibility (F), Resistance Training (R), Flexibility Training and Resistance Training combined (FR), and a Control (C) group of subjects who remained sedentary during the length of the study.

### Assessments

**Flexibility.** The authors defined flexibility as “the physiological maximal range of motion of a given movement performed passively without producing pain or severe discomfort.” Using a Flexitest technique, the study assessed 20 different joint ranges, including the upper and lower limbs, shoulder, hip and trunk. One experienced researcher took each subject through a particular ROM at a joint and, depending on the actual joint angle, applied a score of 0–4, with 4 denoting the best score for the subject’s particular ROM. The authors cite that the Flexitest method has been previously validated and has high reliability. (For more information on the Flexitest, go to the Human

Kinetics website [[www.humankinetics.com](http://www.humankinetics.com)] and do a book search for *Flexitest: An Innovative Flexibility Assessment Method* by Claudio Gil Soares de Araújo.) During the 12-week training sessions, the F and FR groups held all flexibility movements at a maximal range (with no pain) for 30 seconds, repeating each stretch a total of three times during every 40-minute flexibility training session.

**Muscular Strength.** Subjects were assessed on peak muscular strength for leg press and supine bench press (using the 1-repetition maximum [1RM] test) and for handgrip (left and right, using a hydraulic dynamometer).

### Resistance Training Program

Subjects performed the following exercises during the 12-week training program: supine bench press, seated chest press, seated row, seated shoulder press, arm curl, triceps extension, seated leg press, standing calf press (heel raise) and seated abdominal crunch. A 2- to 3-minute full-body, dynamic-movement warm-up preceded all resistance training sessions. At the beginning of the training, subjects performed each exercise at 60% of their 1RM. The researchers progressively overloaded the subjects’ resistance training program to induce momentary muscular fatigue between 8 and 12 repetitions of each exercise. Three sets of each exercise were performed, with a 1- to 2-minute rest period between exercises.

### Results

As can be clearly seen in Figure 1, the global flexibility scores (reported in numerical units)—which are a sum total of the upper-limb, lower-limb, trunk and hip flexibility scores from the Flexitest—increased in response to flexibility training alone. Flexibility also increased when resistance training was

combined with flexibility training. Thus, resistance training did not interfere with the improvements in flexibility. However, it is also very apparent from Figure 1 that resistance training alone did not have a significant effect on improving flexibility in this study. Thus, the statement made by some personal trainers that they don't do flexibility training because it is achieved from resistance exercise is challenged and contested by this investigation.

Another interesting finding from this investigation can be seen in Figure 2. In this figure the sum values in kilograms (kg) for the left and right hand-grip test, bench press and leg press have been graphed. Note how flexibility training did not appear to hinder the resistance training gains. This clearly disclaims the opinions of some trainers who do not support flexibility training because they feel it may obstruct muscular-fitness gains from resistance training.

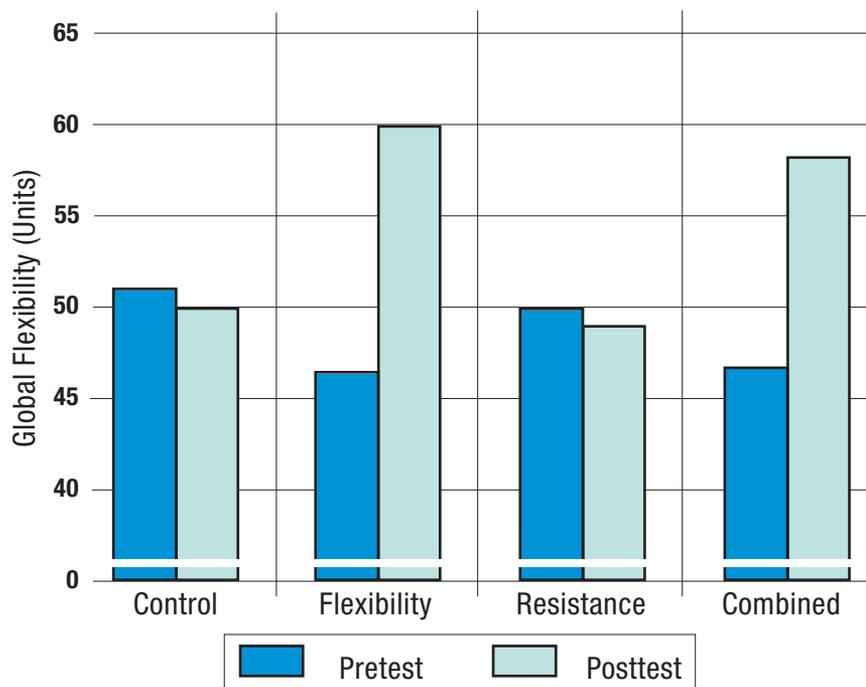
### Practical Lessons for Fitness Professionals

This study, using the Flexitest measurement method, examined full-body measures of flexibility and was not limited to one or two joint ranges of motion, as has been a restraint of previous investigations. The findings help clarify some important misconceptions regarding flexibility training and resistance exercise. Certainly, more research of this kind is recommended to authenticate this study's conclusions. (For further stretching guidelines, please refer to the 2006 ACSM Flexibility Guidelines on the previous page.)

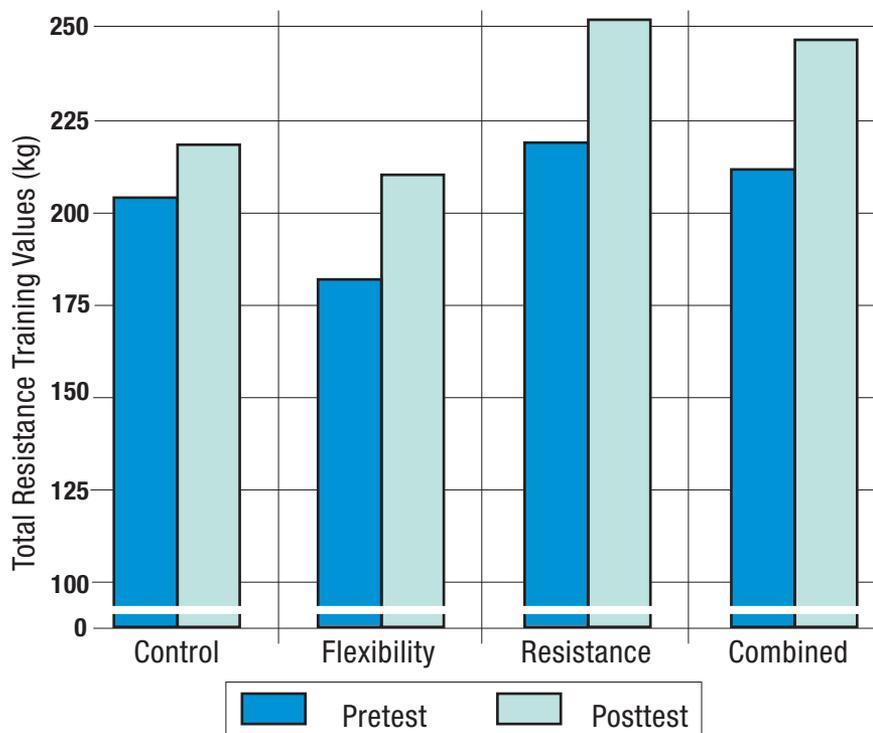
This study also clarifies that resistance training had no independent influence on improving flexibility training. The combined program of resistance training and flexibility training produced positive and meaningful enhancements in both fitness components. Finally, stretching separately increased flexibility and should be incorporated in an all-inclusive fitness program when it is deemed valuable to improve a client's ROM.

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**figure 1. global flexibility scores**



**figure 2. total resistance training values in kilograms**



*Year Award. He was also honored with the 1999 Can-Fit-Pro International Presenter of the Year Award and was the first person to win the IDEA Fitness Instructor of the Year Award.*

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