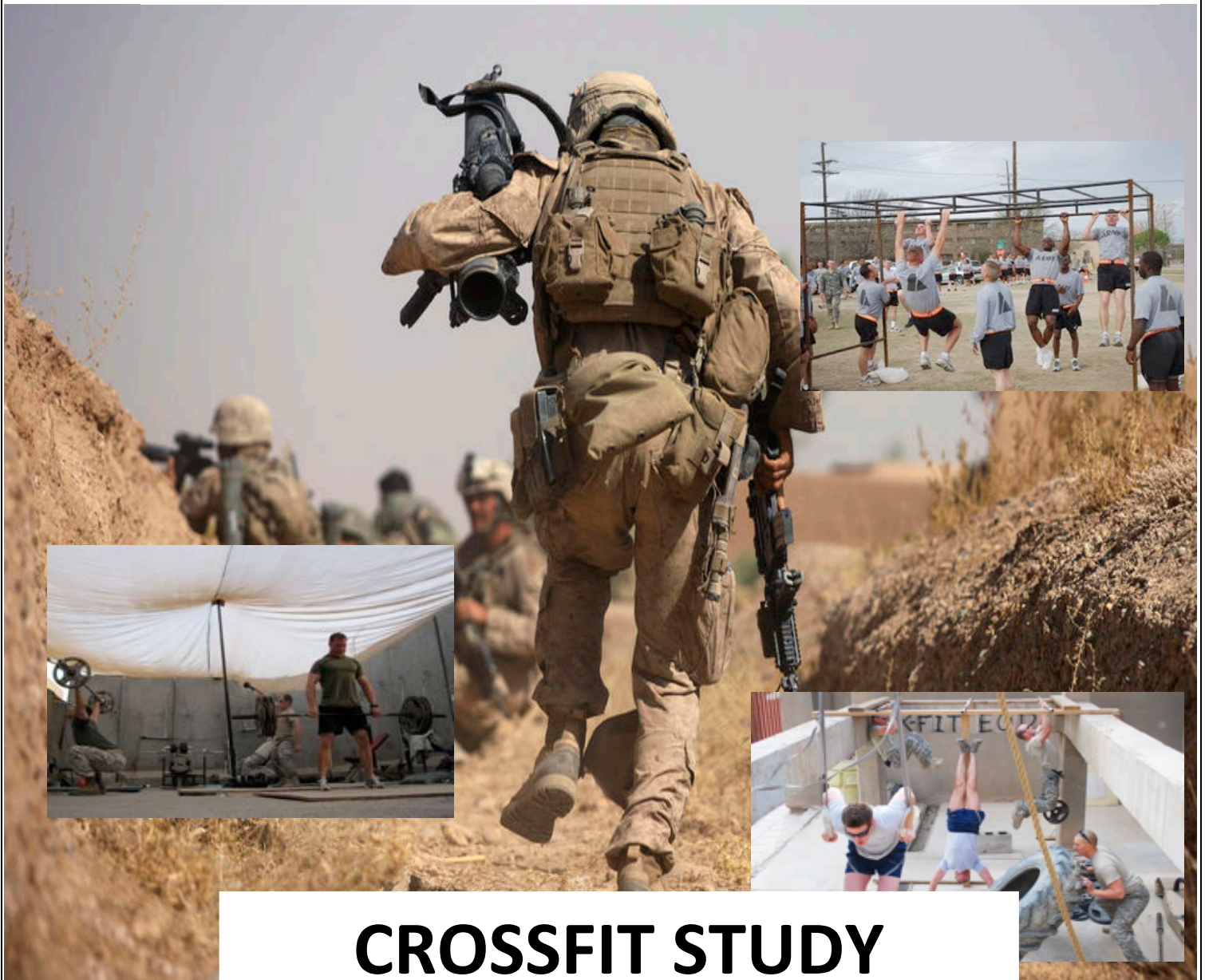


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COMMAND AND GENERAL STAFF COLLEGE



CROSSFIT STUDY

MAY 2010

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Executive Summary

The purpose of this study is to test the efficacy of the CrossFit fitness program and methodology to increase the physical fitness of U.S. Army Soldiers. Over the past several years, the CrossFit fitness program has gained popularity among U.S. Army Soldiers and leaders. In unit's across the U.S. Army, CrossFit is replacing or augmenting traditional physical training methods. CrossFit's growing popularity in the U.S. Army begs the question, is CrossFit an effective fitness program and does it match the U.S. Army's physical training requirements?

CrossFit is a core strength and conditioning program created in 1995 by Greg Glassman, a life-long physical fitness trainer and gymnast from Santa Cruz, CA. The stated goal of the CrossFit program is to develop a broad, general and inclusive fitness, the type of fitness that would best prepare trainees for any physical contingency. To achieve the aim of general, broad and inclusive fitness, the CrossFit program has athletes perform constantly varied, high intensity, functional movements. These movements generally fall into the three modalities of gymnastics, Olympic weightlifting, and metabolic conditioning or "cardio." In a typical CrossFit workout athletes conduct a warm-up, a skill or strength development segment and then a "Workout of the Day" or WOD. The WOD by design varies from day to day, but typically includes a mixture of functional exercises conducted at high intensity from anywhere between 5 and 20 minutes.

Since the creation of the U.S. Army, physical fitness training has played an important role in combat readiness. However, throughout its history the U.S. Army's method for conducting physical fitness training has changed and evolved. Most recently, in the late 1990s, the U.S. Army began to see evidence that its method of conducting physical training was not producing Soldiers ready for the rigors of modern ground combat. This reality began a general move within the U.S. military towards functional fitness programs as many leaders and organizations began to rethink physical training and its relation to combat readiness. Take for example, the revision of FM 21-20 (*Physical Fitness Training*), the Ranger Athlete Warrior program, and the United States Marine Corps, Functional Fitness Program. The CrossFit program's growth in the U.S. military over the last decade is equally representative of the U.S. Military's move to functional fitness. In 2006, Glassman estimated that up to 7,000 members of the U.S. military were using the CrossFit program regularly. That number has grown exponentially since 2006 represented by the fact that there are now over 58 non-profit military CrossFit affiliates throughout the world, to include affiliates at many major U.S. Army installations like Fort Bragg, Fort Hood, Fort Polk, Fort Knox, Fort Meade, Fort Leavenworth, the Pentagon and the United States Military Academy.

In order to test the efficacy of the CrossFit program, this study measured the change in level of physical fitness (defined as an athletes' work capacity across broad time periods and modal domains) of fourteen athletes during eight-weeks of physical training utilizing the CrossFit program. The fourteen athletes were all students at the Command and General Staff College, and were a mix of men and women with varying levels of physical fitness and CrossFit experience. The athletes were given an initial assessment made-up of four physical evaluations (the APFT, and three CrossFit benchmark workouts; "Fran," "Fight Gone Bad," and "the CrossFit Total") that tested their ability to perform a variety of functional movements across modalities and for differing periods of time. These athletes were then introduced to the specific CrossFit movements and conducted a six-week CrossFit specific training program. During the last week of the program these athletes were re-assessed using the same evaluation tools in order to measure the change in their level of physical fitness. Athletes in the study were required to

complete each initial and final evaluation and attend an initial three hours of CrossFit Foundations instruction. During the six-week training period athletes were required to attend a minimum of four, one hour, training sessions per week.

Based on the results of the data we collected during the athletes' performance on the assessments, and our qualitative evaluations of the athletes during the six-weeks of training, we believe this study produced four important findings.

1) Over the eight-week study, every athlete experienced an increase in their work capacity, measured in terms of power output, with an average increase of 20%. Therefore, we believe the CrossFit program was successful in increasing every athlete's general level of physical fitness.

2) While those athletes that were least fit at the beginning of the study saw the largest net gains in work capacity, even the most-fit athletes in the study experienced significant gains. The results of our study indicate that above average athletes overall work capacity increased 14.38%. One of our most fit athletes, with considerable CrossFit experience, saw a gain of 28.32% in overall work capacity. From our perspective, these results considerably strengthen our assertion in the first finding by demonstrating the CrossFit program's ability to increase the level of physical fitness of above-average athletes who in theory would have less capacity for improvement. We believe that the CrossFit program's prescription of high intensity combined with constant variance is one of the primary reasons that the above-average athletes in the study experienced gains in work capacity. Additionally, based on our qualitative observations, individual motivation to both maintain intensity and develop new physical skills appears to be one of the major observed differences between above-average athletes and average or below average athletes.

3) Despite a generalized training program that did not specifically train the athletes for any of the assessments, the athletes' performance on the assessments improved. For example, on the one repetition maximum weight deadlift assessment, the athletes mean increase in work capacity increased 21.11%. Importantly, these results were achieved despite only performing the deadlift in a workout five times out of twenty-eight training sessions. The results from the shoulder press, back squat, push-up and sit-up assessments mirror the deadlift in that despite limited number of training sessions devoted specifically to these exercises, the athletes' performance during the assessments improved. These results lead us to the conclusion that generalized training can prepare athletes for unknown and unknowable events, a crucial capability in combat, and can produce improvement in specialized events despite non-specialized training.

4) Generally the athletes in the study experienced relatively equal increases in power output in each of the assessments. Based on how we devised the assessments, this indicates a balanced increase in performance across metabolic pathways and across the ten general physical skills. We believe the consistency of improvement across assessments validates the CrossFit program's claim that it produces a broad and inclusive brand of fitness. From the perspective of the U.S. Army, this is significant because capacity across metabolic pathways and modalities characterizes the type of versatility required of U.S. Army Soldiers.

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I. Purpose: The purpose of this study is to test the efficacy of the CrossFit fitness program and methodology to increase the physical fitness of U.S. Army Soldiers. Over the past several years, the CrossFit fitness program has gained popularity among U.S. Army Soldiers and leaders. In unit's across the U.S. Army, CrossFit is replacing or augmenting traditional physical training methods.¹ CrossFit's growing popularity in the U.S. Army begs the question, is CrossFit an effective program and does it match the U.S. Army's physical training requirements? Currently there exists a host of anecdotal evidence claiming that the CrossFit program is effective.² However, to date, only one formal study within the U.S. Army has attempted to add empirical evidence to these claims.³ Our study seeks to contribute to the discussion by adding further analytical research on the CrossFit program in hopes of helping U.S. Army leaders make well-informed decisions regarding the future of U.S. Army physical fitness training.

II. Background:

a. What is CrossFit?

CrossFit is a core strength and conditioning program created in 1995 by Greg Glassman, a life-long physical fitness trainer and gymnast from Santa Cruz, CA. The stated goal of the CrossFit program is to develop a broad, general and inclusive fitness, the type of fitness that would best prepare trainees for any physical contingency, to include the unknown and the unknowable.⁴ As Greg Glassman states in a CrossFit Training Guide, "Our specialty is not specializing. Combat, survival, many sports, and life reward this kind of fitness and, on average, punish the specialist." Additionally, Glassman states that the CrossFit method is unique in its focus on maximizing "neuroendocrine response, developing power, cross-training with multiple training modalities, constant training and practice with functional movements and the development of successful diet strategies."⁵

The CrossFit program's concepts of fitness rest on three standards. Athletes are held up to these standards to determine their level of fitness. The first standard is the 10 general physical skills, which include: cardio respiratory endurance, stamina, strength, flexibility, power, speed, coordination, agility, balance, and accuracy. By this standard an athlete is as fit as they are

¹ U.S. Army units using the CrossFit method include both conventional and special operations forces. U.S. Army installations, both in the continental United States and deployed, have established functional fitness training facilities that allow Soldiers to do CrossFit type workouts. Specifically, there are 58 non-profit military CrossFit affiliates located on U.S. military installations around the world (see the list of affiliates at www.CrossFit.com). For example, at Fort Hood there are two non-profit military affiliates. The first is the 20th Engineer Battalion whose leadership created Lumberjack CrossFit and use CrossFit for their battalion physical training (see <http://lumberjackcrossfit.blogspot.com/>). The second is CrossFit Centurion Fort Hood (see <http://CrossFitforhood.blogspot.com/>). For news reports that chronicle the rising popularity of CrossFit in the U.S. military see Rebekah Sanderlin, "Commando-style workout has cult following," *Fayetteville Observer* (December 18, 2006), and Bryan Mitchell, "CrossFit workout craze sweeps the Corps," *Marine Corps Times* (June 22, 2008).

² See for example, Major Dave Maxwell, "Winning the Battle of the Bulge," *CrossFit Journal* (November, 18 2008).

³ The non-profit military affiliate at Fort Hood, CrossFit Centurion Fort Hood, conducted a study similar to this one in 2009. That study is unpublished.

⁴ Greg Glassman, "Understanding CrossFit," *CrossFit Journal* 56 (April 2007), 1.

⁵ Greg Glassman, "Foundations," *CrossFit Journal* (April 2002), 1.

competent across these 10 skills. The second standard encapsulates the idea that fitness is about performing well at a broad range of physical tasks. CrossFit refers to this standard as the “hopper.” If one puts every physical task imaginable into a hopper, spins it around and then pulls out a random task, we would measure an athletes’ level of fitness by their ability to consistently perform well at any of the tasks pulled from the hopper. The third standard is the ability of athletes to perform well across the three metabolic pathways that provide energy for all human activity. These are the phosphagen, glycolytic and oxidative pathways.⁶ According to this standard, an athlete is as fit as they are conditioned in each of the metabolic pathways. To achieve the aim of general, broad and inclusive fitness, CrossFit has athletes perform constantly varied, high intensity, functional movements. These movements generally fall into the three categories, or modalities, of gymnastics, Olympic weightlifting, and metabolic conditioning or “cardio.” In a typical CrossFit workout athletes conduct a warm-up, a skill or strength development segment and then a “Workout of the Day” or WOD. The WOD by design varies from day to day, but typically includes a mixture of functional exercises conducted at high intensity from anywhere between 5 and 20 minutes. Key to the CrossFit method is the idea that CrossFit is the “sport of fitness” -- it attempts to harness the, “natural camaraderie, competition, and fun of sport,” by keeping score, timing workouts and defining rules and standards of performance.⁷

b. Functional Fitness – Back to the Future:

Since the creation of the U.S Army, physical fitness training has played an important role in combat readiness. However, throughout its history the U.S. Army’s method for conducting physical fitness training has changed and evolved. Most recently, in the late 1990s, the U.S. Army began to see evidence that its method of conducting physical training was not producing Soldiers ready for the rigors of modern ground combat. The Army Physical Fitness School, then at Fort Benning, Georgia, began testing Soldiers using a 1946 Physical Efficiency Test. This test, created from the lessons of combat during WWII and intended to test U.S. Army Soldiers’ readiness for combat, consisted of the following events: jumping over a 3ft wall, and an 8ft ditch, climbing a 12ft rope two times without pause, conducting a fireman’s carry 100 yards in 1 minute, foot marching 5 miles in 1 hour, running 1 mile in 9 minutes, swimming 30yds and treading water for 2 minutes. After giving this older test to modern day Soldiers, the Army Physical Fitness School found that present day Soldiers were less fit than their WWII counterparts were. The director of the Army Physical Fitness School attributed this trend to the fact that the current APFT had become the focus of physical training in the Army and that the APFT did not accurately measure the skills necessary for combat, particularly anaerobic skills such as agility, strength and speed.⁸ In response to these findings the Army Physical Fitness School at the time proposed changes to the APFT and a revision of FM 21-20, the Army physical training manual. That revision was recently published as TC 3-22.20 (*Army*

⁶ Greg Glassman, "The CrossFit Training Manual, v4," http://www.CrossFit.com/cf-seminars/CertRefs/CF_Manual_v4.pdf (accessed January 13, 2010).15.

⁷ Ibid, 2.

⁸ Stephen Lee Myers, "The Old Army, It Turn Out, Was the Fitter One," June 25, 2000, <http://www.ihrpa.orgnewyorktimes.htm> (accessed January 13, 2010).

Physical Readiness Training) and outlines three fundamentals for U.S. Army physical training: strength, endurance and mobility.⁹

Throughout the past decade the realities of modern combat have caused many military leaders and organizations within the U.S. military, in addition to the U.S. Army Physical Fitness School, to rethink physical training and its relation to combat readiness. This thinking has led to a resurgence of functional fitness programs in the U.S. Military. Two important cases in point demonstrate the U.S. military's recent move to functional, combat-focused fitness. The first case is the U.S. Army Ranger Regiment. In the summer of 2005, the Ranger Regiment initiated a program called the Ranger Athlete Warrior Program, or RAW. This program was intended, among other objectives, to "achieve a level of physical fitness that is commensurate with the physical requirements of Ranger missions."¹⁰ The RAW program includes four primary components: functional fitness, performance nutrition, sports medicine and mental toughness. The perceived importance of this new fitness program to the U.S. Army is captured in the following statement from the editor of *Infantry* magazine in 2007, "The Ranger Athlete Warrior Program offers a means of improving Soldiers' conditioning well beyond anything we have tried up to now, and deserves our close attention."¹¹ The second case is the U.S. Marine Corps. In 2006, the U.S. Marine Corps leadership began to believe that its current physical fitness training regime was not adequately preparing Marines for the rigors of modern combat. In a paper entitled, "A Concept for Functional Fitness," the U.S. Marine Corps spelled out its move away from traditional military physical training with its focus on long distance running and other endurance training to functional fitness focused on combat readiness. As LTG James F. Amos explains in the introduction to this paper, "In recent decades we have not maintained our focus on combat when we designed our physical fitness programs. Our physical training was not 'functional' in this sense."¹² The U.S. Marine Corps reinforced its change in thinking by adding a Combat Fitness Test in addition to its traditional Physical Fitness Test in October 2008.

Although different than RAW and the U.S. Marine Corps' functional fitness concept because of its grassroots nature, the CrossFit fitness program's growth in the U.S. military over the last decade is equally representative of the U.S. Military's move to functional fitness. In 2006, Glassman estimated that up to 7,000 members of the U.S. military were using the CrossFit program regularly.¹³ That number has grown exponentially since 2006 represented by the fact that there are now over 58 non-profit military CrossFit affiliates throughout the world, to include affiliates at many major U.S. Army installations like Fort Bragg, Fort Hood, Fort Polk, Fort Knox, Fort Meade, Fort Leavenworth, the Pentagon and the United States Military Academy.¹⁴ The growth of CrossFit in the U.S. military mirrors the growth of the program throughout America in general. Glassman opened the first CrossFit affiliated gym in Santa Cruz in 1995. Then in 2001, he introduced his fitness program on the Internet at CrossFit.com, and began publishing a monthly journal and holding seminars at his local gym. Since that time, CrossFit

⁹ Department of the Army, *TC 3-22.20: Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2010).

¹⁰ RAW PT, v.3.0, 4, online at http://www.utoledo.edu/hshs/military_science/pdfs/RAW_PT_Manual%2C_v3.pdf ; accessed on 5/3/2010.

¹¹ Danny McMillian, "Ranger Athlete Warrior Program: A Systemic Approach to Conditioning," *Infantry*, May-June 2007. 5.

¹² U.S. Marine Corps Combat Development Command, "A Concept for Functional Fitness," November 2006, <http://www.CrossFit.com/2007/01/a-concept-for-functional-fitness.html> (accessed May 14, 2010).

¹³ Rebekah Sanderlin, "Commando-style workout has cult following," *Fayetteville Observer*, December 18, 2006.

¹⁴ Study authors conducted a search on the CrossFit website, www.CrossFit.com, for military affiliates.

has grown from 18 affiliated gyms in 2005 to almost 1,700 in 2010.¹⁵ Glassman attributes the growth of his fitness program to the confluence of the launch of his website and the start of the wars in Iraq and Afghanistan. From his perspective, at that time “people [began to take] fitness much more seriously.”¹⁶ In addition to its functional applications to the military, many attribute the CrossFit program’s popularity to its simplicity and variety. Soldiers in deployed or austere environments have found that the CrossFit program, because it does not rely on a lot of equipment or distance running, can be performed almost anywhere.¹⁷

III. Research Methodology:

a. Overview: In order to test the efficacy of the CrossFit program this study measured the change in level of physical fitness of fourteen athletes during eight-weeks of physical training utilizing the CrossFit program. Athletes were given an initial assessment made-up of four physical evaluations that tested their ability to perform a variety of functional movements across modalities and for differing periods of time. These athletes were then introduced to the specific CrossFit movements and principles and conducted a six-week CrossFit specific training program. During the last week of the program these athletes were re-assessed using the same evaluation tools in order to measure the change in their level of physical fitness. Athletes in the study were required to complete each initial and final evaluation and attend an initial three hours of CrossFit Foundations instruction. During the six-week training period athletes were required to attend a minimum of four, one hour, training sessions per week.

b. Defining and Measuring Physical Fitness: We defined physical fitness as an athletes’ work capacity across broad time periods and modal domains.¹⁸ More plainly stated, physical fitness is an athlete’s ability to successfully conduct a host of different physical tasks for varying periods of time at varying levels of intensity. We chose this definition because we believe it best articulates the type of fitness required of U.S. Army Soldiers. Soldiers need to be broadly trained athletes who can perform well across a full spectrum of athletic tasks, and who are competent across the ten general physical skills.¹⁹ They cannot afford to be strictly endurance athletes or strictly strength athletes. We believe our definition of fitness captures these requirements. Therefore, by our definition, increases in an athlete’s level of physical fitness can be measured by increases in an athlete’s work capacity or average power output regardless of the physical activity being performed. Therefore, this metric of fitness allows for a comparison between traditionally incomparable activities such as running long distance and weight lifting.

By our definition, the ability to demonstrate a high level of work capacity (intensity) across varying time periods indicates an ability to perform using any three of the major metabolic pathways that provide energy for all human action. These three major engines are known as the phosphagen pathway, the glycolytic pathway and the oxidative pathway (see

¹⁵ James Wagner, "Fitness is a Full-Time Pursuit," *The Wall Street Journal*, February 2, 2010.

¹⁶ Bryan Mitchell, "CrossFit workout craze sweeps the Corps," *Marine Corps Times*, June 22, 2008.

¹⁷ See for example, First Lieutenant Matthew Hoff, "The Panther Recon Downrange Gym," *The CrossFit Journal* (September 20, 2009).

¹⁸ Greg Glassman, "The CrossFit Training Manual, v4," http://www.CrossFit.com/cf-seminars/CertRefs/CF_Manual_v4.pdf (accessed January 13, 2010)., 2.

¹⁹ The ten general physical skills are outlined in Appendix C (General Physical Skills) and were taken from *The CrossFit Training Guide v4*, 17.

Figure 1). The phosphagen pathway is the pathway the human body predominately uses when conducting high-powered activities that last for only a few seconds; for example, a one-repetition maximum weight dead lift. The glycolytic pathway is the pathway the body predominately uses when conducting moderately powered activities that last up to several minutes; for example, an 800m sprint or two minutes of push-ups. The third metabolic pathway is the pathway that dominates low powered activities that last in excess of several minutes; for example, running two miles. The phosphagen and the glycolytic pathways generally power anaerobic exercises; these systems generate energy in the absence of oxygen. Conversely, the oxidative pathway is aerobic and generates energy using oxygen. The use of oxygen makes aerobic activity sustainable for long periods of time whereas anaerobic activity is unsustainable past several minutes. This leads to the natural observation that power or intensity and duration of physical activity are inversely related. Therefore, athletes will experience a decrease in average power output the longer they perform.²⁰ However, by our definition the most-fit athletes will be able to generate large amounts of power in short periods of time and maintain relatively higher power outputs for longer periods of time.

Modal domains are distinct categories of physical training tasks. In this study we define three modal domains: metabolic conditioning, gymnastics, and weight lifting. Metabolic conditioning or “cardio” refers to physical training tasks whose primary function is to improve cardio respiratory capacity and stamina. These include tasks such as running, biking, rowing, and jumping rope. The gymnastics modality comprises body weight exercises or tasks that require the ability to manipulate one’s own body weight. The primary purpose of these types of exercises is to improve neurological dominated skills like coordination, agility, balance, and accuracy and improve functional upper body capacity and core strength. The weightlifting modality is made up of weight lifting, Olympic lifts and powerlifting. The primary purpose of training in this modality is to increase strength, power, and speed.²¹ By our definition the ability to show work capacity across modal domains indicates an athlete’s competence across the ten general physical skills (see Appendix C: General Physical Skills for a definitions) and, more generally, an ability to successfully execute a broad range of diverse physical tasks.

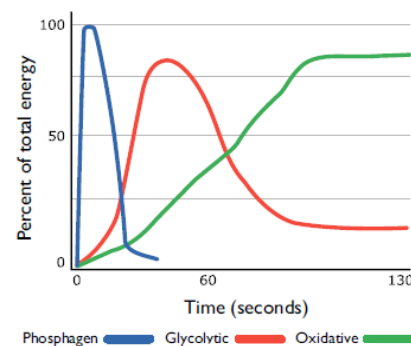


Figure 1

c. Selection of athletes:

1) We asked for volunteers for the study by sending out an e-mail to all of the Command and General Staff College Class 2010-01. We received over 150 applications from interested students. All members of the CGSC class are mid-grade officers in the U.S. Armed Forces between the ages of 30-45. Selected officers had to be in good health and without physical limitations that prohibited their ability to perform any of the required CrossFit movements.

²⁰ Greg Glassman, "Metabolic Conditioning," *CrossFit Journal*, June 2003, 1-2.

²¹ Greg Glassman, "The CrossFit Training Manual, v4," http://www.CrossFit.com/cf-seminars/CertRefs/CF_Manual_v4.pdf (accessed January 13, 2010), 79.

2) We selected candidates in order to achieve a mix of both male and female athletes with widely varying levels of physical fitness and varying levels of previous CrossFit experience.²² When applying for the study, athletes were asked to include their last Army Physical Fitness (APFT) score and their CrossFit experience described as: *No Experience* (“What is CrossFit?”); *Some Experience* (“I have done a few CrossFit workouts”); *Moderate Experience* (“I have attended a CrossFit Foundations class and/or I have been using CrossFit as my primary fitness program for at least two months”); or *Considerable Experience* (“I have been using CrossFit as my primary fitness program for over a year and I have attended or I am planning to attend in the near future a Level I CrossFit Certification”). We selected a broad range of athletes in order to evaluate the ability of CrossFit to improve physical fitness regardless of current level of fitness or experience with the program. We hypothesized that almost any fitness program would show improvement in athletes who prior to the study did not conduct physical fitness training regularly and scored below average on the APFT. We felt that the real test of the CrossFit program would be its ability to increase in the physical fitness level of average to above average athletes.

3) Study Participants demographics: We selected five females and nine males for the study. Four of the athletes had no CrossFit experience and had historically below average scores on the APFT (defined as 250 and below). Four of the athletes had little to no CrossFit experience and had historically average scores on the APFT (defined as 250-290). Six of the athletes had historically above average scores on the APFT (defined as 290 and above) of which two had significant CrossFit experience and two had moderate CrossFit experience. See Appendix A (Athlete Profiles) for a detailed description of each athlete’s profile.

	Gender	APFT (Below AVG)	APFT (AVG)	APFT (Above AVG)	CF Exp (None)	CF Exp (Some)	CF Exp (Mod)	CF Exp (Con)
Male	9	3	2	4	3	2	2	2
Female	5	1	2	2	3	2	0	0

Figure 2

d. Assessments: During the initial and final week of the study, the athletes’ physical fitness readiness was tested using four physical assessments. One of the assessments was the Army Physical Fitness Test (APFT). The APFT was chosen as an assessment in order to provide a traditional frame of reference to evaluate increases or decreases in physical fitness and to provide an assessment that was not a CrossFit workout. The other assessments were benchmark Workouts of the Day (WOD) from the CrossFit.com website. Each of the WODs was chosen based on their diversity from one another and their collective ability to test the athletes’ performance across different metabolic pathways and modalities. All four assessments took place over the course of a week and athletes were given at least one day of recovery between assessments. Each assessment had prescribed weights to lift or repetitions to complete. When athletes could not complete the assessments as prescribed, they were allowed to scale the movement, or the weight as needed. Trained and certified trainers were present as graders during each of the assessments. They evaluated the athletes’ correctness in performing the

²² Varying levels of physical fitness should be understood in the context of the U.S. Army where everyone has to be fit enough to pass an Army Physical Fitness test.

required movements. Trainers had the ability to take away or not count repetitions if an athlete's form or technique was not accurate or if they did not properly complete a movement. Points of performance for each exercise were based on the Army APFT standards as described in FM 21-20 (*Physical Fitness Training*) and the CrossFit movement standards as outlined in the CrossFit Training Guide (see Appendix D: Movement Points of Performance for a detailed description of the CrossFit movement standards). Below is a detailed description of each assessment.

1) **APFT:**

For maximum repetitions/fastest time:

Maximum repetitions of Push-ups (2 minutes)

Rest 10 minutes

Maximum repetitions of Sit-ups (2 minutes)

Rest 10 minutes

Run 2 miles (as rapidly as possible)

The first workout that we had our athletes perform during the assessment week was the APFT. The APFT consists of three separate events; the push-up, the sit-up, and the two-mile run. These three events are conducted in sequence giving the athlete up to ten minutes of rest between events. For the push-up and sit-up portion of the test, an athlete has two minutes to perform as many repetitions of the exercise as possible. For the two-mile run, athletes attempt to complete a two-mile course in as short a time as possible. According to APFT standards, an athlete performs a push-up by starting in the plank position with arms fully extended and then lowering themselves as a single unit until their upper arm is parallel to the ground and then pushing their body weight back up until their arms are fully extended. During the two minutes, athletes are not allowed to rest by placing their chest or knees on the ground. The sit-up is performed by an athlete lying on their back with their knees bent and then sitting up to a position where their back is perpendicular to the ground. For the sit-up, athletes have their feet secured by another athlete and they must have their hands behind their head.

As previously mentioned the assessments were chosen because of their diversity from one another in terms of metabolic pathway and modality. As such, we classified each assessment based on these criteria in order to make clear their distinctions from one another. Regarding the APFT, we classified the push-up and sit-up events as workouts that predominately required athletes to use the glycolytic pathway because these events require exactly two minutes of maximum workout effort. We further classified these two events as gymnastic events because they require athletes to manipulate their own body weight. We classified the two-mile run as an event in the oxidative pathway and as a metabolic conditioning exercise.

2) **Fran:**

For Time:

21-15-9 repetitions of

Thrusters (96lbs/65lbs) and Pull-ups

The second workout that we had our athletes perform during the assessment weeks was “Fran.” Fran consists of three rounds of a couplet of exercises: the thruster and the pull-up. Athletes perform the thruster by holding a barbell in their hands at shoulder height (resting on the front of their shoulders), executing a front squat followed immediately by an aggressive press of the barbell overhead. Athletes perform pull-ups by starting from a dead hang on a bar, arms straight, and pulling themselves upward until their chin is above the level of the bar. In Fran, each athlete performs twenty-one of each exercise, followed immediately by fifteen of each, then finishes with nine of each. Time does not stop during this workout and the exercises must be executed in order; thrusters then pull-ups. The prescribed weight for the thrusters is ninety-five pounds for men and sixty-five pounds for women. Depending on their level of fitness and confidence, athletes may choose to scale either exercise. Athletes scale thrusters by reducing the weight on the barbell. Athletes scale pull-ups by using resistance bands to assist them; bands offer either an estimated 20% assistance (blue band) or 30% assistance (green band) to the athlete. Athletes may also scale pull-ups by performing jumping pull-ups: using leg drive to gain momentum in order to get their chins above the bar.

We classified Fran as a WOD that required athletes to predominately rely on the glycolytic pathway because, if scaled properly, athletes complete the WOD in between three and eight minutes. We further classified Fran as a mixture of two modalities, gymnastic and weightlifting and those modalities’ corresponding primary physical skills.

3) Fight Gone Bad:

3 Rounds for repetitions/calories of the following:

1 minute of wall ball shots (20lbs/14lbs)

1 minute of sumo deadlift high-pull (75lbs/55lbs)

1 minute of box jumps (20 inch)

1 minute of push press (75lbs/55lbs)

1 minute of rowing

1 minute rest

The third workout our athletes performed was “Fight Gone Bad.” Fight Gone Bad consists of three rounds of five different exercises: wall ball shots, box jumps, sumo deadlift high pull, push press, and rowing on a Concept 2 rowing ergometer. Athletes perform each exercise for one minute, then move to the next exercise and immediately begin that exercise, then on to the next exercise, until all five exercises are complete. At the conclusion of each round, athletes get a one-minute break before beginning the next round. “Fight Gone Bad” takes exactly seventeen minutes to perform. Athletes count the number of repetitions performed for each

exercise and number of calories generated on the rowing machine (as displayed on its monitor). The total score is equal to the total number of repetitions plus total calories for rowing. The goal is for athletes to score as many points as possible.

Wall Ball Shots are performed by squatting with a medicine ball (20-lbs for men and 14-lbs for women) then throwing and hitting a ten-foot target line on a wall. Athletes perform box jumps by jumping on to a 20-inch box with both feet, standing up to fully open their hips once on top of the box, and then jumping down. Athletes execute sumo deadlift high pulls by grabbing a barbell (75-lbs for men and 55-lbs for women) with their arms inside their knees, dead lifting the barbell, and pulling it to a position even with their collarbones, then returning the barbell to the ground. Athletes push press by holding a barbell (75-lbs for men and 55-lbs for women) in their hands at shoulder height (resting on the front of shoulders), bending their knees slightly, then driving with their legs and hips and pressing the bar overhead with their arms and shoulders. Like Fran, athletes can scale portions of “Fight Gone Bad” to fit their physical and mental capacities. For Wall Ball shots, athletes can scale by either using a lighter ball or throwing to a lower target or both. Athletes can scale box jumps by using a lower box or performing “step-ups” in lieu of box jumps or both. Scaling for Sumo Deadlift High Pull and Push Press involves reducing the amount of weight on the barbell. Athletes cannot scale rowing.

We classified Fight Gone Bad as a WOD that required athletes to rely, relative to the other WODs, primarily on the oxidative pathway because in this athletes are required to sustain a relatively low-power output over longer periods of time. Although the athletes do get a one minute rest every five minutes, the lower work to rest ratio in this WOD requires athletes to rely on stamina and endurance to maintain their intensity. We further classified Fight Gone Bad as a mixture of all three modalities, gymnastic, weightlifting and metabolic conditioning.

4) CrossFit Total:

1 repetition maximum weight of the following:

Shoulder press

Back squat

Deadlift

The CrossFit Total is a strength assessment. It requires athletes to perform back squats, deadlifts, and shoulder presses to determine a one repetition maximum weight. Athletes generally were allowed three attempts before their one repetition maximum weight was determined. Athletes were allowed to rest as needed between lifts and between each attempt. In the back squat, the athletes placed a loaded barbell behind their neck on their shoulders and performed a squat reaching a depth where the crease of their hip was below the top of their kneecap and then standing back up to full extension of the hip and knees. In the dead lift, athletes lift a loaded barbell from the ground to a position just below their waist where they can achieve full extension of their knees and hip and then return the barbell back to the floor. In the shoulder press athletes start with a barbell across their chest and hands gripped around the bar just outside their shoulders. Then they press the bar overhead using only their arms and

shoulders until their elbows are locked out above the head. An athlete's score on the CrossFit total is the total weight lifted in pounds for all three exercises.

We classified the CrossFit Total as a WOD that required athletes to predominately rely on the phosphagen pathway because each lift required high power output for only seconds at a time with a large work to rest ratio. In terms of modality, we classified the CrossFit Total as a weight lifting task, which required competency in each of the physical skills related to that modality.

e. CrossFit Foundations classes: During the initial assessment week we conducted three hours of classes to train and educate the athletes participating in the study on the CrossFit methodology and specific CrossFit movements. The day prior to each assessment, athletes were trained in the specific movements required in that WOD. For example, the day prior to assessing the athletes on Fran, they received instruction and coaching on the front squat, the push press, the thruster, and the pull-up. They were also informed of the points of performance for each of these movements.

f. Training Plan: The training plan for the study was based on the CrossFit programming methodology as described in The CrossFit Training Guide.²³ The workout for each training session was designed to be varied, functional and have the ability to be executed at high intensity. Daily workouts varied in terms of their modality (gymnastics, Olympic weight lifting, metabolic conditioning), their time and intensity (generally between 5-20 minutes) and their structure (singlet, couplet, triplet, WODs of up to ten exercises). Several other specific considerations guided programming. The first consideration was the skill and experience level of the athletes. The programming took into account that many of the athletes in the study had very little if any CrossFit experience. Therefore, training sessions in the beginning of the study involved few if any tasks with a high skill level, specifically movements like muscle-ups, push-jerks, or snatch. High skill tasks were introduced to athletes in daily skill and strength portions of a training session with reduced intensity, and then only introduced into workouts later in the six-week period once the athletes had practiced those skills. The second consideration was the desire to allow for adequate recovery for athletes during the week, especially in the first two weeks of the program. For this reason, the training plan specifically sought to avoid the same type of movements multiple days in a row. This allowed athletes who had not been working out regularly before the study to maintain the intensity of their workouts throughout a week. The last consideration was weather. The study was conducted in the winter months in Kansas. Running outside became difficult during the latter parts of the six-week training period. Therefore, weather limited the types of metabolic conditioning that the athletes could perform. For the detailed six-week training plan, see Appendix B (Training Plan).

g. Training sessions: Training sessions during the study lasted for six-weeks and were conducted five days a week. Athletes were required to attend at least four training sessions each week during that six-week period. Each training session lasted approximately one hour and athletes could choose to attend a training session at either 0515 or 1600. All training sessions were lead by CrossFit Level I certified trainers from the Iron Major CrossFit affiliate at Fort Leavenworth, KS. Training sessions generally following the format; warm-up, skill or strength

²³ Greg Glassman, "The CrossFit Training Manual, v4," http://www.CrossFit.com/cf-seminars/CertRefs/CF_Manual_v4.pdf (accessed January 13, 2010), 7-86.

work and then a workout of the day or WOD. The warm-up consisted of a series of body weight or lightweight exercises and movements conducted at a slow to moderate pace. Typical warm-up exercises included rowing, squats, push-ups, pull-ups, sit-ups, back extensions, and stretching. Skill and strength work was also conducted at low to moderate intensity and was intended to build capacity in a single CrossFit movement. The athletes would move through each separate portion of the training session together and then begin the WOD at the same time. During the WOD, the trainer would help athletes record their time, reps or weight for each workout. All athletes were encouraged to maintain their own fitness logbook to record the results of their workouts.

IV. Presentation of Data:

a. Empirical Measurement of Workout Performance²⁴:

In order to compare workout performance in a single athlete or between athletes, it is necessary to establish a common unit of measure. In terms of our functional fitness program, this common unit is *average power* (in foot-pounds per second or ft-lbs/s). This is the quantification of the general physical skill of *power*: the ability of a muscular unit or combination of muscular units, to apply a maximum force in minimum time.²⁵ Because average power is exactly equal to intensity, it is a great common unit to compare workout performances from the same athlete or between athletes.²⁶

To begin, we must be able to mathematically define *average power*:

$$P_{AVG} = W \div t$$

P_{AVG} is average power.

W is work in ft-lbs.

t is time in seconds.

Work is:

$$W = F \times d.$$

²⁴ The mathematical formulas for calculating work and power of specific exercises were developed and given to the authors in an Excel Spreadsheet by Bill Abney from www.beyondthewhiteboard.com.

²⁵ Greg Glassman, "The CrossFit Training Manual, v4," http://www.CrossFit.com/cf-seminars/CertRefs/CF_Manual_v4.pdf (accessed January 13, 2010), 10.

²⁶ Ibid. 1.

Force (F) is weight, measured in pounds (lbs), distance (d) is measured in feet, and time is measured in seconds. Using these basic formulas, we can calculate the amount of average power generated in a workout performance. Therefore:

$$P_{AVG} = (F \times d) \div t$$

By calculating average power for a workout performance, we can compare performances regardless of any scaling of weight or repetitions the athlete might have done.

b. Empirical Data by Assessment:

1) Fran

The first workout that our athletes performed for record was “Fran.” To calculate average power generated for Fran (P_{Fran}), we had to calculate the work performed by the athlete in performing thrusters ($P_{Thrusters}$) and the work performed in performing pull-ups ($P_{Pull-ups}$) and divide that by the total time of the WOD.

$$P_{Fran} = (W_{Thrusters} + W_{pull-ups}) \div t$$

The average power for thrusters is a combination of the work of moving the barbell and body weight through a known distance over a time period. The athlete must move the load, consisting of the weight of the barbell and the portion of the bodyweight moved in the thruster, from the bottom of the front squat position to the full overhead position.

$$W_{Thrusters} = n_{Thrusters} \times ([Weight_{Barbell} + (p_{Squat} \times Weight_{Athlete})] \times d_{Thruster})$$

$Weight_{Barbell}$ and $Weight_{Athlete}$ are the weights of the barbell and athlete in pounds.

p_{Squat} is the portion of the bodyweight moved in the squat.

$d_{Thruster}$ is the distance the barbell moves through the entire thruster range of motion.

$n_{Thrusters}$ is the total number of thruster repetitions performed by the athlete.

The distance the bar moves is determined by calculating the differences between the height of the barbell when standing as if for a squat and the height of the barbell at the bottom of the squat and adding to it the difference between the squat height and the full overhead height.

$$d_{\text{Thruster}} = (\text{Height}_{\text{Squat}} - \text{Depth}_{\text{Squat}}) + (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Squat}})$$

Therefore, the work performed for a given number of thrusters is:

$$W_{\text{Thrusters}} = n_{\text{Thrusters}} \times [([\text{Weight}_{\text{Barbell}} + (p_{\text{Squat}} \times \text{Weight}_{\text{Athlete}})] \times [(\text{Height}_{\text{Squat}} - \text{Depth}_{\text{Squat}}) + (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Squat}})]) \div t$$

We calculated the average power generated for pull-ups in a similar manner, resulting in the following formula:

$$W_{\text{pull-up}} = n_{\text{pull-up}} \times \text{Weight}_{\text{Athlete}} \times (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Squat}})$$

$n_{\text{pull-up}}$ is the number of pull-up repetitions performed by the

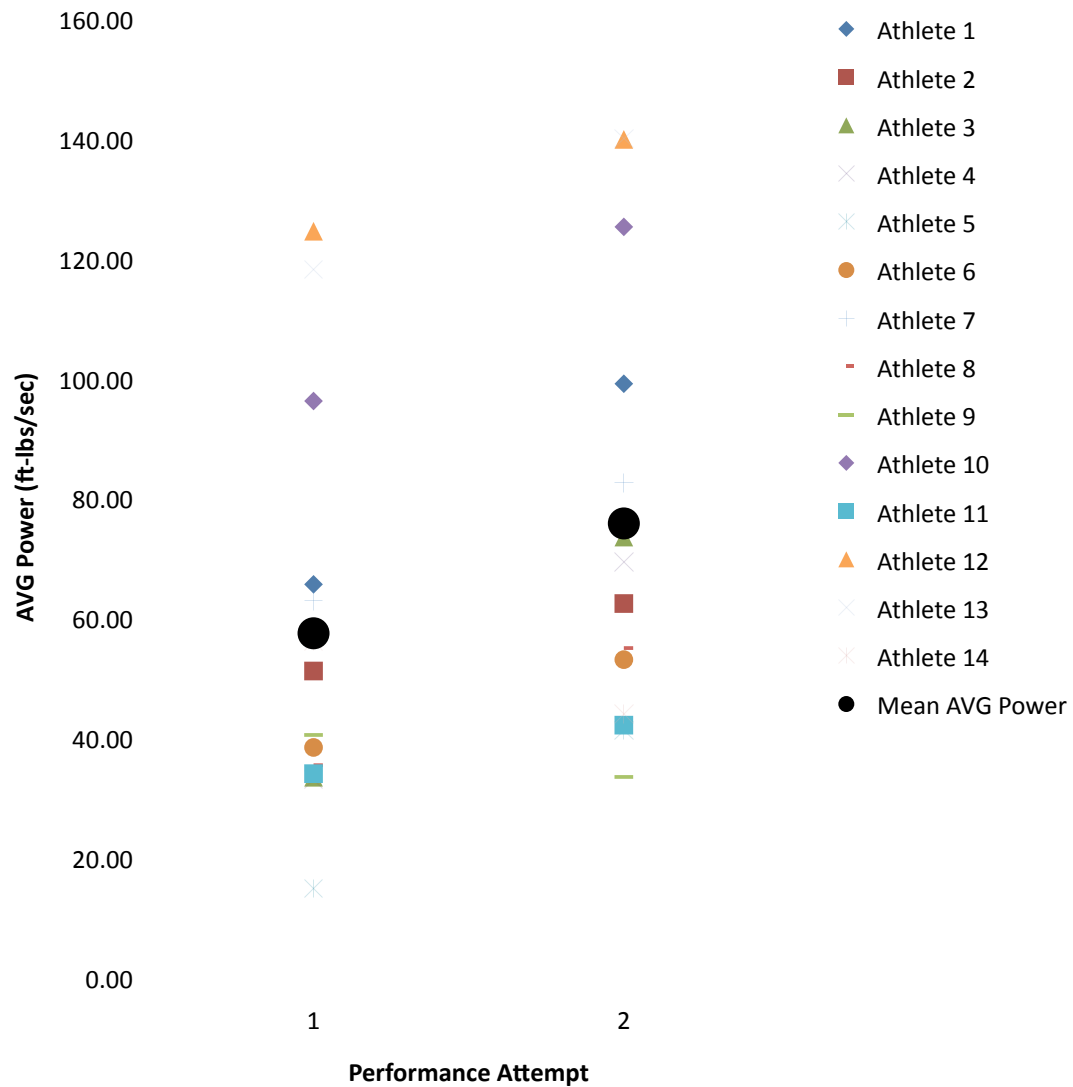
Combining each of these formulas into our original formula gives us a method of calculating the average power generated by the athlete for Fran.

$$P_{\text{Fran}} = [[n_{\text{Thrusters}} \times [([\text{Weight}_{\text{Barbell}} + (p_{\text{Squat}} \times \text{Weight}_{\text{Athlete}})] \times [(\text{Height}_{\text{Squat}} - \text{Depth}_{\text{Squat}}) + (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Squat}})]) + [n_{\text{pull-up}} \times \text{Weight}_{\text{Athlete}} \times (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Squat}})]] \div t$$

Figure 3 displays the athletes' performances of Fran during the pre- and post-assessment periods. In their first attempt at performing Fran prior to beginning the training period, athletes generated between 14.85 and 124.46 ft-lbs/sec with a group mean of 57.4 ft-lbs/sec. Fran performances from the post-training period assessment resulted in performances between 33.43 and 139.94 ft-lbs/sec and a group mean of 75.72. Generated average power increased by 24.2 % for the group mean in an eight-week period. Furthermore, some individuals experienced much greater gains in power: the greatest gain by a female athlete was 63.94% and the greatest gain by a male athlete was 35.56%. The least gains by female and male athletes were 18.05% and 10.96% respectively. Two athletes, one male and one female, experienced a decrease in generated power. Upon reviewing the specifics of their assessment performances, both had drastically reduced their scaling of exercises, resulting in a load and power requirement greater than their physical capacity.

Fran Average Power Generated

Figure 3



2) Fight Gone Bad

The second record workout our athletes performed was Fight Gone Bad (FGB). We calculate the average power generated by each athlete for FGB (P_{FGB}) in a similar manner to Fran, by combining the work performed for each exercise in the WOD and then dividing that sum by the total WOD time.

$$P_{FGB} = (W_{WB} + W_{Box} + W_{SDHP} + W_{PP} + W_{Row}) \div t$$

W_{WB} is the work performed in Wall Ball Shots.

W_{Box} is the work performed for Box Jumps.

W_{SDHP} is the work performed in Sumo Deadlift High Pulls.

W_{PP} is the work performed in the Push Press.

W_{Row} is the work performed in rowing.

t is time in seconds.

To calculate the work performed in Wall Ball Shots (W_{WB}), we determine the weight of the medicine ball and the portion of the athlete's bodyweight moved in the squat moved across the distance to the target.

$$W_{WB} = n_{WB} \times (W_{Squat} + W_{Throw})$$

$$W_{Squat} = (p_{Squat} \times \text{Weight}_{Athlete}) \times (\text{Height}_{Squat} - \text{Depth}_{Squat})$$

$$W_{Throw} = \text{Weight}_{WB} \times (\text{Height}_{Target} - \text{Depth}_{Squat})$$

n_{WB} is the number of Wall Ball Shot repetitions performed.

W_{Squat} is the work performed in the squat.

W_{Throw} is the work performed in the movement of the medicine ball in the throw.

p_{Squat} is the portion of the athlete's bodyweight moved in the squat.

$\text{Weight}_{Athlete}$ and Weight_{WB} are the weights of the athlete and medicine ball in pounds.

Height_{Target} is the height of the target in feet (prescribed as 10 feet).

The work performed in box jumps (W_{Box}) is determined by multiplying the weight of the athlete by the height of the box.

$$W_{\text{Box}} = n_{\text{Box}} \times (\text{Weight}_{\text{Athlete}} \times \text{Height}_{\text{Box}})$$

n_{Box} is the number of box jump repetitions performed by the athlete.

The work performed in executing a Sumo Deadlift High Pull (W_{SDHP}) is the sum of the work moving the bodyweight in a squat and the work moving the barbell from the floor to the high pull position.

$$W_{\text{SDHP}} = n_{\text{SDHP}} \times (W_{\text{Squat}} + W_{\text{Pull}})$$

$$W_{\text{Pull}} = \text{Weight}_{\text{Barbell}} \times (\text{Height}_{\text{Shoulder}} - \text{Height}_{\text{Barbell}})$$

n_{SDHP} is the number of Sum Deadlift High Pull repetitions performed.

$\text{Weight}_{\text{Barbell}}$ is the weight of the barbell in pounds.

$\text{Height}_{\text{Shoulder}}$ is the height of the athlete's shoulders.

$\text{Height}_{\text{Barbell}}$ is the height of the barbell while resting on the ground.

Work performed in a push press (W_{PP}) is the weight of the barbell moved through the difference between height of the overhead position and the rack or shoulder position.

$$W_{\text{PP}} = n_{\text{PP}} \times [\text{Weight}_{\text{Barbell}} \times (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Shoulder}})]$$

n_{PP} is the number of push press repetitions performed by the athlete.

$\text{Weight}_{\text{Barbell}}$ is the weight of the barbell in pounds.

$\text{Height}_{\text{Overhead}}$ is the height to the top of the athlete's shoulders.

For rowing, we already measured calories on the Concept 2 rowing machine. Because calories are already a unit of work, we merely needed to convert them to ft-lbs/s. What most people think of as a calorie is technically a kilocalorie: the amount of energy required to heat one kilogram of water one degree Celsius. The conversion factor is one kilocalorie is equal to 3088.3 ft-lbs. Because the rower displays effort as calories, but actually represents kilocalories, we can use this conversion factor to determine the work performed while rowing.

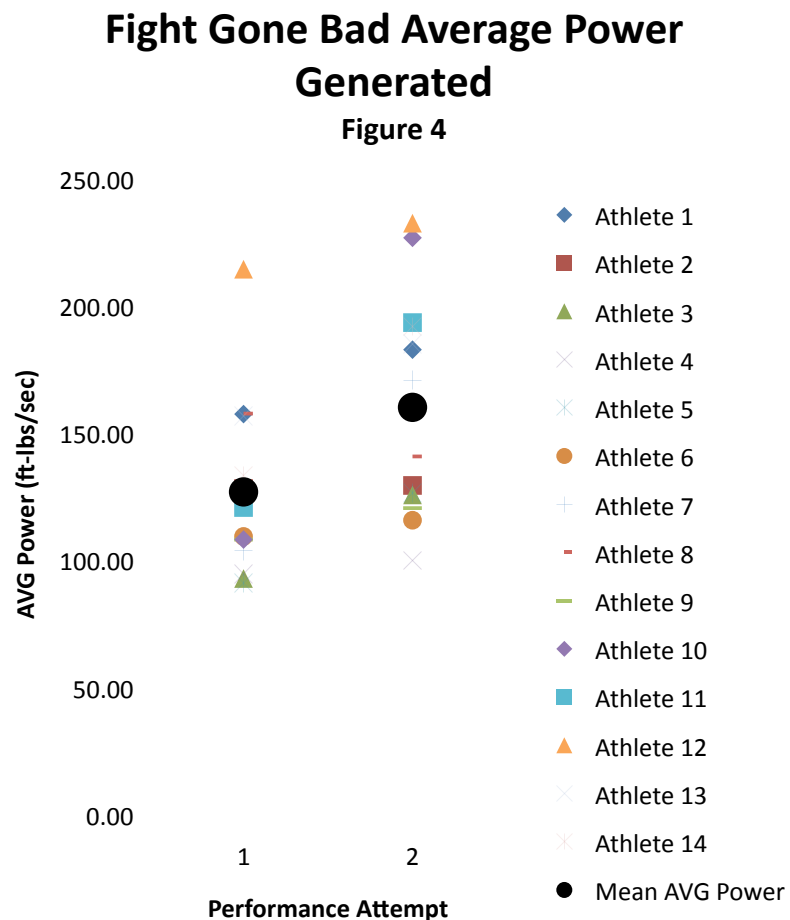
$$W_{\text{Row}} = 3.088.3 \times \text{kCal}_{\text{Row}}$$

kCal_{Row} is the number of kilocalories expended during rowing. It is displayed as *calories* on the C2 Rower display.

After calculating the work performed for each individual exercise in FGB, we can total them and divide by the total time for the WOD to determine the average power generated by an athlete for FGB.

$$P_{\text{FGB}} = [(n_{\text{WB}} \times (W_{\text{Squat}} + W_{\text{Throw}})) + (n_{\text{Box}} \times (\text{Weight}_{\text{Athlete}} \times \text{Height}_{\text{Box}})) + (n_{\text{SDHP}} \times (W_{\text{Squat}} + W_{\text{Pull}})) + (n_{\text{PP}} \times (\text{Weight}_{\text{Barbell}} \times (\text{Height}_{\text{Overhead}} - \text{Height}_{\text{Shoulder}}))) + (3.088.3 \times \text{kCal}_{\text{Row}})] \div t$$

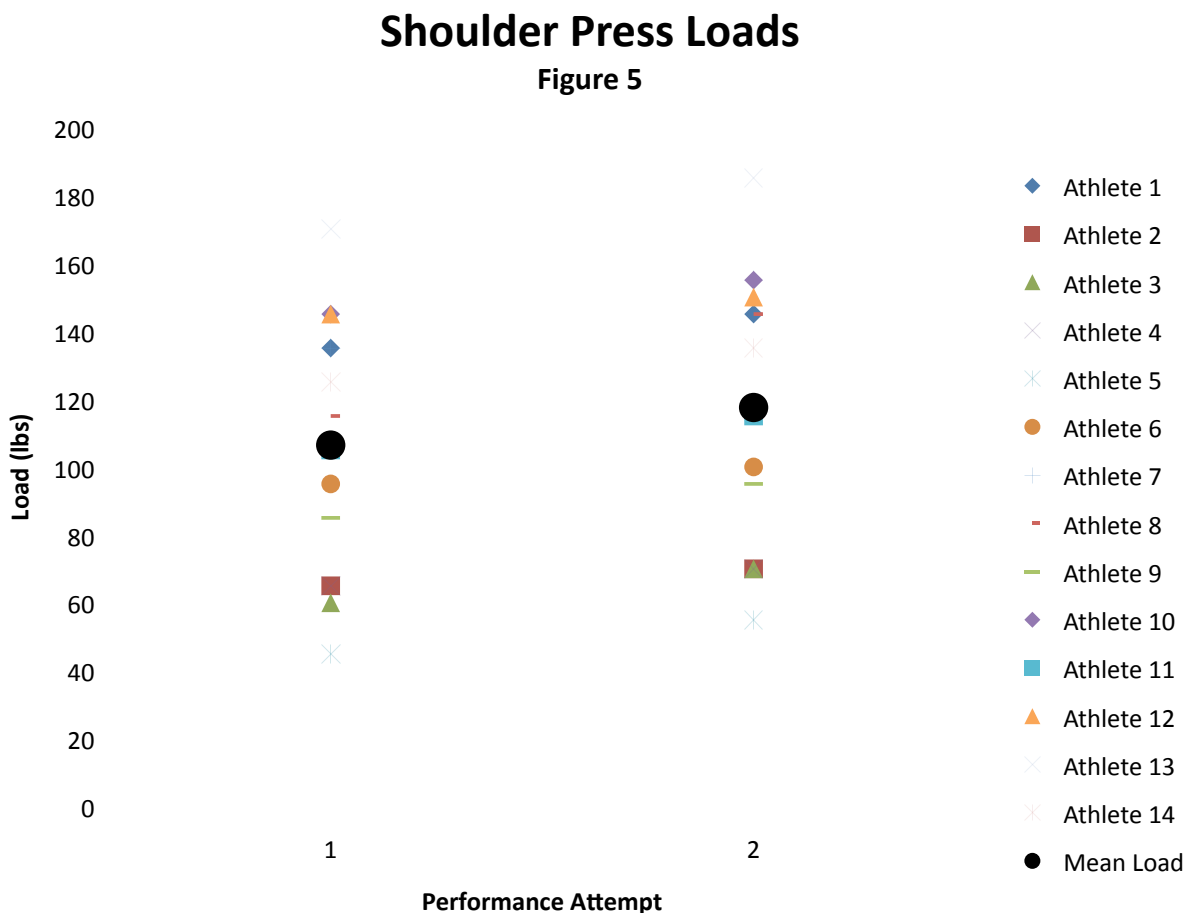
Figure 4 shows the athletes' performance of Fight Gone Bad from the pre- and post-assessment sessions. In the pre-training assessments, athletes generated between 90.84 and 214.14 ft-lbs/sec; the group mean for average power generated was 126.62 ft-lbs/sec. In the post-training assessment, athletes produced between 99.72 and 232.24 ft-lbs/sec, averaging 159.86 ft-lbs/sec for the group. This demonstrates a 20.79% increase in average power generated for the group. The highest increase for an individual male athlete was 52.37% and for an individual female athlete was 27.97%. The least increases for male and female, respectively, were 5.52% and 0.94%. One male athlete saw a decrease in average power generated, showing an 11.98% decrease. Again, this one



athlete's performance is most likely explained by an overzealous increase in load or reduction in scaling.

3) CrossFit Total

The third workout our athletes performed for assessment was the CrossFit Total, a combination of back squat, shoulder press, and deadlifts. Figure 5 shows the athletes' performance in the shoulder press event of the CrossFit Total. Athletes varied in the loads they could lift in each exercise. They lifted between 45 and 170 pounds during the pre-training assessment and between 55 and 185 pounds in the post-training assessment. The group mean loads for shoulder press were 106 pounds (pre-training assessment) and 118 pounds (post-training assessment). The mean increase in load was 9.42%. However, some athletes experience much greater gains of 18.18% (female athlete) and 20.69% (male athlete).



Back Squat Loads

Figure 6

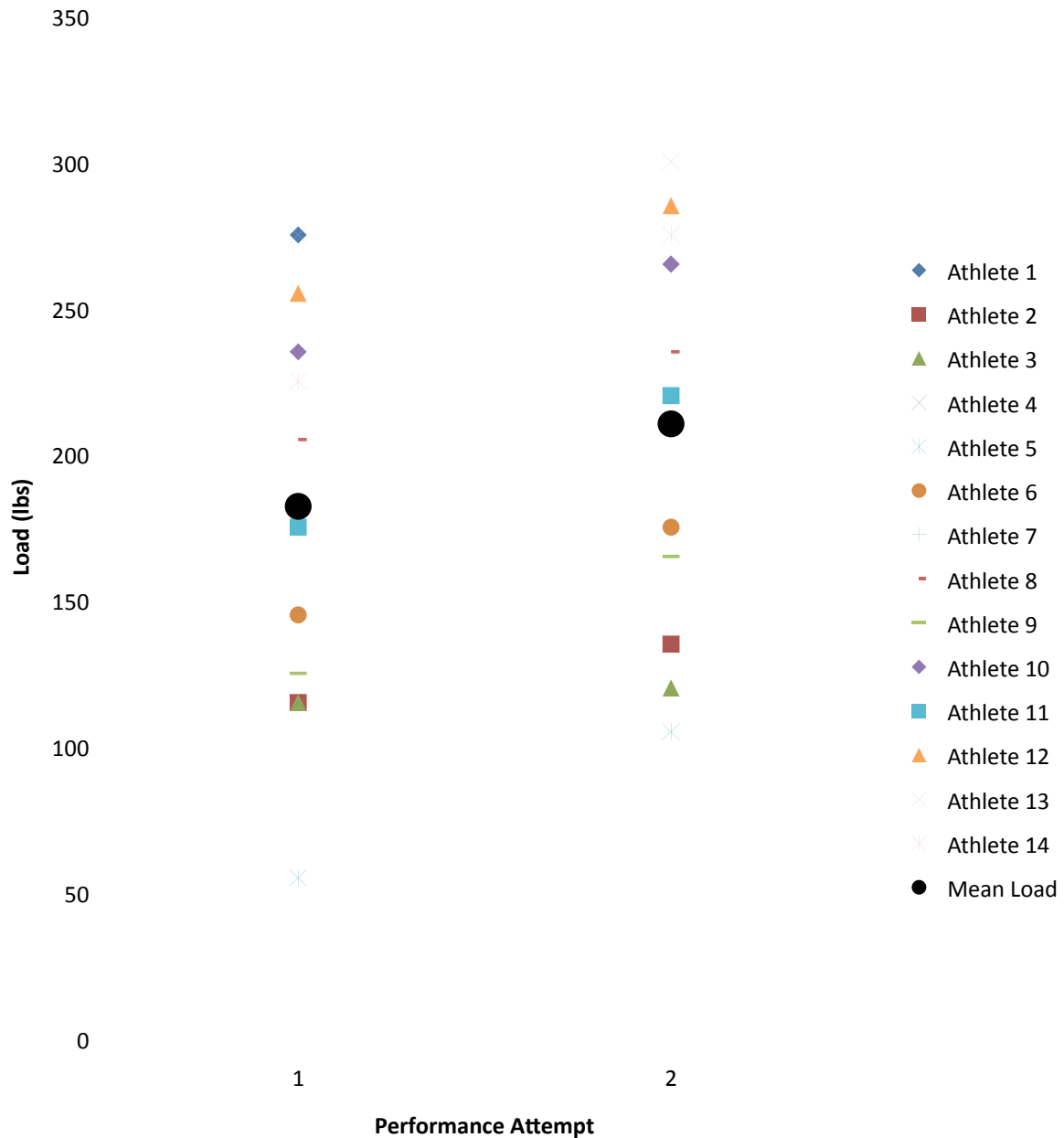


Figure 6 displays the athletes' performance in the back squat event of the CrossFit Total. Athletes lifted between 55 and 275 pounds during the pre-training assessment with a group mean of 182 pounds. During the post-training assessment, athletes lifted between 105 and 300 pounds; the group mean equaled 210 pounds. The group mean increase was 13.41%. The greatest individual increases were 47.62% (female athlete) and 20.45% (male athlete). The least individual increases were 8.33% (female athlete) and 4.17% (male athlete). One athlete saw a 3.17% decrease in back squat load.

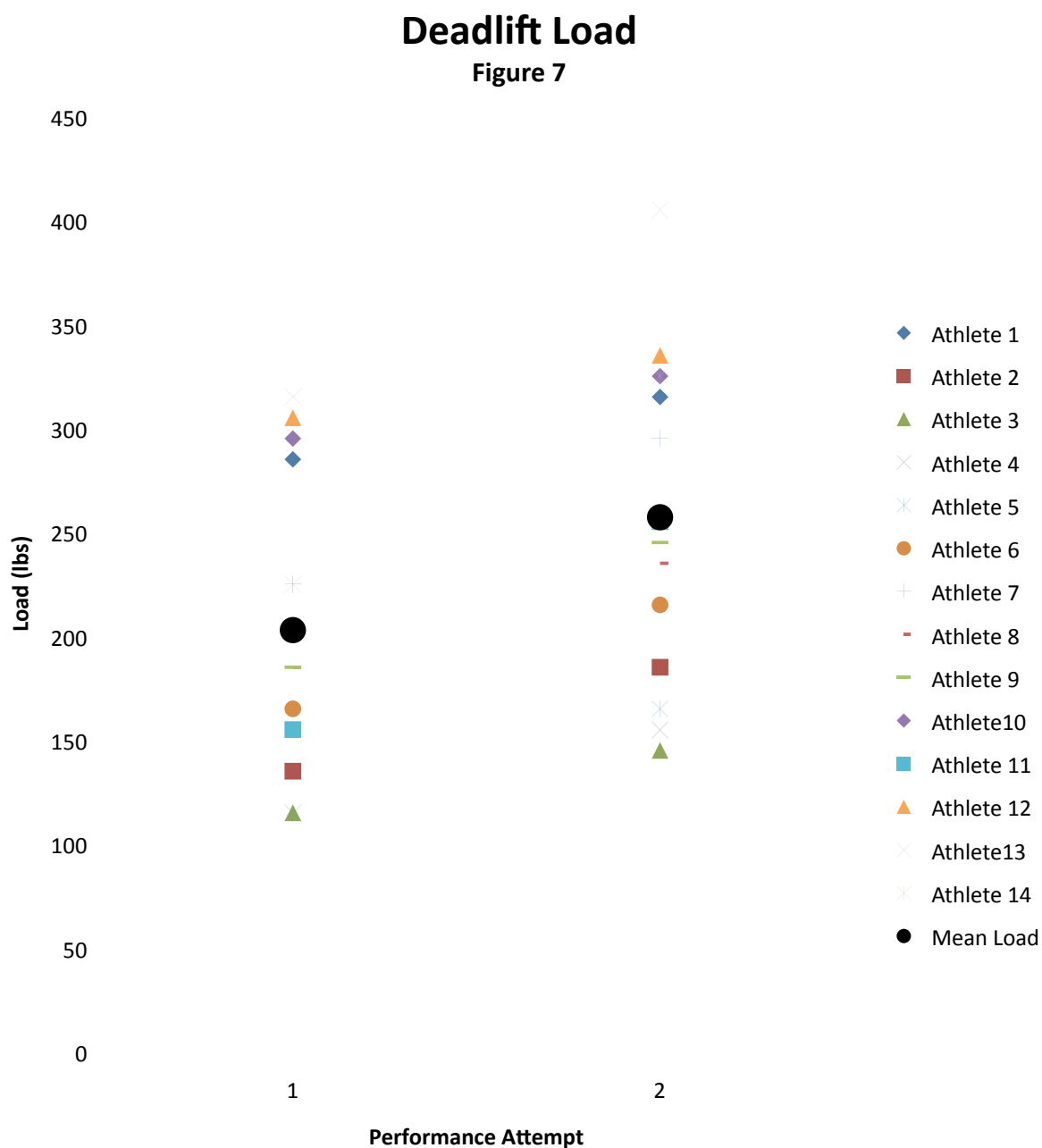


Figure 7 shows the athletes' loads lifted during the deadlift event of the CrossFit Total. Athletes lifted between 115 and 315 pounds on the initial attempts, with a group mean load of 203 pounds. Following the training period, athletes lifted between 100 and 405 pounds, averaging 257 pounds for the group. The mean increase was 21.11%. The largest individual improvements were 30.30% (female athlete) and 39.22% (male athlete). The smallest increases were 12.9% (female athlete) and 8.96% (male athlete). No athletes saw a decrease in load lifted on the deadlift.

CrossFit Total Performance

Figure 8

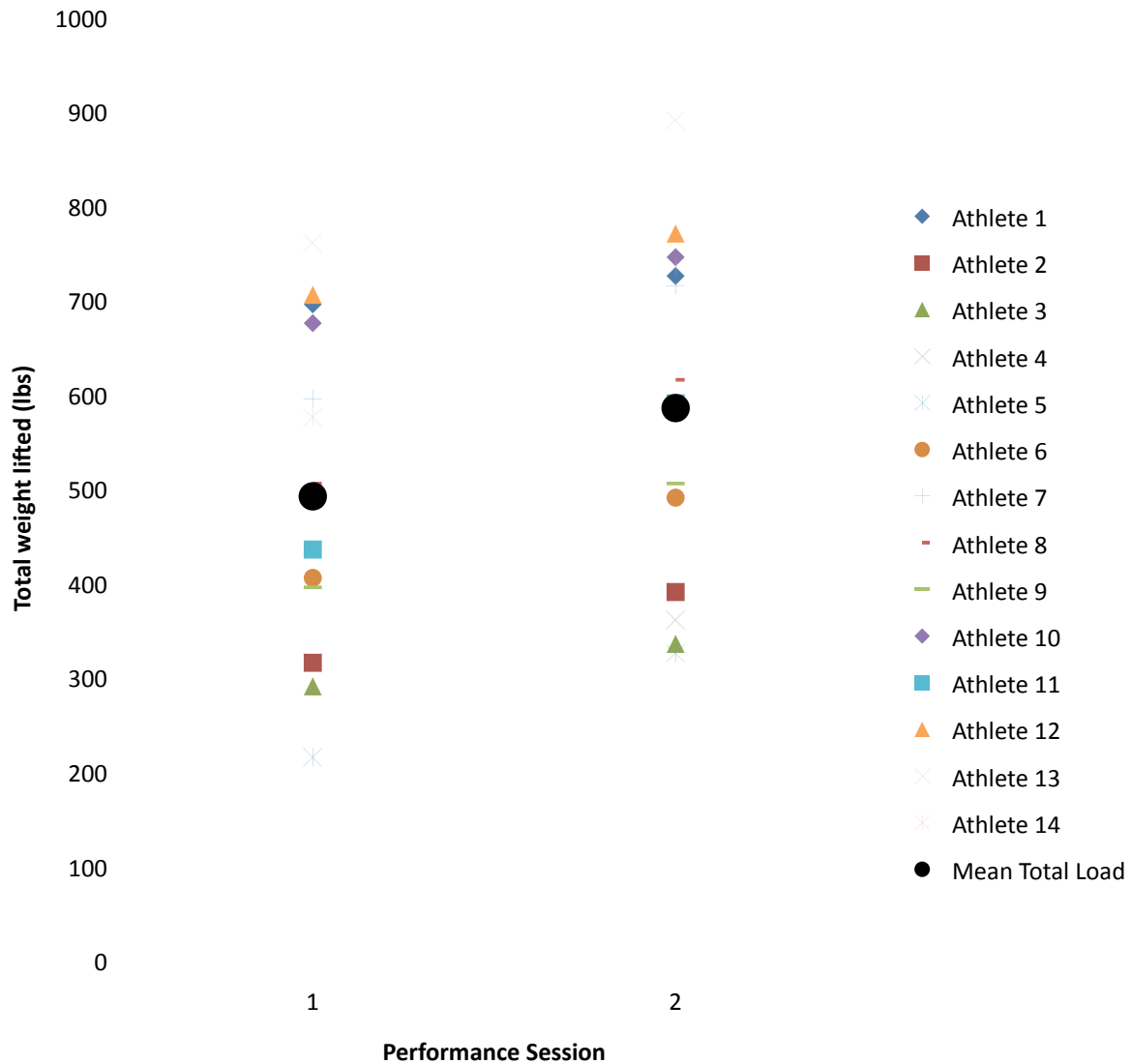
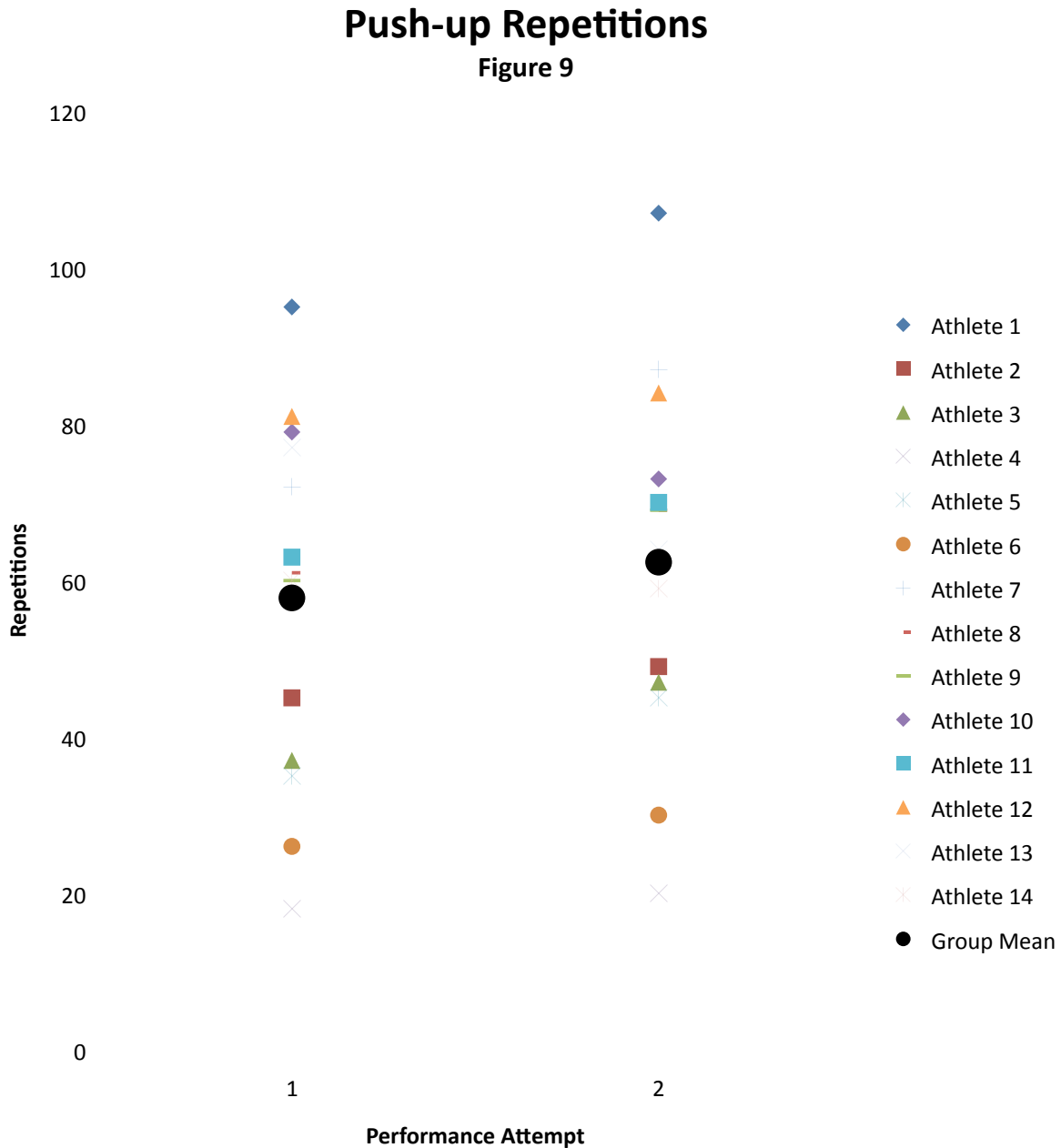


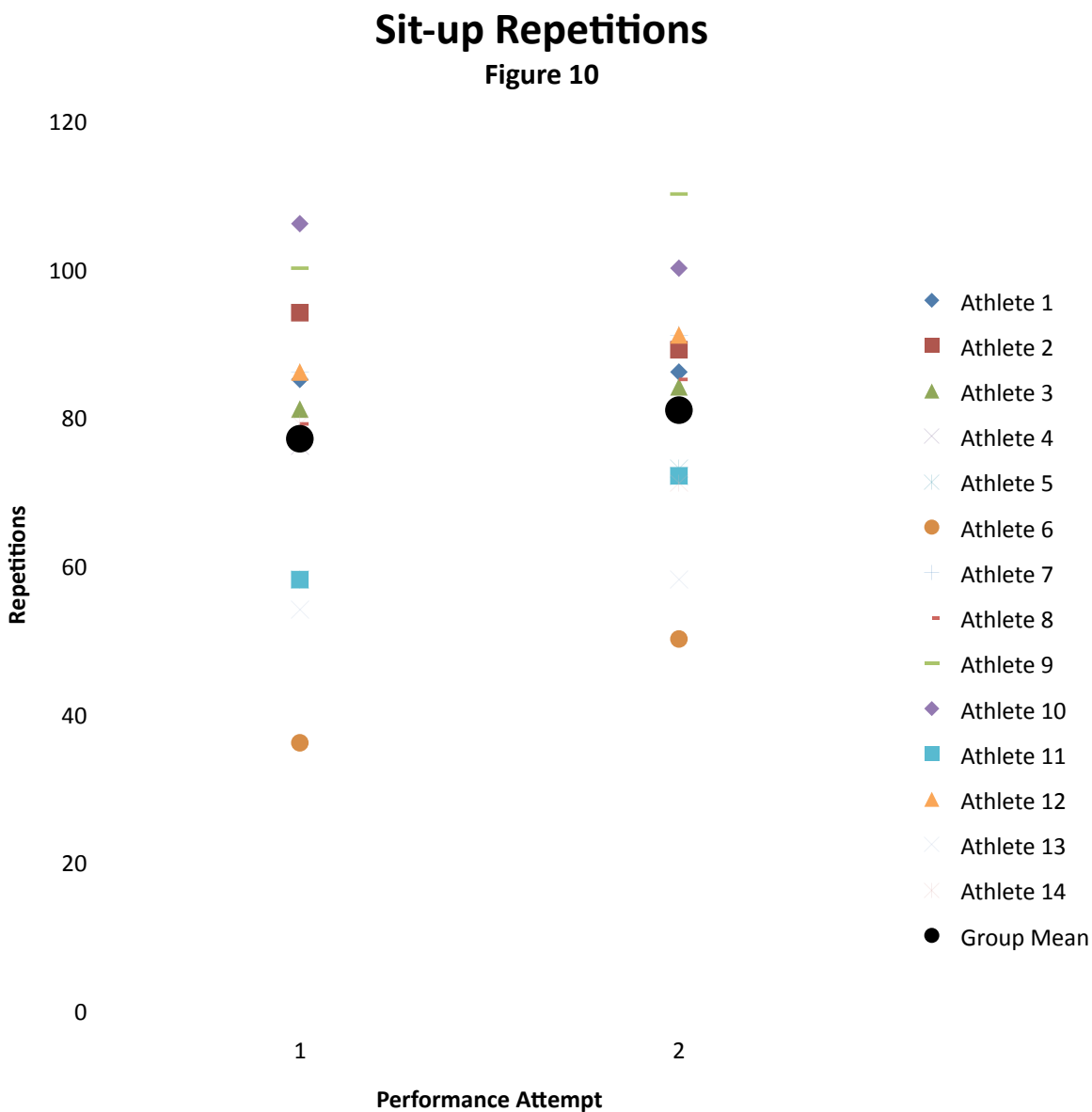
Figure 8 shows the overall increases in load lifted by the athletes in the CrossFit Total. Athletes lifted totals between 215 and 760 pounds, an average of 491 pounds, in the initial performance; they lifted between 325 and 890 pounds, averaging 585 pounds, in the final assessment. This demonstrates a mean improvement of 16.0%. The greatest individual improvement was 33.8% for a female athlete and 26.3% for a male athlete. All fourteen athletes saw a total increase in their performance on the CrossFit Total.

4) The Army Physical Fitness Test



In addition to the CrossFit assessment workouts, our athletes also performed two Army Physical Fitness Tests to provide a basis for comparison between the pre- and post-training assessments and serve as a common reference. Because we have an established standard for push-ups and sit-ups on the APFT and we provide no option for scaling them, we can compare repetitions rather than calculating average power. During the initial APFT, the athletes performed between 18 and 95 push-ups with a group mean of 57.79 repetitions. During the final APFT, athletes executed between 20 and 107 repetitions with a mean of 62.36. This represents an increase of 7.33%, or 4.57 push-ups (see Figure 9). One athlete experienced an increase of

11.21% (15 repetitions). Two male athletes experienced a decrease in total push-up repetitions during the final APFT.



During the pre-training APFT, athletes did between 36 and 106 sit-ups with a mean of 77.0. In the final APFT, they did between 50 and 110 repetitions. This shows a mean increase of 3.86 sit-ups, or 4.77% (see Figure 10). Two athletes saw significant improvement: a male athlete increased by 14 repetitions (28%) and a female athlete increase by 15 repetitions (20.55%). Several athletes experienced a decreased performance in sit-ups.

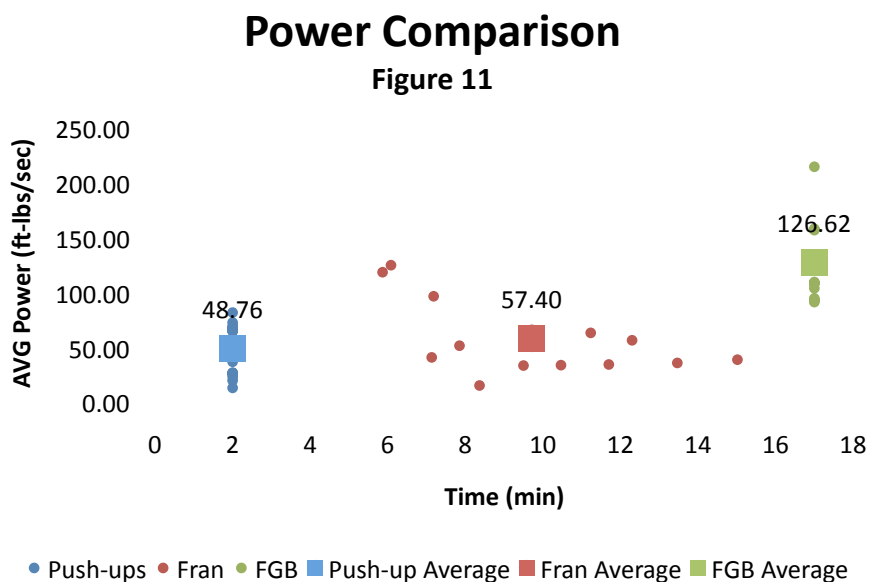
We did not include the data from the 2-mile run event of the APFT in our analysis. The primary reason for this was that the weather on the day of the final APFT was cold, icy and windy and did not offer the athletes the opportunity to perform at their peak levels. We did not feel that the conditions of the test fairly measured both the athletes and the conditioning program

in the study. The conditions on the day of the test may also partially explain some of the decreased performances by a few athletes on the push-up and sit-up events. There may be additional reasons as well, such as athlete fatigue, illness, or an “off day” – all variables for which we could not plan and could not control.

c. Comparison of Assessments

For comparison and a contextual frame of reference, consider figure 11 (Power Comparison). The chart plots time versus average power output for three standard workouts: 1) 2 minutes of standard Army push-ups; 2) Fran; and 3) Fight Gone Bad. The mean average power output for push-ups was 48.76 ft-lbs/sec and had a wide range of variance. The mean average power output for Fran was slightly higher at 57.40 ft-lbs/sec, but occurred over time ranging from approximately 6 minutes to 15 minutes. Finally, Fight Gone Bad produced a much greater amount of power (mean average power output of 126.62 ft-lbs/sec) over 17 minutes.

Depending on the athlete and the level of intensity he can maintain, 2 minutes of Army push-ups produces only slightly less power than Fran. However, athletes performing Fran maintained that power, interpreted as intensity, for a longer period of time. Furthermore, Fight Gone Bad produces greater average power outputs, and thus greater intensity, by an order of magnitude and sustains that power output across 17 minutes of work. By observing the



performance of individual athletes, we can see that athletes with a higher number of push-up repetitions generally performed Fran faster and had a greater delta between their average power outputs. A similar observation can be made between push-ups and Fight Gone Bad. Conversely, athletes that performed fewer repetitions of push-ups generally produced less power

on Fran and Fight Gone Bad, being unable to maintain a higher level of intensity over a greater period of time.

V. Findings:

Based on the results of the data we collected during the athletes’ performance on the assessment, and our qualitative evaluations of the athletes during the six-weeks of training, we believe this study produced four important findings.

a. Each athlete in the study experienced an overall increase in his or her work capacity over the eight-week training period based on their performance during the assessments. These increases ranged from 3.71% to 41.92% with an average increase of 20.33% (see Appendix E Performance Data). Therefore, very generally, we can conclude that the CrossFit program is a successful method for increasing the level of physical fitness of U.S. Army Soldiers. That said, this initial finding comes with two important caveats. First, recognizing that some athletes' level of fitness at the beginning of the study was minimal, we acknowledge that *any* fitness program would likely achieve some increases in work capacity and fitness. Many of the athletes prior to the study were not working out four or five days a week. Therefore, simply conducting more physical training regardless of its quality would have produced positive gains in work capacity. Second, even for some of the more fit athletes in the study, the CrossFit program introduced new movements and new intensity levels. Therefore, we also acknowledge that a new stimulus is likely to cause positive adaptations in an athlete and produce increase work capacity for a period of time. These two caveats lead to the importance of our second finding.

b. Although the below average athletes in the study saw the largest gains in work capacity, even the above average athletes in the study experienced significant gains. At the beginning of the study we believed that the true test of the CrossFit program would be its ability to increase the work capacity of the average to above average athletes in the study.²⁷ Our hypothesis was that well-conditioned athletes would have less potential for improvement because they are closer to their genetic potential for performance. Whereas, less fit athletes with any advancement of metabolic and oxygen demand beyond their more sedentary lifestyle would provide a new stress to their body and, therefore, produce positive gains in performance.²⁸ Moreover, we hypothesized that some of our most fit athletes' previous fitness regimens may be more effective than the CrossFit program. Therefore, we believed that it would be possible for some of the above-average athletes to experience a decrease in work capacity. However, the results of our study indicate that above average athletes overall work capacity increased 14.38%, slightly below the group mean. One of our most fit athletes (Athlete # 10) saw a gain of 28.32% in overall work capacity. This is significant because this athlete was both in above-average physical conditioning prior to the study and came into the study with what we categorized as considerable CrossFit experience (see Appendix A, Athlete Profile). Both of these factors would indicate that the athlete had less capacity for improvement. However, because Athlete #10 experienced an increase of 28.32%, this demonstrates that considerable positive adaptations in metabolic conditioning and physical skill occurred over the six-week training period. Furthermore, none of the above average athletes saw decreases in overall work capacity. This is compared to the below average athletes who realized increases of 23.68%, with the biggest increase from Athlete #5 who showed a 41.92% improvement in work capacity.

From our perspective, these results considerably strengthen our assertion in the first finding by demonstrating the CrossFit program's ability to increase the level of physical fitness of above-average athletes who in theory would have less capacity for improvement. We believe that the CrossFit program's prescription of high intensity combined with constant variance is one of the primary reasons that the above-average athletes in the study experienced gains in work

²⁷ Level of fitness was measured by APFT score prior to the study using the following classifications; above average (290-300), average (250-290), below average (below 250).

²⁸ This hypothesis is based on a discussion of the impact of exercise on beginning athletes in Lon Kilgore, "The Paradox of Aerobic Fitness Prescription," *The CrossFit Journal* 52 (December 2006), 3.

capacity. Based on our qualitative observations, individual motivation to both maintain intensity and develop new physical skills appears to be one of the major observed differences between above-average athletes and average or below average athletes. Above average athletes appear more willing to pay a higher price for bigger gains. Therefore, our findings suggest that while many fitness programs could potentially increase the work capacity of below average athletes, the CrossFit program might be unique in its ability to create increases in work capacity in above average athletes because of its reliance on high intensity workouts and task variance.

c. Despite a broad and generalized training program that did not specifically train the athletes for any of the assessments, the athletes' performance on the assessments improved. Several examples serve to illustrate this point. The first is the results from the Deadlift portion of the CrossFit total. On this assessment, the athletes mean increase in work capacity was 21.11%. The largest individual improvements were 30.30% (female athlete) and 39.22% (male athlete). The smallest increases were 12.9% (female athlete) and 8.96% (male athlete). No athletes saw a decrease in load lifted on the deadlift (see Figure 7). Importantly, these results were achieved despite a limited number of training sessions that involved the deadlift. During the six-week training period, athletes performed the deadlift only five times out of twenty-eight training sessions.²⁹ Moreover, only one of those training sessions was specifically focused on strength development.³⁰ The results from the shoulder press and push-up assessment mirror the deadlift. On the shoulder press the athletes mean increase in work capacity was 13.41 (see Figure 5). Similar to the deadlift, only seven training sessions included any one of the three presses (shoulder press, push press, push jerk), and of those seven only one was specifically focused on strength development. Additionally, the athletes did not specifically shoulder press during the six-week training period.³¹ Lastly, the athletes experienced a mean increase in push-ups of 7.75 (See Figure 9). This increase occurred despite only conducting push-ups or burpees in seven training sessions.³²

These results are significant for two reasons. First, they provide credibility to the CrossFit program's claim that CrossFit can prepare athletes for the unknown and unknowable. While the final assessments were not unknown to the athletes, they did not prepare specifically for these events and it had been six-weeks since they had completed these same WODs. This conclusion is important because this type of physical versatility is crucial for Soldiers in combat. While we can very generally predict some of the physical requirements of Soldiers in combat (carry heavy loads, move long distance with weight, sprint, climb etc.), it is impossible to predict with any accuracy the specific physical requirements (specific load, duration, sequence) of combat because the possibilities are virtually endless. Therefore, to be successful and to survive, Soldiers must have a broad and versatile type of physical fitness. Second, these results are significant because they demonstrate that an effective physical training program does not need to train Soldiers for specific events on a physical fitness test in order to achieve successful results

²⁹ Training sessions that included the deadlift were conducted on 29 October, 4 November, 11 November, 17 November and 30 November. See Appendix B (Training Plan). Strength workouts are defined as 3-6 sets of 5 repetitions or less of an Olympic or power lift.

³⁰ Strength workouts are defined as 3-6 sets of 5 repetitions or less of an Olympic or power lifting exercise.

³¹ Training sessions that included any of the three presses occurred on 3 November, 11 November, 13 November, 23 November, 30 November, 2 December and 3 December. See Appendix B (Training Plan).

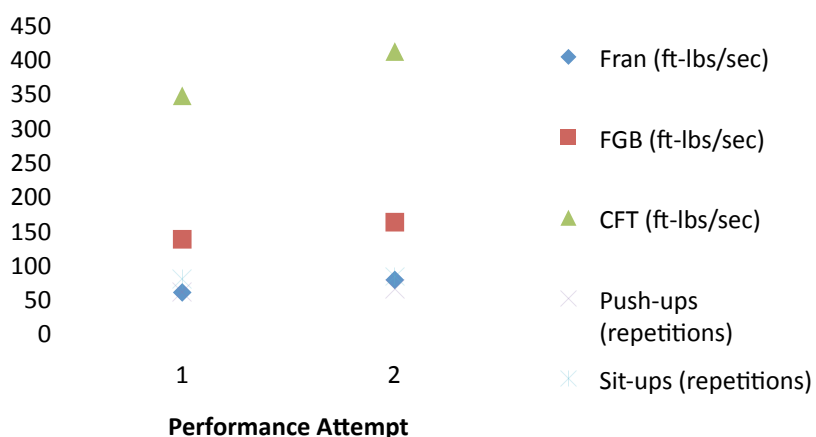
³² Training sessions that included push-ups or burpees were conducted on 27 October, 2 November, 6 November, 10 November, 17 November, 24 November, 3 December.

on that test. For example, an effective program can improve Soldiers score on the push-up portion of the APFT without a specific push-up improvement focus, a commonplace filler on many units physical fitness calendar. This conclusion has important implications for how U.S. Army leaders approach their units' preparation for the APFT versus combat-focused fitness. The results suggest that the CrossFit program's generalized approach to fitness training can allow leaders to focus their physical training on combat readiness, but still achieve success on the APFT.³³

- d. The athletes in the study experienced relatively equal increases in power output across all four assessments.

Overall Trends

Figure 12



These results indicate a balanced increase in performance across metabolic pathways and modalities. Figure 12 shows a comparison of the four assessments in terms of increases in average power output. In the assessment Fran, athletes experienced a mean increase in work capacity of 24.2 %, compared to 20.9 % for Fight Gone Bad, 16.0% for the CrossFit Total and increases in repetitions of 7.7 % and 4.7% for push-

ups and sit-ups.³⁴ As explained previously, we chose the assessments for the study based on their diversity from one another in terms of metabolic pathway and modality. Each assessment represented a different type of work capacity relative to these two criteria. For example, Fran represented a WOD in the glycolytic pathway using the gymnastic and weightlifting modalities. The CrossFit Total, on the other hand, represented a workout in the phosphagen pathway using strictly the weightlifting modality. If the assessments had produced disproportional increases

³³ This is not to imply that U.S. Army Soldiers can in every case be successful with a generalized training program. Certain units in the Army conduct tasks that will require them to tailor they fitness program to achieve those specific tasks. Moving long distances on foot with moderate weight is a good example of this type of specialized requirement. Having the ability to move long distances on foot with weight would likely require specialized physical training in order for a unit to successfully accomplish this task in combat. This is no different than the type of specialized training required of athletes in many sports. In this case, the CrossFit program's generalized training would help to facilitate this specialized endurance training by adding a host of reinforcing physical skills like strength, stamina, endurance and flexibility.

³⁴ It is our assessment that the reason the increases in push-up and sit-ups were not as great as the other WODs is because all of the athletes in the study had significant experience doing push-ups and sit-ups as opposed to many of the other movements introduced in the study. This is because all of the athletes in the study were military officers who have been required to pass a physical fitness test throughout their career that included these two exercises. Therefore, these athletes had less potential for significant improvement in a short period of time in the APFT than in the other WODs.

from one another, for example an increase in power output on Fran, but a decrease on the CrossFit total, this would have signaled either an unbalanced methodology or improper programming. However, that the results demonstrate consistent improvement across assessments validates the CrossFit program's claim that it produces a broad and inclusive brand of fitness. From the perspective of the U.S. Army, this is significant because capacity across metabolic pathways and modalities characterizes the type of versatility required of U.S. Army Soldiers. Soldiers don't need to be world-class distance running athletes any more than they need to be the world's strongest man. In fact, the type of specialization required to achieve success on either of those fitness extremes could make a Soldier less combat capable. The U.S. Army requires well-balanced Soldier-athletes who can perform a variety of physical tasks at high intensity across varying time periods. The results of this study suggest that the CrossFit program's approach produces this type of Soldier-athlete.

VI. Conclusions and Recommendations:

a. The CrossFit program and other functional fitness programs present the U.S. Army with unparalleled opportunities to improve Soldiers' level of physical fitness. In this study, after only six-weeks of training using the CrossFit program, on average the athletes increased their level of physical fitness by 20%. One athlete increased her level of fitness by 41%. Moreover, the athletes in this study experienced relatively equal increases across all of the four assessments each of which required a different type of conditioning and skill set. This suggests that the CrossFit program produces the type of Soldier-athletes that the U.S. Army requires to succeed in the contemporary operating environment. That is, Soldier-athletes who can successfully perform a broad range of physical tasks and challenges, many of them unknown or unknowable.

b. Recommendations for implementing CrossFit into U.S. Army units.

We cannot over-emphasize the important role that we believe effective coaching played in the results the athletes achieved in this study. Similar to combatives training or rifle marksmanship training, CrossFit movements are only safe and effective when done correctly. The CrossFit mantra is "Mechanics, Consistency, Intensity."³⁵ This means that athletes should first develop the skill required to perform movements correctly and consistently before they attempt to add intensity when conducting those movements (i.e. do them with heavier weight or faster). Moreover, establishing an effective training plan is similarly important to effective results. Properly trained coaches are fundamentally important in both establishing an effective training program and developing proper movement mechanics in athletes. All of the trainers in this study were either Level I or Level II certified CrossFit trainers, meaning that they had received at least 16 hours of instruction on CrossFit movements. Additionally all of the trainers had considerable CrossFit experience in excess of two years.

Based on our experience in the study, for the U.S. Army to safely and effectively harness the power of functional fitness training it needs to relook how it trains small unit physical fitness trainers, like squad/section leaders, and how it implements functional fitness programs into tactical units. Across the U.S. Army, junior Non-Commissioned Officers (NCOs) and officers

³⁵ Authors' notes from the CrossFit Level I Certification held at West Point, NY in April 2009.

are expected to effectively conduct physical fitness training. Many times the only training these junior leaders have received to prepare them for this task is what they learned from their squad leader when they were a Private and what they learned in one of the NCO Academies, if they have had time to attend one of these schools. Similar to U.S. Army Combatives training, effective functional fitness training requires a high level of expertise from trainers. This signals a change from the past when physical training, relatively speaking, was low skill. However, unlike the U.S. Army Combatives program, the U.S. Army does not currently have a method for training physical fitness trainers and giving them the skills required to train and coach Soldiers using functional movements.³⁶ To fill this gap in expertise, the U.S. Army should establish a formal functional fitness trainer program similar to the Combatives program. In the meantime, we have outlined below how we believe tactical units can effectively implement a functional fitness training program into their physical training plan.

The following section describes a way to implement a functional fitness regimen as the primary physical fitness training program in a military unit. We make two major assumptions in outlining this plan for change. The first and most important is that the unit commander supports the ideas contained in the plan and is willing to commit time, personnel, and funds to achieve the transition to a functional fitness program. We hope that the data presented in this paper accompanied by personal observations and anecdotal evidence will be a start in convincing commanders of the need and advantages of this method. The second assumption is that this plan is designed to implement at the battalion level for a unit consisting of between 500 and 750 Soldiers. The principles described should be valid for a unit of any size, but may require some modification in numbers of trainers, quantity of equipment, etc., to be viable for a smaller or larger unit.

Implementation of a functional fitness program as a unit training program should be done in three phases: 1) Training a cadre of trainers and acquiring the necessary equipment; 2) building credibility through a test population; and 3) full implementation across the battalion. It is important to phase the implementation for several reasons. Units will need the time to nominate and train trainers; trainers will need time to practice and refine their training techniques. Additionally, this will give time for leaders in the unit to see, evaluate, and become accustomed to the idea of functional fitness.

During the first phase of implementation, units will select and train the primary physical training cadre and begin to assemble equipment sets necessary for functional fitness training. Trainers should be leaders within the battalion who are respected by the Soldiers in their unit. It is not necessary for the trainers to have previous experience in functional fitness programs such as of CrossFit, so long as they are generally physically fit. Initially, the battalion should have approximately one or two trainers per company, or about one trainer per fifty to seventy-five Soldiers, and one to two senior trainers at the battalion level to oversee the program. Ideally, these trainers should be serving squad leaders, platoon sergeants, and platoon leaders with the battalion goal being to train and certify all leaders at these levels through a CrossFit Level I Trainer certification. This would give them the requisite skills for teaching and training the functional movements as well as a basic understanding of nutrition, workout development, and programming. Ideally, the senior trainers would attend both a Level I certification and the

³⁶ For a description of the Army Combatives trainer certification program see, Department of the Army, FM 3-25.150, *Combatives* (Washington, DC.: Government Printing Office, April 2009).

CrossFit Coaches' Preparation course to educate them in techniques for managing the overall unit program.

Following the cadre's initial certification training, the senior trainers should conduct a dedicated program with only other trainers during normal unit PT hours for a period of 30 days. During this time, trainers will refine their teaching and training techniques, be given the opportunity to program workouts for a period of time for the trainer group, and further enhance their understanding of physical fitness. Each trainer would, depending on the size of the unit, be responsible for programming for the cadre and several days during which they would supervise and coach during the workout. The trainers and the battalion leadership must understand that there is an up-front investment of time and effort in this transition. It will take time for the trainers, and ultimately the Soldiers, to learn, become proficient, and master some of the movements and skills in the functional fitness program. Additionally, trainers will have to develop and improve their training style throughout this 30-day period and beyond in to the subsequent phases of the transition. One of the major points we identified in our study was that trainers had to make a significant investment of time and effort to train their athletes in the skills prior to seeing physical improvements – the more complex the movement and the poorer the condition of the athlete only extended this time. During Phase I, trainers should focus on building the skill sets -- both training the movements and executing the movements themselves -- before advancing to high intensity performance in workouts. Once the movements and teaching techniques are established, the improvements in physical performance will come.

Concurrently with the training and preparation for the cadre, the battalion must gather the necessary equipment sets to conduct functional fitness training. Units should purchase enough equipment for each company to have its own set. For an example of a company functional fitness equipment set see Appendix F (Sample Company Equipment Set). These sets should consist of Olympic barbells, "bumper" weights, kettlebells or dumbbells, squat racks and benches, medicine balls, and resistance bands (to assist in pull-ups). Companies should also own or have convenient access to pull-up bars and may purchase rings for use with their training programs. It is not necessary, however, for a unit to purchase all gym-quality equipment; units can use some of the equipment around them in lieu of dedicated weights and bars. For an example of how to make functional fitness equipment from military items, see Appendix G (Austere Company Equipment Set). For example, ammunition cans can be filled with dirt or sand and used for presses, lifts, and swings. Old basketballs or soccer balls can also be filled with sand and sealed, then used in throwing exercises in place of medicine balls. Truck tires can be used for lifting and "jerry" cans could be filled with water and lifted or carried. Using equipment and supplies that are at hand is especially useful in that these items are readily available while units are deployed or conducting field training, allowing a unit to easily maintain a high level of fitness while away from a garrison environment.

Key to the first phase is the management of programming and equipment. The senior trainers must be able to deconflict the training area used, as well as the equipment required for workouts. Furthermore, the trainers will gain an understanding of what equipment is available for use during physical training and how often they will be able to use specific equipment in training their companies. By developing and testing systems early in the process, senior trainers and unit leaders will make the transition run smoother and ensure that all companies and Soldiers get maximum benefit out of the training.

At the conclusion of the initial 30 days of cadre training, the battalion will transition into the second phase: building credibility through training a test population. This test population could be a single company or platoon out of the battalion on which the trainers focus their efforts. Another option would be to form two groups from across the battalion, one of physically weak Soldiers or APFT failures and one of physically strong Soldiers. The training cadre would assess, develop a program, and execute functional fitness training for 45 days with the test populations, carefully documenting performance and any progress. At the conclusion of the 45-day period, the test group would perform an APFT as well as another benchmark workout for the leadership of the battalion. As the leaders and Soldiers see the improvement of the fitness of the test group, their confidence in the new training program will increase, overcoming resistance to change.

The second phase is also the next step in the development and training of the training cadre. During the first phase, they practiced training Soldiers that had the same training and education; during the second phase, they would train Soldiers that had little or no experience in the movements, techniques, and philosophy of functional fitness, essentially starting from scratch with their Soldier-athletes. This would assist them in further developing and refining their training and teaching techniques. It would also require them to actively tailor and scale workouts based on the abilities of the training audience, whether on a group or individual basis. The increase in experience and training ability of the cadre will prepare them for the third phase, full implementation across the battalion.

In phase three, the training cadre would return to their companies and begin a transition similar to phase one, but at the company level. Trainers would teach fundamental movements and techniques to squad leaders, platoon sergeant, and platoon leaders and lead training sessions. Each company would designate a lead trainer for coordinating and managing equipment at the company level, advising the commander and other trainers on programming, and conducting quality control of the training program. Trainers should attend the Coaches' Preparation course or one of many specialty certifications to continue learning and building their knowledge base. Companies would send additional squad- and platoon-level leaders to attend Level 1 certifications. As additional trainers are certified, companies would integrate them into the training and programming efforts. The goal of the battalion and company would be to train and certify all squad leaders, platoon sergeants, and platoon leaders as functional fitness trainers; all squad leaders should be trained, certified, and capable of planning, programming, leading, and executing a functional fitness training program with their own Soldiers.

Battalions and other military units can take advantage of the techniques of functional fitness and implement them as the primary physical training regimen in the unit. Units begin by training cadre and acquiring equipment, then build credibility through training a test population and publicizing the results, and then finally proceed to full implementation throughout the battalion. As described above, the entire transition process should take around six months to complete. Leaders can accelerate the process by applying more resources of training time, leader attention, a greater number of initial trainers, and funds for certification and equipment purchase. Throughout the transition process, leaders and trainers work to overcome resistance to change by showing empirical and anecdotal results to convince Soldiers of benefits of a functional fitness program in building unit physical readiness.

c. Recommendations for further research

1) There are several areas in which more research would benefit our understanding of how a functional fitness regimen improves physical fitness. The first would be to expand the study in terms of length of the training period and the number of athletes. Allowing for a training period of six months, athletes could learn and practice the requisite skills for the movements and participate in multiple assessment periods, possibly every sixty days. This would provide those conducting the study a more accurate picture of the athletes' performance and improvement throughout the study, so that an "off" day during the assessment would only be one of many assessments and not invalidate any findings. As an example from our study, we conducted the post-training period assessment during the second week of December. On the day athletes performed the Army Physical Fitness Test, the temperature was approximately thirty degrees Fahrenheit and a twenty-mile-per-hour wind was blowing along the 2-mile run course. Wind and ice had a significant impact on the 2-mile run times for all athletes, resulting in slower run times. Because we only conducted two assessments periods, these slower times represented 50% of our APFT data and may give the impression that cardiovascular endurance (one of the ten physical skills) decreased during the functional fitness training. Multiple testing periods throughout a longer assessment would eliminate this data point as an outlier. With the data and training period that we had, we were unable to accurately assess increases in cardiovascular endurance in terms of the APFT because of the anomalous run times in 50% of the APFT scores.

Additionally, a longer training period would allow for a greater amount of time to build the physical skills in the athletes at the beginning of the study and then allow them to more effectively increase their intensity as the study progressed. For example, some of our athletes struggled to learn the proper technique for the clean after several weeks of training. As a result, any workout that involved cleans was a challenge for these athletes in terms of their ability to maintain intensity. Therefore, over a six-week period it is difficult to ascertain the true impact of the CrossFit program on metabolic conditioning because the low skill level of some athletes never allowed them to increase their intensity level to a point that would have produced positive adaptations in how their body used energy. Instead, they had to remain focused on movement mechanics.

A larger sample size and a control group would also increase the validity of our study. We made the conscious decision to forego a control group in this study because of the pool from which we chose our athletes. Drawing from students at the Command and General Staff College, where no organized physical training occurs and students conduct physical training individually, it was not feasible to form a control group with which to compare the functional fitness regimen. In an operational Army unit, we could simply remedy this by assigning a platoon or company as control group and have them continue with their standard physical training plan. Both a larger sample size and the addition of a control group would generate more data and a greater understanding of the impacts of a functional fitness program.

2) The second major recommendation for further research would be to study the impact of nutrition and diet control on the performance of the athletes. Athletes in the test group would be given instruction in basic nutrition and asked to record what they ate. The control group would merely record types and quantities of foods consumed during the study. The test group would

eat according to a programmed diet, possibly following the Zone Diet or the Paleo Diet³⁷. During the assessment periods, both groups would be evaluated on changes in body composition, cholesterol level, and other chemical indicators in the body.

Conducting additional studies including the above considerations and adjustments to the planned program would greatly increase the quantity of data collected and contribute to a better understanding of the impact of a functional fitness program and the role nutrition and diet play in improved performance.

³⁷ For the Zone Diet, see Barry Sears, *The Zone: A Dietary Road Map* (New York, NY: Regan Books, 1995). For the Paleo Diet, see Loren Cordain and Joe Friel, *The Paleo Diet For Athletes* (Hoboken, NJ: John Wiley & Sons, 2005).

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Appendix A (Athlete Profiles)

	Sex	Height (ft)	Weight (lbs)	APFT (or equiv)	CF Experience
Athlete 1	M	5.66	165	300	Considerable
Athlete 2	F	5.33	136	300	None
Athlete 3	F	5.5	140	270	Some
Athlete 4	F	5.66	153	260	None
Athlete 5	F	5.16	132	247	None
Athlete 6	M	6	205	76.75 (AF)	None
Athlete 7	M	5.75	192	270	Some
Athlete 8	M	6.16	217	264	Some
Athlete 9	F	5.41	138	300	Some
Athlete 10	M	5.83	183	300	Considerable
Athlete 11	M	5.75	184	206	None
Athlete 12	M	6.33	195	297	Moderate
Athlete 13	M	5.83	184	300 (USMC)	Moderate
Athlete 14	M	6	220	220	None

Appendix B (Training Schedule)

CrossFit Study Training Calendar						
25	26	27	28	29	30	31
	3 RFT 185 lbs Power Cleans x 5 Hand Stand PU x 5 Pull-Ups x 10	Tabata Something Else 20 sec of work / 10 sec rest Pull-ups push-ups sit-ups squats	4 Rounds 800m run rest exactly 2 min between sets	Diane 21-15-9 225lbs deadlift Hand Stand Push-Ups	20 min AMRAP Box jump x 5 (55/35) Kettlebell Swing x 10 Wallball x 15 Increase each exercise by one rep each round	
1	2	3	4	5	6	7
	100 burpees for time	The Bear Complex 5 rounds of 7 complexes 1 complex = Power Clean Front Squat Push press Back Squat Push Press	Deadlift 5-5-5-5-5 then... 3 RFT 10 pull-ups 10 GHD 10 KBS (55/35)	12 min AMRAP Medball cleans x 7 Burpees x 7 50 m sprint Do this WOD in the basketball court. Sprint = down and back on the court	JT 21-15-9 Handstand Push-ups Ring Dips Push-ups	
8	9	10	11	12	13	14
	The Crippler For time - (BW) back squat x 30 Run 1 mile	Barbara 5 RFT 20 pull-ups 30 push-ups 40 sit-ups 50 squats	Hero WOD DT 5 RFT (155lbs) Deadlift x 12 (155lbs) Hang P Clean x 9 (155lbs) Push jerk x 6	Front Squat 5-3-3-2-2-2-1-1-1-1	Triple Decker 8 min AMRAP Burpee broad jump x 10 Walking lunge x 15 Sprint 50 m rest exactly 2 min 8 min AMRAP Knees to elbows x 10 (35lbs) kettlebell swings x 15 (45lbs) Thruster x 20 rest exactly 2 min 8 min AMRAP Pull-ups x 10 box jump x 15 (20lbs) wallball x 20	
15	16	17	18	19	20	21
	Nastly Girls 3 RFT 50 squats 7 muscle ups 10 Hang P Cleans (135lbs)	3 RFT 10 Deadlift (275lbs) 10 burpees	12 x 25m sprints start each sprint every 20 seconds then... practice a gymnastics skill	15 rounds 2 x Front Squat (80% 1rm) 5 x pull-ups start each round on the minute	Full Mission Profile (will provide details at later date)	
22	23	24	25	26	27	28
	Shoulder Press 1-1-1-1-1 Push Press 3-3-3-3-3 Push Jerk 5-5-5-5-5	12 min AMRAP 3 x P Clean (185lbs) 1 x Cindy (5 PU/10 Push/15 Squat)	Annie 50-40-30-20-10 Double Unders sit-ups	Happy Thanksgiving	Run 5k	
29	30	1	2	3	4	5
	10 min AMRAP 15 x BW deadlift 9 x Pull-ups 21 x push press (75lbs)	5RFT 21 x SDHP (95/65) 21 x ring dips	Clean and Jerk 1-1-1-1-1-1-1-1	3 RFT 250m Row 5 x thrusters (135lbs) 10 Burpees	Chipper (TBD)	

CrossFit Study Training Plan (26-30 OCT)

26 OCT	27 OCT	28 OCT	29 OCT	30 OCT
<p><u>Warm-Up:</u> 3rds Squats Push-ups Sit-ups Back Extension Stretch</p> <p><u>WOD:</u> “Fran” 21-15-9 Thrusters (95/35) Pull-ups</p> <p>Scaling Pull-ups 1) Bands 2) Jumping</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 2 rds 50 x Jump Rope / Row Stretch</p> <p><u>Skill/Drill:</u> 1) Hand-stand Push-ups Introduce/Practice Scale 1) Band harness 2) Handstand hold 3) Feet on elevated bar 4) Feet on 24inch box, pike position</p> <p><u>WOD:</u> “Tabata Something Else” 20sec work/10sec rest Pull-ups Push-ups Sit-ups Squats</p> <p>Scaling Pull-ups 1) Bands 2) Jumping</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Push-ups Sit-ups Squats Run (slow) x 400m</p> <p><u>WOD (at the track):</u> 4 rounds for time 800m run Rest 2 mins between rds</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Squats Push-ups Sit-ups Pull-ups Back Extension Stretch</p> <p><u>Skill/Drill:</u> 1) Kettle Bell Swing Introduce/practice</p> <p><u>WOD:</u> “Diane” 21-15-9 Deadlift Handstand Push-ups</p> <p>Scale for HSPUs 1) Band harness 2) Handstand hold 3) Feet on elevated bar 4) Feet on 24inch box, pike position</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Squats Push-ups Sit-ups Pull-ups Back Extension Stretch</p> <p><u>WOD:</u> 20 min AMRAP Box jump (24/20) x 5 KBS (55/35) x 10 Wallball (20/14) x 15</p> <p><u>Cool Down:</u> Stretching</p>

CrossFit Study Training Plan (2 – 6 NOV OCT)

02 NOV	03 NOV	04 NOV	05 NOV	06 NOV
<p><u>Warm-Up:</u> 3rds Squats Sit-ups Back Extension HSPU Stretch</p> <p><u>Skill/Drill:</u> 1) Medball clean 2) Burgener clean warm-up 3) Barbell Clean</p> <p><u>WOD:</u> 100 x Burpees for time</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Squats Push-up Sit-ups Back Extension HSPU Stretch</p> <p><u>Skill/Drill:</u> GHD sit-up</p> <p><u>WOD:</u> The “Bear” Complex 5 rds of 7 complexes 1 complex = Power Clean Front Squat Push Press Back Squat Push Press</p> <p>Rules— 1) During the round the weight cannot remain on the Floor (touch and go) 2) Rest as needed between Rounds 3) Attempt to increase weight on each round</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Row 1 min or Jump rope Burgener Warm-Up Push-ups Squats HSPUs stretch</p> <p><u>WOD (at the track):</u> 1) Deadlift: 5-5-5-5-5 2) 3 RFT 10 pull-ups 10 GHD 10 KBS (55/35)</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Squats Push-ups Sit-ups Pull-ups Back Extension Stretch</p> <p><u>Skill/Drill:</u> Push Jerk</p> <p><u>WOD:</u> (recommend using the b-ball court) 12 min AMPRAP 7 x medball cleans (20/14) 7 x burpress 50m run (down and back on the basketball court is approx 50m)</p> <p><u>Cool Down:</u> Stretching</p>	<p><u>Warm-Up:</u> 3rds Squats GHD sit-ups Pull-ups Burgener Warm-Up Stretch</p> <p><u>Skill/Drill:</u> Double Unders</p> <p><u>WOD:</u> “JT” 21-15-9 HSPU Ring Dips Push-Ups</p> <p><u>Cool Down:</u> Stretching</p>

CrossFit Study Training Plan (9 – 13 NOV OCT)

09 NOV	10 NOV	11 NOV	12 NOV	13 NOV
<p>Warm-Up: 3rds Double Unders Squats Sit-ups Push-ups Back Extension HSPU Stretch</p> <p>WOD: “The Crippler” For Time: 30 x (BW) Back Squat Run 1 mile</p> <p>Skill/Drill: 1) Knees to Elbows</p> <p>Beginner = just practice Intermediate = 5-5-5-5-5 Advanced = 15-12-9-6-3</p> <p>2) L-sit (paraletes)</p> <p>Cool Down: Stretching</p>	<p>Warm-Up: 3rds Bergner Warm-Up Squats Push-up Sit-ups Back Ext HSPU Stretch</p> <p>Skill/Drill: Hang P Clean Review - Push Jerk</p> <p>WOD: Hero WOD for Veteran’s Day “DT” 5RFT Deadlift x 12 (155) Hang p Clean x 9 (155) O/H Anyway x 6 (155)</p> <p>Cool Down: Stretching</p>	<p>No scheduled Sessions!!!</p> <p>WOD: “Barbara” 20 Pull-ups 30 Push-ups 40 Sit-ups 50 Squats</p> <p>Cool Down: Stretching</p>	<p>Warm-Up: 3rds Squats Push-ups Sit-ups Back Extension HSPUs Stretch</p> <p>WOD: Front Squat 5-3-3-2-2-2-1-1-1-1</p> <p>Skill/Drill: Muscle Up</p> <ol style="list-style-type: none"> 1) Show Muscle Up progression 2) Practice or work component parts based on skill level (pull-ups and ring dips) <p>Cool Down: Stretching</p>	<p>Warm-Up: 50 jump rope or 1 min row 3 rds Squat Push-up Sit-up</p> <p>WOD: “Triple Decker” 8min AMRAP Burpee broad Jump x 10meters Walking lunge x 15 Double Unders x 20</p> <p><u>Rest Exactly 3 minutes</u></p> <p>8min AMRAP Knees to Elbows x 10 KBS (55/35) x 15 Thrusters (45/25) x 20</p> <p><u>Rest Exactly 3 minutes</u></p> <p>8min AMRAP Pull-ups x 10 Box Jump x 15 Wallball (20/14) x 20</p> <p>Cool Down: Stretching</p>

CrossFit Study Training Plan (16-20 NOV OCT)

16 NOV	17 NOV	18 NOV	19 NOV	20 NOV
<p>Warm-Up: 50 Jump ropes or DUs Then... 3rds Squats Sit-ups Push-ups Back Extension HSPU Stretch</p> <p>WOD: “Nasty Girls” 3 rds For Time: 50 squats 7 muscle ups 10 hang p cleans (135/95) (Sub for MU is 3 pull-up and 3 dips)</p> <p>Skill/Drill: O/H Squat Instruction and Practice Beg = just practice Int /Adv= 5-5-5-5-5 (not five rep max / choose a weight and stick with it for all sets)</p> <p>Cool Down: Stretching</p>	<p>Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch</p> <p>WOD: 3 rds For Time 10 deadlift (275) 10 burpees</p> <p>Skill/Drill: Snatch Instruction and Practice Beg = just practice Int /Adv= 5-5-5-5-5 (not five rep max / choose a weight and stick with it for all sets)</p> <p>Cool Down: Stretching</p>	<p>CF 101 1330-1730 (no afternoon training session)!!!</p> <p>Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch</p> <p>WOD: 12 x 25m sprints (start each sprint every 20 seconds until complete)</p> <p>Skill/Drill: Practice a gymnastic skill Handstand / HSPU Rings Muscle up L-Sit</p> <p>Cool Down: Stretching</p>	<p>Harney Gym closed 0730-1700!!!!</p> <p>Warm-Up: 3rds Squats Push-ups Sit-ups Back Extension HSPUs Stretch</p> <p>WOD: Morning Session (Harney) – 15 rds 2 x Front Squat 5 pull-ups Start each round on the minute</p> <p>Afternoon Session (Gruber)- 100 pull-ups ***Each time you drop/or come off the bar 10 push-ups 25 squats 50m run (b-ball court)</p> <p>Cool Down: Stretching</p>	<p>Harney Gym closed 0730-1700!!!!</p> <p>Meet at Track Warm-Up: Run 400m 30 squats stretch</p> <p>WOD: 4 rds For Time: 800m run 25 push-ups 25 sit-ups</p> <p>Cool Down: Stretching</p>

CrossFit Study Training Plan (23-27 NOV)

23 NOV	24 NOV	25 NOV	26 NOV	27 NOV
Warm-Up: 3rds Squats Sit-ups Push-ups Back Extension HSPU Stretch WOD: Shoulder Press 1-1-1-1-1 Push Press 3-3-3-3-3 Push Jerk 5-5-5-5-5 Skill/Drill: K2E or A2B 20-15-10-5 Or L-St (reverse tabata) Cool Down: Stretching	Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch Strength: Back Squat 40% 1rm 1 x 5 50% 1rm 1 x 5 60% 1rm 1 x 5 75% 1rm 1 x 5 80% 1rm 1 x 5 85% 1rm 1 x 5 WOD: 12 min AMRAP 3x P Clean (185) 5 pull-ups 10 push-ups 15 squats Cool Down: Stretching	Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch WOD: Annie 50-40-30-20-10 Double Unders Sit-ups Skill/Drill: Muscle Ups Cool Down: Stretching	Thanksgiving	Run 5k

CrossFit Study Training Plan (30 NOV- 4 DEC)

30 NOV	1 DEC	2 DEC	3 DEC	4 DEC
Warm-Up: 3rds Squats Sit-ups Push-ups Back Extension HSPU Stretch Strength: Overhead Squat 40% 1rm 1x 5 50% 1rm 1x 5 60% 1rm 1x 3 75% 1rm 1x 5 80% 1rm 1x 5 <u>85% 1rm 1x 5</u> WOD: 10 min AMRAP 15 x Deadlift (BW) 9 x Pull-ups 21 x Push Press (75/45) Cool Down: Stretching	Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch Skill/Drill: Review SDHP WOD: 5RFT 21 x SDHP (95/65) 21 x Ring Dips Cool Down: Stretching	Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch Skill/Drill: Review Clean and Push Jerk WOD: Clean and Jerk 1-1-1-1-1-1-1-1 Cool Down: Stretching	Warm-Up: 3rds Squats Push-up Pull-ups Sit-ups Back Ext HSPU Stretch Strength: Deadlift 40% 1rm 1x 5 50% 1rm 1x 5 60% 1rm 1x 3 75% 1rm 1x 5 80% 1rm 1x 5 <u>85% 1rm 1x 5</u> WOD: 3RFT 250m row 5 x thrusters (135/95) 10 burpees Cool Down: Stretching	Full Mission Profile "Up in Smoke" Insertion – Swim 500m Run 1 mile Contact – 3rds 10 burpees 10 pull-ups Action on O8J – 21-15-9 Thrusters (45lbs) pull-ups KBS (55) 50 Double-unders /rd Extraction – Run 2 miles (drop every min for 10 push-ups) ***Have to complete this mission in 1 hour or you miss extraction

APPENDIX C (General Physical Skills)

1. Cardiovascular/respiratory endurance- The ability of body systems to gather, process, and deliver oxygen.
2. Stamina - The ability of body systems to process, deliver, store, and utilize energy.
3. Strength - The ability of a muscular unit, or combination of muscular units, to apply force.
4. Flexibility - the ability to maximize the range of motion at a given joint.
5. Power - The ability of a muscular unit, or combination of muscular units, to apply maximum force in minimum time.
6. Speed - The ability to minimize the time cycle of a repeated movement.
7. Coordination - The ability to combine several distinct movement patterns into a singular distinct movement.
8. Agility - The ability to minimize transition time from one movement pattern to another.
9. Balance - The ability to control the placement of the body's center of gravity in relation to its support base.
10. Accuracy - The ability to control movement in a given direction or at a given intensity.ⁱ

AIR SQUAT

The Air Squat is Foundational to the Front Squat and Overhead Squat

I. TEACHING THE MOVEMENT

SETUP:

- Stance = shoulder width
- Full extension at hips and knees

EXECUTION:

- Weight on heels
- Lumbar curve maintained
- Chest up
- Butt travels back and down
- Bottom of squat is below parallel (hip crease is below the top of the kneecap)
- Knees track parallel to feet
- Return to full extension at the hips and knees to complete the move
- Head position is neutral

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Lumbar curve maintained
- Weight in heels
- Depth below parallel
- Knees track over feet

3. CORRECTING THE MOVEMENT

FAULT: LAZY LUMBAR CURVE, OR LOSING IT (I.E., "BUTT WINK")

- Fix - Lift the chest while engaging the hip flexors by anteriorly rotating the pelvis strongly.
- Fix - Raise the arms as you descend to the bottom of the squat.

FAULT - WEIGHT SHIFTS FORWARD TO BALLS OF FEET.

- Fix - Exaggerate weight in the heels by floating the toes slightly throughout the entire movement.

FAULT - NOT LOW ENOUGH.

- Fix - Cue "Lower!" and do not relent.
- Fix - Squat to a 10" box or medicine ball to develop awareness of depth.

FAULT - KNEES ROLL IN.

- Fix - Cue "Push your knees out" or "Spread the ground apart with your feet."
- Fix - Touch the outside of the knee and have the athlete press into your hand.

FAULT - TRAIN WRECK SQUAT: INABILITY TO MAINTAIN LUMBAR CURVE, STAY ON HEELS, AND GET TO DEPTH ALL AT THE SAME TIME.

FAULT - IMMATURE SQUAT: LUMBAR CURVE IS MAINTAINED, DEPTH MIGHT BE THERE, AND HEELS ARE IN CONTACT WITH THE GROUND, BUT THE ATHLETE HAS TO CANTILEVER FORWARD EXCESSIVELY ONTO THE QUADS TO MAINTAIN BALANCE.

- Fix - Squat Therapy: Set up the athlete facing a wall or pole with a 10" box under their butt. Set them up in the proper stance, with heels to the box, chest close to wall. Have them squat to the box slowly, maintaining control and weight in the heels.

FRONT SQUAT

The Setup, Execution, Points of Performance, and Corrections carry over exactly from the Air Squat. We now add to those a load in the FRONT RACK POSITION.

1. TEACHING THE MOVEMENT

SETUP:

- Stance = shoulder Width
- Full extension at hips and knees
- Bar “racked” on the shoulders (create a shelf with the shoulders for bar to sit on), hands outside shoulders, loose fingertip grip.
- Elbows high, upper arm parallel to the ground.

EXECUTION:

- Weight on heels
- Lumbar curve maintained
- Chest up
- Elbows high; arms stay parallel to the ground throughout the whole movement
- Butt travels back and down
- Bottom of squat is below parallel (hip crease is below the top of the kneecap)
- Knees track parallel to feet
- Return to full extension at the hips and knees to complete the move
- Head position is neutral

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Bar racked properly: elbows high, hands just outside shoulders, bar rests on shoulders with a loose fingertip grip
- Elbows high throughout the movement

3. CORRECTING THE MOVEMENT

ALL FAULTS AND FIXES FROM THE **AIR SQUAT** APPLY TO THIS MOVEMENT, PLUS THE FOLLOWING:

FAULT – BAR NOT IN CONTACT WITH THE TORSO OR HOLDING BAR OUT IN FRONT.

- Fix – Cue “Elbows high and allow bar to roll back onto fingertips.”

FAULT – ELBOWS DROP AND CHEST COMES FORWARD.

- Fix – Cue “Elbows UP UP UP! And big chest.”
- Fix – Tactile Cue – Place a hand or arm under the athlete’s elbows to help keep them lifted.

SHOULDER PRESS

The key elements of the Shoulder Press, and all the overhead lifts, are the setup position, the overhead position, tight belly, and the bar path. These are foundational to all the overhead lifts.

1. TEACHING THE MOVEMENT

SETUP (THIS SETUP IS EXACTLY THE SAME FOR ALL THREE OVERHEAD LIFTS):

- Stance = hip width
- Hands just outside the shoulders
- Bar in front, resting on the “rack” or “shelf” created by the shoulders
- Elbows down and in front of bar; elbows are lower than in the front squat
- Tight midsection
- Closed grip, with thumbs around the bar

EXECUTION:

- The cue for the action is “Press”
- Drive through heels; keep the whole body rigid; tight belly
- Bar travels straight up to locked out, with active shoulders, directly overhead
- Head accommodates bar (bar path is a straight line)

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Good setup
- Constant tightness in the midsection, ribs locked down
- Overhead and active shoulder at the top of the press; overhead means that the bar is over or just behind the arch of the foot, with the shoulder angle fully open
- Bar travels straight up

3. CORRECTING THE MOVEMENT

FAULT - BAR FORWARD OF FRONTAL PLANE.

- Fix - Press up and pull back on the bar as it travels to overhead.

FAULT - LEANING BACK, RIBS STICKING OUT.

- Fix - Tighten abs / suck rib cage down (be sure to check the overhead position again after this fix).

FAULT - PASSIVE SHOULDERS OR BENT ELBOWS.

- Fix - Cue “Press up!” “Shoulders into ears.”

FAULT - BAR ARCS OUT AROUND THE FACE.

- Fix - Pull head back out of the way of the bar.
- Fix - Check that elbows are not too low in the setup.

PUSH PRESS

The Push Press builds on the same setup and overhead position as the Shoulder Press. We add velocity with the dip and drive of the hip. The focus here is on a dip and drive that is explosive and straight down and up.

1. TEACHING THE MOVEMENT

SETUP:

- Stance = hip width
- Hands just outside the shoulders
- Bar in front, resting on the “rack” or “shelf” created by the shoulders
- Elbows down and in front of bar; elbows are lower than in the front squat
- Tight midsection
- Closed grip, with thumbs around the bar

EXECUTION:

- The cue for the action is “Dip, drive, press”
- Dip: perform a shallow dip (flexion) of the hips, where the knees push forward slightly, the butt goes back, and the chest stays upright
- Drive: extend the hip rapidly and fully
- Press: press the bar to overhead, with locked arms

PROGRESSION (WITH STICK):

1. Dip (check chest and hip)
2. Dip-drive slow
3. Dip-drive fast
4. Dip-drive-press (full Push Press)

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Torso drops straight down on the dip. There is no forward inclination of the chest and no muting of the hip.
- Aggressive turn around from the dip to the drive.

3. CORRECTING THE MOVEMENT

ALL FAULTS AND FIXES FROM THE **SHOULDER PRESS** APPLY TO THIS MOVEMENT, PLUS THE FOLLOWING:

FAULT - OUT OF SEQUENCE: PRESS BEGINS BEFORE HIP OPENS UP

- Fix - Take back to step 3 in progression—dip-drive fast

FAULT - COCKING: PAUSING IN THE DIP

- Fix - Cue for dip-drive and more aggressive turnaround of the hip

FAULT - FORWARD INCLINATION OF THE CHEST

- Fix - Have athlete hold in the dip position and then manually adjust them to true upright torso
- Fix - Cue a shallower dip
- Fix - Cue knees forward more
- Fix - Stand in front of athlete to prevent the chest from coming forward
- Fix - Dip therapy: Stand with back against a wall, with heels, butt, and shoulder blades all touching the wall; then dip and drive, keeping everything in contact with wall

FAULT - MUTED HIP

- Fix - Turn the pelvis over (anterior rotation) strongly

DEADLIFT

The Deadlift is foundational to the Sumo Deadlift High Pull and the Medicine Ball Clean.

1. TEACHING THE MOVEMENT

SETUP:

- Stance = between hip width and shoulder width
- Weight in heels
- Back arched/lumbar curve locked in
- Shoulders slightly in front of the bar
- Bar in contact with the shins
- Arms locked straight
- Symmetrical grip outside the knees, just wide enough to not interfere with knees

EXECUTION:

- Drive through the heels
- Extend legs while hips and shoulders rise at the same rate
- Once the bar passes the knees, the hip opens all the way up
- Bar maintains contact with the legs the entire time
- Head neutral
- On return to the floor, push hips back and shoulders forward slightly; delay the knee bend
- Once bar descends below the knees and the torso angle is set, return the bar down to the setup position

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Lumbar curve maintained
- Weight on heels
- Shoulders slightly in front of bar on setup
- Hips and shoulders rise at same rate
- Bar stays in contact with legs throughout the movement
- At the top the hip is completely open and knees are straight

3. CORRECTING THE MOVEMENT

FAULT - LOSS OF LUMBAR CURVE

- Fix - Cue to pull hips back and lift the chest
- Fix - Touch person at lumbar curve and say, "Arch!" Do not relent.
- Fix - Abort and decrease the load to where the lumbar arch can be maintained.

FAULT - WEIGHT ON OR SHIFTING TO TOES.

- Fix - Have athlete settle into the heels and pull hips back, maintaining tension in the hamstrings at start of movement, and focus on driving through heels.
- Fix - Check that the bar stays in contact with legs throughout the movement.

FAULT - SHOULDERS BEHIND BAR ON SETUP.

- Fix - Raise hips to move shoulder over or slightly in front of the bar.

FAULT - HIPS RISE BEFORE THE CHEST (STIFF-LEGGED DEADLIFT).

- Fix - Allow the shoulders and chest to rise sooner. Cue "Lift your chest more aggressively" or "Lift the chest and hips at the same rate until the bar passes your knees."

FAULT - SHOULDERS RISE WITHOUT THE HIPS. BAR TRAVELS AROUND THE KNEES INSTEAD OF STRAIGHT UP.

- Fix - Be sure athlete is set up correctly: weight in heels and with shoulders in front of the bar. Cue "Push knees back as your chest rises."
- Fix - Block the knees' travel with your hand.
- Fix - Stick trick: Lock the person in between two sticks on either side of the bar and have them execute the move without hitting the sticks.

FAULT - BAR COLLIDES WITH KNEES ON THE DESCENT.

- Fix - Initiate the return by pushing the hips back and delay the knee bend.

FAULT - BAR LOSES CONTACT WITH LEGS.

- Fix - Cue "Pull the bar in to your legs the whole time."
- Fix - Tactile cue: Touch the athlete's leg where the bar should touch from thigh to shin.

SUMO DEADLIFT HIGH PULL

The Sumo Deadlift High Pull (SDHP) builds on the Deadlift, widening the stance, bringing the grip inside the knees, adding a shrug, an upward pull with the arms, but, most importantly velocity. The move requires an aggressive extension of the hips and legs before the arms pull.

1. TEACHING THE MOVEMENT

SETUP:

- Stance = wider than shoulder width, but not so wide that the knees roll inside the feet
- Weight in heels
- Back arched/lumbar curve locked in
- Shoulders slightly in front of the bar
- Bar in contact with the shins
- Arms locked straight
- Symmetrical grip inside the knees

EXECUTION:

- Accelerate through the heels from the ground to full extension of the hips and legs
- Shrug, with straight arms
- Arms follow through by pulling bar to the chin with elbows high and outside
- Return the bar down fluidly in the reverse sequence: arms, then traps, then hips, then knees, back to the setup position

PROGRESSION:

1. Sumo deadlift
2. Sumo deadlift shrug, slow
3. Sumo deadlift shrug, fast
4. Full Sumo Deadlift High Pull

2. SEEING THE MOVEMENT

PRIMARY POINTS OF PERFORMANCE:

- Hips open before shrug and arm bend
- Bar is pulled up to just below the chin
- Fast and aggressive
- Elbows travel and finish high and outside; elbows are higher than the hands at all times during the movement

3. CORRECTING THE MOVEMENT

ALL FAULTS AND FIXES FROM THE **DEADLIFT** APPLY TO THIS MOVEMENT, PLUS THE FOLLOWING:

FAULT - PULLING TOO EARLY WITH THE ARMS. HIP NOT COMPLETELY OPEN BEFORE SHRUG OR ARM PULL.

- Fix - Take the athlete to step 3 in the progression (Sumo Deadlift Shrug). Emphasize that the hip needs to fire first, before arms. Try two Sumo Deadlift Shrugs for every full SDHP; do as many times as needed to get it right.

FAULT - NO SHRUG.

- Fix - Back to progression. Do two Sumo Deadlift Shrugs and one High Pull; do as many times as needed to get it right.

FAULT - ELBOWS LOW AND INSIDE.

- Fix - Cue: "Elbows high!"

FAULT - INCORRECT DESCENT (HIPS BEFORE ARMS).

- Fix - Slow down the movement; return arms then hips, then legs; then speed it up again.

FAULT - TOO SLOW.

- Fix - Cue "Faster!"

FAULT - SEGMENTING THE MOVEMENT.

- Fix - Cue to accelerate or jump the bar off the ground.

FAULT - LOSING CONTROL AND LEVELNESS OF BAR.

- Fix - Widen the grip a bit. Make sure the grip is symmetrical on the bar.

FAULT - RUNNING INTO THE KNEES

- Fix - Narrow the grip and make sure the hips aren't too low in the setup position.

Appendix E (Start-up Company Equipment Set)³⁸

- ☐ 10 ea Olympic Barbells (45 lbs)
- ☐ Olympic Bumper plates of various weights (45, 35, 25, 10, 5 lbs plates)
- ☐ 10 ea Squat Racks
- ☐ 5 ea Flat Bench
- ☐ 5 ea Kettlebells – 55 lbs
- ☐ 5 ea Kettlebells – 35 lbs
- ☐ 5 ea Kettlebells – 20 lbs
- ☐ Pull-up Bars
- ☐ 5 ea Medicine Balls – 20 lbs
- ☐ 5 ea Medicine Balls – 14 lbs
- ☐ 3 ea Medicine Balls – 10 lbs
- ☐ 10 ea AbMat®
- ☐ 5 pr Parallettes
- ☐ 10 ea Tumbling Mats
- ☐ 5 pr Gymnastics Still Rings with Straps
- ☐ 10 ea Plyometric Boxes – 24-in
- ☐ 5 ea Plyometric Boxes – 20-in
- ☐ 20 ea Jump Ropes

³⁸ Adapted from Greg Glassman, “The Garage Gym,” *CrossFit Journal* (September, 2002), online at <http://journal.CrossFit.com/2002/09/the-garage-gym-sept-02-cfj.tpl>; accessed 05/18/ 2010.

Appendix F (Austere Equipment List)³⁹

- ☐ 10 ea Ammunition Cans, 7.62 mm filled with Sand (20 lbs)
- ☐ 10 ea Ammunition Cans, 5.56 mm filled with Sand (30 lbs)
- ☐ 10 ea Ammunition Cans, .50 Caliber filled with Sand (50 lbs)
- ☐ 10 ea Ammunition Cans, 25mm filled with Sand (70 lbs)
- ☐ 10 ea 5-gal Jerry Cans, filled with water (45 lbs)
- ☐ 30 ea Sandbags, filled with Sand (50 lbs)
- ☐ 4 ea 5-ton/MTV truck tires with rims (350 lbs)
- ☐ 10 ea medicine balls (soccer balls filled with sand and sealed with duct tape)
- ☐ Pull-up bars (battalion mechanics/welders can construct)
- ☐ 10 ea Plyometric Boxes – 24-in
- ☐ 20 ea Jump Ropes

³⁹ Adapted from Greg Glassman, Wade Rutland, and JT Williams, “AOFPAustere Program,” *CrossFit Journal*, (August, 2006), online at <http://journal.CrossFit.com/2006/08/the-aofp-CrossFit-austere-prog-1.tpl>; accessed on 05/18/2010.

Appendix G (Assessment Data)

Athlete 1 (Male)

Variables		Estimates	Formula
BW	165 lbs		
H	5.667 ft		
SQD	1 ft	SQH-SQD=	0.264690312334569 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	4.958625 ft	OHH-H=	0.25 *H
OHH	7.08375 ft	OHH-DLH=	0.808849479442386 *H
DLH	2.5 ft	SHH-BHH=	0.742654843832716 *H
BBH	0.75 ft	OHH-BHH=	1.11765484383272 *H
WBB_Thr	95 lbs	DLH-BHH=	0.308805364 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.610309688 *H
P_SQ	0.744	H-DLH=	0.558849479 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SQ*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
	528.526875 ft-lbs		
Pull-up	(P_PULL*BW)*(OHH-SHH)	23783.70938	38221.54298
	320.8407469 ft-lbs		
Wall Ball Shot	(P_SQ*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))	14437.83361	
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SQ*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row_Cal * kCal_ftlb_Conv		

Army Push-Ups (Pre)

Reps	95	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	72.17	ft-lbs/s
Work	8660.947	ft-lbs

Thruster Reps	45
Pullups	45
Time (min:sec)	9:43
Time (sec)	583
Avg Power	65.56011
	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	160353
	ft-lbs
FGB_Power	157.2089
	ft-lbs/s

Round 1			
Wall Ball	19	WMB1	20
Push Press	31	WPP1	75
SDHP	15	WSDHP1	75
Box Jump	26	H_Jump1	2
Row	14		

Round 2			
Wall Ball	15	WMB2	20
Push Press	24	WPP2	75
SDHP	10	WSDHP2	75
Box Jump	15	H_Jump2	2
Row	10		

Round 3			
Wall Ball	10	WMB3	20
Push Press	22	WPP3	75
SDHP	10	WSDHP3	75
Box Jump	11	H_Jump3	2
Row	12		
FGB_Total_Score	244		

Work_WB1	6728.66	ft-lbs
Work_PP1	4940.916	ft-lbs
Work_SDHP1	1696.697	ft-lbs
Work_Jump1	8580	ft-lbs
Work_Row1	43232.35	ft-lbs

Work_WB2	5312.1	ft-lbs
Work_PP2	3825.225	ft-lbs
Work_SDHP2	1236.347	ft-lbs
Work_Jump2	4950	ft-lbs
Work_Row2	30880.25	ft-lbs

Work_WB3	3541.4	ft-lbs
Work_PP3	3506.456	ft-lbs
Work_SDHP3	1236.347	ft-lbs
Work_Jump3	3630	ft-lbs
Work_Row3	37056.3	ft-lbs

CFT (Pre)

Back Squat	275	lbs
Shoulder Press	135	lbs
Deadlift	285	lbs
Work_Squat	412.5	ft-lbs
P_Squat	165	ft-lbs/sec
Work_Sh Press	286.8919	ft-lbs
P_Sh Press	114.7568	ft-lbs/sec
Work_Deadlift	498.75	ft-lbs
P_Deadlift	199.5	ft-lbs/sec
P_CFT	479.2568	ft-lbs/sec

Army Push-Ups (post)

Reps	107	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	81.29	ft-lbs/s
Work	9754.961288	ft-lbs

Thruster Reps	45
Pullups	45
Time (min:sec)	6:26
Time (sec)	386
Avg Power	99.01954141
	ft-lbs/sec

Fight Gone Bad (Post)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	186178.425
	ft-lbs
FGB_Power	182.5278676
	ft-lbs/s

Round 1			
Wall Ball	20	WMB1	20
Push Press	30	WPP1	75
SDHP	20	WSDHP1	75
Box Jump	35	H_Jump1	2
Row	15		

Round 2			
Wall Ball	15	WMB2	20
Push Press	20	WPP2	75
SDHP	15	WSDHP2	75
Box Jump	27	H_Jump2	2
Row	11		

Round 3			
Wall Ball	15	WMB3	20
Push Press	15	WPP3	75
SDHP	15	WSDHP3	75
Box Jump	26	H_Jump3	2
Row	14		
	293		

Work_WB1	7082.8	ft-lbs
Work_PP1	4781.53125	ft-lbs
Work_SDHP1	2157.046875	ft-lbs
Work_Jump1	11550	ft-lbs
Work_Row1	46320.375	ft-lbs

Work_WB2	5312.1	ft-lbs
Work_PP2	3187.6875	ft-lbs
Work_SDHP2	1696.696875	ft-lbs
Work_Jump2	8910	ft-lbs
Work_Row2	33968.275	ft-lbs

Work_WB3	5312.1	ft-lbs
Work_PP3	2390.765625	ft-lbs
Work_SDHP3	1696.696875	ft-lbs
Work_Jump3	8580	ft-lbs
Work_Row3	43232.35	ft-lbs

CFT (Post)

Back Squat	265	lbs
Shoulder Press	145	lbs
Deadlift	315	lbs
Work_Squat	397.5	ft-lbs
P_Squat	159	ft-lbs/sec
Work_Sh Press	308.14	ft-lbs
P_Sh Press	123.26	ft-lbs/sec
Work_Deadlift	551.25	ft-lbs
P_Deadlift	220.5	ft-lbs/sec
P_CFT	502.75725	ft-lbs/sec

Athlete 2 (Female)

Variables		Estimates	Formula
BW	136 lbs		
H	5.333 ft		
SQD	1 ft	SQH-SQD=	0.281267579223701 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	4.666375 ft	OHH-H=	0.25 *H
OHH	6.66625 ft	OHH-DLH=	0.781220701293831 *H
DLH	2.5 ft	SHH-BHH=	0.734366210388149 *H
BBH	0.75 ft	OHH-BHH=	1.10936621038815 *H
WBB_Thr	45 lbs	DLH-BHH=	0.328145509 *H
WBB_FGB	55 lbs	SHH-SOH+SQD=	0.593732421 *H
P_SQ	0.744	H-DLH=	0.531220701 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SQ*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
	309.270375 ft-lbs	13917.16688	24070.83623
Pull-up	(P_PULL*BW)*(OHH-SHH)		
	248.864445 ft-lbs	10153.66936	
Wall Ball Shot	(P_SQ*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SQ*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row Cal * kCal_ftlb_Conv		

Army Push-Ups

Assumptions:

Reps	45	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	26.52	ft-lbs/s
Work	3182.201	ft-lbs

Army Push-Ups (post)

Assumptions:

Reps	49	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	28.88	ft-lbs/s
Work	3465.06342	ft-lbs

FRAN (Pre)

Thruster Reps	45	45#
Pullups	45	Blue Band 20% assist
Time (min:sec)	7:51	
Time (sec)	471	
Avg Power	51.10581	ft-lbs/sec

FRAN (Post)

Thruster Reps	45	
Pullups	45	
Time (min:sec)	6:26	
Time (sec)	386	
Avg Power	62.35967935	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	130503.2	ft-lbs
FGB_Power	127.9443	ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	131742.8941	ft-lbs
FGB_Power	129.1597001	ft-lbs/s

Round 1		
Wall Ball	27 WMB1	14
Push Press	15 WPP1	55
SDHP	17 WSDHP1	55
Box Jump	13 H_Jump1	2
Row	10	

Round 1		
Wall Ball	19 WMB1	14
Push Press	11 WPP1	55
SDHP	20 WSDHP1	55
Box Jump	15 H_Jump1	2
Row	11	

Round 2		
Wall Ball	21 WMB2	14
Push Press	14 WPP2	55
SDHP	15 WSDHP2	55
Box Jump	15 H_Jump2	2
Row	10	

Round 2		
Wall Ball	20 WMB2	14
Push Press	12 WPP2	55
SDHP	18 WSDHP2	55
Box Jump	18 H_Jump2	2
Row	10	

Round 3		
Wall Ball	21 WMB3	14
Push Press	12 WPP3	55
SDHP	13 WSDHP3	55
Box Jump	11 H_Jump3	2
Row	10	
FGB_Total_Score	224	

Round 3		
Wall Ball	21 WMB3	14
Push Press	11 WPP3	55
SDHP	19 WSDHP3	55
Box Jump	19 H_Jump3	2
Row	9	
	233	

Work_WB1	7310.952	ft-lbs
Work_PP1	1649.897	ft-lbs
Work_SDHP1	1505.497	ft-lbs
Work_Jump1	3536	ft-lbs
Work_Row1	30880.25	ft-lbs

Work_WB1	5144.744	ft-lbs
Work_PP1	1209.924375	ft-lbs
Work_SDHP1	1733.160625	ft-lbs
Work_Jump1	4080	ft-lbs
Work_Row1	33968.275	ft-lbs

Work_WB2	5686.296	ft-lbs
Work_PP2	1539.904	ft-lbs
Work_SDHP2	1353.721	ft-lbs
Work_Jump2	4080	ft-lbs
Work_Row2	30880.25	ft-lbs

Work_WB2	5415.52	ft-lbs
Work_PP2	1319.9175	ft-lbs
Work_SDHP2	1581.384625	ft-lbs
Work_Jump2	4896	ft-lbs
Work_Row2	30880.25	ft-lbs

Work_WB3	5686.296	ft-lbs
Work_PP3	1319.918	ft-lbs
Work_SDHP3	1201.945	ft-lbs
Work_Jump3	2992	ft-lbs
Work_Row3	30880.25	ft-lbs

Work_WB3	5686.296	ft-lbs
Work_PP3	1209.924375	ft-lbs
Work_SDHP3	1657.272625	ft-lbs
Work_Jump3	5168	ft-lbs
Work_Row3	27792.225	ft-lbs

CFT (Pre)

Back Squat	115 lbs
Shoulder Press	65 lbs
Deadlift	135 lbs
Work_Squat	172.5 ft-lbs
P_Squat	69 ft-lbs/sec
Work_Sh Press	129.9919 ft-lbs
P_Sh Press	51.99675 ft-lbs/sec
Work_Deadlift	236.25 ft-lbs
P_Deadlift	94.5 ft-lbs/sec
P_CFT	215.4968 ft-lbs/sec

CFT (Post)

Back Squat	135 lbs
Shoulder Press	70 lbs
Deadlift	185 lbs
Work_Squat	202.5 ft-lbs
P_Squat	81 ft-lbs/sec
Work_Sh Press	139.99 ft-lbs
P_Sh Press	56.00 ft-lbs/sec
Work_Deadlift	323.75 ft-lbs
P_Deadlift	129.5 ft-lbs/sec
P_CFT	266.4965 ft-lbs/sec

Athlete 3 (Female)

Variables		Estimates	Formula
BW	140 lbs		
H	5.5 ft		
SQD	1 ft	SQH-SQD=	0.272727272727273 * H
SOH	2.5 ft	OHH-SHH=	0.375 * H
SHH	4.8125 ft	OHH-H=	0.25 * H
OHH	6.875 ft	OHH-DLH=	0.795454545454545 * H
DLH	2.5 ft	SHH-BHH=	0.738636363636364 * H
BBH	0.75 ft	OHH-BHH=	1.11363636363636 * H
WBB_Thr	35 lbs	DLH-BHH=	0.318181818 * H
WBB_FGB	55 lbs	SHH-SQH+SQD=	0.602272727 * H
P_SO	0.744	H-DLH=	0.545454545 * H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre		Post	
	280.9275 ft-lbs		12641.7375	12641.7375	24531.01875 Post
Pull-up	(P_PULL*BW)*(OHH-SHH)				
	264.20625 ft-lbs		8322.496875	11889.28125	20964.23438 Pre
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))				
Push Press	WBB*(OHH-SHH)				
SDHP	(P_SO*BW)*((SQH-SQD)/2) +				
Box Jump	BW*BOXH				
Row	Row Cal * kCal_ftlb_Conv				

Army Push-Ups

Reps	37	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	23.15	ft-lbs/s
Work	2777.775	ft-lbs

Army Push-Ups (post)

Reps	47	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	29.40	ft-lbs/s
Work	3528.525	ft-lbs

FRAN (Pre)

Thruster Reps	45	
Pullups	45	Green Band 30% assist
Time (min:sec)	10:28	
Time (sec)	628	
Avg Power	33.38254	ft-lbs/sec

FRAN (Post)

Thruster Reps	45	
Pullups	45	Jumping Pull-ups
Time (min:sec)	5:34	
Time (sec)	334	
Avg Power	73.44616392	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	94434.56	ft-lbs
FGB_Power	92.5829	ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	127949.95	ft-lbs
FGB_Power	125.4411275	ft-lbs/s

Round 1		
Wall Ball	11 WMB1	14
Push Press	14 WPP1	55
SDHP	8 WSDHP1	55
Box Jump	10 H_Jump1	2
Row	7	

Round 1		
Wall Ball	13 WMB1	14
Push Press	12 WPP1	55
SDHP	10 WSDHP1	55
Box Jump	18 H_Jump1	2
Row	12	

Round 2		
Wall Ball	12 WMB2	14
Push Press	14 WPP2	55
SDHP	5 WSDHP2	55
Box Jump	8 H_Jump2	2
Row	8	

Round 2		
Wall Ball	14 WMB2	14
Push Press	10 WPP2	55
SDHP	10 WSDHP2	55
Box Jump	17 H_Jump2	2
Row	9	

Round 3		
Wall Ball	12 WMB3	10
Push Press	12 WPP3	75
SDHP	8 WSDHP3	75
Box Jump	7 H_Jump3	2
Row	8	
FGB_Total_Score	144	

Round 3		
Wall Ball	13 WMB3	14
Push Press	9 WPP3	55
SDHP	15 WSDHP3	45
Box Jump	16 H_Jump3	2
Row	10	
	188	

Work_WB1	3027.64	ft-lbs
Work_PP1	1588.125	ft-lbs
Work_SDHP1	848.3975	ft-lbs
Work_Jump1	2800	ft-lbs
Work_Row1	21616.18	ft-lbs

Work_WB1	3578.12	ft-lbs
Work_PP1	1361.25	ft-lbs
Work_SDHP1	1004.6375	ft-lbs
Work_Jump1	5040	ft-lbs
Work_Row1	37056.3	ft-lbs

Work_WB2	3302.88	ft-lbs
Work_PP2	1588.125	ft-lbs
Work_SDHP2	614.0375	ft-lbs
Work_Jump2	2240	ft-lbs
Work_Row2	24704.2	ft-lbs

Work_WB2	3853.36	ft-lbs
Work_PP2	1134.375	ft-lbs
Work_SDHP2	1004.6375	ft-lbs
Work_Jump2	4760	ft-lbs
Work_Row2	27792.225	ft-lbs

Work_WB3	2654.88	ft-lbs
Work_PP3	1856.25	ft-lbs
Work_SDHP3	929.6475	ft-lbs
Work_Jump3	1960	ft-lbs
Work_Row3	24704.2	ft-lbs

Work_WB3	3136.12	ft-lbs
Work_PP3	1392.1875	ft-lbs
Work_SDHP3	1476.4875	ft-lbs
Work_Jump3	4480	ft-lbs
Work_Row3	30880.25	ft-lbs

CFT (Pre)

Back Squat	115	lbs
Shoulder Press	60	lbs
Deadlift	115	lbs
Work_Squat	172.5	ft-lbs
P_Squat	69	ft-lbs/sec
Work_Sh Press	123.75	ft-lbs
P_Sh Press	49.5	ft-lbs/sec
Work_Deadlift	201.25	ft-lbs
P_Deadlift	80.5	ft-lbs/sec
P_CFT	199	ft-lbs/sec

CFT (Post)

Back Squat	120	lbs
Shoulder Press	70	lbs
Deadlift	145	lbs
Work_Squat	180	ft-lbs
P_Squat	72	ft-lbs/sec
Work_Sh Press	144.38	ft-lbs
P_Sh Press	57.75	ft-lbs/sec
Work_Deadlift	253.75	ft-lbs
P_Deadlift	101.5	ft-lbs/sec
P_CFT	231.25	ft-lbs/sec

Athlete 4 (Female)

Variables		Estimates	Formula
BW	153 lbs		
H	5.6667 ft		
SQD	1 ft	SOH-SQD=	0.264704325268675 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	4.958363 ft	OHH-H=	0.25 *H
OHH	7.083375 ft	OHH-DLH=	0.808826124552208 *H
DLH	2.5 ft	SHH-BHH=	0.742647837365663 *H
BBH	0.75 ft	OHH-BHH=	1.11764783736566 *H
WBB_Thr	45 lbs	DLH-BHH=	0.308821713 *H
WBB_FGB	55 lbs	SHH-SQH+SQD=	0.610295675 *H
P_SQ	0.744	H-DLH=	0.558826125 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	9 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SQ*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre	5880.142688	15024.31031	28411.41093 Post
Pull-up	(P_PULL*BW)*(OHH-SHH)				
Wall Ball Shot	(P_SQ*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		12940.86393	13387.10062	18821.00662 Pre
Push Press	WBB*(OHH-SHH)				
SDHP	(P_SQ*BW)*((SQH-SQD)/2) +				
Box Jump	BW*BOXH				
Row	Row_Cal * kCal_ftlb_Conv				

Army Push-Ups

Reps	18	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	12.68	ft-lbs/s
Work	1521.594	ft-lbs

FRAN (Pre)

Thruster Reps	45	
Pullups	45	Green - 5 reps, J. Pulls - 40
Time (min:sec)	9:30	
Time (sec)	570	
Avg Power	33.01931	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	96123.17	ft-lbs
FGB_Power	94.2384	ft-lbs/s

Round 1		
Wall Ball	8 WMB1	14
Push Press	8 WPP1	55
SDHP	12 WSDHP1	55
Box Jump	11 H_Jump1	2
Row	8	

Round 2		
Wall Ball	11 WMB2	14
Push Press	12 WPP2	55
SDHP	12 WSDHP2	55
Box Jump	9 H_Jump2	2
Row	9	

Round 3		
Wall Ball	14 WMB3	10
Push Press	13 WPP3	75
SDHP	16 WSDHP3	75
Box Jump	6 H_Jump3	2
Row	6	
FGB_Total_Score	155	

Work_WB1	2205.984	ft-lbs
Work_PP1	935.0055	ft-lbs
Work_SDHP1	1255.948	ft-lbs
Work_Jump1	3366	ft-lbs
Work_Row1	24704.2	ft-lbs

Work_WB2	3033.228	ft-lbs
Work_PP2	1402.508	ft-lbs
Work_SDHP2	1255.948	ft-lbs
Work_Jump2	2754	ft-lbs
Work_Row2	27792.23	ft-lbs

Work_WB3	3300.472	ft-lbs
Work_PP3	2071.887	ft-lbs
Work_SDHP3	1681.611	ft-lbs
Work_Jump3	1836	ft-lbs
Work_Row3	18528.15	ft-lbs

CFT (Pre)

Back Squat	115 lbs	
Shoulder Press	65 lbs	
Deadlift	135 lbs	
Work_Squat	172.5	ft-lbs
P_Squat	69	ft-lbs/sec
Work_Sh Press	138.1258	ft-lbs
P_Sh Press	55.25033	ft-lbs/sec
Work_Deadlift	236.25	ft-lbs
P_Deadlift	94.5	ft-lbs/sec
P_CFT	218.7503	ft-lbs/sec

Army Push-Ups (post)

Reps	20	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	14.09	ft-lbs/s
Work	1690.659945	ft-lbs

FRAN (Post)

Thruster Reps	45	
Pullups	45	Jumping Pull-ups
Time (min:sec)	6:50	
Time (sec)	410	
Avg Power	69.29612423	ft-lbs/sec

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	101718.0527	ft-lbs
FGB_Power	99.72358107	ft-lbs/s

Round 1		
Wall Ball	13 WMB1	14
Push Press	10 WPP1	55
SDHP	12 WSDHP1	55
Box Jump	10 H_Jump1	2
Row	9	

Round 2		
Wall Ball	14 WMB2	14
Push Press	9 WPP2	55
SDHP	13 WSDHP2	55
Box Jump	11 H_Jump2	2
Row	8	

Round 3		
Wall Ball	11 WMB3	14
Push Press	7 WPP3	55
SDHP	13 WSDHP3	55
Box Jump	12 H_Jump3	2
Row	7	
	159	

Work_WB1	3584.724	ft-lbs
Work_PP1	1168.756875	ft-lbs
Work_SDHP1	1255.947938	ft-lbs
Work_Jump1	3060	ft-lbs
Work_Row1	27792.225	ft-lbs

Work_WB2	3860.472	ft-lbs
Work_PP2	1051.881188	ft-lbs
Work_SDHP2	1341.321938	ft-lbs
Work_Jump2	3366	ft-lbs
Work_Row2	24704.2	ft-lbs

Work_WB3	2703.228	ft-lbs
Work_PP3	1115.631563	ft-lbs
Work_SDHP3	1425.489188	ft-lbs
Work_Jump3	3672	ft-lbs
Work_Row3	21616.175	ft-lbs

CFT (Post)

Back Squat	135 lbs	
Shoulder Press	70 lbs	
Deadlift	155 lbs	
Work_Squat	202.5	ft-lbs
P_Squat	81	ft-lbs/sec
Work_Sh Press	148.75	ft-lbs
P_Sh Press	59.50	ft-lbs/sec
Work_Deadlift	271.25	ft-lbs
P_Deadlift	108.5	ft-lbs/sec
P_CFT	249.00035	ft-lbs/sec

Athlete 5 (Female)

Variables		Estimates	Formula
BW	132 lbs		
H	5.1667 ft		
SQD	1 ft	SQH-SQD=	0.290320707608338 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	4.520863 ft	OHH-H=	0.25 *H
OHH	6.458375 ft	OHH-DLH=	0.766132153986103 *H
DLH	2.5 ft	SHH-BHH=	0.729839646195831 *H
BBH	0.75 ft	OHH-BHH=	1.10483964619583 *H
WBB_Thr	45 lbs	DLH-BHH=	0.338707492 *H
WBB_FGB	55 lbs	SHH-SQH+SQD=	0.584679292 *H
P_SO	0.744	H-DLH=	0.516132154 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	8 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre		Post	
Pull-up	(P_PULL*BW)*(OHH-SHH)		4014.513563	13590.00281	20961.40474 Post
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		3439.987568	7371.401932	7454.501131 Pre
Push Press	WBB*(OHH-SHH)				
SDHP	(P_SO*BW)*((SQH-SQD)/2) +				
Box Jump	BW*BOXH				
Row	Row_Cal * kCal_ftlb_Conv				

Army Push-Ups

Reps	35	Assumptions:
Time	120	H_Push = .15% of Height
AVG Power	19.39 ft-lbs/s	P_PUSH = .73 * BW (Men); .65 (Women)
Work	2327.34 ft-lbs	

FRAN (Pre)

Thruster Reps	45	25#
Pullups	45	Green - 21, did not complete pulls
Time (min:sec)	8:22	
Time (sec)	502	
Avg Power	14.8496 ft-lbs/sec	

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	92658.73 ft-lbs	
FGB_Power	90.84189 ft-lbs/s	

Round 1		
Wall Ball	10 WMB1	14
Push Press	22 WPP1	55
SDHP	14 WSDHP1	15
Box Jump	9 H_Jump1	2
Row	6	

Round 2		
Wall Ball	10 WMB2	10
Push Press	20 WPP2	55
SDHP	17 WSDHP2	15
Box Jump	10 H_Jump2	2
Row	7	

Round 3		
Wall Ball	11 WMB3	10
Push Press	22 WPP3	55
SDHP	19 WSDHP3	15
Box Jump	20 H_Jump3	2
Row	8	
FGB_Total_Score	205	

Work_WB1	2383.12 ft-lbs
Work_PP1	2344.39 ft-lbs
Work_SDHP1	1087.747 ft-lbs
Work_Jump1	2376 ft-lbs
Work_Row1	18528.15 ft-lbs

Work_WB2	2123.12 ft-lbs
Work_PP2	2131.264 ft-lbs
Work_SDHP2	1308.715 ft-lbs
Work_Jump2	2640 ft-lbs
Work_Row2	21616.18 ft-lbs

Work_WB3	2335.432 ft-lbs
Work_PP3	2344.39 ft-lbs
Work_SDHP3	1456.027 ft-lbs
Work_Jump3	5280 ft-lbs
Work_Row3	24704.2 ft-lbs

CFT (Pre)

Back Squat	55 lbs
Shoulder Press	45 lbs
Deadlift	115 lbs
Work_Squat	82.5 ft-lbs
P_Squat	33 ft-lbs/sec
Work_Sh Press	87.18806 ft-lbs
P_Sh Press	34.87523 ft-lbs/sec
Work_Deadlift	201.25 ft-lbs
P_Deadlift	80.5 ft-lbs/sec
P_CFT	148.3752 ft-lbs/sec

Army Push-Ups (post)

Reps	45	Assumptions:
Time	120	H_Push = .15% of Height
AVG Power	24.94 ft-lbs/s	P_PUSH = .73 * BW (Men); .65 (Women)
Work	2992.294305 ft-lbs	

FRAN (Post)

Thruster Reps	45	
Pullups	45	Green Band (30% assist)
Time (min:sec)	8:29	
Time (sec)	509	
Avg Power	41.18154174 ft-lbs/sec	

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	128641.0672 ft-lbs	
FGB_Power	126.1186933 ft-lbs/s	

Round 1		
Wall Ball	10 WMB1	14
Push Press	22 WPP1	55
SDHP	9 WSDHP1	55
Box Jump	21 H_Jump1	2
Row	11	

Round 2		
Wall Ball	10 WMB2	14
Push Press	6 WPP2	55
SDHP	9 WSDHP2	55
Box Jump	20 H_Jump2	2
Row	11	

Round 3		
Wall Ball	10 WMB3	14
Push Press	6 WPP3	55
SDHP	8 WSDHP3	55
Box Jump	20 H_Jump3	2
Row	11	
	168	

Work_WB1	2383.12 ft-lbs
Work_PP1	639.379125 ft-lbs
Work_SDHP1	719.4669375 ft-lbs
Work_Jump1	5544 ft-lbs
Work_Row1	33968.275 ft-lbs

Work_WB2	2123.12 ft-lbs
Work_PP2	639.379125 ft-lbs
Work_SDHP2	719.4669375 ft-lbs
Work_Jump2	5280 ft-lbs
Work_Row2	33968.275 ft-lbs

Work_WB3	2123.12 ft-lbs
Work_PP3	639.379125 ft-lbs
Work_SDHP3	645.8109375 ft-lbs
Work_Jump3	5280 ft-lbs
Work_Row3	33968.275 ft-lbs

CFT (Post)

Back Squat	105 lbs
Shoulder Press	55 lbs
Deadlift	165 lbs
Work_Squat	157.5 ft-lbs
P_Squat	63 ft-lbs/sec
Work_Sh Press	106.56 ft-lbs
P_Sh Press	42.63 ft-lbs/sec
Work_Deadlift	288.75 ft-lbs
P_Deadlift	115.5 ft-lbs/sec
P_CFT	221.125275 ft-lbs/sec

Athlete 6 (Male)

Variables		Estimates	Formula
BW	205 lbs		
H	6 ft		
SQD	1 ft	SQH-SQD=	0.25 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.25 ft	OHH-H=	0.25 *H
OHH	7.5 ft	OHH-DLH=	0.833333333333333 *H
DLH	2.5 ft	SHH-BHH=	0.75 *H
BBH	0.75 ft	OHH-BHH=	1.125 *H
WBB_Thr	65 lbs	DLH-BHH=	0.291666667 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.625 *H
P_SQ	0.744	H-DLH=	0.583333333 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SQ*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
	472.53 ft-lbs	21263.85	34558.22813
Pull-up	(P_PULL*BW)*(OHH-SHH)		
	422.04375 ft-lbs	13294.37813	
Wall Ball Shot	(P_SQ*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SQ*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row Cal * kCal_ftlb_Conv		

Army Push-Ups

Reps	26	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	25.98	ft-lbs/s
Work	3118.05	ft-lbs

Army Push-Ups (post)

Reps	30	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	29.98	ft-lbs/s
Work	3597.75	ft-lbs

FRAN (Pre)

Thruster Reps	45	65#
Pullups	45	Green Band 30% assist
Time (min:sec)	15:01	
Time (sec)	901	
Avg Power	38.35541	ft-lbs/sec

FRAN (Post)

Thruster Reps	45	65#
Pullups	45	Green Band (30% assist)
Time (min:sec)	10:52	
Time (sec)	652	
Avg Power	53.00341737	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	111305	ft-lbs
FGB_Power	109.1226	ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	117805.735	ft-lbs
FGB_Power	115.4958186	ft-lbs/s

Round 1		
Wall Ball	9 WMB1	14
Push Press	13 WPP1	75
SDHP	6 WSDHP1	75
Box Jump	8 H_Jump1	2
Row	8	

Round 1		
Wall Ball	17 WMB1	20
Push Press	10 WPP1	75
SDHP	8 WSDHP1	75
Box Jump	11 H_Jump1	2
Row	9	

Round 2		
Wall Ball	12 WMB2	14
Push Press	13 WPP2	75
SDHP	6 WSDHP2	75
Box Jump	5 H_Jump2	2
Row	10	

Round 2		
Wall Ball	12 WMB2	20
Push Press	7 WPP2	75
SDHP	9 WSDHP2	75
Box Jump	10 H_Jump2	2
Row	9	

Round 3		
Wall Ball	10 WMB3	14
Push Press	13 WPP3	75
SDHP	7 WSDHP3	75
Box Jump	5 H_Jump3	2
Row	9	
FGB_Total_Score	134	

Round 3		
Wall Ball	11 WMB3	20
Push Press	7 WPP3	75
SDHP	7 WSDHP3	75
Box Jump	10 H_Jump3	2
Row	9	
	146	

Work_WB1	3130.02	ft-lbs
Work_PP1	2193.75	ft-lbs
Work_SDHP1	1023.84	ft-lbs
Work_Jump1	3280	ft-lbs
Work_Row1	24704.2	ft-lbs

Work_WB1	5912.26	ft-lbs
Work_PP1	1687.5	ft-lbs
Work_SDHP1	1252.62	ft-lbs
Work_Jump1	4510	ft-lbs
Work_Row1	27792.225	ft-lbs

Work_WB2	4173.36	ft-lbs
Work_PP2	2193.75	ft-lbs
Work_SDHP2	1023.84	ft-lbs
Work_Jump2	2050	ft-lbs
Work_Row2	30880.25	ft-lbs

Work_WB2	4173.36	ft-lbs
Work_PP2	1181.25	ft-lbs
Work_SDHP2	1367.01	ft-lbs
Work_Jump2	4100	ft-lbs
Work_Row2	27792.225	ft-lbs

Work_WB3	3477.8	ft-lbs
Work_PP3	2193.75	ft-lbs
Work_SDHP3	1138.23	ft-lbs
Work_Jump3	2050	ft-lbs
Work_Row3	27792.23	ft-lbs

Work_WB3	3825.58	ft-lbs
Work_PP3	1181.25	ft-lbs
Work_SDHP3	1138.23	ft-lbs
Work_Jump3	4100	ft-lbs
Work_Row3	27792.225	ft-lbs

CFT (Pre)

Back Squat	145	lbs
Shoulder Press	95	lbs
Deadlift	165	lbs
Work_Squat	217.5	ft-lbs
P_Squat	87	ft-lbs/sec
Work_Sh Press	213.75	ft-lbs
P_Sh Press	85.5	ft-lbs/sec
Work_Deadlift	288.75	ft-lbs
P_Deadlift	115.5	ft-lbs/sec
P_CFT	288	ft-lbs/sec

CFT (Post)

Back Squat	175	lbs
Shoulder Press	100	lbs
Deadlift	215	lbs
Work_Squat	262.5	ft-lbs
P_Squat	105	ft-lbs/sec
Work_Sh Press	225.00	ft-lbs
P_Sh Press	90.00	ft-lbs/sec
Work_Deadlift	376.25	ft-lbs
P_Deadlift	150.5	ft-lbs/sec
P_CFT	345.5	ft-lbs/sec

Athlete 7 (Male)

Variables		Estimates	Formula
BW	192 lbs		
H	5.75 ft		
SQD	1 ft	SQH-SQD=	0.260869565217391 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.03125 ft	OHH-H=	0.25 *H
OHH	7.1875 ft	OHH-DLH=	0.815217391304348 *H
DLH	2.5 ft	SHH-BHH=	0.744565217391304 *H
BBH	0.75 ft	OHH-BHH=	1.1195652173913 *H
WBB_Thr	95 lbs	DLH-BHH=	0.304347826 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.614130435 *H
P_SO	0.744	H-DLH=	0.565217391 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
Pull-up	(P_PULL*BW)*(OHH-SHH)	25272.70875	42319.15875
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))	17046.45	
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SO*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row Cal * kCal_ftlb_Conv		

Army Push-Ups

Reps	72	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	64.58 ft-lbs/s	
Work	7750.08 ft-lbs	

Army Push-Ups (post)

Reps	87	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	78.04 ft-lbs/s	
Work	9364.68 ft-lbs	

FRAN (Pre)

Thruster Reps	45
Pullups	45
Time (min:sec)	11:14
Time (sec)	674
Avg Power	62.78807 ft-lbs/sec

FRAN (Post)

Thruster Reps	45
Pullups	45
Time (min:sec)	8:33
Time (sec)	513
Avg Power	82.49348684 ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	105513.3 ft-lbs
FGB_Power	103.4444 ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	173891.6025 ft-lbs
FGB_Power	170.4819632 ft-lbs/s

Round 1		
Wall Ball	21 WMB1	20
Push Press	13 WPP1	75
SDHP	11 WSDHP1	75
Box Jump	11 H_Jump1	2
Row	7	

Round 1		
Wall Ball	23 WMB1	20
Push Press	15 WPP1	75
SDHP	17 WSDHP1	75
Box Jump	17 H_Jump1	2
Row	16	

Round 2		
Wall Ball	14 WMB2	20
Push Press	12 WPP2	75
SDHP	9 WSDHP2	75
Box Jump	11 H_Jump2	2
Row	6	

Round 2		
Wall Ball	19 WMB2	20
Push Press	15 WPP2	75
SDHP	15 WSDHP2	75
Box Jump	15 H_Jump2	2
Row	13	

Round 3		
Wall Ball	17 WMB3	20
Push Press	12 WPP3	75
SDHP	8 WSDHP3	75
Box Jump	14 H_Jump3	2
Row	7	
FGB_Total_Score	173	

Round 3		
Wall Ball	18 WMB3	20
Push Press	13 WPP3	75
SDHP	13 WSDHP3	75
Box Jump	14 H_Jump3	2
Row	10	
	233	

Work_WB1	8069.712 ft-lbs
Work_PP1	2102.344 ft-lbs
Work_SDHP1	1499.59 ft-lbs
Work_Jump1	4224 ft-lbs
Work_Row1	21616.18 ft-lbs

Work_WB1	8838.256 ft-lbs
Work_PP1	2425.78125 ft-lbs
Work_SDHP1	2142.40575 ft-lbs
Work_Jump1	6528 ft-lbs
Work_Row1	49408.4 ft-lbs

Work_WB2	5379.808 ft-lbs
Work_PP2	1940.625 ft-lbs
Work_SDHP2	1285.318 ft-lbs
Work_Jump2	4224 ft-lbs
Work_Row2	18528.15 ft-lbs

Work_WB2	7301.168 ft-lbs
Work_PP2	2425.78125 ft-lbs
Work_SDHP2	1928.13375 ft-lbs
Work_Jump2	5760 ft-lbs
Work_Row2	40144.325 ft-lbs

Work_WB3	6532.624 ft-lbs
Work_PP3	1940.625 ft-lbs
Work_SDHP3	1178.182 ft-lbs
Work_Jump3	5376 ft-lbs
Work_Row3	21616.18 ft-lbs

Work_WB3	6916.896 ft-lbs
Work_PP3	2102.34375 ft-lbs
Work_SDHP3	1713.86175 ft-lbs
Work_Jump3	5376 ft-lbs
Work_Row3	30880.25 ft-lbs

CFT (Pre)

Back Squat	235 lbs
Shoulder Press	135 lbs
Deadlift	225 lbs
Work_Squat	352.5 ft-lbs
P_Squat	141 ft-lbs/sec
Work_Sh Press	291.0938 ft-lbs
P_Sh Press	116.4375 ft-lbs/sec
Work_Deadlift	393.75 ft-lbs
P_Deadlift	157.5 ft-lbs/sec
P_CFT	414.9375 ft-lbs/sec

CFT (Post)

Back Squat	265 lbs
Shoulder Press	155 lbs
Deadlift	295 lbs
Work_Squat	397.5 ft-lbs
P_Squat	159 ft-lbs/sec
Work_Sh Press	334.22 ft-lbs
P_Sh Press	133.69 ft-lbs/sec
Work_Deadlift	516.25 ft-lbs
P_Deadlift	206.5 ft-lbs/sec
P_CFT	499.1875 ft-lbs/sec

Athlete 8 (Male)

Variables		Estimates	Formula
BW	217 lbs		
H	6.1667 ft		
SQD	1 ft	SQH-SQD=	0.243241928422009 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.395863 ft	OHH-H=	0.25 *H
OHH	7.708375 ft	OHH-DLH=	0.844596785963319 *H
DLH	2.5 ft	SHH-BHH=	0.753379035788996 *H
BBH	0.75 ft	OHH-BHH=	1.128379035789 *H
WBB_Thr	95 lbs	DLH-BHH=	0.28378225 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.631758072 *H
P_SO	0.744	H-DLH=	0.594596786 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre	Post	
	604.3606875 ft-lbs	13109.40169	27196.23094	43726.02404 Post
Pull-up	(P_PULL*BW)*(OHH-SHH)			
	459.1609194 ft-lbs	15703.30344	16529.7931	28812.70513 Pre
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))			
Push Press	WBB*(OHH-SHH)			
SDHP	(P_SO*BW)*((SQH-SQD)/2) +			
Box Jump	BW*BOXH			
Row	Row Cal * kCal_ftlb_Conv			

Army Push-Ups

Reps	61	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	66.32	ft-lbs/s
Work	7958.789	ft-lbs

Army Push-Ups (post)

Reps	69	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	75.02	ft-lbs/s
Work	9002.564912	ft-lbs

FRAN (Pre)

Thruster Reps	45	75#
Pullups	45	Blue-18, 3 L pulls, Green 24
Time (min:sec)	13:28	
Time (sec)	814	
Avg Power	35.39644	ft-lbs/sec

FRAN (Post)

Thruster Reps	45	
Pullups	45	Blue Band (20% assist)
Time (min:sec)	13:16	
Time (sec)	796	
Avg Power	54.932191	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	160556.8	ft-lbs
FGB_Power	157.4087	ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	143373.9604	ft-lbs
FGB_Power	140.5627063	ft-lbs/s

Round 1		
Wall Ball	17 WMB1	14
Push Press	17 WPP1	45
SDHP	11 WSDHP1	75
Box Jump	12 H_Jump1	2
Row	14	

Round 1		
Wall Ball	26 WMB1	20
Push Press	15 WPP1	75
SDHP	15 WSDHP1	75
Box Jump	18 H_Jump1	2
Row	9	

Round 2		
Wall Ball	13 WMB2	14
Push Press	11 WPP2	45
SDHP	7 WSDHP2	75
Box Jump	8 H_Jump2	2
Row	14	

Round 2		
Wall Ball	15 WMB2	20
Push Press	11 WPP2	75
SDHP	11 WSDHP2	75
Box Jump	13 H_Jump2	2
Row	10	

Round 3		
Wall Ball	11 WMB3	14
Push Press	10 WPP3	45
SDHP	6 WSDHP3	75
Box Jump	13 H_Jump3	2
Row	12	
FGB_Total_Score	176	

Round 3		
Wall Ball	13 WMB3	20
Push Press	12 WPP3	75
SDHP	11 WSDHP3	75
Box Jump	12 H_Jump3	2
Row	12	
	203	

Work_WB1	6139.924	ft-lbs
Work_PP1	1769.072	ft-lbs
Work_SDHP1	1680.386	ft-lbs
Work_Jump1	5208	ft-lbs
Work_Row1	43232.35	ft-lbs

Work_WB1	9390.472	ft-lbs
Work_PP1	1560.945938	ft-lbs
Work_SDHP1	2164.729688	ft-lbs
Work_Jump1	7812	ft-lbs
Work_Row1	27792.225	ft-lbs

Work_WB2	4695.236	ft-lbs
Work_PP2	1144.694	ft-lbs
Work_SDHP2	1196.042	ft-lbs
Work_Jump2	3472	ft-lbs
Work_Row2	43232.35	ft-lbs

Work_WB2	5417.58	ft-lbs
Work_PP2	1144.693688	ft-lbs
Work_SDHP2	1680.385688	ft-lbs
Work_Jump2	5642	ft-lbs
Work_Row2	30880.25	ft-lbs

Work_WB3	3972.892	ft-lbs
Work_PP3	1040.631	ft-lbs
Work_SDHP3	1074.956	ft-lbs
Work_Jump3	5642	ft-lbs
Work_Row3	37056.3	ft-lbs

Work_WB3	4695.236	ft-lbs
Work_PP3	1248.75675	ft-lbs
Work_SDHP3	1680.385688	ft-lbs
Work_Jump3	5208	ft-lbs
Work_Row3	37056.3	ft-lbs

CFT (Pre)

Back Squat	205	lbs
Shoulder Press	115	lbs
Deadlift	185	lbs
Work_Squat	307.5	ft-lbs
P_Squat	123	ft-lbs/sec
Work_Sh Press	265.9389	ft-lbs
P_Sh Press	106.3756	ft-lbs/sec
Work_Deadlift	323.75	ft-lbs
P_Deadlift	129.5	ft-lbs/sec
P_CFT	358.8756	ft-lbs/sec

CFT (Post)

Back Squat	235	lbs
Shoulder Press	145	lbs
Deadlift	235	lbs
Work_Squat	352.5	ft-lbs
P_Squat	141	ft-lbs/sec
Work_Sh Press	335.31	ft-lbs
P_Sh Press	134.13	ft-lbs/sec
Work_Deadlift	411.25	ft-lbs
P_Deadlift	164.5	ft-lbs/sec
P_CFT	439.625725	ft-lbs/sec

Athlete 9 (Female)

Variables		Estimates	Formula
BW	138 lbs		
H	5.41667 ft		
SQD	1 ft	SQH-SQD=	0.276922906508981 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	4.739586 ft	OHH-H=	0.25 *H
OHH	6.770838 ft	OHH-DLH=	0.788461822485032 *H
DLH	2.5 ft	SHH-BHH=	0.73653854674551 *H
BBH	0.75 ft	OHH-BHH=	1.11153854674551 *H
WBB_Thr	65 lbs	DLH-BHH=	0.323076724 *H
WBB_FGB	55 lbs	SHH-SQH+SQD=	0.598077093 *H
P_SO	0.744	H-DLH=	0.538461822 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	8 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre		Post	
Pull-up	(P_PULL*BW)*(OHH-SHH)		7304.791781	9789.425606	21331.2999 Post
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		10002.95772	11541.87429	17307.7495 Pre
Push Press	WBB*(OHH-SHH)				
SDHP	(P_SO*BW)*((SQH-SQD)/2) +				
Box Jump	BW*BOXH				
Row	Row_Cal * kCal_ftlb_Conv				

Army Push-Ups

Reps	60	Assumptions:
Time	120	H_Push = .15% of Height
AVG Power	36.44 ft-lbs/s	P_PUSH = .73 * BW (Men); .65 (Women)
Work	4372.878 ft-lbs	

FRAN (Pre)

Thruster Reps	45	45#
Pullups	45	Blue-30, j pulls-15
Time (min:sec)	7:08	
Time (sec)	428	
Avg Power	40.43867 ft-lbs/sec	

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	110046.5 ft-lbs	
FGB_Power	107.8888 ft-lbs/s	

Round 1			
Wall Ball	22	WMB1	14
Push Press	14	WPP1	55
SDHP	11	WSDHP1	55
Box Jump	10	H_Jump1	2
Row	8		

Round 2			
Wall Ball	18	WMB2	14
Push Press	10	WPP2	55
SDHP	13	WSDHP2	55
Box Jump	11	H_Jump2	2
Row	10		

Round 3			
Wall Ball	17	WMB3	14
Push Press	8	WPP3	55
SDHP	15	WSDHP3	55
Box Jump	10	H_Jump3	2
Row	8		
FGB_Total_Score	185		

Work_WB1	5390.176 ft-lbs
Work_PP1	1564.063 ft-lbs
Work_SDHP1	1066.471 ft-lbs
Work_Jump1	2760 ft-lbs
Work_Row1	24704.2 ft-lbs

Work_WB2	4410.144 ft-lbs
Work_PP2	1117.188 ft-lbs
Work_SDHP2	1220.479 ft-lbs
Work_Jump2	3036 ft-lbs
Work_Row2	30880.25 ft-lbs

Work_WB3	4165.136 ft-lbs
Work_PP3	893.7506 ft-lbs
Work_SDHP3	1374.487 ft-lbs
Work_Jump3	2760 ft-lbs
Work_Row3	24704.2 ft-lbs

CFT (Pre)

Back Squat	125 lbs
Shoulder Press	85 lbs
Deadlift	185 lbs
Work_Squat	187.5 ft-lbs
P_Squat	75 ft-lbs/sec
Work_Sh Press	172.6564 ft-lbs
P_Sh Press	69.06254 ft-lbs/sec
Work_Deadlift	323.75 ft-lbs
P_Deadlift	129.5 ft-lbs/sec
P_CFT	273.5625 ft-lbs/sec

Army Push-Ups (post)

Reps	69	Assumptions:
Time	120	H_Push = .15% of Height
AVG Power	41.91 ft-lbs/s	P_PUSH = .73 * BW (Men); .65 (Women)
Work	5028.809345 ft-lbs	

FRAN (Post)

Thruster Reps	45	65#-.1st rd, 55#2d, 3d Rd
Pullups	45	
Time (min:sec)	10:38	
Time (sec)	638	
Avg Power	33.43463934 ft-lbs/sec	

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	122659.0826 ft-lbs	
FGB_Power	120.2540025 ft-lbs/s	

Round 1			
Wall Ball	22	WMB1	14
Push Press	13	WPP1	45
SDHP	13	WSDHP1	45
Box Jump	13	H_Jump1	2
Row	11		

Round 2			
Wall Ball	20	WMB2	14
Push Press	11	WPP2	45
SDHP	12	WSDHP2	45
Box Jump	13	H_Jump2	2
Row	9		

Round 3			
Wall Ball	20	WMB3	14
Push Press	10	WPP3	45
SDHP	10	WSDHP3	45
Box Jump	13	H_Jump3	2
Row	9		
	199		

Work_WB1	5390.176 ft-lbs
Work_PP1	1452.344644 ft-lbs
Work_SDHP1	1220.479244 ft-lbs
Work_Jump1	3588 ft-lbs
Work_Row1	33968.275 ft-lbs

Work_WB2	4900.16 ft-lbs
Work_PP2	1228.907006 ft-lbs
Work_SDHP2	1143.475244 ft-lbs
Work_Jump2	3588 ft-lbs
Work_Row2	27792.225 ft-lbs

Work_WB3	4900.16 ft-lbs
Work_PP3	1117.188188 ft-lbs
Work_SDHP3	989.4672438 ft-lbs
Work_Jump3	3588 ft-lbs
Work_Row3	27792.225 ft-lbs

CFT (Post)

Back Squat	165 lbs
Shoulder Press	95 lbs
Deadlift	245 lbs
Work_Squat	247.5 ft-lbs
P_Squat	99 ft-lbs/sec
Work_Sh Press	192.97 ft-lbs
P_Sh Press	77.19 ft-lbs/sec
Work_Deadlift	428.75 ft-lbs
P_Deadlift	171.5 ft-lbs/sec
P_CFT	347.6875475 ft-lbs/sec

Athlete 10 (Male)

Variables		Estimates	Formula
BW	183 lbs		
H	5.833 ft		
SQD	1 ft	SQH-SQD=	0.257157551860106 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.103875 ft	OHH-H=	0.25 *H
OHH	7.29125 ft	OHH-DLH=	0.821404080233156 *H
DLH	2.5 ft	SHH-BHH=	0.746421224069947 *H
BBH	0.75 ft	OHH-BHH=	1.12142122406995 *H
WBB_Thr	95 lbs	DLH-BHH=	0.300017144 *H
WBB_FGB	75 lbs	SHH-SOH+SQD=	0.617842448 *H
P_SO	0.744	H-DLH=	0.57140408 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
	554.528625 ft-lbs	24953.78813	41435.71343
Pull-up	(P_PULL*BW)*(OHH-SHH)		
	366.2650069 ft-lbs	16481.92531	
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SO*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row Cal * kCal_ftlb_Conv		

Army Push-Ups

Reps	79	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	68.52	ft-lbs/s
Work	8221.949	ft-lbs

FRAN (Pre)

Thruster Reps	45
Pullups	45
Time (min:sec)	7:11
Time (sec)	431
Avg Power	96.13855 ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	228735.3 ft-lbs
FGB_Power	224.2503 ft-lbs/s

Round 1		
Wall Ball	15 WMB1	20
Push Press	21 WPP1	75
SDHP	17 WSDHP1	75
Box Jump	37 H_Jump1	2
Row	18	

Round 2		
Wall Ball	11 WMB2	20
Push Press	18 WPP2	75
SDHP	15 WSDHP2	75
Box Jump	26 H_Jump2	2
Row	18	

Round 3		
Wall Ball	9 WMB3	20
Push Press	21 WPP3	75
SDHP	13 WSDHP3	75
Box Jump	20 H_Jump3	2
Row	19	
FGB_Total_Score	278	

Work_WB1	5613.42 ft-lbs
Work_PP1	3445.116 ft-lbs
Work_SDHP1	2062.479 ft-lbs
Work_Jump1	13542 ft-lbs
Work_Row1	55584.45 ft-lbs

Work_WB2	4116.508 ft-lbs
Work_PP2	2952.956 ft-lbs
Work_SDHP2	1858.251 ft-lbs
Work_Jump2	9516 ft-lbs
Work_Row2	55584.45 ft-lbs

Work_WB3	3368.052 ft-lbs
Work_PP3	3445.116 ft-lbs
Work_SDHP3	1654.023 ft-lbs
Work_Jump3	7320 ft-lbs
Work_Row3	58672.48 ft-lbs

CFT (Pre)

Back Squat	235 lbs
Shoulder Press	145 lbs
Deadlift	295 lbs
Work_Squat	352.5 ft-lbs
P_Squat	141 ft-lbs/sec
Work_Sh Press	317.1694 ft-lbs
P_Sh Press	126.8678 ft-lbs/sec
Work_Deadlift	516.25 ft-lbs
P_Deadlift	206.5 ft-lbs/sec
P_CFT	474.3678 ft-lbs/sec

Army Push-Ups (post)

Reps	73	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	63.31	ft-lbs/s
Work	7597.497083	ft-lbs

FRAN (Post)

Thruster Reps	45
Pullups	45
Time (min:sec)	5:31
Time (sec)	331
Avg Power	125.1834243 ft-lbs/sec

Fight Gone Bad (Post)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	231025.0661 ft-lbs
FGB_Power	226.4951629 ft-lbs/s

Round 1		
Wall Ball	16 WMB1	20
Push Press	30 WPP1	75
SDHP	20 WSDHP1	75
Box Jump	32 H_Jump1	2
Row	19	

Round 2		
Wall Ball	12 WMB2	20
Push Press	24 WPP2	75
SDHP	21 WSDHP2	75
Box Jump	29 H_Jump2	2
Row	17	

Round 3		
Wall Ball	12 WMB3	20
Push Press	20 WPP3	75
SDHP	21 WSDHP3	75
Box Jump	29 H_Jump3	2
Row	17	
	319	

Work_WB1	5987.648 ft-lbs
Work_PP1	4921.59375 ft-lbs
Work_SDHP1	2368.820625 ft-lbs
Work_Jump1	11712 ft-lbs
Work_Row1	58672.475 ft-lbs

Work_WB2	4490.736 ft-lbs
Work_PP2	3937.275 ft-lbs
Work_SDHP2	2470.934625 ft-lbs
Work_Jump2	10614 ft-lbs
Work_Row2	52496.425 ft-lbs

Work_WB3	4490.736 ft-lbs
Work_PP3	3281.0625 ft-lbs
Work_SDHP3	2470.934625 ft-lbs
Work_Jump3	10614 ft-lbs
Work_Row3	52496.425 ft-lbs

CFT (Post)

Back Squat	265 lbs
Shoulder Press	155 lbs
Deadlift	325 lbs
Work_Squat	397.5 ft-lbs
P_Squat	159 ft-lbs/sec
Work_Sh Press	339.04 ft-lbs
P_Sh Press	135.62 ft-lbs/sec
Work_Deadlift	568.75 ft-lbs
P_Deadlift	227.5 ft-lbs/sec
P_CFT	522.11725 ft-lbs/sec

Athlete 11 (Male)

Variables		Estimates	Formula
BW	184 lbs		
H	5.75 ft		
SQD	1 ft	SQH-SQD=	0.260869565217391 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.03125 ft	OHH-H=	0.25 *H
OHH	7.1875 ft	OHH-DLH=	0.815217391304348 *H
DLH	2.5 ft	SHH-BHH=	0.744565217391304 *H
BBH	0.75 ft	OHH-BHH=	1.1195652173913 *H
WBB_Thr	95 lbs	DLH-BHH=	0.304347826 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.614130435 *H
P_SO	0.744	H-DLH=	0.565217391 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre		Post	
	552.68775 ft-lbs		12421.46925	15492.71925	26928.04613 Post
Pull-up	(P_PULL*BW)*(OHH-SHH)				
	363.02625 ft-lbs		11435.32688	11435.32688	23856.79613 Pre
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))				
Push Press	WBB*(OHH-SHH)				
SDHP	(P_SO*BW)*((SQH-SQD)/2) +				
Box Jump	BW*BOXH				
Row	Row Cal * kCal_ftlb_Conv				

Army Push-Ups

Reps	63	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	54.16	ft-lbs/s
Work	6498.765	ft-lbs

Army Push-Ups (post)

Reps	70	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	60.17	ft-lbs/s
Work	7220.85	ft-lbs

FRAN (Pre)

Thruster Reps	45	75#-36, 65#-9
Pullups	45	Green Band 30% assist
Time (min:sec)	11:42	
Time (sec)	702	
Avg Power	33.98404	ft-lbs/sec

FRAN (Post)

Thruster Reps	45	95#-30, 85#-15
Pullups	45	Green Band 30% assist
Time (min:sec)	10:40	
Time (sec)	640	
Avg Power	42.07507207	ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	122895.4	ft-lbs
FGB_Power	120.4857	ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	197035.585	ft-lbs
FGB_Power	193.1721422	ft-lbs/s

Round 1		
Wall Ball	10 WMB1	20
Push Press	18 WPP1	75
SDHP	13 WSDHP1	75
Box Jump	10 H_Jump1	2
Row	12	

Round 1		
Wall Ball	13 WMB1	20
Push Press	17 WPP1	75
SDHP	14 WSDHP1	75
Box Jump	16 H_Jump1	2
Row	18	

Round 2		
Wall Ball	12 WMB2	14
Push Press	15 WPP2	75
SDHP	13 WSDHP2	45
Box Jump	8 H_Jump2	2
Row	9	

Round 2		
Wall Ball	11 WMB2	20
Push Press	14 WPP2	75
SDHP	12 WSDHP2	75
Box Jump	16 H_Jump2	2
Row	16	

Round 3		
Wall Ball	11 WMB3	14
Push Press	12 WPP3	75
SDHP	15 WSDHP3	45
Box Jump	9 H_Jump3	2
Row	8	
FGB_Total_Score	175	

Round 3		
Wall Ball	9 WMB3	20
Push Press	14 WPP3	75
SDHP	13 WSDHP3	75
Box Jump	12 H_Jump3	2
Row	17	
	212	

Work_WB1	3753.44	ft-lbs
Work_PP1	2910.938	ft-lbs
Work_SDHP1	1655.83	ft-lbs
Work_Jump1	3680	ft-lbs
Work_Row1	37056.3	ft-lbs

Work_WB1	4879.472	ft-lbs
Work_PP1	2749.21875	ft-lbs
Work_SDHP1	1758.50175	ft-lbs
Work_Jump1	5888	ft-lbs
Work_Row1	55584.45	ft-lbs

Work_WB2	3892.128	ft-lbs
Work_PP2	2425.781	ft-lbs
Work_SDHP2	1527.392	ft-lbs
Work_Jump2	2944	ft-lbs
Work_Row2	27792.23	ft-lbs

Work_WB2	3567.784	ft-lbs
Work_PP2	2264.0625	ft-lbs
Work_SDHP2	1424.72025	ft-lbs
Work_Jump2	5888	ft-lbs
Work_Row2	49408.4	ft-lbs

Work_WB3	3567.784	ft-lbs
Work_PP3	1940.625	ft-lbs
Work_SDHP3	1732.736	ft-lbs
Work_Jump3	3312	ft-lbs
Work_Row3	24704.2	ft-lbs

Work_WB3	2919.096	ft-lbs
Work_PP3	2264.0625	ft-lbs
Work_SDHP3	1527.39225	ft-lbs
Work_Jump3	4416	ft-lbs
Work_Row3	52496.425	ft-lbs

CFT (Pre)

Back Squat	175 lbs	
Shoulder Press	105 lbs	
Deadlift	155 lbs	
Work_Squat	262.5	ft-lbs
P_Squat	105	ft-lbs/sec
Work_Sh Press	226.4063	ft-lbs
P_Sh Press	90.5625	ft-lbs/sec
Work_Deadlift	271.25	ft-lbs
P_Deadlift	108.5	ft-lbs/sec
P_CFT	304.0625	ft-lbs/sec

CFT (Post)

Back Squat	220 lbs	
Shoulder Press	115 lbs	
Deadlift	255 lbs	
Work_Squat	330	ft-lbs
P_Squat	132	ft-lbs/sec
Work_Sh Press	247.97	ft-lbs
P_Sh Press	99.19	ft-lbs/sec
Work_Deadlift	446.25	ft-lbs
P_Deadlift	178.5	ft-lbs/sec
P_CFT	409.6875	ft-lbs/sec

Athlete 12 (Male)

Variables		Estimates	Formula
BW	195 lbs		
H	6.333 ft		
SQD	1 ft	SQH-SQD=	0.236854571293226 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.541375 ft	OHH-H=	0.25 *H
OHH	7.91625 ft	OHH-DLH=	0.855242381177957 *H
DLH	2.5 ft	SHH-BHH=	0.756572714353387 *H
BBH	0.75 ft	OHH-BHH=	1.13157271435339 *H
WBB_Thr	95 lbs	DLH-BHH=	0.276330333 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.638145429 *H
P_SO	0.744	H-DLH=	0.605242381 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftLb_Conv	3088.025		

Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
	585.733125 ft-lbs	26357.99063	45426.15886
Pull-up	(P_PULL*BW)*(OHH-SHH)		
	423.7370719 ft-lbs	19068.16823	
Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		
Push Press	WBB*(OHH-SHH)		
SDHP	(P_SO*BW)*((SQH-SQD)/2) +		
Box Jump	BW*BOXH		
Row	Row Cal * kCal_ftlb_Conv		

Army Push-Ups

Assumptions:

Reps	81	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	81.27	ft-lbs/s
Work	9752.899	ft-lbs

FRAN (Pre)

Thruster Reps	45
Pullups	45
Time (min:sec)	6:05
Time (sec)	365
Avg Power	124.4552 ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	218427.6 ft-lbs
FGB_Power	214.1447 ft-lbs/s

Round 1		
Wall Ball	31 WMB1	20
Push Press	21 WPP1	75
SDHP	27 WSDHP1	75
Box Jump	24 H_Jump1	2
Row	18	

Round 2		
Wall Ball	21 WMB2	20
Push Press	13 WPP2	75
SDHP	20 WSDHP2	75
Box Jump	17 H_Jump2	2
Row	14	

Round 3		
Wall Ball	20 WMB3	20
Push Press	13 WPP3	75
SDHP	15 WSDHP3	75
Box Jump	18 H_Jump3	2
Row	17	
FGB_Total_Score	289	

Work_WB1	12016.22 ft-lbs
Work_PP1	3740.428 ft-lbs
Work_SDHP1	3297.223 ft-lbs
Work_Jump1	9360 ft-lbs
Work_Row1	55584.45 ft-lbs

Work_WB2	8140.02 ft-lbs
Work_PP2	2315.503 ft-lbs
Work_SDHP2	2535.553 ft-lbs
Work_Jump2	6630 ft-lbs
Work_Row2	43232.35 ft-lbs

Work_WB3	7752.4 ft-lbs
Work_PP3	2315.503 ft-lbs
Work_SDHP3	1991.503 ft-lbs
Work_Jump3	7020 ft-lbs
Work_Row3	52496.43 ft-lbs

CFT (Pre)

Back Squat	255 lbs
Shoulder Press	145 lbs
Deadlift	305 lbs
Work_Squat	382.5 ft-lbs
P_Squat	153 ft-lbs/sec
Work_Sh Press	344.3569 ft-lbs
P_Sh Press	137.7428 ft-lbs/sec
Work_Deadlift	533.75 ft-lbs
P_Deadlift	213.5 ft-lbs/sec
P_CFT	504.2428 ft-lbs/sec

Army Push-Ups (post)

Assumptions:

Reps	84	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men); .65 (Women)
AVG Power	84.28	ft-lbs/s
Work	10114.11765	ft-lbs

FRAN (Post)

Thruster Reps	45
Pullups	45
Time (min:sec)	5:25
Time (sec)	325
Avg Power	139.7727965 ft-lbs/sec

Fight Gone Bad (Post)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	236888.8338 ft-lbs
FGB_Power	232.2439547 ft-lbs/s

Round 1		
Wall Ball	27 WMB1	20
Push Press	26 WPP1	75
SDHP	25 WSDHP1	75
Box Jump	20 H_Jump1	2
Row	20	

Round 2		
Wall Ball	20 WMB2	20
Push Press	20 WPP2	75
SDHP	20 WSDHP2	75
Box Jump	17 H_Jump2	2
Row	17	

Round 3		
Wall Ball	20 WMB3	20
Push Press	25 WPP3	75
SDHP	20 WSDHP3	75
Box Jump	15 H_Jump3	2
Row	18	
	310	

Work_WB1	10465.74 ft-lbs
Work_PP1	4631.00625 ft-lbs
Work_SDHP1	3079.603125 ft-lbs
Work_Jump1	7800 ft-lbs
Work_Row1	61760.5 ft-lbs

Work_WB2	7752.4 ft-lbs
Work_PP2	3562.3125 ft-lbs
Work_SDHP2	2535.553125 ft-lbs
Work_Jump2	6630 ft-lbs
Work_Row2	52496.425 ft-lbs

Work_WB3	7752.4 ft-lbs
Work_PP3	4452.890625 ft-lbs
Work_SDHP3	2535.553125 ft-lbs
Work_Jump3	5850 ft-lbs
Work_Row3	55584.45 ft-lbs

CFT (Post)

Back Squat	285 lbs
Shoulder Press	150 lbs
Deadlift	335 lbs
Work_Squat	427.5 ft-lbs
P_Squat	171 ft-lbs/sec
Work_Sh Press	356.23 ft-lbs
P_Sh Press	142.49 ft-lbs/sec
Work_Deadlift	586.25 ft-lbs
P_Deadlift	234.5 ft-lbs/sec
P_CFT	547.9925 ft-lbs/sec

Athlete 13 (Male)

Variables		Measurement Estimates	Formula		
BW	184 lbs				
H	5.83 ft				
SQD	1 ft	SQH-SQD=	0.257289879931389 *H		
SOH	2.5 ft	OHH-SHH=	0.375 *H		
SHH	5.10125 ft	OHH-H=	0.25 *H		
OHH	7.2875 ft	OHH-DLH=	0.821183533447684 *H		
DLH	2.5 ft	SHH-BHH=	0.746355060034305 *H		
BBH	0.75 ft	OHH-BHH=	1.12135506003431 *H		
WBB_Thr	95 lbs	DLH-BHH=	0.300171527 *H		
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.61771012 *H		
P_SO	0.744	H-DLH=	0.571183533 *H		
P_PULL	0.915				
P_D	0.915				
P_PUSH	0.65				
WBH	10 ft				
BOXH	2 ft				
H-PUSH	0.15 % of Height				
kCal_ftlb_Conv	3088.025				
		Thruster	(P_SO*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))		
			555.53775 ft-lbs	24999.19875	41562.666
		Pull-up	(P_PULL*BW)*(OHH-SHH)		
			368.07705 ft-lbs		
		Wall Ball Shot	(P_SO*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))	16563.46725	
		Push Press	WBB*(OHH-SHH)		
		SDHP	(P_SO*BW)*((SQH-SQD)/2) + WBB*(SHH-BBH)		
		Box Jump	BW*BOXH		
		Row	Row_Cal * kCal_ftlb_Conv		

Army Push-Ups

Assumptions:

Reps	77	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	67.11 ft-lbs/s	
Work	8053.445 ft-lbs	

Army Push-Ups (post)

Assumptions:

Reps	64	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	55.78 ft-lbs/s	
Work	6693.7728 ft-lbs	

FRAN (Pre)

Thruster Reps	45
Pullups	45
Time (min:sec)	5:52
Time (sec)	352
Avg Power	118.0758 ft-lbs/sec

FRAN (Post)

Thruster Reps	45
Pullups	45
Time (min:sec)	4:57
Time (sec)	297
Avg Power	139.9416364 ft-lbs/sec

Fight Gone Bad (Pre)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	159532.8 ft-lbs
FGB_Power	156.4047 ft-lbs/s

Fight Gone Bad (Post)

Time (min:sec)	17:00
Time (sec)	1020
FGB_Total_Work	188416.475 ft-lbs
FGB_Power	184.7220343 ft-lbs/s

Round 1		
Wall Ball	14 WMB1	20
Push Press	20 WPP1	75
SDHP	32 WSDHP1	75
Box Jump	19 H_Jump1	2
Row	9	

Round 1		
Wall Ball	15 WMB1	20
Push Press	25 WPP1	75
SDHP	21 WSDHP1	75
Box Jump	25 H_Jump1	2
Row	17	

Round 2		
Wall Ball	9 WMB2	20
Push Press	21 WPP2	75
SDHP	22 WSDHP2	75
Box Jump	18 H_Jump2	2
Row	13	

Round 2		
Wall Ball	11 WMB2	20
Push Press	14 WPP2	75
SDHP	16 WSDHP2	75
Box Jump	20 H_Jump2	2
Row	14	

Round 3		
Wall Ball	10 WMB3	20
Push Press	20 WPP3	75
SDHP	21 WSDHP3	75
Box Jump	10 H_Jump3	2
Row	14	
FGB_Total_Score	252	

Round 3		
Wall Ball	10 WMB3	20
Push Press	14 WPP3	75
SDHP	16 WSDHP3	75
Box Jump	20 H_Jump3	2
Row	13	
	251	

Work_WB1	5254.816 ft-lbs
Work_PP1	3279.375 ft-lbs
Work_SDHP1	3611.848 ft-lbs
Work_Jump1	6992 ft-lbs
Work_Row1	27792.23 ft-lbs

Work_WB1	5630.16 ft-lbs
Work_PP1	4099.21875 ft-lbs
Work_SDHP1	2482.45575 ft-lbs
Work_Jump1	9200 ft-lbs
Work_Row1	52496.425 ft-lbs

Work_WB2	3378.096 ft-lbs
Work_PP2	3443.344 ft-lbs
Work_SDHP2	2585.128 ft-lbs
Work_Jump2	6624 ft-lbs
Work_Row2	40144.33 ft-lbs

Work_WB2	4128.784 ft-lbs
Work_PP2	2295.5625 ft-lbs
Work_SDHP2	1969.09575 ft-lbs
Work_Jump2	7360 ft-lbs
Work_Row2	43232.35 ft-lbs

Work_WB3	3753.44 ft-lbs
Work_PP3	3279.375 ft-lbs
Work_SDHP3	2482.456 ft-lbs
Work_Jump3	3680 ft-lbs
Work_Row3	43232.35 ft-lbs

Work_WB3	3753.44 ft-lbs
Work_PP3	2295.5625 ft-lbs
Work_SDHP3	1969.09575 ft-lbs
Work_Jump3	7360 ft-lbs
Work_Row3	40144.325 ft-lbs

CFT (Pre)

Back Squat	275 lbs
Shoulder Press	170 lbs
Deadlift	315 lbs
Work_Squat	412.5 ft-lbs
P_Squat	165 ft-lbs/sec
Work_Sh Press	371.6625 ft-lbs
P_Sh Press	148.665 ft-lbs/sec
Work_Deadlift	551.25 ft-lbs
P_Deadlift	220.5 ft-lbs/sec
P_CFT	534.165 ft-lbs/sec

CFT (Post)

Back Squat	300 lbs
Shoulder Press	185 lbs
Deadlift	405 lbs
Work_Squat	450 ft-lbs
P_Squat	180 ft-lbs/sec
Work_Sh Press	404.46 ft-lbs
P_Sh Press	161.78 ft-lbs/sec
Work_Deadlift	708.75 ft-lbs
P_Deadlift	283.5 ft-lbs/sec
P_CFT	625.2825 ft-lbs/sec

Athlete 14 (Male)

Variables		Measurement Estimates	Formula
BW	220 lbs		
H	6 ft		
SQD	1 ft	SQH-SQD=	0.25 *H
SOH	2.5 ft	OHH-SHH=	0.375 *H
SHH	5.25 ft	OHH-H=	0.25 *H
OHH	7.5 ft	OHH-DLH=	0.8333333333333333 *H
DLH	2.5 ft	SHH-BHH=	0.75 *H
BBH	0.75 ft	OHH-BHH=	1.125 *H
WBB_Thr	95 lbs	DLH-BHH=	0.291666667 *H
WBB_FGB	75 lbs	SHH-SQH+SQD=	0.625 *H
P_SQ	0.744	H-DLH=	0.583333333 *H
P_PULL	0.915		
P_D	0.915		
P_PUSH	0.65		
WBH	10 ft		
BOXH	2 ft		
H-PUSH	0.15 % of Height		
kCal_ftlb_Conv	3088.025		

Thruster	(P_SQ*BW)*(SQH-SQD) + WBB*((SQH-SQD)+(OHH-SHH))	Pre		Post	
Pull-up	(P_PULL*BW)*(OHH-SHH)		601.77 ft-lbs	14834.79	27079.65
Wall Ball Shot	(P_SQ*BW)*(SQH-SQD) + WMB*(WBH-(SHH-(SQH-SQD)))		452.925 ft-lbs	19566.36	14267.1375
Push Press	WBB*(OHH-SHH)				34401.15
SDHP	(P_SQ*BW)*((SQH-SQD)/2) + WBB*(SHH-BBH)				Pre
Box Jump	BW*BOXH				
Row	Row_Cal * kCal_ftlb_Conv				

Army Push-Ups

Assumptions:

Reps	60	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	64.35 ft-lbs/s	
Work	7722 ft-lbs	

Army Push-Ups (post)

Assumptions:

Reps	59	H_Push = .15% of Height
Time	120	P_PUSH = .73 * BW (Men): .65 (Women)
AVG Power	63.28 ft-lbs/s	
Work	7593.3 ft-lbs	

FRAN (Pre)

Thruster Reps	45	95#-30, 65#-15
Pullups	45	Blue-9, j.pulls-36
Time (min:sec)	12:18	
Time (sec)	738	
Avg Power	56.02546 ft-lbs/sec	

FRAN (Post)

Thruster Reps	45	
Pullups	45	Green Band 30% assist
Time (min:sec)	15:41	
Time (sec)	941	
Avg Power	43.93920032 ft-lbs/sec	

Fight Gone Bad (Pre)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	135763.1 ft-lbs	
FGB_Power	133.1011 ft-lbs/s	

Fight Gone Bad (Post)

Time (min:sec)	17:00	
Time (sec)	1020	
FGB_Total_Work	195503.23 ft-lbs	
FGB_Power	191.6698333 ft-lbs/s	

Round 1		
Wall Ball	12 WMB1	20
Push Press	13 WPP1	75
SDHP	9 WSDHP1	75
Box Jump	10 H_Jump1	2
Row	12	

Round 1		
Wall Ball	10 WMB1	20
Push Press	12 WPP1	75
SDHP	17 WSDHP1	75
Box Jump	13 H_Jump1	2
Row	22	

Round 2		
Wall Ball	8 WMB2	20
Push Press	9 WPP2	45
SDHP	7 WSDHP2	75
Box Jump	11 H_Jump2	2
Row	11	

Round 2		
Wall Ball	9 WMB2	20
Push Press	12 WPP2	75
SDHP	12 WSDHP2	75
Box Jump	11 H_Jump2	2
Row	16	

Round 3		
Wall Ball	10 WMB3	14
Push Press	8 WPP3	45
SDHP	4 WSDHP3	75
Box Jump	12 H_Jump3	2
Row	10	
FGB_Total_Score	146	

Round 3		
Wall Ball	7 WMB3	20
Push Press	11 WPP3	75
SDHP	12 WSDHP3	75
Box Jump	8 H_Jump3	2
Row	14	
FGB_Total_Score	186	

Work_WB1	4986.24 ft-lbs
Work_PP1	2193.75 ft-lbs
Work_SDHP1	1442.34 ft-lbs
Work_Jump1	4400 ft-lbs
Work_Row1	37056.3 ft-lbs

Work_WB1	4155.2 ft-lbs
Work_PP1	2025 ft-lbs
Work_SDHP1	2424.42 ft-lbs
Work_Jump1	5720 ft-lbs
Work_Row1	67936.55 ft-lbs

Work_WB2	3324.16 ft-lbs
Work_PP2	911.25 ft-lbs
Work_SDHP2	1196.82 ft-lbs
Work_Jump2	4840 ft-lbs
Work_Row2	33968.28 ft-lbs

Work_WB2	3739.68 ft-lbs
Work_PP2	1215 ft-lbs
Work_SDHP2	1810.62 ft-lbs
Work_Jump2	4840 ft-lbs
Work_Row2	49408.4 ft-lbs

Work_WB3	3645.2 ft-lbs
Work_PP3	810 ft-lbs
Work_SDHP3	828.54 ft-lbs
Work_Jump3	5280 ft-lbs
Work_Row3	30880.25 ft-lbs

Work_WB3	2551.64 ft-lbs
Work_PP3	1113.75 ft-lbs
Work_SDHP3	1810.62 ft-lbs
Work_Jump3	3520 ft-lbs
Work_Row3	43232.35 ft-lbs

CFT (Pre)

Back Squat	225 lbs
Shoulder Press	125 lbs
Deadlift	225 lbs
Work_Squat	337.5 ft-lbs
P_Squat	135 ft-lbs/sec
Work_Sh Press	281.25 ft-lbs
P_Sh Press	112.5 ft-lbs/sec
Work_Deadlift	393.75 ft-lbs
P_Deadlift	157.5 ft-lbs/sec
P_CFT	405 ft-lbs/sec

CFT (Post)

Back Squat	275 lbs
Shoulder Press	135 lbs
Deadlift	325 lbs
Work_Squat	412.5 ft-lbs
P_Squat	165 ft-lbs/sec
Work_Sh Press	303.75 ft-lbs
P_Sh Press	121.50 ft-lbs/sec
Work_Deadlift	568.75 ft-lbs
P_Deadlift	227.5 ft-lbs/sec
P_CFT	514 ft-lbs/sec

THE CrossFit JOURNAL

Look, Ma: No Bands!

Through her RX Girls: Miami blog, Monik Lopez-Calleja is starting a global community of strong women who believe in themselves.

By Monik Lopez-Calleja

September 2010



All images courtesy of Monik Lopez-Calleja

"I have an idea that the phrase 'weaker sex' was coined by some woman to disarm some man she was preparing to overwhelm."

— Ogden Nash

I was never really the fitness or sports type. That sounds weird coming from me now, because these days my life revolves around my fitness and nutrition.

Hooked on Fitness

Right around the time of my wedding almost three years ago, I decided to get more involved in fitness and started working out at the gym. It was always either spin class, yoga or the group weightlifting class. I remember the weight class always seemed hard for me, and my max after about four months was a “heavy” 20 lb. I didn’t lift more because I didn’t think I could, and I also thought I would get hurt if I even tried. I guess in my mind, I wasn’t strong enough.

My husband started mentioning this thing called “CrossFit” that he had heard about, and I had absolutely no interest in doing it because things like that were “way too hard.” Anyway, I was comfortable doing my little routine. It was hard sometimes, but not too hard, and it made me feel like I was at least doing *something*. In hindsight, I shouldn’t have been too surprised when I fell in love with CrossFit, because I always preferred the weightlifting classes to the machines, and I would rather be outdoors on a bike than on a treadmill.

The first time I stepped foot into a CrossFit box was for the grand opening of CrossFit Kingdom. I remember a friend of my husband and I had written my name on the whiteboard to participate in the workout, and even though I was intimidated as hell I decided to give it a try. The workout was something like wall-balls, box jumps and burpees for four rounds. I could barely finish Round 1.

**That workout killed me, but
it also did something else:
it showed me that I could
have fun working out.**



Monik Lopez-Calleja didn't think she'd stick with CrossFit but now finds herself training others at CrossFit Kingdom in Florida.

That workout killed me, but it also did something else: it showed me that I could have fun working out. The friend of ours who had invited us there had been doing CrossFit for a few months, and she kicked ass through that workout. I remember thinking that if she could do it, I could too. My husband and I signed up that day and committed to three months, although I remember telling the owner, "I'm not really the motivated type, so we'll see. I'll do my best."

Burpees and Blogs

Those first two weeks were some of the most challenging workouts of my life. I was learning about things I had never seen before, and my body was the most sore it had ever been. In a very short time I began to feel a change in myself. I was completing workouts that before might have seemed impossible. I was working out with guys, and they were struggling as much as I was, but I was finishing and some of them weren't. I was watching other people do things that I wanted to do ... I was hooked. Every day after I came home, I would post on Facebook what I had just done. When I hit a PR, I wrote about it. When I

got my first pull-up, I wrote about it. When I first lifted my own body weight, I wrote about it. Those were some of my proudest moments, because I felt strong physically and mentally—and man was I proud.

I would also spend a lot of time on different CrossFit blogs reading motivating stories about how people's lives had changed because of the program. I felt more motivated than I had ever been, and I wanted to see if other people were as stoked about this as I was. What I found out is there are *tons* of people out there who felt the same way. CrossFit has a way of changing the way you feel that is different than any other form of fitness I've done before. I've grown to love and appreciate the program more and more since I started, and I've enjoyed gains that are greater than I could have ever imagined. I started talking more to the girls at CrossFit Kingdom and sharing stories with them. That's when I decided to start my own blog, [RX Girls: Miami](#).



Strong women who can lift weights, too.



The blog started off as a way for me to share articles I had read about women in the CrossFit community. Some of the first things I wrote about were issues I had dealt with myself, like trying to learn the kipping pull-up or dealing with the calluses that were forming on my hands. The guys liked having those “battle wounds,” but me? I can’t exactly go to work looking like I stuck my hand in a blender. Even though I have embraced these things about CrossFit now, I had no clue about what to do back then. So I took to the Internet for help, and then I shared what I found with the girls at my box.

Being in the field of mental health, I also became very aware of the improvements in my body image and self-esteem that I got through doing this program. I remember one of the first things I learned in here is that you have to feed your body to perform, not to lose weight. Even though most of us came into this program wanting that physical change in ourselves, you realize that just by being here and giving your all, your mind changes too. Soon you start trying to improve your previous records or wanting to improve your form on a technical lift, and before you know it, the body has followed the mind. It improved. None of that can happen unless you have a good foundation for improvement, and that starts with what you eat, what your habits are, and how willing you are to work toward reaching your goals.

I started taking more time to write about these things on the blog and put a lot of thought into the posts I made. Little by little, I began to get feedback from the girls at our box. Someone would come in and tell me they practiced a visualization technique I posted, or another girl would tell me that she loved the recipe I put up. I remember one day I wrote about being confident in yourself and doing the things in life that make you happy, and later that night one of the girls told me it was exactly what she needed to read that day.

As the months passed, I started getting more feedback from women not only at my box and in the South Florida area, but also from women around the United States. It’s funny how when you put your heart and soul into something, people start to notice and connect with you. The more I opened up about my own thoughts and experiences, the more I heard from people.

Inspiring Other Women

It’s not uncommon for women to start CrossFit a little bit skeptical of the program. After all, CrossFit is often promoted as a sport, and for the most part, sports have always been seen as male dominated. In our culture, the thin feminine ideal that most women grow up striving for completely clashes with an athletic female body type. One of the most common concerns I’ve heard from new women coming in is that they don’t want to “get big,” and they want to make sure they work on their abs. A valid concern, I guess, but it sounds so funny to me now.

**It’s funny how when you
put your heart and soul into
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***Female CrossFitters have unique concerns, and RX Girls:
Miami is a place for women to share their stories and learn from other women.***

Lots of women are misinformed about what their body is capable of in terms of size and how their muscles work. Women in general don't usually do a lot of heavy lifting, and when you see images of weightlifters in magazines with huge muscles and tons of veins, there usually isn't a disclaimer saying those results are unnatural. After talking a bit with these concerned women, I usually tell them a little about my blog and the stuff I write about on there. Knowing that these concerns are common usually makes people feel better about the program and what it can do for them.

I've noticed that, as women, our self-concept manifests in different ways. Lots of women are very confident in some areas of their lives, but in others they may feel that they are not good enough. Most of us want to keep this image of femininity, at the same time wanting to feel secure, beautiful and empowered. It's a constant struggle that's always in our minds whether we like it or not.

It's pretty common for women to tie their self-esteem and self-worth to the way they look, and that's really not what it's about. Self-esteem and self-worth come from doing things that make you feel good and from overcoming hardships, meeting goals and conquering challenges in life. CrossFit provides all of that and more, but it takes an open mind and maybe even a little push to get comfortable in that place. You have to be willing

to look at yourself and you have to be ready to commit, because without commitment to the program you can't get the benefits. What is unfortunate is that the women who have not yet found this program or those who are afraid to start for whatever reason are missing out on the opportunity to gain competence, assertiveness, strength and empowerment. That fact alone is why I try to promote my blog to as many women as possible.

Helping Others See Their Potential

One of the things I love doing is highlighting the women from our box when we do "Athlete of the Month." I also write for our main site, so each month the other coaches and I pick someone we feel has truly committed to the program. The messages that come from the women are always about developing strength, overcoming fears and weaknesses, and feeling better than they have ever felt. That's what it's all about: not only feeling good physically but also feeling good mentally. Highlighting these awesome girls has allowed for me to share the fact that anyone can do this. CrossFit is not just for super-athletic people who have always been fit. CrossFit women are secretaries, nurses, housewives, accountants, students, mothers and teachers, and they are sharing stories about how they could once barely lift a 15-lb. bar but can now lift their own weight. They are talking about meeting goals they never thought they would reach.

One thing I haven't really mentioned is how I found a deeper passion in CrossFit. It might be obvious because of all that I've written, but I really enjoy helping other people. It's what I have chosen to do with my professional career, and CrossFit has blended well with that. Since starting, I was asked by the owner of my box to become the head women's coach. I love to be able to watch a new member transform into the strong, beautiful woman she didn't know was there. I even started printing shirts especially for the women at my box. They feature inspiring quotes the women can show off and be proud of. Those shirts have become a little more of a success than I thought, and I've been shipping them around the United States, too.

CrossFit and the RX Girls blog have done so much for me personally, and I couldn't be more grateful. For one, it makes me so much more self-aware. When I write about things I want the girls to do, there's no way I can't follow my own advice.

**I know the women we
work with are strong and
capable, and I know they
can succeed, even if they
don't know it themselves.**

How am I going to tell someone to challenge herself if I am unwilling to do the same thing? I *know* how easy it is to want to quit, and I also *know* how hard it is to fight that. How can I suggest eating clean if I plan to eat crap? One of the things I love doing is creating new recipes I can share so that transitioning to a healthier diet is still enjoyable. And how would I know you can push through something if I have never done it?

I know the women we work with are strong and capable, and I know they can succeed, even if they don't know it themselves.



"There are so many people out there that will tell you that you can't. What you've got to do is turn around and say, 'Watch me.'" — Unknown



About the Author

After working part-time at CrossFit Kingdom of Miami, Monik and her husband recently opened CrossFit Soul, where they hope to combine her passion for mental health, physical health and fitness.

THE CrossFit JOURNAL

Testing Fitness as Sport

The CrossFit Games are the ultimate test of fitness.
Tony Budding shares some of the theory behind the structure of the 2010 Games.

By Tony Budding

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A. Anthony/CrossFit

CrossFit is both a training modality and a sport. As a training modality, we can improve the real-world physical capacity of folks from any walk of life. As a sport, we can compete for fun, or we can compete for the title of "fittest." The CrossFit Games are the world championships of our sport, so we title the winners the Fittest on Earth. Using a single CrossFit workout as a sport is pretty simple. Put the names up on the whiteboard. Allow scaling, which is a form of handicapping, or not. Pre-register any excuses, or not. Set the terms of the workout and go. The winner is he or she who finishes first, with the most rounds and reps, or who lifts the most weight.

Combining multiple workouts into an integrated CrossFit competition is more complicated. Because every workout is different, combining them in a fair way is rarely a simple, straightforward process. We've been experimenting with this in the Games for four years now. The rest of this article is a philosophical look into what it means to test fitness as a sport.

What Is Fitness?

Testing fitness is not easy. The technical definition of fitness is "increased work capacity across broad time and modal domains." A more casual definition of fitness is "competency at the tasks of life." Both of these definitions are inherently hard to pin down. This is not a flaw in the definition but rather a complexity inherent in what fitness really is. In other words, artificially simplifying either the definition or assessment of fitness doesn't change the complex nature of fitness.

The tasks of life are incredibly diverse, probably even infinitely diverse. There is no possible way we could assess capability in all of them in a year, not to mention a weekend. Therefore, we must seek exercises—alone and in combination—that both represent and predict broad capacity.

Obviously, functional movements must be the foundation of any good test of fitness.

Functional Movements

Obviously, functional movements must be the foundation of any good test of fitness. Functional movements are the natural, prehistoric and essential movements of life. They are characterized by their ability to move large loads long distances quickly. They are the best tools for delivering the highest possible levels of average power (real work performed divided by time of completion). There is simply no way to assess fitness without pushing the limits of power in varied domains.



D. Re/CrossFit

To mimic the real world, the CrossFit Games asked athletes to go overhead immediately after a longer effort.

What, then, are the relevant domains that best assess and predict fitness in other domains? There is no simple answer to this, and it is here that the richest, most productive debates about fitness occur. Because life requires millions of specific tasks, we have to be satisfied with demonstrating capacity in categories or genres of movements. Some functional movements require very little specific skill; others require much more. The fittest should be competent in both. Some tasks require you to control your body in three-dimensional space (gymnastics, calisthenics, running). Others require you to move external objects (weightlifting, throwing). Some movements are performed standing. Others require inversion (handstand push-ups) or getting horizontal (burpees). Some external objects start on the ground and must be lifted. Others must be moved some distance. Some objects are easy to grab (barbells, kettlebells) while others are less so (sandbags, stones, tires). Sometimes external obstacles have to be navigated (over, under, around).



Odd objects made an appearance at the Home Depot Center.

Combinations, Not Single Modality

In the 2010 CrossFit Games, we included all of the above. We also tested them in combination and at various loads and volumes. It is becoming increasingly clear that single-modality events are inferior tests of fitness when compared to well-designed multi-element events. Single-modality days are essential training tools, but given the inherent limitations of any test, well-formed combinations of movements are much better predictors of capacity across broad time and modal domains. Even workouts like the final event in the '08 Games—30 reps, ground to overhead, with 155 lb.—aren't as good at assessing and predicting fitness as the same drill combined with something very different (such as gymnastics or calisthenics movements).

The reason for this should be obvious. Single modalities are less broad, and thus it's possible an athlete could have a narrow capacity that just happens to correlate to this particular event. The likelihood of an athlete having two narrow bands of capacity that are both tested in a single event is tiny in comparison. The challenge of course is creating combinations that achieve the desired impact.

Selection of Movements

There have been complaints that the Games each year are more a test of the best CrossFitter than a test of the world's fittest athlete, with the evidence being the high correlation of exercises in both CrossFit workouts and Games events. These arguments tend to suggest we should get rid of all gym-style implements (barbells, dumbbells, etc.). This is based on a misunderstanding of why we use gym-style implements in the first place. Very simply, they are unmatched in their ability to test (produce) power output in extremely varied manners. Fitness is work capacity (power output) across broad time and modal domains. How better to test capacity at heavy, medium and light loads with various durations and volume than with an implement that is ideal for maximizing power?

Thrusters at 45, 95 and 185 lb. are testing different capacities. We know this because the rankings of the same athletes can change significantly when the loads and volume differ when keeping the movement constant. Furthermore, odd objects present substantial logistical challenges. Consistency across all objects, efficiency of testing, varying time and modal domains, and visibility for spectators are all more difficult with odd objects.

It is becoming increasingly clear that single-modality events are inferior tests of fitness when compared to well-designed multi-element events.

Obviously, we still use odd objects despite these challenges, as we used sandbags, wheelbarrow and walls of various kinds and sizes in the 2010 Games.

One final limitation of odd objects is that they tend to tax the same aspects of the body. Testing variation of capacity is thus more difficult if you were to use odd objects alone.

The Events

The nine events of the 2010 CrossFit Games covered a wide variety of skills and domains. The athletes' outputs at each element were compared to those of their peers, and the most consistent top performers made it to the podium. What follows is a breakdown of the various elements in each event and why they were chosen.

The first event of the Games was 9, 7 and 5 reps of muscle-ups and squat snatches (135/95 lb.). This was a relatively low-volume, high-skill, high-power event. We knew everyone could do both muscle-ups and 135/95 squat snatches, but we also knew the couplet required enough skill and had enough volume and weight that athletes would be able to differentiate themselves nicely. We required a single-movement squat snatch, something new in CrossFit competition, because it required greater amounts of coordination, accuracy, agility and balance. The combination required a very well-rounded athlete;

testing either just muscle-ups or just snatches would have delivered a different ranking.

The second event was the long Helen-like workout, followed immediately by a max-effort overhead lift. We chose the long Helen because it was fundamentally opposite to the first event. It was long, light and high volume. None of the movements were complex, new or particularly challenging to Games competitors. The running distances were long enough to punish inefficient runners but not so long that they required specialization. The 72 pull-ups were a lot but not an excessive amount because workouts like Angie and Cindy require 100-plus pull-ups in a similar time frame.

The athletes had 90 seconds after completing this first part of the workout to get a single maximum load overhead. We did this for several reasons. The first is that testing overhead capacity at high heart rates is a new endeavor for competition, but not life. We regularly hear from soldiers and first responders that max efforts on duty (lifting, fighting, etc.) often follow intense sprints or other intense efforts. Furthermore, the 90-second time constraint required



The high-skilled, high-power movements of the first workout created a challenge for all the athletes, including 2008 Games champ Jason Khalipa, shown here missing a squat snatch in dramatic fashion.



S.Dy/CrossFit

Inversion with a twist.

that the athletes demonstrate significant self-awareness in knowing how much they could handle. There simply wasn't a lot of time to experiment. This is also similar to many situations in the real world.

The third event was a medium-duration, moderate-volume, mixed-element workout. It was a seven-minute AMRAP of deadlifts (315/205 lb.), pistols and double-unders, with short sprints between the deadlifts and the pistols/double-unders. The heavy deadlifts and runs were relatively low skill, but the pistols and double-unders were relatively high skill. This workout required you to be strong and nimble with lots of gas. Any one of the three elements could trip you up if it was a weakness.

The fourth event was moving sandbags from one part of the stands to another, navigating stairs, walls and wheelbarrows along the way. There were four different sizes and weights of sandbags spread out. You had to strategize the order in which you'd do things, but the rules were very simple: move the bags. Were you going to make fewer heavier trips or more lighter trips? How well did you load the wheelbarrow? Most of the biggest differences in performance came from avoidable situations, such as tipping over the wheelbarrow and not shifting unsuccessful strategies (i.e., trying the same technique over and over even though it wasn't working). Adaptation, planning and staying within limits are also elements of real-world fitness.

The fifth event comprised heavy cleans and handstand push-ups. CrossFitters should be proficient at both. In planning this event, we went back and forth quite a bit. It needed to be new, hard to complete, fair to the competitors, easy to judge and fun to watch. When we pulled the trigger on the format, we assessed this workout to be fairly balanced. We thought an elite CrossFitter with no significant chinks would struggle equally with the handstand push-ups and heavy cleans. In the end, though, most athletes struggled much more with the handstand push-ups than the cleans.

I've wondered about this. Was the workout unbalanced or were these athletes generally weaker at handstand push-ups than heavy cleans? Ring handstand push-ups are hard, but because competitors were allowed to wrap their feet, they were not an entirely different skill than regular handstand push-ups. In other words, the athletes who were best at regular or parallette handstand push-ups should also be best at the ring variety. Similarly, for the women, the slight extra depth ended up differentiating the proficient from the barely adequate.

One interesting observation here is that there has been a vocal emphasis among the general affiliate community on "strength bias," referring primarily to the ability to move heavy external objects. This type of strength is certainly important, but fitness also requires the strength to control and move your own body. Four handstand push-ups is not a huge number, even on the rings or plates. The relative ease of the heavy cleans and relative difficulty of the inverted push-ups for so many of these athletes appears to me like a training imbalance.

The Final Event

The sixth event was the blind triple event. We took simple movements that all the athletes would be familiar with and combined them in ways that would pack a punch but still be reasonable. We had a high enough volume that most athletes wouldn't be able to finish, which in essence turned this into a single long event. The blind element meant little to no opportunity to plan or "game" the workout. It also meant the athletes didn't know how long they were going to have to work. So they had to go as hard as they could while still leaving something in the tank for the next event(s).

The tests needed to be both hard and fair, where athletes could differentiate themselves through their performances.

This again mimics the real world, where you rarely know how long something will last or what comes after. The logistics of pulling this off were complex to say the least. We had to keep all the events secret from all the athletes until they were ready to move. If anyone knew ahead of time, it would have dramatically altered the unknown aspect of the competition. We had to have movement standards and combinations that could be easily described and judged and quickly understood by tired athletes. And, the tests needed to be both hard and fair, where athletes could differentiate themselves through their performances.

All three segments were scored separately, which did several things. It recognized the difference between starting strong and finishing strong. It also allowed for greater movement of standings if an athlete dominated or if we exposed weaknesses. Also inherent in the scoring was that every rep counted. The scoring approach of the Games was to rank each athlete compared to his or her peers. Time caps are arbitrary limitations. Folks who complete the workout faster rank higher than the slower athletes. Athletes who complete more reps (though not

the entire event) rank higher than those who complete fewer, but behind everyone who finished them all. This was consistent and fair for all timed events.

Moving into the specifics of the event, the first part was push-ups and overhead squats separated by a 12-foot wall: basic calisthenics, climbing and relatively high-volume overhead barbell work. The second part was toes-to-bar and ground-to-overhead: relatively high-volume body control and barbell control, both with a substantial systemic hit. The final part was wall burpees and rope climbs. How well can you move your body down, up and over? All three of these were fairly simple, moderate-weight drills that tested the athlete's ability to keep going. How much do you have in the tank? How deep can you dig?



D. Smith/CrossFit

The final event of the Games found athletes climbing walls and ropes for time.



S.Dy/CrossFit

Kristan Clever climbs the 20-foot rope en route to victory in the Games.

The Rope

There have been some complaints about the lack of matting under the ropes. Most of the complainers have gone so far as to express incredulity over its absence, as if having mats in place was indisputably the proper procedure. This is an oversimplified and naïve position. While it's not an experiment I'd like to try, I'd practically guarantee that having gymnastics mats under the ropes would have dramatically increased the number of injuries, not reduced it.

Of course, there is an important place for matting. For example, if someone were to freefall from any distance, I'd hope there was matting under him or her. But, even better, would be to avoid the freefall in the first place. The assertion that not having matting was irresponsible misses the very important point that the lack of matting resulted in more conservative choices on the part of the athletes. In other words, freefall was all but eliminated in that third segment.

Before we get into all the "what-ifs," we have to be clear that there were only two minor injuries that actually happened, and this includes all the individual athletes plus the teams (1). I'm confident that fear was a significant factor in preventing additional injuries. Without this fear of falling, which would have been less severe with any kind of matting, the athletes would have taken more risks. Several athletes came within a few feet of the top and decided to come down because they didn't think it was safe to keep going. This is called intelligence, which is a part of fitness. If there had been mats, some athletes would have felt safe enough to keep going. This would have been stupid. A fall from 18 or 20 feet is very dangerous even if you know proper falling techniques. Furthermore, mats are inherently unstable, and falls from even a few feet could result in badly sprained ankles or significant damage to knees and hips.

In other words, while good gymnastics matting might have helped reduce injury in a theoretical catastrophic fall, it may have caused one by giving an athlete a false sense

of security. Furthermore, a much more likely scenario is that with matting present, athletes would have been very likely to drop from significant heights to gain competitive advantage. But landing safely on matting is difficult for trained athletes and extremely risky for untrained athletes.

Scoring

The purpose of the CrossFit Games scoring system is to determine the Fittest on Earth. Before the Games, there was an extensive qualification process by which about 100 men and women earned the right to compete in the arena at the Home Depot Center. Just getting there established them among the world's elite of fitness. The Games just needed to differentiate among these elite.

After last year's Games, there was a lot of talk about proportional scoring. The great benefit of this system is that it rewards margins. If I beat you in Elizabeth by one second but you beat me in Diane by three minutes, we can say you're fitter because of the margins of victory even though we each won an event. This impact of marginal differences, however, becomes less significant as the number of events increases. But the fatal flaw of proportional scoring is that the margins and proportions between different events are not equally valid indicators of fitness. Some workouts simply have greater margins, even as a percentage. In fact, the workouts with greater margins usually have specialized skills in them. In other words, when you dig into the reality of proportional scoring, it favors the specialist by overly weighting workouts with special skills.

At the end of the day, no one was taken out of contention because of some mathematical anomaly. The best athletes differentiated themselves early and often.



T. Campitelli/CrossFit

Graham Holmberg didn't finish below 16th in any event at the Games and came away with the overall title.

This year, the most common complaint about point-per-position scoring has been the impact of cuts to the field. It is mathematically true that if you finish at the bottom of the heap before the cut, the cost is greater. If you finish 40th in an early event but still make it past the first cut, the worst your competition can do is 24th. In other words, a bottom finish in the first four events leaves you with 40-plus points, but after the cut the most points you can get is 24 or 16. This makes deficits harder to eliminate as the competition goes on. The complaint is that this means the early events are weighted more heavily.

This is not quite true because there is a better way to describe this mathematical impact. It's not so much that it weights the early events more heavily but rather that it punishes glaring weaknesses. This system intentionally rewards athletes who finish closer to the top in every event. This assumes, of course, that the early events are good tests

of general fitness. Furthermore, the number of athletes in the initial pool is a huge component. This year 45 men and 41 women competed. They all qualified through a solid process, but were they all legitimate contenders for the title? Of course not. Out of the bottom 20 of each group, there were only four top-10 finishes in any of the first four events. Even with all the variety built in, they were never in contention. Eliminating them at the first cut, therefore, didn't really change the competition.

Going deeper into the actual results, neither Graham Holmberg, Rich Froning Jr. nor Mikko Salo finished any event below 16th. None of them was punished by having a larger field in the early events. Chris Spealler had a 26th and a 22nd. If you capped the score on any workout at 16 (the fewest number of competitors in any event), he would have finished with 16 fewer points. But he was 18 points behind Rich, so the overall placings would have been identical. Even Austin Malleolo, who got 37 points in the max-overhead event but still finished sixth overall, wouldn't have made the podium with a cap of 16 points because Speal would have benefitted from that also.

Going deeper, only three men in the top 16 after four events (right before the cut) had over 30 points on any event. On the women's side, no woman in the top eight overall had over 20 points in any event, and no one in the top 16 after four events had over 30 points on any event. What does this mean? It means that the scoring system worked beautifully.

At the end of the day, no one was taken out of contention because of some mathematical anomaly. The best athletes differentiated themselves early and often. The system rewarded those athletes with the greatest work capacity across broad time and modal domains. Whatever absolute mathematical facts there may be about weighting early or later events more or less, the reality is that the Games, like nature, favor the generalist and punish the specialist with any glaring weakness.

The bottom 20 athletes were never really in contention, so the mathematical weighting of the early rounds was insignificant. Even when the pool of athletes was reduced to 24 and then 16, there was very little change in the top positions. This means that the best athletes performed consistently toward the top in spite of how large the field was or what the events were. This is particularly impressive because of the diversity of athletes, movements and events.

A True Test of Fitness

Each year, we refine the CrossFit Games, and each year they become a better test of fitness and a better test of the world's best athletes. In 2010, the events were more balanced, more varied, and tested the athletes' work capacity across broader time and modal domains. With the point-per-position scoring system, the truly elite of these awesome competitors differentiated themselves from their peers by finishing consistently toward the top despite the variety.

In this way, the programming and structure of the competition matched the scoring system. With fewer scoring events, or more specialized events, or with different cuts, the competition wouldn't have been as fair. These elements worked together to ensure that the athletes who finished on the podium at the Games were indeed the Fittest on Earth.

Footnotes

1. Rich Froning Jr. bruised his heel when he fell, and Heather Bergeron had a minor sprained ankle when she landed on the rope.



About the Author

Tony Budding is the Director of Media and Web Content for CrossFit, the Co-Director of the CrossFit Games, and the Executive Producer of Live Media for CrossFit.



THE CrossFit JOURNAL

Keeping Your Adductors Strong

Knees rolling in on squats and pulls? Bill Starr explains how you can fix the problem by working on your adductors, which will translate to more weight on the bar.

By Bill Starr

September 2010



C. Worden/CrossFit Journal

Any program designed to build greater strength must be constantly monitored to ensure the various muscles that make up a particular body part are worked proportionally. In order to continue to gain strength, the athlete (or his coach) must pay close attention to the less-obvious groups because they are integral to the successful development of the more prominent ones. The adductors are a set of muscles that is often overlooked in the total scheme of things.

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When the knees roll in on a squat, weak adductors are the cause. That's the reason many new CrossFitters learn to squat properly and wake up with very sore inner thighs the next day.

All strength improvement emanates from the center of the body—hips, glutes, upper leg—then radiates upward and downward. Those on a mission to get stronger recognize the importance of leg strength and know the back squat is the very best exercise for the job. In addition to heavy squats, many strength athletes also add in leg extensions and leg curls to ensure they're keeping their quads and hamstrings plenty strong. But few do anything specific for their adductors. They're sort of the forgotten leg muscles. Even those with experience generally fail to take the adductors into consideration when setting up their programs.

Of all the athletes, both male and female, that I started on strength routines, at least a third of them displayed a weakness in their adductors right away. I attributed this to the fact that they had all been doing a great deal of running, which works the quads and hams a lot more than the adductors. So they start in squatting with a slight handicap that needs to be corrected as soon as possible. Then there are those who are fine at the beginning, but after the poundages in the squat start to be considerable, weak adductors reveal themselves.

How? When an athlete's knees turn inward when he's squatting or pulling heavy weights, his adductors are relatively weaker than his quads and hams. It's easy to spot once you know what you're looking for, and the nice thing about working the adductors is that they respond to direct attention rather quickly.

Wide Squats and Machines

The adductors comprise four separate muscles: adductor brevis, adductor longus, adductor magnus and the gracilis. They originate closely together high up in the groin on the pubis bone, then swing down and arc over to attach to various parts of the femur, running from the top to the bottom of the long leg bone until the magnus finally attaches to the medial condyle at the knee. This last part is most important. Strong adductors are critical to the stability of the knee joint, and their primary function is to pull the upper leg inward.

This is why the athlete's knees turn inward during a heavy squat or pull. The adductors are not strong enough to hold the knees in the correct position. More than a few athletes that I've coached have trouble differentiating between the adductors and abductors. A way to remember the two groups is to think about a kidnapping. The victim is taken away, abducted. Not adducted. The abductors pull the leg away from the center while the adductors pull it toward the center.

One of the main reasons why many strength athletes end up with relatively weak adductors is they don't go low enough in the squat. Some coaches in high schools and colleges have their athletes do partial squats, believing the shorter movement will be less risky to the knees. Actually, half and quarter squats are much more stressful to the knees than a full-range movement. When an athlete does only partial squats, he develops the quads but neglects the adductors and also the hamstrings to some extent. And all the pressure of the downward movement has to be handled by the knees. However, when he goes deep, well below parallel, all the muscles and attachments that surround the knee, including the adductors and hams, get stronger and help support that large joint. Plus, in a full squat, the powerful hips do most of the halting of the descending bar, taking the stress away from the knees.

Whenever I have an athlete switch from partial squats to full ones, he always gets extremely sore in his adductors, and usually hams, because they have been neglected previously. So the very first step in regards to making the adductors stronger is to do full squats—the deeper the better. Front squats are excellent as well because the athlete must go very low in order to do that exercise correctly.

Yet, I've had some athletes who did go into a deep bottom position in both their front and back squats but started showing a weakness in their adductors. Again, I think this came from all the running they were doing while practicing and playing their chosen sport. As soon as a weakness is revealed, steps need to be taken to correct the problem.

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why many strength athletes
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Staff CrossFit Journal

For correcting weak adductors, extra work is often needed. Most CrossFit gyms don't have cable stations, so it might be necessary to try another of Bill Starr's adductor exercises.

***If you do have a cable station, Starr recommends
3 sets of 20 reps.***

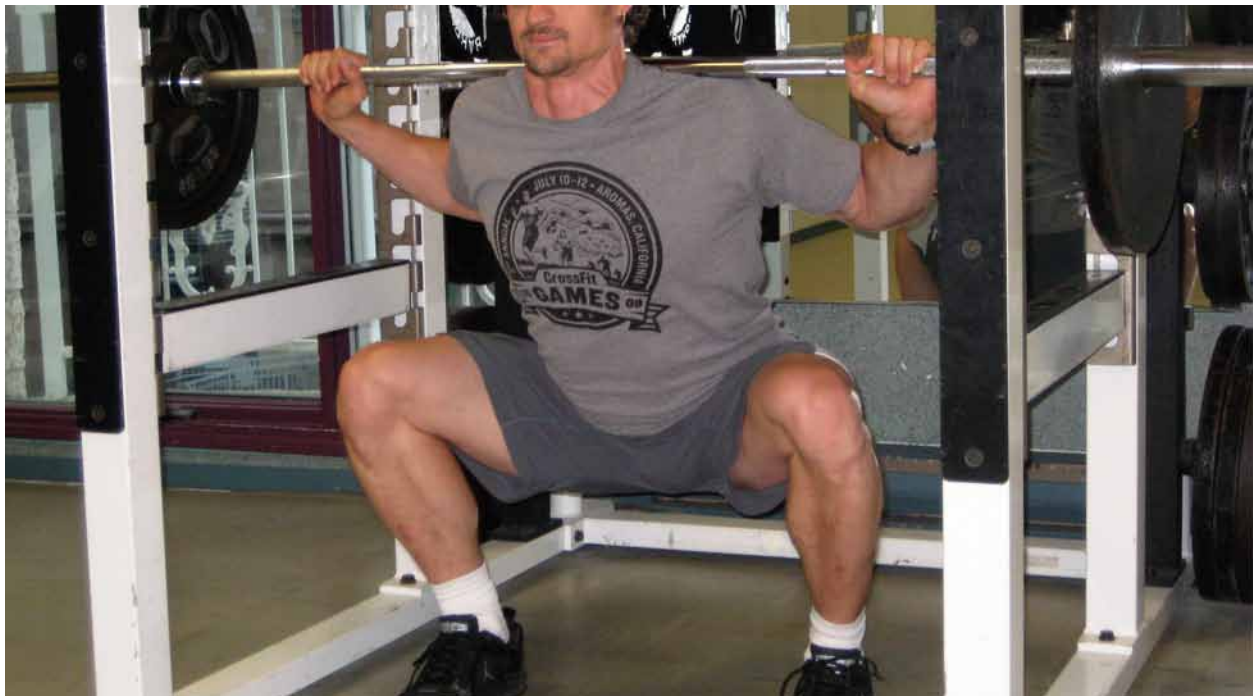
As many readers know, I'm not big on machines, but I do like a few: seated and standing calf machines and the adductor machine. I've had athletes just starting out on a strength program who had glaring weaknesses in their adductors. After three or four weeks of working that group on the machine, the problem was resolved.

I had them do 1 set of 20 prior to squatting, which they did at every workout, then 2 more sets of 20 at the end of their sessions. Even when they have corrected the relatively weak area, I still have them do no less than 2 sets of 20 at the end of their workouts twice a week. The warm-up set on the adductor machine doesn't have to be hard, but the 2 work sets need to be taxing. When you get to the 14th or 15th reps, your adductors should be screaming. Work right on to the last rep. That's how you force them to get stronger. Merely teasing doesn't get the job done because the adductors are potentially a powerful group.

Adductor machines are not found in every weight room, and very few home gyms have one. What to do if one is not available? Actually, an athlete can do quite a few barbell exercises to improve strength in his adductors.

The one I use in the absence of an adductor machine is wide-stance squats. How wide? The wider the better, just so long as you can maintain your balance and go extremely deep. The adductors really get in the act once you dip below parallel, and the deeper you go, the more they're activated. It takes a bit of practice to do these correctly, so start off with a light poundage and concentrate on form.

As many readers know, I'm not big on machines, but I do like a few: seated and standing calf machines and the adductor machine.



Staff/CrossFit Journal

Wide-stance squats with the toes pointed forward are good for working the adductors. Athletes should work to go as low as they can: the deeper they go, the more they will work their adductors. Depth will increase as flexibility increases.

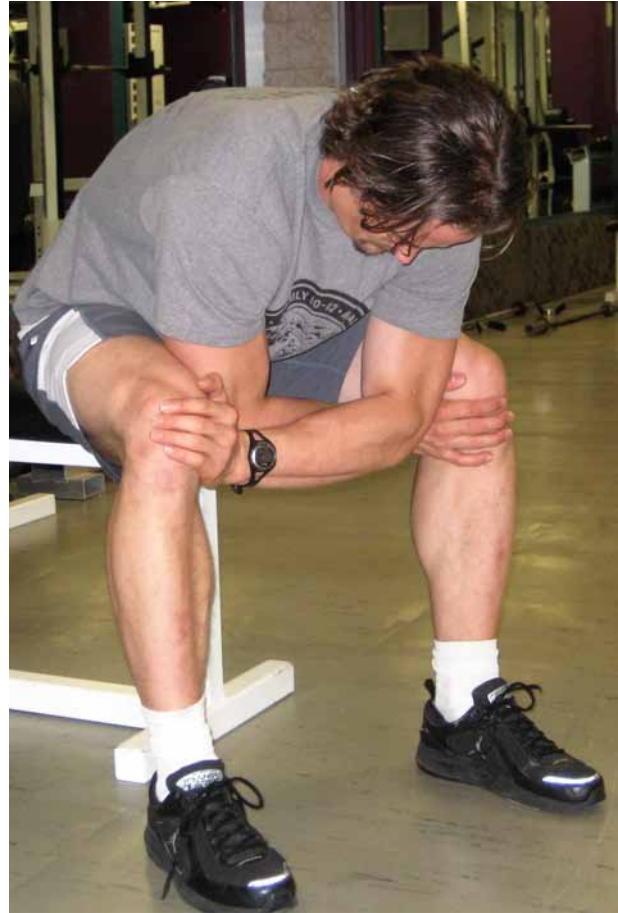
Some form pointers: Your feet have to be pointed straight ahead, not outward as in the conventional squat. The pressure should be on the outside of your feet, not on the toes or heels, and your torso must remain perfectly upright on both the down and up motion. It should appear as if you are working inside a Smith machine when you do these. Of course, wide-stance squats can be performed inside a Smith machine, but for athletes, having to balance the weight during the execution of the exercise is a good thing. Any time you have to utilize any athletic attribute during an exercise with resistance, it carries over to other athletic activities.

Do these for higher reps, 15-20 for 3 sets, and, again, the final few reps should make your eyes water. If you stay in the comfortable range, the results will not be nearly as good as if you lean on these. When the adductor weakness is glaring, I have the athlete do all his squats in this manner until the problem is solved, then I have him do wide-stance squats twice a week after he has done his regular squat workout. These back-off sets are done on the heavy and medium days, but not on the light day.

Sumo Deadlifts

I mentioned that the knees turning inward during heavy pulling exercises represents one indication of adductor weakness. It's most apparent when doing deadlifts, but I have also seen it in Olympic lifters when they approach their limit in snatches and cleans. Their knees move inward when the bar breaks off the floor. When the athlete has very weak adductors, his knees will move even when doing high pulls, bent-over rows and good mornings. I use wide-stance deadlifts, or sumo-style deadlifts, to rectify the weakness. They work extremely well, and quite often an athlete finds he is much more comfortable deadlifting with the wide stance than with the conventional close stance normally used by most powerlifters.

Again, the question, how wide should the feet be placed? This will take a bit of experimentation. You will be gripping the bar with your hands inside your thighs, but you don't want to place your feet so wide that you can't lower your hips enough to be in the proper starting position. Use straps so you can concentrate on doing the movement correctly, or you can use the over and under grip if you prefer.



Staff/CrossFit Journal

Isometric work on the adductors can be done anywhere. All you have to do is hold the knees out with your hands while activating the adductors for 8-10 seconds by trying to pull your legs together.

Lower the bar in a controlled manner. Even if you're using rubber bumper plates, don't let the bar crash back to the floor. This will cause your back to round.

Adductors ... (continued)

Use the same idea for foot placement that I mentioned with the wide-stance squats: feet pointed straight ahead with all the pressure placed on the outside. When doing a sumo deadlift, there is a tendency for the bar to run forward more so than it does with the conventional style. You have to tuck it in snugly against your shins and make sure it doesn't move forward when you break it off the floor. One way to ensure doing that is to get set for the start, then think of pushing your feet down through the floor rather than thinking of pulling the weight upward. Guide the bar right up your shins and thighs. Right after the bar breaks off the floor, just lay back and like magic it will climb right into lockout. Don't look down. Rather, look slightly upward, and this will help you keep the bar close to your body on its flight.

There are times in everyone's life when he finds himself in a place that doesn't have any sort of training equipment.

Lower the bar in a controlled manner. Even if you're using rubber bumper plates, don't let the bar crash back to the floor. This will cause your back to round. Whenever the back rounds in a pulling exercise, there is a risk of injury, and it doesn't matter whether it happens on the way up or down. Plus, the controlled lowering of the weight acts as a negative and adds a bit more usefulness to the exercise.

Same set and rep idea if you're using these to improve strength in your adductors: 3 sets of 15-20 reps, with those final half dozen reps being gruesome. Make sure your hips don't rise up too fast on these because that will send the bar scurrying forward. Try to set your hips as low as possible, and this will force the adductors, along with many other muscles in the hips, legs and lower back, to work harder. This, of course, translates to stronger muscles and corresponding attachments.

Once you've pulled your adductors up to par with the high reps, you can start doing these as a pure strength exercise. The formula I like is 5 sets of 5 with a high-rep back-off, but if you have a favorite routine, by all means use it. There's more than one way to skin a cat.



Former Atlanta Thrashers forward J.P. Vigier uses a slide board. Many NHL players use slide boards in dry-land training, and Bill Starr has used them to build up weak adductors in his athletes.

I had a lacrosse player at Hopkins who always did 7 reps on the various primary exercises. I never was sure why, but it worked for him, and that's all that matters.

Tricks and ThighMasters

I've also had success in strengthening relatively weak adductors by having athletes utilize the slide, an apparatus that came out of speed skating. It's a wide board with a slick surface where the athlete moves laterally wearing socks or little booties. It was quite a hit with the group aerobics crowd for a while and does a terrific job of working the adductors and abductors. Those who used it consistently discovered that they greatly improved their lateral speed as they made their adductors and abductors stronger.

It's also very demanding, so several sets of lateral movement for 5 minutes at a time is generally enough for most. Naturally, the more you work on the slide, the more proficient you will become, and as a bonus you will improve your aerobic base.

Another gadget I have used to either help rehab injured adductors or build them up when they're very weak is the ThighMaster that Suzanne Somers hawked on TV for years. It wouldn't be useful to anyone squatting and deadlifting 400 lb., but it would help someone who is starting from scratch in terms of building some strength in his adductors, such as after knee or hip surgery.

There is another form of exercise that has been around for nearly a century that is beneficial to someone with very weak adductors. Usually this occurs after an accident, surgery or long illness. It's called Dynamic Tension and was the brainchild of George Jowett. I sent away for one of his courses when I was in high school, and because I couldn't afford to buy a set of weights to use his weight-training program, I just did the Dynamic Tension stuff. The only movement that got me sore was the one for my adductors, so I did lots of those.

Sit on the floor or a chair with your legs wide apart. Cross your arms and push against the insides of your knees with your hands as you try and pull them together. Hold the tension against your knees for 8-10 seconds, then ease off a bit and allow them to touch and rest. Then do another set.



Staff/CrossFit Journal

The multi-hip station found in most Globo Gyms provides another way you can do some additional work on weak adductors.



Lateral movement on a slide board will build the adductors, and doing 5-minute sets will train the aerobic system at the same time.

Do as many sets as necessary to fatigue the adductors, which will happen surprisingly fast the first few times you do these. I've had athletes who did these on spring break tell me the simple exercise got their adductors sore the following day. They're obviously not going to be as effective as wide-stance squats or deadlifts, but sometimes weight equipment just isn't available.

Back before the adductor machine came on the scene, those wanting to build more strength in their inner thighs or to shape them for appearance's sake used other ways to achieve their goal. One of the most popular methods in fitness centers was to use cables attached to stacks of plates in a Universal machine. The cable was fixed to a padded strap that was secured to the ankle, then the person either stood or sat on the floor and with straight legs worked his, or her, adductors. High reps, as in 20s for 3 sets, were the order for the day.

Ankle weights were all the rage for a while, and they still get the job done. These are especially useful for someone who trains at home. In the formative years of weight training, Iron Boots served the same purpose. They're still around, although few know how to put them to use. Basically, Iron Boots are pieces of metal shaped like a foot, with straps and a hole in which a dumbbell bar can be inserted and plates added to it, if need be. It's actually a very versatile piece of equipment. John Grimek once demonstrated an entire leg

workout using them. I tried them for my hamstrings and quickly discovered that they were not for the lighthearted, especially when a fair amount of weight is added to the boots themselves. The last time I was at York Barbell, I saw them and later on wished I had bought a pair. They would be most useful in my high-rep type of program.

There are times in everyone's life when he finds himself in a place that doesn't have any sort of training equipment. I usually scrounge something up or make long drives to gyms whenever this happens, but a friend of mine wasn't able to do either of these things. He was house-sitting for a month at an isolated estate on the side of a mountain. The nearest training facility was 50 miles away, and there were no neighbors for him to try and borrow some weights from. So he ran the hills and did an hour-and-a-half workout every day that consisted of freehand movements. I won't bother going into his whole routine, but for his adductors, he sat in a chair, and while keeping his leg straight, moved it back and forth until his adductor gave out, then did the other leg. When he first started this program, he could do 200 reps, and after only three weeks he was up to 300 for 3 sets. He told me he was surprised at how sore his adductors were after a session with the freehand reps, and since then I have put the idea to use on several occasions, usually when I'm traveling.

Smith Machines and Advanced Techniques

That's the far end of the spectrum. At the other end are the adductor machine, wide-stance deadlifts and squats. In regards to the latter exercise, I want to mention a couple of ways of doing these when the athlete is having a great deal of difficulty going low using the very wide stance. In some cases, this is due to a lack of flexibility, and in others it's because the adductors are not strong enough for him to hold his balance.

While I'm not a fan of the Smith machine, I have found that it can be most useful in this regard. By doing the wide-stance squats in the Smith machine, an athlete can stop worrying about his balance and concentrate on going lower and lower. Wide stances are only effective if the movement is done very, very low.

Not all training facilities have a Smith machine, of course, but most do have power racks. If the rack is wide enough, the athlete who is having trouble going into the hole when he does wide-stance squats can use the uprights to steady the bar as he moves up and down. However, as soon as he gets his adductors strong enough and gains the sufficient flexibility to nearly touch his butt on the floor at the bottom position, he needs to move out of the rack and do them without any support. Same holds true for working in the Smith machine.

Make sure you always go low on all your squats.

Finally, an exercise for those strength athletes who are very advanced and are looking for a way to further improve their adductor strength so they can move bigger numbers in the front and back squat and all the pulling movements in their routine. Be warned: it's not for the weak of spirit, because these will make your eyes cross.

It's an isotonic-isometric move done from the lowest point of the wide-stance squat. Set the bar across the pins inside the rack so that it's where you would be when you hit the deepest part of the movement. This will require a bit of trial and error as you test the position of the bar to make sure



Staff/CrossFit Journal

you can get under it and still be able to maintain an erect body posture. Once you have the right pin placement, put two more pins just above the lower ones. The closer they are together, the better.

While learning how to do this, use light weights. Squeeze under the loaded bar, set your feet as wide as you can, make sure your upper body is rigidly upright, take a breath and move the bar up to the top pins. In the learning stage, just tap the top pins, lower the bar to the bottom pins, then tap the top pins a second time. But on the third rep, lock the bar against the top pins and hold it there for an 8-12 second count.

Once you get the feel of what you're trying to accomplish, you can skip the first two reps and go right to the work set. As you get used to the isos, add more weight to the bar for the work set. But keep in mind that for these the time factor is far more important than how much weight is being used. If, when you get to a 12 count and find you can hold the contraction longer, use more weight the next time. Conversely, if you can't lock the bar into the top pins for at least an eight count, lower the poundages.

These are very concentrated exertions and can be done right after a regular squat session two or three times a week. They work best for advanced strength athletes, but there is no reason why anyone, at any strength level, shouldn't try them if for no other purpose than to know how to do them later on.

Don't Ignore a Weakness

Make sure you always go low on all your squats. One of the things I like about front squatting is that the athlete has to go deep, and this helps strengthen the adductors. Be aware of how your knees react during a heavy squat or pull. Or better yet, have someone keep an eye on your knees when you're squatting or pulling heavy. You may be focusing all your attention on the exercise itself, so get some help in identifying the fact that your knees are turning inward during a heavy attempt.

When a weakness in the adductors is determined, don't hesitate. Start doing something to remedy the situation right away. As I mentioned, adductors respond to specific exercises very readily. Then, after you've brought them back in proportionate strength to your hamstrings and quads, continue to include at least one exercise in your weekly program specifically for your adductors.

Keep in mind that when adductor strength falls behind, it adversely affects every back and leg exercise you do. And that's a lot of exercises. Weak adductors have a direct bearing on foot speed, leaping ability and endurance. Equally as important to any aspiring athlete is the fact that the adductors play a major role in securing the knee joint, especially the anterior part. Strong knees are critical for anyone participating in any sport, but doubly so for those engaged in contact sports like football, soccer, lacrosse, rugby and hockey.

Don't take your adductors for granted. Make sure you give them the attention they deserve and require so you can continue to make gains in the weight room and become a stronger, more proficient athlete.



Jody Foster

About the Author

*Bill Starr coached at the 1968 Olympics in Mexico City, the 1970 World Olympic Weightlifting Championship in Columbus, Ohio, and the 1975 World Powerlifting Championships in Birmingham, England. He was selected as head coach of the 1969 team that competed in the Tournament of Americas in Mayaguez, Puerto Rico, where the United States won the team title, making him the first active lifter to be head coach of an international Olympic weightlifting team. Starr is the author of the books **The Strongest Shall Survive: Strength Training for Football** and **Defying Gravity**, which can be found at [The Asgaard Company Bookstore](http://TheAsgaardCompanyBookstore.com).*

THE CrossFit JOURNAL

CrossFit Athletes vs. the Combine 360

Over 1,000 elite athletes have been tested at IMG Academies, including a group of top CrossFitters. Dave Castro describes the test protocols and shares the results.

By Dave Castro

September 2010



All images S. Matossian/CrossFit Journal

In the spring of 2010, we sent a group of elite CrossFit athletes to the IMG Academies in Bradenton, Fla. The purpose of the trip was to put them through Under Armour's Combine 360 training protocol, "the global measurement standard for improved performance." We were excited about putting our best CrossFit competitors up against a testing protocol of which we had essentially no knowledge.



Miranda Oldroyd tests her standing broad jump.

We selected our group from the current crop of outstanding CrossFit competitors.

They fell into a few different categories: winners of the CrossFit Games, high-placing 2009 Games athletes and 2010 sectionals winners or runners-up. At the time of this testing, we had not started the regionals.

The female athletes included Miranda Oldroyd, Lindsey Smith, Karianne Dickson, Emily Beers, Heather Bergeron, '08 champ Caity Henniger, '09 champ Tanya Wagner, and Kristan Clever, who would go on to win the 2010 Games in July.

The men were Patrick Burke, Spencer Hendel, David Millar, Pat Barber, Rob Orlando, Chris Spealler, Tommy Hackenbruck, Jared Davis, and '09 champ Jason Khalipa.

Including our group, over 1,000 athletes have been put through the testing. This list comprises pro football players and other pro athletes from baseball, lacrosse, tennis and golf, as well as one of Canada's top 100-meter sprinters and a host of other elite track stars. A host of elite amateur athletes have also been tested.

The purpose of this piece is not to judge, evaluate or criticize the testing protocol or the Combine 360. The purpose is to report how our CrossFit group measured up against the athletes who have gone through the 360 protocol.



Chris Spealler goes vertical in a test of power.



Jason Khalipa's upper-body strength put him at the top of the seated med-ball toss.

The Tests

There were three major components to the test.

1. Athleticism
2. Movement
3. Character

Each component had 120 points available for a total possible score of 360.

Athleticism—120 Points

The 120 points available for Athleticism were available in nine scored components. They included the following tests:

- Broad jump
- Seated med-ball throw
- Vertical jump
- 5-10-5 drill
- 10-yard sprint
- 20-yard sprint
- Grip test
- 300-yard shuttle
- Sit and reach

The max points available for each category was 13.3.

Hackenbruck had the biggest vertical (41 inches), which was actually a 4-inch PR from when he last did a combine during his football days as a linebacker at the University of Utah. Little Pat Barber had the second highest jump with 36.5. The highest-scoring females were Beers and Henniger, the latter of whom played basketball at Ohio State. Both had 25-inch jumps. All males, with the exception of me, were over 30 inches. I jumped 27 inches. (Since I am not a CrossFit competitor, my scores were not factored into the group's scores for overall rankings.)

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For the seated med-ball test, Khalipa threw the ball 23 feet 4 inches. The next furthest throw was Jimi Letchford (21 feet 1 inch), who was there as an HQ rep. 2008 Games champ Henniger had the best toss for the women with 16 feet 9 inches, which bested both me and Spealler by a few inches.

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On the grip test, which was conducted on a hand dynamometer, CrossFit strongman Orlando dominated the test with a 186-lb. pull. Hackenbruck and Khalipa were tied for second with 180. Wagner pulled a 121 for the top female score, beating Barber in the process.

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Pat Barber scored well in both the standing- and broad-jump tests but was unable to beat Tommy Hackenbruck, who was tops in both.

On the standing broad jump, Hackenbruck again had the biggest leap (114 inches), while Hendel leapt 113 inches. Davis and Spealler rounded out the top four with jumps of 112 and 111 inches. The best jump on the women's side was Beers' 94 inches. Smith was second with 92 inches.

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For the 300-yard shuttle, Davis and Hendel had a score of 53 seconds. The fastest time on record was by a top-tier Division I football player who scored 50 seconds. Beers had the fastest women's time (59 seconds).

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The 10- and 20-yard sprint times were gathered on our attempts at a 40-yard dash. The 40 was not included in this section of the testing, but the scores for the full distance were included later on in the sport-specific section of testing. Orlando was the fastest male over 10 yards (1.59 seconds), and Smith was the fastest female (1.65). Burke was fastest over 20 yards (2.65 seconds) on the male side, and Clever was tops for the women (2.81).

For the 5-10-5 event, Davis was the fastest within our crew (4.34 seconds). The top female for our group was Henniger (4.89 seconds). A few guys were lucky and procured some cleats from the IMG staff, and we conducted the test on an artificial grass field. Those who did not have cleats were at a disadvantage.

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The median score for all 1,000 athletes who have competed is 57 out of the possible 120 points available for this section. The median score for our CF group was 73. Davis had an Athleticism score of 90, and Hackenbruck had the highest score for our group, with 96. For the women, Beers' 73 was the highest. The highest-scoring athlete tested by IMG has a score of 104 and is a wide receiver for a top-tier Division I football team.

Movement—120 Points

Movement was broken up into three parts:

- Sport Specific
- Integrative Movement
- Visual Ability

The Sport Specific section was worth 40 points and included the following tests, each worth 13.3 points:

- Three-cone drill
- 40-yard dash
- An interval conditioning test

The three-cone drill is commonly seen in football combines. Our best score here was put in by Davis (7.02 seconds). Hackenbruck scored 7.19, and Hendel scored 7.21. Clever scored 8.13, besting men including Burke, Orlando and Millar.



Lindsey Smith was the fastest female over 10 yards and 40 yards

Four of our eight men went below 5 seconds on the 40, with Davis having the fastest time (4.72). Smith had the fastest women's 40 (5.12), which was actually faster than Millar and tied Khalipa.
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Spealler's conditioning helped him to a great score in the interval test.

The interval-conditioning test consisted of 10-second shuttles over escalating distances with 10 seconds of rest at the end of each run. This was similar to a multi-stage fitness test, except in this case distance was controlled rather than time. Davis, Hackenbruck and Spealler all completed 28 intervals. The next highest was 26.
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For this Sport Specific category, we had a median score of 20.5 out of 40 possible points. The median for the 1,000 tested was 23, and the median for an entire top-tier Division I football team was 21. Our high scorer was Davis (35), and Hackenbruck had a 31. The highest female score was 20, by Kristan Clever. This is only the part of the test where components are different for different athletes. For example, football players bench instead of doing the interval conditioning test.

In this area, I would have liked to have seen CrossFit athletes doing CrossFit events. It could have looked like this: CrossFit Total for a third of the points, a couplet or triplet like Fran or Helen for the second third, and a series of skill-validation drills for the final third of the points available. The skill-validation section could have been a drill that verified competency in some of the higher-skill CF movements, like the handstand push-up, muscle-up, pistol, rope climb and squat snatch. You would just have to show ability to do each.



CrossFit's female reps at the IMG Academies.

The Integrative Movement section was worth 40 points and comprised three tests:

- Pressing squat
- Balance
- Posture

The pressing squat most resembled a pressing snatch balance in movement pattern. You started with the dowel on your back and pressed down to an overhead snatch position. But it was definitely not a pressing snatch balance. Your feet had to be set at shoulder width and toes had to be pointed perfectly straight forward. The point of this test from the test creators' point of view was to test a total-body movement pattern and mobility. Hackenbruck scored higher than Spealler on this, not because he has a better squat, or a better overhead squat, but because he was able to "test" it better and do what the grader was looking for.

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For the balance portion you had to stand on one leg with your arms out. You then leaned forward, still balancing on one leg, into a position that had your upper body horizontal at that hip with your arms out and your elevated leg extended behind you. From here you rotated and touched your leg with your opposite arm while maintaining balance throughout and then returning to the balanced position. Two scored tries were allowed for each leg.

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On the posture drill, you started in a push-up position (arms extended) and then lifted one arm off the ground while lifting the opposite leg off the ground. Two scored attempts were allowed on each side. Each of these movement patterns was improved with each subsequent attempt.

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Our median score was 20, and the median of all athletes who have been tested is 13. Clever had our highest score, with a 34. Our highest male score was Orlando, with a 25. Spealler had 24.

The Visual section was worth 40 points over three drills:

- Near/far accommodation
- Saccadic movement—horizontal
- Saccadic movement—vertical



Tommy Hacks does his best superman impression on his way to a 114-inch broad jump.



Heather Bergeron followed up her IMG performance with a top 10 finish at the CrossFit Games.

The visual component comprised some tests that evaluated our near-far visual skills, as well as horizontal and vertical tests that evaluated our rapid eye movements. This section included drills that had athletes reading numbers from one display that was close and one that was far. Each tried to read as many letters as he or she could in a fixed time while alternating from near sheet to far. Similar drills were done with side-to-side tests and vertical tests. We did some additional testing that was not part of this scoring, including a rapid-eye hand test where athletes tried to touch dots that appeared on a wall as fast as quickly as they could.

Davis had the highest score here with a 29, and I was second with a 28. We were told baseball players traditionally do well on this test, and Davis comes from a baseball background. My years of shooting in my past job probably helped me on this test. Henniger and Dickson each scored 26.
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The median for all athletes is 20. Our median score was 21.5. The top-tier Division I football team scored 19. A basketball player actually had a perfect score of 40 on this.

Our total for the entire movement section was a median of 62 out of a possible 120 points. The median for all athletes tested is 56. The top-tier Division I football team registered 55.5.

Character—120 points

Character was broken up into three parts, each worth 40 points:

- Mentality
- Nutrition
- Communication

Interestingly enough, all three of these were self-scored. We did not know or realize this at the time of the test. I found that out in writing this piece for the *CrossFit Journal* and in my research. The scores we reported for ourselves on an info sheet were the scores that we were given. We thought that sheet was for basic knowledge of the athletes and not for the actual testing. Some of the stuff that we did think was on the scoring, like the acting scenarios, was actually not scored on this 360 sheet.

Self-reporting on tests like this is not outside the norm. The NFL also does some self-reported tests. I asked Dr. Angus Mugford, head of mental conditioning, about this, and he responded with the following: "The 'character' portion was self-reported—specifically—nutrition, mentality and communication. There is a 'zen' like quality that you essentially grade your own character! There is a capacity for people to cheat the system, but they are only cheating themselves. Mentality and communication scores on a 5-point scale from 'never' to 'always'

experience particular thoughts or situations. For people who simply try to get the highest score, we put in a 'lie scale' that aims to measure the impression that they are trying to create—by giving the perfect answer. This scale was called 'impression management' and ranges from 'balanced' (where we want people to be objective and balanced), to 'extreme' (exposing the potential to either not be honest with where you are at, or simply not aware of how you are doing at those things).

Gender	Last Name	First Name	C360	Foundation	Sport	Integrative	Vision	Mentality	Nutrition	Commn
M	Davis	Jared	267	90	35	11	29	34	40	28
M	Hackenbruck	Tommy	266	96	31	22	25	32	40	20
M	Spealler	Chris	249	84	25	24	21	31	40	24
M	Orlando	Rob	247	85	21	25	24	31	30	31
F	Clever	Kristan	244	68	20	34	21	33	40	28
M	Barber	Patrick	242	85	25	20	20	33	30	29
M	Letchford	James	241	85	22	16	18	32	40	28
M	Millar	David	241	84	21	20	17	31	40	28
F	Bergeron	Heather	238	66	17	25	25	32	40	33
M	Hendel	Spencer	238	81	26	16	21	34	35	25
F	Beers	Emily	236	73	17	25	24	31	40	26
F	Dickson	Karianne	232	61	15	30	26	32	35	33
F	Smith	Lindsey	228	72	16	20	22	31	40	27
M	Burke	Patrick	225	77	13	20	12	36	40	27
F	Wagner	Tanya	225	65	19	20	22	31	40	28
F	Henniger	Caity	222	64	18	20	26	31	35	28
M	Khalipa	Jason	222	73	23	20	17	34	30	25
F	Oldroyd	Miranda	198	68	15	14	20	28	25	28
TOTAL			267	96	35	34	29	36	40	33
MIN			198	61	13	11	12	28	25	20
MEDIAN			238	75	20.5	20	21.5	32	40	28
OVERALL SAMPLE OF 1000 ATHLETES (IMG Academy JR Athletes, Division 1 Football Program, Elite & Professionals)										
TOTAL	MAX	267	104	36	35	40	36	40	36	
	MIN	122	10	1	1	3	24	5	17	
	MEDIAN	204	57	23	13	20	31	30	27	
TOP-TIER DIVISION 1 FOOTBALL PROGRAM										
TOTAL	MAX	267	104	31	26	33	36	40	34	
	MIN	156	15	4	4	8	25	15	20	
	MEDIAN	223	80.5	21	15.5	19	31	30	28	

Figure 1: The scores of CrossFit's athletes, as well as a comparison of the group's performance vs. all athletes and vs. athletes from a top-tier Division 1 football program.

M/F	Age	Last Name	First Name	Sport	C360	Foundation	Sport Specific	Integrative	Vision	Mentality	Nutrition	Communication
M	-	Division I Player		FOOTBALL	267	94	25	26	20	36	35	31
M	26	Davis	Jared	GENERAL	267	90	35	11	29	34	40	28
M	28	Hackenbruck	Tommy	GENERAL	266	96	31	22	25	32	40	20
M	19	IMG Athlete		GOLF	264	82	32	18	34	31	35	32
M	-	Division I Player		FOOTBALL	256	98	23	20	32	31	25	27
M	-	IMG Athlete		BASEBALL	256	77	35	15	34	34	30	31
M	-	IMG Athlete		BASEBALL	256	76	35	8	31	33	40	33
M	18	IMG Athlete		BASKETBALL	256	78	35	20	19	33	40	31
M	-	Division I Player		FOOTBALL	252	86	24	16	23	35	35	33
M	31	Spealler	Chris	GENERAL	249	84	25	24	21	31	40	24
M	-	Division I Player		FOOTBALL	248	97	23	17	17	36	25	33
M	-	Division I Player		FOOTBALL	248	69	27	22	33	29	40	28
M	-	IMG Athlete		GOLF	248	74	25	35	16	30	40	28
M	20	IMG Athlete		TENNIS	248	61	36	34	14	35	35	33
M	35	Orlando	Rob	GENERAL	247	85	21	25	24	31	30	31
M	-	Division I Player		FOOTBALL	246	88	28	21	16	35	25	33
M	-	IMG Athlete		BASEBALL	246	84	34	17	19	30	35	27
M	16	IMG Athlete		BASEBALL	244	72	32	12	25	35	35	33
M	18	IMG Athlete		BASEBALL	244	68	32	10	36	35	30	33
M	19	IMG Athlete		BASKETBALL	244	75	29	24	28	30	30	28
F	27	Clever	Kristan	GENERAL	244	68	20	34	21	33	40	28
M	-	IMG Athlete		BASEBALL	242	65	31	17	27	36	40	26
M	-	IMG Athlete		BASEBALL	242	65	31	17	27	36	40	26
M	24	Barber	Patrick	GENERAL	242	85	25	20	20	33	30	29

Figure 2: The top 24 of the 1,000 athletes tested in the Combine 360.

"This section creates a really interesting tool to be able to have a colleague, coach or trainer hold you accountable to the things you report in here. For example, our athletes frequently see themselves one way, but behave another way in practice/competition. For our coaches and athlete to complete this process from both sides, it provides a great middle ground to discuss the perception of where any potential differences are. This can have really meaningful follow up and support about effort, confidence, attitude, teamwork, etc

"The mentality and communication items were developed by having our senior coaching staff generate their definitions of what 'mental' characteristics and areas of communication ... are most important to be successful in their sport (tennis, soccer, baseball, basketball, golf, football).



Barber contemplates closing out the day with another 40-yard sprint.



From 150 different responses, we found 7 themes that emerged from the mentality side of the equation and 4 from communication, and from this we went back to athletes to see how they defined them with examples (e.g. what does confidence look like to you ... ?). From this feedback we were able to generate questions that both athletes and coaches recognized and identified."

The mentality section asked us questions about our attitude, effort given to activities, coachability, awareness, concentration, confidence, composure and impression management. Burke had the highest score with a 36, and for the women Clever had a 33. If you know these athletes, this sounds right.

On the nutrition portion, again self-reported, we had 11 out of our 18 athletes score 40 out of 40. This section had questions on our dietary intake and how nutritionally aware we are.

The 40 points available for communication were broken into questions about the following: conversation, self-awareness, body language, humor and impression management. Dickson and Bergeron had high scores of 33, and Orlando and I had 31.

Our median for the character section was 100 out of 120. The median for the sample of 1,000 tested athletes was 88. The median for the top-tier Division I football team was 89.

The Numbers

As of this writing, the highest individual score on the Combine 360 is 267, and it is shared by a CrossFitter, Jared Davis of CrossFit SS (Jacksonville, Fla.), and a player from a Division I football team. Davis was the first-place finisher in the Florida Regional and competed at the 2010 CF Games on the CrossFit SS affiliate team. Jared's entire scoresheet can be viewed by clicking on "Appendix A" below.

Three of the top 10 overall scores are held by CrossFitters. Hackenbruck holds the second-place spot (266), one point behind Davis, and Spealler (249) has the 10 spot. Clever had the top female score with a 244, which puts her 21st in the overall scoring.

Our group had a median score of 238, while the median for all athletes is 204. The Division I football team had a median score of 223. Our high was 267 and our low was 198. See Figure 1 (Page 8) for a chart showing our results across the board, and Figure 2 (Page 9) for the overall top scores.

The CrossFit group as a whole finished in the top 10 percent of **all** athletes tested.

[Appendix A: Jared Davis - C360.pdf](#)

Special thanks to Angus Mugford, Trevor Moawad, Lynn Dorton, Jeff Dillman and his strength and condition team, and all the members of the IMG Academies. Thanks to B.J. Corey of Under Armour for helping us get this going.



About the Author

Dave Castro is CrossFit's Co-Director of Training.

THE CrossFit JOURNAL

A Theoretical Template for CrossFit Endurance Programming

John McBrien offers basic programming for single-sport and multi-sport athletes who are looking to improve their endurance while training with CrossFit.

By John McBrien

September 2010



Courtesy of John McBrien

In February 2003, Coach Greg Glassman wrote an article titled *Theoretical Template for CrossFit's Programming*, which provided some of the rationale behind the workout of the day (WOD) and a foundation for understanding the specifics of CrossFit programming. Today, there has in many ways been an evolution in CrossFit programming due to the creation of programs such as the *CrossFit strength bias* and more sport-specific programs such as CrossFit Football and CrossFit Endurance.

Using Coach Glassman's 2003 article as an example, our goal is to provide a theoretical template or model for CrossFit Endurance programming as a means for improving not only the sport-specific capacity of an endurance athlete, but also the broad work capacity of the CrossFit athlete.

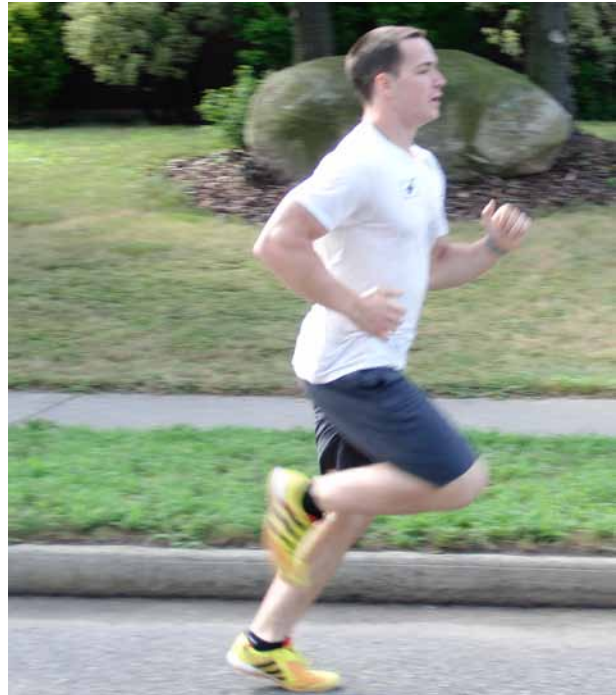
Constant Variation

Before delving into the programming specifics of CrossFit Endurance, it is important to revisit one of the major principles of CrossFit: constant variance. In any thoughtful programming, variance should always be present through the utilization of different energy pathways, time domains, loads, rep schemes, exercises, couplets, triplets, etc. After all, a constantly varied program is fundamental to increasing work capacity across broad time and modal domains.

This principle of variance carries over into CrossFit Endurance programming as well and is just as important for the endurance athlete.

This principle of variance carries over into CrossFit Endurance programming as well and is just as important for the endurance athlete. However, the typical endurance athlete is not familiar with variance and spends the majority of time "going long" through training the oxidative pathway. At the same time, the typical CrossFit athlete, while likely more balanced, tends to favor shorter time domains and is predominately training the phosphagen and glycolytic pathways. For a real-world example, one need only casually observe the comments, and subsequent substitutions, on the CrossFit main site after a 5K or 10K is posted.

CrossFit Endurance programming addresses the weaknesses of both groups. Our programming provides the endurance athlete with a progression of technique, intensity and *then* volume. It is our goal to reduce an



Courtesy of John McBrien

James Hobart showing off his Pose at the CrossFit Endurance Cert at CrossFit Milford.

endurance athlete's dependence on only oxidative training by increasing broad work capacity and enhancing all 10 general physical skills through constantly varied CrossFit programming. After a foundation of CrossFit has been established, we proceed to supplement the endurance athlete's CrossFit programming with sport-specific endurance workouts.

The same is true of the CrossFit athlete. An excellent example can be found in analyzing Rob Orlando's improvements in work capacity with specific regards to running. Utilizing CrossFit Endurance programming provided by CrossFit Endurance head coaches Jason Leydon and Brian MacKenzie, Orlando has seen his mile time drop from over 7:00 to 5:59 in his training leading up to the 2010 CrossFit Games. John Steger, a 2010 CrossFit Central East Regional competitor, has seen broad increases in his overall work capacity as well and utilized CrossFit and CrossFit Endurance to run the 2009 Marine Corps Marathon in 2 hours 59 minutes.

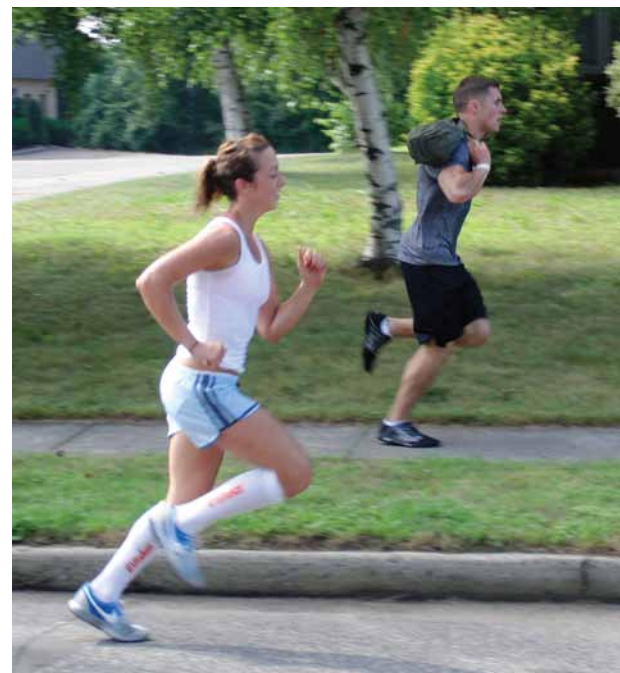
Programming for the Single-Sport Athlete

Now that we have established a basic foundation for training both the CrossFit athlete and endurance athlete, let us delve into the first template or model: programming for the single-sport athlete. When programming for a single-sport athlete, we are typically referring to someone looking to improve his or her running. For this particular template, we will utilize this general trend in the example outlined in Table 1.

The general prescription for the single-sport athlete with an emphasis on running is four to six CrossFit workouts per week, supplemented with two to three sport-specific endurance workouts per week.

The general prescription for the single-sport athlete with an emphasis on running is four to six CrossFit workouts per week, supplemented with two to three sport-specific endurance workouts per week. These endurance workouts are interval-based and stamina-based. In the example above, the athlete is supplementing five CrossFit workouts with two CrossFit Endurance workouts: one interval-based and one stamina-based. The interval-based workout may be something as simple as performing 8 reps of 200-meter sprints, holding each effort within 2-3 seconds and resting 2 minutes between efforts.

The stamina-based workout will be either a time trial or tempo workout and is performed on a CrossFit rest day. With a time trial, the goal is maximal effort for a given distance or time. For a tempo, the athlete is required to work anywhere from 85-95 percent of a best time or effort level for a given distance or time. In the template above, Week 1 may consist of a stamina workout in the form of a 5K time trial as a benchmark measurement. Week 2 may be a tempo at 95 percent of an athlete's best 1-mile pace. Knowledge and an understanding of the athlete's capacities, limitations and goals should drive the template's programming, not the other way around. Distances for the stamina-based workouts will range from 5K to 13.1 miles, depending on the athlete's goals.



Courtesy of John McBrien

Simple aerobic conditioning is being replaced by interval- and stamina-based workouts designed to increase work capacity.

Table 1: Single-Sport Athlete (Running)

Day	M	TU	WE	TH	FR	SA	SU
	CF	CF	CF	OFF	CF	CF	OFF
	INT			STA			
INT: Interval-based workout				STA: Stamina-based workout			

Notice plenty of flexibility is built into Table 1 to ensure the athlete is getting ample recovery. As a fundamental rule, always remember that recovery is why an athlete improves, not more training. With that said, room exists in the above template for the addition of a second interval-based endurance workout. This second interval workout may be performed, for example, on Saturday afternoon following a morning CrossFit workout. Again, as a general rule of thumb, attempt to ensure that CrossFit and CrossFit Endurance workouts are performed at least three hours apart to ensure proper recovery. For example, very few athletes will have the capacity to perform Fran with maximal effort followed immediately by intervals; progression is key.

As seen above, programming for the single-sport athlete is not unlike biasing CrossFit programming toward an athlete's weaknesses through supplemental work. As a result, programming for a single-sport athlete is relatively easy provided the principles of recovery and progression are respected. The template outlined in Table 1 is also not limited simply to an athlete focusing on running but can be utilized as a means for improving metabolic conditioning in general and for other single-sport athletes as well.

Programming for the Multi-Sport Athlete

In comparison to the template for a single-sport athlete, programming for the multi-sport athlete is far more complex and requires a greater understanding of an athlete's ability to perform on a daily basis. Again, for the purposes of this article we will use a general trend for outlining our multi-sport template. In this case, the multi-sport athlete is a triathlete. It is important to note that when programming for a triathlete, the athlete is essentially competing in four sports: CrossFit, running, biking and swimming.

The general prescription for the multi-sport athlete is to again perform four to six CrossFit workouts per week. In this case, however, supplementation will include two workouts per sport per week maximum.



With careful programming, single- and multi-sport athletes, as well as CrossFitters, can see impressive gains in endurance and stamina through relatively brief workouts.

The general prescription for the multi-sport athlete is to again perform four to six CrossFit workouts per week. In this case, however, supplementation will include two workouts per sport per week maximum. Furthermore, due to the number of sports that are being trained simultaneously, we prescribe performing no more than one to two stamina-based workouts per week—maximum—as well. Table 2 outlines the template for the multi-sport athlete.

Similar to the single-sport template, the multi-sport template places a week's stamina-based workout on a CrossFit rest day. This is useful not only as a means for ensuring adequate recovery, but also for mirroring an athlete's race schedule given that most races are usually held on Saturday or Sunday. It is unlikely an athlete will be capable of handling two stamina-based workouts per week, and certainly no more than one stamina-based workout for a particular sport, unless the number or total volume of CrossFit workouts is reduced. As a general guideline, distances for swimming- and biking-based stamina workouts will range from 500 meters to 1,500 meters and 10 miles to 30 miles, respectively. The athlete's goals and/or race distance(s) should drive the length of stamina-based programming.

We can readily see that programming for multi-sport athletes demands a greater understanding of an athlete's recovery abilities and, in addition, an athlete's strengths or weaknesses in particular sports. For example, an athlete with a strong background in swimming may not require two swimming workouts per week. This keen understanding of an athlete's abilities is required to ensure that the athlete can satisfactorily perform at the requisite intensity during both CrossFit workouts and sport-specific CrossFit Endurance workouts.



Courtesy of John McBrien

Hobart, center, is now a lifter and a runner.



Courtesy of John McBrien

A wide variety of CrossFitters are finding CrossFit Endurance workouts are a great supplement to their base CrossFit regimen.

Table 2: Multi-sport Athlete (Triathlete)							
Day	M	TU	WE	TH	FR	SA	SU
	CF	CF	CF	OFF	CF	OFF	OFF
	Swim	Bike	Run	Swim	Bike	Run	
	INT	INT	INT	INT	INT	STA	
INT: Interval-based workout				STA: Stamina-based workout			



Courtesy of John McBrien

The Forcai Endurance Team prepares to begin a 4x500 meter track workout.

Strong and Fast

This article is neither exhaustive nor entirely comprehensive in its scope but is instead designed to provide a theoretical foundation for how to program CrossFit Endurance for endurance athletes and CrossFit athletes alike. Some indicators for recognizing improvement include broad increases in work capacity for CrossFit benchmark workouts, faster interval splits and quicker recovery.

When individualized, a combination of CrossFit and CrossFit Endurance can be used to further maximize an athlete's performance potential. Rob Orlando is at an all-time low body weight yet has improved his running-specific capacity and cardiorespiratory endurance dramatically while still seeing progressive improvement in his strength. This is not an uncommon occurrence, and with attention to progression and recovery, all athletes can see the efficacy of the program in their own training.



About the Author

A convert from traditional endurance training, John McBrien is a CrossFit Endurance head coach and utilizes CrossFit and CrossFit Endurance exclusively in his own training and the training of his athletes. He works with athletes of all ability levels and takes pride in helping the average Joe and Jane reach their performance potential in endurance events. He is also the head coach of the Capital CrossFit Elite Anaerobic Endurance Team out of [CrossFit Capital Jiu-Jitsu](#).



Courtesy of John McBrien

THE CrossFit JOURNAL

Death of the Meathead

CrossFitting powerlifter Chris Moore visits a bodybuilding show and ponders the evolution of fitness.

By Chris Moore CrossFit Memphis

September 2010



Courtesy of Chris Moore

"I feel a change comin' on"

— Bob Dylan

Right around Highway 61 and State Line Road, we realized just how late we were.

Damn. The show was starting in 10 minutes, and we were still 45 minutes outside of town. Maybe it was because we didn't really want to go in the first place. After all, this was no place for our kind. If you only train for performance, then why the hell come here, to a bodybuilding show, for chrissakes?

It doesn't matter. This crew trains together. And when you train together, you show up, no matter what. It's been said, "Buy the ticket. Take the ride."

Welcome to Tunica

We pushed the pace to 80 in a 60. I wasn't about to go any faster down a narrow two-lane highway.

"I'm not dying for this," I thought.

A little on the late side, it occurred to us that we weren't even sure where to go.

"It's at Sam's Town Casino, right?"

"Yeah, it should be right up there," Jani said. "Maybe just a few more minutes?"

In the burgeoning mess of tourist traps, all the buildings had the same facade. Who the hell could tell them apart?

"I thought Sam's Town was here No, that's the Horseshoe," I said, confused. "Let me call Mike." The rest of the crew from the gym were right on our heels.

"Mike! Where were we supposed to go again? Sam's Town, right?"

"Hello? Who's this?"

"It's Chris!"

"Mike's not here. You'll have to talk to Mike Beezy. I'm Mike Beezy now!"

"What the hell are you talking about?"

"Beezy! Anyway The casino's in Tunica. I think it's in Tunica."

I could practically smell the Sailor Jerry through the cell phone. Mike exemplifies the work-hard, train-hard, party-hard mindset. My only thought: "Looks like it's going to be an interesting night."

We arrived at the venue just mere minutes before Nicole was to go on stage. Not a problem. It was just a matter of getting inside, scooping up a pair of tickets and sneaking down to our seats. I was instantly reminded of why I hate these places.

Welcome to Hell

To step into the lobby is to find yourself lodged in a bizarre world. In the middle, a gigantic fire-engine-red monster truck is on display. Apparently, if luck be your lady tonight, you can drive home in this thing. Circling around the truck

are a sample of the local population. The stereotypical country folk getting 'er done. The confused obese couple looking for the entrance to the all-you-can-eat barbecue buffet. Dehabilitated grandmothers driving around on battery-powered Rascals, pension checks in hand. It's all overwhelming.

We make our way back to the customer-service counter. There are only about five to 10 people in line. What a relief. I approach the counter, "We're hear for the Battle of the Bluff. Two tickets, please."



Courtesy of Chris Moore

Former WWE and WCW wrestler Sid Eudy (Sid Vicious) going guns in a posedown in Mississippi.



Courtesy of Chris Moore

Nicole Conner might have competed in a bodybuilding/fitness show, but she's still training for performance.

"Oh, sorry." The clerk responds. "You'll have to go upstairs. The escalator is right behind you, there. Just go right on up. It's on your right. Can't miss it."

"Uh, sure. Thanks."

Halfway up, we're bathed with an escalating white noise, the sound of a couple of hundred chattering mouths. Looking over the rail, we find ourselves entering the gluttonous second circle of Dante's hell. There is a massive winding line of humanity for as far as we can see. All are here for the show.

How could we tell? It's way too easy to spot a bodybuilding fan. All along the outer edge of the line, you can see nothing but the elbows of young men who are desperately trying to make themselves look as wide as possible. Each is wearing some variety of bedazzled MMA shirt, complete with either angel wings or dueling goth skulls. All together, they look like shimmering chain-mail scales on a long Jersey Shore serpent.

"We're not going to make it. No way I'm waiting in that line with these guys."

I start preparing my apology to Nicole: "Sorry for missing your competition. Yes, yes. I know I should have bought tickets ahead of time. Look, here's 20 bucks. Go knock yourself out on the slots. I hear they're especially loose tonight."

At that moment, Nicole's husband shows up out of nowhere with the solution.

"What are you guys doing?" Rob Conner says. "She's almost on stage."

"Dude, there's no way we're getting tickets in time. See that line?"

"Wow. Yeah, that ain't gonna work. Tell you what: just come with me."

We work our way down through the back of the casino, through the hotel, to the entrance of the event hall. As we get closer and closer to the show, I can't help but notice this persistent smell getting stronger and stronger and stronger. It's Preparation H. Bodybuilders apparently use it to dehydrate the skin, giving the illusion of a leaner physique. It gives me the impression that bodybuilders are even bigger assholes than I had first imagined.

"Now, Jani, I'm going to give you my spare ticket. We'll walk into the show together. Then when you leave to go to the bathroom, take both tickets with you and bring Chris in."

"The ol' switcharoo? Is that going to work?" I ask.

"Sure. The guy at the door doesn't look that sharp. He's not even paying attention."

Rob is right. It works like a charm. We both get in, right on time to see Nicole walk, and we didn't have to drop \$70 on tickets. Was it the wrong thing to do? Sure. But fitting. There's already so much wrong with this sport to begin with.

The Belly of the Beast

At ground zero, the heavily lit stage is surrounded by a thousand-odd physique-o-philes. The outer perimeter features vendors of all types peddling their wares. It's the usual crap. Extreme nutrition programs, super hardcore workout apparel. One shirt I notice says, "Only the Strong Survive." Just what you must wear to achieve hugeness.

On the stage, the novice heavyweight men are completing their posedowns. They're all veins and bloat. With the strain of flexion, their faces fill with bright red blood. In between poses, they gasp for breath—the very picture of health and fitness. The announcer calls out, "All right, gentlemen, please face the rear of the stage. Hands over abdominals. Excellent. Double biceps ... into rear lat spread."

From the audience, a man stands up and shouts at the top of his voice, "Spread it, Tommy. *Spread it!* Fuck, yeah, man!"

"Jesus," I think, "is this a competition or an exhibition prison search?"

All throughout the procedure, contemporary pop metal permeates the venue. It's all too much for a sane mind to tolerate. But we are here for a reason. Remember that. Just then, Mike Beezy and the rest of the crew arrive. They seem a little bit dazed to me. Perhaps it's the heavy perfume of Ed Hardy cologne in that ticket line or sticker shock from discovering the ticket price. I act sympathetic.

"Man, I know right? Bummer."

"Well, at least there are some hot chicks here," Mike says.

"Only if you like them extra crispy and full of hard edges. I think they've all been tanning a little too much. It's disturbing."

"Yeah, disturbingly awesome."



Courtesy of Chris Moore

Functional training isn't about aesthetics, but some fitness competitors find great success with CrossFit.

As the men exit the stage, I take a moment to look around the crowd. One thing is clear: these are folks who really want to be someone else. They want to be bigger, leaner ... more than what they are. Then a thought crosses my mind. Here I am, a 300-lb. tattooed man at a bodybuilding show. Somewhere in this audience, there's a guy eying me down right now and thinking to himself, "Look at this guy. What a poser." Fair enough.

The announcer calls out for the next group: "And now, our next competitors are the girls in bikinis."

Cue the hooting and hollering from the sex-crazed, hormone-fed attendees.

"Sensuality. Sexuality. Soft and smooth—just like me."

Everyone shares an uneasy laugh.



Courtesy of Chris Moore

Using nothing but CrossFit Nicole placed fifth in her first show.

Girl No. 15 is the first to walk across the stage, then No. 29 ... No. 33. They all carefully hit their marks, assuming the same catwalk action pose at the end of the runway.

A guy beside us decides to make small talk.

"Man, eight bucks for a Bud Light! Can you believe that? You guys got a girl up there?"

"Yeah, one of the girls from our gym is competing."

"Oh yeah? Right on. What gym you guys from?"

"We all train at CrossFit Memphis," Mike replies.

"CrossFit?"

"Yeah. We don't really care too much for aesthetics. We mostly train for performance. Our friend wanted to come down and compete, so we're here to support her."

"I can dig that. I mean, I may look a'puss, but I can do some shit. I lift up at 24 Hour Fitness."

"Cool. You know, you should come by our place sometime. Saturdays are free, so—"

He interrupts. "Damn! D'you see that dude? Man, I'd give \$100,000 to look like that guy."

Amused, I reply, "Yeah, that's probably what it would cost you."

"Winstrol, baby! *Winstrol*. I'll get there. I'll be looking just like Sid Vicious! You'll see."

It's Nicole's turn to walk.

"And from Cordova, Tennessee, give it up for girl No. 31 ... Nicole!"

This took some courage, going out there in nothing but a little bikini. She'd had no previous experience or coaching. The only training she had done for this show was CrossFit. She looked incredible.

"Rob, she looks great. I'm surprised. Well, not surprised ... It's just that, she—"

"You know that spray tan shit costs \$100? \$100!"

"Yeah, well, she does look pretty dark. I guess you have to have it under those bright stage lights."

"The bikini's over \$100, too. It all adds up. But as long as she's having fun, I guess. I'm proud of her."

As all 10 ladies line up for judging, the announcer hands them each a red rose. You see, it's very important to make a lady feel like a lady, especially after you make her feel like a piece of meat up for auction. After a brief pause, the bottom five girls are asked to leave the stage. Oh, the rejection. At least the bottom girl is spared the humiliation of being asked to leave first. The judges pause again. Then out of the silence, No. 31 is called.

Nicole took fifth place. Now she can always say she placed at a figure show, her very first, no less. Fourth and third follow, with a dramatic unveiling of the first-place winner. As she is crowned, the announcer cues the Nickelback victory song: "She didn't make it this far by just shaking

Courtesy of Chris Moore



The CrossFit Memphis crew. The author is at the the far right.

hands." Wow, very classy. This must be every little girl's dream.

We all meet up with Nicole backstage after the show to congratulate her on how great she did and how great she looked.

"You're so tiny!" Jani says. "How'd you do it?"

"Simple. Don't eat!"

"See, that's your problem. You can't prepare for something like this by eating just a bowl of cornflakes in the morning," Rob says.

"No! The judges told me I wasn't sexy enough! They said it's sex that sells, and that I should try and be more seductive. Forget it. I'm a mother! I'm not shaking my butt on some stage!"

We all pause, nodding in agreement. Paying no attention to Rob, Mike Beezy leans in close to Nicole, "I like your earrings. They're dangly. What are you doing later?"

It's Evolution, Baby

At that show, I saw a dying, antiquated culture. The era of the meathead is quickly coming to an end, and not because the lives of these people revolve around their "fitness" goals. I'm very much aware that we all share that focus. No, it all comes down to the root motive. Why do you do what you do?

That culture is familiar to anyone who has ever been inside a modern Globo Gym and anyone who has ever picked up a health and fitness magazine in hopes of finding some knowledge. In this scene, everything is done for someone else. You're not lean enough—unless you're as lean as that girl on the magazine cover. You're not big enough—unless you're as big as that one huge guy in your gym. This is not a path to long-term success and fulfillment. It's an unsustainable path to failure.

Picture in your head the stereotypical, brutish Neanderthal. They dominated most of Europe and Asia for at least 300,000 years. That body plan and way of life worked for a very long time. They had reason, language, complex social

structures, beliefs, hopes. But they were only good enough until something better showed up. Something sexy, long and lean, more keen. Something whose time had come. That same kind of shift is manifesting in gyms like ours all over the world.

What is *our* motive? We do it for us. We train to become capable, more like what we were meant to be. We take what is useful and throw away what is not. Within our crew, we build community. We take the time to get to know the people we train with, to learn more about ourselves. We turn the volume to 11 and let the chalk fly.

To all the brutes out there, I only have one thing to say: You should come by our place sometime. Saturdays are always free.



About the Author

Chris Moore is writer and powerlifting Coach at [CrossFit Memphis](#). Prior to his lifting career, Chris played Division 1 football at the University of Memphis. During this time, he began his study of human performance, eventually obtaining a master's degree in exercise and sport science. In 2007, Chris joined Mike Bledsoe, Doug Larson and Rob Conner to found Memphis' first CrossFit gym.

Today, CrossFit Memphis has grown to include powerlifters, weightlifters and mixed martial artists, all training and competing under the banner of Faction Strength & Conditioning. As a drug-free lifter, Chris' best competitive lifts include a 975-lb. squat, a 675-lb. bench press and 675-lb. deadlift.

You can reach him at christophermoore57@gmail.com, or visit FactionSC.com.

THE CrossFit JOURNAL

Tested by Fire

Peter Trapp survives one of Australia's worst bushfires—and he believes CrossFit helped him do it.

By Peter Trapp

September 2010



Courtesy of Peter Trapp

"On the hottest day ever recorded in Melbourne and across the state of Victoria, a bushfire fanned by strong winds is second only to hell itself."

—David A. Johns, "A Day like no other"

1 of 4

In 2009, CrossFit training saved my life when the physical fitness and mental fortitude developed through countless WODs helped me survive Australia's worst-ever bushfires.

In January of that year, as Melbourne sweltered under daily temperatures as high as 42 C, I continued to do my daily WODs much to the dismay of my non-CrossFitting family and friends. I had been following CrossFit principles for about two years by then, and I had made mistakes along the way but continued to learn and progress. I was 41 years of age and had been training pretty hard—or so I thought—since the age of 15.

Every WOD I did had that moment where I asked myself why the hell I was punishing my mind and body like that. Often I came close to quitting, but for some reason I never did. I always reminded myself of that exquisite moment where I could collapse to the ground knowing I had given my all, and the hope of getting a personal best kept me going.

Twelve months earlier and with the help of two other partners, I had opened my first “box” through CrossFit Victoria. Fast-forward to Feb. 7, 2009, a Saturday. After teaching our 9 a.m. class, which had been full of great energy as usual, I supervised our “open gym” session, offering coaching advice and generally shooting the breeze. I had grave reservations about the mood of the weather that day. The sky looked different and menacing, the wind swirled much more than usual, and it was already very hot. I was conscious of the fact that I should leave work soon. Colleagues and clients thought the same. I began the one-hour drive home.

In the car, I immediately put the radio on to check the news. According to reports, there was a bushfire about 30 kilometers from my home. As I drove up the mountain, I could see smoke in the far distance. Arriving home, all seemed fine. My heavily pregnant wife and three-year-old son slept peacefully. Suddenly, one of my neighbours knocked on the door and told me the fire would be at our place soon.



When he was battling bushfires in Australia, Peter Trapp was thankful he'd learned to persevere while battling challenging CrossFit workouts.

Wall of Fire

It was time to evacuate the home. Taking the photo albums and not much else, my family nervously drove off.

I was confident I could fight the fire; I had rehearsed a few times for this. I was prepared: water pump, buckets, hoses, fire clothes, radio ... I felt terrified and very alone.

The radio assured me the fire was still far away. Ten minutes later, the sky turned black, then red. I could hear it coming. Imagine standing next to a jumbo jet. Then I saw the flames: hundreds of metres in length and over three stories high. This was no normal fire. My land exploded into flames fuelled by 160-kilometer-an-hour winds. As I rushed to the fire pump, I felt calm and ready.

The pump didn't start. Almost surrounded by flames, I fled into the house to get my two dogs. The house started burning. I put a blanket over myself and, clutching the hysterical dogs, went outside. *The heat!* Everything was on fire—even my driveway. I had to run through the flames. Rushing to my neighbor's property, which was my only sanctuary, I could feel myself burning. At this precise time, 21 people were burning to death 100 meters up the road.

Twenty meters on, I lost all visibility. The smoke blinded me. I stumbled into a ditch and twisted my ankle. I could not find my neighbour's gate. It was then I decided it was my time to die. But then a desperate desire to live for my family took hold, and all the memories of painful, gut-wrenching WODs came flooding back.

I vividly remember screaming to myself, "Come on! Go! Go faster! Push! Don't give up! Go!"

I blindly felt for the gate and found it. I sprinted up the neighbor's steep driveway. Dogs in the house, I jumped into his swimming pool, then spent an hour helping him save his house and us. I then collapsed to the ground.

**Everything was on fire—
even my driveway. I had to
run through the flames.**

Recovery and Refocusing

After leaving hospital, it took a while to realize I had lost everything. I began to despair, and dark thoughts entered my mind. My CrossFit community rallied behind me and my family big time. Fundraising CrossFit T-shirts were produced by my supporters, and they were called "Pete's Pain" in honour of the first WOD I would give the group when I got back. These ended up selling across Australia, the U.S.A. and the U.K.

Three weeks after the fire, I traveled to Sydney to do my first Level 1 Certification. Unable to do most of the fundamental movements or WODs because of my burns, I mainly watched. I met Coach Glassman, and he showed me great kindness and offered much encouragement. I cried when I watched my friends do Fran. Before the fire, I had trained very hard for that moment by practicing my woeful thrusters. I had been determined to beat my personal best of 10:28 and avoid the dreaded 10-minute cut-off time.

Four weeks after this, I did my first WOD. With six people screaming encouragement, I did a very slow Christine and vomited afterwards. Progressing very slowly, I went back to coaching, and my workouts continued.

**Six years after I discovered
CrossFit and came to
the realization that I,
Peter Trapp, wanted my
own affiliate, I received
confirmation that I was
now a member of the
CrossFit Family.**

In August 2009, I attended the Level 1 Certification again, which our box was hosting. I did Fran in 7:15. Up until October, every WOD became a PB. On Oct. 11—my 42nd birthday—I ran the 42km Melbourne Marathon to celebrate. The media enjoyed that story. I did it for me.

After that, I felt burned out and decided I needed to spend some down time with my family and new baby, so I resigned from CrossFit Victoria. After a break, I set up a training business specializing in fighter strength and conditioning, and it's doing very well. I am the proud trainer of numerous state champions, four Australian champions and a world title holder.

But I missed CrossFit. I missed it a lot. I felt a need to start up a new box. I missed the satisfaction of helping people learn how to move and exercise properly. I missed encouraging people to push harder to see what they are capable of. I also missed the CrossFit family. That's why I did the "essay" to become an affiliate.

On the 12th of June, a dream came true for me. Six years after I discovered CrossFit and came to the realization that I, Peter Trapp, wanted my own affiliate, I received confirmation that I was now a member of the CrossFit Family.

A New Passion

Now I can do things on my terms and set up a CrossFit box the way it should be set up. I am in charge of my own destiny. I have planned the layout and logistics, and I've teamed up with two former clients. Together, we hope to create something special.

I genuinely hope that my practical CrossFit training, coaching and life experiences combined with those of my partners will make our affiliation a valuable addition to the CrossFit Family as a whole.

I intend to be a CrossFit athlete for as long as I am able to. I want to keep improving!

It is my deepest desire to constantly improve as a coach. One of my mentors years ago, strength coach Barry Conlin, never lost enthusiasm for new information and knowledge. I still remember that after 50 years in the game and thousands of athletes later, the highlight of his week was when I gave him a pile of articles to read. I want to be like that. If I can change people's attitudes to exercise or influence a handful of young people, then I will be happy. What's better than that?

And in life I am never going to give up.

Thank you to my family and friends for your belief in me. Thank you CrossFit. It will never be forgotten.



About the Author

Peter Trapp has been training seriously for over 25 years. He started off as a middle-distance runner, reaching national standard before injuries curtailed his career. He has been training people for 20 years and is currently preparing for the Australian weightlifting championships in the masters division. He intends to undertake further CrossFit certifications when he visits the United States and Canada later this year.

He holds the following qualifications: Crossfit Level 1, CrossFit Gymnastics, strength and conditioning coach (Australia Strength and Conditioning Association), track and field coach level 2 (Australia Track and Field Coaches Association), olympic weightlifting coach level 1 (Weightlifting Australia), certified boxing trainer (Punch), cert IV fitness trainer-personal trainer (Fitness Australia). Peter is the owner of [Full Contact Fitness](#)/Specialist Fighter Strength and Conditioning, and he is the former owner/director of [CrossFit Victoria](#).

THE CrossFit JOURNAL

Preparing for the First Olympic Meet

You only get six chances to make a lift at an Oly meet. Bob Takano details how coaches and athletes can prepare to get optimal results on the platform.

By Bob Takano

September 2010



An athlete's first weightlifting meet is often a hugely memorable event with emotions ranging from ecstatic euphoria all the way to sheer terror. In most cases this first meet will go a long ways toward establishing the nature of the athlete's competitive character, and so it would be of great benefit for both the athlete and the coach to take some time for advance preparation to make sure as many controllable factors go as smoothly as possible.

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The Performance

A weightlifting meet is psychologically unlike the vast majority of athletic events—even the other individual sports competitions. In track and field, there are numerous events occurring simultaneously. The same is true of gymnastics. Even in the combative sports there is another person, the opponent, sharing the officials' and audience's attention.

A weightlifter stands alone and is the sole focus of everyone's attention.

Fortunately, it is like all other performance experiences in that the chemical state of the performer is altered. Those with experience at handling this adrenalized state can transfer this expertise or aplomb to the competition platform. Others can learn to handle their adrenaline through other performance experiences. This is one of the reasons that I ask each new weightlifter I coach about their competitive sports history.

Coaching a new athlete with a successful competitive sports history just means that I won't have to explain or coach the adrenalized state. I just have to make sure the athlete is aware of the specifics of the weightlifting competition that are relevant to the performance.

Pre-Meet Preparation

Both the coach and the athlete should be aware of the procedures for conducting the competition. They should both know the rules for weight changes, the timing of attempts, the judging process and other details that are easily learned by reading the rule book. The coach should know them *much* better than the athlete, and the athlete should have complete faith in the expertise of the coach. Otherwise the athlete's mind may be preoccupied by this lack of faith, and this may interfere with concentration on the performance, which is the most important focus.

**Lifters need to learn to wait
for the official signal before
lowering the weight.**



Jonturn/Creative Commons

***Weightlifters stand on the platform alone,
to succeed or fail by themselves.***

It would probably behoove some teams to stage mock meets in the gym so that each athlete and the coach or coaches understand how the meet is to be conducted. Lifters need to learn to wait for the official signal before lowering the weight, for example.

For new coach/athlete teams, a mock meet might also help to determine which weights are to be attempted in the competition. The first attempt should be a makeable lift with the coach fully aware that the adrenaline demon may take over and suddenly provide an over-pull or over-jerk that cannot be well controlled.

In any event, the athlete should not be surprised by the weights that are called in the competition. In a first meet it is most important to succeed with many attempts with properly selected weights. Lifting to compete may have to be left to subsequent competitions and not the first ones.

Make sure you have all your gear (including your lifting suit) packed in your bag, and that you carry your bag with you to the competition. If you are flying, make sure your bag is carry-on luggage. Pack your weightlifting registration card, photo ID and proof of mailing if there is a deadline for entries.

The Weigh-In

The coach should be entirely familiar with the rules of the weigh-in. When does it start? How long does an athlete have to make weight? How much clothing can be removed and/or must be removed? What are the rules on jewelry?

I would also strongly recommend that the coach not artificially induce a body-weight loss for a first competition as this will superficially introduce another distraction that can inhibit the athlete's psyche for competition.

**For the first meet,
the weigh-in should not
become a distraction,
nor should taking care of
administrative paperwork.**

Because it would behoove an athlete to weigh lighter than heavier as potential tiebreakers include lighter body weight, the coach should have food ready for after the weigh-in. It should be easily digestible food with a high carbohydrate component.

For the first meet, the weigh-in should not become a distraction, nor should taking care of administrative paperwork. All of that should be taken care of well before the day of the meet. The coach should have the athlete's USAW card and ID.

The coach should be ready to provide opening attempts at the weigh-in.

The coach, in consultation with the athlete well beforehand, should determine the goal weight to be lifted in the competition. Then subtract approximately 5-6 percent to determine the opening weight. If that is successful, the second attempt of 2-3 percent less than the goal weight

can be called for the second-attempt poundage. The goal weight is going to vary with the individual. Some competitive types are overly aggressive and will want to take much more weight than they've lifted in training. Others are more trepidatious. This is why the goal weight should be determined through a consultation with the coach. Percentages of maximum are not valid at this point because a true maximum can only be determined under competition conditions.



Jonathan/creative commons

Everything should be taken care of well before the competition so that the athlete has only to walk to the platform and lift.

The Warm-Up

The coach should be entirely confident of the warm-up procedure. This means establishing the athlete in a seat near a platform with a bar and enough weights to warm up properly. Water or a sports drink should be available, and chalk should be nearby (bringing your own chalk is often advisable). Except during the initial warm-up and during individual warm-up lifts, the athlete should be seated. Well-wishers, family members and other non-essential personnel should be kept away from the lifter in the warm-up room as they can provide unnecessary distractions.

The coach should know how to count attempts on the expediting cards or off the warm-up room attempt board. The plan should be three competitive lifts for each warm-up lift. Thus an athlete taking 5 warm-up attempts should take the first one with 15 attempts remaining before the opening attempt.

After the initial "warming up" of the body, the athlete should take four to five progressively heavier singles until the final one is within 5 kilograms or so of the first attempt on the platform. The athlete should have two to three minutes after the last warm-up and the first attempt on the competition platform.

The athlete should walk to the competition area before the weight is loaded.

During the Competition

In order to lessen the anxiety of working under the constraints of a time clock, the coach should have the lifter prepared to lift at the side of the stage (competition area) before the lifter's name is called (the calling of the name signals the start of the time clock). If the lifter is not out of breath, the one-minute clock provides plenty of time, and many first-time lifters end up performing the lift after less than 30 seconds have elapsed. Again, a mock meet in the gym will help the lifter lessen the level of anxiety and feel comfortable with the rules regarding the time clock.

After the completion of a successful attempt, the coach needs to inform the announcer of the weight of the next attempt (if there is one available). Otherwise the weight of the next attempt is the automatic one-kilo increase.

The first few meets should be a time to acquire expertise in successfully calling and succeeding with weights that are makeable for the athlete. In other words, there should be a plan to develop the competitive psyche of the athlete by calling and lifting challenging but not necessarily maximal lifts. Sticking to a plan will do much for the psychological development of the athlete in the long run. If a lifter has a sound record of completion percentage and regular establishment of personal records in competition after two or three meets, the coach can then begin to call weights strategically.

The attitude of the best lifters is that personal records lifted while placing fifth are more rewarding than mediocre winning performances against low-level competition. In short, the first few meets should be a time of learning to lift in a meet. When the weights lifted reach a certain level of competency, then is the time to think about competing against lifters of approximately equal caliber.

**Immediately after a lift, the
lifter should not express
any signs of doubt over the
validity of the lift.**

Immediately after a lift, the lifter should not express any signs of doubt over the validity of the lift. The athlete should not turn to look at the official's lights to see if the lift is valid. Referees can change their minds, and the body language of the lifter can sway an official's decision.

If a first attempt is successful, the coach needs to determine how many attempts are remaining before the second attempt. If it is a large number, say five or greater, the coach needs to escort the athlete back to the warm-up area and perform a pull with a weight of at least 90 percent of the opening weight in order to encourage circulation and maintain warmth.

If the coach is working with several athletes in a given session, it may be necessary to have assistance available to help in the changing of the warm-up weights and in the counting of attempts for the timing of the warm-up.

The Final Bit of Advice

At some point any coach will need to learn the rules. They can be downloaded from the International Weightlifting Federation site [here](#). Read the rules and understand them. Furthermore, watch other veteran coaches and learn how they conduct the warm-up and performance.

So many of the factors in a competition are controllable if not foreseeable. An experienced coach can take the risk out of many of these factors and leave the athlete to do only what the athlete has trained to do—lift the weights!

Good luck with your first meet!



Marta Takano

About the Author

*Bob Takano has developed and coached some of the best weightlifters in the U.S. for the past 39 years. A 2007 inductee into the U.S.A. Weightlifting Hall of Fame, he has coached four national champions, seven national record holders and 28 top 10 nationally ranked lifters. Fifteen of the volleyball players he's coached have earned Division 1 volleyball scholarships. His articles have been published by the NSCA and the International Olympic Committee and helped to establish standards for the coaching of the Olympic lifts. He is a former member of the editorial board of the **NSCA Journal**, and an instructor for the UCLA Extension program. He is currently the chairperson of the NSCA Weightlifting Special Interest Group. For the past year he has been coaching in the Crossfit Oly Cert program. Website: www.takanoathletics.com*

THE CrossFit JOURNAL

End of the Line?

Is linear-progression strength training optimal for CrossFitters? Chris Mason doesn't think so and offers up a different method for building strength.

By Chris Mason

September 2010



Linear progression is a system utilized by many CrossFit practitioners for the strength-training component of their overall regimen. It is a proven and effective method to increase one's strength, but is it the most effective method, and in particular, is it the most effective method for CrossFitters?

The short answer is no, and the balance of this article will address why and offer an alternative system for optimized strength-training results.

Unsustainable Intensity

Linear progression as it relates to resistance training involves the progressive increase of loads in a straight-forward manner, hence the name “linear.” In other words, for a given exercise and prescribed number of sets and repetitions, the trainee will strive to regularly increase the loads used for their working (post warm-up) sets.

Let’s use the overhead press as an example. A trainee following a linear progression program might employ a 5x5 (5 working sets of 5 repetitions) format. Once the 5 sets of 5 reps can be completed with a given resistance, say 100 lb., the trainee will typically attempt to increase the load for his or her next session by a small increment (5-10 lb.). When the new load can be handled for 5x5 the weight is again increased, and so on for so long as the trainee can continue to do so.

The final statement in the paragraph above is the rub of linear progression. The program, while very simple and quite effective for beginners, is quickly exhausted of its effectiveness assuming one is training with the requisite intensity (the term “intensity” being defined in the classic weightlifting fashion as a percentage of one’s 1-rep-maximum lift) for building strength. The body’s response to resistance training, especially that of the high-intensity variety practiced with strength training, is one of fast adaptation initially, both in the form of contractile myofibril hypertrophy and neural adaptation to a given exercise.

Lean muscle hypertrophy quickly takes a back seat to neural adaptation, very likely due to the physiological “expense” of skeletal muscle (total caloric intake plays a part in the duration of the hypertrophy response, but I want to keep things as simple as possible for the moment). Increased skeletal muscular size is a tremendous burden on the chemical processes of the body, and the body seemingly does what it can to mitigate the amount of muscle added to deal with the stress of lifting heavy loads. Anyone who has trained with weights has experienced this overall phenomenon. It is generally called “beginner’s gains.”



D. ReCrossFit

Linear progression works for a time, but as athletes become more experienced, progress often stalls and new approaches are required for success.

The linear program, while very simple and quite effective for beginners, is quickly exhausted of its effectiveness assuming one is training with the requisite intensity.

Neural adaptation thus becomes the limiting factor with linear progression. Unlike with other forms of training (periodization, etc.), there is no real variation of the loads used from session to session. The trainee is working at a high intensity every training day. When the same movements are repeated each session (as is the case with most CrossFit linear progression practitioners) in this intense fashion, the nervous system quickly becomes overwhelmed in terms of its ability to continue to adapt. Much like the muscular system, there seems to be a point of no return or negative returns relative to the amount of high-intensity exercise the nervous system can tolerate.

The “fix” prescribed by the linear progression pundits for this rather rapid form of neural overtraining is to eat more and or take a break from intense strength training. Each of these solutions has problems. Excessive caloric intake leads to body fat and even potential health problems. It is only a temporary fix, as no amount of caloric intake can stave off neural overtraining for long. Time off is not really any better, as it leads to a detraining effect of one kind or another.

In fact, because skeletal-muscular recovery seems to be significantly faster than neural recovery, skeletal-muscular atrophy is a very real and common occurrence. This atrophy places the body in a literally weakened position that forces the nervous system to work even harder once one is back to training, and a yo-yo effect manifests itself. This is demonstrated millions of times per day throughout the world as well-intentioned trainees toil away with the same weights day in and day out. They used linear progression to get to a point, and no matter what they do they cannot get past it.

Managing Intensity, Building Strength

So, what is the fix? What form of strength training is optimal for the CrossFit practitioner?

The answer lies in a system of conjugate variation. The cornerstone of conjugate variation as taught by Louie Simmons of *Westside Barbell* is constant variation of exercises used to target given body parts or movements. So, for example, on the Westside maximum effort (ME) day for bench—where the lifters warm up to a 1-rep-maximum attempt (1RM)—Louie’s guys might floor press one week,



S. Dy/CrossFit

What strength program will help you lift this? If you're serious about training, you owe it to yourself to explore your options.



D. Smith/CrossFit

Unbridled intensity can lead to overtraining. Smart training with maximum intensity can lead to PRs.

board press the next, reverse band press the next, and then end the four-week cycle with full-range shirted bench presses.

Conjugate variety allows for repeated high-intensity training without neural overtraining for prolonged periods—even at the most elite levels of strength development. To help understand this phenomenon, one must know something of the science of motor learning. Motor learning involves skill acquisition relative to physical movement and how said skill may or may not transfer to other movements. One of the findings of motor learning is that physical movements which at face value appear to be very similar have very little skill transfer.

For example, the fastest runner in a straight line is not necessarily the fastest runner in a circle. Another example would be the skill of swinging a tennis racket. A great tennis player may be a very poor badminton player. Both sports involve swinging rackets, but the difference in the rackets and objects being struck makes the skill, or neural, requirements to play either sport vastly different.

This same concept is applicable to weight-training exercises. Even a minor tweak to a given exercise makes a significant difference to the nervous system. You see this concept in practice every week at Westside Barbell in Columbus, Ohio. As mentioned earlier, the Westside team switches main exercises for their ME days every week. Even alterations as seemingly minor as switching the bar used for squatting can make all the difference in terms of nervous-system recovery.

**Conjugate variety allows
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For instance, Louie's team might use a straight squat bar to perform box squats with bands for ME day one week, then switch to the Buffalo Bar the next week while still doing box squats with the same band tension. Both are similar, nearly identical movements to the eye but are experienced very differently by the nervous system, thus helping to preclude, or at least mitigate, central nervous system overtraining.

Another major factor in the efficacy of conjugate training relates to its addressing of weak points. With the Westside system, this happens in two ways. First, the fact the trainee is switching ME exercises weekly helps to address weaknesses by the inherent differences in the movements themselves. For example, if one has a weak lockout on the bench press, a board press or floor press will help to address it. If hamstrings and gluteus muscles are a weakness in one's squat, the good morning can help to address it, and so on. Second, if conjugate variety is the cornerstone of the Westside system, then assistance exercises (or "special" exercises) are the mortar. Louie's Westside system specifically targets individual's weaknesses via the extensive use of assistance exercises. This results in an athlete who is stronger and less prone to injury.

Training Hard and Smart

Now that you know why I believe conjugate variety is superior, why is it not used more extensively for strength training in the CrossFit world? I think many CrossFitters are first introduced to strength training with a linear progression model that's simple and easy to understand. The fact the program works quite well for a period of time creates a false sense of faith in its efficacy. When it invariably fails the trainee looks to other variables to explain the problem (diet, supplements, rest, etc.). Those who are still progressing continue to spread the word about how wonderful it is, thus further confusing those who have stagnated. This cycle continues simply because the involved parties don't know a better way. My hope with this article is that it will be a catalyst for CrossFitters everywhere to open their minds to a superior method of strength training.

Ignorance to a better way can also manifest itself as a form of fear. I have often seen on the CrossFit forums the argument that Westside methods or other forms of non-linear training are too complicated for the beginner, that they are even potentially dangerous. Nothing could be further from the truth!

First, how complicated is it to train with one speed day (dynamic effort, or DE) and one ME day per major exercise (bench and squat) weekly? How hard is it to switch the ME exercise each week? I suppose there could be an argument that targeting weaknesses can be somewhat difficult, but with the glut of information available via the Internet, even that is not truly a difficult chore for the properly motivated individual. Furthermore, the percentages used for the DE days are quite straightforward. If you can't figure 50 or 55 percent of a given number, then perhaps you should work on your mind a bit more than you are working on your body

What really puts the "too difficult for beginners" argument to bed in my mind is that fact that Louie Simmons has taken several very young trainees (early teens) and turned them into world-champion powerlifters (while still very young) using his system from Day 1. If you want to toss out the world champions as genetic freaks, they can easily be replaced by an army of Simmons-trained young men and women who have improved their strength and athletic performance dramatically.

Louie's conjugate variety system works just as well for beginners as it does for elite athletes. In Louie's own words, "Why would someone want to learn how to train less than optimally?"

Why indeed?



About the Author

*Chris Mason is the co-owner of [AtLarge Nutrition](#). Chris has been involved with bodybuilding and powerlifting for over two decades. He is an accomplished writer in the genre, having published articles in **Athlete**, **Planet Muscle**, **Ironman** and **Powerlifting USA** magazines, as well as online. You can view several of his articles on his website [WannaBeBig.com](#). Chris currently resides in Charlottesville, Va., and makes monthly treks to Ohio to train at [Westside Barbell](#) with Louie Simmons. He is also a member of Louie's team for CrossFit Powerlifting Certs.*

THE CrossFit JOURNAL

Lifting to Save a Pair

Zionna Munoz has started a new program to support the fight against breast cancer.

Robert Wilson explains how Amazing Grace: Barbells for Boobs got its start.

By Robert Wilson

September 2010



All images courtesy of Spike Sales LLC

The CrossFit community is no stranger to fundraisers. And CrossFitters are no strangers to going against the grain, even if that means putting themselves on the line.

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So much of CrossFit training embraces the ideals of focus, concentration and working through those toughest of moments. That's when it's best to have a community of supporters around you. The benefit from tough mental training that comes from CrossFit spills over into everyday life, including when dealing with the hardships faced by family and friends. This is one of the reasons CrossFit is more than just a gym, and CrossFitters are never more a true community than when they stand by one another to support a cause. Whether they're supporting firefighters, soldiers or a loved one, CrossFitters step up and get things done.

One of these CrossFitters is Zionna Munoz, founder of Mammograms in Action, a non-profit organization dedicated to providing funds to women who have trouble gaining access to mammograms. Many in the CrossFit community know Zionna simply as "Z." She's been involved with CrossFit since 2007 and was co-owner of CrossFit Next Level Performance in Lake Forest, Calif. What everyone is coming to know her for now, however, is her quest to save boobs—and lives.

Fired up to Fight

Many of us have in some way been affected by breast cancer. According to the American Cancer Society report [Breast Cancer Facts & Figures 2009-2010](#), "Excluding cancers of the skin, breast cancer is the most common cancer among women, accounting for nearly 1 in 4 cancers diagnosed in US women."

While it's often our mothers, sisters, wives and friends who contract the illness, we all live with it, and we can all do something about it. Two women—one who's a CrossFitter—and one organization made possible through CrossFit are doing something about it right now.

**While it's often our mothers,
sisters, wives and friends who
contract the illness, we all
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something about it.**



***Zionna (Z) Munoz is the link between
CrossFit and the fight against breast cancer.***

Zionna met her friend Cecy nearly 10 years ago in Long Beach, Calif. They stayed close over the years, and both women were committed to keeping fit. As young, healthy women, cancer wasn't an issue that was foremost in their minds. Not even the doctors were worried when Cecy mentioned she felt something in her breast that clearly wasn't right. During her appointment with her doctor, she was told that she was young and not in need of a mammogram. She was told to come back when she was 40. Cecy was 26 at the time. The issue wasn't a lack of insurance. Cecy had a good job with good health coverage, but it was clear that a mammogram wasn't something the doctor wanted to order.

Over the next several months, Cecy's pain and discomfort hadn't subsided. While the physical problems persisted, the worry and the mental pain only grew stronger. She finally made the decision to return to the doctor and demand a mammogram. When the results came back, Cecy was diagnosed with Stage 0 DCIS breast cancer.

As Zionna would find out one late night after recently opening her new gym, Cecy was scheduled for a mastectomy just two weeks later. Zionna sat quietly that night reading the message from Cecy, which asked only for the support and presence of her close friends. She felt shock. Cecy wanted her friends with her, but Zionna realized that Cecy was worried more about her friends and family than she was about herself. Zionna also asked herself why a message was sent to everyone so matter-of-factly.

As she sat and thought and worried, she began to understand why.

"Who wants to talk about that subject, the subject of losing your boobs?" she asks.

It isn't completely clear how much the disease progressed in the time between Cecy's first visit to the doctor and her actual diagnosis, but the point of Cecy's story, and the mission statement of Mammograms In Action, is that women, regardless of age, financial status or ability to produce a health-insurance card, should be able to be screened for breast cancer.

As she learned more about what her friend had gone through and about how difficult it is for a woman *without* money or insurance to get any help with screening, Zionna began to get angry. The helplessness was the worst part of it for her.

"Family and friends shouldn't have to go through that," she insists.

What ate away at her was knowing that there really wasn't anything she could do aside from trying to make her friend feel a little more comfortable. This is where Mammograms in Action began. And this is where CrossFit helps make things happen.

Amazing Grace Is Born

Zionna knew she needed to take some action, either that or go insane.

"I'm a fixer," she says, "I needed to do something."

She knew CrossFit was big on fundraisers. She had seen plenty of them over the years, but she realized that they were almost always geared towards men. The anger she felt over her friend's situation fueled her drive to take action and create her own fundraiser with the help of her CrossFit family.



Relying on the tightly knit CrossFit community, Munoz is using Amazing Grace to get mammograms for the women who need them.



A small event that started in Corona Del Mar, Calif., is now a global phenomenon.

During the summer of 2009, the germ of an idea began to grow in Zionna and led to an event that was nameless at the time. She explains that she got some friends together and “loaded a bunch of weights up in the truck and headed down to the beach.” This was how the “fundraiser” began. Zionna describes it as being a very organic and somewhat confusing process to get underway, but she also describes it as an absolutely amazing experience.

All throughout October, which is breast-cancer awareness month, CrossFit gyms around the globe will hold their own Amazing Grace fundraising WOD event.

The workout? “Amazing” Grace. Yep, 30 clean and jerks for time. After realizing that it was too overcast to hold the event at Corona Del Mar beach as planned, Amazing Grace was moved to a nearby gym, Shape-Up Fitness Center, also in Corona Del Mar, Calif. They didn’t really know what to expect that day, but with nearly 50 people participating they were able to raise \$2,000. The event was professionally taped and photographed, T-shirts had been printed and were handed out, and the sun poked through as well. Some impressive times were put up, making it quite a competitive event. The topper came when Coach Greg Glassman put up a matching grant, bringing the total raised to \$4,000.

The amazing thing about the matching grant, and the entire day, is that with the money raised Zionna was able to fully realize her vision of a non-profit organization dedicated to helping women avoid the horrible events Cecy had endured. Zionna is now gathering a truly staggering amount of support from the CrossFit community. As of this writing, there are already over 150 affiliates worldwide committed to sponsoring this event. She has also gathered a good number of sponsors, including Reebok, the *CrossFit Journal*, Lululemon Athletica and Spike Sales LLC, the later of whom redesigned Zionna’s website.

It’s also important to mention that the fundraiser has been named. The celebration after last year’s event took Zionna and several friends to a local bar near the gym, where after several pints someone blurted out, “Barbells for Boobs!” And it stuck. This year, the Amazing Grace—Lifting Barbells for Boobs fundraiser, the first CrossFit fundraiser geared specifically toward women, will be held across the world, and for an entire month. That’s quite an amazing journey in a short time.

All throughout October, which is breast-cancer awareness month, CrossFit gyms around the globe will hold their own Amazing Grace fundraising WOD event with 100 percent of the proceeds going to Mammograms in Action, which will “provide funding for qualified women who need screening and/or diagnostic procedures in the prevention of breast cancer.”



CrossFitters, like anyone else, go through every emotion imaginable during everyday life, sometimes even within a particularly killer WOD. While anger and frustration fueled Zionna's drive to make a difference in the lives of women and those who love them, determination and perseverance saw her project through to completion. She wants young women to be proactive with their health and their fitness. She wants women to educate themselves about their family medical history and to research what they aren't sure of. She strives to encourage everyone, especially young women, to get involved, whether it's with their health and fitness or any other important aspect of their lives. And Zionna is determined to empower young women to put their foot down and insist they get the screening and treatment they deserve.

Mammograms for the Masses

At the helm of Mammograms in Action, Zionna is already making a difference. After raising funds last year, they have already begun funding mammograms.

According to 2010 breast-cancer statistics as reported by breastcancer.org, "About 40,170 women in the U.S. were expected to die in 2009 from breast cancer, though death rates have been decreasing since 1990. These decreases are thought to be the result of treatment advances, earlier detection through screening, and increased awareness." Raising awareness and helping to provide the means for screening are the primary goals for this fundraiser.

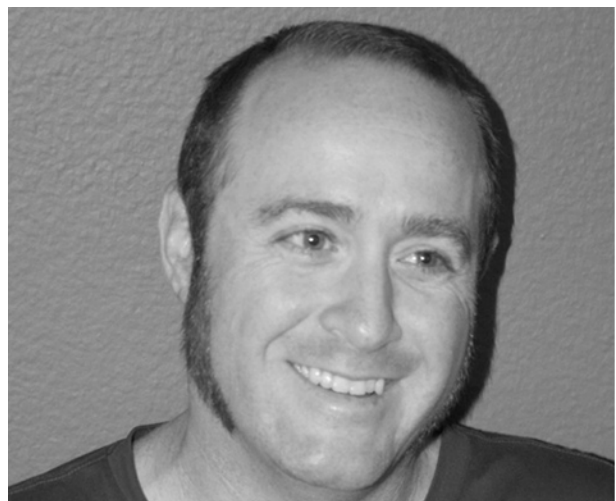
In explaining the choice of workouts for this event Zionna says this: "Grace, to me, is one of the hardest workouts. You have to have a lot of strength and courage to finish it. Every single woman that has breast cancer is an amazing grace to me."

As the Mammograms in Action team travels to visit some of the participating boxes around the country that are participating, you can follow along with them at their newly redesigned website barbellsforboobs.org.



About the Author

Robert Wilson is the lead copywriter at Spike Sales LLC and was instrumental in developing Spike's new division, Forging Elite Marketing, an all-in-one web and marketing solution created specifically for CrossFit affiliates. Robert is a local lacrosse coach, hockey player and avid runner and lives with his wife and two kids in Southern California.



THE CrossFit JOURNAL

By the Numbers

Members of Flatirons CrossFit set out to get hard data about the effects of the Paleo Diet and CrossFit workouts. Amy Santamaria and Tim Retzik report their findings.

By Amy Santamaria and Tim Retzik Flatirons CrossFit

September 2010



Courtesy of Flatirons CrossFit

As more members of the CrossFit community adopt a Paleo Diet, there is a great need for data quantifying the benefits of such a diet. We hear plenty of anecdotal evidence for Paleo-related improvements, including weight loss and leaner body composition, improvements in cholesterol and other blood markers, increased strength and metabolic conditioning, reduced pain and improved immune response, and better energy and mood.

But how reliable are these unsubstantiated claims? Those recommending a switch to Paleo need a foundation of results and critical evaluation.

The Study

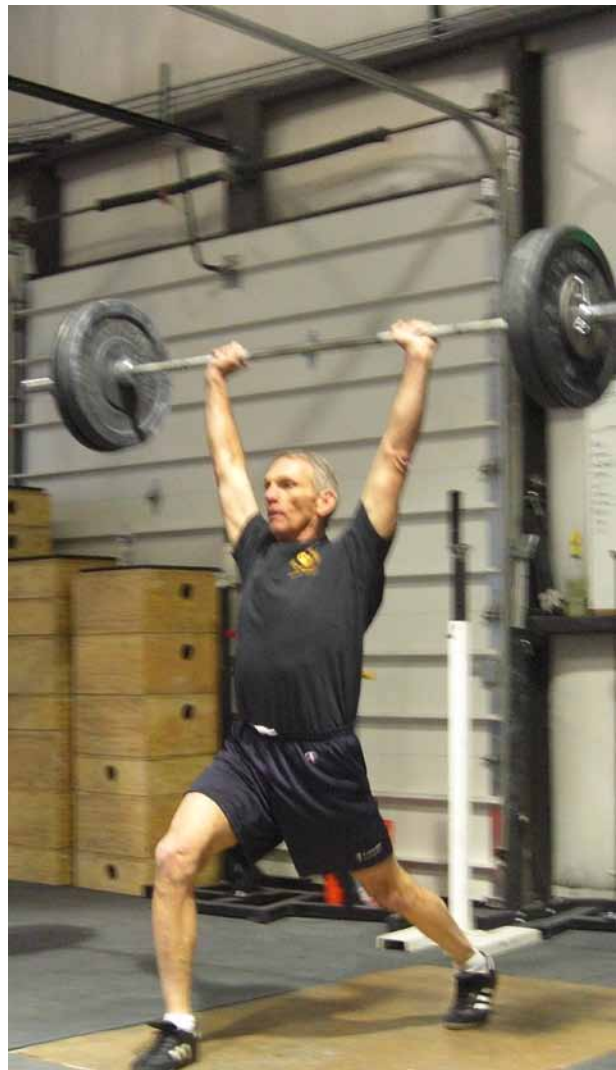
To encourage their members to try out the Paleo Diet, many CrossFit affiliates are embarking on Paleo “challenges,” often with a competitive element to help with motivation. At our affiliate, Flatirons CrossFit, we tried that, but only a few people stuck with the diet long-term, so the second time around we tried a different approach. We decided to embark on a Paleo study rather than a challenge. There was no competitive element; rather, affiliate members agreed to participate in a scientific investigation following the standard guidelines for experimentation with human participants. This meant that they committed to participating, filled out consent forms, followed an experimental protocol, provided data at regular intervals, and participated in an interview and debriefing at the end of the study.

We chose to do a study rather than a challenge for several reasons:

1. To add to the body of data evaluating the effects of a Paleo Diet.
2. To provide a template/example for other affiliates wishing to add to the body of data.
3. To encourage our members to try Paleo in a non-competitive, supportive context and judge the results for themselves.

Participants agreed to eat a Paleo-Zone diet for eight weeks. The Paleo Diet is based on the diet of our human ancestors from the Paleolithic era. The modern interpretation of Paleolithic nutrition includes meat, vegetables, fruit, seeds and nuts. It omits all grains, dairy, refined sugar, soy, and starches like potatoes and legumes. The Zone part (see *Enter the Zone* by Dr. Barry Sears) refers to portion sizes and macronutrient ratios. The Zone ratio is 30 percent protein, 40 percent carbohydrates, and 30 percent fat. The Zone Diet uses “blocks,” which refer to certain benchmark portion sizes to save you from doing calculations all the time. Paleo-Zone simply refers to a diet based on Paleo foods with Zone portions/ratios.

In addition, participants agreed to track their compliance and several other factors in a daily log, train regularly, get body-composition measures taken every two weeks throughout the study, and get performance measures and blood work (a lipid profile) taken at the beginning and the end of the study.



Courtesy of Flatirons CrossFit

Many people think a Paleo Diet improves performance, but the authors wanted to bolster anecdotal claims with hard numbers.

We hypothesized that:

1. Cholesterol and triglyceride measures would improve, particularly for participants outside the normal range.
2. Strength and metabolic-conditioning performance would improve on average.
3. Subjective wellness measures (energy and affect) would improve throughout the study.
4. Body composition would improve (weight loss and lowered body-fat percentage).



Members of Flatirons CrossFit volunteered for a non-competitive eight-week study in which their athletic performance and their body composition and blood profile would be evaluated.

Participants

All participants were members of our affiliate who volunteered for the study. The sample we chose certainly shows a self-selection bias: motivation, dedication and health, and fitness levels of CrossFitters are likely higher than in the general population. Furthermore, this was a subset of CrossFitters who were motivated and dedicated enough to change up their diet for eight weeks and make a number of study-related commitments.

Recruitment

Participants were recruited with announcements on our affiliate's website. All participants received a thorough written description of the study, attended a lecture on eating Paleo-Zone given by our resident nutrition expert, and gave informed consent to participate. Potential benefits of participating included:

- Participation in a scientific investigation to benefit the CrossFit community and beyond.
- An improved understanding of the real effects of a Paleo-Zone diet on performance and physiological measures of health.
- An individualized data profile of performance and physiological measures, with analyses of sleep, training and eating patterns over two months.
- A chance to experiment with diet and potentially see big gains in health and fitness.

Participant Background Information

A total of 21 participants volunteered for the study, ranging in age from 18 to 59, with an average age of 37.5 ($s = 9.8$). There were 13 men (average age 40.4) and 8 women (average age 32.8). There were no existing medical conditions other than high cholesterol (5) and exercise-induced asthma (1). At the beginning of the study, participants averaged:

- 11.9 months of CrossFit experience ($s = 5.7$, range: 5-21 months).
- 3.5 training days per week ($s = 1.1$, range: 1.5-5 days).
- 7.3 hours of sleep per night ($s = 0.8$, range: 6-9 hours).

We asked them to rate their current diet on a scale of 1-10, with 1 being unhealthy and 10 being healthy, and ratings averaged 6.9 ($s = 1.4$, range: 4-9). We also asked them to rate their motivation to change their current diet, and ratings averaged 8.0 ($s = 2.0$, range: 2-10). Eleven of the 21 participants reported that someone else in their household was also eating Paleo.

A total of 15 participants completed the study, and 6 dropped out. Six of those 15 participants were missing one or more measures: two were missing blood work, three were missing end-of-study performance measures (strength and met-con) due to illness or injury, and one was missing both.

The 15 participants who completed the study ranged in

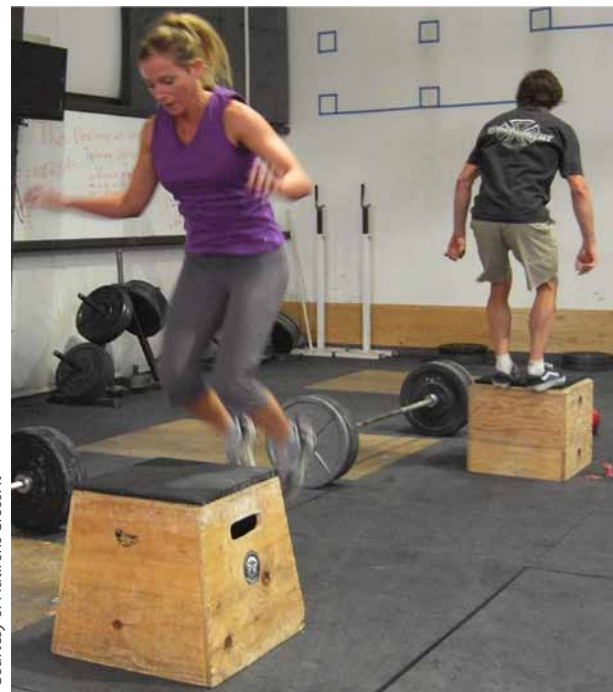
age from 25 to 59, with an average age of 38.7 ($s = 10.0$). There were 11 men (average age 41.7) and 4 women (average age 30.3). At the beginning of the study, these 15 participants averaged:

- 11.6 months of CrossFit experience ($s = 4.8$, range: 6-20 months)
- 3.6 training days per week ($s = 0.9$, range: 1.5-5 days)
- 7.4 hours of sleep per night ($s = 0.7$, range: 6-8 hours)

Their healthiness-of-diet ratings averaged 6.4 ($s = 1.3$, range: 4-9). Their motivation-to-change-diet ratings averaged 8.5 ($s = 1.1$, range: 7-10). Six of these 15 participants reported that someone else in their household was also eating Paleo.

Reasons for Participating

We asked participants why they chose to volunteer for the study, and they gave several reasons. Of the original 21 participants, 11 mentioned performance, nine mentioned health, and three specifically mentioned cholesterol. Seven mentioned body composition—wanting to lean out or lose weight.



Courtesy of Flatirons CrossFit

Study participants were all CrossFitters, and 11 of them chose to participate in hopes of improving performance.

Measures

We collected a wide range of measures to investigate the effects of switching to a Paleo Diet. They included body-composition measures, physiological measures (blood work), performance measures (strength and metabolic conditioning), subjective measures, and compliance measures.

Body-composition measures included weight, percent body fat and waist circumference in inches. Percent body fat was measured with a scale that required inputs for height, sex, age and activity level. Scales that measure body composition are not entirely accurate, but because we were interested in before and after differences for individuals and not absolute values of body composition, the scale suited our purpose and was more convenient for multiple measurements than some of the more involved and expensive methods of body-fat measurement.

Physiological measures included total cholesterol, HDL, LDL, VLDL (when available) and triglycerides. These measures are part of a standard lipid profile. Participants went to their usual doctor or ordered a kit from bloodtestsathome.com.

Performance measures included both strength measures and metabolic-conditioning (met-con) measures. For strength we used the CrossFit Total (deadlift, back squat and press), and for met-con we used the CrossFit workout Christine, which is 3 rounds for time of a 500-meter row, 12 body-weight deadlifts and 21 box jumps.

Subjective measures included daily self-ratings of energy and affect ("How did you feel today, overall?"). Participants rated these on a scale of 1 to 10, with 1 being worst and 10 being best.

Compliance measures included daily self-reports of Paleo compliance and training compliance. For the study, participants agreed to consume at least 90 percent of their calories from Paleo foods and to train at least three days a week.

Participants also recorded hours of sleep per night to track overall wellness.

Subjective measures, compliance measures and sleep were recorded in an online log (a Google spreadsheet) that was shared only with the study administrator to protect the participants' privacy.

Method

Participants were told that the study would require an eight-week commitment. They were told that by agreeing to participate in the study, they agreed to:

1. Eat a Paleo-Zone diet, which means eating no more than 10 percent of your calories each day in non-Paleo foods and trying to stay within approximate Zone portions and ratios (which may be adjusted for individuals; e.g., 2x fat, half carbohydrates, etc.).
2. Get blood work done. They needed to do this two times: once before and once after the eight-week study period, at their regular doctor. If they did not have a regular doctor, we recommended a convenient laboratory alternative, bloodtestsat home.com.
3. Get weight and body composition measured at the beginning of the study and every two weeks throughout the eight weeks of the experiment. These measurements were taken at Flatirons CrossFit and were kept confidential.
4. Perform a collection of benchmark strength and metabolic-conditioning tests, once before and once after the eight-week study period. These tests took place at Flatirons CrossFit.
5. Keep a daily log for eight weeks, answering several questions regarding adherence to diet, hours of sleep per night, whether they trained, whether they visited a Paleo-Zone support site set up for the study. They also self-rated affect and energy levels. They signed off on these logs once a week.
6. Train at least three times a week for the eight-week study period.

Participants were told that all their information would remain confidential and that their data would not be individually identifiable in any public documents.



Courtesy of Flatirons CrossFit

Study participants agreed to work out a minimum of three times per week during the study.



Courtesy of Flatirons CrossFit

Participants kept daily logs throughout the study to keep track of adherence and any anomalies that might affect the study.



Before the study, all participants were given a lecture on nutrition to ensure they understood Paleo/Zone protocols.

Results

Reported results exclude two identified outliers. In addition, results for different measures are based on different numbers of participants. This is because some participants provided incomplete information; for example, some were injured during the study and unable to complete a second set of performance measures, but they still provided body composition and physiological measures. A few participants opted not to get blood work completed. Complete descriptive statistics, including measures of central tendency and variability, are available in Tables A-D (see end).

Body-composition measures (13 participants)

On average, participants lost 7.1 lb. over eight weeks, ranging from a minimum of 2.6 to a maximum of 15.8 lb. They also lost up to four inches from waist circumference, with an average of 1.4 inches, and up to 12.8 percent body fat, with an average loss of 3.0 percent and, at worst, a gain of 0.6 percent body fat.

Physiological measures (11 participants)

On average, participants' total cholesterol dropped 17 points, with a maximum drop of 106 points. HDL rose on average 1 point, with a maximum gain of 55; LDL dropped on average 18 points, with a maximum drop of 85; and triglycerides dropped on average by 1, with a maximum drop of 42. We had VLDL measures for four participants; it dropped on average 1 point, with a maximum drop of 9. We would expect the largest changes from participants who started with above-normal cholesterol levels (over 200). There were five participants who fit this description. When we look at only these five, their total cholesterol fell on average 48 points, HDL rose by 1 point, LDL fell by 46 points, and triglycerides fell by 15.

Performance measures (9 participants)

Relative strength measures, which are weights lifted divided by body weight, all improved. On average, relative deadlift improved by 8 percent, relative back squat improved by 9 percent, and relative press improved by 3 percent. Relative CrossFit Total improved by 20 percent, on average, ranging from -1 percent to +38 percent. All participants improved on the met-con workout (Christine), with an average improvement of 69 seconds. Improvements ranged from 29 to 165 seconds.

Subjective measures

Energy and affect ratings were similar for participants and across time. Energy averaged a rating of 6.7 across the study, and affect averaged 6.8. Average ratings stayed within a small window (6-7) throughout the study, rose slightly over the first three weeks and then stayed fairly steady.

Compliance and other measures

Compliance with the eating guidelines was good, with participants averaging 6.1 days per week of staying 90 percent Paleo. Paleo compliance stayed close to 6 days per week throughout the study. Training compliance was also good, with number of training days averaging 3.8 (we set a minimum of 3), and it stayed steady throughout the study, with the exception of participants who experienced an illness or injury during the study period. Hours of sleep per night averaged 7.4. Sleep increased a bit from Week 1 to Week 2 but stayed fairly flat throughout the rest of the study.

Two Examples

In addition to the group results, we would like to highlight the experience of two of our participants. Both participated in the study because of concerns about health and, in particular, cholesterol levels. Both saw the improvements they were hoping for at the end of just eight weeks. In fact, their improvements exceeded their expectations.

The first participant lost nearly 16 lb. and 2 inches off his waist and also dropped his percent body fat. At just over 6 feet tall, he went from 205 to 189 lb. and from a 37- to a 35-inch waist. His percent body fat went from 17.4 to 15.7. His given reason for participating was to lower his cholesterol based on a recommendation from his doctor, and he did just that. He started with a total cholesterol measure of 240 (over 200 is considered "high") and dropped to 197, his HDL ("good cholesterol") went up from 43 to 55, his LDL ("bad cholesterol") dropped from 173 to 127, his VLDL cholesterol dropped from 24 to 15, and his triglycerides dropped from 118 to 76.

The second participant, at 5 feet 9.5 inches tall, went from 186 to 178 lb., and from a 36-inch waist to a 34-inch waist. He dropped his percent body fat by more than 2. His blood work also revealed big changes. He started the experiment with the highest total cholesterol of all the participants, at 339. By the end of the eight weeks, his total cholesterol had dropped to 233, an improvement of over 100 points, putting him much closer to the 200-point cut-off used by physicians. His LDL cholesterol dropped from 225 to 140, and his triglycerides dropped from 292 to 250.

These were impressive changes over just eight weeks, especially keeping in mind that only the type of food was regulated and the amount was not limited in any way. While there is debate about the value of blood cholesterol levels in predicting health outcomes (see extensive review and discussion in Gary Taubes' *Good Calories, Bad Calories*), most of us must answer to our family physician's concern about elevated cholesterol. To show that a Paleo Diet not only does not increase cholesterol levels but can actually drastically reduce them provides people with some justification for trying a nutrition plan that is not advocated or even accepted within mainstream medicine. For these two participants, impressive numbers overcame the skepticism of their doctors.

Feedback From Participants

Twelve participants provided written feedback about their participation in the study. We asked them to evaluate their experience and about their perceived improvements, support during the study, and their future diet plans.

Evaluation of the Study

What was your overall experience with the study?—Ten of the 12 responding participants indicated that their experience was only positive. The remaining two had a mixed experience, noting that it was challenging or that they didn't feel "good" during the study but that they felt that it was worth it.



Courtesy of Flairons CrossFit

After the study, both strength and met-con numbers were up on average.

Did you get what you hoped to get from participating in the study?

Ten of the 12 participants said that they did get what they hoped for from the study. The remaining two had mixed responses.

What did you like about participating in the study?

Seven of the participants indicated that they liked the accountability and structure of the study to keep them on track. Three mentioned health improvements, three mentioned the challenge of experimenting with new foods, and two said they liked the support from the study.

What do you not like/what difficulties did you encounter during the study?

Three participants mentioned difficulty planning meals, and three mentioned cravings or hunger. Problems getting enough energy and enough variety were also mentioned.

Do you feel that your strength and conditioning improved (rate on a scale of 1-10)?

The mean rating was 6.5 ($s = 2.1$), with ratings ranging from a minimum of 3 to a maximum of 9.

Do you feel that your body composition improved (rate on a scale of 1-10)?

The mean rating was 6.8 ($s = 2.5$), with ratings ranging from a minimum of 1 to a maximum of 10.

Did anyone not officially part of the study eat Paleo with you?

Eight of the 12 responding participants had support from someone not officially part of the study (usually a spouse or partner).

Did you feel you had enough support throughout the study?

All but one of the responding participants indicated that they had enough support. The remaining participant indicated that he or she did not actively seek support.

Do you plan to continue eating a Paleo or primal diet now that the study is over?

All 12 responding participants indicated that they planned to continue to eat Paleo after the study. Five qualified this statement somewhat ("mostly" or "with cheats now and then").



Courtesy of Flatirons CrossFit

After the study, most participants reported that they would continue eating Paleo.

Courtesy of Flatirons CrossFit



More research is needed to confirm the results of the study, and every CrossFit box is a lab.

If so, do you plan to make any changes to how you eat from how you ate during the study?

Almost all of the proposed changes were to reduce strictness, allowing a cheat meal or food now and then, or allowing them to experiment with occasionally adding back in a specific food, such as oatmeal or beans or dairy. Two indicated that they would adjust macronutrient ratios (carbohydrate/protein/fat).

Discussion

In summary, we saw positive results across the board.

Body-composition improvements were moderate in most participants and large in a few. On average, over the eight-week study, participants lost about 7 lb., 1.5 inches off their waistlines, and 3 percent body fat. The largest losses were 16 lb., 4 inches, and 13 percent body fat. While cholesterol, LDL, and triglycerides all fell on average, the largest drops were for the five participants who started the study with what is considered above-normal cholesterol (over 200). Their total cholesterol fell on average 48 points, LDL fell by 46 points, and triglycerides fell by 15, with maximum drops of 106, 85, and 42, respectively.

Relative strength measures all improved; the relative CrossFit Total improved on average by 20 percent (and up to 38 percent). All participants improved on the met-con workout, with an average improvement of over a minute. Of course, we would expect to see these improvements over time with consistent training, and without a control group, we cannot be certain that the improvements in performance were due to the change in diet. However, it is encouraging to see improvements in these measures over just eight weeks.

Self-reported energy and affect stayed relatively stable across the study, on average. Compliance with the eating guidelines was good throughout the study, with participants staying 90 percent Paleo more than six days a week. Training compliance was excellent; we set a minimum of 3 days per week, and participants averaged 3.8 days per week (not including periods of injury or illness).

In addition, our attrition rate was fairly low. We lost only six of the 21 affiliate members who volunteered for the study. Twelve of the 15 participants who completed the study provided written feedback about the study, and all of them indicated that they planned to continue to eat a Paleo Diet, which is extremely encouraging.

Because we don't have a random or representative sample from the general population, we can't claim that our study results generalize to the population at large. However, we believe they likely do generalize to other CrossFitters, and so we wanted to publish them here to make them available to other CrossFitters. In addition, we hope that this study can lay the foundation for other researchers to conduct more rigorous investigations of the effects of a Paleo Diet in a broader population.

We hope that other CrossFit affiliates can use this study as an example if they wish to embark on in-house Paleo challenges. We found that taking a study approach fostered a supportive and positive atmosphere rather than a competitive one, and this resulted in better commitment and morale among our members. Overall, our participants saw improvements across a variety of measures including body composition, physiological measures, and athletic performance. A large proportion of participants had a positive experience and plan to stick with the new eating habits they learned. The study also piqued interest in members who did not participate in the study.

To conclude, we would like to share some of our favorite quotes from participants:

- "It was life-changing for me: my cholesterol levels dropped to acceptable levels after years of 'healthy eating' as I saw it."
- "I enjoyed the overall experience and thought it was well worth the dedication."
- "The Paleo approach was challenging because it is such a change from my normal way, but I've become accustomed to it and will continue."
- "It forced me to address my diet in a structured way and provided me an excellent alternative to statins."
- "Commitment to the study made it harder to 'blow off' the diet. Sticking to the diet felt good. No sugar crashes. No bloating."
- "I rarely had an upset stomach while eating Paleo foods. Also, I felt energized when I woke up instead of ill and sluggish."
- "Hard at first to eat a variety of Paleo foods. Practice with new recipes made it easier over time."
- "I think I ate too many fat blocks (curse you, almond butter!)."
- "I improved in all areas that were measurable. I developed new habits for food choices."



	Weight Lost (pounds)	Inches Lost (waist)	% Body Fat Lost
Mean	7.1	1.4	3.0
Median	6.0	1.5	1.8
Min	2.6	0.0	-0.6
Max	15.8	4.0	12.8
Std. Dev.	3.8	1.0	3.7
Count	13	13	13

Table A: Body-Composition Results

	Deadlift Change (% body weight)	Back Squat Change (% body weight)	Press Change (% body weight)	CF Total Change (% body weight)	Met-Con Improvement (seconds)
Mean	8	9	3	20	69
Median	6	12	3	27	41
Min	1	-2	-2	-1	29
Max	22	18	7	38	165
Std. Dev.	7	8	3	15	48
Count	9	9	9	9	9

Table B: Relative Strength Results

	Total Cholesterol Change	HDL Change	LDL Change	Triglycerides Change	VLDL Change
Mean	-17	1	-18	-1	-1
Median	-6	-7	-15	1	1
Min	-106	-17	-85	-42	-9
Max	41	55	43	55	3
Std. Dev.	43	21	39	27	5
Count	11	11	11	11	5

Table C: Blood Cholesterol and Triglycerides Results

	Total Cholesterol Change	HDL Change	LDL Change	Triglycerides Change
Mean	-48	1	-46	-15
Median	-43	3	-46	1
Min	-106	-13	-85	-42
Max	-6	12	-15	8
Std. Dev.	39	10	27	25
Count	5	5	5	5

Table D: Blood Cholesterol and Triglycerides for Participants With Total Cholesterol >200.

Courtesy of Amy Santamaria



About the Authors

Amy Santamaria is a member at [Flatirons CrossFit](#) in Boulder, Colo. and has a Ph.D. in psychology and neuroscience. She has been involved in CrossFit for two years and has been strict Paleo for over a year. Her background in research and her improvements in health and fitness after switching to a Paleo Diet came together to inspire this study. Amy blogs about her CrossFit experiences at [KnitFit](#).

Courtesy of Tim Retzik



Tim Retzik owns and runs [Flatirons CrossFit](#) in Boulder, Colo. His motivation for carrying out this study was to encourage more members to try a Paleo Diet and judge for themselves whether it improved their health and fitness.