
The Scientific Rationale

Today's Society

To understand the rationale behind integrated training, it's imperative for the health and fitness professional to first understand the current state of today's society. In addition to the current obesity epidemic, the number of older individuals is also growing rapidly. The U.S. Census Bureau reports that the proportion of the population over 65 is projected to increase from the 12% reported in 2000 to almost 20% by 2030. This lends to the number of individuals developing chronic diseases and disability. In the United States, approximately 80% of all persons 65 or older have at least one chronic health condition, and 50% have at least two. One in five adults report having doctor-diagnosed arthritis which is a leading cause of disability in the U.S.

Meanwhile, daily activity levels continue to decline. People are less active and are no longer spending as much of their free time engaged in physical activity. Physical education and after-school sport programs are being cut from school budgets, further decreasing the amount of physical activity in children's lives. This new environment is producing more inactive and non-functional people, leading to structural deficiencies and injury.

Evidence of Increased Injury and Musculoskeletal Pain

Research suggests that musculoskeletal pain is more common now than it was 40 years ago. This lends support to the concept that decreased activity may lead to muscular dysfunction and, ultimately, injury. Some of the major health topics of interest include low back pain, knee injuries, chronic diseases, such as heart disease and diabetes, and musculoskeletal injuries.

Low back pain is one the major forms of musculoskeletal degeneration seen in the adult population, affecting nearly 80 percent of all adults. It is common among workers in enclosed workspaces, such as offices, as well as those who sit for periods of time greater than three hours, and in people who have altered lumbar lordosis, or an exaggerated curvature of the low back.

The incidence of knee injuries is also a concern. An estimated 80,000 to 100,000 anterior cruciate ligament, or ACL, injuries occur annually and approximately 70 percent of these are non-contact

injuries. Non-contact injuries include losing your balance stepping off a curb or planting your foot to change directions while running. Most ACL injuries occur between 15 and 25 years of age. This comes as no surprise when considering the lack of activity and increased obesity occurring in this age group.

Another contributor to musculoskeletal injuries is poor posture, which results in increased neck, mid- and lower back, shoulder and leg pain.

Work-related injuries are also a factor, with over 40% of reported injuries coming in the form of sprains and strains. More than one-third of all work-related injuries involve the trunk and, of these, over 60% involve the low back. The cost of this poor health and function? The value of lost work time due to musculoskeletal injuries is estimated to be approximately \$120 billion dollars.

So what does this all mean? Simply put, the extent to which we condition or decondition our musculoskeletal system directly influences our risk of injury. The less conditioned we are, the higher the risk of injury. The body is a master of adaptation. Since our daily lives include little physical activity, we are poorly prepared to participate in recreational and leisure activities such as resistance training, weekend sports or simply playing on the playground. For most, daily life conditions us to handle no more than sitting still.

Traditional Training Programs

Now that we have a better understanding of today's client, let's take a look at how most traditional training programs are designed and how that carries over to the needs of today's client.

First, most traditional training programs do not emphasize movements in all three planes of motion including the sagittal, frontal and transverse planes. Most programs include exercises that are primarily sagittal plane dominant, or movements that are performed in a forward and backward motion.

Examples of these types of movements include rows, presses and front lunges. Rarely do you see individuals performing exercises requiring them to move from side to side in the frontal plane or in rotation in the transverse plane. In fact, many injuries occur while moving in the transverse plane, yet traditional exercise programming does not challenge an individual's ability to control themselves in this plane. It will be important that training programs of today challenges the individuals' ability to control themselves in all three planes of motion.

Second, the majority of traditional training programs do not emphasize all aspects of the muscle contraction spectrum. Generally, the emphasis is placed on how much weight one can lift concentrically. Rarely do you see one emphasize how slowly they can eccentrically lower the weight back to the starting position or how well they can isometrically stabilize the load before they lift the weight again. However, most injuries occur during the eccentric and isometric phases of movement. Individuals are typically not trained efficiently to slow themselves down (or decelerate) nor are they efficient in their ability to dynamically stabilize themselves. This style of training poorly equips the exerciser to handle the dynamic requirements of an active life.

For this reason, it is important for programs of today to emphasize all three contractions of the muscle action spectrum: the concentric contraction, or lifting the load, the eccentric contraction, or lowering the load, and the isometric contraction to stabilize the body while performing the exercise.

Lastly, many traditional programs do not challenge individuals in proprioceptively enriched environment. A proprioceptively enriched environment is one that challenges the internal balance and stabilization mechanisms of the body.

Examples of this include performing a dumbbell chest press while on a stability ball or performing an overhead press on one leg. It is important to include exercises that challenge the internal balance and stabilization mechanisms of the body so they'll be better prepared to control themselves and protect against injury in unstable environments outside the gym. Doing so will also make your clients better prepared for higher intensity exercise in the future and continuous progress towards their goals.

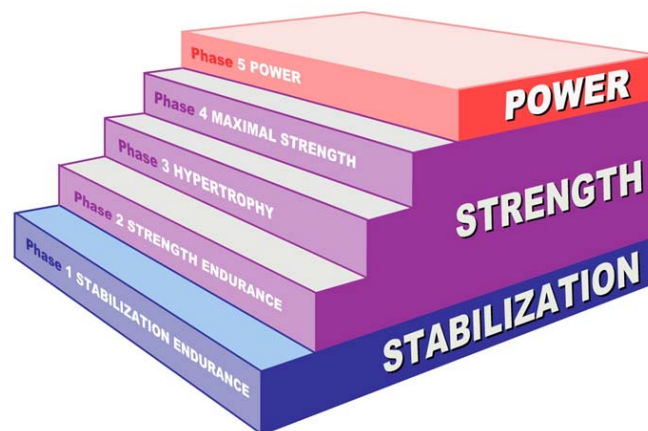
So with all of that said, the new mind-set in fitness should cater to creating programs that address functional capacity, as part of a safe program designed especially for each individual. In other words, training programs must consider each person, their environment and the tasks and activities that they will be engaged in. This is best achieved by introducing an integrated approach to program design. It is upon this premise that the National Academy of Sports Medicine (NASM) presents the rationale for integrated training and the Optimum Performance Training (OPT™) model.

Integrated Training and the OPT™ Model

Let's first define integrated training. Integrated training is a concept that incorporates all forms of training in an integrated fashion as part of a progressive system. These forms of training include flexibility training, cardiorespiratory training, core training, balance training, reactive training, speed, agility and quickness training and resistance training. This system was developed by NASM and is termed Optimum Performance Training (OPT™).

The OPT™ model was conceptualized as a training program for a society that has more physical structural imbalances and susceptibility to injury than ever before. It is a process of programming that systematically progresses any client to any goal. In other words, it is a periodization system, where each phase of training prepares the body for the next set of demands.

The model is divided into three different building blocks—stabilization, strength and power. Each building block contains a specific phase or phases of training. It is imperative that the fitness professional understands the scientific rationale behind each building block in order to properly utilize the OPT™ model.



Phase 1 - Stabilization

The OPT model starts with the stabilization level. This level of training consists of one phase of training, stabilization endurance training, with the goals being to increase systemic stabilization, muscular endurance, flexibility and optimum levels of neuromuscular efficiency (control). This level will help prepare the neuromuscular system for the higher intensities of exercise that will be experienced in the following levels.

The progression for this stage of training is proprioceptively based. In other words, rather than increasing load, or weight, you increase the stabilization requirements of the exercise. This may come in the form of performing an exercise from two arms to alternating arms, from two legs to one leg or from a sitting position to a standing position. The loads used at this level are lower with the repetitions being higher to enhance endurance.



Once an individual has developed appropriate amounts of stability, they can then progress to the strength level of the model.

Strength Level – Three Phases

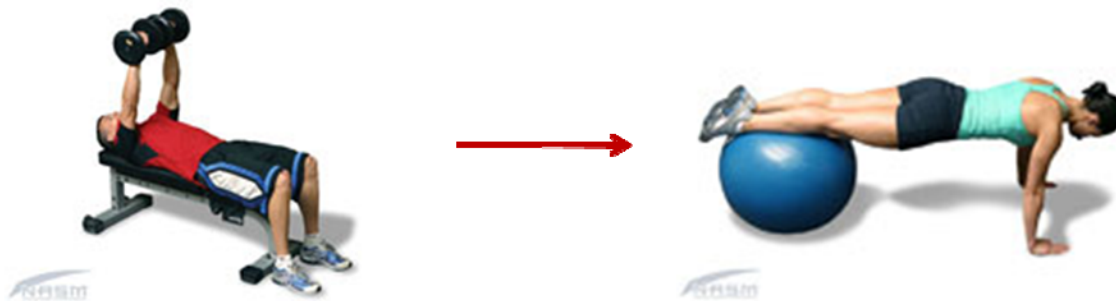
The strength level of the model consists of three phases of training: phase 2 strength endurance, phase 3 hypertrophy and phase 4 maximal strength.

Phase 2 – Strength Endurance

In phase 2, strength endurance, the training goal is to maintain stabilization endurance while increasing prime mover strength. Basically, we are looking to improve the ability to produce higher forces for a longer time. This will enable the body to handle the higher volume and intensity training programs that will come later in the OPT model. These adaptations are accomplished by performing

two exercises in a superset sequence (or back-to-back without rest) with similar joint dynamics for a given body part. One exercise is a traditional strength exercise performed in a more stable environment, followed immediately by a similar movement performed in a more unstable fashion.

For example, one would first perform a chest press on a bench or machine then immediately perform something like a push up on a stability ball. The principle behind this method is to work the prime movers predominantly in the first exercise in order to elicit prime mover strength. Then, immediately follow with an exercise that challenges the endurance of the stabilization muscles. This produces an increased ability to maintain postural stabilization or good posture and dynamic joint stabilization.



Phase 3 – Hypertrophy

In phase 3, hypertrophy, the training goal is to achieve optimum levels of muscular size. To elicit muscular hypertrophy requires high a level of training intensity and volume. Traditionally, this is where a lot of individuals begin their training. However, hopefully you can now understand the importance that one must progress to this level of training to decrease the risk of injury and ensure they attain their goal. This phase of training is optional depending on the individual's goal.

Phase 4 – Maximal Strength

In phase 4, maximal strength, the training goal is to achieve maximal prime mover strength by lifting heavy loads. This form of training increases motor unit recruitment and the frequency of motor unit firing with peak force production being the end product. Basically, maximal force production, regardless of speed of movement, is the goal. As with phase 3, this phase is optional.

Once an individual has obtained optimal levels of strength, they are ready to progress to the Power level of the model.

Phase 5 – Power

The power level consists of one phase of training: Power Training. This level of training emphasizes the development of speed and power (or rate of force production) while maintaining prime mover strength. In this phase, one would super set a traditional strength exercise with an explosive power exercise of similar joint mechanics. This is to enhance prime mover strength while also improving the rate of force production. An example of training this way would include doing a heavy squat or leg press immediately followed by jump squats.

Individuals would not enter into this level of training until they have developed proper amounts of stabilization in phase 1 and strength in phases 2, 3, and 4. This will help decrease the risk of injury while ensuring improvements in performance.

Summary

In summary, when working with today's typical client, who is likely to be deconditioned, fitness professionals must take special consideration when designing programs. An integrated approach should be used to create safe programs that consider functional capacity for each individual. They must address factors such as flexibility, improving stability, increasing strength and endurance, enhancing cardiorespiratory capacity and training in different types of environments. These are the basis for NASM's OPT™ model.

The OPT™ Model

The OPT Model vs. Traditional Training

The different periods of training seen in a traditional periodization model include a preparatory period, a hypertrophy period, a maximum strength period and a power period.

The OPT™ model as a phase-specific model of training includes five different phases of training. These phases systematically progress all clients through the three main adaptations of stabilization, strength and power.

Your client's exercise programs are based on the OPT model and each component of the workout includes a video demonstration. These workouts can be modified based on exercise frequency, duration and available equipment.

Stabilization

The first level of training in the OPT™ model focuses on the main adaptation of stabilization or anatomical adaptation and is designed to prepare the body for the demands of higher levels of training that may follow. This period is crucial for all beginners. In addition, it allows the body to rest from more intense bouts of training.

The focus of stabilization training includes

- Correcting muscle imbalances
- Improving stabilization of the core musculature
- Preventing tissue overload by preparing muscles, tendons, ligament and joints for the upcoming imposed demands of training
- Improving overall cardiorespiratory and neuromuscular condition
- Establishing proper movement patterns or exercise technique

Phase 1 – Stabilization Endurance Training

The stabilization level of training in the OPT™ model consists of one phase of training: Stabilization Endurance Training. Stabilization Endurance Training should be used for the beginning client who may possess muscle imbalances, lack postural control and stability.

This phase of training focuses on

- Increasing stability
- Muscular Endurance
- Increasing neuromuscular efficiency of the core
- Improve inter- and intramuscular coordination

The acute variables used at this phase of training would include the following:

- Lower sets
 - 1-3
- Higher repetitions
 - 12-20
- Lower intensities
 - 50-70%
- Slower tempos
 - 4/2/1
- Rest intervals
 - 0-90 seconds

Strength Level

The second level of training in the OPT™ model focuses on the main adaptation of strength, which includes strength endurance, hypertrophy and maximal strength training.

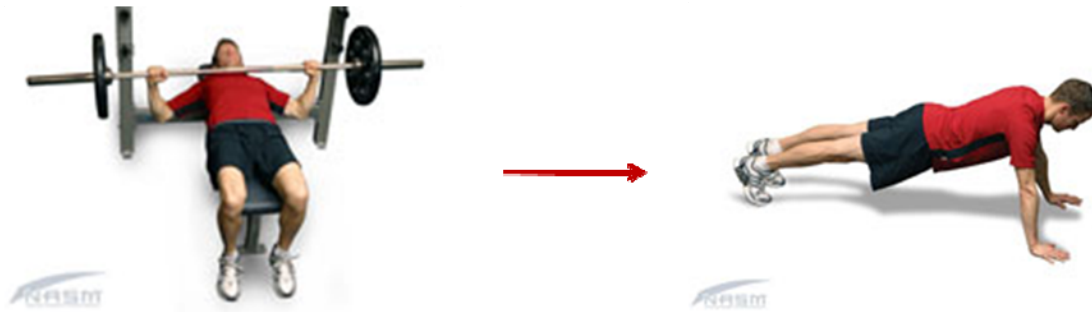
The focus of the strength period of training is to

- Increase caloric expenditure
- Increase muscle size
- Increase muscle strength

Phase 2 – Strength Endurance Training

Strength Endurance Training is a hybrid form of training that promotes increased stabilization endurance and prime mover strength. This form of training entails the use of superset techniques where a more stable exercise is followed immediately with a stabilization exercise with similar biomechanical motions.

An example would be performing a barbell bench press immediately followed with a push up. This style of training allows for increased motor-unit recruitment after the prime movers have fatigued and enhances dynamic joint stabilization while improving prime mover strength.



The acute variables used at this phase of training would include the following:

- Low to moderate sets
 - 2-4
- Moderate repetitions
 - 8-12
- Moderate intensities
 - 70-80%
- Moderate to slower tempos
 - 2/0/2: Strength exercise
 - 4/2/1: Stabilization exercise
- Rest intervals
 - 0-60 seconds

Phase 3 – Hypertrophy Training

Hypertrophy training, is specific for the adaptation of maximal muscle growth, focusing on high levels of volume with minimal rest periods to force cellular changes that result in an overall increase in muscle size. Keep in mind that this phase of training is optional depending on the goals of the client.

The acute variables used at this phase of training would include the following:

- Moderate to high sets
 - 3-5
- Moderate repetitions
 - 6-12
- Moderate to high intensities
 - 75-85%
- Moderate tempos
 - 2/0/2
- Rest intervals
 - 0-60 seconds

Phase 4 – Maximal Strength

The Maximal Strength Training phase focuses on increasing the load placed upon the tissues of the body.

Maximal intensity improves

- Recruitment of more motor units
- Rate of force production
- Motor unit synchronization

Maximal Strength Training has also been shown to help increase the benefits of power training used in Phase 5. As with hypertrophy training, this phase of training is optional depending on the goals of the client.

The acute variables used at this phase of training would include the following:

- High sets
 - 4-6
- Low repetitions
 - 1-5
- Moderate to high intensities
 - 85-100%
- Moderate tempos
 - As quickly as can be controlled
- Rest intervals
 - 3-5 minutes

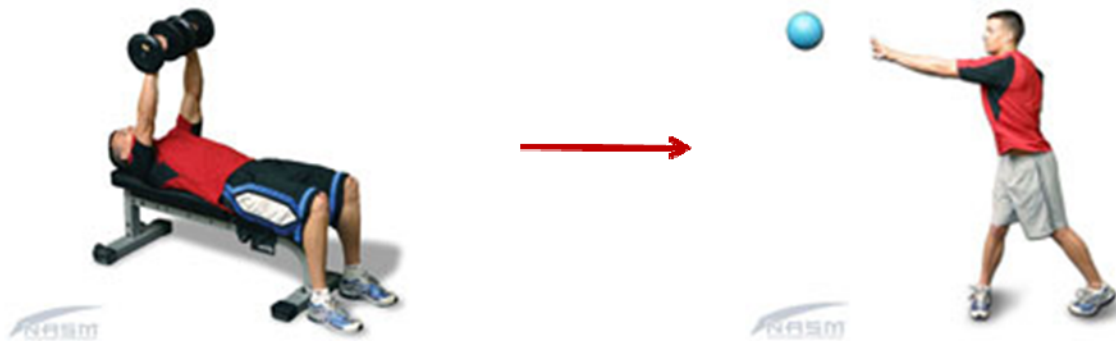
Phase 5 – Power

The third level of training is power and is designed to increase speed of muscle contraction. This form of training uses the adaptations of stabilization and strength acquired in the previous phases of training and applies them with more realistic speeds and forces that the body will encounter in everyday life and/or sport.

The goals of power training include the following:

- Increase the velocity of movements
- Increase the rate of force production by increasing the number of motor units activated, synchronization and the speed at which they are excited

Phase 5 focuses on both high force and velocity to increase power. This is accomplished by super-setting a strength exercise with a power exercise for each body part, such as performing a dumbbell bench press super-set with a medicine ball rotation chest pass.



The acute variables used at this phase of training would include the following:

- Moderate to high sets
 - 3-5
- Low to moderate repetitions
 - 1-5: strength exercise
 - 8-10: power exercise
- High intensities
 - 85-100%: strength exercise
 - 30-45% 1RM or 10% of bodyweight: power exercise
- Fast tempos
 - Fast/As quickly as can be controlled
- Rest intervals
 - 1-2 minutes between super-sets

Summary

The Optimum Performance Training (OPT™) model provides a system for properly and safely progressing any client to his/her goals, by utilizing integrated training methods. It consists of three building blocks—stabilization, strength and power.

The stabilization level addresses muscular imbalances and attempts to improve the stabilization of joints and overall posture. This training level has one phase of training—Phase 1 -- Stabilization Endurance Training.

The strength level focuses on enhancing stabilization and strength endurance (Phase 2 – Strength Endurance Training) while increasing muscle size (Phase 3 – Hypertrophy Training) and/or maximal prime mover strength (Phase 4 – Maximal Strength Training).

The power level is designed to target specific forms of training that is necessary for maximal rate of force production. This stage has one phase of training—Phase 5 -- Power Training.