Dynamic changes in the health of the country are leading more people to the services and knowledge of a certified personal trainer. Personal trainers are finding greater responsibilities related to providing the appropriate exercise prescription for each of a wide variety of special populations. Most personal trainers are very comfortable training a client who is apparently healthy, between 18-40 years of age without any major medical conditions. When presented with the additional challenges of programming for what are collectively referred to as special populations, some trainers may fall short in their programming due to a lack of knowledge about a certain niche group, in particular the programming considerations necessary for safe and effective exercise prescription for children, older adults, and those individuals with pre-existing medical conditions such as diabetes. This article will provide an overview of the key points to keep in mind when considering program objectives for these populations.

Children

Children can be a difficult, yet very rewarding, population to work with as a personal trainer. Depending on the specific type of training, children may experience different responses to the activity when compared to the adult population. In addition, due to developmental concerns, a personal trainer will want to adhere to accepted practices specific to working with this population. There are four primary goals each trainer should focus on when working with children: 1) improve overall health and fitness; 2) initiate an active lifestyle habit that will hopefully continue throughout life; 3) decrease disease risk; and 4) make it fun. Specific programming recommendations for children include an accumulation of at least 60 minutes and up to several hours of age-appropriate physical activity most days of the week. In addition, 15 minutes of vigorous activity, done on an intermittent basis, should be included during each day of activity. Trainers should also offer a variety of activities to make sure that their young clients stay interested in the program and are exposed to a wide array of activities. This will increase the likelihood of a child staying active on a regular basis, and will also assist in motor skill acquisition.

Children exhibit a few acute and chronic adaptations to exercise that are worth noting. Compared with an adult population, children are similar in their acute response to exercise in VO_{2}max and the utilization of their creatine phosphate and ATP stores. This means that endurance activities, as well as short duration, intense exercises can be handled well by children. However, it is important to note that when compared to an adult population, children have a reduced capacity to utilize ATP via glycolysis, translating into a reduced ability to perform intense activity lasting between 10-120 seconds. In addition, children often have a reduced ability to dissipate heat and regulate internal body temperature. Trainers need to be aware of this when programming activity to prevent heat-related illnesses. An interesting characteristic of children is their collective ability to reach steady-state levels of oxygen uptake quicker than adults. This corresponds with a lower oxygen deficit at the onset of exercise and a correspondingly low oxygen debt, thereby reducing recovery time back to baseline.

Chronic exposure to exercise will result in a variety of adaptation responses in children, which for the most part, are very similar to those seen in an adult population. Over 60% of studies examining children’s response to exercise have found that chronic adaptations include improved musculoskeletal and cardiovascular health, improvement in levels of adiposity in those who are overweight, and decreases in blood pressure for those who were mildly hypertensive at the start of a program. Additional long-term effects include improved self-confidence and academic performance, reduced levels of anxiety and depression, and
improved blood pressure and lipid profiles. In broad perspective, children are one of the most important niche markets for personal trainers, especially as activity levels in schools continue to decrease, while levels of childhood obesity and the early onset of Type II diabetes rises. Trainers who can program exercise effectively can be very successful working with this population, and many find the work to be extremely rewarding, particularly when looking at the long-term adaptations that can occur.

Older Adults

On the other end of the age spectrum, one of the largest developing markets for personal trainers may be working with the older adult (classified as >65 years of age). As with any special population, the older adult has a number of characteristics specific to exercise programming that are important to note for safe and effective exercise participation. Each and every client you work with will present different abilities or limitations. However, there are some statistics that can provide a general overview of this population. Nearly 55% of individuals over the age of 65 report having at least one disability, with just over a third (37%) reporting a severe disability. Disabilities are classified as conditions that limit an individual’s ability to perform activities of daily living (ADLs) such as cooking and shopping. In addition to the likelihood of working with a client who has a disability, the probability is also high that they will have at least one chronic medical condition such as hypertension (49%), arthritis (36%), heart disease (31%), or diabetes (15%). Exercise programming that accounts for these conditions may require additional considerations, but should be fairly manageable with a little effort.

Specific programming goals for the older adult population should include the prevention or reduction of progress of any chronic disease state or physical limitation and reducing age-limiting factors. In addition, increasing or maintaining the level of physical fitness will improve the likelihood that a client will be able to maintain or improve their level of independence, a common goal of all older adults. Many adaptations to exercise are similar in older adults as are observed in younger adults. Improved blood lipid profiles, decreased level of body fatness, lower blood pressure, and improved glucose tolerance and insulin sensitivity will result from regular exercise participation.

Two key components of physical fitness a trainer should focus on specific to this population are aerobic capacity and bone density. Aerobic capacity (VO$_2$ max) decreases approximately 1% per year in both men and women due primarily to reduced cardiac output in conjunction with reduced oxygen extraction capabilities. Regular aerobic conditioning can maintain current levels of aerobic capacity, and over time has been shown to actually improve VO$_2$ by 10%-30% if the level of training is of high enough intensity to foster adaptation responses. Accelerated decreases in bone mineral density are also a concern for the older adult, mostly due to reduced levels of activity and decreased amounts of calcium in the diet. Exercise prescription should include weight-bearing activities and resistance training. This will increase bone stress, positively affecting bone density. Prescribing exercise that will increase the strength of all muscle groups will also increase bone density, due to the stress placed on the attachment points of the bone during force production. If osteoporosis is a concern, be cautious of the wrist, vertebrae, and hip as they are often most affected by the disease. Likewise, if osteoarthritis is a factor, use longer warm-ups and lower volumes and intensities.

Due to general functional decline with age, exercise programs focusing on improving balance and coordination can have excellent results related to a reduction in falls and the consequent injuries. It is important to evaluate individual clients for adequate baseline levels of muscular strength and endurance, as well as aerobic capacity. Strength training for the older adult should utilize a repetition range of 10 to 15, with an associated rate of perceived exertion (RPE) of 12-13. The exercise routine should be completed at least twice a week, with 48 hours of rest between training sessions. As with any population, proper lifting technique should be stressed as well as moving through a pain-free range of motion. Activities centering on balance training, resistance training, walking, and weight transfer, when completed consistently will result in an older adult less likely to fall. Independent factors such as vision, medications, and environmental factors may also need to be addressed prior to programming. A personal trainer has many tools in his/her repertoire to pull from when working with this population. Ideally, a combination of strength training utilizing total body movements and a selection of
the most functional activities possible will result in positive adaptations for older adults.

**Diabetes**

The probability of a trainer encountering a client with either type I or type II diabetes is increasing everyday. It has recently been estimated that more than 20 million Americans have diabetes, with nearly 90% of those cases being type II diabetes. Although the development of type II diabetes can be related to genetics, a large portion of those individuals with type II diabetes can trace their development of the disease to low levels of activity, being overweight or obese, and having poor nutritional habits. It should not be surprising that personal trainers can play a large role in the prevention and reduction in risk of individual development of type II diabetes by programming for increased levels of activity and recommending a decreased caloric intake along with healthier food choices. However, once an individual has been diagnosed with diabetes, there are a few guidelines personal trainers must follow to ensure safe and effective exercise programming.

Although exercise cannot prevent or cure type I diabetes, regular exercise participation should be encouraged to reduce the consequences of the disease and improve health status. Exercise will lead to improvements related to insulin sensitivity and an overall reduction in the risk of disease development, a similar occurrence to what is observed in a healthy population with exercise. Prior to exercising a client with type I diabetes, certain precautions should be taken to avoid exercise-induced hypoglycemia: measure blood glucose immediately before and 15 minutes after exercise, avoid exercise during times of peak insulin action, reduce insulin dose on days of planned exercise, avoid exercise late at night due to the possibility of hypoglycemia occurring at night, and extend the warm-up and cool-down periods.

Exercise can be beneficial in both the prevention and treatment of type II diabetes. Two of the more common traits of individuals with type II diabetes are obesity and physical inactivity. Research shows that individuals who exercise regularly are 30% to 50% less likely to develop type II diabetes compared to their less active counterparts. Among the list of benefits of regular physical activity for those with type II diabetes are: lower fasting blood glucose concentrations, improved glucose tolerance and insulin sensitivity, increase in lean mass and a reduction in fat mass, improved lipid profile and blood pressure, and lower risk of cardiovascular disease. Ideal programming for an individual with type II diabetes should require the individual to expend at least 1,000 kcals/week from aerobic activity. At least 3 nonconsecutive days are recommended, although individuals looking to maximize caloric expenditure and glucose control may exercise daily. A typical exercise session should last at least 15 minutes, with an ultimate goal of total accumulated time between 30 to 60 minutes. While walking or jogging are great methods to increase caloric expenditure, swimming and other non-impact exercise may be necessary for those with peripheral nerve damage.

Resistance training is also a suggested mode of exercise for individuals with type II diabetes. Weight training will result in the maintenance or even increase of muscle mass, thereby resulting in an increased resting metabolic rate and positively affecting caloric balance and weight management. In addition, weight training will improve an individual’s glucose tolerance and insulin sensitivity. Resistance training programs for individuals with type II diabetes should focus on 8-10 major muscle groups and utilize repetition ranges of 10 to 15 at least 2 days/week. Oftentimes these individuals have a history of poor levels of physical activity and nutrition. Goals should be realistic, exercise prescription should progress at a slow pace, and the client’s needs and preferred activities should be included in a well-designed exercise program.

Personal trainers need to be aware of programming considerations for all populations they may come in contact with in a gym or fitness facility. Understanding the training adaptations and any special exercise considerations is necessary in order for safe and effective programming. If individual considerations are ignored when dealing with a special population adverse effects may result. Children, older adults, and individuals with diabetes represent only a few of the special populations one may encounter in personal training. Given the current trends within the fitness industry such as childhood obesity, an ever expanding baby boomer generation (older adults), and increasing levels of diabetes in our society, these three populations will continue to require the services of qualified personal trainers in their fight to stay healthy.