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Aging and Training

I've been thinking a lot about aging and training. It's not been the usual 'musings'.

This issue shows – hopefully - that I've also given a good deal of thought to training principles and training precisely and correctly.

So, what is there to think about with aging and training that's in any way new? And, if I'm training precisely and correctly and understand how I like to train, how I recover, and how I adapt to training, why the various experiments with such variables as frequency of training and different combinations of exercises?

"Once you accept the aging process, you can move on to effective training."

Here's what I've concluded.

Until very recently, I could not accept – beyond some 'intellectual understanding' – that how you respond to training, as defined by absolute outcomes, changes as you age. I've been looking for something to get the same absolute outcomes as a decade ago.

I now accept that it can't be done.

For most people, obvious changes become apparent by your 50's and almost certainly by 60.

The manifestations of aging differ between people based on genetics and life style so the time of changes and patterns between people are different. For example, I've retained most of my strength and fitness but have lost muscle mass and gained fat. I don't know if the changes in body composition are more or less or about the norm for people who continue to exercise at my age. I do know that there are very noticeable differences from as little as several years ago.

It's not my imagination. Pants that fit well a few years ago are now tighter and shirts that fit well now seem to drape over me. I weigh about the same but my waist is bigger.

All of this is predictable because I'm almost 60. It's also quite predictable by simply looking at the photos of top masters bodybuilders in the annual Southern States contest that have appeared in *Master Trainer* over the years. The 50 year olds don't look like the 40 year olds and the 60 year olds don't look like the 50 year olds. They all look great but the age groups look different.

Compared to my age group, even those who continue to exercise, I'm doing very well. My health is great, I have the resting heart rate of an endurance athlete, and I feel super. When I diligently train and stay very focused for six to eight weeks, I can make improvements in my strength and fitness. I can reach levels achieved a few years ago and sometimes slightly surpass those levels.

I think that's pretty amazing and I thoroughly enjoy the training process.

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Master Trainer focuses on information about lifetime bodybuilding, master athletics, and health and fitness. Information reflects the author's opinions as well as summaries of books, articles, and recent scientific news. This publication does **not** provide medical advice for specific medical problems. Medical advice should be obtained from medical personnel.

the repetitions. It likely is that the force involved can be too great for your musculoskeletal system and you will get hurt. It is similar to seeing your heart rate go considerably over your target range in the GXP. You're not doing the protocol correctly. Your high heart rate signals danger. In the same way, careful monitoring and feedback tells you to adjust your performance and the weight you are using in resistance training.

Very close monitoring of performance, and doing it all correctly, doesn't sound very 'heroic'. The heroic images we have are ones of people going to exhaustion in their cardiovascular training and doing whatever it takes, in whatever form, to do the last couple of repetitions in resistance training. Keep in mind that some of the images you have are demonstrations of the limits of performance and are not images of safe productive training. The images you want to keep in mind feature perfectly done repetitions to improve strength and body composition. ◆

"Perform each protocol perfectly."

Gender Differences in Strength: A Comparison of Male and Female World-Record Performances in Powerlifting - An Update

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Introduction

Researchers have investigated gender differences in strength since the early 1900s. In terms of absolute strength – that is, without regard for bodyweight, body composition or muscular size – the average man tends to be considerably stronger than the average woman. In an early review of the literature, Hettinger[1] concluded that the absolute total-body strength of women was "about two thirds that of men". Since that time, numerous studies have compared the absolute strength levels of men and women and have reported varying degrees of differences. In general, however, research has consistently shown that men tend to be stronger than women in absolute terms.

It should be noted that the differences in absolute strength between men and women vary according to the areas of the body that are being compared. As an example, a review of nine studies by Laubach[2] revealed that, in comparison to men, the absolute lower-body and upper-body strength of women is about 57 - 86% (averaging 71.9%) and 35 - 79% (averaging 55.8%), respectively.

So in absolute terms, men are much stronger than women. However, men are significantly larger and heavier than women. In terms of absolute strength, the greater body size of men gives them a decided advantage over women. When assessing gender differences in strength, then, comparisons should be made relative to some measure of size. When the disparities in bodyweight and body composition are taken into consideration, the strength differences between men and women are less substantial. Bishop[3], for instance, reported that the upper-body strength of women averaged 60 – 70% that of men relative to bodyweight.

The purpose of this investigation is to examine the gender differences in strength by comparing recent world-record performances in powerlifting. This investigation updates an earlier one that was conducted by the author[4].

Three different lifts are contested in powerlifting competition: the squat, bench press and deadlift. These three movements involve the major muscles in the lower body and upper body. Furthermore, the performances of powerlifters are a measure of strength – essentially one-repetition maximums – and they compete in different weight classes, which is handy for making comparisons to established and accepted data. Of course, the calculations are not totally precise since someone who 'makes weight' in the 60-kilogram class, for example, will likely weigh somewhat more or less than this when actually competing. Nonetheless, it is still a convenient way to obtain a rough estimate of gender differences in strength relative to bodyweight.

Methods

Data for world-record performances by male and female powerlifters were collected and analyzed. The world records were those officially recognized by the International Powerlifting Federation as of June 2004. (Records that were pending were not considered.) Performances by men and women in the three competitive lifts were compared in

seven mutual weight classes: 52.0, 56.0, 60.0, 67.5, 75.0, 82.5 and 90.0 kilograms.

In each of the seven weight classes, the world-record performance of the woman was divided by the world-record performance of the man. Thus, the resulting number is a percentage of male strength.

Results

The major muscles used in the squat are the buttocks, hamstrings, quadriceps and lower back. Table 1 shows that the world-record performances by women in the squat ranged from 66.7 – 77.4% (averaging 72.1%) of their male counterparts.

The chest, shoulders and triceps are the major muscles used in the bench press. Table 2 shows that the world-record performances by women in the bench press ranged from 63.4 – 79.1% (averaging 70.4%) of their male counterparts.

"When lean bodyweight is considered, there's less difference in strength between men and women."

The major muscles used in the deadlift are the buttocks, hamstrings, quadriceps and lower back. Table 3 shows that the world-record performances by women in the deadlift ranged from 69.8 – 77.9% (averaging 74.7%) of their male counterparts.

Discussion

Various anatomical and physiological attributes of women have been mentioned as contributing factors in gender strength differences including narrower shoulders and – though not corroborated by research – higher percentages of slow-twitch fibers (which produce lower amounts of force than fast-twitch fibers). Regardless of the reasons, the average man is much stronger than the average woman in terms of absolute strength. These gender differences in strength become less significant, however, when making comparisons relative to bodyweight and/or body composition.

Though not investigated, making comparisons relative to body composition essentially eliminates any gender differences in strength. Consider the fact that females tend to inherit higher percentages of body fat than do males. Specifically, the average 18- to 22-year-old woman has about 22 – 26% body fat, whereas the average man of similar age has about 12 – 16%. There is a direct correlation between having a higher percentage of body fat and having a lower percentage of functional tissue (namely, lean-body mass). For instance, the average college-age man who weighs 154 pounds (lbs) with 14% body fat has 21.56 pounds of body fat and about 132.44 pounds of functional tissue [154 lbs x 14% = 21.56 lbs; 154 lbs - 21.56 lbs = 132.44 lbs]. On the other hand, the average college-age woman who weighs 121 pounds with 24% body fat has 29.04 pounds of body fat and 91.96 pounds of functional tissue [121 lbs x 24% = 29.04 lbs; 121 lbs - 29.04 lbs = 91.96 lbs]. So, in this illustration, the average college-age man has 27.27% more bodyweight [154 lbs compared to 121 lbs] and 44.02% more functional tissue [132.44 lbs compared to 91.96 lbs] than the average college-age woman.

Strength is directly related to muscular size (that is, the cross-sectional area of the muscle). As an example, a study by Schantz et al.[5] examined the strength per unit of cross-sectional area of muscle tissue of 18 physical education students (7 females and 11 males) and 5 male bodybuilders. The researchers found no significant differences between men and women when strength was expressed in relation to muscle cross-sectional area. Therefore, the differences in strength between men and women appear to be in the volume of muscle fibers not in the makeup of individual fibers. Gender strength differences are quantitative rather than qualitative. This means that although men usually have larger muscles than women, the force exerted by equal-sized muscles is the same in both genders. This isn't surprising since muscle tissue is essentially the same regardless of gender.

SQUAT

WEIGHT CLASS	FEMALE	MALE	% OF MALE
52.0	212.5	300.5	70.7
56.0	222.5	287.5	77.4
60.0	220.5	320.0	68.9
67.5	247.5	332.5	74.4
75.0	255.5	337.5	75.7
82.5	253.0	379.5	66.7
90.0	270.0	375.0	72.0

Table 1:
Comparison of female and male world-record performances in the squat. (Weights are in kilograms.)

BENCH PRESS

WEIGHT CLASS	FEMALE	MALE	% OF MALE
52.0	120.0	182.5	65.8
56.0	135.0	188.0	71.8
60.0	145.0	200.0	72.5
67.5	160.0	215.0	74.4
75.0	180.0	227.5	79.1
82.5	160.0	252.5	63.4
90.0	175.0	260.5	68.6

Table 2:
Comparison of female and male world-record performances in the bench press. (Weights are in kilograms.)

DEADLIFT

WEIGHT CLASS	FEMALE	MALE	% OF MALE
52.0	197.5	256.0	77.1
56.0	222.5	289.5	76.9
60.0	227.5	310.0	73.4
67.5	245.0	317.5	77.2
75.0	265.0	340.0	77.9
82.5	257.5	357.5	72.0
90.0	260.0	372.5	69.8

Table 3:
Comparison of female and male world-record performances in the deadlift. (Weights are in kilograms.)

Despite the fact that the average man is stronger than the average woman in terms of absolute strength, many women are much stronger than the average man. A number of women, for instance, have lifted more than three times their bodyweight in the squat and deadlift – with one woman having squatted more than four times her bodyweight and another woman having deadlifted close to four times her bodyweight. And many women have exceeded twice their bodyweight in the bench press with at least one woman having bench pressed nearly 400 pounds. The vast majority of the male population has not been able to attain these performances in the three powerlifts.

Conclusion

This examination of male and female world-record performances in powerlifting found that the gender differences in strength are not as significant when bodyweight is taken into consideration. In relation to bodyweight, the world-record performances by women in the squat and deadlift ranged from 66.7 – 77.4% (averaging 72.1%) and 69.8 – 77.9% (averaging 74.7%) of their male counterparts, respectively, compared to the reported range of 57 – 86% (averaging 71.9%) for gender differences in absolute lower-body strength. And based upon bodyweight, the world-record performances by women in the bench press ranged from 63.4 – 79.1% (averaging 70.4%) of men compared to the reported range of 35 - 79% (averaging 55.8%) for gender differences in absolute upper-body strength.

This investigation examined 21 world records by men and 21 world records by women (three lifts in seven weight classes). Of the 21 world records by men, 14 (66.7%) have been set since July 1993. Incredibly, of the 21 world records by men, 5 (23.8%) were set prior to August 1982. Of the 21 world records by women, 20 (95.2%) have been set since July 1993. The other one was established in 1984. In fact, 16 of the 21 (76.2%) world records by women have been established since December 2000. This suggests that women have not reached their performance potential in the three powerlifts and are closing the gap in gender differences in strength.

References

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