

Strength Index

Psychological Effects of Resistance Exercise

By Wayne L. Westcott, Ph.D., CSCS, and Rita La Rosa Loud



If you are a regular reader of this column, then you are well-aware of the numerous physiological benefits of properly performed resistance exercise. You may recall that these include reduced resting blood pressure, improved blood lipid profiles, enhanced glucose uptake and insulin sensitivity, increased muscle mass and bone density, faster gastrointestinal transit speed, decreased arthritic and low back discomfort, increased muscle strength and functional abilities, increased resting metabolic rate and energy expenditure, and reduced risk of diabetes, metabolic syndrome, heart disease, osteoporosis and some types of cancer.

However, if these health and fitness advantages are not adequate for potential clients to adopt a lifestyle that includes regular resistance exercise, there are many psychological benefits associated with sensible strength training. Over the past few years, I have been privileged to conduct several research studies with Dr. James Annesi of the Atlanta YMCA on changes in psychological measures following a 10-week program of circuit format strength exercise. Dr. Annesi is an international leader in health psychology, as well as a prolific researcher who has published more than 100 scientific studies in his field.

My role in our cooperative research projects was to conduct the training programs in compliance with the exercise guidelines published by the American College of Sports Medicine.^{1,2} In each of our studies, the participants adhered to the following exercise protocol:

Resistance Exercise

Training Period:	10 weeks
Training Exercises:	Leg extension, leg curl, chest cross, chest press, back pullover, lateral raise, biceps curl, triceps extension, back extension, abdominal curl, neck flexion

	and neck flexion
Training Sets:	1 set per exercise
Training Resistance:	Approximately 75 percent of maximum resistance
Training Repetitions:	8 to 12 repetitions per exercise set
Training Progression:	Increase resistance by 5 percent upon completing 12 repetitions
Training Frequency:	2 or 3 nonconsecutive days per week
Training Speed:	6 seconds per repetition
Training Range:	Full, pain-free movement range

Aerobic Activity

Training Period:	10 - 26 weeks
Training Exercises:	Treadmill and stationary cycle
Training Intensity:	Approximately 70 percent of age-predicted maximum heart rate
Training Duration:	20 minutes
Training Frequency:	2 or 3 nonconsecutive days per week

Dr. Annesi's role in conducting these research studies was to provide the appropriate validated instruments (psychological questionnaires) for the participants to complete at the beginning and end of the 10 – 26 week exercise programs. The data collection tools included instruments such as the Profile of Mood States, the Tennessee Self-Concept Scale 2, the Exercise-Induced Feeling Inventory, Exercise Self-Efficacy Scale, Multidimensional Body – Self Relations Questionnaire (MBSRQ), and the Weight Efficacy Life-Style Questionnaire.

At the completion of the training period, Dr. Annesi performed statistical analyses on all of the data to determine any significant psychological changes attributable to the exercise program. Thus far the results have been very interesting.

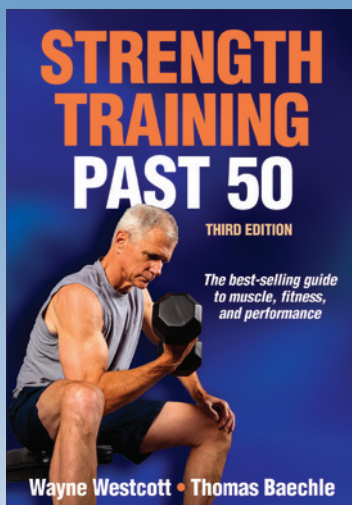
In one of our first studies³ a sample of 17 untrained older women (mean age 67 years) participated in our standard 10-week program of resistance exercise and aerobic activity. In addition to attaining significant physiological improvements in muscular and cardiovascular measures, the women experienced positive psychological changes in ratings of Physical Self-Concept, Total Mood Disturbance, Depression, and Fatigue. They also made non-significant improvements in ratings of Tension, Vigor, Anger and Confusion.

A larger study of 52 previously sedentary women (mean age 56 years) examined the relationship between feeling state changes immediately following an exercise session and mood changes after completing our standard 10-week program of resistance training and aerobic activity.⁴ The results showed that a single exercise session produced a positive psychological response pattern (higher ratings of Positive Engagement, Revitalization and Tranquility; lower ratings of Physical Exhaustion) most of the time. Furthermore, the positive changes in feeling states from single exercise bouts were associated with positive long-term changes in Total Mood Disturbance.

Another study⁵ was designed to assess physiological and psychological responses to different instructional techniques. Using our standard 10-week program of resistance exercise, 39 older untrained women (mean age 65 years) were placed into a group that received association-format instruction or a group that received dissociation-format instruction. The association-format group featured instructor interactions focused on

physical performance with limited casual conversation and distraction from the exercise tasks. The dissociation-format featured instructor interactions focused less on physical performance and more on casual conversation, and included exercise distractions such as music, pleasant scenery, and relaxing activities. At the end of the training period, both groups attained significant and similar physiological improvements in percent body fat and muscle strength. Both groups also experienced significant and similar after-exercise increases in the psychological components of Positive Engagement, Revitalization, and Tranquility. However, only the dissociation-format participants experienced an after-exercise reduction in Physical

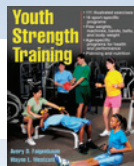
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Exhaustion. Likewise, only the dissociation-format subjects significantly reduce their Tension and Depression scores over the course of the study.

Our next research study ⁶, included a wait-list control group (N=40) and a strength training group (N=48) of older women (mean age 62 years). After 10 weeks of our standard resistance exercise program, the previously sedentary participants demonstrated significant after-exercise improvements in Positive Engagement, Revitalization, Tranquility, and Physical Exhaustion. Control group subjects did not realize significant improvements in any of the psychological measures. In addition, for the strength training group, scores on Physical Self-Concept were significantly correlated with after-exercise changes in Physical Exhaustion.

We recently conducted a study similar to our other research with one exception. Instead of assessing psychological changes in previously sedentary participants, this study was conducted with trained individuals who had just completed our introductory strength training program. As in our other research, the 46 program participants performed 1 set of each resistance exercise, using a weightload that could be performed for 8 to 12 controlled repetitions, as well as 20 minutes of standard aerobic activity. The physiological changes were consistent with those in our previous studies, showing significant improvements in prevent body fat (-1.4%), fat weight (-2.8 lbs), and lean weight (+2.3 lbs). However, the psychological changes were less pronounced than those in our previous studies. These intermediate level exercisers did not experience statistically significant changes between the pre-training and post-training psychological assessments (Profile of Mood States, Exercise-Induced Feeling Inventory, ExerSelf-Efficacy Items, MBSRQ-Body Areas Satisfaction, and Weight Efficacy Life Style Questionnaire. It was hypothesized that these more experienced exercisers had already established many mood improvements and were now maintaining them.

Based on the findings from these five studies, it would appear that previously inactive adults and older adults who complete a 10-week introductory program of strength exercise and aerobic activity attain significant improvements in psychological assessments of Physical Self-Concept, Total Mood Disturbance, Depression, Fatigue, Positive Engagement, Revitalization, Tranquility, Physical Exhaustion, and Tension, as well as significant improvements in physiological assessments of muscular fitness, cardiovascular fitness and body composition. Although previously trained exercisers continued to make significant physiological improvements, they did not experience significant changes in the psychological measures. These results suggest that participation in a structured exercise program provides both physiological and

psychological benefits. The findings further indicate that the psychological changes are more likely to occur during the initial (10-week) conditioning session.

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