



**Strength
and
Conditioning
MANUAL**



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I. Coaching Philosophy

3 Primary Goals of the Minnetonka Strength & Conditioning Program:

Reduce the likelihood and severity of injury – Keeping athletes healthy and on the field of play is imperative to the success of a team. Thus, the primary goal of all strength and conditioning programs should be injury prevention. This goal includes both reducing the likelihood and severity of injury occurring during athletic performance and also eliminating injuries occurring in the weight room. A strength training program must emphasize areas that are prone to injury as a result of competing in any number of athletic endeavors. Performing potentially dangerous exercises in the weight room to prepare for potentially dangerous activities in competition is like banging your head against a wall to prepare for a concussion.

Stimulate positive physiological adaptations – Physiological changes resulting from a proper strength training regimen include an improvement in strength and the ability to produce force, improved power/explosive capacity, achievement and maintenance of a functional range of motion, and an improvement in body composition.

Improve confidence and mental toughness – An extremely valuable byproduct of strength training is improved confidence and mental toughness. Intense workouts will expand an athlete's tolerance for physical discomfort. Most athletes who pride themselves in proper strength training will compete harder because they have invested time and energy to physically prepare for competition.

Supervision:

Supervision is a key component in obtaining the best possible results from a strength training program. Proper supervision ensures that the athletes are performing proper repetitions, training with a high level of intensity, and neatly recording progression on the workout card.

Supervision Guidelines:

All strength staff members should be found on the floor and not in the office.

Strength and conditioning coaches must consider themselves to be teachers.

Educate the athletes on strength training principles.

Teach with great intensity and enthusiasm.

Use positive, specific reinforcement.

Be hands on and make a personal connection with each participant.

Treat students with respect.

Demand great effort.

Never use profanity.

II. Program Foundations

The following 10 principles are the foundation of our strength and conditioning program at Minnetonka High School. These principles comprise a comprehensive approach that we use to train our students, athletes, and anyone else interested in reaping the benefits of improved muscular fitness.

1. Year-round participation

Off-season strength and conditioning is a key component of an athlete's success. Unfortunately, many athletes train very hard in the off-season and then discontinue training once their sport season begins. The most important period for an athlete is in-season. Not strength training in-season would be like studying hard for a test in June, then not studying in October when you actually take the test. A year-round commitment to strength and conditioning is vital in maximizing athletic potential and injury prevention.

2. Perfect Repetitions

Perfect repetitions should be a foundation of all strength programs. For maximum gains, the resistance must be raised at a speed that forces the muscle to perform all of the work. If momentum is used, fewer muscle fibers are recruited. After raising the weight, pause momentarily in the contracted position and then make a smooth transition into the lowering phase. For maximum gains, more time must be taken to lower the resistance than was used to raise it.

3. Intensity

Intensity of exercise is the most controllable factor in any resistance training program. Despite what the majority of the population believes, magical set rep schemes, barbells and one repetition maxes have little or nothing to do with obtaining results. The physiological basis for any strength training program is the **overload principle**. The overload principle states that a system must be stressed beyond its current capacity in order to stimulate a physiological response... that response is an increase in muscular strength and size. In our program, each and every exercise is taken to the point of momentary muscle failure, followed by 2-4 forced repetitions.

4. Progression

To ensure progressive overload, we use a double progressive system. The goal on each exercise is to either perform more repetitions or use more resistance than the previous workout.

5. Brief and Infrequent

Our athletes train 2-3 days per week with each workout lasting between 15 and 60 minutes. Emphasis is placed on the quality of the work, rather than the quantity of the work. Because high intensity exercise is so demanding, only small amounts can be tolerated. Each athlete should perform the minimum amount of exercise needed to attain the desired response.

6. Total Body Training

Every athlete we work with trains the entire body, placing an equal emphasis on each muscle group. Athletic performance in all sports requires the muscular systems to work synergistically, meaning that all muscles groups must be developed.

7. Record Data

All pertinent workout information must be recorded to ensure progression. The workout card should allow for the recording of the following information: seat settings, number of repetitions achieved, amount of resistance used, and the date of the workout. We also list descriptions of different overload protocols and have each athlete record the percentage of exercises in which they demonstrated progress.

8. Supervision

The success of a strength training program is directly related to the amount of supervision and coaching each athlete receives. Athletes always strength train with a partner whose job it is to not only spot, but also to provide specific feedback related to speed of movement, posture, and exercise form.

9. Variety

Variety in a training program will help the athlete to avoid mental and physical boredom and has the potential to make the athletes experience more challenging and enjoyable. Variety can be achieved by using all forms of resistance (free weights, machines, manual resistance, etc.), varying rep speed, varying the number of reps performed, and varying the plane of movement. We also like to throw in abbreviated workouts such as a 3x3 or FAT (fried and toasted). The same goals are achieved by these workouts, differing only in how the goal is attained.

10. Unification

Creating a unified program that has the support of physical education staff, coaches, and athletes is a key to building the best possible strength training program. Confusion and doubt will exist if coaches from different sports recommend different styles of training. Educating coaches and athletes is key in achieving program unification.

III. Player Development Profile:

Muscular strength/power

Cardiovascular fitness

Range of motion

Specificity of skills

Nutrition

Speed development

Rest and recovery

This program has been prepared to meet the following objectives:

Increase and maintain functional range of motion

Increase and maintain total body strength levels for improved performance and reduced likelihood of serious injury

Increase functional muscular mass – which will enhance your ability for greater power output

Keep your percentage of body fat at an acceptable and efficient level

Improve muscular endurance

Improve your cardiovascular/cardiopulmonary efficiency

Improve your quickness and speed

Make you mentally and physically tougher

Prepare you to win

Muscular Strength/Power

Function Dictates Prescription:

The function of a particular muscle structure dictates what exercise will be performed to target that muscle structure. This means that we must first think about the role or purpose of a given muscle before we can decide what exercise we will use to train it.

Muscle Groups

It is important to understand the major muscle groups of the body, what they do, and how we can train them. We will break the body up into the following groups:

Neck.

Shoulders.

Chest.

Back.

Arms.

Legs.

Midsection.

The exercises performed can be grouped into the following:

Multijoint – ex. Leg Press

a. push

b. pull

Single joint – ex. Leg Extension

Progressive Overload

The physiological basis for any resistance training program is the **overload principle**. The overload principle states that a system must be stressed beyond its current capacity in order to stimulate a physiological response... that response is an increase in muscular strength and size. The goal should be to use more resistance or perform more repetitions each time you strength train. The overload principle is the single most important part of a resistance training program. Without overload, a resistance training program is of little or no value. **Our goal is to safely and efficiently facilitate overload.**

Intensity

Intensity of exercise is the most controllable factor in any resistance training program. Despite what the majority of the population believes, magical set rep schemes, barbells and one repetition maxes have little or nothing to do with obtaining results. Training with a high level of intensity is what stimulates results. A trainee cannot control how he/she will respond to a resistance training program; that response is controlled by genetics. There is no evidence to suggest that low reps with high weight will produce muscular size and strength and high reps with low weight will produce toned muscles. This is a common assumption with no scientific backing.

Brief and Infrequent

Because high intensity exercise is so demanding on the physiological systems of the body, only small amounts can be tolerated. Only a limited amount of exercises can be performed in a workout and only a limited amount of workouts should be performed per week. An excess of volume will cause over training and will lead to little or no results. Because of these facts, our training sessions last only 15-60 minutes and are performed only two or three times per week.

Repetition Performance

The prescribed protocol will often dictate how the repetitions for a set are to be performed. However, there are some performance techniques that are common to all repetitions regardless of the protocol.

Always change directions from concentric to eccentric in a smooth fashion allowing the muscles to do the work, not momentum. Never jerk or throw a weight. When a weight is jerked or thrown, momentum is incorporated to move the resistance. When momentum is used the load is taken off of the muscles and less muscle fibers are recruited thus limiting the degree of overload.

Never twist or torque body when performing a rep. The athlete should be instructed to maintain proper positioning, posture, and form.

If a protocol does not dictate a specific rep speed, rep speed should be as follows. Raise weight under control taking approximately 2 seconds; pause in the contracted position; lower weight with a speed twice as slow as the raising of the weight. If in doubt, move slower, never faster.

Never sacrifice form for more reps or more resistance.

It is not the amount of weight or the number of repetitions performed that matters; **it is how the repetitions are performed that matters.**

Explosive Training

None of the workouts we will be using contain traditional "explosive" exercises. It is important to understand why we do not implement these exercises. A traditional explosive lift, such as the power clean, does little if anything to build strength, does nothing to develop speed or explosiveness, and is extremely dangerous. Explosive lifts incorporate momentum... when momentum is used to *throw* a weight, the load is taken off the skeletal muscle, thus, reducing fiber recruitment. In order to develop speed and explosiveness, an individual must train in a slow manner that allows the muscles to raise and lower the resistance... thus leading to fatigue of the targeted muscular structure and leading to the recruitment of more fast twitch muscle fibers.

Specificity

Skills are specific. They do not transfer. Do not attempt to mimic a skill performed on the field in the weight room. Throwing a weighted baseball is a far different skill than throwing a conventional baseball. As soon as you add resistance to a skill it becomes a new skill. A different neuromuscular pattern is recruited. In his text, Introduction to Motor Behavior: A Neuropsychological Approach, author George Sage states, "Practice of nonspecific coordination or quickening tasks will not transfer to sport specific skills."

Cardiovascular Fitness

The energy used to play sports is provided by two predominant energy systems. They are the aerobic system and the anaerobic system. The term aerobic means with oxygen and the term anaerobic means without oxygen.

The aerobic energy system draws its energy from oxygen in the air you breathe. Aerobic exercise improves the ability of the cardiorespiratory system to transport oxygen (fuel) to the working muscles.

The anaerobic system draws its energy from ATP and glycogen. The anaerobic system is divided into two separate systems which are the Anaerobic Glycolysis system and the ATP-PC system. Both systems have a limited supply of energy.

Aerobic – 12 minutes to unlimited; 1.5 miles to ?

Anaerobic glycolysis – 11 to 60 seconds; 100-400 yards; 2 to 1 rest/work ratio

ATP-PC – 0 to 10 seconds; 0-100 yards; 3 or 4 to 1 rest/work ratio

The aerobic system is best developed when the following criteria are met:

The activity is continuous and rhythmical in nature (jogging, biking, swimming, stepping, rowing, etc.)

The activity involves larger muscle groups

The activity is sustained for a minimum of 12 minutes

The activity is performed at an intensity level between 70% and 85% of maximum heart rate

Aerobic training zone = $220 - \text{age} \times .70$ Ex. $220 - 20 = 200 \times .7 = 140$

$220 - \text{age} \times .85$ Ex. $220 - 20 = 200 \times .85 = 170$

Interval exercise best develops the anaerobic system. The following are sample interval workouts.

400's

Description – athlete will sprint 400 yards (1 time around track)

Exercise time – 60 seconds (approximately)

Rest interval – 150 seconds

Number of reps – 4 or 5

200's

Description – Athlete will sprint 200 yards (half the distance around track)

Exercise time – 30 seconds

Rest interval – 1 min. 15 sec.

Number of reps – 10

Decreasing Intervals

Description – Athlete will do one 800 yd. sprint, two 400 yd. sprints, four 200 yd. sprints, and eight 100 yd. sprints

Rest/Exercise Ratio – 3/1

Upbacks

Description – Athlete will sprint forward 5 yards, backpedal 5 yards, sprint forward 10 yards, backpedal 10 yards, sprint forward 15 yards, backpedal 15 yards, sprint forward 20 yards, backpedal 20 yards. This is considered one rep. Sprint forward 5 yards, shuffle 5 yards back,Sprint forward 5 yards, carioca 5 yards back,..... This is considered one set of 3 reps.

Rest/Exercise ratio – 3/1

Number of sets – 4 (12 total reps)

Texan Shuttles

Description – Athlete will sprint forward 5 yards, turn and sprint forward 10 yards, turn and sprint forward 15 yards

Rest/Exercise ratio – 3/1

Number of reps – 20

Range of Motion

Achieving and maintaining functional range of motion is important for achieving optimal performance, specifically the ability to produce power. Flexibility is a term used to define joint mobility and muscular range of motion. Traditionally, stretching exercises have been implemented in most programs to improve range of motion and decrease the risk of injury. However, there is very little support from scientific research showing any benefit from these stretching exercises.

Functional range of motion is achieved and maintained through full ROM strength training exercises and functional flexibility drills. The best way to improve sport specific range of motion is to practice sport specific skills.

Skill Development

The execution of any skill requires a sophisticated series of signals sent from the brain to the muscles. Muscle fibers must be activated in the proper sequence to perform a skill with any proficiency. An increase in proficiency will occur if that specific skill or parts of that skill is practiced.

Skills are extremely specific. Skill transfer is a term used to describe the impact that the practice of one skill has on another. There are three types of transfer: positive, neutral, and negative.

Positive transfer occurs by rehearsing the exact skills used to perform a task. Positive transfer only takes place when the practice of the skill is identical to those in the task.

Brian Sharkey, in his text, Physiology of Fitness, states, "Skill is achieved by practice. Every skill is specific; therefore each must be learned individually. Ability in tennis doesn't assure success in badminton, squash, or racquetball; skill doesn't transfer as readily as we once thought."

Neutral transfer describes a different skill or activity that won't help or hurt the development of another skill. Coaches and athletes often credit the positive impact one skill has on another. We've all heard, "jump rope to improve foot speed and hit the speed bag to improve hand speed." Jumping rope will improve your ability to jump rope and hitting the speed bag will improve your skill to hit a speed bag. These skills do not transfer to football, basketball, or any other sport.

Negative transfer occurs when the learning of one task impairs or inhibits learning a second task. Do not add resistance to a skill. Shooting a weighted basketball is similar to shooting a basketball, but it is a different skill. Doing this may confuse the brain and disrupt the skill pattern developed when shooting a conventional ball.

Adding any resistance to a skill makes it a new skill. Do not attempt to mimic or imitate a skill in the weight room. It cannot be done. **Strengthen the muscles in the weight room, develop a high level of conditioning, and practice the skills used to play the game. It's that simple.**

Nutrition

Proper nutrition can enhance and maximize an athlete's performance potential. Perhaps just as important, a poor diet can harm performance. Nutrition for optimized health and physical performance should always involve moderation, variety and balance. There are no magic pills or potions available that will give you more energy, make you run faster, or improve your skills. Having the discipline to eat a balanced diet of normal foods each day is the only "secret formula."

Dietary Guidelines:

Eat a variety of foods

Maintain a healthy weight

Choose a diet low in saturated fat and cholesterol

Choose a diet with plenty of fruits, vegetables and whole grains

Consume sugars and fats in moderation

6 Basic Nutrients:

1. Water

What you need to know – The need for water before, during, and after exercise cannot be over-emphasized. Dehydration is one of the major factors that limit the body's capacity to perform strenuous exercise. Fluids should be consumed before thirst sets in and after a person no longer feels thirsty.

2. Carbohydrates

Percent of daily calories – 60-70%

Calories per gram – 4

What you need to know – Carbohydrates are the body's most important source of fuel. However, try to limit your intake of simple carbohydrates, which are mostly sugar.

Good sources – Whole grain bread, cereal, pasta, fruit, and some vegetables

3. Protein

Percent of daily calories – 12-15%

Calories per gram – 4

What you need to know – Most important role of protein is to build, maintain and repair tissue. Consuming large amounts of protein will not increase muscle mass. Protein shakes, bars, and drinks should not be consumed.

Good sources – Lean meats, fish, chicken, eggs

4. Fat

Percent of daily calories – 20-25%

Calories per gram – 9

What you need to know – Some fat is essential, both in the body and as an energy source. Diets high in fat, especially saturated fat, are associated with heart disease.

5. Vitamins

What you need to know – A balanced diet will provide ample vitamins. Vitamin supplementation is not necessary.

6. Minerals

What you need to know – A balanced diet will provide ample minerals. *Female athletes must monitor diet to ensure they are getting enough calcium and iron in their diet.*

Supplements:

Currently, the supplement/ergogenic aid industry is a multi-billion dollar industry. More fraud exists in the area of supplements than any other segment of the fitness industry. A new supplement that everyone should try is **discipline**. Supplements are not more effective than a balanced diet. There are no shortcuts.

Position statement on supplements – The Minnetonka Strength & Conditioning staff strongly discourages the use of all supplements due to: the potential for acute or chronic negative side effects, the lack of scientific evidence supporting their use, and the lack of regulation in the supplement industry.

Speed Development

An athlete's goal should be to develop the speed and quickness used to play their sport or sports and attain a level of conditioning to sustain that speed and quickness during a game.

Speed Gadgets

There are no magical potions, gadgets, or exercises that will miraculously increase your speed. Increases in speed are often obtained in spite of the training regimen employed by the athlete.

An example of a speed gadget is the **Strength Shoe**, which claims that it can increase speed, power, strength, and explosiveness. Research on the strength shoe conducted by the Department of Orthopedic Surgery, at Tulane University was published in the American Journal of Sports Medicine. The report states, "No enhancement of flexibility, strength, or performance was observed for participants wearing the strength shoe at the end of an 8 week training program, following the suggested use of the manufacturer. In summary, the Strength Shoe was found to provide no training benefit and was associated with increased anterior tibial pain."

Things you can control that contribute to your ability to run fast:

Eliminate excess body fat.

Strengthen the muscles used to run.

Develop adequate flexibility.

Refine start/stance techniques.

Develop sound running techniques.

Develop a level of fitness to maintain speed and quickness

Practice running fast

Rest and Recovery

Rest and recovery are important, but often overlooked, components in the athletic development profile. People often incorrectly assume that more exercise is always better. The key to maximum gains is the proper amount of exercise and adequate rest and recovery.

IV. Myths and Misconceptions

1. Myth: Females who strength train with a high level of intensity will gain large, bulky muscles.

Reality: Very few females have the genetic potential to significantly increase the size of their muscles. In the case of female bodybuilders, they inherit a greater potential to increase muscular size and many take anabolic steroids. The majority of women can gain considerable strength with little or no gain in muscle mass.

2. Myth: High weights and low reps will improve muscular strength, while low weights and high reps will improve muscular strength.

Reality: As muscular strength increases, so does muscular endurance. High weight and low rep schemes are not advisable because strength gains will occur whether fatigue sets in on the 4th rep or the 12th rep and the risk of injury is greater. Performing an extremely high amount of reps at a low weight is also not advised because the exercise becomes more of a test of aerobic endurance.

3. Myth: To improve explosiveness on the field or court, one must train explosively in the weight room.

Reality: To improve explosiveness on the field or court, strength train all the muscles involved in the activity, develop a high level of conditioning, and practice the specific skills used to play the game. **Its that simple!**

4. Myth: A football player must strength train very differently then a volleyball player.

Reality: All athletes are humans, and therefore the physiological requirements for improving strength are the same for all athletes – progressively overloading all muscle groups. The skills used for each sport are very different, but requirements to improve strength are the same. The only differences might be a greater emphasis on areas of the body more susceptible to injury for that sport – ie. cross country runners performing exercises for the anterior tibialis, baseball players performing exercises for the rotator cuff, etc.

5. Myth: All college/pro strength coaches and celebrity personal trainers are highly qualified professionals.

Reality: Many coaches, even at the highest levels of the field are not highly educated. Often their degrees are in areas outside of fitness. These individuals often are given their position because they were once a very good athlete for that pro team or university. Just because a team has a great record does not mean that coach and strength program is something you or your team should try to copy. Many times these individuals and teams succeed in spite of how they train.

V. Manual Resistance

Manual resistance exercises are incorporated into all of our strength and conditioning workouts. Manual resistance exercises are an extremely effective alternative to traditional free weight or machine exercises.

Responsibilities of the lifter:

Exert an all out effort every repetition

Keep tension on the muscle at all times

Communicate with the spotter (ex. "You are not giving me enough resistance on the way down.")

Responsibilities of the spotter:

Make it difficult enough that lifter reaches muscle failure within a given time frame

Resistance provided should decrease slightly with each rep due to the lifter's fatigue level

Give smooth resistance throughout the full range of motion and during transitions

Give more resistance on the lowering phase

VI. Training the Injured Athlete

Guidelines for Training the Injured Athlete:

The approach to working with an injured athlete should be an aggressive one. Adjustments made to the strength training routine will allow an athlete to continue to improve total body strength and will hasten the recovery process.

Communicate with sports medicine staff.

Exercise uninjured body parts – This allows total body strength levels to be maintained and improved and may lead to a *cross transfer* effect in which the opposite limb benefits from training the healthy limb.

Alter exercise selection - Sometimes a particular exercise may cause discomfort, but another exercise that targets the same muscle group can be performed pain free without compromising the health of the injured area.

Vary repetition speed – By slowing repetition speed, momentum is eliminated and less stress is placed on the joint. The 10/10 protocol is an excellent protocol for rehab.

Increase the target number of repetitions – Raising the target number of reps (ex. from 12-20) forces the athlete to use a lighter resistance, resulting in less force/stress on the injured area.

Limit the range of motion – Occasionally, particular portions of a range of motion may cause pain or discomfort. In these cases, a partial or restricted range of motion may be used.

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