

The Effectiveness of the ENERGI® Product Line as a Strength and Flexibility Builder



Ian Proud & Elizabeth Ingraham

November 2009



Contents

Summary.....	3
Test & Sample Description.....	3
Observations	
Upper Body Strength.....	5
Single Leg Squat.....	6
Shuttle Run.....	7
Abdominal Strength.....	7
Flexibility.....	8
Weight.....	8
Recommendations for Further Testing.....	10
Acknowledgements.....	11
Footnotes.....	1

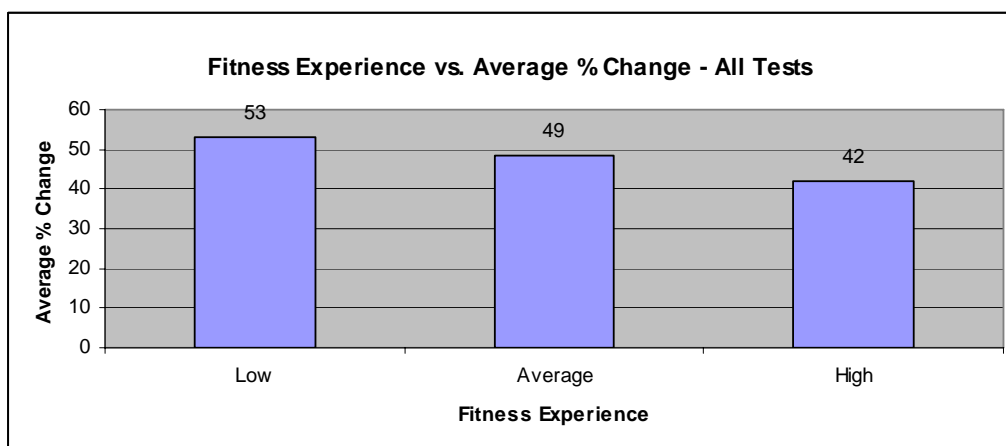
Summary

The ENERGI® product line is an outdoor exercise product line comprised of 5 stations that together include 120 exercises divided into three skill levels. The system is built on a philosophy of multi-joint, multi plane, whole-body exercises that combine body weight training and functional fitness to create a progressive workout routine.

This study suggests that this product line is effective in building strength, speed and flexibility in users. The average participant increased their upper body strength by 35%, improved their leg strength by 34.5%, sprinting speed by 6%, their abdominal strength as measured in full sit-ups by 34.7% and improved their flexibility by an inch in a sit and reach test.

The average participant gained just over a pound of body weight over the five week test period.

When we look at the average improvement across all tests in the study we find that the more fit someone was (fitness experience) the lower their overall average improvement percentage was likely to be. It's easier to make big progress early in an exercise program than later.

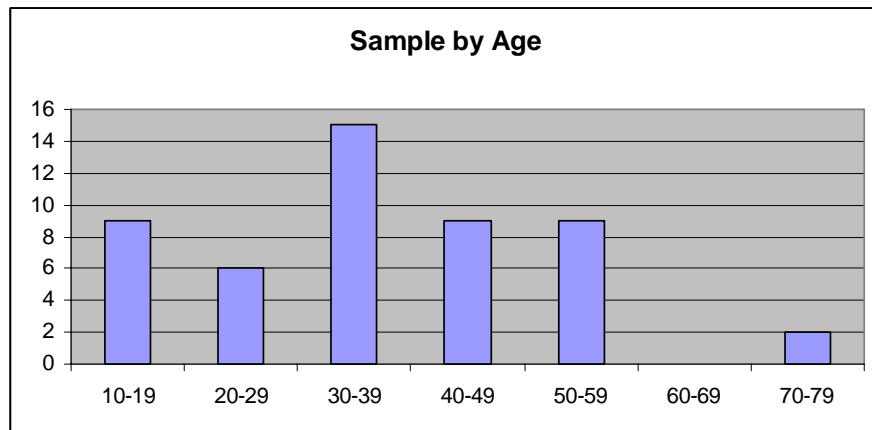


Test & Sample Description

1. The study was conducted at the Danville Area Community Center in Danville, Pennsylvania. The participants used the equipment between September 14 – October 16, with testing occurring immediately before and after those dates.
2. The pre- and post-testing took place in an indoor environment. Participants were monitored by testers as they completed the test. Every participant except two completed the test in one visit.
3. The participants were instructed to add usage of ENERGI to their exercise regimen, otherwise changing as little as possible in their routines. The one exception was diet. On that subject the participants received email messages encouraging them to consider what they were eating.

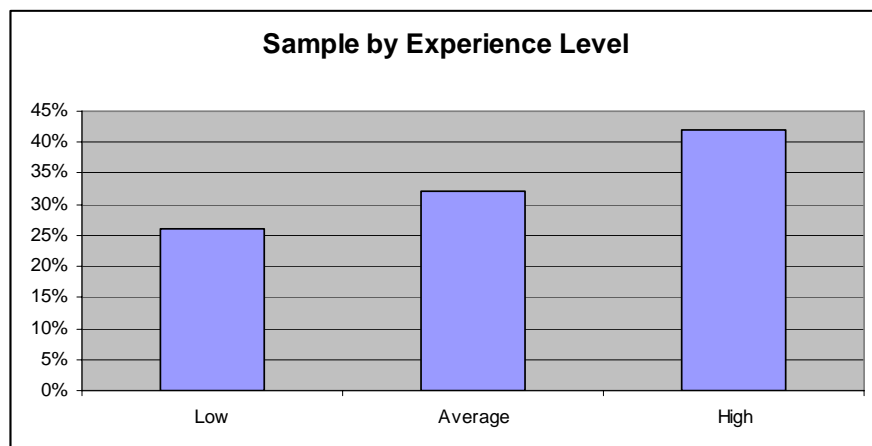
4. Sample

- a. 50 people committed to using ENERGI for five weeks, three times a week.
- b. Gender and age:
 - i. 32 females and 18 males were registered for the program.
 - ii. Most age groups were represented in the sample, with people in their 30s representing 30% of the total.



c. Experience level:

- i. Almost all the participants were known to the program coordinators. Based on that knowledge the coordinators assigned the individual an experience rating consistent with what they believe was the person's exercise regimen entering the study. Over 40% (21 people) were placed in the High Experience category. This meant they were frequent gym users, were known to run frequently, take part in competitive races or the equivalent.



d. Completion Rates

- i. 20 people did not complete a post-test. These participants were 45% male, but since males only comprised 35% of the subjects who had signed up, a higher percentage of males than females did

not post-test. This does not necessarily mean they did not complete the 5 week program. Available time was cited by more than 50% of this group as the issue that prevented them from either completing the program or attending the post-test. Other issues included illness, injuries not related to the system and loss of interest.

	Number	Male	Female
Original	50	36%	64%
Untested	20	45%	55%
Tested	30	30%	70%

- ii. The strongest predictor of completion was the level of exercise experience of the subject.

	Experience		
	Low	Average	High
Original	26%	32%	42%
Untested	30%	35%	35%
Tested	23%	30%	47%

- e. Other Comments on the Sample:

- i. The average participant was a female in her late 30s with an average to high level of exercise experience. The youngest participants were 11 year old triplets, the oldest were a 72 year old couple. No racial categorization was recorded.

Observations

The following observations are based on comparisons between pre and post data of 30 people, 21 females and 9 males.

Upper Body Strength

The measures in our study that deal with upper body strength are the push-up, the sit-up, the static hang, and the pull-up.

- **Push-up:** All Subjects were given a choice of knee push-ups or toe push-ups. Both versions required the subject to touch a 4” block beneath their chest on the down stroke. Maximum # performed in 1 minute.
- **Static Hang:** The subject is required to grasp a bar above their head, palms facing inward and pull their chin above the bar. The clock then starts, and is stopped when the chin falls below the bar.

- **Pull-up:** With the subject's palms facing outward they pull themselves up until their chin is equal to the height of the bar, or above. Maximum # performed in one minute.

52% of the post-tested females were not able to perform any portion of a pull-up in their pre-test and the average pre-test pull-up for females as a whole was 0.5. In the post-test 2 women could not perform any portion of a pull-up, while post-tested females as group generated an average pull-up of 1.4 repetitions.

Average upper body results for entire sample, # reps unless otherwise stated.

Test	Pretest avg	Post test avg	% diff avg
Pull Ups	1.9	3.3	42%
Static hang (secs)	19.1	29.7	36%
Push up, toe	28.4	36.1	21%
Push up, knee	26.3	34.9	42%
Overall Average			35%

Results: The participants improved their upper body strength by an average of 35% across four tests.

Single Leg Squat

The single leg squat requires the subject to rise from a seated position on one leg with no assistance from the arms. The number of repetitions possible in one minute is recorded. The test is then repeated with the other leg.

In addition to lower body strength the subject's sense of balance is also engaged while raising and lowering their body on one foot. Since changes in balance were not measured separately, we cannot definitively state that their sense of balance has improved.

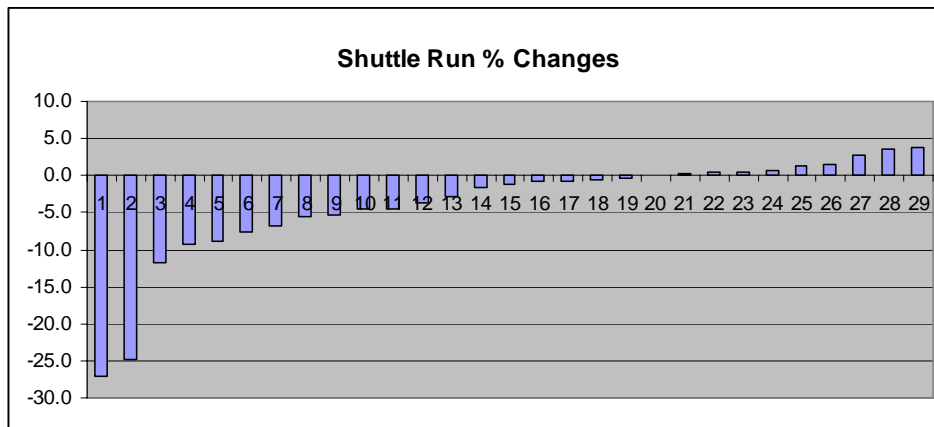
Test	Pretest avg	Post test avg	% diff avg
Single leg squat - R	18.7	28.3	34%
Single leg squat - L	19.4	29.1	35%
Overall Average			34.5%

Results: The single leg squat test results show an approximately 35% increase in average leg strength over the course of the study.

Shuttle Run

The shuttle run required subjects to run 12 lengths of a basketball court for a total length of 300 yards. The subject then rested 5 minutes before repeating the run. Sustained performance over the two runs is a meaningful measure since it incorporates the ability of the subject to recover.

The graph below shows the percentage change in individual results.



Results: The participants as a whole completed the two runs 6% faster after using ENERGI(r) for 5 weeks. Nine people, or almost a third of the sample improved their shuttle run time by more than 5%.

Abdominal Strength

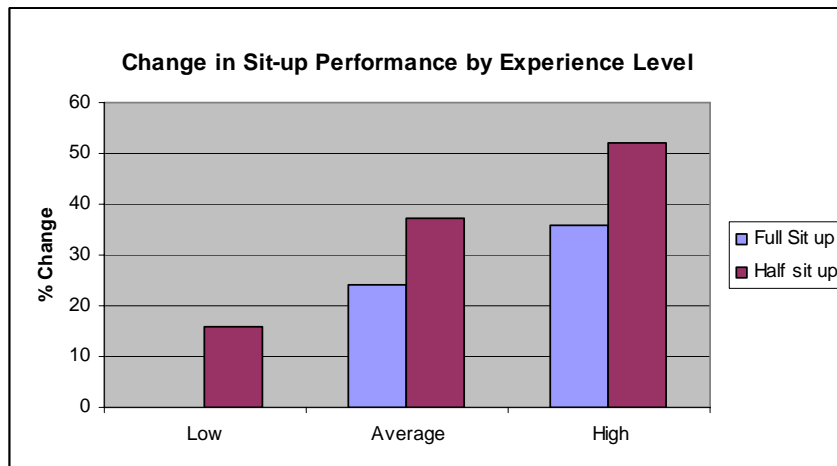
A full sit-up requires the subject to place their hands either behind their head or at their ears (in case of neck problems), legs bent at a 90 degree angle, and lift the upper body until the elbows touch the knees and return to the start position. Maximum number performed in one minute.

A half sit-up requires the subject to lie with their fingertips on one mark. The subject curls their upper body upward and forward to touch a second mark 3-1/2" further toward their toes. Maximum number performed in one minute.

Sit-up % Change by Gender

	Men	Women	Overall Avg
Sit-up full	38.6	31.4	36.7
Sit-up half		20.4	20.4

Sit-up % Change by Exercise Experience Level



Results: The sample as a whole demonstrated an average improvement of 29%. Men showed greater improvement than women, and the more experienced the subject was, the greater their improvement tended to be.

Flexibility

Flexibility was measured by a sit and reach test. This requires the subject to sit on the ground and reach forwards between their feet, touching the point on the ground that is furthest from their torso. The markings on the ground number from 0 to 27, with the subject's heels placed at 15. A count of 17 means they are reaching 2" beyond their heels.

Results: The average user increased their flexibility by an inch from 16.2 to 17.2 over the course of the study. Expressing this as a percentage is not meaningful since the scale is randomly assigned, but as an average change this is a significant improvement in whole body flexibility.

Body Mass

Weight was measured with a Healthometer electronic scale.

BMI of the sample ranged from 15.0 to 34.7 with an average of 24.3 and a median of 24.5.

On average the men in our study gained 2.0 lbs, while the average woman gained 0.1 lbs.¹ Exercising a muscle consistently and vigorously that has not been used or used moderately will increase its mass. This gain in muscle mass is not necessarily offset with a decrease in fat over a 5 week period.

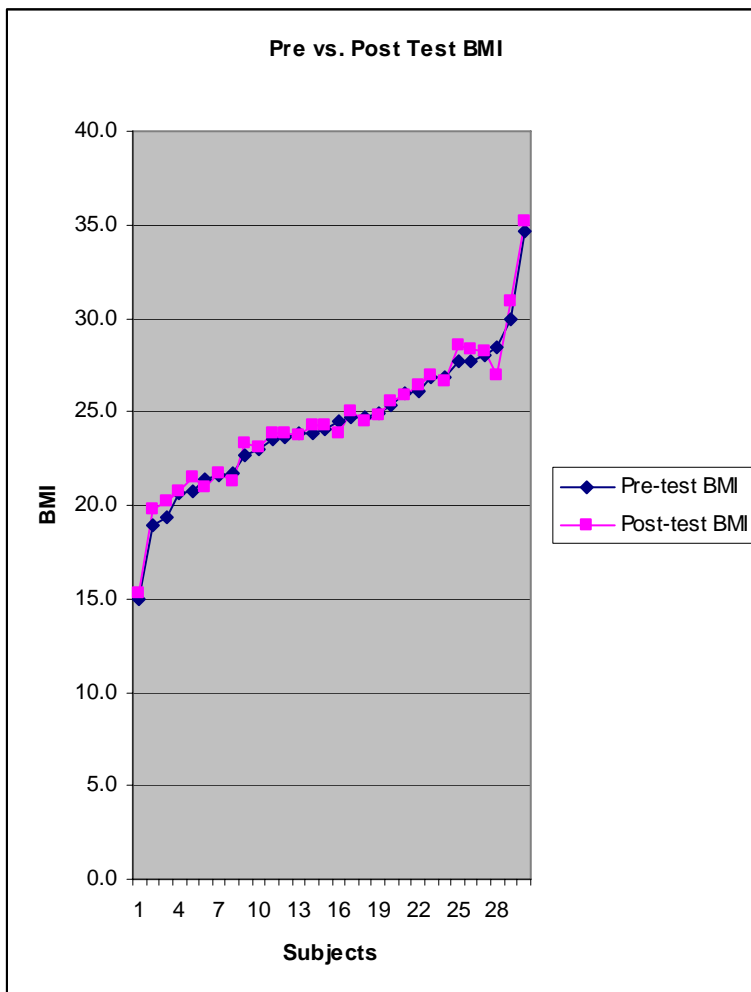
That gain in weight did not correlate to exercise experience or age. The 11-19 year old age group is still growing and weight gain occurs regardless of exercise.

Among several subjects a change in body proportion was visible to an observer, broadly described as wider shoulders, narrower waist. This kind of body weight redistribution influences the body weight measure as fat is replaced with lean muscle of a higher density.

Age	11-19	20-29	30-39	40-49	50-59	60-69	70+
Weight change (lbs)	1.88	0.55	0.4	0.5	0.3		2.4

The average body mass index of the sample as a whole increased from 24.3 to 24.5.

The graph below shows the individual BMI data points and the changes that occurred during the study.



Recommendations for Further Testing

The ENERGI product line has several exercises designed to improve balance and agility, but there is no adequate measure for these capability in this study. We recommend that such a test be incorporated into a future study.

Further testing should incorporate monitoring of step frequency into the 3 minute step test. The methodology for this test did not use such a protocol and the data was not usable. This test also requires the use of a heart rate monitor and measurement of the subject's recovery rate.

The way that the body changes during this program needs further examination. In addition to weight measurement we recommend that the following measurements be recorded:

Body proportion changes: Waist, and possibly chest girth, in inches.

Body fat changes: Skin fold test, and a foot-based body electrical impedance analysis.

Future studies need to monitor consistency in the way that subjects are tested. There were minor inconsistencies in the way that subjects were tested that can be reduced or eliminated in future tests.

Acknowledgements

Thanks to the management and staff at the Danville Area Community Center, Danville PA. Jean Knouse, Executive Director was instrumental in implementing the program. Special appreciation is due to Ralph Reedy, who, with Elizabeth, made a huge difference in recruiting, organizing, testing and encouraging participants.

Thanks to Michelle Simons for the overall direction for the study & physiological context for each test.

The participants themselves exhibited a high level of commitment and dedication to performing the exercises on the required schedule for the requested duration, and without their dedication this study could not have been conducted.

Footnotes

ⁱ Exercise = Weight Loss, Except When It Doesn't - New York Times, Sept 12 2006