

THE INFLUENCE OF BODY MASS AND BODY SIZE ON  
PERFORMANCE OF THE AIR FORCE  
PHYSICAL FITNESS TEST

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## **CHAPTER I**

### **INTRODUCTION**

Physical fitness tests are commonly used to assess health, skill, and functional fitness in numerous settings and across a variety of populations. For example, youth fitness tests have been developed to assess health-related fitness in children and adolescents in order to evaluate their potential for healthy outcomes as adults (Haydon & Squires, 1988; Lloyd, Bishop, Walker, Sharp, & Richardson, 2003). Adult fitness evaluations can be used to determine present health-related fitness levels and to help develop appropriate fitness programs (Silverman, Keating, & Phillips, 2008), while military fitness assessments are required for all military personnel to ensure they are healthy, fit, and combat ready (Department of Defense, 2002).

Military fitness tests typically include components that evaluate aerobic capacity, muscular strength and endurance, and body size/composition. Each branch of the United States military has developed different modes to assess each of the factors. Specifically, the U.S. Air Force utilizes the 1.5 mile run to assess cardiorespiratory fitness, the one-minute crunch and push-up test are used to evaluate

abdominal and upper body muscular strength and endurance respectively, and Body Mass Index (BMI) and abdominal circumference (AC) are the selected methods to measure body composition (U.S. Air Force, 2006).

Fitness tests for military personnel require primarily weight-bearing activity, and are consequently disadvantageous to members with higher body mass or body composition measurements (Vanderburgh, 2007). Although a lower body mass may be an advantage for these weight-bearing tests, some demanding military field work requires absolute strength and power that is typical in members with a greater lean body mass. However, individuals with a greater lean body mass tend to be penalized during military fitness testing (Vanderburgh, 2008).

Recent research has attempted to find methods to alleviate this body mass discrepancy (Vanderburgh, 2007, 2008; Vanderburgh & Crowder, 2006). Various techniques have been proposed, including the use of correction factors, or allometric scaling. It has been hypothesized that when correction factors, or allometric scaling, are applied to actual fitness scores, the resulting adjusted scores are free from body mass bias (Vanderburgh, 2007).

Previous research has failed to determine the validity of the published correction factors (see appendix A) for adjusting military test performances based on body size. An examination of these methods is essential for ensuring a consistent and accurate appraisal of all military

members' fitness levels. Previous research has also failed to determine the effect of correcting military fitness test performances based on BMI or AC. Body mass index might better correct for actual lean body mass since it is a ratio that considers body mass relative to height. Likewise, AC may also be useful in adjusting fitness scores based on body size, since AC is highly correlated with body composition. Because of this body mass discrepancy, there is a clear need for research that considers the effect of BMI and AC on performances of military fitness test components in order to account for variations in body mass and/or size.

### **Purpose of the Study**

The purpose of this study is to cross validate previously researched correction factors for body mass bias in military physical fitness tests. Data will also be used to develop regression models that will remove all bias from body mass, body mass index, and AC measurements in fitness test results from the United States Air Force military members' fitness test scoring procedures.

### **Hypotheses**

Based on the Vanderburgh corrected fitness scores, it is hypothesized that:

1. There will be no correlation between body weight and the corrected 1.5 mile run times, crunches, and push-up scores.

2. There will be no correlation between the corrected 1.5 mile run times and either BMI or AC.
3. There will be no correlation between the corrected push-up scores and either BMI or AC.
4. There will be no correlation between the corrected abdominal crunch scores and either BMI or AC.

Based on the regression-model-adjusted fitness scores, it is hypothesized that:

1. There will be no correlation between 1.5 mile run times and body weight, BMI, and AC.
2. There will be no correlation between push-up scores and body weight, BMI, and AC.
3. There will be no correlation between abdominal crunch scores and body weight, BMI, and AC.

### **Operational Definitions**

1. Physical Activity: Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure
2. Physical Fitness: A set of attributes that people have or achieve that related to the ability to perform physical activity
3. Maximal Oxygen Uptake (VO<sub>2max</sub>): The maximal capacity for oxygen consumption by the body during maximal exertion

4. Body Composition: A health-related component of physical fitness that related to the relative amounts of muscle, fat, bone, and other vital parts of the body.
5. Body Mass Index (BMI): Measurement of body size, calculated by dividing weight in kilograms by height in meters squared
6. Anthropometry: The science of measurement applied to the human body, generally includes measurements of height, weight, and selected body girths

#### **Delimitations of the Study**

1. This study is delimited to male and females assigned to Headquarters Air Force Personnel Center located at Randolph Air Force Base in San Antonio, Texas.
2. Subjects will range in age from 19 to 63 years of age.
3. All subjects must have completed all four fitness testing components consisting of the 1.5 mile run, one-minute push-ups, one-minute crunches, and abdominal circumference measurements.
4. All subjects must have completed their fitness assessment no more than one year prior to May 31, 2009.
5. Subjects will be excluded if they have received any prior health or fitness related intervention strategies.

### **Significance of the Study**

Since fitness is key to all military missions, the Air Force Physical Fitness Test (PFT) is a necessity that commanders require to determine a military member's readiness for duty. It also gives the commanders a picture of the members' overall health. With properly scored results, free of bias, commanders would be better able to determine if their members are physically ready to carry out their military mission.

There have been suggested methods to help eliminate the body mass bias that appears in military testing. Examples of such methods are the use of scaled scores and correction factors. Scaled scores, or allometric equations, remove bias from scores and although effective, their difficult calculations make them a challenge to implement. Correction factors, body-mass-numbers calculated using scaled scores, are another method for bias removal. The application of the correction factors is easier since only one calculation is necessary; the multiplication of the correction factor by the actual fitness score which results in an adjusted score. These correction factors adjust for bias since the adjusted scores reflect the scores the members would have earned if they had a lighter body mass of 125 lb for women and 150 lb for men (Vanderburgh, 2007). Thus, all members would have the chance to be evaluated uniformly since their performances would be based on the same body mass.

Even with their hypothesized removal of bias, it appears that no research study has examined the application of correction factors to real-world military fitness testing data. It has yet to be determined if use of the correction factors will produce scores that remove body mass bias and represent a more accurate outcome of performance. Through research, the effectiveness of these factors could be determined. If found valid and reliable, correction factors could be utilized in real-world military fitness testing situations. Similarly, if bias can be removed from military fitness test scores based on BMI and AC as well, fitness scores could be based solely on actual fitness levels rather than the body mass of service members.

## **CHAPTER II**

### **LITERATURE REVIEW**

Physical activity has been incorporated in daily life throughout history. In pre-industrial societies, it was integrated into life not only for survival, but for religious, social, and cultural purposes as well (U.S. Department of Health and Human Services, 1996). Today, physical activity continues to be viewed as a benefit to society and in appropriate amounts has been shown to reduce all-cause mortality and to improve a number of health-outcomes (Kesaniemi, Danforth, Jensen, Kopelman, Lefebvre, & Reeder, 2001). It has been documented that the onset of diseases such as cardiovascular disease, hypertension, type 2 diabetes mellitus, osteoporosis, obesity, colon cancer, breast cancer, anxiety, and depression have an inverse relationship with physical activity (Haskel et al., 2007; Kesaniemi et al.). Therefore, as physical activity drops below the recommended levels, a person's chance of developing one of more of the diseases listed increases.

Over the years, physical activity levels have declined in developed countries due to technology, which reduces the energy needed for activity, and economic incentives where pay has increased for sedentary

work rather than active work (Haskel et al., 2007). Due to this reduction, there has been a rise in sedentary lifestyles (Brock et al., 2009). It was documented through the Behavioral Risk Factor Surveillance System survey (Brock et al.) that a quarter of the US population is completely sedentary. This lack of physical activity within the population has led to a public health concern.

In order to inform people as to the amount of physical activity needed to maintain a positive health status, health-related organizations in the 1960s and 1970s started to create recommendations for the appropriate amounts of physical activity needed to achieve fitness and health benefits (U.S. Department of Health and Human Services, 1996). These recommendations were aimed at assisting citizens in improving health, while in turn reducing their risk of disease. Over time, the recommendations have been modified to reflect the most current research in order to provide up-to-date information to the public. For instance in 2007, the American College of Sports Medicine (ACSM) modified its recommendations to state (Haskel et al., 2007):

“healthy adults aged 18-65 years should perform moderate-intensity aerobic activity for a minimum of 30 minutes on five days each week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week. In addition, at least twice each week, adults will benefit by performing activities using major

muscles of the body that maintain or increase muscular strength and endurance.”

Also, ACSM indicated that there is a difference between the level of physical activity necessary to improve health versus the quantity needed to improve physical fitness. The amount and type of exercise for health-related benefits may be lower than what is recommended to achieve fitness benefits. Therefore, ACSM added the following statement to their recommendations: “persons who wish to further improve their personal fitness, reduce their risk for chronic diseases and disabilities, or prevent unhealthy weight gain will likely benefit by exceeding the minimum recommended amount of physical activity” (Haskell et al., 2007).

### **Physical Fitness**

Physical fitness is described as a set of attributes that relate to the ability to perform physical activity (Kesaniemi et al., 2001). There are two components of fitness, each comprised of different attributes. These components are health-related and performance-related fitness. The amount of physical activity required by an individual depends on which component is included in the person’s fitness goal. The attributes that comprise health-related fitness include cardiorespiratory fitness, muscular strength and endurance, body composition, and flexibility. Health-related fitness may generally be the goal of non-athletes. Whereas, athletes may strive to achieve performance-related fitness

which includes additional fitness elements such as speed, agility, balance, reaction time, and muscular power (U.S. Department of Health and Human Services, 1996).

For both the athlete and non-athlete, knowledge of their fitness level can be vital. For an athlete, the information allows for proper exercise prescription to maximize competition performance (Baechle & Earle, 2008), while a non-athlete may utilize this information to find an exercise prescription best suited to achieve a reduction in the risk of disease (Jackson, 2006).

In order to determine a person's fitness level, evaluation methods are needed. Much previous research has attempted to determine the best methods to reliably and validly measure an individual's level of physical fitness in each of the five components of health-related fitness.

### **Fitness Testing**

Various fitness tests have been developed to evaluate each specific area of health-related fitness. The level of physical fitness in each of these areas can be validly measured with laboratory or specific field techniques (Mood, Jackson, & Morrow, 2007). The following sections describe the various techniques that are available to assess the five components of health-related fitness: cardiorespiratory fitness, muscular strength and endurance, body composition, and flexibility.

## **Cardiorespiratory Fitness**

Maximum oxygen uptake ( $VO_{2max}$ ) is defined by the U.S. Surgeon General's report as the maximal capacity for oxygen consumption by the body during maximal exertion (U.S. Department of Health and Human Services, 1996). When measured by laboratory methods such as indirect calorimetry,  $VO_{2max}$  has been documented as the "gold standard" for assessing cardiorespiratory fitness (Garatachea, Cavalcanti, García-López, González-Gallego, & de Paz, 2007; Jackson, 2006). Indirect calorimetry is typically conducted in a laboratory with computer-controlled equipment for measuring minute ventilation and gas concentrations of expired air, and therefore requires skilled personnel. It can also be costly, laborious, and may even require medical supervision (Larsen et al., 2002). Although indirect calorimetry in a laboratory is considered the most valid means of measuring cardiorespiratory fitness (Larsen et al.), the limitations of utilizing laboratory methods can be unfavorable when testing large groups. Therefore, alternate tests have been developed. Some of these alternate tests have an advantage when testing large groups because they can be administered in a field setting with minimal cost and without highly trained personnel.

Examples of alternate field-setting tests include the 1.5 mile run and 1-mile track jog (Larsen et al., 2002). Subjects are

required to cover the prescribed distance in the shortest amount of time possible and the time to completion is used as the prediction variable in estimating  $VO_{2max}$ . Although more practical, these prediction tests require a maximal effort which may not be appropriate for un-fit individuals. To alleviate maximal effort, submaximal  $VO_2$  tests were created.

Since  $VO_2$  and heart rate increase linearly with work rate, submaximal  $VO_2$  tests can estimate  $VO_{2max}$  from heart rate response to submaximal exercise (Garatachea et al., 2007).

Submaximal tests can be administered through various methods, and they usually involve a fixed submaximal work rate established by a “set grade and speed on a treadmill, keeping a constant pace in stepping to the beat of a metronome, or cycling with a fixed resistance and revolutions per minute” (Larsen et al., 2002).

Since regular physical activity and cardiorespiratory fitness decrease the risk of cardiovascular disease (CVD) mortality and coronary heart disease mortality (Jackson, 2006; Larsen et al., 2002), fitness testing can be imperative to determining a person’s risk of developing these diseases.

### **Muscular Strength and Endurance**

Muscular strength and endurance are another two of the main components of health-related fitness. An individual’s level of

strength and endurance can affect the person's daily functional skills and physical activities (McManis, Baumgartner, & Wuest, 2000). Adequate muscular strength contributes to health and efficient body function while endurance will allow for the performance of prolonged periods of physical activity without excessive fatigue (Pyfer & Crooks, 1988).

Muscular strength is related to the force a muscle or muscle group can exert in one maximal effort (Baechle & Earle, 2008). Two forms of assessment are generally used to determine muscular strength. They are one-repetition maximum (1RM) testing and dynamometry (Verdijk, Van Loon, Meijer, & Savelberg, 2009). One-repetition maximum testing requires lifting a maximal weight at a voluntary speed for one repetition. Various weight lifting exercises such as the bench press or back squat can be utilized to test the 1RM strength for various muscle groups. One repetition maximum tests are sometimes incorporated into fitness testing as they do not require expensive equipment and they often mimic dynamic sports movements (Baechle & Earle).

Dynamometry is considered the "gold standard" of muscular strength testing. This is due to the high reliability and objectivity achieved when isometric and isokinetic peak torque measurements are taken with the dynamometer. It has even been used to validate other strength assessment procedures. The one disadvantage to

dynamometer testing is that it does not resemble the movements that are generally associated with sports and exercise intervention programs (Verdijk et al., 2009).

Muscular endurance is defined as the ability of certain muscles or muscle groups to perform repeated contractions against a submaximal resistance. It is typically quantified as the maximal power output during muscular activity between 30 and 90 seconds. A variety of tests can be used to test upper and lower body muscular endurance (Baechle & Earle, 2008).

For example, the curl-up fitness test was devised to assess the endurance of the abdominal muscles. This assessment was devised because low abdominal muscular endurance has been hypothesized to relate to low back pain (Knudson, 2001). There are many ways to perform the curl-up fitness test with protocols such as the modified curl-ups, full sit-ups, and bench trunk-curls. These tests also vary since they can be performed at different cadences and for varying durations (Knudson).

Tests evaluating upper-arm and shoulder-girdle strength and endurance have also been established. Examples include the pull-up, flexed-arm hang, traditional push-up, and the 90° push-up (McManis et al., 2000). Again, like the curl-up test, they can be performed at different cadences and for varying durations.

## **Body Composition**

Body Composition, as defined by the U.S. Surgeon General, is the relative amounts of muscle, fat, bone, and other vital parts of the body (U.S. Department of Health and Human Services, 1996). It is another important health-related fitness component. It can be measured several ways in a laboratory such as underwater (hydrostatic) weighing and dual x-ray absorptiometry. It can also be estimated in field assessments by taking skinfold measurements.

Anthropometry, a person's measurement of height, weight, and selected girths, can also lead to body size measurements. Examples of such measurements include BMI, which is calculated as weight in kilograms (kg) divided by height in meters (m) squared, and AC which is measured at the level of the umbilicus (Baechle & Earle, 2008).

It has been recognized that percent fat, as well as BMI and AC (abdominal obesity), are predictors of an increased risk of morbidity and mortality due to numerous diseases such as type 2 diabetes, cardiovascular disease, and stroke (Fogelholm et al., 2006; Janssen, Katzmarzyk, & Ross, 2004; Wong et al., 2004). By knowing body composition and body size measurements, individuals can compare their results to normative data to determine if they fall in an increased risk category.

## **Flexibility**

Flexibility is also considered a health-related fitness component. It pertains to the range of motion available to a joint. Flexibility enhances efficient movement and body function while contributing to health. It may also reduce the incidence of injury to muscles and joint pain (Pyfer & Crooks, 1988). There are numerous ways to measure flexibility, including manual and electric goniometers to measure joint angles and the sit-and-reach box test which evaluates the combined flexibility of the lower back and hips (Baechle & Earle, 2008).

## **Fitness Test Results**

Fitness test results may be useful for intervention. Individuals can assess their current fitness status through testing and use the results to determine what areas are acceptable and which areas need improvement. For instance, knowing information from cardiovascular fitness testing, such as estimated  $VO_{2max}$ , allows for a more effective selection of appropriate exercises and intensities to be included in individualized exercise programs (Vehrs, George, Fellingham, Plowman, & Dustman-Allen, 2007).

### **Health/Fitness in the Workplace**

Employers are continually confronted with rising costs, especially in medical care. Certain aspects of these rising costs can be a result of direct medical costs, typically associated with sick employees, and indirect costs such as lost work time through absenteeism, presenteeism (working ill), and disability (Lankford, Kruger, & Bauer, 2009). As an example, a direct relationship to higher employee expenditures has been shown from chronic disease risks (Lankford et al.).

It is recognized that physical fitness can promote health and longevity (Kesaniemi et al., 2001). When a person is considered healthy, not only does their risk for many diseases decrease, many aspects of life can improve such as increased energy and stamina, enhanced self-confidence and self-esteem, and a reduction in anxiety and stress levels (Haydon, Murray, & Edwards, 1986). The benefits of healthier individuals can also be seen in the workplace, as there is evidence that improved employee health has positive impacts on the employer as well (Haydon et al., 1986). Examples of expected benefits to the employer are reduced health care costs, lower absenteeism, lower turnover, greater productivity and a reduction in lost time due to chronic disease (Haydon et al., 1986). Since research has shown reduced health care costs from employer-provided health promotion and employee participation (Lankford et al., 2009), and the fact that a great majority of an

individual's life is spent at the workplace, many companies are establishing employee health and fitness programs (Chang, 2003).

Corporations in the private sector are not the only organizations interested in workplace fitness programs. Worksite fitness programs can also be found in state agencies and institutions of higher learning, and especially in the United States military.

### **Military Fitness**

All branches of the United States military require their members to be physically fit. Physical fitness is required not only for health purposes, but it is essential for many military members to be ready to carry out the physical duty of military service, and especially in combat. Fitness testing is a mandatory annual requirement and can be used as one of several determinates for promotion to a higher grade.

Department of Defense Instruction (DODI) 1308.3 states that the military services must develop and maintain physical fitness programs through the testing of personal (Department of Defense, 2002). In order to determine their members' physical readiness, each service is required to implement a fitness testing program. According to DODI 1308.3, the fitness test program must include components to assess aerobic capacity, muscular strength, and muscular endurance (Department of Defense). Each service must also establish body fat standards utilizing circumference-based measurements as well as height and weight. Each

branch's fitness test protocol varies and requires different testing components; however they are all based on the DODI 1308.3 (Department of Defense). For the remainder of this review, the focus will be concentrated solely on the fitness and testing requirements for the United States Air Force.

### **Air Force Fitness Test Requirements**

The Air Force PFT requires its members to run 1.5 miles, perform as many crunches as possible in one minute with good form, and perform as many push-ups as possible in one minute with good form. It also requires the documentation of body size and body composition measurements to include height, weight, and measurement of each member's abdominal circumference (AC). A description of the administration of each test as mandated in Air Force Instruction 10-248 follows (U.S. Air Force, 2006).

#### **1.5 Mile Run Procedure**

The 1.5 mile run is the test used to predict  $VO_{2max}$ . At times, members may be medically exempt from the run, but cleared for a sub-maximal test. When medically directed, a cycle ergometry assessment, a 3-mile walk, or a Fit Step test may be conducted in place of the 1.5 mile run which requires maximal

effort. However, since the 1.5 mile run is the main test implemented, this review will focus only on the procedures of run.

The 1.5 mile run must be conducted on a standardized outdoor course. Treadmills are not authorized for use during the testing procedure. The track should be level, and if slopes are present, they should not exceed three degrees. Weather instructions state that in order to perform the test outdoors, the temperature must be above 20 °F but that the Wet Bulb Globe Temperature (WBGT) should be less than 85°F or a heat index less than 99°F when the WBGT is not available. The ultraviolet light index must read below 10, and sustained winds should be less than 20 mph. If wet conditions are present, the temperature must be above 50°F.

Members are given standardized instructions and no physical assistance from outside sources is allowed. Pacing is permissible, but there can be no interference with other runners. The stopwatch begins when the member crosses the start line and is stopped when crossing the finish line. Members are required to complete the entire course, and leaving the course will result in a disqualified run. Walking is permissible, but will lengthen the time to completion. Time results are recorded in minutes and seconds.

**One-Minute Push-Up Procedure**

The purpose of the push-up test is to assess upper body muscular fitness. Each member has one minute to complete as many push-ups as possible in good form. The member must begin in proper starting position which requires the member to be in a prone position with arms fully extended with the body in a straight line from head to toe and the feet must be no more than 12 inches apart. Throughout the assessment, the hands and toes must remain on the floor and the body must be in a ridged straight line from head to toe. If resting is needed during the test, the member is allowed to do so, but only in the starting position. Bowing of the back may occur during rest, but must become rigid again once performance resumes. To complete a push-up, the member lowers their body towards the floor until the elbows achieve a 90° angle, or less, at which time the member pushes his/her body up to return to the starting position. If the body does not reach a lowered position with the elbows achieving at least a 90° angle, the push-up does not count towards the total number of push-ups completed. After one-minute, or to volitional fatigue when the member can no longer perform proper push-ups, the total number of push-ups completed is recorded.

### **One-Minute Crunch Procedure**

The purpose of the one-minute crunch procedure is to assess the member's abdominal muscular fitness. To complete the one-minute crunch assessment, the member lays supine on the floor (the usage of a mat is optional) with knees bent at a 90° angle and with feet and heels in contact with the floor at all times. Feet may be anchored during the test, however careful technique must be used as the member's legs may not be anchored, such as holding on to the member's calves during the assessment. Arms are to be crossed at the front of the chest.

A proper crunch is performed with the member's shoulder blades rising above the floor and the member's elbows touching the knees or thighs at the top of the crunch. The member then lowers back down and the crunch is completed when the shoulder blades touch the floor on the return. The hands must stay in contact with the chest at all times, and rest is only permissible in the up position. If a member fails to complete a crunch with proper form, the crunch is not counted toward the total number of crunches. Instructions may be given as to how to correct form for the subsequent crunches. After one-minute, or to volitional fatigue when the member can no longer perform proper crunches, the total number of crunches completed is recorded.

## **Body Size Measurements**

The body composition measurement as described in the Air Force fitness testing procedure requires measurement of the member's height, weight and AC. The height measurement can be taken in the member's uniform, standard physical training gear, or gym clothing. Shoes may not be worn. The member is required to stand on a flat surface facing directly forward with the head in a horizontal position and the chin parallel to the floor. The body should be straight, but not rigid. Measurement is then acquired and rounded to the nearest  $\frac{1}{2}$  inch.

Weight measurement must be obtained on a calibrated scale. The same clothing attire as with the height measurements may be worn when determining weight. Again, shoes are not allowed. Weight is measured and rounded to the nearest  $\frac{1}{2}$  pound. When recorded, two pounds are subtracted from the measured weight to compensate for clothing.

The last measure of body composition is the AC. The AC measurement is taken in a private or partitioned area and the measurer must be of the same gender as the member. The tape measure that is used for this assessment must be made of a non-stretchable material. The Gulick, a fiberglass measuring tape, is a suggested for use. To complete the measurement, the member will stand with arms down looking straight ahead. The measurer must

stand on the member's right side and locate the top of the right iliac crest. The tape should be placed at a horizontal position just above the top of the right iliac crest and wrapped around the member's midsection horizontally and level at this height. The tape should be snug, but not compressing the skin and the measurement should be taken at the end of a normal exhalation.

The measurement procedure is repeated and recorded 3 times, rounding down to the nearest  $\frac{1}{2}$  inch each time. If the measurements differ by more than one inch another two measurements are to be completed. The three closest measurements are averaged and rounded down to the nearest  $\frac{1}{2}$  inch. This average is recorded as the AC measurement.

Body mass index is another measurement recorded for each member; however it is automatically calculated from the height and weight measurements when it is entered into the Air Force Fitness Management System. Body mass index is calculated by dividing the member's weight in kilograms by his/her height in meters squared.

### **Fitness Test Scoring Procedures**

According to the guidelines set forth in AFI 10-248, the AF fitness evaluation is based on a total composite score comprised of the scores earned for each fitness component (U.S. Air Force, 2006). Each test has

a point value for the member's performance based on their age and gender (see appendix B). The maximum points for each of the components are as follows: 1.5 mile run: 50 points, push-ups: 10 points, crunches: 10 points, and AC: 30 points. Therefore a maximum number of points possible for any age and gender are 100 points. The composite score is determined by taking the total number of points achieved, dividing it by the total number of points possible, and multiplying it by 100.

Members earn the full 30 points for body composition when their BMI is less than 25 kg/m<sup>2</sup>, regardless of their AC measurement. When their BMI is greater than 25 kg/m<sup>2</sup>, the AC measurement is used to calculate points earned for the body composition fitness test component.

Certain circumstances such as a medical exemption may allow for an exclusion of one or more components of the fitness testing procedures. This will modify the total number of points possible. For example, if a member is medically exempt from the push-up portion, that test is not conducted and the fitness score is based on a total number of points that does not include the points for the push-ups. For example, the 10 points possible for the push-up component would be subtracted from the overall 100 total points leaving only 90 total points possible. The composite score is then calculated using 90 points as the total number of possible points.

There are three levels of classification in which the scores are placed: excellent, good, and poor. An excellent rating is defined by a composite score greater than or equal to 90. A good rating is defined by a composite score of 75-89.99 and a poor classification is given if the composite score is less than 75.

The composite score represents a health-based fitness level. As the fitness scores increase, the better performance will be exhibited by the members when faced with extremes in temperature, fatigue, and stress, in regular work, and deployed environments. If members achieve an excellent or good score on their annual fitness test, they are considered current and are required to re-test in one year with no additional requirements. If members achieve a poor score, they are required to re-test all components within 90 days, participate in a unit Fitness Improvement Program (FIP), and complete the Healthy Living Program (HLP) within 10 days of the Fitness Assessment. For those members with an AC of greater than 40 inches for men and greater than 35 inches for females, participation in the Body Composition Improvement Program (BCIP) is mandatory.

The FIP program requires members to exercise four to five days per week. The members must monitor heart rate/intensity during their exercise and they must have an AF Form 1975 signed by the FIP class instructor. The HLP consists of an initial 2-hour minimum class that consists of three educational components: behavioral change, nutrition,

and exercise. Each component addresses strategies for success and offers educational information such as approaches to eating a balanced diet and to developing exercise plans. Monthly follow-up sessions are required thereafter. The BCIP is a multidisciplinary, multi-session body composition improvement program. It must be started within 10 days of attendance of the initial HLP class, and includes nutrition education and counseling, behavior modification, self-monitoring techniques, weight-loss maintenance strategies, and monthly follow-up sessions that review the food records BCIP participants are required to maintain.

### **Body Mass Penalties**

Body composition measurement plays a large role in the performance of health-related fitness tests. It is believed that people with greater body weight, body fat, or both have a disadvantage when performing fitness tests. This is especially true in any weight-bearing activity. This disadvantage may lead to a poorer performance on these tests and therefore result in an incorrect assessment of fitness for heavier, overweight individuals. However, lighter individuals may also demonstrate bias since their better performances may be due largely to the advantage of a smaller body size, or body composition, rather than their absolute level of fitness (Lloyd et al., 2003; McManis et al., 2000).

Recent investigation has begun examining the influence of body size on the outcome measures of military fitness testing. There is

evidence that military physical fitness tests impose a bias against heavier, and not necessarily fatter, service members (Vanderburgh, 2007, 2008; Vanderburgh & Crowder, 2006). Heavier service members appear to have a disadvantage when required to perform tests that require them to lift or move their body mass.

It has been documented that heavier service members within specific body mass range limits receive 15 to 20% lower scores for physiologically equivalent performances (Vanderburgh, 2007). This decrement can be seen in both distance run times and in muscular endurance tests. For instance it was documented that larger body mass was associated with slower run times in service academy cadets (Vanderburgh & Mahar, 1995). As with distance run times, Vanderburgh (2007) also found that the push-ups and abdominal crunches are also susceptible to body mass bias, since the force that is exerted in each repetition of the push-up and crunch is relative to one's body mass.

### **Strategies to Eliminate Body Mass Bias**

Recent research has attempted to find methods to alleviate this body mass discrepancy in evaluating fitness (Vanderburgh, 2007, 2008; Vanderburgh & Crowder, 2006). Various methods have been suggested such as, weight loss, alternate testing protocols, scaled scores, and correction factors.

Weight loss is one suggested strategy to eliminate body mass bias. However, Kramer et al. (2001), disputes this idea. Kramer et al. reported significant improvements in push-ups, sit-ups, and 2-mile-run scores in un-trained women after a 6-month resistance training program. This improvement was in conjunction with an increase in body mass, primarily due to an increase in lean body mass. Therefore, performance improvements were seen by increasing lean body mass, rather than from decreasing mass through weight loss (Vanderburgh, 2008).

Another proposal is to implement alternate testing protocols that do not take body mass into account. For example, muscular strength could be tested using an absolute strength test. Members could perform maximal repetitions with a bench press exercise against a fixed resistance. This test eliminates body mass bias because ability is based on moving a fixed resistance which is independent of body weight. It may also better simulate military field tasks since military field duties generally require service members to lift absolute amounts of weight. However, because the absolute bench press test requires equipment, it would not be as easily incorporated when conducting mass testing procedures (Vanderburgh, 2007).

Scaled scores for run times and muscular endurance tests were proposed by Vanderburgh (2007). The scaled scores are calculated from allometric equations that were shown to remove body mass bias from fitness scores. For instance, previous research found distance run times

proportional to body mass raised to the  $1/3$  power. This lead to the equation of run time  $\cdot (\text{body mass})^{-1/3}$  to eliminate body mass bias from run times. Although effective, a major disadvantage to utilizing scaled scores is that they are difficult to calculate and interpret due to the non-integer exponents and resulting units (Vanderburgh, 2007).

Finally, correction factors, body-mass-based numbers based on calculations using scaled scores, have been proposed for use in order to generate fitness scores free of body mass bias. The correction factors are multiplied by the actual fitness score which results in an adjusted score. This adjusted score would be the score the subjects would have earned if they had a lighter body mass of 125 lb for women and 150 lb for men (Vanderburgh, 2007). These weights were selected as the lower weight limits when calculating the correction factors based on previous research that suggests these limits are close to those required for optimal military fitness test performance. Also, as weight falls below these limits, subjects may have too little lean muscle mass which may place them at a disadvantage. However, if necessary, these lower limits may easily be adjusted through specific mathematical calculations (Vanderburgh, 2007).

The score calculated with correction factors would indicate differences in fitness levels without the effect of body mass. It would neither reward nor punish those persons with excess body fat. When a person becomes heavier from gaining additional body fat, a performance

reduction occurs. This performance reduction is theoretically larger than what would be gained through removal of body mass bias when using the correction factors. Therefore, when people are heavier due to gaining fat mass, their corrected score will still reflect a poor performance (Vanderburgh, 2007).

### **Future Research**

Although correction factors have been calculated based on lower weight limits of 125 lb for women and 150 lb for men (Vanderburgh, 2007), it appears that no research study has examined their application to real world data. To determine the effectiveness of these factors at eliminating body mass bias from military fitness testing, more research is necessary. If tested and determined applicable, the correction factors could be utilized in real-world military fitness testing situations.

Similarly, another research area could focus on removing bias from military fitness test scores based on BMI and AC. Possible investigations could include devising regression models that will remove bias based on all three factors of body mass, BMI, and AC. If found effective, these models would allow final fitness scores to be based on actual fitness levels rather than based upon the body mass of the service member.

Since fitness is a key to all military missions, the Air Force PFT is a necessity that commanders require to determine their military members' readiness to carry out their military mission. It also gives them a picture

of the members' overall health. With properly scored results, free of bias, commanders would be better able to determine if their members have actually attained the status that the Air Force's fitness slogan describes as - "Fit to Fight."

## **CHAPTER III**

### **METHODS**

The purpose of this study was to cross validate previously researched correction factors for body mass bias in military physical fitness tests. Data were also used to develop regression models that removed all bias from body mass, body mass index, and abdominal circumference measurements in fitness test results from the United States Air Force military members' fitness test scoring procedures.

#### **Subjects**

This study's sample consisted of 533 subjects of both genders, ages 19 to 63 years with a mean age of  $35.6 \pm 6.9$  years. The subjects were members of the United States Air Force and were assigned to Headquarters Air Force Personnel Center located at Randolph Air Force Base (AFB) in San Antonio, Texas. The subjects completed a fitness test within one year of May 31, 2009. Subjects were excluded from the study if they did not complete all four fitness testing components consisting of the 1.5 mile run, one-minute push-ups, one-minute crunches, and AC measurements. Subjects were also excluded if it was documented in the

AFFMS that they participated in any intervention strategies such as the FIP, HLP, or BCIP programs.

### **Procedures for Evaluation**

Data necessary for this research project were previously recorded no more than one year prior to May 31, 2009. It was stored in an existing database, the AFFMS, and consisted of Air Force members' 1.5 mile running times, number of push-ups and crunches completed in one minute each, height, weight, and AC measurements. No human interaction was required to download the data files from the original database at Randolph AFB.

When the data were accumulated for analysis, names and identifiable features were excluded. Precautions were taken so the data could not be traced to the person whom it described.

Data were originally collected by unit Physical Training Leaders (PTL), who are trained to oversee and conduct unit fitness programs and fitness assessments. Physical Training Leaders are required to attend an initial PTL course that provides hands-on practical training and instruction of the Air Force approved fitness testing procedures, and they must attend mandatory annual refresher courses. Current cardiopulmonary resuscitation certification was also required.

As stipulated by University policy, the Texas State University-San Marcos Institutional Review Board reviewed this research topic and

design. Since this research project involved the collection and study of existing data, an exemption from a full review of research was granted. Written permission for data collection and study was acquired from the Health and Wellness Center Director on Randolph AFB, and original data were obtained following the Air Force fitness testing protocols as described within.

### **1.5 Mile Run Procedure**

The 1.5 mile run was conducted on a standardized outdoor course. Treadmills were not authorized for use during the testing procedure. The track was level, and if slopes were present, they did not exceed three degrees. If the test was conducted outdoors, the temperature was above 20 °F but that the Wet Bulb Globe Temperature (WBGT) was less than 85°F or a heat index less than 99°F when the WBGT was not available. The ultraviolet light index read below 10, and sustained winds were less than 20 mph. If wet conditions were present, the temperature was above 50°F.

Members were given standardized instructions and no physical assistance from outside sources was allowed. Pacing was permissible, but there was no interference with other runners. The stopwatch began when the member crossed the start line and was stopped when the member crossed the finish line. Members were required to complete the entire course, and leaving the course

resulted in a disqualified run. Walking was permissible, but lengthened the time to completion. Time results were recorded in minutes and seconds.

### **One-Minute Push-Up Procedure**

Each member had one minute to complete as many push-ups as possible in good form. The member began in proper starting position which required the member to be in a prone position with arms fully extended and the body in a straight line from head to toe with the feet being no more than 12 inches apart. Throughout the assessment, the hands and toes remained on the floor and the body was in a ridged straight line from head to toe. If resting was needed during the test, the member was allowed to do so, but only in the starting position. Bowing of the back was allowed during rest, but the member became rigid again once the performance resumed. To complete a push-up, the members lowered their body towards the floor until the elbows achieved a 90° angle or less at which time the member pushed his/her body up to return to the starting position. If the body did not reach a lowered position with the elbows achieving at least a 90° angle, the push-up did not count towards the total number of push-ups completed. After one-minute, to volitional fatigue, or when the

member could no longer perform proper push-ups, the total number of push-ups completed was recorded.

### **One-Minute Crunch Procedure**

To complete the one-minute crunch assessment, the member laid on the floor (the usage of a mat was optional) with knees bent at a 90° angle and with the feet and heels in contact with the floor at all times. If the members requested, feet, but not legs, were allowed to be anchored during the test. Holding on to the member's calves during the assessment was not allowed. Arms were crossed at the front of the chest.

A proper crunch was performed when the member's shoulder blades rose above the floor and the member's elbows touched the knees or thighs at the top of the crunch. The member then lowered back down and the crunch was completed when the shoulder blades touched the floor on the return. The hands stayed in contact with the chest at all times, and rest was only permissible in the up position. If a member failed to complete a crunch with proper form, the crunch was not counted toward the total number of crunches. Instructions were allowed to be given as to how to correct form when completing subsequent crunches. After one-minute, to volitional fatigue, or when the member could

no longer perform crunches in proper form, the total number of crunches completed was recorded.

### **Body Size Measurements**

The body composition measurement as described in the Air Force fitness testing procedure required measurement of the member's height, weight, and AC. The height measurement was taken in the member's uniform, standard physical training gear, or gym clothing. Shoes were not worn. The member was required to stand on a flat surface facing directly forward with the head in a horizontal position and the chin parallel to the floor. The body was straight, but not rigid. Measurement was acquired and rounded to the nearest  $\frac{1}{2}$  inch.

Weight measurement was obtained on a calibrated scale. The same clothing attire as with the height measurements was allowed when determining weight. Again, shoes were not allowed. Weight was measured and rounded to the nearest  $\frac{1}{2}$  pound. When recorded, two pounds were subtracted from the measured weight to compensate for clothing.

The last measure of body composition was the AC. The AC measurement was taken in a private or partitioned area and the measurer was of the same gender as the member. The tape measure that was used for this assessment was made of a non-

stretchable material. To complete the measurement, the member stood with arms down looking straight ahead. The measurer stood on the member's right side and located the top of the member's right iliac crest. The tape was placed at a horizontal position just above the top of the right iliac crest and wrapped around the member's midsection horizontally and level at this height. The tape was snug, but was not compressing the skin and the measurement was taken at the end of a normal exhalation.

The measurement procedure was repeated and recorded 3 times, rounding down to the nearest  $\frac{1}{2}$  inch each time. If the measurements differed by more than one inch another two measurements were completed. The three closest measurements were averaged and rounded down to the nearest  $\frac{1}{2}$  inch. This average was recorded as the AC measurement.

Body mass index was another measurement recorded for each member, however it was automatically calculated from the height and weight measurements when it was entered into the Air Force Fitness Management System (AFFMS). Body mass index was calculated by the AFFMS by dividing the member's weight in kilograms by his/her height in meters squared.

### **Design and Analysis**

The dependent variables in this study were the following components of the Air Force fitness evaluation:

1. 1.5 mile run
2. Curl-ups
3. Push-ups

The independent variables in this study were:

1. Body weight
2. BMI
3. AC

The correction factors suggested by Vanderburgh (2007) were used to adjust each dependent variable. To determine the validity of these correction factors, the Pearson product-moment correlation coefficient between each adjusted dependent variable and body weight was calculated. If the correction factor was successful in adjusting all scores for body mass, there would be no significant correlation between the adjusted scores and body weight. Pearson product-moment correlation coefficients were also used to determine the relationship between each independent variable with each unadjusted dependent variable.

As an alternative to the Vanderburgh (2007) method, each dependent variable was also adjusted according to the regression technique reported by Cureton, Baumgartner, and McManis (1991), and Lloyd et al. (2003). To correct the fitness test scores for body weight, a

regression model was developed for predicting each fitness test component from body weight, as well as age and gender. The residual (actual minus predicted) value for each score was calculated. The mean for each fitness test component was added to these residual values, and the resulting score represented the corrected score for that component, adjusted for body weight. Due to a probable correlation between body weight, BMI, and AC, and to avoid collinearity, separate regression models were developed for each dependent variable, using body weight, BMI, and AC as separate predictors. Each model was also tested for linear as well as quadratic relationships. If each regression model was successful in adjusting all scores for body size, there will be no significant correlation between the adjusted scores and any of the independent variables. An alpha level of .05 will be used for all tests of significance.

Subject demographics, including age, height, weight, BMI, and AC were each analyzed and described through measures of central tendency to include range, mean, and standard deviation.

## CHAPTER IV

### RESULTS

The sample included a total of 533 cases of Air Force military members that completed a fitness evaluation within the previous 12 months. The sample consisted of 199 female and 334 male members. The subjects ranged in age from 19 to 63 years, in height from 54 to 81 inches, and in weight from 95 to 265 pounds. The members' BMI ranged from 16.6 to 35.9 kg/m<sup>2</sup>, and their AC ranged from 23.5 to 41 inches. Table 1 reports the descriptive values for the members' physical characteristics.

**Table 1. Descriptive Statistics of Members**

	<b>Females</b> n=199	<b>Males</b> n=334	<b>All</b> n=533
<b>Age</b>	33.6 ± 6.8	36.9 ± 6.6	35.6 ± 6.9
<b>Height (in)</b>	64.7 ± 2.6	70.4 ± 2.7	68.3 ± 3.9
<b>Weight (lbs)</b>	143.4 ± 20.1	186.3 ± 24.4	170.3 ± 30.9
<b>BMI (kg/m<sup>2</sup>)</b>	24.0 ± 2.9	26.3 ± 2.9	25.5 ± 3.1
<b>AC</b>	30.1 ± 2.6	34.7 ± 2.8	33.0 ± 3.5

Table 2 reports the members' fitness test scores according to gender, which were somewhat heterogeneous. The 1.5 mile run times ranged from 8.23 to 20.36 min, push-ups ranged from zero to 100 and the number of completed crunches varied from 19 to 75 repetitions.

**Table 2. Actual Fitness Test Scores**

	<b>Females</b>	<b>Males</b>	<b>All</b>
	n=199	n=334	n=533
<b>1.5 Mile Run Time (min)</b>	14.25 ± 1.5	12.1 ± 1.4	12.8 ± 1.8
<b>Push-Up Score</b>	32.7 ± 10.3	49.4 ± 9.3	43.2 ± 12.6
<b>Crunches Score</b>	42.7 ± 7.7	48.9 ± 6.8	46.2 ± 7.9

To further describe the sample, Tables 3 and 4 report the relationship between the fitness test performance and the three measures of body mass: body weight (lbs), BMI, and AC (in) for females and males, respectively. For females, 1.5 mile run times and crunches were significantly correlated with all three measures of body mass; however push-up scores were not significantly correlated with any of the three body mass measures.

**Table 3: Correlation of Female Fitness Scores and Body Size Measures**

	<b>Age</b>	<b>Weight (lbs)</b>	<b>BMI (kg/m<sup>2</sup>)</b>	<b>AC</b>
<b>1.5 Mile Run Time (min)</b>	0.09	0.23*	0.30*	0.25*
<b>Push-Up Score</b>	-0.40*	-0.10	-0.03	-0.05
<b>Crunches Score</b>	-0.12*	-0.23*	-0.21*	-0.26*
<b><u>Vanderburgh Correction Scores</u></b>				
<b>Adj. 1.5 Mile Run Time (min)</b>		-0.14*	0.01	-0.02
<b>Adj. Push-Up Score</b>		0.02	0.06	0.04
<b>Adj. Crunches Score</b>		-0.03	-0.06	-0.12

\* Significant correlation

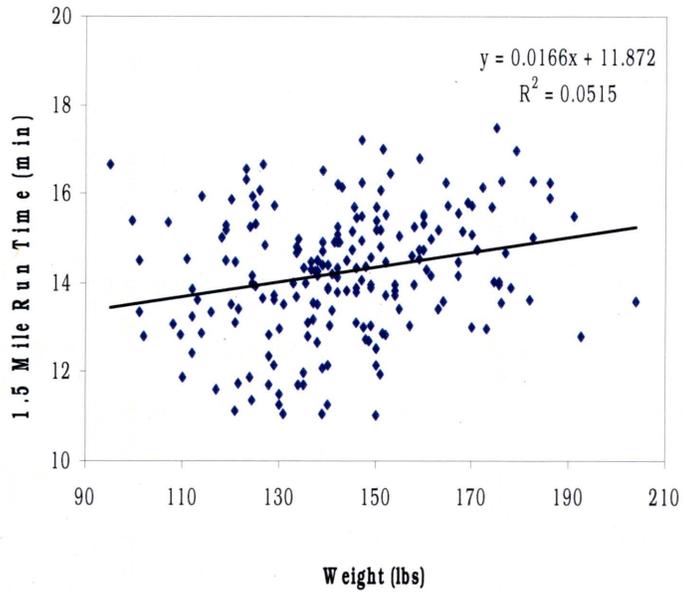
For males, 1.5 mile run times were significantly correlated with all three measures of body mass. Push-up scores were significantly correlated with body weight and AC, but not BMI, and crunches were significantly correlated with AC only.

**Table 4: Correlation of Male Fitness Scores and Body Size Measures**

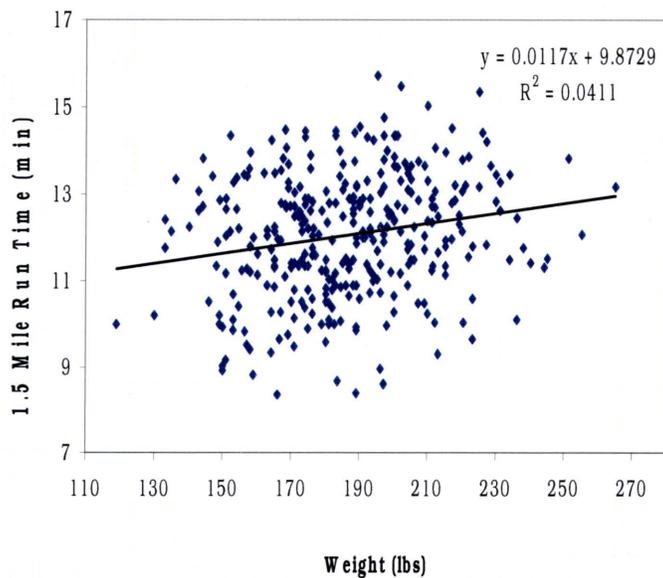
	<b>Age</b>	<b>Weight (lbs)</b>	<b>BMI (kg/m<sup>2</sup>)</b>	<b>AC</b>
<b>1.5 Mile Run Time (min)</b>	0.19*	0.20*	0.28*	0.26*
<b>Push-Up Score</b>	-0.52*	-0.17*	-0.10	-0.32*
<b>Crunches Score</b>	-0.41*	-0.11	-0.10	-0.31*
<b><u>Vanderburg Correction Scores</u></b>				
<b>Adj. 1.5 Mile Run Time (min)</b>		-0.13*	0.01	-0.01
<b>Adj. Push-Up Score</b>		0.04	0.07	-0.15*
<b>Adj. Crunches Score</b>		0.17*	0.12*	-0.07

\* Significant correlation

The three measures of body mass were all found to be highly correlated with each other. The correlations between body weight and BMI and AC for females were 0.79 and 0.74, and 0.81 and 0.79 for males. The following scatterplots demonstrate the relationship between the fitness test scores and body measures; however to avoid repetition, the scatterplots will be limited to one measure of body mass (body weight), except for crunches in males, which was only correlated with AC. Figures 1 and 2 demonstrate the relationship between 1.5 mile run times and body weight for females and males, respectively.

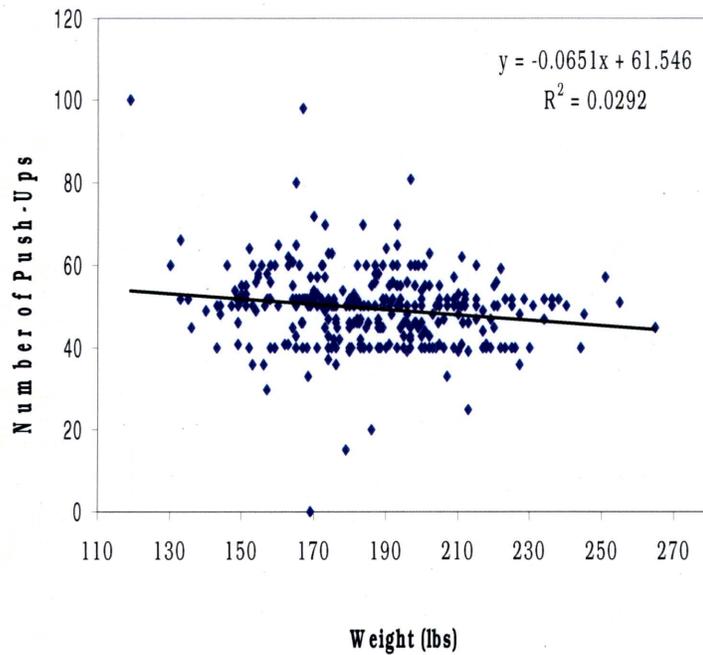


**Figure 1. Female Body Weight versus 1.5 Mile Run Times**



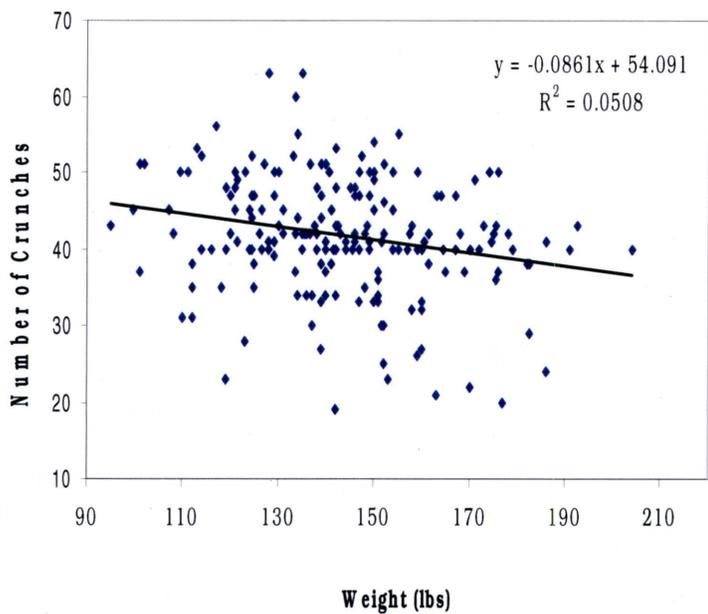
**Figure 2. Male Body Weight versus 1.5 Mile Run Times**

Figure 3 demonstrates the relationship between push-up performances and body weight in males. Push-up performance in females was not significantly correlated with any measure of body size.

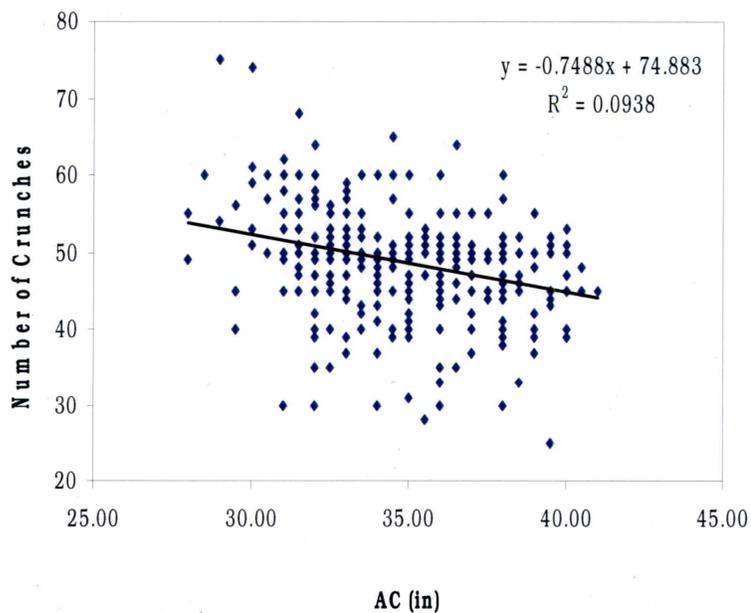


**Figure 3. Male Body Weight versus Push-Up Scores**

Figure 4 demonstrates the relationship between crunches and body weight in females. Figure 5 demonstrates the relationship between crunches and AC in males.



**Figure 4. Female Body Weight versus Crunches Scores**



**Figure 5. Male AC versus Crunches Scores**

The actual fitness scores were adjusted utilizing the correction factors proposed by Vanderburgh (2007). Table 5 represents the

members' corrected fitness test scores after adjustment. In addition, each measure of body mass was also compared to these corrected fitness test scores. These correlations are reported in Tables 3 and 4.

**Table 5: Vanderburgh-Corrected Fitness Test Scores**

	Females	Males	All
	n=199	n=199	n=199
<b>Adj. 1.5 Mile Run Time (min)</b>	13.7 ± 1.4	11.2 ± 1.3	12.1 ± 1.8
<b>Adj. Push-Up Score</b>	34.2 ± 10.8	53.0 ± 9.8	46.0 ± 13.6
<b>Adj. Crunches Score</b>	43.7 ± 7.8	52.4 ± 7.4	49.1 ± 8.7

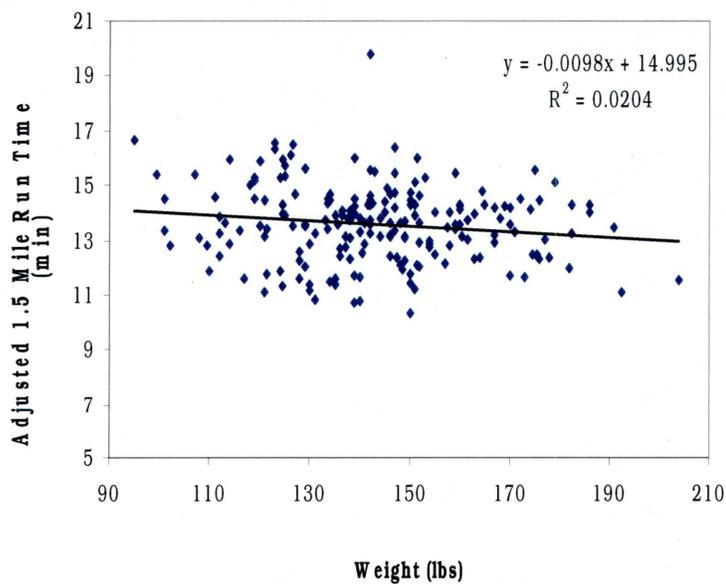
For females, there is no significant correlation between the Vanderburgh-corrected scores and BMI or AC, demonstrating that these adjusted scores have eliminated any bias due to body size represented by BMI or AC, in females only. There is also no significant correlation between body weight and push-ups and crunches in females, indicating that the Vanderburgh-corrected push-up and crunches scores are free of body weight bias.

In males, the Vanderburgh-corrected push-up scores are significantly correlated with AC (-0.15), and the corrected crunch scores are also significantly correlated with both body weight (0.17) and BMI (0.12). However, since the uncorrected crunches scores were not

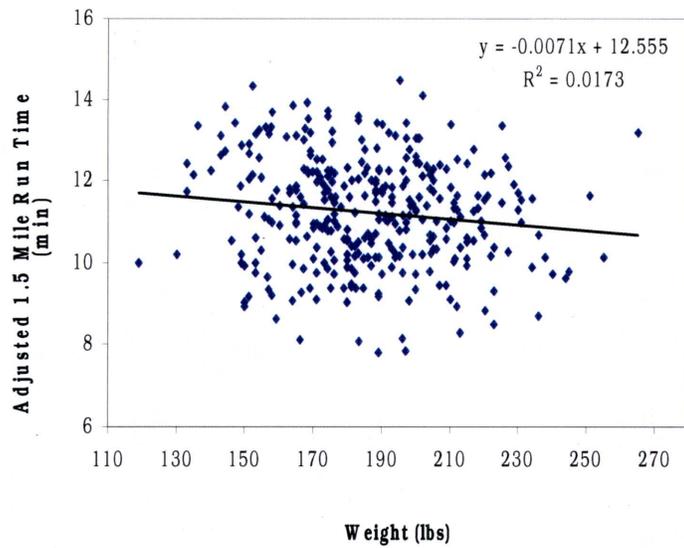
originally significantly correlated with body weight or BMI, correction for these body size variables does not seem warranted.

In addition, the Vanderburgh-corrected 1.5 mile run times demonstrate a small, yet significant correlation with body weight for both females (-0.14) and males (-0.13).

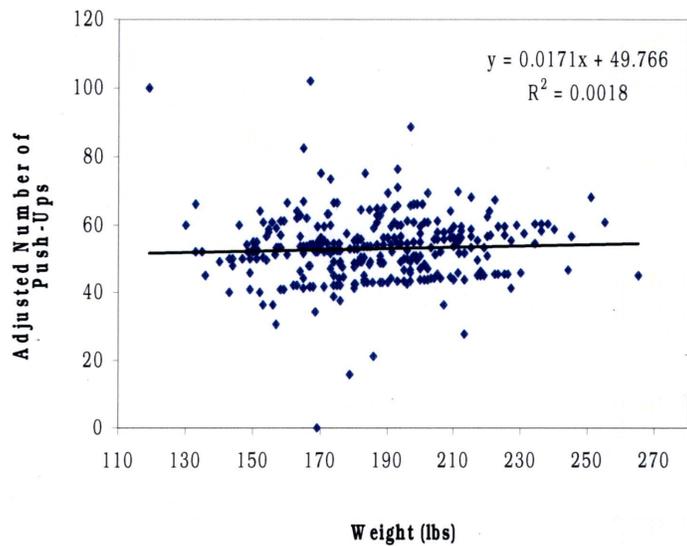
Figures 6-9 demonstrate the relationship between the corrected fitness test performances and body weight in both females and males. Figure 10 demonstrates the relationship between the corrected crunches scores and AC in males.



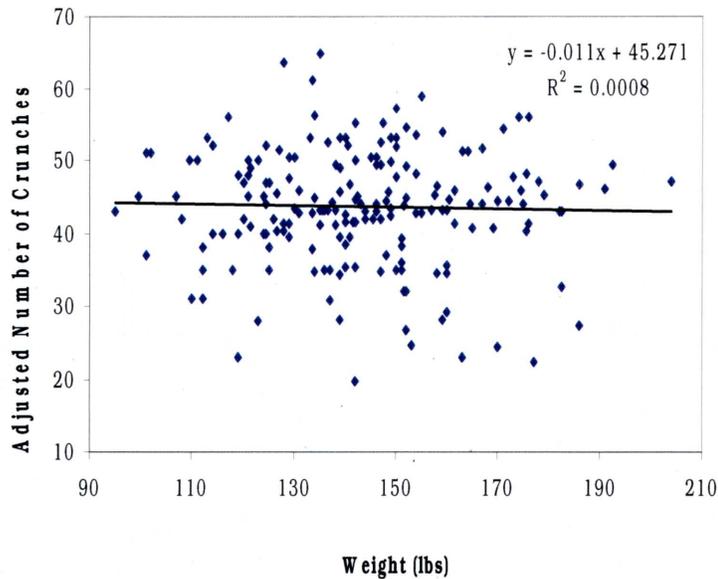
**Figure 6. Female Body Weight versus Vanderburgh-Corrected 1.5 Mile Run Times**



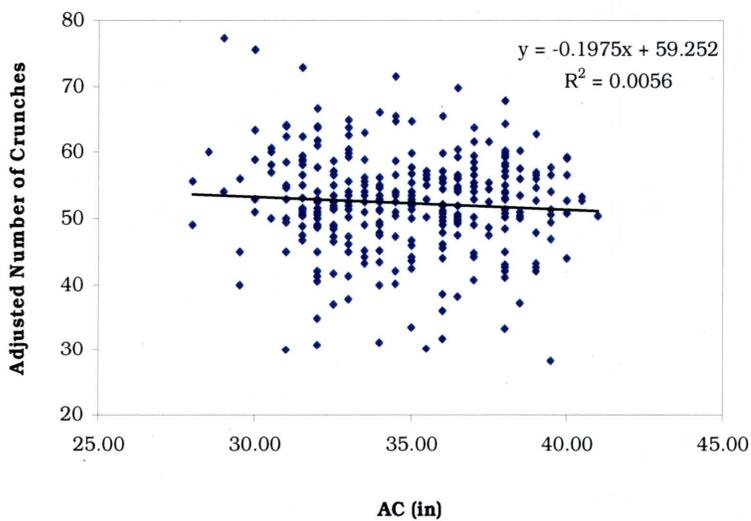
**Figure 7. Male Body Weight versus Vanderburgh-Corrected 1.5 Mile Run Times**



**Figure 8. Male Body Weight versus Vanderburgh-Corrected Push-Up Scores**



**Figure 9. Female Body Weight versus Vanderburgh-Corrected Crunches Scores**



**Figure 10. Male AC versus Vanderburgh-Corrected Crunches Scores**

Multiple regression models, another method for adjusting the fitness performance scores for body size, were developed for each of the three performance tests: 1.5 mile run, push-ups and crunches. Due to

the high correlation between the body size measures (body weight, BMI, and AC), and problems of collinearity, separate prediction models were developed.

Age was also included as a predictor variable in order to adjust for performance differences due to age. (Tables 3 and 4 report the correlation of the three body size measures to age.) Age was found to be a predictor variable in all three performance tests, for males and females, except for predicting 1.5 mile run time in females as there was no significant correlation between females' age and 1.5 mile run times ( $r = 0.09$ ,  $F(1,197) = 1.66$ ,  $p = .19$ ).

Furthermore, no regression models were developed for females regarding push-ups since none of the three body size measures were significantly correlated with push-ups in females. The prediction equations for females are reported in Table 6.

**Table 6: Regression Equations for Predicting Performance Based on Body Size in Females**

<u>R<sup>2</sup></u>	<u>SEE</u>	<u>Predicted Variable</u>	<u>Regression Equation</u>
0.05	1.436	1.5 mile run (min)	$Y = 0.017(\text{weight}) + 11.872$
0.09	1.408	1.5 mile run (min)	$Y = 0.151(\text{BMI}) + 10.625$
0.06	1.428	1.5 mile run (min)	$Y = 0.141(\text{AC}) + 10.014$
0.07	7.438	Crunches	$Y = -0.075(\text{weight}) - 0.170(\text{age}) + 58.239$
0.07	7.447	Crunches	$Y = -0.502(\text{BMI}) - 0.185(\text{age}) + 60.036$
0.10	3.324	Crunches	$Y = -0.756(\text{AC}) - 0.210(\text{age}) + 71.518$

The prediction equations for males are reported in Table 7. Since weight and BMI were not significantly correlated with crunches in males, the only regression model for predicting crunches in males included AC as a predictor. Like females, BMI was not significantly correlated with push-ups in males and therefore a regression model including BMI was not developed for this variable.

**Table 7: Regression Equations for Predicting Performance Based on Body Size in Males**

<u>R<sup>2</sup></u>	<u>SEE</u>	<u>Predicted Variable</u>	<u>Regression Equation</u>
0.07	1.369	1.5 mile run (min)	$Y = 0.010(\text{weight}) + 0.034(\text{age}) + 8.902$
0.10	1.345	1.5 mile run (min)	$Y = 0.124(\text{BMI}) + 0.030(\text{age}) + 7.691$
0.08	1.360	1.5 mile run (min)	$Y = 0.111(\text{AC}) + 0.024(\text{age}) + 7.335$
0.20	6.124	Crunches	$Y = -0.455(\text{AC}) - 0.366(\text{age}) + 78.190$
0.28	7.932	Push-ups	$Y = -0.034(\text{weight}) - 0.709(\text{age}) + 81.927$
0.29	7.846	Push-ups	$Y = -0.540(\text{AC}) - 0.652(\text{age}) + 92.222$

The predicted values (Y) from these regression equations were used to adjust each performance for body size and age. The residual (actual minus predicted score) for each observation was calculated and added to the sample mean for that variable. For example, the mean for the 1.5 mile run in females was 14.249 minutes. Therefore, the adjusted run times (minutes) were calculated as: actual 1.5 mile run time - Y + 14.249. The mean for crunches in females was 41.749, so the adjusted female crunch scores were calculated as: actual crunch score - Y + 41.749. The mean for the 1.5 mile run in males was 12.057 minutes, so the adjusted run times (minutes) were calculated as: actual 1.5 mile run time - Y + 12.057. The mean for push-ups in males was 49.425, so the

adjusted push-up scores were calculated as: actual crunch score -  $Y + 49.425$ . The mean for crunches in males was 48.871, so the adjusted crunch scores were calculated as: actual crunch score -  $Y + 48.871$ .

The correlation between each body size variable and the adjusted scores based on the regression method was zero for each fitness variable. This demonstrates that the adjusted scores based on the derived regression models were independent of body size. Likewise, the correlation between age and adjusted scores based on the regression model was zero for each fitness variable. This demonstrates that the adjusted scores based on the derived regression models were independent of age, with the exception of the 1.5 mile run for females. Since age was not originally found to have a significant correlation with 1.5 mile run times in females, it was not used as a predictor variable for the regression equations predicting 1.5 mile run in females.

## **CHAPTER V**

### **DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

The present study investigated the presence of body mass bias on fitness test scores in military fitness testing. This study revealed significant correlations between the 1.5 mile run and three measures of body mass - body weight, BMI, and AC - for both male and female military members. For females only, push-up scores were not significantly correlated with any of the three measures of body mass. However, there were significant correlations between male push-up scores and body weight and AC, but not BMI. Also, crunch scores were significantly correlated between all three measures of body mass in females, but in males, crunch scores were only significantly correlated with AC, and not body weight or BMI.

The Vanderburgh (2007) correction factors were moderately effective for eliminating body mass bias. In regards to the 1.5 mile run, the corrected scores were not significantly correlated with BMI or AC in both males and females. However in both genders, there was a significant correlation between corrected 1.5 mile run times and body weight. When the correction factors were applied to female members'

push-up and crunch scores, there was no significant correlation between the corrected scores and any of the body mass measurements. However, in males, a small, yet significant, correlation was found not only between corrected push-up scores and AC, but also between their corrected crunches scores and body weight and BMI.

This chapter will discuss the relationship between body size and the actual and corrected fitness scores, as well as the use of multiple regression models to adjust fitness performances based on body size and age. Additionally, test interpretations, conclusions, and future research recommendations will be offered.

### **Correlations of Body Mass Measures and Actual Fitness Test Scores**

The results of this study support previous research that has linked performance to body composition, with most finding an inverse relationship between the two variables. In other words, higher measures of body mass led to poorer performance scores. This relationship has not only been documented in adults (Crecelius, Vanderburgh, & Lloyd, 2008; Vanderburgh & Laubuch, 2006), but in youth as well (Cureton et al., 1991; Lloyd et al., 2003).

For example, Crecelius et al. (2008) discovered during a test measuring 5K run time in males, that men with a greater body mass completed the run in a slower time. Similar to the results of the present study ( $r = 0.20$ ), their data exhibited a significant correlation between

body weight and run time ( $r = 0.357$ ). Another comparison can be made with the results from a study conducted by Vanderburgh and Laubuch (2006). Their data, like the present study, also revealed a significant correlation between run time and body weight ( $r = 0.42$ ).

Stronger correlations between body size and performance did appear in these previous studies referenced above; however this might be attributed to subject motivation as well as sample size differences ( $n = 99$  and  $275$ ) from the present study ( $n = 533$ ). Both of these studies used subjects that were 5K race runners who most likely prepared for best effort performances in the races from which data was collected. With all subjects producing best efforts, it is presumable that they would complete the run in times more commonly associated with their body mass such as heavier individuals finishing in longer amounts of time than lighter individuals, thus producing a stronger correlation.

Within the present study, the subjects' true level of preparation was unknown. For instance, unprepared, lighter individuals may have taken a longer amount of time to complete the run than would generally be associated with lighter body weights. The same could be true with the heavier individuals in this study. The level of preparedness might have been greater as they may have felt the need to run faster in order to prevent an unsuccessful performance on their fitness test.

A negative correlation between push-ups and body weight in males ( $-0.19$ ) was documented in a study completed by Mayhew, Ball, Arnold,

and Bowen (1991). This correlation is similar to the significant correlation documented in the present study between push-up scores and body weight of males (-0.17). These data support the notion of body weight bias in push-ups for males. Male push-up scores were also significantly correlated to AC (-0.32), but not BMI. Also, female push-up scores were not significantly correlated to any of the three body mass measures. More research should be conducted with female subjects to uncover explanations for this non-relationship.

Male crunch scores were significantly correlated to AC (-0.31) only, but not body weight or BMI. While female crunch scores were significantly correlated to all three body mass measures.

As indicated in Tables 3 and 4, there is certainly a body mass bias in most components of the AF fitness test for males and females, especially 1.5 mile run times. In order to alleviate this bias, new scoring procedures, or alternate assessment measures, should be devised to account for the bias imposed on performance scores due to body weight, BMI, and AC.

### **Correlations of Body Mass Measures and Corrected Fitness Test**

#### **Scores**

One goal of this study was to evaluate the effectiveness of previously published correction factors for body mass bias in military physical fitness tests (Vanderburgh, 2007). When these correction

factors were applied to the push-up and crunches scores of females; the corrected score were found to be unrelated to body weight, BMI, and AC. Therefore, the bias of these three measures of body mass was effectively removed from these muscular endurance performance tests, in females only.

When the correction factors were applied to the males' push-up scores, the bias was effectively removed from body weight, but not AC. There was also no correlation found between the males' corrected push-up scores and BMI, however there was no bias to remove since the actual push-up scores were not originally correlated to BMI.

After further analysis, the males' corrected crunches scores were found to be significantly correlated with body weight and BMI, but not AC. Although the correction factors eliminated the AC bias found in the males' actual crunches scores, the correction factors added body mass bias to these scores based on body weight and BMI. Originally, the actual scores did not display any significant correlations based on these two body mass measures. The correction factors provided a negative bias that did not exist beforehand, suggesting that there is no need for correction of these performance scores for body size in the first place. Therefore, the Vanderburgh (2007) correction factors were only moderately effective in eliminating body mass bias in the male muscular endurance test scores.

When the correction factors were applied to the male and female 1.5 mile run times collected in this study, they showed similar results. The correction factors were able to effectively remove bias based on BMI and AC, but not all of the bias due to body weight. Based on the negative correlations for males and females (-0.14 and -0.13, respectively), the correction factors were slightly, but significantly, over-correcting the actual performance scores. The scores seem to be corrected in such a way that the adjusted scores reflect heavier members as running faster than the lighter members, giving them too much compensation for heavier body weight.

Even though the correction factors appeared to be moderately effective in correcting for all three body mass measures, especially BMI and AC, there are factors to consider. For instance, the resulting scores of all components derived from using the correction factors are based on the hypothetical scores the members would have received if they were an “exact replica” of themselves, except lighter (120 lb for women or 150 lb for men) (Vanderburgh, 2007). It is unclear as to the proper interpretation of “exact replica.” The correction factors are based on scaling scores with a standard body mass (Vanderburgh, 2007), but they appear not to account for variation that might occur in other factors such as BMI and AC measurements when members’ scores are standardized at a lighter weight.

For example, members may not have the same body proportions if they are a lighter body mass. Assuming they did not get shorter when they lost weight, their BMI would decrease. Since BMI takes into account height and weight, if members weigh less at the same height, their BMI would be reduced, and therefore they would not be an exact replica. The same could be argued that AC measurements would most likely change, since dimensions of a heavier person would presumably differ with a person of a lighter body weight.

Regardless of these issues, the correction factors do place all military members at a standardized weight, allowing the fitness scores to be compared as such. It may appear that heavier members receive more assistance on their performance scores, however if a person performs poorly on a test due to being heavier because of fat versus lean muscle, even when the score is corrected, the score will still reflect a poor performance as compared to other scores that have been adjusted to the same weight (Vanderburgh, 2007). In contrast, if heavier members perform exceptional for their body size, then their adjusted scores would reflect the better performance. Also, if lighter members perform poorly relative to their body size; their inadequate performance would still be reflected after the scores had been adjusted.

### **Multiple Regression to Predict Performance Based on Body Size**

Regression analysis was shown in prior research to successfully assist with eliminating body mass bias in fitness test performances (Crececius et al., 2008; Cureton et al., 1991; Lloyd et al., 2003). Lloyd et al. (2003) studied youth subjects, and reported that body mass bias was effectively eliminated from the endurance run, curl-up test, trunk-lift test, push-up test, and the back-saver sit-and-reach test, all of which were significantly correlated to BMI and body weight prior to the application of the regression models.

The same successful results appeared in the present study, which supported this study's hypothesis that no correlation would exist between the three AF fitness test components regression-model-adjusted fitness scores and body weight, BMI, and AC. These adjusted scores were independent of body size, and the correlation was zero between each body mass measure and each fitness variable. Due to these results, the adjusted fitness scores resulting from applying the regression equations could be utilized in a real-world setting. These scores could be evaluated solely on performance without taking into account a member's body size. In fact, due to their successful elimination of all body size and age influences from the fitness test scores, the regression models may be an effective alternative to the Vanderburgh (2007) correction factors, when the elimination of body mass bias is required in military fitness testing.

### **Age as a Predictor of Fitness**

All AF fitness test components' scores are derived from score charts that award points based on the members' performance score and age. Generally, as members (male and female) get older, they are allowed to run slower and complete fewer repetitions of push-ups and crunches in order to earn the same amount of points that younger members receive for better performances. In other words, the current scoring system accounts for a reduction in performance according to age.

A recent study conducted by Vanderburgh and Laubach (2006) annotates that the concept of increasing age contributing to slower run times is widely accepted. In fact, the results of the present study partially agree with this notion. The results of this study indicate that age was a predictive factor of 1.5 mile run times in male military members, but not in female members. Based on this information, it appears that 1.5 mile run times for females should only be adjusted for body weight, but not for age.

From the regression equations reported in Table 9, the coefficients for age in predicting 1.5 mile run time are: .034 for body weight, .030 for BMI, and .024 for AC. This means that for the same body size, 1.5 mile run times will be from 1.44 to 2.44 seconds slower per year in males. This decrease would indicate a 10 second adjustment for every 5-year age group in males. Since there was no correlation between age and 1.5

mile run performance in females, such an adjustment seems unwarranted.

Furthermore, the current fitness score charts, may be under-correcting male 1.5 mile performance scores for certain age groups and over-correcting scores for other age groups. For example, the difference in run times for maximal points (50) for male members 29 years old to 39 years old is 12 seconds. According to the present study's regression models, a ten year difference in age should account for a 20 second adjustment, therefore revealing an eight second under-correction. As another example, the difference in run times for maximal points for male members 39 years old to 49 years old is 36 seconds. As stated before, according to the present study's regression models, a ten year difference in age should account for a 20 second adjustment, therefore revealing an over-correction of 16 seconds for this age span.

Since female 1.5 mile run time scores were not found to be predicted by age, the regression models for the female 1.5 mile-run times did not include age as a predictor variable. Only weight-adjusted corrections would be needed to award points to female members' 1.5 mile run times. Age was also found to be a significant predictor variable for crunches in females, and for push-ups and crunches in males.

Corrected scores based on age appear to be needed in most of the Air Force fitness test components. Even though the correction method based on Vanderburgh's (2007) correction factors was successful in

correcting for body mass bias it did not take into account age. Therefore, the correction factors would not be ideal for adjusting performance scores based on age. However, the regression models devised in this research study would be a good option to utilize as they take into account both body mass and age.

Since it has been documented that male and female members at the upper end of the active duty air force age distribution are at an increased risk for low physical fitness (Robbins, Chao, Fonseca, Snedecor, & Knapik, 2001), this area of age bias requires further research. If proper age adjustments can be made to allow for reasonable age-related performance expectations and fair distribution of points, military members may have a decreased risk of being unsuccessful on their annual physical fitness test.

### **Test Interpretation**

One explanation for variations in the data could be based on motivation levels. Heavier personnel with larger AC measurements may feel the need to work harder than their lighter, smaller counterparts on the 1.5 mile run to make-up for points lost on the AC portion of their fit test. By doing so, lighter personnel may not have pushed to their full potential while heavier members exceeded what was expected of them, thus altering the anticipated results.

Also, these results may not reflect a best effort from military members. This lack of effort may be attributed to an inadequate source of motivation. It appears that there is no incentive for military members to achieve a rating of excellent, or higher scores within the good category. If a minimal passing score of 75 has the same effect as a maximal score of 100, members may not be interested in pursuing maximal scores on their fitness tests. They may be inclined to only perform to the standards that allow them to achieve a minimal passing score with no extra effort. Thus the results of the fitness test may not reflect the members' best efforts, and only provide an adequate picture of minimum fitness.

Finally, the subjects in this study were a representation of military members who work mainly in office positions at the AF Headquarters Personnel Center. They are more likely to be older and higher ranking officer and enlisted members. This study may not have extracted a sample of subjects that is indicative to the entire Air Force population, as many other units throughout the Air Force require more physically demanding duties and are filled with more junior ranking members. However, this sample may provide insight into the performance of members in the Air Force who are assigned to less physically active positions.

## **Conclusions**

Based on the results of this study, the following conclusions can be made:

1. This study revealed that male and female military members' 1.5 mile run times have an inverse relationship with body weight, BMI, and AC.
2. Male push-up scores are significantly correlated to body weight ( $r = -0.17$ ) and AC ( $r = -0.32$ ), but not BMI, and their crunch scores are only significantly correlated to AC ( $r = -0.31$ ).
3. Female push-up scores displayed no correlation to any of the three measures of body mass, but their crunch scores are significantly correlated to body weight ( $r = -0.23$ ), BMI ( $r = -0.21$ ), and AC ( $r = -0.26$ ).
4. The correction factors developed by Vanderburgh (2007) are very effective in removing bias due to BMI and AC in both female and male scores on all testing components, but not as effective for eliminating bias due to body weight in 1.5 mile run times.
5. Age was found to be a significant,  $t(331) = 2.93$ ,  $p = 0.00$ , predictor in male 1.5 mile run times.
6. Age was not a significant predictor in female 1.5 mile run times.
7. Age was found to be a significant predictor in male push-up,  $t(331) = 9.40$ ,  $p < 0.001$ , and crunch,  $t(331) = 6.77$ ,  $p = <0.001$ , performances.

8. The regression models proposed in this study effectively remove all body mass bias in fitness test performance scores and account for age in all components, except for female 1.5 mile run times in which there was no correlation to age in the unadjusted scores.

### **Recommendations for Future Research**

A number of issues remain for further research. Additional research is needed to devise appropriate evaluation methods that look at performance relative to body size, as well as alternative methods on how to correct fitness test scores for body weight and age. However, the regression equations developed in the present study were found extremely effective in the correcting for all three body size measures, and would be an effective method for eliminating body size bias in Air Force fitness testing. Future studies could incorporate these new regression equations with a different cross-section of the Air Force to include military members who are not only younger, but those assigned to more physically demanding duties.

Attention should also be paid to alternative methods of body composition evaluation that may allow for a more accurate picture of body mass make-up such as dual-energy x-ray absorptiometry or skinfold assessments. Measures such as lean body mass and percent fat could be more appropriate for assessing performance measures and indicating physical fitness levels since fat mass and percentage have

shown to be contributors to poorer physical performance (Matilla, Tallroth, Marttinen, & Pihlajamäki, 2007). Adjustments of fitness test scores based on body size appear warranted where body size is a significant factor in performance, but such adjustments should not include a reward for increased percent fat. To adjust scores for body size without correcting for higher percent fat will require the measurement of percent fat as an independent variable in future research.

Finally, the effects of motivation tactics on performance should be researched. This area of study might reveal that incentives are capable of positively altering fitness test performances, as well as helping to ensure best effort performances. Adjusting performances based on body size and age may provide additional motivation for best-effort performance. Another possible benefit would be the increased fitness levels of military members. If members must perform well on their annual fitness test, they may be willing to spend more time preparing. This would almost certainly lead to an increase their fitness and activity levels, as well as promoting a decrease in their risks to various health-related diseases.

## APPENDIX A

### VANDERBURGH CORRECTION FACTOR CHARTS

CORRECTION FACTORS FOR MUSCLE ENDURANCE TESTS (PUSH-UPS, SIT-UPS, ABDOMINAL CRUNCHES)<sup>a</sup>

		Weight (lb)									
Women	120	130	140	150	160	170	180	190	200		
0	1.00	1.01	1.04	1.06	1.08	1.11	1.13	1.15	1.17		
1	1.00	1.02	1.04	1.06	1.09	1.11	1.13	1.15	1.17		
2	1.00	1.02	1.04	1.07	1.09	1.11	1.13	1.15	1.17		
3	1.00	1.02	1.05	1.07	1.09	1.11	1.13	1.15	1.17		
4	1.00	1.02	1.05	1.07	1.09	1.12	1.14	1.16	1.18		
5	1.00	1.03	1.05	1.07	1.10	1.12	1.14	1.16	1.18		
6	1.00	1.03	1.05	1.08	1.10	1.12	1.14	1.16	1.18		
7	1.01	1.03	1.05	1.08	1.10	1.12	1.14	1.16	1.18		
8	1.01	1.03	1.06	1.08	1.10	1.12	1.14	1.16	1.18		
9	1.01	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.18		
		Weight (lb)									
Men	150	160	170	180	190	200	210	220	230	240	250
0	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.18
1	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.15	1.17	1.19
2	1.00	1.03	1.05	1.07	1.08	1.10	1.12	1.14	1.15	1.17	1.19
3	1.01	1.03	1.05	1.07	1.09	1.11	1.12	1.14	1.16	1.17	1.19
4	1.01	1.03	1.05	1.07	1.09	1.11	1.12	1.14	1.16	1.17	1.19
5	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.14	1.16	1.18	1.19
6	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.14	1.16	1.18	1.19
7	1.02	1.04	1.06	1.08	1.09	1.11	1.13	1.15	1.16	1.18	1.19
8	1.02	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.16	1.18	1.20
9	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.18	1.20

CORRECTION FACTORS FOR TIMED DISTANCE RUNS<sup>a</sup>

		Weight (lb)										
Women		120	130	140	150	160	170	180	190	200		
0		1.00	0.99	0.96	0.94	0.92	0.90	0.89	0.87	0.85		
1		1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.87	0.85		
2		1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.87	0.85		
3		1.00	0.98	0.96	0.93	0.92	0.90	0.88	0.87	0.85		
4		1.00	0.98	0.95	0.93	0.91	0.90	0.88	0.86	0.85		
5		1.00	0.97	0.95	0.93	0.91	0.89	0.88	0.86	0.85		
6		1.00	0.97	0.95	0.93	0.91	0.89	0.88	0.86	0.85		
7		0.99	0.97	0.95	0.93	0.91	0.89	0.87	0.86	0.85		
8		0.99	0.97	0.95	0.92	0.91	0.89	0.87	0.86	0.84		
9		0.99	0.97	0.94	0.92	0.90	0.89	0.87	0.86	0.84		
		Weight (lb)										
Men		150	160	170	180	190	200	210	220	230	240	250
0		1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.88	0.87	0.85	0.84
1		1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.88	0.87	0.85	0.84
2		1.00	0.97	0.96	0.94	0.92	0.91	0.89	0.88	0.86	0.85	0.84
3		0.99	0.97	0.95	0.94	0.92	0.90	0.89	0.88	0.86	0.85	0.84
4		0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.87	0.86	0.85	0.84
5		0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.87	0.86	0.85	0.84
6		0.99	0.97	0.95	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84
7		0.98	0.96	0.95	0.93	0.91	0.90	0.88	0.87	0.86	0.85	0.84
8		0.98	0.96	0.94	0.93	0.91	0.90	0.88	0.87	0.86	0.85	0.83
9		0.98	0.96	0.94	0.93	0.91	0.90	0.88	0.87	0.86	0.84	0.83

**APPENDIX B**

**AIR FORCE FITNESS ASSESSMENT SCORE CHARTS**

Males Under 25

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≤9:36	≥54	50.00	<32.5	30.00	≥62	10.00	≥55	10.00
9:37-9:48	53	47.50	32.50	28.75	61	9.75	53-54	9.50
9:49-10:12	51-52	45.00	33.00	27.50	60	9.50	52	9.00
10:13-10:36	49-50	43.50	33.50	26.25	59	9.25	50-51	8.75
10:37-11:06	47-48	42.00	34.00	25.00	57-58	9.00	48-49	8.50
11:07-11:36	45-46	40.50	34.50	23.75	52-56	8.75	46-47	8.25
11:37-12:12	43-44	39.00	35.00	22.50	49-51	8.50	44-45	8.00
12:13-12:54	41-42	37.50	35.50	22.35	45-48	8.25	42-43	7.75
12:55-13:36	39-40	36.00	36.00	22.20	41-44	8.00	40-41	7.50
13:37-14:24	37-38	34.00	36.50	22.05	37-40	7.75	38-39	7.40
14:25-14:54	36	32.00	37.00	21.90	33-36	7.50	36-37	7.30
14:55-15:18	35	30.00	37.50	21.75	30-32	7.40	35	7.20
15:19-15:48	34	27.00	38.00	21.60	27-29	7.30	33-34	7.10
15:49-16:24	33	24.00	38.50	21.45	24-26	7.20	32	7.00
16:25-16:54	32	21.00	39.00	21.30	21-23	7.10	30-31	6.00
16:55-17:36	31	18.00	39.50	21.25	19-20	7.00	28-29	4.00
17:37-18:12	30	15.00	40.00	21.00	17-18	6.00	27	2.00
18:13-18:54	29	12.00	40.50	18.00	15-16	5.00	<27	0.00
18:55-19:42	28	9.00	41.00	15.00	14	4.00		
19:43-20:36	27	6.00	41.50	12.00	12-13	3.00		
20:37-21:30	26	3.00	42.00	9.00	10-11	2.00		
>21:30	<26	0.00	42.50	6.00	8-9	1.00		
			43.00	3.00	<8	0.00		
			>43.00	0.00				

Males 25-29

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≤9:36	≥54	50.00	<32.5	30.00	≥57	10.00	≥53	10.00
9:37-9:48	53	47.50	32.50	28.75	56	9.75	51-52	9.50
9:49-10:12	51-52	45.00	33.00	27.50	55	9.50	50	9.00
10:13-10:36	49-50	43.50	33.50	26.25	54	9.25	48-49	8.75
10:37-11:06	47-48	42.00	34.00	25.00	52-53	9.00	46-47	8.50
11:07-11:36	45-46	40.50	34.50	23.75	48-51	8.75	44-45	8.25
11:37-12:12	43-44	39.00	35.00	22.50	45-47	8.50	42-43	8.00
12:13-12:54	41-42	37.50	35.50	22.35	41-44	8.25	40-41	7.75
12:55-13:36	39-40	36.00	36.00	22.20	37-40	8.00	38-39	7.50
13:37-14:24	37-38	34.00	36.50	22.05	34-36	7.75	36-37	7.40
14:25-14:54	36	32.00	37.00	21.90	30-33	7.50	34-35	7.30
14:55-15:18	35	30.00	37.50	21.75	27-29	7.40	33	7.20
15:19-15:48	34	27.00	38.00	21.60	25-26	7.30	31-32	7.10
15:49-16:24	33	24.00	38.50	21.45	23-24	7.20	30	7.00
16:25-16:54	32	21.00	39.00	21.30	20-22	7.10	28-29	6.00
16:55-17:36	31	18.00	39.50	21.25	17-19	7.00	27	4.00
17:37-18:12	30	15.00	40.00	21.00	15-16	6.00	25-26	2.00
18:13-18:54	29	12.00	40.50	18.00	13-14	5.00	<25	0.00
18:55-19:42	28	9.00	41.00	15.00	11-12	4.00		
19:43-20:36	27	6.00	41.50	12.00	10	3.00		
20:37-21:30	26	3.00	42.00	9.00	9	2.00		
>21:30	<26	0.00	42.50	6.00	7-8	1.00		
			43.00	3.00	<7	0.00		
			>43.00	0.00				

## Males 30-34

<b>Aerobic Fitness</b>		
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points
≤9:48	≥53	50.00
9:49-10:12	51-52	47.50
10:13-10:24	50	45.00
10:25-10:54	48-49	43.50
10:55-11:24	46-47	42.00
11:25-11:54	44-45	40.50
11:55-12:30	42-43	39.00
12:31-12:54	41	37.50
12:55-13:36	39-40	36.00
13:37-14:24	37-38	34.00
14:25-14:54	36	32.00
14:55-15:18	35	30.00
15:19-15:48	34	27.00
15:49-16:24	33	24.00
16:25-16:54	32	21.00
16:55-17:36	31	18.00
17:37-18:12	30	15.00
18:13-18:54	29	12.00
18:55-19:42	28	9.00
19:43-20:36	27	6.00
20:37-21:30	26	3.00
>21:30	<26	0.00

<b>Body Composition</b>	
Abdominal Circumference (inches)	Component Points
<32.5	30.00
32.50	28.75
33.00	27.50
33.50	26.25
34.00	25.00
34.50	23.75
35.00	22.50
35.50	22.35
36.00	22.20
36.50	22.05
37.00	21.90
37.50	21.75
38.00	21.60
38.50	21.45
39.00	21.30
39.50	21.25
40.00	21.00
40.50	18.00
41.00	15.00
41.50	12.00
42.00	9.00
42.50	6.00
43.00	3.00
>43.00	0.00

<b>Muscle Fitness</b>			
1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≥52	10.00	≥51	10.00
50-51	9.75	49-50	9.50
49	9.50	48	9.00
48	9.25	46-47	8.75
46-47	9.00	44-45	8.50
43-45	8.75	42-43	8.25
40-42	8.50	40-41	8.00
36-39	8.25	38-39	7.75
33-35	8.00	36-37	7.50
30-32	7.75	34-35	7.40
27-29	7.50	33	7.30
24-26	7.40	31-32	7.20
22-23	7.30	30	7.10
20-21	7.20	28-29	7.00
17-19	7.10	26-27	6.00
15-16	7.00	25	4.00
13-14	6.00	23-24	2.00
12	5.00	<23	0.00
10-11	4.00		
8-9	3.00		
7	2.00		
5-6	1.00		
<5	0.00		

## Males 35-39

<b>Aerobic Fitness</b>		
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points
≤9:48	≥53	50.00
9:49-10:12	51-52	47.50
10:13-10:24	50	45.00
10:25-10:54	48-49	43.50
10:55-11:24	46-47	42.00
11:25-11:54	44-45	40.50
11:55-12:30	42-43	39.00
12:31-12:54	41	37.50
12:55-13:36	39-40	36.00
13:37-14:24	37-38	34.00
14:25-14:54	36	32.00
14:55-15:18	35	30.00
15:19-15:48	34	27.00
15:49-16:24	33	24.00
16:25-16:54	32	21.00
16:55-17:36	31	18.00
17:37-18:12	30	15.00
18:13-18:54	29	12.00
18:55-19:42	28	9.00
19:43-20:36	27	6.00
20:37-21:30	26	3.00
>21:30	<26	0.00

<b>Body Composition</b>	
Abdominal Circumference (inches)	Component Points
<32.5	30.00
32.50	28.75
33.00	27.50
33.50	26.25
34.00	25.00
34.50	23.75
35.00	22.50
35.50	22.35
36.00	22.20
36.50	22.05
37.00	21.90
37.50	21.75
38.00	21.60
38.50	21.45
39.00	21.30
39.50	21.25
40.00	21.00
40.50	18.00
41.00	15.00
41.50	12.00
42.00	9.00
42.50	6.00
43.00	3.00
>43.00	0.00

<b>Muscle Fitness</b>			
1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≥46	10.00	≥49	10.00
45	9.75	47-48	9.50
44	9.50	46	9.00
42-43	9.25	44-45	8.75
41	9.00	42-43	8.50
38-40	8.75	40-41	8.25
35-37	8.50	38-39	8.00
32-34	8.25	36-37	7.75
30-31	8.00	34-35	7.50
27-29	7.75	32-33	7.40
24-26	7.50	30-31	7.30
21-23	7.40	29	7.20
19-20	7.30	27-28	7.10
17-18	7.20	25-26	7.00
15-16	7.10	23-24	6.00
13-14	7.00	22	4.00
11-12	6.00	20-21	2.00
9-10	5.00	<20	0.00
8	4.00		
6-7	3.00		
5	2.00		
3-4	1.00		
<3	0.00		

## Males 40-44

Aerobic Fitness		
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points
<10:24	>50	50.00
10:25-10:36	49	47.50
10:37-10:54	48	45.00
10:55-11:24	46-47	43.50
11:25-11:54	44-45	42.00
11:55-12:30	42-43	40.50
12:31-13:12	40-41	39.00
13:13-13:36	39	37.50
13:37-14:24	37-38	36.00
14:25-15:18	35-36	34.00
15:19-15:48	34	32.00
15:49-16:24	33	30.00
16:25-16:54	32	27.00
16:55-17:36	31	24.00
17:37-18:12	30	21.00
18:13-18:54	29	18.00
18:55-19:42	28	15.00
19:43-20:36	27	12.00
20:37-21:30	26	9.00
21:31-22:30	25	6.00
22:31-23:36	24	3.00
>23:36	<24	0.00

Body Composition	
Abdominal Circumference (inches)	Component Points
<32.5	30.00
32.50	28.75
33.00	27.50
33.50	26.25
34.00	25.00
34.50	23.75
35.00	22.50
35.50	22.35
36.00	22.20
36.50	22.05
37.00	21.90
37.50	21.75
38.00	21.60
38.50	21.45
39.00	21.30
39.50	21.25
40.00	21.00
40.50	18.00
41.00	15.00
41.50	12.00
42.00	9.00
42.50	6.00
43.00	3.00
>43.00	0.00

Muscle Fitness	
1 minute Push-up (# Reps)	Component Points
>40	10.00
39	9.75
38	9.50
37	9.25
36	9.00
33-35	8.75
31-32	8.50
28-30	8.25
26-27	8.00
23-25	7.75
21-22	7.50
18-20	7.40
16-17	7.30
14-15	7.20
12-13	7.10
10-11	7.00
8-9	6.00
7	5.00
6	4.00
4-5	3.00
3	2.00
1-2	1.00
<1	0.00

1 minute Crunch (# Reps)	Component Points
>47	10.00
45-46	9.50
43-44	9.00
41-42	8.75
39-40	8.50
37-38	8.25
35-36	8.00
33-34	7.75
31-32	7.50
29-30	7.40
27-28	7.30
26	7.20
24-25	7.10
22-23	7.00
20-21	6.00
18	4.00
17-18	2.00
<17	0.00

## Males 45-49

Aerobic Fitness		
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points
<10:24	≥50	50.00
10:25-10:36	49	47.50
10:37-10:54	48	45.00
10:55-11:24	46-47	43.50
11:25-11:54	44-45	42.00
11:55-12:30	42-43	40.50
12:31-13:12	40-41	39.00
13:13-13:36	39	37.50
13:37-14:24	37-38	36.00
14:25-15:18	35-36	34.00
15:19-15:48	34	32.00
15:49-16:24	33	30.00
16:25-16:54	32	27.00
16:55-17:36	31	24.00
17:37-18:12	30	21.00
18:13-18:54	29	18.00
18:55-19:42	28	15.00
19:43-20:36	27	12.00
20:37-21:30	26	9.00
21:31-22:30	25	6.00
22:31-23:36	24	3.00
>23:36	<24	0.00

Body Composition	
Abdominal Circumference (inches)	Component Points
<32.5	30.00
32.50	28.75
33.00	27.50
33.50	26.25
34.00	25.00
34.50	23.75
35.00	22.50
35.50	22.35
36.00	22.20
36.50	22.05
37.00	21.90
37.50	21.75
38.00	21.60
38.50	21.45
39.00	21.30
39.50	21.25
40.00	21.00
40.50	18.00
41.00	15.00
41.50	12.00
42.00	9.00
42.50	6.00
43.00	3.00
>43.00	0.00

Muscle Fitness	
1 minute Push-up (# Reps)	Component Points
≥40	10.00
39	9.75
37-38	9.50
35-36	9.25
33-34	9.00
30-32	8.75
27-29	8.50
25-26	8.25
22-24	8.00
20-21	7.75
18-19	7.50
16-17	7.40
14-15	7.30
12-13	7.20
10-11	7.10
9	7.00
7-8	6.00
6	5.00
5	4.00
4	3.00
2-3	2.00
1	1.00
0	0.00

1 minute Crunch (# Reps)	Component Points
≥45	10.00
43-44	9.50
41-42	9.00
39-40	8.75
37-38	8.50
35-36	8.25
33-34	8.00
31-32	7.75
29-30	7.50
27-28	7.40
25-26	7.30
24	7.20
22-23	7.10
20-21	7.00
18-19	6.00
17	4.00
15-16	2.00
<15	0.00

## Males 50-54

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
<11:06	≥47	50.00	<32.5	30.00	≥39	10.00	≥43	10.00
11:07-11:24	46	47.50	32.50	28.75	37-38	9.75	41-42	9.50
11:25-11:36	45	45.00	33.00	27.50	35-36	9.50	39-40	9.00
11:37-12:12	43-44	43.50	33.50	26.25	32-34	9.25	37-38	8.75
12:13-12:54	41-42	42.00	34.00	25.00	30-31	9.00	35-36	8.50
12:55-13:36	39-40	40.50	34.50	23.75	27-29	8.75	32-34	8.25
13:37-14:24	37-38	39.00	35.00	22.50	25-26	8.50	30-31	8.00
14:25-15:18	35-36	37.50	35.50	22.35	22-24	8.25	28-29	7.75
15:19-15:48	34	36.00	36.00	22.20	20-21	8.00	26-27	7.50
15:49-16:54	32-33	34.00	36.50	22.05	17-19	7.75	24-25	7.40
16:55-17:36	31	32.00	37.00	21.90	15-16	7.50	22-23	7.30
17:37-18:12	30	30.00	37.50	21.75	13-14	7.40	21	7.20
18:13-18:54	29	27.00	38.00	21.60	12	7.30	19-20	7.10
18:55-19:42	28	24.00	38.50	21.45	10-11	7.20	17-18	7.00
19:43-20:36	27	21.00	39.00	21.30	9	7.10	15-16	6.60
20:37-21:30	26	18.00	39.50	21.25	7-8	7.00	14	4.60
21:31-22:30	25	15.00	40.00	21.00	6	6.00	12-13	2.00
22:31-23:36	24	12.00	40.50	18.00	5	5.00	<12	0.00
23:37-24:48	23	9.00	41.00	15.00	4	4.00		
24:49-26:06	22	6.00	41.50	12.00	3	3.00		
26:07-27:36	21	3.00	42.00	9.00	2	2.00		
>27:36	<21	0.00	42.50	6.00	1	1.00		
			43.00	3.00	0	0.00		
			>43.00	0.00				

## Males 55+

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
<11:06	≥47	50.00	<32.5	30.00	≥35	10.00	≥41	10.00
11:07-11:24	46	47.50	32.50	28.75	33-34	9.75	39-40	9.50
11:25-11:36	45	45.00	33.00	27.50	31-32	9.50	37-38	9.00
11:37-12:12	43-44	43.50	33.50	26.25	29-30	9.25	34-36	8.75
12:13-12:54	41-42	42.00	34.00	25.00	28	9.00	32-33	8.50
12:55-13:36	39-40	40.50	34.50	23.75	26-27	8.75	30-31	8.25
13:37-14:24	37-38	39.00	35.00	22.50	24-25	8.50	27-29	8.00
14:25-15:18	35-36	37.50	35.50	22.35	21-23	8.25	25-26	7.75
15:19-15:48	34	36.00	36.00	22.20	19-20	8.00	23-24	7.50
15:49-16:54	32-33	34.00	36.50	22.05	17-18	7.75	21-22	7.40
16:55-17:36	31	32.00	37.00	21.90	15-16	7.50	20	7.30
17:37-18:12	30	30.00	37.50	21.75	13-14	7.40	18-19	7.20
18:13-18:54	29	27.00	38.00	21.60	11-12	7.30	16-17	7.10
18:55-19:42	28	24.00	38.50	21.45	10	7.20	15	7.00
19:43-20:36	27	21.00	39.00	21.30	8-9	7.10	13-14	6.00
20:37-21:30	26	18.00	39.50	21.25	6-7	7.00	12	4.00
21:31-22:30	25	15.00	40.00	21.00	5	6.00	10-11	2.00
22:31-23:36	24	12.00	40.50	18.00	4	5.00	<10	0.00
23:37-24:48	23	9.00	41.00	15.00	3	4.00		
24:49-26:06	22	6.00	41.50	12.00	2	3.00		
26:07-27:36	21	3.00	42.00	9.00	1	2.00		
>27:36	<21	0.00	42.50	6.00	0	0.00		
			43.00	3.00				
			>43.00	0.00				

## Females Under 25

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≤11:06	≥47	50.00	<29.5	30.00	≥42	10.00	≥51	10.00
11:07-11:36	45-46	47.50	29.50	28.75	41	9.75	50	9.50
11:37-11:54	44	45.00	30.00	27.50	40	9.50	49	9.00
11:55-12:30	42-43	43.50	30.50	26.25	38-39	9.25	46-48	8.75
12:31-13:12	40-41	42.00	31.00	25.00	37	9.00	44-45	8.50
13:13-14:00	38-39	40.50	31.50	23.75	34-36	8.75	42-43	8.25
14:01-14:54	36-37	39.00	32.00	22.50	31-33	8.50	40-41	8.00
14:55-15:18	35	37.50	32.50	22.30	27-30	8.25	37-39	7.75
15:19-15:48	34	36.00	33.00	22.00	24-26	8.00	35-36	7.50
15:49-16:24	33	34.00	33.50	21.80	21-23	7.75	33-34	7.40
16:25-16:54	32	32.00	34.00	21.50	18-20	7.50	30-32	7.30
16:55-17:36	31	30.00	34.50	21.30	16-17	7.40	28-29	7.20
17:37-18:12	30	27.00	35.00	21.00	14-15	7.30	26-27	7.10
18:13-18:54	29	24.00	35.50	18.00	12-13	7.20	24-25	7.00
18:55-19:42	28	21.00	36.00	15.00	10-11	7.10	22-23	6.00
19:43-20:36	27	18.00	36.50	12.00	9	7.00	20-21	4.00
20:37-21:30	26	15.00	37.00	9.00	8	6.00	18-19	2.00
21:31-22:30	25	12.00	37.50	6.00	7	5.00	<18	0.00
22:31-23:36	24	9.00	38.00	3.00	6	4.00		
23:37-24:48	23	6.00	>38.00	0.00	5	3.00		
24:49-26:06	22	3.00			4	2.00		
>26:06	<22	0.00			3	1.00		
					<3	0.00		

## Females 25-29

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≤11:24	≥46	50.00	<29.5	30.00	≥41	10.00	≥47	10.00
11:25-11:36	45	47.50	29.50	28.75	40	9.75	46	9.50
11:37-11:54	44	45.00	30.00	27.50	38-39	9.50	45	9.00
11:55-12:30	42-43	43.50	30.50	26.25	36-37	9.25	42-44	8.75
12:31-13:12	40-41	42.00	31.00	25.00	35	9.00	40-41	8.50
13:13-14:00	38-39	40.50	31.50	23.75	31-34	8.75	38-39	8.25
14:01-14:54	36-37	39.00	32.00	22.50	28-30	8.50	36-37	8.00
14:55-15:18	35	37.50	32.50	22.30	25-27	8.25	34-35	7.75
15:19-15:48	34	36.00	33.00	22.00	22-24	8.00	31-33	7.50
15:49-16:24	33	34.00	33.50	21.80	19-21	7.75	29-30	7.40
16:25-16:54	32	32.00	34.00	21.50	16-18	7.50	27-28	7.30
16:55-17:36	31	30.00	34.50	21.30	14-15	7.40	25-26	7.20
17:37-18:12	30	27.00	35.00	21.00	13	7.30	23-24	7.10
18:13-18:54	29	24.00	35.50	18.00	11-12	7.20	21-22	7.00
18:55-19:42	28	21.00	36.00	15.00	10	7.10	19-20	6.00
19:43-20:36	27	18.00	36.50	12.00	8-9	7.00	17-18	4.00
20:37-21:30	26	15.00	37.00	9.00	7	6.00	15-16	2.00
21:31-22:30	25	12.00	37.50	6.00	6	5.00	<15	0.00
22:31-23:36	24	9.00	38.00	3.00	5	4.00		
23:37-24:48	23	6.00	>38.00	0.00	4	3.00		
24:49-26:06	22	3.00			3	2.00		
>26:06	21	0.00			2	1.00		
					<2	0.00		

## Females 40-44

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
<12:30	≥42	50.00	<29.5	30.00	≥20	10.00	≥38	10.00
12:31-12:54	41	47.50	29.50	28.75	19	9.50	36-37	9.50
12:55-13:12	40	45.00	30.00	27.50	18	9.00	34-35	9.00
13:13-14:00	38-39	43.50	30.50	26.25	16-17	8.75	32-33	8.75
14:01-14:54	36-37	42.00	31.00	25.00	15	8.50	30-31	8.50
14:55-15:48	34-35	40.50	31.50	23.75	14	8.25	28-29	8.25
15:49-16:24	33	39.00	32.00	22.50	13	8.00	26-27	8.00
16:25-16:54	32	37.50	32.50	22.30	12	7.75	24-25	7.75
16:55-17:36	31	36.00	33.00	22.00	11	7.50	22-23	7.50
17:37-18:12	30	34.00	33.50	21.80	9-10	7.40	20-21	7.40
18:13-18:54	29	32.00	34.00	21.50	8	7.30	18-19	7.30
18:55-19:42	28	30.00	34.50	21.30	7	7.20	17	7.20
19:43-20:36	27	27.00	35.00	21.00	6	7.10	15-16	7.10
20:37-21:30	26	24.00	35.50	18.00	5	7.00	13-14	7.00
21:31-22:30	25	21.00	36.00	15.00	3-4	6.00	11-12	6.00
22:31-23:36	24	18.00	36.50	12.00	2	4.00	9-10	4.00
23:37-24:48	23	15.00	37.00	9.00	1	2.00	7-8	2.00
24:49-26:06	22	12.00	37.50	6.00	0	0.00	<7	0.00
26:07-27:36	21	9.00	38.00	3.00				
27:37-29:18	20	6.00	>38.00	0.00				
29:19-31:12	19	3.00						
>31:12	<19	0.00						

## Females 45-49

Aerobic Fitness			Body Composition		Muscle Fitness			
1.5-Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
≤12:30	≥42	50.00	<29.5	30.00	≥18	10.00	≥34	10.00
12:31-12:54	41	47.50	29.50	28.75	17	9.50	33	9.50
12:55-13:12	40	45.00	30.00	27.50	16	9.00	32	9.00
13:13-14:00	38-39	43.50	30.50	26.25	14-15	8.75	30-31	8.75
14:01-14:54	36-37	42.00	31.00	25.00	13	8.50	28-29	8.50
14:55-15:48	34-35	40.50	31.50	23.75	12	8.25	26-27	8.25
15:49-16:24	33	39.00	32.00	22.50	11	8.00	24-25	8.00
16:25-16:54	32	37.50	32.50	22.30	10	7.75	22-23	7.75
16:55-17:36	31	36.00	33.00	22.00	9	7.50	20-21	7.50
17:37-18:12	30	34.00	33.50	21.80	8	7.40	18-19	7.40
18:13-18:54	29	32.00	34.00	21.50	7	7.30	16-17	7.30
18:55-19:42	28	30.00	34.50	21.30	6	7.20	14-15	7.20
19:43-20:36	27	27.00	35.00	21.00	5	7.10	12-13	7.10
20:37-21:30	26	24.00	35.50	18.00	4	7.00	10-11	7.00
21:31-22:30	25	21.00	36.00	15.00	3	6.00	8-9	6.00
22:31-23:36	24	18.00	36.50	12.00	2	4.00	7	4.00
23:37-24:48	23	15.00	37.00	9.00	1	2.00	6	2.00
24:49-26:06	22	12.00	37.50	6.00	0	0.00	<6	0.00
26:07-27:36	21	9.00	38.00	3.00				
27:37-29:18	20	6.00	>38.00	0.00				
29:19-31:12	19	3.00						
>31:12	<19	0.00						

**Females 50-54**

<b>Aerobic Fitness</b>			<b>Body Composition</b>		<b>Muscle Fitness</b>			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
<14:24	≥37	50.00	<29.5	30.00	≥16	10.00	≥30	10.00
14:25-14:54	36	47.50	29.50	28.75	15	9.50	29	9.00
14:55-15:18	35	45.00	30.00	27.50	14	9.00	27-28	8.75
15:19-16:24	33-34	43.50	30.50	26.25	13	8.75	25-26	8.50
16:25-16:54	32	42.00	31.00	25.00	12	8.50	23-24	8.25
16:55-17:36	31	40.50	31.50	23.75	11	8.25	21-22	8.00
17:37-18:12	30	39.00	32.00	22.50	10	8.00	19-20	7.75
18:13-18:54	29	37.50	32.50	22.30	9	7.75	17-18	7.50
18:55-19:42	28	36.00	33.00	22.00	8	7.50	15-16	7.40
19:43-20:36	27	34.00	33.50	21.80	7	7.40	13-14	7.30
20:37-21:30	26	32.00	34.00	21.50	6	7.30	11-12	7.20
21:31-22:30	25	30.00	34.50	21.30	5	7.20	9-10	7.10
22:31-23:36	24	27.00	35.00	21.00	4	7.10	7-8	7.00
23:37-24:48	23	24.00	35.50	18.00	3	7.00	5-6	6.00
24:49-26:06	22	21.00	36.00	15.00	2	6.00	3-4	4.00
26:07-27:36	21	18.00	36.50	12.00	1	3.00	1-2	2.00
27:37-29:18	20	15.00	37.00	9.00	<1	0.00	<1	0.00
29:19-31:12	19	12.00	37.50	6.00				
31:13-33:18	18	9.00	38.00	3.00				
33:19-35:48	17	6.00	>38.00	0.00				
35:49-38:36	16	3.00						
>38:36	<16	0.00						

**Females 55+**

<b>Aerobic Fitness</b>			<b>Body Composition</b>		<b>Muscle Fitness</b>			
1.5 Mile Run Time (min.)	Bike Test (VO <sub>2</sub> )	Component Points	Abdominal Circumference (inches)	Component Points	1 minute Push-up (# Reps)	Component Points	1 minute Crunch (# Reps)	Component Points
<14:24	≥37	50.00	<29.5	30.00	≥14	10.00	≥27	10.00
14:25-14:54	36	47.50	29.50	28.75	13	9.50	26	9.50
14:55-15:18	35	45.00	30.00	27.50	12	9.00	25	9.00
15:19-16:24	33-34	43.50	30.50	26.25	10-11	8.50	23-24	8.75
16:25-16:54	32	42.00	31.00	25.00	9	8.00	21-22	8.50
16:55-17:36	31	40.50	31.50	23.75	7-8	7.50	19-20	8.25
17:37-18:12	30	39.00	32.00	22.50	6	7.40	18	8.00
18:13-18:54	29	37.50	32.50	22.30	5	7.30	16-17	7.75
18:55-19:42	28	36.00	33.00	22.00	4	7.20	14-15	7.50
19:43-20:36	27	34.00	33.50	21.80	3	7.10	12-13	7.40
20:37-21:30	26	32.00	34.00	21.50	2	7.00	10-11	7.30
21:31-22:30	25	30.00	34.50	21.30	1	6.00	8-9	7.20
22:31-23:36	24	27.00	35.00	21.00	<1	0.00	6-7	7.10
23:37-24:48	23	24.00	35.50	18.00			4-5	7.00
24:49-26:06	22	21.00	36.00	15.00			3	6.00
26:07-27:36	21	18.00	36.50	12.00			2	4.00
27:37-29:18	20	15.00	37.00	9.00			1	2.00
29:19-31:12	19	12.00	37.50	6.00			<1	0.00
31:13-33:18	18	9.00	38.00	3.00				
33:19-35:48	17	6.00	>38.00	0.00				
35:49-38:36	16	3.00						
>38:36	<16	0.00						

**APPENDIX C**

ORIGINAL DATA

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
2	37	F	70.00	150.00	21.5	11	1	28.50	35	54
131	24	F	64.50	139.00	23.4	11	3	29.00	53	51
107	37	F	65.50	131.00	21.4	11	4	27.50	31	42
80	38	F	63.50	121.00	21.0	11	7	27.00	31	50
34	35	F	63.00	130.00	23.0	11	15	26.00	42	50
96	45	F	67.00	140.00	21.9	11	15	26.00	18	34
36	23	F	60.50	124.50	23.9	11	21	27.50	42	52
319	38	F	67.00	130.00	20.3	11	31	27.00	40	50
306	41	F	62.00	117.00	21.3	11	37	26.50	50	56
311	44	F	65.00	128.00	21.2	11	42	30.00	47	63
77	35	F	64.50	134.00	22.6	11	42	29.00	70	55
347	30	F	66.00	135.00	21.7	11	43	25.50	40	42
123	37	F	65.00	121.50	20.2	11	45	29.50	31	41
351	19	F	61.00	124.00	23.4	11	52	28.50	45	45
333	52	F	63.00	110.00	19.4	11	53	25.00	17	31
422	28	F	65.00	151.00	25.1	11	56	32.00	36	33
133	46	F	66.00	135.00	21.7	11	58	30.00	60	63
339	27	F	64.50	139.00	23.4	12	4	29.00	43	47
552	38	F	64.00	140.00	24.0	12	8	29.50	31	41
545	29	F	61.00	129.00	24.3	12	9	28.50	29	41
78	32	F	67.00	150.00	23.4	12	9	30.00	19	45
40	48	F	67.00	128.00	20.0	12	22	27.00	20	40
109	33	F	61.00	112.00	21.1	12	26	28.00	26	38
67	30	F	69.50	150.00	21.8	12	31	31.00	37	50
32	36	F	68.00	138.00	20.9	12	40	28.50	30	40
462	29	F	65.00	148.50	24.7	12	42	30.00	27	43
143	42	F	65.00	148.00	24.6	12	43	32.00	25	42

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height(Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
182	34	F	70.00	192.50	27.6	12	47	33.00	41	43
116	21	F	62.00	102.00	18.6	12	48	28.50	42	51
137	32	F	66.00	136.00	21.9	12	48	26.00	34	42
322	30	F	68.00	109.50	16.6	12	49	24.50	32	50
93	33	F	64.00	128.00	21.9	12	49	29.50	29	41
433	25	F	65.00	152.00	25.2	12	50	33.00	34	51
355	41	F	65.00	151.50	25.2	12	51	32.00	35	30
314	25	F	62.50	114.00	20.5	12	53	26.00	42	52
253	29	F	64.00	130.00	22.3	12	58	29.00	20	43
70	33	F	71.00	173.00	24.1	12	58	30.00	25	43
98	25	F	67.00	147.50	23.0	13	0	31.00	41	52
262	33	F	67.00	170.00	26.6	13	0	35.00	35	22
551	32	F	66.00	149.00	24.0	13	2	32.00	19	50
492	32	F	65.50	157.00	25.7	13	2	32.00	28	40
327	35	F	63.00	140.50	24.8	13	3	28.00	30	50
308	38	F	61.00	108.00	20.4	13	5	28.50	32	42
497	26	F	64.00	136.00	23.3	13	6	30.50	34	34
127	28	F	65.50	146.00	23.9	13	6	30.00	37	48
134	38	F	64.50	121.00	20.4	13	7	26.00	30	48
280	25	F	63.50	137.00	23.8	13	10	29.00	40	34
132	36	F	64.00	112.00	19.2	13	14	28.00	33	35
343	23	F	61.00	101.00	19.0	13	20	27.00	42	51
136	38	F	65.00	116.00	19.3	13	20	28.00	30	40
345	41	F	65.00	141.00	23.4	13	23	27.00	20	38
456	29	F	64.00	163.00	27.9	13	24	34.00	41	47
39	28	F	60.00	121.50	23.7	13	25	32.00	41	49
113	33	F	66.00	155.00	25.0	13	25	28.00	42	55

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
200	25	F	64.00	120.00	20.5	13	30	27.50	50	42
529	34	F	66.50	138.00	21.9	13	30	30.00	17	42
135	33	F	64.00	131.00	22.4	13	31	28.50	40	45
146	30	F	61.00	137.00	25.8	13	33	29.50	40	30
321	20	F	70.00	176.00	25.2	13	33	28.00	49	50
394	27	F	67.00	164.00	25.6	13	34	30.00	41	47
3	32	F	70.00	204.00	29.2	13	35	35.50	54	40
465	26	F	62.00	113.00	20.6	13	37	27.00	33	53
26	40	F	68.00	182.00	27.6	13	37	32.00	19	38
338	25	F	68.50	129.00	19.3	13	38	27.00	44	50
548	42	F	61.50	126.50	23.5	13	40	29.50	21	40
534	32	F	64.00	133.50	22.9	13	41	27.00	40	42
201	30	F	65.00	129.00	21.4	13	43	31.50	28	39
486	23	F	64.00	152.00	26.0	13	43	33.50	42	30
54	27	F	63.00	152.00	26.9	13	44	33.50	22	46
237	35	F	65.00	154.00	25.6	13	44	32.00	30	40
436	30	F	63.00	142.00	25.1	13	48	27.50	21	43
38	39	F	65.00	146.00	24.2	13	48	33.00	30	41
230	27	F	63.00	144.00	25.5	13	49	32.00	33	41
349	29	F	68.00	154.00	23.4	13	50	29.00	41	50
387	25	F	62.00	112.00	20.4	13	52	27.00	35	31
18	37	F	63.00	140.00	24.7	13	52	33.00	30	37
325	29	F	63.50	140.00	24.4	13	53	33.00	42	51
526	51	F	63.50	146.00	25.4	13	53	29.50	17	42
348	27	F	65.50	149.00	24.4	13	54	32.00	41	47
385	33	F	66.00	178.00	28.7	13	54	34.00	35	42
510	21	F	65.00	125.00	20.7	13	56	27.00	30	47

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
277	27	F	67.00	158.00	24.7	13	57	31.00	18	32
502	36	F	54.00	149.00	35.9	13	58	30.50	35	40
335	30	F	67.00	154.00	24.1	13	58	30.00	44	45
428	32	F	68.50	175.50	26.2	13	58	33.50	30	36
129	35	F	62.50	124.50	22.4	13	59	28.00	30	40
51	31	F	64.00	133.00	22.8	14	0	27.00	30	52
330	42	F	66.00	135.50	21.8	14	0	27.00	20	42
76	37	F	71.00	174.50	24.3	14	1	30.50	30	41
274	33	F	63.50	175.50	30.5	14	1	35.50	21	43
111	30	F	70.00	147.00	21.0	14	4	30.50	44	50
388	30	F	66.00	142.00	22.9	14	8	30.00	35	48
71	45	F	65.50	138.00	22.6	14	9	30.00	20	40
470	30	F	58.50	138.00	28.3	14	9	35.00	31	40
63	46	F	61.50	124.50	23.1	14	10	30.00	30	47
589	43	F	64.00	161.50	27.7	14	10	31.00	21	38
41	36	F	65.50	167.00	27.3	14	10	31.50	30	40
403	33	F	64.00	141.00	24.1	14	11	30.00	30	45
112	39	F	63.00	137.50	24.3	14	15	30.00	30	43
130	35	F	63.00	138.00	24.4	14	15	31.00	50	40
560	43	F	64.00	160.50	27.5	14	18	32.00	30	41
125	33	F	69.50	136.50	19.8	14	19	27.00	40	42
174	29	F	66.00	142.00	22.9	14	20	29.50	33	34
415	32	F	64.50	135.00	22.8	14	21	30.50	40	40
158	35	F	67.00	146.00	22.8	14	21	30.00	20	42
438	31	F	66.50	148.00	23.5	14	22	31.50	12	35
503	24	F	63.00	139.00	24.6	14	24	30.00	43	33
316	37	F	67.00	140.00	21.9	14	24	29.00	30	40

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
315	43	F	63.50	121.00	21.0	14	29	26.00	38	45
381	30	F	64.00	136.50	23.4	14	29	30.00	51	51
252	33	F	66.00	152.00	24.5	14	29	32.00	45	25
177	36	F	64.50	167.00	28.2	14	29	30.00	30	40
215	35	F	64.00	119.00	20.4	14	30	27.00	12	40
522	39	F	65.00	138.00	22.9	14	30	29.00	35	48
359	28	F	59.00	101.00	20.3	14	31	24.50	40	37
87	44	F	64.00	144.00	24.7	14	31	29.00	41	40
527	45	F	65.00	111.00	18.4	14	33	23.50	27	50
411	31	F	63.00	159.00	28.1	14	33	35.00	45	50
161	35	F	64.00	149.00	25.5	14	34	30.00	27	41
605	38	F	65.00	157.50	26.2	14	37	32.00	30	42
328	40	F	64.00	133.50	22.9	14	40	29.00	57	60
488	27	F	66.00	177.00	28.5	14	40	34.50	41	20
513	26	F	67.00	139.00	21.7	14	42	29.00	37	44
47	34	F	66.00	159.00	25.6	14	44	31.50	35	40
389	28	F	64.00	134.00	22.9	14	45	30.00	23	34
364	28	F	64.50	145.00	24.5	14	45	28.00	45	48
218	29	F	66.50	160.00	25.4	14	45	32.50	32	33
165	37	F	65.00	171.00	28.4	14	45	32.50	37	49
354	30	F	63.00	151.00	26.7	14	48	34.00	29	37
562	39	F	61.00	133.50	25.2	14	49	30.00	31	37
368	28	F	58.00	127.00	26.5	14	51	31.50	52	51
324	40	F	62.00	139.00	25.4	14	54	29.00	20	38
565	35	F	68.00	141.50	21.5	14	54	29.50	17	40
298	29	F	61.00	142.00	26.8	14	54	31.00	33	34
406	28	F	62.00	142.50	26.0	14	55	33.00	41	43

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
154	28	F	66.00	147.00	23.7	14	57	28.00	20	50
573	33	F	67.00	161.50	25.2	14	58	31.00	38	42
247	36	F	62.00	134.00	24.5	15	0	30.00	30	44
472	20	F	65.00	118.00	19.6	15	1	30.00	22	35
578	39	F	65.00	182.50	30.3	15	2	35.00	32	38
204	28	F	66.50	155.00	24.6	15	4	32.00	40	40
449	33	F	65.00	142.00	23.6	15	5	30.50	12	19
431	25	F	67.00	170.00	26.6	15	6	32.50	42	40
432	33	F	63.00	145.00	25.6	15	9	32.50	43	48
427	31	F	65.50	168.00	27.5	15	10	35.00	42	42
423	29	F	63.00	119.00	21.0	15	11	26.00	42	23
524	39	F	63.50	151.00	26.3	15	11	33.00	17	36
412	30	F	63.00	150.00	26.5	15	12	32.00	50	50
494	40	F	68.00	163.00	24.7	15	12	31.50	6	21
372	28	F	65.50	142.00	23.2	15	15	29.00	41	48
157	33	F	63.00	158.00	27.9	15	15	31.00	43	43
424	36	F	63.00	124.00	21.9	15	16	27.00	31	40
479	29	F	61.50	119.00	22.1	15	17	26.50	41	48
414	35	F	61.00	125.00	23.6	15	20	27.00	29	35
459	43	F	68.00	160.00	24.3	15	20	32.00	11	32
591	26	F	63.00	107.00	18.9	15	22	26.00	30	45
163	34	F	63.00	99.50	17.6	15	23	23.50	26	45
362	42	F	62.00	150.00	27.4	15	23	32.00	20	33
498	28	F	65.00	146.00	24.2	15	27	32.00	20	47
451	46	F	62.00	160.00	29.2	15	29	30.50	29	40
296	42	F	68.00	191.00	29.0	15	29	36.00	22	40
48	31	F	66.00	147.00	23.7	15	30	30.00	40	40

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
221	39	F	64.50	152.00	25.6	15	32	32.50	31	42
499	44	F	64.50	160.00	27.0	15	32	30.50	20	27
60	25	F	65.00	167.00	27.7	15	34	33.00	30	47
225	27	F	66.00	174.00	28.0	15	41	32.00	38	50
400	31	F	67.00	145.50	22.7	15	42	31.00	27	40
604	29	F	65.00	150.00	24.9	15	42	33.50	41	49
357	25	F	60.00	125.00	24.4	15	44	32.00	45	38
435	34	F	69.00	165.00	24.3	15	44	33.00	35	37
336	54	F	67.00	170.00	26.6	15	44	29.50	40	40
460	25	F	61.50	129.00	23.9	15	45	31.00	30	47
482	39	F	62.50	169.00	30.4	15	48	33.50	30	37
257	28	F	61.00	120.00	22.6	15	53	27.00	41	47
290	32	F	69.50	186.00	27.0	15	55	34.00	30	41
145	42	F	63.50	114.00	19.8	15	57	24.00	20	40
180	26	F	62.00	124.50	22.7	15	57	29.50	39	44
147	31	F	63.00	126.00	22.3	16	5	30.00	20	42
152	45	F	66.50	151.00	24.0	16	5	30.50	18	34
235	34	F	67.50	143.00	22.0	16	9	30.50	35	42
517	38	F	63.50	172.00	29.9	16	9	33.00	30	40
374	27	F	64.50	142.00	23.9	16	13	29.50	45	53
366	27	F	62.00	147.00	26.8	16	15	30.00	40	47
376	38	F	64.00	164.50	28.2	16	15	30.00	25	40
358	47	F	68.00	186.00	28.2	16	15	35.00	20	24
15	48	F	69.50	176.00	25.6	16	16	33.00	22	37
405	43	F	72.00	182.50	24.7	16	16	33.50	19	29
250	29	F	63.00	123.00	21.7	16	18	28.00	41	50
504	41	F	68.00	153.00	23.2	16	27	32.00	20	23

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
425	33	F	66.00	139.00	22.4	16	31	31.00	30	27
396	28	F	59.00	123.00	24.8	16	34	33.00	30	28
606	28	F	62.00	95.00	17.3	16	40	26.50	32	43
265	33	F	62.50	126.50	22.7	16	40	28.00	17	45
231	46	F	66.00	159.00	25.6	16	48	31.00	11	26
384	40	F	67.50	179.00	27.6	16	58	33.00	20	40
475	36	F	66.50	151.50	24.0	17	0	27.00	30	41
409	28	F	65.00	147.00	24.4	17	13	30.00	41	33
28	46	F	64.00	175.00	30.0	17	29	34.00	21	42
166	40	F	61.50	142.00	26.3	20	36	28.00	31	40
88	35	M	70.00	166.00	23.8	8	23	31.50	60	55
122	36	M	73.00	189.00	24.9	8	24	35.00	60	60
142	37	M	74.00	197.00	25.2	8	38	36.00	81	55
65	28	M	73.50	183.50	23.8	8	42	31.50	70	68
73	37	M	71.00	159.00	22.1	8	49	30.00	60	74
110	39	M	72.00	150.00	20.3	8	56	30.50	55	57
66	38	M	76.00	196.00	23.8	8	58	32.00	56	56
118	33	M	70.00	150.00	21.5	9	3	31.00	53	53
144	34	M	66.00	151.00	24.3	9	10	30.00	55	53
128	36	M	73.00	213.00	28.0	9	19	36.50	46	49
102	34	M	69.50	164.00	23.8	9	21	31.00	61	62
99	40	M	68.00	158.00	24.0	9	24	33.50	56	48
141	38	M	70.00	171.00	24.5	9	30	33.00	50	50
550	38	M	68.00	157.00	23.8	9	32	31.50	58	50
114	35	M	71.00	180.00	25.1	9	36	35.00	46	49
79	35	M	69.00	166.50	24.5	9	39	32.00	46	49
121	34	M	75.50	223.00	27.5	9	40	36.50	52	52

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
72	31	M	70.00	169.00	24.2	9	46	32.00	52	52
30	38	M	71.00	156.50	21.8	9	50	32.00	50	50
91	37	M	73.00	153.00	20.1	9	51	31.50	36	50
547	37	M	69.00	189.00	27.9	9	52	34.00	50	52
35	38	M	69.50	175.00	25.4	9	53	34.00	50	50
332	25	M	69.00	150.00	22.1	9	55	31.00	52	50
108	36	M	70.00	189.00	27.1	9	56	34.00	52	52
104	32	M	72.00	198.00	26.8	9	58	33.00	55	55
94	32	M	63.00	119.00	21.0	9	59	29.50	100	56
329	50	M	67.00	179.00	28.0	9	59	37.00	50	50
89	36	M	72.00	182.50	24.7	9	59	33.50	46	49
75	44	M	67.50	149.00	22.9	10	0	32.00	41	42
352	38	M	72.00	181.00	24.5	10	0	34.00	50	50
263	32	M	72.50	212.00	28.3	10	2	37.50	52	55
512	35	M	70.00	220.50	31.6	10	3	38.00	56	52
541	30	M	72.00	184.50	25.0	10	5	31.00	60	60
119	44	M	67.00	153.00	23.9	10	6	31.50	50	47
86	34	M	70.00	181.00	25.9	10	6	35.00	53	51
214	33	M	76.00	236.00	28.7	10	6	37.00	52	55
24	27	M	69.50	171.00	24.8	10	9	33.00	57	57
539	41	M	68.50	130.00	19.4	10	12	28.50	60	60
309	38	M	67.00	149.00	23.3	10	12	32.00	50	35
97	40	M	69.00	176.00	25.9	10	14	34.00	40	47
25	34	M	73.00	210.00	27.7	10	14	38.00	53	51
334	41	M	67.50	164.00	25.3	10	16	34.50	45	39
317	26	M	67.00	167.00	26.1	10	16	32.00	98	64
490	33	M	72.50	200.00	26.7	10	16	36.00	52	52

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
549	44	M	69.50	174.00	25.3	10	22	34.50	40	40
595	36	M	68.50	182.00	27.2	10	22	37.50	46	49
92	28	M	71.00	154.50	21.5	10	25	31.00	57	49
57	35	M	75.50	209.00	25.7	10	29	38.50	50	50
216	33	M	70.00	181.00	25.9	10	30	34.50	52	51
211	44	M	70.00	207.00	29.6	10	30	36.00	50	50
103	32	M	74.00	170.00	21.8	10	31	31.50	52	51
340	35	M	66.00	146.00	23.5	10	32	31.00	60	55
140	25	M	74.00	173.00	22.2	10	32	33.50	57	53
260	33	M	66.00	180.00	29.0	10	32	34.00	52	52
95	38	M	71.00	176.00	24.5	10	35	32.50	47	49
540	33	M	74.00	190.00	24.3	10	35	33.50	52	52
184	34	M	71.00	223.00	31.0	10	35	39.00	52	42
464	29	M	67.00	187.00	29.2	10	40	37.00	60	55
37	39	M	70.00	200.00	28.6	10	40	32.50	52	52
82	38	M	69.00	153.00	22.5	10	42	31.00	60	58
294	39	M	71.50	180.00	24.7	10	42	35.00	50	44
337	43	M	74.00	193.00	24.7	10	44	33.00	65	55
353	34	M	71.50	196.00	26.9	10	44	32.50	50	45
542	31	M	70.00	171.00	24.5	10	48	32.50	53	53
553	45	M	71.50	175.00	24.0	10	48	34.50	40	45
533	32	M	67.00	182.00	28.5	10	48	33.00	52	52
101	51	M	70.00	180.00	25.8	10	50	36.00	39	43
115	44	M	72.00	184.50	25.0	10	51	33.50	45	50
81	45	M	70.00	165.00	23.6	10	52	34.50	43	57
341	45	M	68.50	163.00	24.4	10	53	32.50	41	50
120	41	M	71.00	183.00	25.5	10	53	33.00	40	47

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
205	32	M	70.50	186.00	26.3	10	53	34.00	20	50
444	27	M	71.00	188.00	26.2	10	53	35.50	45	53
284	39	M	72.00	189.00	25.6	10	53	36.50	50	50
197	36	M	72.00	204.00	27.6	10	53	36.00	50	49
74	32	M	74.50	194.00	24.5	11	0	35.00	52	52
222	37	M	68.00	181.00	27.5	11	3	36.00	46	49
457	29	M	68.00	182.00	27.6	11	3	33.50	60	55
55	32	M	71.50	195.00	26.8	11	3	35.00	43	39
124	41	M	71.00	168.00	23.4	11	6	32.00	40	47
312	32	M	68.00	160.00	24.3	11	8	30.50	65	57
463	35	M	70.00	194.00	27.8	11	8	35.00	55	49
232	37	M	73.00	215.00	28.3	11	8	39.00	47	50
246	47	M	73.00	202.00	26.6	11	10	38.00	43	50
346	36	M	73.00	151.00	19.9	11	11	29.50	52	45
33	43	M	72.00	183.00	24.8	11	11	36.50	47	46
139	47	M	71.00	180.00	25.1	11	12	32.50	40	35
206	35	M	72.00	199.00	26.9	11	12	34.00	60	60
318	34	M	71.50	158.00	21.7	11	13	32.50	52	51
69	28	M	66.00	155.50	25.0	11	14	30.50	60	60
538	35	M	73.00	179.00	23.6	11	14	32.00	50	50
213	31	M	70.50	180.00	25.4	11	14	35.50	45	52
596	36	M	72.00	193.00	26.1	11	14	37.00	50	45
84	28	M	69.50	211.00	30.7	11	15	32.00	62	57
217	33	M	70.00	157.00	22.5	11	16	33.00	30	53
570	36	M	72.00	187.00	25.3	11	16	33.50	56	40
126	44	M	69.00	165.00	24.3	11	18	31.50	50	50
90	27	M	74.00	170.00	21.8	11	18	30.00	72	61

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
195	40	M	74.50	244.00	30.9	11	18	40.50	40	45
326	21	M	67.00	165.00	25.8	11	20	29.00	80	75
350	21	M	70.50	172.00	24.3	11	20	32.50	60	56
138	33	M	72.50	174.00	23.2	11	20	35.00	52	51
269	36	M	72.00	211.50	28.6	11	20	35.50	46	50
543	34	M	65.00	148.00	24.6	11	21	29.00	54	54
295	32	M	70.00	175.00	25.1	11	21	34.00	63	43
185	33	M	71.00	215.00	29.9	11	21	37.00	52	51
307	42	M	68.50	187.00	28.0	11	22	33.00	58	58
509	42	M	71.00	192.00	26.7	11	22	36.00	56	52
598	38	M	71.00	204.50	28.5	11	22	35.00	46	42
402	42	M	70.50	196.00	27.7	11	23	36.50	50	50
569	44	M	66.50	170.00	27.0	11	24	35.00	54	50
546	30	M	71.00	171.00	23.8	11	24	32.50	57	40
370	23	M	68.50	172.50	25.8	11	25	33.50	60	60
559	37	M	72.00	185.00	25.0	11	25	34.50	46	49
420	36	M	75.00	240.00	29.9	11	25	37.00	50	50
44	32	M	72.00	205.00	27.7	11	29	39.50	52	51
342	20	M	66.00	165.00	26.6	11	30	32.00	65	56
68	46	M	71.50	173.00	23.7	11	30	34.50	45	50
557	40	M	71.00	180.00	25.1	11	30	33.00	40	39
313	29	M	67.00	188.00	29.4	11	30	31.50	58	55
244	37	M	70.00	206.00	29.5	11	30	37.50	47	49
601	37	M	74.50	234.00	29.6	11	30	38.00	47	50
331	33	M	72.00	186.00	25.2	11	32	31.50	55	55
187	32	M	81.00	245.00	26.2	11	32	38.00	48	51
434	26	M	75.50	222.00	27.3	11	34	35.00	59	45

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
391	40	M	65.50	176.00	28.8	11	35	33.00	50	45
300	43	M	67.00	177.00	27.7	11	35	35.00	42	50
544	39	M	67.50	160.00	24.6	11	37	33.00	50	51
83	41	M	72.00	174.00	23.5	11	37	33.00	50	50
446	26	M	72.00	213.00	28.8	11	40	37.00	25	55
117	37	M	75.00	195.00	24.3	11	42	32.50	46	49
310	32	M	70.00	164.00	23.5	11	43	31.50	55	57
382	44	M	73.00	204.00	26.9	11	43	36.00	50	47
254	34	M	72.50	209.00	27.9	11	44	36.00	52	51
344	30	M	68.50	133.00	19.9	11	45	29.00	66	54
106	36	M	71.00	176.00	24.5	11	46	34.00	46	49
175	32	M	72.00	238.00	32.2	11	46	40.00	52	51
105	36	M	67.00	158.00	24.7	11	47	31.50	60	57
501	32	M	70.00	215.00	30.8	11	48	37.00	52	50
199	43	M	74.00	223.00	28.6	11	48	39.00	40	42
43	40	M	73.00	205.00	27.0	11	49	37.00	50	50
160	43	M	70.00	227.00	32.5	11	49	39.00	36	37
371	43	M	73.00	204.00	26.9	11	51	36.00	40	47
270	33	M	70.00	189.00	27.1	11	52	36.50	52	44
320	34	M	70.00	148.50	21.3	11	53	30.00	52	51
46	34	M	72.50	197.00	26.3	11	53	36.50	45	46
568	35	M	69.00	167.00	24.6	11	55	34.50	46	49
514	28	M	70.00	194.00	27.8	11	55	35.00	50	40
383	44	M	71.00	215.00	29.9	11	55	40.00	50	50
56	32	M	74.50	182.00	23.0	11	56	31.50	47	48
228	34	M	69.00	166.00	24.5	11	58	32.00	52	40
53	43	M	72.50	217.00	29.0	11	58	38.50	40	33

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
156	38	M	68.00	191.50	29.1	11	59	38.00	48	49
361	41	M	68.50	159.00	23.8	12	1	33.00	40	37
590	38	M	72.00	189.00	25.6	12	1	35.00	50	41
59	31	M	68.00	191.00	29.0	12	1	38.00	55	39
528	44	M	72.00	191.00	25.9	12	1	39.50	50	50
363	31	M	70.50	151.00	21.3	12	2	32.00	55	49
240	29	M	71.00	209.00	29.1	12	2	40.00	57	53
282	38	M	70.50	163.00	23.0	12	3	32.00	60	60
603	40	M	68.00	176.00	26.7	12	3	33.50	50	50
178	35	M	70.50	178.00	25.1	12	4	35.00	54	50
275	37	M	74.00	255.00	32.7	12	4	38.00	51	50
477	44	M	70.00	197.00	28.2	12	5	36.00	40	47
572	31	M	70.00	193.00	27.6	12	6	36.00	60	60
279	24	M	68.00	152.00	23.1	12	8	30.50	64	60
447	33	M	70.00	165.00	23.6	12	8	32.00	52	50
487	34	M	70.00	191.00	27.4	12	8	32.00	55	45
302	41	M	72.00	220.00	29.8	12	8	36.50	50	50
419	33	M	67.50	135.00	20.8	12	9	31.00	52	30
61	28	M	67.00	173.00	27.0	12	9	33.50	49	42
576	37	M	73.00	202.00	26.6	12	9	36.50	55	55
360	24	M	70.00	163.00	23.3	12	10	32.50	62	55
356	25	M	70.00	154.50	22.1	12	12	32.50	58	46
583	35	M	71.00	175.00	24.4	12	12	34.00	50	52
297	31	M	66.00	193.00	31.1	12	12	36.50	70	64
100	43	M	71.00	176.50	24.6	12	13	35.50	45	50
27	42	M	69.00	206.00	30.4	12	14	40.50	40	48
555	36	M	69.00	140.00	20.6	12	15	30.00	49	59

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
323	40	M	69.50	165.00	24.0	12	15	32.50	40	47
408	31	M	72.00	196.00	26.5	12	15	34.00	48	45
45	37	M	74.00	198.00	25.4	12	15	36.00	50	40
401	34	M	65.50	173.00	28.3	12	19	37.00	70	42
194	35	M	72.00	219.00	29.6	12	19	38.00	47	38
186	50	M	70.00	180.50	25.8	12	20	34.00	40	41
600	43	M	71.00	188.00	26.2	12	21	36.50	47	48
50	35	M	74.00	211.00	27.0	12	21	36.00	50	50
276	34	M	68.50	200.00	29.9	12	22	35.50	50	52
367	39	M	68.00	174.00	26.4	12	23	31.50	50	48
507	40	M	72.00	210.00	28.4	12	23	36.50	48	50
266	44	M	70.50	200.00	28.2	12	24	36.50	40	46
52	23	M	66.00	133.00	21.4	12	25	31.00	52	45
202	38	M	75.00	236.00	29.4	12	26	38.50	50	52
85	41	M	72.00	171.00	23.1	12	29	32.50	40	47
395	25	M	70.00	172.00	24.6	12	30	35.00	52	55
478	41	M	66.00	173.00	27.9	12	30	36.00	50	44
17	41	M	70.00	185.00	26.5	12	30	33.00	50	50
441	48	M	70.00	213.00	30.5	12	30	41.00	39	45
251	37	M	70.00	198.50	28.4	12	31	36.00	46	35
224	42	M	73.50	219.00	28.4	12	32	39.50	40	25
301	47	M	72.00	188.00	25.4	12	34	37.50	40	45
226	41	M	71.00	199.00	27.7	12	34	39.50	45	45
571	35	M	66.50	172.00	27.3	12	35	34.00	50	50
151	42	M	72.50	172.50	23.0	12	35	32.50	50	50
169	48	M	70.00	193.00	27.6	12	36	36.00	40	45
173	39	M	67.00	175.50	27.4	12	37	34.50	50	50

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
268	45	M	73.50	179.00	23.2	12	37	36.00	15	30
234	40	M	68.00	143.00	21.7	12	38	30.50	50	50
42	39	M	72.50	231.00	30.8	12	38	38.50	50	50
219	34	M	67.50	151.00	23.2	12	39	31.00	53	55
473	28	M	66.00	154.00	24.8	12	40	32.00	56	52
286	34	M	73.00	188.00	24.8	12	40	34.00	46	52
563	38	M	75.50	198.00	24.4	12	40	38.00	46	49
421	21	M	74.50	203.00	25.7	12	40	35.50	48	51
393	38	M	65.00	168.50	28.0	12	42	34.00	33	46
375	34	M	70.50	212.00	29.9	12	42	38.00	53	52
521	41	M	68.00	171.00	25.9	12	43	38.00	40	41
288	42	M	70.50	190.00	26.8	12	43	35.50	40	28
256	38	M	73.50	211.00	27.4	12	43	36.50	50	51
582	42	M	64.50	144.00	24.3	12	44	35.00	50	46
210	30	M	67.50	169.50	26.1	12	44	31.00	53	60
594	34	M	70.00	168.00	24.1	12	45	32.00	52	39
566	37	M	70.00	174.00	24.9	12	45	33.00	43	44
198	48	M	72.50	201.00	26.8	12	45	39.00	44	48
426	27	M	68.00	190.00	28.8	12	46	33.00	64	59
607	36	M	67.00	181.00	28.3	12	47	36.00	50	30
577	42	M	70.50	167.00	23.6	12	48	32.50	40	47
518	40	M	68.50	183.00	27.4	12	48	34.00	42	48
506	37	M	70.00	217.00	31.1	12	48	40.00	49	39
14	41	M	72.00	190.00	25.7	12	49	33.00	40	50
592	43	M	66.00	176.00	28.4	12	50	38.00	36	40
272	34	M	74.50	188.00	23.8	12	50	35.00	40	31
188	41	M	70.00	230.00	32.9	12	50	38.00	40	47

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
386	36	M	66.50	149.00	23.6	12	51	35.00	46	50
584	34	M	69.00	207.00	30.5	12	51	39.50	52	52
511	41	M	72.00	218.00	29.5	12	51	38.00	40	47
537	51	M	70.50	175.00	24.7	12	53	32.50	40	45
167	33	M	72.00	193.00	26.1	12	53	35.00	55	55
16	45	M	70.00	211.00	30.2	12	53	38.50	41	45
4	37	M	64.50	151.00	25.5	12	54	31.00	50	50
588	45	M	64.00	174.00	29.8	12	54	39.00	37	40
273	43	M	74.00	187.00	24.0	12	54	36.00	50	47
437	47	M	69.00	191.00	28.2	12	54	38.00	41	38
159	50	M	69.50	188.00	27.3	12	55	37.50	40	44
170	40	M	67.00	171.00	26.7	13	2	35.00	50	50
556	37	M	69.00	196.00	28.9	13	2	36.50	46	35
602	42	M	73.00	205.00	27.0	13	2	37.50	41	50
467	34	M	68.00	143.00	21.7	13	5	28.00	40	49
236	34	M	72.00	180.00	24.4	13	5	35.00	52	51
535	33	M	69.00	212.00	31.3	13	5	37.00	53	49
442	29	M	72.00	220.00	29.8	13	5	38.00	55	57
149	37	M	72.00	185.00	25.0	13	6	34.00	50	50
189	36	M	74.00	204.00	26.1	13	7	35.00	50	50
586	45	M	72.00	169.00	22.9	13	8	34.00	0	30
245	31	M	70.00	225.00	32.2	13	10	39.00	50	50
455	42	M	75.00	225.00	28.1	13	10	39.00	40	48
448	38	M	67.00	172.50	27.0	13	11	33.50	50	50
223	43	M	68.00	189.00	28.7	13	11	37.00	45	50
561	45	M	70.00	197.00	28.2	13	11	38.00	42	46
515	39	M	74.00	265.00	34.0	13	11	38.00	45	45

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
162	36	M	71.00	189.00	26.3	13	12	37.00	50	50
530	46	M	71.00	218.00	30.4	13	12	40.00	41	45
255	36	M	72.00	221.00	29.9	13	13	39.00	50	55
483	40	M	71.00	185.50	25.8	13	15	33.00	40	47
413	23	M	74.00	153.00	19.6	13	16	28.00	60	55
379	30	M	70.50	169.00	23.9	13	16	36.00	50	50
150	39	M	73.00	231.00	30.4	13	16	39.50	50	44
500	47	M	69.50	210.00	30.5	13	18	35.50	50	50
261	31	M	69.00	192.00	28.3	13	19	36.50	52	46
493	42	M	71.00	202.00	28.1	13	19	34.50	63	65
445	48	M	63.00	136.00	24.0	13	20	32.00	45	45
458	26	M	71.00	205.00	28.5	13	20	36.00	55	50
264	36	M	66.00	154.00	24.8	13	23	32.00	49	50
491	38	M	63.00	147.00	26.0	13	24	30.50	50	50
248	35	M	66.00	157.00	25.3	13	24	31.50	52	50
229	35	M	70.00	184.00	26.3	13	24	34.50	50	50
285	37	M	70.00	156.00	22.3	13	26	34.00	36	47
608	30	M	75.00	234.00	29.2	13	26	40.00	52	51
580	41	M	72.00	230.00	31.1	13	27	35.00	40	47
171	40	M	68.00	162.00	24.6	13	28	32.50	41	50
242	53	M	70.00	196.00	28.1	13	28	39.50	39	43
239	48	M	71.00	204.00	28.4	13	29	38.50	40	45
192	34	M	72.50	165.00	22.0	13	30	32.00	40	30
516	26	M	71.00	167.00	23.2	13	33	31.50	52	53
397	24	M	70.00	157.50	22.5	13	35	33.50	52	50
410	37	M	67.00	175.50	27.4	13	36	34.50	52	48
191	37	M	66.50	204.00	32.4	13	36	38.50	50	46

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
238	44	M	69.00	201.00	29.6	13	38	37.00	40	37
49	33	M	73.00	205.00	27.0	13	39	34.50	50	51
283	42	M	66.00	209.00	33.7	13	39	40.00	40	47
452	22	M	75.00	200.00	24.9	13	40	32.00	54	58
505	33	M	72.50	228.50	30.5	13	40	38.00	52	52
485	34	M	67.50	169.00	26.0	13	42	31.50	57	45
597	38	M	73.00	185.00	24.4	13	42	32.50	46	49
508	41	M	69.00	203.00	29.9	13	43	39.00	40	39
468	45	M	69.00	188.50	27.8	13	45	36.00	40	46
148	63	M	71.00	207.00	28.8	13	46	38.00	33	30
183	41	M	68.50	220.00	32.9	13	47	36.50	45	44
575	39	M	76.00	197.00	23.9	13	48	36.00	43	33
480	27	M	72.50	144.00	19.2	13	49	29.50	48	40
471	33	M	71.50	167.50	23.0	13	49	31.50	52	60
461	33	M	71.00	251.00	35.0	13	50	38.00	57	57
558	37	M	76.50	200.00	24.0	13	51	34.50	46	49
587	41	M	72.50	222.00	29.6	13	51	38.50	40	47
399	26	M	75.00	175.50	21.9	13	54	33.50	42	43
373	24	M	70.00	158.00	22.6	13	58	32.00	40	49
58	28	M	70.00	215.00	30.8	13	58	38.00	60	60
416	43	M	72.00	184.00	24.9	13	59	35.50	40	47
176	44	M	68.50	198.00	29.6	14	1	34.00	60	45
469	37	M	69.00	168.50	24.8	14	4	31.50	50	47
454	40	M	71.00	212.00	29.5	14	5	39.00	50	50
155	36	M	73.50	227.00	29.5	14	12	38.00	48	49
564	31	M	66.50	164.00	26.0	14	14	31.00	52	53
429	44	M	67.50	194.00	29.9	14	14	34.00	45	47

<b>ID Number</b>	<b>Age</b>	<b>Gender</b>	<b>Height (Inches)</b>	<b>Weight (lbs)</b>	<b>BMI kg/m(2)</b>	<b>1.5 mile (Minutes)</b>	<b>1.5 Mile (Seconds)</b>	<b>AC (Inches)</b>	<b>Push-ups</b>	<b>Crunches</b>
418	27	M	67.00	174.00	27.2	14	18	35.00	63	50
581	33	M	71.00	192.00	26.7	14	18	34.50	60	60
190	46	M	68.00	152.00	23.1	14	20	33.00	40	45
220	33	M	74.00	183.00	23.4	14	20	33.00	50	52
153	44	M	72.50	197.00	26.3	14	20	34.50	60	60
593	41	M	68.00	200.00	30.4	14	20	40.00	43	40
289	28	M	68.00	200.50	30.4	14	20	33.00	60	59
172	41	M	69.50	201.00	29.2	14	20	34.00	55	50
209	40	M	68.00	188.50	28.6	14	24	33.50	45	50
203	48	M	76.00	226.00	27.5	14	25	39.50	40	45
179	43	M	69.00	183.00	27.0	14	26	37.00	41	47
243	39	M	65.00	174.00	28.9	14	27	33.00	47	49
227	34	M	66.00	168.00	27.1	14	29	33.50	52	53
495	55	M	76.00	217.00	26.4	14	31	38.00	44	45
554	41	M	75.00	190.00	23.7	14	33	34.00	40	37
267	49	M	72.50	197.00	26.3	14	45	36.00	45	46
520	50	M	72.00	210.00	28.4	15	2	37.00	39	40
609	31	M	68.00	225.00	34.2	15	20	38.00	52	45
168	52	M	70.50	202.00	28.5	15	30	38.00	40	44
398	54	M	71.00	195.00	27.1	15	44	36.00	40	44

**APPENDIX D**

DATA CORRECTED BY VANDERBURGH CORRECTION FACTORS

<b>ID Number</b>	<b>Vanderburgh Correction Factor: Distance Runs</b>	<b>Vanderburgh Correction Factor: Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh Adjusted Crunches Score</b>
2	0.94	1.06	10.3557	37.10	57.24
131	0.97	1.04	10.7185	55.12	53.04
107	0.98	1.02	10.8453	31.62	42.84
80	1.00	1.00	11.1167	31.00	50.00
34	0.99	1.01	11.1375	42.42	50.50
96	0.96	1.04	10.8000	18.72	35.36
36	1.00	1.00	11.3500	42.00	52.00
319	0.99	1.01	11.4015	40.40	50.50
306	1.00	1.00	11.6167	50.00	56.00
311	0.99	1.01	11.5830	47.47	63.63
77	0.98	1.02	11.4660	71.40	56.10
347	0.97	1.03	11.3652	41.20	43.26
123	1.00	1.00	11.7500	31.00	41.00
351	1.00	1.00	11.8667	45.00	45.00
333	1.00	1.00	11.8833	17.00	31.00
422	0.94	1.06	11.2173	38.16	34.98
133	0.97	1.03	11.6077	61.80	64.89
339	0.97	1.04	11.7047	44.72	48.88
552	0.96	1.04	11.6480	32.24	42.64
545	0.99	1.01	12.0285	29.29	41.41
78	0.94	1.06	11.4210	20.14	47.70
40	0.99	1.01	12.2430	20.20	40.40
109	1.00	1.00	12.4333	26.00	38.00
67	0.94	1.06	11.7657	39.22	53.00
32	0.97	1.03	12.2867	30.90	41.20

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
462	0.94	1.06	11.9380	28.62	45.58
143	0.95	1.06	12.0808	26.50	44.52
182	0.87	1.15	11.1215	47.15	49.45
116	1.00	1.00	12.8000	42.00	51.00
137	0.97	1.03	12.4160	35.02	43.26
322	1.00	1.00	12.8167	32.00	50.00
93	0.98	1.01	12.5603	29.29	41.41
433	0.94	1.07	12.0633	36.38	54.57
355	0.94	1.07	12.0790	37.45	32.10
314	1.00	1.00	12.8833	42.00	52.00
253	0.99	1.01	12.8370	20.20	43.43
70	0.90	1.11	11.6700	27.75	47.73
98	0.95	1.06	12.3500	43.46	55.12
262	0.90	1.11	11.7000	38.85	24.42
551	0.94	1.06	12.2513	20.14	53.00
492	0.93	1.08	12.1210	30.24	43.20
327	0.96	1.04	12.5280	31.20	52.00
308	1.00	1.00	13.0833	32.00	42.00
497	0.97	1.03	12.7070	35.02	35.02
127	0.95	1.05	12.4450	38.85	50.40
134	1.00	1.00	13.1167	30.00	48.00
280	0.97	1.03	12.7717	41.20	35.02
132	1.00	1.00	13.2333	33.00	35.00
343	1.00	1.00	13.3333	42.00	51.00
136	1.00	1.00	13.3333	30.00	40.00

<b>ID Number</b>	<b>Vanderburgh Correction Factor: Distance Runs</b>	<b>Vanderburgh Correction Factor: Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh Adjusted Crunches Score</b>
345	0.96	1.04	12.8480	20.80	39.52
456	0.92	1.09	12.3280	44.69	51.23
39	1.00	1.00	13.4167	41.00	49.00
113	0.93	1.07	12.4775	44.94	58.85
200	1.00	1.00	13.5000	50.00	42.00
529	0.97	1.03	13.0950	17.51	43.26
135	0.98	1.02	13.2463	40.80	45.90
146	0.97	1.03	13.1435	41.20	30.90
321	0.91	1.12	12.3305	54.88	56.00
394	0.91	1.09	12.3457	44.69	51.23
3	0.85	1.18	11.5458	63.72	47.20
465	1.00	1.00	13.6167	33.00	53.00
26	0.88	1.13	11.9827	21.47	42.94
338	0.99	1.01	13.4970	44.44	50.50
548	0.99	1.01	13.5300	21.21	40.40
534	0.98	1.02	13.4097	40.80	42.84
201	0.99	1.01	13.5795	28.28	39.39
486	0.94	1.07	12.8937	44.94	32.10
54	0.94	1.07	12.9093	23.54	49.22
237	0.93	1.07	12.7720	32.10	42.80
436	0.96	1.04	13.2480	21.84	44.72
38	0.95	1.05	13.1100	31.50	43.05
230	0.95	1.05	13.1258	34.65	43.05
349	0.93	1.07	12.8650	43.87	53.50
387	1.00	1.00	13.8667	35.00	31.00

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
18	0.96	1.04	13.3120	31.20	38.48
325	0.96	1.04	13.3280	43.68	53.04
526	0.95	1.05	13.1892	17.85	44.10
348	0.94	1.06	13.0660	43.46	49.82
385	0.89	1.12	12.3710	39.20	47.04
510	1.00	1.00	13.9333	30.00	47.00
277	0.92	1.08	12.8340	19.44	34.56
502	0.94	1.06	13.1287	37.10	42.40
335	0.93	1.07	12.9890	47.08	48.15
428	0.89	1.12	12.4303	33.60	40.32
129	1.00	1.00	13.9833	30.00	40.00
51	0.98	1.02	13.7200	30.60	53.04
330	0.97	1.03	13.5800	20.60	43.26
76	0.89	1.12	12.4748	33.60	45.92
274	0.89	1.12	12.4748	23.52	48.16
111	0.95	1.05	13.3633	46.20	52.50
388	0.96	1.04	13.5680	36.40	49.92
71	0.97	1.03	13.7255	20.60	41.20
470	0.97	1.03	13.7255	31.93	41.20
63	1.01	1.00	14.3083	30.00	47.00
589	0.92	1.09	13.0333	22.89	41.42
41	0.91	1.10	12.8917	33.00	44.00
403	0.96	1.04	13.6160	31.20	46.80
112	0.97	1.03	13.8225	30.90	44.29
130	0.97	1.03	13.8225	51.50	41.20

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
560	0.92	1.09	13.1560	32.70	44.69
125	0.97	1.03	13.8872	41.20	43.26
174	0.96	1.04	13.7600	34.32	35.36
415	0.97	1.03	13.9195	41.20	41.20
158	0.95	1.05	13.6325	21.00	44.10
438	0.95	1.06	13.6483	12.72	37.10
503	0.97	1.04	13.9680	44.72	34.32
316	0.96	1.04	13.8240	31.20	41.60
315	1.00	1.00	14.4833	38.00	45.00
381	0.97	1.03	14.0488	52.53	52.53
252	0.94	1.07	13.6143	48.15	26.75
177	0.91	1.10	13.1798	33.00	44.00
215	1.00	1.00	14.5000	12.00	40.00
522	0.97	1.03	14.0650	36.05	49.44
359	1.00	1.00	14.5167	40.00	37.00
87	0.95	1.05	13.7908	43.05	42.00
527	1.00	1.00	14.5500	27.00	50.00
411	0.92	1.08	13.3860	48.60	54.00
161	0.94	1.06	13.6927	28.62	43.46
605	0.92	1.08	13.4473	32.40	45.36
328	0.98	1.02	14.3733	58.14	61.20
488	0.89	1.12	13.0533	45.92	22.40
513	0.97	1.04	14.2590	38.48	45.76
47	0.92	1.08	13.5547	37.80	43.20
389	0.98	1.02	14.4550	23.46	34.68

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
364	0.95	1.05	14.0125	47.25	50.40
218	0.92	1.08	13.5700	34.56	35.64
165	0.90	1.11	13.2750	41.07	54.39
354	0.94	1.06	13.9120	30.74	39.22
562	0.98	1.02	14.5203	31.62	37.74
368	0.99	1.01	14.7015	52.52	51.51
324	0.97	1.04	14.4977	20.80	39.52
565	0.96	1.04	14.3040	17.68	41.60
298	0.96	1.04	14.3040	34.32	35.36
406	0.96	1.05	14.3200	43.05	45.15
154	0.95	1.05	14.2025	21.00	52.50
573	0.92	1.09	13.7693	41.42	45.78
247	0.98	1.02	14.7000	30.60	44.88
472	1.00	1.00	15.0167	22.00	35.00
578	0.88	1.13	13.2293	36.16	42.94
204	0.93	1.07	14.0120	42.80	42.80
449	0.96	1.04	14.4800	12.48	19.76
431	0.90	1.11	13.5900	46.62	44.40
432	0.95	1.05	14.3925	45.15	50.40
427	0.91	1.10	13.8017	46.20	46.20
423	1.00	1.00	15.1833	42.00	23.00
524	0.94	1.06	14.2723	18.02	38.16
412	0.94	1.06	14.2880	53.00	53.00
494	0.92	1.09	13.9840	6.54	22.89
372	0.96	1.04	14.6400	42.64	49.92

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
157	0.92	1.08	14.0300	46.44	46.44
424	1.00	1.00	15.2667	31.00	40.00
479	1.00	1.00	15.2833	41.00	48.00
414	1.00	1.00	15.3333	29.00	35.00
459	0.92	1.08	14.1067	11.88	34.56
591	1.00	1.00	15.3667	30.00	45.00
163	1.00	1.00	15.3833	26.00	45.00
362	0.94	1.06	14.4603	21.20	34.98
498	0.95	1.05	14.6775	21.00	49.35
451	0.92	1.08	14.2447	31.32	43.20
296	0.87	1.15	13.4705	25.30	46.00
48	0.95	1.05	14.7250	42.00	42.00
221	0.94	1.07	14.6013	33.17	44.94
499	0.92	1.08	14.2907	21.60	29.16
60	0.91	1.10	14.1657	33.00	51.70
225	0.90	1.12	14.1150	42.56	56.00
400	0.95	1.05	14.9150	28.35	42.00
604	0.94	1.06	14.7580	43.46	51.94
357	1.00	1.00	15.7333	45.00	38.00
435	0.91	1.10	14.3173	38.50	40.70
336	0.90	1.11	14.1600	44.40	44.40
460	0.99	1.01	15.5925	30.30	47.47
482	0.90	1.10	14.2200	33.00	40.70
257	1.00	1.00	15.8833	41.00	47.00
290	0.88	1.14	14.0067	34.20	46.74

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
145	1.00	1.00	15.9500	20.00	40.00
180	1.00	1.00	15.9500	39.00	44.00
147	1.00	1.00	16.0833	20.00	42.00
152	0.94	1.06	15.1183	19.08	36.04
235	0.96	1.05	15.5040	36.75	44.10
517	0.90	1.11	14.5350	33.30	44.40
374	0.96	1.04	15.5680	46.80	55.12
366	0.95	1.05	15.4375	42.00	49.35
376	0.91	1.10	14.7875	27.50	44.00
358	0.88	1.14	14.3000	22.80	27.36
15	0.89	1.12	14.4773	24.64	41.44
405	0.88	1.13	14.3147	21.47	32.77
250	1.00	1.00	16.3000	41.00	50.00
504	0.93	1.07	15.2985	21.40	24.61
425	0.97	1.04	16.0212	31.20	28.08
396	1.00	1.00	16.5667	30.00	28.00
606	1.00	1.00	16.6667	32.00	43.00
265	0.99	1.01	16.5000	17.17	45.45
231	0.92	1.08	15.4560	11.88	28.08
384	0.89	1.13	15.1003	22.60	45.20
475	0.94	1.07	15.9800	32.10	43.87
409	0.95	1.05	16.3558	43.05	34.65
28	0.89	1.05	15.5602	22.05	44.10
166	0.96	1.04	19.7760	32.24	41.60
88	0.97	1.03	8.1318	61.80	56.65

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
122	0.93	1.08	7.8120	64.80	64.80
142	0.91	1.09	7.8563	88.29	59.95
65	0.93	1.07	8.0910	74.90	72.76
73	0.98	1.02	8.6403	61.20	75.48
110	1.00	1.00	8.9333	55.00	57.00
66	0.91	1.09	8.1597	61.04	61.04
118	1.00	1.00	9.0500	53.00	53.00
144	1.00	1.00	9.1667	55.00	53.00
128	0.89	1.12	8.2918	51.52	54.88
102	0.97	1.03	9.0695	62.83	63.86
99	0.98	1.02	9.2120	57.12	48.96
141	0.96	1.04	9.1200	52.00	52.00
550	0.98	1.02	9.3427	59.16	51.00
114	0.94	1.06	9.0240	48.76	51.94
79	0.96	1.04	9.2640	47.84	50.96
121	0.88	1.14	8.5067	59.28	59.28
72	0.96	1.04	9.3760	54.08	54.08
30	0.98	1.02	9.6367	51.00	51.00
91	0.99	1.01	9.7515	36.36	50.50
547	0.93	1.08	9.1760	54.00	56.16
35	0.95	1.05	9.3892	52.50	52.50
332	1.00	1.00	9.9167	52.00	50.00
108	0.93	1.08	9.2380	56.16	56.16
104	0.91	1.10	9.0697	60.50	60.50
94	1.00	1.00	9.9833	100.00	56.00

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
329	0.94	1.06	9.3843	53.00	53.00
89	0.94	1.07	9.3843	49.22	52.43
75	1.00	1.00	10.0000	41.00	42.00
352	0.94	1.06	9.4000	53.00	53.00
263	0.89	1.12	8.9297	58.24	61.60
512	0.88	1.14	8.8440	63.84	59.28
541	0.93	1.07	9.3775	64.20	64.20
119	0.99	1.01	9.9990	50.50	47.47
86	0.94	1.06	9.4940	56.18	54.06
214	0.86	1.16	8.6860	60.32	63.80
24	0.96	1.04	9.7440	59.28	59.28
539	1.00	1.00	10.2000	60.00	60.00
309	1.00	1.00	10.2000	50.00	35.00
97	0.95	1.05	9.7217	42.00	49.35
25	0.89	1.12	9.1077	59.36	57.12
334	0.97	1.03	9.9587	46.35	40.17
317	0.96	1.04	9.8560	101.92	66.56
490	0.91	1.10	9.3427	57.20	57.20
549	0.95	1.05	9.8483	42.00	42.00
595	0.94	1.07	9.7447	49.22	52.43
92	0.99	1.01	10.3125	57.57	49.49
57	0.90	1.12	9.4350	56.00	56.00
216	0.94	1.06	9.8700	55.12	54.06
211	0.90	1.11	9.4500	55.50	55.50
103	0.96	1.04	10.0960	54.08	53.04

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
340	1.00	1.00	10.5333	60.00	55.00
140	0.95	1.05	10.0067	59.85	55.65
260	0.94	1.06	9.9013	55.12	55.12
95	0.95	1.05	10.0542	49.35	51.45
540	0.92	1.08	9.7367	56.16	56.16
184	0.88	1.14	9.3133	59.28	47.88
464	0.93	1.08	9.9200	64.80	59.40
37	0.91	1.10	9.7067	57.20	57.20
82	0.99	1.01	10.5930	60.60	58.58
294	0.94	1.06	10.0580	53.00	46.64
337	0.92	1.09	9.8747	70.85	59.95
353	0.91	1.09	9.7673	54.50	49.05
542	0.96	1.04	10.3680	55.12	55.12
553	0.95	1.05	10.2600	42.00	47.25
533	0.94	1.07	10.1520	55.64	55.64
101	0.94	1.06	10.1833	41.34	45.58
115	0.93	1.07	10.0905	48.15	53.50
81	0.97	1.03	10.5407	44.29	58.71
341	0.97	1.03	10.5568	42.23	51.50
120	0.94	1.07	10.2303	42.80	50.29
205	0.93	1.07	10.1215	21.40	53.50
444	0.93	1.08	10.1215	48.60	57.24
284	0.93	1.08	10.1215	54.00	54.00
197	0.90	1.11	9.7950	55.50	54.39
74	0.92	1.09	10.1200	56.68	56.68

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
222	0.94	1.06	10.3870	48.76	51.94
457	0.94	1.07	10.3870	64.20	58.85
55	0.92	1.09	10.1660	46.87	42.51
124	0.96	1.04	10.6560	41.60	48.88
312	0.98	1.02	10.9107	66.30	58.14
463	0.92	1.09	10.2427	59.95	53.41
232	0.89	1.13	9.9087	53.11	56.50
246	0.91	1.10	10.1952	47.30	55.00
346	1.00	1.00	11.1833	52.00	45.00
33	0.94	1.07	10.5123	50.29	49.22
139	0.94	1.06	10.5280	42.40	37.10
206	0.91	1.10	10.1920	66.00	66.00
318	0.98	1.02	10.9923	53.04	52.02
69	0.99	1.01	11.1210	60.60	60.60
538	0.94	1.06	10.5593	53.00	53.00
213	0.94	1.06	10.5593	47.70	55.12
596	0.92	1.09	10.3347	54.50	49.05
84	0.89	1.12	10.0125	69.44	63.84
217	0.98	1.02	11.0413	30.60	54.06
570	0.93	1.08	10.4780	60.48	43.20
126	0.97	1.03	10.9610	51.50	51.50
90	0.96	1.04	10.8480	74.88	63.44
195	0.85	1.17	9.6050	46.80	52.65
326	0.97	1.03	10.9933	82.40	77.25
350	0.96	1.05	10.8800	63.00	58.80

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
138	0.95	1.05	10.7667	54.60	53.55
269	0.89	1.12	10.0867	51.52	56.00
543	1.00	1.00	11.3500	54.00	54.00
295	0.95	1.05	10.7825	66.15	45.15
185	0.89	1.13	10.1015	58.76	57.63
307	0.93	1.08	10.5710	62.64	62.64
509	0.92	1.08	10.4573	60.48	56.16
598	0.90	1.11	10.2300	51.06	46.62
402	0.91	1.09	10.3588	54.50	54.50
569	0.96	1.04	10.9440	56.16	52.00
546	0.96	1.04	10.9440	59.28	41.60
370	0.95	1.05	10.8458	63.00	63.00
559	0.93	1.07	10.6175	49.22	52.43
420	0.85	1.17	9.7042	58.50	58.50
44	0.90	1.11	10.3350	57.72	56.61
342	0.97	1.03	11.1550	66.95	57.68
68	0.95	1.05	10.9250	47.25	52.50
557	0.94	1.06	10.8100	42.40	41.34
313	0.93	1.08	10.6950	62.64	59.40
244	0.90	1.11	10.3500	52.17	54.39
601	0.86	1.16	9.8900	54.52	58.00
331	0.93	1.07	10.7260	58.85	58.85
187	0.85	1.18	9.8033	56.64	60.18
434	0.88	1.14	10.1787	67.26	51.30
391	0.95	1.05	11.0042	52.50	47.25

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
300	0.94	1.06	10.8883	44.52	53.00
544	0.98	1.02	11.3843	51.00	52.02
83	0.95	1.05	11.0358	52.50	52.50
446	0.89	1.12	10.3833	28.00	61.60
117	0.92	1.09	10.7640	50.14	53.41
310	0.97	1.03	11.3652	56.65	58.71
382	0.90	1.11	10.5450	55.50	52.17
254	0.90	1.12	10.5600	58.24	57.12
344	1.00	1.00	11.7500	66.00	54.00
106	0.95	1.05	11.1783	48.30	51.45
175	0.86	1.16	10.1193	60.32	59.16
105	0.98	1.02	11.5477	61.20	58.14
501	0.89	1.13	10.5020	58.76	56.50
199	0.88	1.14	10.3840	45.60	47.88
43	0.90	1.11	10.6350	55.50	55.50
160	0.87	1.15	10.2805	41.40	42.55
371	0.90	1.11	10.6650	44.40	52.17
270	0.93	1.08	11.0360	56.16	47.52
320	1.00	1.00	11.8833	52.00	51.00
46	0.91	1.09	10.8138	49.05	50.14
568	0.96	1.04	11.4400	47.84	50.96
514	0.92	1.09	10.9633	54.50	43.60
383	0.89	1.13	10.6058	56.50	56.50
56	0.94	1.07	11.2173	50.29	51.36
228	0.97	1.03	11.6077	53.56	41.20

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
53	0.88	1.13	10.5307	45.20	37.29
156	0.92	1.08	11.0247	51.84	52.92
361	0.98	1.02	11.7763	40.80	37.74
590	0.93	1.08	11.1755	54.00	44.28
59	0.92	1.08	11.0553	59.40	42.12
528	0.92	1.08	11.0553	54.00	54.00
363	1.00	1.00	12.0333	55.00	49.00
240	0.90	1.12	10.8300	63.84	59.36
282	0.97	1.03	11.6885	61.80	61.80
603	0.95	1.05	11.4475	52.50	52.50
178	0.94	1.06	11.3427	57.24	53.00
275	0.84	1.19	10.1360	60.69	59.50
477	0.91	1.09	10.9958	43.60	51.23
572	0.92	1.09	11.1320	65.40	65.40
279	1.00	1.00	12.1333	64.00	60.00
447	0.97	1.03	11.7693	53.56	51.50
487	0.92	1.08	11.1627	59.40	48.60
302	0.88	1.13	10.6773	56.50	56.50
419	1.00	1.00	12.1500	52.00	30.00
61	0.95	1.05	11.5425	51.45	44.10
576	0.91	1.10	11.0565	60.50	60.50
360	0.97	1.03	11.8017	63.86	56.65
356	0.99	1.01	12.0780	58.58	46.46
583	0.95	1.05	11.5900	52.50	54.60
297	0.94	1.09	11.4680	76.30	69.76

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
100	0.95	1.06	11.6058	47.70	53.00
27	0.90	1.11	11.0100	44.40	53.28
555	1.00	1.00	12.2500	49.00	59.00
323	0.97	1.03	11.8825	41.20	48.41
408	0.91	1.09	11.1475	52.32	49.05
45	0.91	1.10	11.1475	55.00	44.00
401	0.95	1.05	11.7008	73.50	44.10
194	0.88	1.13	10.8387	53.11	42.94
186	0.94	1.06	11.5933	42.40	43.46
600	0.93	1.08	11.4855	50.76	51.84
50	0.89	1.12	10.9915	56.00	56.00
276	0.91	1.10	11.2537	55.00	57.20
367	0.95	1.05	11.7642	52.50	50.40
507	0.89	1.12	11.0212	53.76	56.00
266	0.91	1.10	11.2840	44.00	50.60
52	1.00	1.00	12.4167	52.00	45.00
202	0.86	1.16	10.6927	58.00	60.32
85	0.96	1.04	11.9840	41.60	48.88
395	0.96	1.05	12.0000	54.60	57.75
478	0.95	1.05	11.8750	52.50	46.20
17	0.93	1.07	11.6250	53.50	53.50
441	0.89	1.12	11.1250	43.68	50.40
251	0.91	1.10	11.3902	50.60	38.50
224	0.88	1.13	11.0293	45.20	28.25
301	0.93	1.08	11.6870	43.20	48.60

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
226	0.91	1.10	11.4357	49.50	49.50
571	0.96	1.05	12.0800	52.50	52.50
151	0.95	1.05	11.9542	52.50	52.50
169	0.92	1.09	11.5920	43.60	49.05
173	0.95	1.05	11.9858	52.50	52.50
268	0.94	1.06	11.8597	15.90	31.80
234	1.00	1.00	12.6333	50.00	50.00
42	0.87	1.15	10.9910	57.50	57.50
219	1.00	1.00	12.6500	53.00	55.00
473	0.99	1.01	12.5400	56.56	52.52
286	0.93	1.08	11.7800	49.68	56.16
563	0.91	1.10	11.5267	50.60	53.90
421	0.90	1.11	11.4000	53.28	56.61
393	0.96	1.04	12.1920	34.32	47.84
375	0.89	1.12	11.3030	59.36	58.24
521	0.96	1.04	12.2080	41.60	42.64
288	0.92	1.08	11.6993	43.20	30.24
256	0.89	1.10	11.3178	55.00	56.10
582	1.00	1.00	12.7333	50.00	46.00
210	0.96	1.04	12.2240	55.12	62.40
594	0.96	1.04	12.2400	54.08	40.56
566	0.95	1.05	12.1125	45.15	46.20
198	0.91	1.10	11.6025	48.40	52.80
426	0.92	1.08	11.7453	69.12	63.72
607	0.94	1.06	12.0163	53.00	31.80

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
577	0.96	1.04	12.2880	41.60	48.88
518	0.94	1.07	12.0320	44.94	51.36
506	0.88	1.13	11.2640	55.37	44.07
14	0.92	1.08	11.7913	43.20	54.00
592	0.95	1.05	12.1917	37.80	42.00
272	0.93	1.08	11.9350	43.20	33.48
188	0.88	1.15	11.2933	46.00	54.05
386	1.00	1.00	12.8500	46.00	50.00
584	0.90	1.11	11.5650	57.72	57.72
511	0.88	1.13	11.3080	45.20	53.11
537	0.95	1.05	12.2392	42.00	47.25
167	0.92	1.09	11.8527	59.95	59.95
16	0.89	1.12	11.4662	45.92	50.40
4	1.00	1.00	12.9000	50.00	50.00
588	0.95	1.05	12.2550	38.85	42.00
273	0.93	1.08	11.9970	54.00	50.76
437	0.92	1.08	11.8680	44.28	41.04
159	0.93	1.08	12.0125	43.20	47.52
170	0.96	1.04	12.5120	52.00	52.00
556	0.91	1.09	11.8603	50.14	38.15
602	0.90	1.11	11.7300	45.51	55.50
467	1.00	1.00	13.0833	40.00	49.00
236	0.94	1.06	12.2983	55.12	54.06
535	0.89	1.12	11.6442	59.36	54.88
442	0.88	1.13	11.5133	62.15	64.41

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
149	0.93	1.07	12.1830	53.50	53.50
189	0.90	1.11	11.8050	55.50	55.50
586	0.96	1.04	12.6080	0.00	31.20
245	0.87	1.14	11.4550	57.00	57.00
455	0.87	1.14	11.4550	45.60	54.72
448	0.95	1.05	12.5242	52.50	52.50
223	0.93	1.08	12.2605	48.60	54.00
561	0.91	1.09	11.9968	45.78	50.14
515	?	?	13.1833	45.00	45.00
162	0.93	1.08	12.2760	54.00	54.00
530	0.88	1.13	11.6160	46.33	50.85
255	0.88	1.14	11.6307	57.00	62.70
483	0.93	1.07	12.3225	42.80	50.29
413	0.99	1.01	13.1340	60.60	55.55
379	0.96	1.04	12.7360	52.00	52.00
150	0.87	1.15	11.5420	57.50	50.60
500	0.89	1.12	11.8370	56.00	56.00
261	0.92	1.08	12.2513	56.16	49.68
493	0.91	1.10	12.1182	69.30	71.50
445	1.00	1.00	13.3333	45.00	45.00
458	0.90	1.11	12.0000	61.05	55.50
264	0.99	1.01	13.2495	49.49	50.50
491	1.00	1.00	13.4000	50.00	50.00
248	0.98	1.02	13.1320	53.04	51.00
229	0.93	1.07	12.4620	53.50	53.50

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
285	0.99	1.01	13.2990	36.36	47.47
608	0.86	1.16	11.5527	60.32	59.16
580	0.87	1.15	11.7015	46.00	54.05
171	0.97	1.03	13.0627	42.23	51.50
242	0.91	1.09	12.2547	42.51	46.87
239	0.90	1.11	12.1350	44.40	49.95
192	0.97	1.03	13.0950	41.20	30.90
516	0.96	1.04	13.0080	54.08	55.12
397	0.98	1.02	13.3117	53.04	51.00
410	0.95	1.05	12.9200	54.60	50.40
191	0.90	1.11	12.2400	55.50	51.06
238	0.91	1.10	12.4063	44.00	40.70
49	0.90	1.11	12.2850	55.50	56.61
283	0.90	1.12	12.2850	44.80	52.64
452	0.91	1.10	12.4367	59.40	63.80
505	0.87	1.15	11.8900	59.80	59.80
485	0.96	1.04	13.1520	59.28	46.80
597	0.93	1.07	12.7410	49.22	52.43
508	0.90	1.11	12.3450	44.40	43.29
468	0.93	1.08	12.7875	43.20	49.68
148	0.90	1.11	12.3900	36.63	33.30
183	0.88	1.13	12.1293	50.85	49.72
575	0.91	1.09	12.5580	46.87	35.97
480	1.00	1.00	13.8167	48.00	40.00
471	0.96	1.04	13.2640	54.08	62.40

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
461	0.84	1.19	11.6200	67.83	67.83
558	0.91	1.10	12.6035	50.60	53.90
587	0.88	1.14	12.1880	45.60	53.58
399	0.95	1.05	13.2050	44.10	45.15
373	0.98	1.02	13.6873	40.80	49.98
58	0.89	1.13	12.4303	67.80	67.80
416	0.93	1.07	13.0045	42.80	50.29
176	0.91	1.10	12.7552	66.00	49.50
469	0.96	1.04	13.5040	52.00	48.88
454	0.89	1.12	12.5342	56.00	56.00
155	0.87	1.15	12.3540	55.20	56.35
564	0.97	1.03	13.8490	53.56	54.59
429	0.92	1.09	13.0947	49.05	51.23
418	0.95	1.05	13.5850	66.15	52.50
581	0.92	1.08	13.1560	64.80	64.80
190	1.00	1.00	14.3333	40.00	45.00
220	0.94	1.07	13.4733	53.50	55.64
153	0.91	1.09	13.0433	65.40	65.40
593	0.91	1.10	13.0433	47.30	44.00
289	0.91	1.10	13.0433	66.00	64.90
172	0.91	1.10	13.0433	60.50	55.00
209	0.93	1.08	13.3920	48.60	54.00
203	0.87	1.14	12.5425	45.60	51.30
179	0.94	1.07	13.5673	43.87	50.29
243	0.95	1.05	13.7275	49.35	51.45

<b>ID Number</b>	<b>Vanderburgh Correction Factor:Distance Runs</b>	<b>Vanderburgh Correction Factor:Endurance</b>	<b>Vanderburgh Adjusted 1.5M Run Time</b>	<b>Vanderburgh Adjusted Push-Up Score</b>	<b>Vanderburgh AdjustedCrunches Score</b>
227	0.96	1.04	13.9040	54.08	55.12
495	0.88	1.13	12.7747	49.72	50.85
554	0.92	1.08	13.3860	43.20	39.96
267	0.91	1.09	13.4225	49.05	50.14
520	0.89	1.12	13.3797	43.68	44.80
609	0.87	1.14	13.3400	59.28	51.30
168	0.91	1.10	14.1050	44.00	48.40
398	0.92	1.09	14.4747	43.60	47.96

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