A POST EXERCISE DYNAMIC STRETCHING MANUAL FOR JUDO INSTRUCTORS

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A POST EXERCISE DYNAMIC STRETCHING MANUAL FOR JUDO INSTRUCTORS

A Project

by

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Department of Kinesiology
Abstract

of

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Statement of the Problem

Current Judo Manuals focus on teaching techniques only on Judo throws, grappling and strength condition. Due to increased popularity there is a need for a stretching manual in Judo.

Purpose

The purpose of this project it to provide to enhance judo performance and prevent injuries by describing stretches that occur post-exercise that are specific to judo training as well as to provide a safe and current reference for stretching for Judo.

Conclusions Reached

Stretching for Judo is needed in order to enhance performance, prevent injuries, prevent pain, avoid cost, and to continue with career and livelihood. Best type of stretch is dynamic stretching for Judo. Best time to stretch is during post-exercise.

_________________________________, Committee Chair
Lindy Valdez, Ed.D.

_________________________________
Date

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Chapter 1

INTRODUCTION

Over the last several years, the study of Judo in the United States has steadily gained in popularity (Burris, 2009). In 1964 Judo became an Olympic sport (Shinohara, 2006). Judo originates from Japan. In Japanese Judo means “gentle way” (Borkowski & Manzo, 1999). Jigoro Kano is known as the founder of Judo in 1882 (Ohlenkamp, 2006). Modern Judo is a martial art based on the traditional Jiu-Jitsu fighting and self-defense techniques. This martial art consists of throwing and grappling on the ground utilizing specialized pins, control holds, arm locks, and choking techniques. Judo uses off balance and leverage techniques in order to effectively throw opponents. Judo teaches self-defense techniques which build self-confidence, mental concentration, as well as physical coordination, power, and flexibility.

Due to the physical force used in Judo techniques there are numerous forms of injuries that participants can receive. Judo injuries consist of sprains, bruises, dislocations, ligament and cartilage tears (Judo Advisor, 2009). Judo injuries can occur to the head, neck, shoulder, wrists, back, knees, and ankles (James, 2000; & Sports Medicine, 2009). Traditionally, stretching has been utilized to prevent injuries (Knudson 1998; Mark, 2006; & Beedle and Mann, 2007). Recent research indicates that there is not only a link between when stretching occurs and the type of stretch used but also that the timing of these two components may prevent injury and increase athletic performance (Knudson, 1998; & Mark, 2006). Stretching has been found effective in flexibility for
both sports and physical activities (Kovacs, 2006). A review of the current research shows there is a lack of specific research on stretching for Judo, indicating a need for additional studies in this area. Especially, there is a lack of research done on Judo stretching. Additional research is required to determine the positive effects of stretching for the purposes of injury prevention and performance enhancement.

The activities in Judo consist of throwing, grappling, randori, and falling. Throws consist of hip throws, hand throws, leg throws, and sacrifice throws. Randori, is the term for free-style practice or sparring. Grappling is ground work done on which consists of pins, control holds, arm locks, and choking techniques. Falling is one of the most important techniques practiced in Judo training because it is important to learn how to fall correctly because it may prevent you and your opponent from getting injured.

The most common areas of the body to be injured are the shoulder, back, and knee (Sports Medicine, 2009). Other Judo injuries can affect the participants in the neck, wrist, and ankles (Sports Medicine, 2009; Elsevier, 2009; & Brown, 2010). The types of injuries that occur can be bruises, sprains, ligament tear, cartilage tear, dislocations, fractures, and paralysis (Sports Medicine, 2009; Elsevier, 2009; American Association of Neurological Surgeons, 2010; Brown, 2010; Sports Injury Clinic, 2011). Injuries of the neck consist of sprains, fractures, and paralysis. The cause of sprains, fractures, and paralysis in Judo are incorrect falling, incorrect throwing, direct contact, and sudden twist of the neck (American Association of Neurological Surgeons, 2010). Shoulder injuries include sprains and dislocation of shoulder. The causes of shoulder injuries in Judo include direct high speed contact, falling on the shoulder, and throwing incorrectly
Wrist injuries include sprains, fractures, and dislocation of wrist (Sports Injury Clinic, 2011). The causes of injuries of the wrist are poor falling technique, grappling, and incorrect throwing technique. Back injuries include ligament and muscle sprains, ligament and muscle tears, paralysis (Sports Medicine, 2009). The causes of back injuries include lifting, incorrect falling, and incorrect throwing. Knee injuries include ligament sprains, ligament tear, cartilage tear, and dislocation of the knee (Sports Medicine, 2009). The cause of Judo knee injuries are quick changes of direction, incorrect falls, incorrect throwing, twisting, and hyperextension of knee. Ankle injuries include sprains and fractures (Sports Medicine, 2009). The cause of ankle injuries in Judo include quick change of direction, twisting ankle, direct contact, landing on your ankle by doing the incorrect fall or throwing, foot locks, and ankle locks (Brown, 2010).

Many injuries are preventable with the proper muscle tone which can be enhanced by stretching.

Prevention of injury is important to Judo students because if participants are injured it may be costly, painful, possibilities in having negative impacts to career and livelihood, and recovery may be time consuming and have negative impacts on quality of life. The cost of medical treatment for injuries may not be affordable. Pain prevention is important because it affects quality of life and may include addictive medicine (Cayon, 2011). Treatments like surgery and physical therapy can be a painful process. Injuries have different levels of severity so that means that certain injuries may take longer to heal than others. If Judo participants get injured, this can affect their career because they may not be able to work efficiently or have a complete loss of work. If a participant is injured
it will not only take time away from training in Judo but also participation in other sports. Finally, quality of life will be increased when you are healthy with no injuries.

Following proper stretching guidelines will dramatically decrease Judo injuries, as well as injuries obtained while practicing other sports (Taylor et al., 2009; Mark, 2006; Herman & Smith, 2008; Fletcher & Jones, 2004; Little & Williams, 2006). There are four primary controversies surrounding stretching: timing of the stretch, the type of stretch to perform, whether stretching truly prevents injuries, and whether or not stretching enhances athletic performance. There is some debate over when stretching should occur in athletic performance cycle (Kovacs, 2006). Stretching can be done in two phases of performance cycle, pre-exercise or post exercise. Pre-exercise happens before the main exercise activity. Post-exercise is done after main exercise activity. It is common practice among athletes, coaches, and the recreational athlete to perform a stretching routine before attempting a strength training session (Ercole, Andrea & Paulo, 2007). Recent research shows that stretching should be done during post-exercise to prevent injuries and to enhance performance (Knudson, 1998; Mark, 2006; Crammer et al. 2004; & Safran et al., 1989). Researchers do not recommended pre-exercise activity stretching before an explosive exercise in view of the evidence that it has the potential to exert negative effects on muscular performance (Guissard & Reiles, 2005; Mark, 2006; Samuel et al., 2008; & McMillian et al., 2006). Since Judo is an explosive exercise, research supports that the best time to stretch is upon completion of a workout.

While proper placement of stretching in the performance cycle is an important aspect of athletic performance the type of stretch performed is another important element
in injury prevention. There are four different types of stretches: proprioceptive neuromuscular facilitation (PNF), ballistic, dynamic, and static stretching. PNF is a combination of sustained static stretch and muscular contraction which is used to increase range of motion (Hamilton & Lutgens, 2002). Ballistic stretching involves bobbing, bouncing, rebounding, and rhythmic types of movement (Alter, 1998). Dynamic stretching is a technique that allows the muscle to elongate naturally while in its relaxed state (Nelson & Brady, 2004). Elongation is achieved by having the subject concentrically contract the antagonist muscle which moves the joint through the full available range of motion (Nelson & Brady, 2004). Dynamic stretching is the best type of stretch for athletes to use after training to prevent injuries and to enhance performance (McMillian, Hatler & Taylor, Herman & Smith, 2008) because controlled movement fully stretches the agonist muscle group (Nelson & Brady, 2004). The most common stretch is static stretching, which involves stretching to the furthest point and holding the stretch (Alter, 1998). Static stretching is the most commonly used type of stretch because it is the most widely known type of stretch. Even though static stretch is the most used stretch it is not the most effective for athletic performance and injury prevention (Sayer et al., 2008; Samuel, 2008; & Pearce et al., 2009).

There is also controversy on whether stretching is an effective form of injury prevention. Many scientists have stated that ballistic stretching is the worst type of stretch as it causes injury to the muscles (Beedle & Mann, 2007; Samuel et al., 2008; Herda, 2008; & Jaggers, 2008; & Taylor et al., 2009). Aside from ballistic stretching, studies show that stretching does in fact prevent injuries when done properly (Nelson et
Researchers believe that stretching does enhance athletic performance (Nelson et al., 2004; & Beedle & Mann, 2007, Guissard & Reiles, 2005; Herman & Smith, 2008). Due to the increased popularity of the sport, there is a need for a stretching manual for Judo specifically in the area of post-exercise dynamic stretching. This component of Judo practice is often overlooked and there is a lack of stretching techniques specific to Judo.

Statement of Purpose

The purpose of this manual is to enhance Judo practice and prevent injuries by describing stretches that occur post-exercise that are specific to Judo training. Additionally the other purpose of this manual is to provide a safe and current reference for stretching for Judo. This project was developed to include a comprehensive stretching guide to increase performance and prevent injuries. The manual covered basic dynamic stretching techniques and safety practices involved for Judo instruction.

Significance of the Project

There are numerous publications available covering the topic of stretching. However, these books and manuals lack stretches specific to Judo. This manual when used properly has the potential to improve participants’ performance, as well as reduce their overall risk of injury while practicing Judo.

Definition of Terms

Ballistic stretching- Stretching involves bobbing, bouncing, rebounding, and rhythmic types of movement (Alter, 1998).
Dojo- Means “place of the way,” is referring to Japanese martial arts school (Borkowski & Manzo, 1999).

Dynamic Stretching- A stretch technique that allows the muscle to elongate naturally while in its relaxed state, this elongation is achieved by having the subject concentrically contract the antagonist muscle to slowly move the joint through the full available range of motion, thereby stretching the agonist muscle group (Nelson & Brady, 2004).

Judo-“The gentle way” is a Japanese martial art sport that relies on leverage to off-balance an attacker (Borkowski & Manzo, 1999).

Jiu-Jitsu -Meaning “soft/pliable method” or “lightening method” is the name of a combative system developed in Japan that incorporates striking, throwing, and grappling techniques (Borkowski & Manzo, 1999).

Grappling- Mat work on the ground that consists of pins, chokes, strangulations, arm locks, and various joint locks (Ohlenkamp, 2006).

Martial Arts- Any of the traditional forms of Oriental self-defense or combat styles that utilize physical skill and coordination without weapons, often practiced as a sport, such styles include: Karate, Aikido, Judo, and Kung fu, often practiced as sport (Dictionary.com, 2011).

Proprioceptive Neuromuscular Facilitation (PNF) - A combination of sustained static stretch and muscular contraction used to increase range of motion (Hamilton & Luttgens, 2002).

Static Stretching- Stretches involving extending to farthest point and holding the stretch (Alter, 1998).
Scope of the Project

This manual is designed to assist Judo instructors to teach proper post-exercise dynamic stretching to their students. Step by step instructions as well as photos are provided for Judo instructors. Instructions on how to create a safe learning environment while teaching stretching techniques to the students are also included.

Limitations

1. This project does not distinguish previous knowledge or experiences that Judo instructors may have used.

2. It is not possible to cover every single dynamic stretch in this manual.

Delimitations

1. This project only focuses on post-exercise stretches.

2. This project only focuses on dynamic stretching.

3. This project is intended solely for Judo instructors.

4. This project focuses stretching techniques only specific to Judo.
Judo instructors are responsible for providing a productive and safe learning environment for their students. It is essential for Judo instructors to teach the best practices possible to enhance Judo power performance, and to prevent injuries. Dynamic stretch optimizes power because it is used for specific movements in sports with slow controlled movements (Nelson et al., 2004). Most importantly dynamic stretching is completed after participating in sports or physical activity and is known to prevent injuries (Mark, 2006; McMillian, 2006; & Taylor et al., 2009). Judo is a power sport, therefore it is imperative to utilize dynamic stretch to optimize power and also stretching should be completed during post-exercise routine (Knudson, 1998; Mark, 2006; Crammer et al. 2004; & Safran et al., 1989). This instructional manual used research that was done to evaluate static versus ballistic stretching, pre-exercise stretching versus post-exercise stretching, dynamic stretching, and the effect of stretching on explosive force production to prove there is a need for post-exercise dynamic stretching.

Static Stretching Versus Ballistic Stretching

In pertinent scientific literature, static stretching is preferred over ballistic stretching. Static stretching is found to be more effective than ballistic stretching because it improves performance by increasing flexibility and prevents injuries (Bradley et al., 2007). There is conflicting research as to what type of stretch should be performed for decreasing injury as well as improving performance. Beedle & Mann (2007) conducted a
research study comparing two warm-ups for joint range of motion using ballistic and static stretching. The purpose of this study was to compare a five minute treadmill activity at 70% maximum heart rate and five and six minutes of ballistic stretching to a five minute treadmill activity at 60% of maximum heart rate and five to six minutes of static stretching. There were 30 participants used in this study who were healthy college students. The test group consisted of seven men and 23 women. The objective was to compare between the two groups which produced a more significant improvement between the participants that performed the traditional warm-ups with static stretch as opposed to cardiovascular activity intensity with ballistic stretching. The polar heart monitor (Polar Electro Inc., Waterbury, NY) was used to assure participants were at their proper maximum heart rate of 60% or 70% while doing the cardiovascular warm-up on the treadmill. After the cardiovascular warm-up the subjects participated in their assigned stretch either ballistic or static. The subjects then performed three different stretches which consisted of back flexion stretch, quadriceps stretch, and a hamstring stretch that was approximately six minutes long. The subjects were then tested for their range of motion of the lower back, hamstrings, and ankle joint. The results showed there was no statistical difference between the warm-ups for ballistic and static stretching in the lower back, knee, or ankle. The data showed that the warm-up with static stretching for the ankle was slightly greater, 68.8 degrees + 8.6, than the warm-up with ballistic stretching of 65.9 degrees + 11.6. The information shows that there was no significant difference between static versus ballistic stretching.
Samuel, Holcomb, Guadagnoli, Rubley and Wallmann (2008) discussed research on acute effects of static and ballistic stretching on measures of strength and power. The purpose of this research was to determine not only the effects of duration of acute static and ballistic stretching, but also the effects of these types of stretching on the vertical jump, lower-extremity power, quadriceps, and hamstring torque. The participants involved in this study were 24 healthy university students that consisted of 12 men and 12 women. The test subjects participated in three different conditions: static stretching, ballistic stretching, and no stretching on separate days. Subjects participated in a five minute warm-up on a treadmill before participating in one of the three conditions. Then the subjects participated in the countermovement jump using the Kistler force plate (Kistler Instument Corp., Amherst, NY) that determined the vertical jump and the lower-extremity power. Vertical jump was measured by the Vertec Vertical Jump System (Sports Imports, Columbus, Ohio). The results showed that static and ballistic stretching did not affect vertical jump, or torque output for the quadriceps and hamstrings. Static and ballistic stretching did cause a decrease in lower-extremity power. In summary Samuel et al. (2008) found that static and ballistic stretching did not have significant effects on the vertical jump and it caused a decrease in power.

Behm. D. G., Bambury. A., Cahill. F., & Power. K. (2004) conducted an experiment on the effect of an acute bout of lower limb static stretching on balance, proprioception, reaction, and movement time. It was concluded that within an acute bout of static stretching there would be a decrease in force and activation, as well as changes in muscular-tendonitis stiffness. There were 16 subjects involved in this experiment who
were healthy male college students. The subjects were tested before and after the acute bout of static stretching on their quadriceps, hamstrings and plantar flexors. The subjects participated in a five minute cycle warm-up followed by three stretches to the point of discomfort for 45 seconds each with a 15 second rest period for each muscle group. The measurements in the Behm et al., (2004) experiment included maximal voluntary isometric contraction force of the leg extensors, static balance utilizing a computerized wobble board, reaction and movement time of the dominant lower limb, and the ability to match 30 and 50% maximal voluntary isometric contraction forces with and without visual feedback. The results showed there were no substantial differences in the decrease in maximal voluntary isometric contraction between the stretch and control conditions or in the ability to match submaximal forces. There was a decrease of 9.2% in the balance score compared to the control condition which showed an increase of 17.3%. Additionally, there was a decrease in reaction time of 5.8% and movement time of 5.7%; however, the control condition differed considerably from the stretch induced increase of 4.0% and 1.9%. Under the control conditions Behm et al., (2004) showed reaction plus movement time and balance were weakened by acute bout stretching.

Sayers, Farley, Fuller, Juenville and Caputo (2008) conducted a study on the effect of static stretching on phases of sprint performance in elite soccer players. The purpose of this study was to determine which phase of a 30 meter sprint was affected by pre-performance static stretching. The subjects who participated were 20 female elite soccer players. The participants were randomly assigned to either no stretch or stretch conditions on two nonconsecutive days. For the first day, the subjects that were assigned
to the non-stretch condition participated in a warm-up protocol and then performed three 30 meter sprints, having a two minute rest in between each sprint. The subjects that were assigned to the stretch condition participated in a standard warm-up protocol and stretch routine that stretched out the hamstrings, quadriceps, and calf muscles. Immediately after the stretch routine the subjects participated in the three 30 meter sprints, having only two minutes of rest in between each sprint. On the second day, the subjects reversed their conditions and participated in the experiment repeating the procedures that were used the first day. The results indicated that static stretching before sprinting resulted in slower times in all three performance variables. Sayers et. al., (2008) discovered static stretching before the 30 meter sprint resulted in an increase in the time spent in the acceleration phase of the sprint compared with the no stretching condition (F(1, 19) = 6.65 p < 0.0167). Therefore, it was concluded that static stretching produced a negative effect on sprint performance and should not be included as part of any preparation routine for physical activity that requires sprinting.

Guissard and Reiles (2005) research was based the effects of static stretching and contract relax methods on force production and jump performance. The purpose of this study was to examine how stretching can impact performance when performed during the pre-exercise phase of the athletic cycle. There were fourteen subjects, ages 20 to 25, that participated in this study. Each of the subjects had a ten to 15 minute specific warm-up, followed by a six minute low intensity stretching exercise. All the subjects participated in static stretching and contract relax at different points in time during the experiment. After the low intensity stretching exercise, the subjects participated in a dynamic exercise
for three minutes. Two series of tests were conducted, the squat jump and the counter movement jump. Guissard & Reiles (2005) tested maximal force using the isokinetic ergometer (Ariel, CES 6000). The isokinetic ergometer measured the effects of stretching on the maximal force of the leg extensor muscles while the subjects participated in a squat. The digital timer (ergojump) assessed the height during standardized vertical jumps. The results showed that there was no significant improvement in maximal velocity and power after the stretching exercise for either method applied. The results concluded that the force produced by the calf muscles at all velocities (20, 70 cm/s), were unchanged (Guissard & Relies, 2005). Guissard & Relies (2005) believe that if stretching is preceded by a warm-up and followed by dynamic exercises, it does not harm the performance and that neither the squat jump nor the counter movement jump are affected by stretching. Guissard & Relies (2005) concluded that stretching, when performed with moderate intensity and duration will not have a negative impact on the explosive force production.

**Dynamic Stretching**

Recent studies showed that dynamic stretching was the superior stretch for high intensity performance, especially when compared to static stretching. McMillian, Hatler and Taylor (2006) studied dynamic versus static stretching focusing on the effect on power and agility performance. The purpose of their study was to compare the effect of dynamic warm-up, static stretching, and no warm-up on selected measures of power and agility. McMillian et al., (2006) hypothesized that dynamic warm-up would most enhance performance compared to static stretching and no warm-up. The subjects that
participated in this study were 30 cadets from the United States Military Academy. Of these cadets, 14 were women and 16 were men, ranging in age from 18 to 24 years old. The subjects participated in one of three routines: either dynamic warm-ups, static stretching warm-ups, or no warm-up for three consecutive days. Each of the routines lasted ten minutes long. The subjects then rested and recovered for one to two minutes before performing three different tests for power and agility. The three tests performed consisted of the T-shuttle run, underhand medicine ball throw for distance, and five-step jump. The results showed that dynamic warm-up had better performance scores for all three test performances compared to static warm-up stretching and no warm-up. In the case of static warm-up and no warm-up, there were no significant differences for the T-drill and medicine ball throw. Subjects did score higher for static stretching than no warm-up for the five step jump. This study demonstrated that dynamic warm-up is better to improve performance compared to static stretching and no warm-up routines.

Herman and Smith (2008) did similar research as McMillian et al., (2006), which focused on dynamic versus static stretching during warm-up and the effect it had on power and agility performance. Within many athletic settings, it is feasible to replace the typical static stretching warm-up with a more active, dynamic, and sport specific stretching warm-up aimed at optimizing performance (Herman & Smith, 2008). Herman and Smith (2008) focused their research on a four-week dynamic stretching warm-up intervention that obtained sustained performance. The purpose of this study was to determine whether a dynamic stretching warm-up intervention performed daily over four weeks positively influenced power, speed, agility, endurance, flexibility, and strength.
performance measures in collegiate wrestlers when compared to a static stretching warm-up intervention. The subjects in this study were 24 male National Collegiate Athletic Association Division I wrestlers. Performance measures were performed before and after the four week experimental period. These measures included the peak torque of the quadriceps and hamstrings, medicine ball underhand throw, 300 yard shuttle, pull-ups, push-ups, sit-ups, broad jump, 600 meter run, sit-and-reach test, and trunk extension test. The result was the wrestlers who participated in the four week dynamic stretching warm-up intervention improved on many of the performances that included push-ups at 3%, broad jump at 4%, underhand medicine ball throw at 4%, sit-ups at 11%, and quadriceps peak torque at 11%, but the 300 yard completion time shuttle run decreased at 2% and completion of time for the 600 meter run decreased at 2.4%. The subjects who participated in the static stretching warm-up intervention did not have any improvements on performance and showed decreased performances on the 600 meter run and push-up test performance measures. The report showed that incorporating the four week dynamic warm-up stretching intervention into the daily pre-season training regimen of wrestlers produced longer-term and sustained power, strength, muscular endurance, anaerobic capacity, and agility performance enhancements (Herman and Smith, 2008).

Jaggers, Swank, Frost, and Lee (2008) researched the acute effects of dynamic and ballistic stretching on vertical jump height, force, and power. The purpose of this study was to compare the differences between two sets of ballistic stretching and two sets of dynamic stretching routines on vertical jump performance. Participants involved in this study included ten males and ten female college students between the ages of 22 and 34.
The subjects had to complete three individual testing sessions on three nonconsecutive days. The three treatments consisted of no stretch, ballistic stretch, and dynamic stretch. On the second and third days the subjects participated in the stretching protocols. The stretching focused on the major muscles. For all three days of testing the subjects were told to walk for five minutes on the treadmill prior to the vertical jump test. Each of the subjects participated in three trial jumps which consisted of a single counter movement jump on the Kistler Quattro force plate (Amherst, New York). A Kistler Quattro Jump force plate (Amherst, New York) was used to measure the jump for height, force, and power. For the second and third days of testing, the subjects participated in a series of five stretches of ballistic or dynamic stretching that was supervised by technicians. After stretching, the subjects were then tested on countermovement jump on the force plate. The technicians averaged the subjects’ scores from the second and third trials for height, force, and power. The results showed that there were significant differences found on the jump power when no stretch was compared with dynamic stretch. There was no significant difference for ballistic and dynamic stretching found for jump height or force. In conclusion, the dynamic stretching elicited gains in the jump power post stretch (Jaggers et al., 2008).

Fletcher’s (2010) research concentrated on the effect of different dynamic stretch velocities on jump performance. There were 24 healthy men who participated in this research study. The subjects participated in the following conditions: no stretch, static stretching, slow dynamic stretching, or fast dynamic stretching, each after a ten minute jog warm-up. The subjects were then tested on three performances of the counter
movement jumps, drop jumps, and squat jumps that were repeated five times with three minute rest between maximal efforts. During each jump the heart rate, tympanic temperature, electromyography, and kinematic data were collected. The results showed that fast dynamic stretching was by far the best stretch because it showed significantly greater jump height improvements in all tests compared to slow dynamic stretch and no stretch conditions. Fletcher (2010) discovered that fast dynamic stretching prepares athletes for optimum power performance.

Fletcher and Jones (2004) focused on the effects of different warm-up stretch protocols on 20 meter sprint performances in trained rugby union players. The purpose of this study was to examine the effect of different static and dynamic stretch protocols on 20 meter sprint performance. There were 97 male rugby union players who participated in this study. The subjects participated in one of four conditions that were randomly assigned, which included passive static stretch, active dynamic stretch, and active static stretch. The subjects participated in a ten minute jog warm-up prior to performing two 20 meter sprints. Next, two 20 meter sprints were repeated after the subjects’ assigned stretch condition. The results indicated passive static stretch and active static stretch groups showed significant increase in sprint time, as opposed to active dynamic stretching group which had substantial decreases in sprint time. Flecher and Jones (2004) concluded that static stretching as part of warm-up will decrease short sprint performance, opposed to dynamic stretching which increased sprint performance.

Little and Williams (2006) concentrated this research on the effects of differential stretching protocols during warm-ups on high-speed motor capacities in professional
soccer players within a pre-exercise warm-up. The participants involved in this study were eighteen professional soccer players. The subjects first participated in one of the three conditions that included static stretch, dynamic stretching, or no stretch. Secondly, the subjects were tested on countermovement vertical jump, stationary 10 meter sprint, flying 20 meter sprint, and agility performance. The results showed there were no significance differences for the vertical jump between the three conditions. For the sprints, dynamic stretching was significantly faster than static stretching and the no stretching condition. Also, dynamic stretching produced significantly faster results on agility performances. Little and Williams (2006) observed that dynamic stretching is the best kind of stretch to improve sprint and agility performances.

Herda, Crammar, Ryan, McHugh, and Stout (2008) examined the acute effects of dynamic stretching versus static stretching on peak torque and electromyographic, mechanomyographic amplitude of the biceps femoris muscle during isometric maximal voluntary contractions of the knee flexors at four different joint angles. The participants involved in this study were 14 men in the age range of 21 to 29 years old. The subjects performed two isometric leg flexion maximal voluntary contractions at knee join angles of 41°, 61°, 81°, and 101°. The subjects’ right hamstrings were stretched with either static or dynamic stretching exercises. The results show peak torque decreased after static stretching at 81° and 110°. Peak torque was not affected after dynamic stretching. Following static stretching, the electromyographic amplitude remained unchanged, but dynamic stretching increased. For static stretching, mechanomyographic amplitude increased at 101°, whereas dynamic stretching increased mechanomyographic amplitude
at all joint angles. This data shows that an acute bout of dynamic stretching is better suited than static stretching for the hamstrings.

Moran, McGrath, Marshall, and Wallace (2009) focused this study on examining the effect of dynamic stretching, static stretching, and no stretching, as part of general warm-up, for golf swing performance. The subjects in this study were eighteen males who were in their early twenties that are right hand dominate with a handicap of six or less. The subjects were assigned to one of the three conditions. The three conditions were: dynamic stretching, static stretching; and no stretching for their warm-up. The subjects’ performance was measured at zero minutes, five minutes, 15 minutes and 30 minutes after stretching. The results showed that dynamic stretching created significantly greater club head speed and ball speed than static stretching and no stretching. This demonstrated that there was more power developed when subjects participated in dynamic stretching. Furthermore, Morgan et al., (2009) recommended dynamic stretching to be used as a warm-up for golfers to increase performance.

Faigenbaum, McFarland, Schwerdtman, Ratamess, Kang, and Hoffman (2006) observed the acute effects of four warm-up protocols with and without a weighted vest on anaerobic performance in female high school athletes. The participants in this study were 18 high school females, all healthy interscholastic athletes. The subjects participated in a five minute jog warm-up and then were randomly assigned to the four protocols which were broken down into five static stretches and nine moderate-intensity to high intensity dynamic exercise. The same nine dynamic exercises performed with a vest weighted with 2% of body mass were repeated with a vest weighted with 6% of their body mass.
The subjects then performed the vertical jump, long jump, seated medicine ball toss, and 10 yard sprint tests. The results showed moderate-intensity to high intensity dynamic exercise, and dynamic exercises performed with a vest weighted with 2% of their body mass was significantly greater compared to that of static stretching the variables of vertical long jump and long jump with static stretching. The long jump was significantly greater for the dynamic exercises performed with a vest weighted with 2% of their body mass than that of the static stretching. The significance was minimal for the seated medicine ball toss or 10 yard sprint. Faigenbaum et al., (2006) reported that a dynamic warm-up performed with a vest with 2 % of the athletes’ body mass was subsequently the most effective warm-up protocol for enhancing jumping performance for high school female athletes. A summary of the research shows dynamic stretching improves power production, and strength.

The research of Taylor, Sheppard, Lee, & Plummer (2009) examines the negative effect of static stretching when combined with a sport specific warm-up component. The purpose of this study was to examine warm-up practices in net ball and to distinguish differences in speed and leg extensor power after static stretching and dynamic warm-up routines. Additionally, the purpose was to determine if differences in performance remained after a period of moderate to high intensity skill rehearsal. It was hypothesized that there would be a negative effect of stretching that would remain after a sport specific warm-up sequence. The subjects that participated in this study were thirteen players from the Australian Institute of Sport Net program. The experimental design consisted of two test sessions. For each of the sessions the subjects completed a submaximal run followed
by either a static stretching or a dynamic warm-up routine and after two to three minutes rest they completed the first set of performance tests. The first set of performance tests consisted of 20 meters spring and a vertical jump test. Next, the subjects participated in a netball specific skill warm-up and were once again tested for sprint time and vertical jump height. The results showed that static stretching condition resulted in a worse performance than the dynamic warm-up with a vertical jump height score of -4.2% and 20 meter sprint time of 1.4%. The results show that dynamic warm-up routine is better than static stretching when preparing for powerful performance. Nevertheless, no significant differences in either performance variables were evident when the skill-based warm-up restored the differences between the two warm-up interventions. Taylor et al., (2009) recommends that dynamic stretching should be prescribed for high intensity sports related skills that is based on activity during pre-exercise warm-up.

Pre-exercise Stretching Versus Post Exercise Stretching

It is essential for athletes to know when in the athletic cycle is the best time for stretching, what type of stretching is recommended for their particular activity, and what is the preferred frequency and intensity of that type of stretch. Knudson (1998) discusses how professionals can apply this information in prescribing for flexibility exercises that use frequency, intensity, and time. The optimal frequency for stretching is at least three times per week, preferably daily or after all workouts. Stretching is best done during the end of a workout, because cooler muscle tension units are more likely to be damaged at the beginning of a workout (Safran, Seaber, & Garrett, 1989). Therefore, stretching the warm muscles at the end of a workout assists in injury prevention. Knudson (1998) states
“stretching should not be accomplished before or in the beginning of a workout, because muscles are not warmed up and will cause injury.” Stretching should be scheduled during the cool-down phase of a workout (Knudosn, 1998). Most professionals in the sports and fitness world are not aware how pre-exercise stretching can cause injury. It is recommended to hold stretches for 15 or 30 seconds long (Knudson, 1995, Magnusson, Simonsen, Aagaard, Dyhre-Poulsen, et al., 1996). Regarding intensity, the appropriate intensity is to slowly stretch and hold the elongated muscle-tendon units at low force levels. Research indicated that the preferred mode of stretch involved static and PNF stretching techniques (Knudson, 1998).

Most athletes assume stretching before physical activities such as sports or working out will decrease injuries. It is often that professional athletes warm-up by stretching before practices and games. Sheha., Mirabelli, Gorenflo, & Fetters (2006) conducted a study that assessed the knowledge, attitudes, and practices of high school coaches regarding pre-exercise stretching. The hypothesis was that coaches continued to believe that pre-exercise stretching will be beneficial and decrease injury regardless of current research. A cross-sectional survey was used for this study. Ten athletic directors agreed to have their coaches participate in the surveys. A total of 71 head coaches participated by completing the cross-sectional survey which consisted of 15 questions. The questions covered their practice of pre-exercise stretching. These multiple choice questions were designed to assess their knowledge of pre-exercise stretching and included five, four, and three-point Likert scale items regarding attitudes and beliefs about pre-exercise and the need for formal recommendations regarding pre-exercise stretching, and demographic
information. The results for attitudes towards pre-exercise stretching, showed approximately 95% of coaches believed that pre-exercise stretching is beneficial, nearly 93% believed pre-exercise stretching will prevent injuries, and 86% coaches believed it enhances mental preparedness. Only 16% of coaches believed that pre-exercise stretching has drawbacks. The results for benefits of pre-exercise stretching showed that roughly 80% of coaches feel pre-exercise is important for athletic conditioning and the establishment of a rhythm for participation. Results also showed that 75% of coaches believe pre-exercise stretching was an important aspect of mental preparation before competition. The majority of coaches in this study routinely had their athletes stretch before practice and competition (Sheha et al., 2006). Coaches are set in their ways because of what they have learned; that pre-exercise stretching does increase injury prevention; and is beneficial to the performance of athletes (Sheha et al., 2006).

Most studies show that pre-exercise stretching is not beneficial. For example Johasson, Lindrom, Sundelin and Lindstrom’s (1999) research study shows that pre-exercise stretching is not preferred. This study examined the effects of pre-exercise stretching on muscular soreness, tenderness, and force loss following heavy eccentric exercise. The emphasis of this study was on delayed onset muscle soreness. Delayed onset muscle soreness has to do with muscular tenderness, weakness, and stiffness of the muscles. There were ten healthy physiotherapy female students who participated in this experiment. Before the warm-up a subject was randomly selected. The subject’s leg was stretched by using a sitting hurdle running position where they completed 4 x 20 static stretches of the hamstring. The subjects performed ten sets of ten maximal isokinetic
eccentric contractions for knee flexion with both legs after a five minutes ergometer cycling warm-up. The subjects then participated in the exercise bout that consisted of ten sets of ten maximal eccentric contraction knee flexors at an angle velocity of 30 degrees in a range of motion 60 degrees. Subjects were asked to sit in a Kin-Com isokinetic dynamometer (Kinetic Communicator, Chattecx Corp., Chattanooga, TN). The subjects were strapped on one of the knees joints. The subjects were asked to rate their soreness in the leg that is strapped. Additional tenderness was acquired by applying pressure with a digital algometer (Somedeic Production AB, Sollentuna, Sweden) on five points of the hamstring muscles on each leg. After the subjects completed the exercise with their stretched hamstring they used their non-stretched leg to complete the exercise. The results showed that muscle soreness peaked 48 hours post-exercise which is a severe delay. There were no major differences between stretched legs, which had a mean rate of 69 (16) mm and non-stretched legs which had a mean rate of 71 (17) mm. Results for tenderness and maximal contractile force did not have a significant difference between the stretched and non-stretched legs. Johansson et al., (1999) suggests that pre-exercise static stretching has no preventive effect on the muscular soreness, tenderness and force loss that follows heavy eccentric exercise.

Anderson (2005) conducted a meta-analysis study by collecting data from MEDLINE, EMBASE, CINAHL, SPORT DISCUS and PEDRO on stretching before and after exercise that mainly dealt with the effect on muscle soreness and injury risk. The information was collected via electronic and manual searches. This collaborative study included randomized investigations that focused on the effects of any stretching
technique before or after exercise, delayed onset muscle soreness, risk of injury, and athletic performance. Studies were incorporated only if stretching occurred immediately before or after exercise. The main outcome results were measurements of muscle soreness and parameters of injury risk. The numeric scores were converted to percentages of the maximum possible score to determine the results of the soreness of the muscle. The data in this study was reported in millimeters on a 100 millimeter visual analogue scale. A total of five stretching and muscle soreness studies that met the criteria of inclusion and exclusion to the meta-analysis study. Static stretching was employed in all the studies that met the criteria. The results showed that by stretching, an individual will observe on average a reduction in soreness of less than two millimeters on a 100 millimeter scale during the 72 hours after exercise. In one of the studies where Army Recruits under-going military training were analyzed, the study showed a reduced risk of injury by only five percent which indicates that stretching protocols used in these studies did not meaningfully reduce lower extremity injuries. Anderson (2005) states that research does not support the role of pre-exercise or post-exercise as an intervention addressing post-exercise muscle soreness. There are many other studies that prove Anderson’s (2005) study wrong (Sheha et al., 2006; Taylor et al., 2009; Johansson et al, 1999; Mark et al., 2006; Samuel at el., 2008; Jaggers at el., 2008; Bradley et al., 2007; & Crammer et al., 2004).

Mark’s (2006) article focuses on current literature which provides information for a valid argument against the belief that slow static stretching before physical activity is beneficial. It is a popular assumption that pre-exercise static stretching before
participating in physical activity or sports improves performance and prevents injuries. There is no substantial research on pre-exercise static stretching that shows increases in performance, as well as, prevention of injuries. Static stretching before activity decreases performance in strength, speed, and power activities such as Judo and other martial arts (McMillian, 2006; Sayers et al., 2008; & Taylor et al., 2009). Static stretching before physical activity does not appear to reduce injury. For example, depth-jump performance is a good indicator of power output, and has significantly decreased after static stretching (Young, and Elliot, 2001, & Cornwell et al., 2002). There is an increase of recent studies on how stretching negatively effects power performance. Many research studies focus on how static stretching can reduce strength and power performance by as much as 30% (Kokkonen et al., 1998, Nelson et al., 2001, Avela et al., 1999, Fletcher et al., 2004, and Fowles, 2000). While there is evidence that shows static stretching decreases performance when preformed before physical activity, people still continue to do it. There is a widespread misconception that pre-exercise stretching improves performance and prevents injury. It is best to perform stretching after physical activities. Finally, it is beneficial to stretch after sports activities or physical activity since it provides enhancements in range of motion and decreases injury. Dynamic stretching is the most beneficial in improving physical performance (Shellock et al., 1985, Bergh et al., 1979, Blomstrand et al., 1984). Dynamic stretching should be practiced after sports activities or physical activity in order to optimize performance and prevent injuries.
The Effect of Stretching on Explosive Force Production

Yamaguchi, Ishii, Yamanaka, and Yasuda (2006) explored the acute effects of static stretching on power output during concentric constant external resistance leg extension. The purpose of this research was to clarify the effect of static stretching on muscular performance during concentric isotonic muscle actions. The subjects who participated in this study were twelve healthy men in their early twenties. The subjects participated in pre-treatments that included the static stretching treatment on right leg and non-stretching treatment. Also, the subjects participated in six additional types of static stretching on leg extensors. They engaged in a total of 20 minutes of static stretching which consisted of four sets of 30 seconds each with 20 seconds of rest in between each stretch. For the non-stretching treatment the subjects rested for 20 minutes in sitting position. For each of the subjects the load for the power output was set at five, 30, and 60% of maximum voluntary contractile torque with isometric leg extension. The results showed that the peak power output following the static stretching treatment was drastically lower than the non-stretching treatment under each load. The data shows that extensive static stretching significantly reduces power output with concentric constant muscle actions under various loads. This study concluded that extensive static stretching decreases power performance.

Bradley, Olsen, and Portas (2007) investigated the effects of static, ballistic, and proprioceptive neuromuscular facilitation (PNF) stretching on vertical jump performance. The purpose of this investigation is to compare the acute effects of different modes of stretching on vertical jump performance. Participants involved in this study consisted of 18 male university students. The subjects participated in four different conditions in a
randomized order on different days. Each of the subjects participated in a five minute warm-up before performing in one of four conditions. The four conditions consisted of: control, ten minute static stretching, ten minutes ballistic stretching, and ten minutes of proprioceptive neuromuscular facilitation stretching. The subjects participated in three trails of static and countermovement jumps before stretching and post stretching at five, 15, 30, 45, and 60 minutes. The results showed that vertical jump performance is diminished for 15 minutes if performed after static or PNF stretching. Ballistic stretching had a smaller decrease on jumping performance. From this it may be deduced that static and PNF stretching should not be performed prior to an explosive athletic movement.

Manoel, Harris-Love, Danoff, and Miller (2008) examined acute effects of static, dynamic, and proprioceptive neuromuscular facilitation (PNF) stretching on muscle power in women. The participants involved in this study were 12 healthy women averaging 24 years old of age. In this experiment the subjects participated in one of the four conditions: static stretching, dynamic stretching, PNF, or no stretching. The subjects concentric isokinetic power of knee extension of the dominate leg was measured before and after the stretching exercises used by calibrated Biodex System three isokinetic dynamometer (Biodex Medical Systems, Inc., Shirly, NY). The results show dynamic stretching produced percentage increases (8.9% at 60° · s⁻¹ and 6.3% at 180° · s⁻¹) in peak knee extension power at both testing velocities that were greater than changes in power after static and PNF stretching. Dynamic stretching increases acute muscular power to a greater degree than static and PNF stretching. Manoel et al., (2008)
recommends that athletes who participate in events relying on a high level of muscular power should focus on dynamic stretching to enhance performance.

Pearce, Kidgell, Zois and Carlson (2009) conducted a study on muscular power following stretching, after a second bout of activity. Subjects were healthy participants which consisted of eleven males and two females, ages 18 to 28 years old. The subjects completed three randomized testing sessions. First, the subjects participated in a five minute warm and two maximal height double-foot vertical jumps, then the subjects participated in one of the three interventions of static stretching, dynamic stretching or control which was no stretching. As soon as the subjects completed their assigned intervention they were tested again on vertical jump. The results show a comparison between dynamic and static stretching condition with a difference of 10.7% in vertical jump. The post-second intervention for all three groups showed significant mean increases in vertical jump. The stretching condition that showed the most significant improvement was dynamic stretching condition. Pearce et al., (2009) concluded their study by having the athletes complete a secondary bout of activity which included the double–foot vertical jump, which also showed improved performance following dynamic stretching.

Marek, Cramer, Fincher, Massey, Dangelmaier, Purkayastha, Fitz, and Culbertson (2005) directed their study on the short-term effects of static and proprioceptive neuromuscular facilitation (PNF) stretching on peak torque, mean power output, active range of motion, passive range of motion, electromyographic amplitude, and mechanomyographic amplitude of the vastus lateralis and rectus femoris muscles during
voluntary maximal concentric isokinetic leg extensions at 60° and 300° · S⁻¹. The subjects who participated in this study were 19 women and nine men in their early twenties. The active range of motion and passive range of motion were measured at the knee joint before and after the subjects’ exercises. The subjects participated in either four static or PNF stretching exercises to the leg extensor muscles of the dominant limb in two separate days. The results show that static and PNF stretching reduced peak torque (P = .051), mean power (.041), and electromyographic amplitude (P = .013) from pre-stretching to post-stretching at 60° and 300° · S⁻¹ (P < .05). The active range of motion and passive range of motion increased due to the static and PNF stretching. The data showed that mechanomyographic amplitude increased in the rectus femoris muscle in response to the static stretching at 60° · S⁻¹ (P = .031). Marek et al., (2005) examined both static and PNF power output, as well as, muscle activation at slow and fast velocities; which caused similar defects in strength and power output.

Crammer, Housh, Johnson, Miller, Corburn and Beck (2004) research the acute effects of static stretching on peak torque in women. The purpose of this research was to examine the effects of static stretching on concentric, isokinetic leg extension peak torque at 60° and 240°· S⁻¹ in the stretched and un-stretched limbs. The participants involved in this study were 14 recreationally active women. Each of the subjects participated in a five minute warm-up using the stationary bicycle. The procedure used to measure the peak torque for the stretched and un-stretched leg extensors was the calibrated Cybex 6000 dynamometer (CYBEX Division of LUMEX, Inc., Ronkonkoma, New York). The leg extensors were stretched using one active stretching and three passive stretching
exercises after the pre-stretching peak torque assessment. The results showed that peak torque decreased following the static stretching in both limbs and at both velocities of 60° and 240°. S\(^{-1}\). Furthermore, the results indicated that static stretching decreased maximal force production. As a result of these findings, Crammer et al., (2004) do not endorse practicing static stretching in pre-performance activities for strength and conditioning professionals.

Summary

In general, research seems to support incorporating new stretching techniques that have more benefits to the athlete above and beyond those which are used presently. Research does not support ballistic stretching as being beneficial and that ballistic stretching is indeed destructive to the body since it causes injury and does not improve performance (Beedle & Mann, 2007; Samuel and Holcomb, 2008; & Jaggers, 2008). In additional study, Knudson (1998) documents his beliefs that PNF stretching is the superior stretch. Although, Knudson’s (1998) study shows that PNF stretching is the best type of stretch, other researcher studies show that this may not be the best stretching routine (Bradley et al., 2007; & Manoel, 2008). Limited research supports that static stretching is the preferred type of stretch (Knudson, 1998; Beedle & Mann, 2007), but most research says that static stretching has a negative effect on performance and causes injury (Taylor et al., 2009; Sayers et al., 2008; Samuel and Holcomb, 2008; McMillion et al., 2006; Fletcher and Jones, 2004; Little and Williams, 2006; Herda, 2008; Yamaguchi, 2006; Bradley et al., 2007; Manoel, 2008; & Pearce, 2009). Static stretching decreases strength and power production for performance (Crammer et al., 2004; Marek et al.,
Most research supports the idea that dynamic stretching is the best for improving strength and power production (Guissard & Relies, 2005; Manoel et al., 2008; Pearce et al., 2009). Dynamic stretching is preferred over the other types of stretches (Taylor et al., 2009; Mark, 2006; McMillian et al., 2006; Herman and Smith, 2008; Jaggers, 2008; Fletcher and Jones, 2004; Little and Williams, 2006; Herda, 2008; Morgan et al., 2009; Faigenbaum et al., 2006; Guissard and Reiles, 2005; Manoel, 2008; & Pearce, 2009). The reason why dynamic stretching is the preferred stretch is because it is specific to a sport or activity and it increases performance, strength, and power production, as well as, the prevention of injuries (Taylor et al., 2009; Mark, 2006; McMillian, 2006; Herman and Smith, 2008; Jaggers, 2008; Fletcher and Jones, 2004; Little and Williams, 2006; Herda, 2008; Morgan et al., 2009; Faigenbaum et al., 2006; Guissard and Reiles, 2005; Manoel, 2008; & Pearce, 2009).

It is most common for people to believe that pre-exercise stretching is the best for performance and preventing injuries. There is only one research article that states stretching is not useful during pre-exercise and post-exercise (Anderson, 2005). Most research does not support Anderson’s (2005) research article (Sheha et al., 2006; & Taylor et al., 2009; Knudson, 1998; Mark, 2006; & Crammer et al. 2004). Although, many believe that stretching before a physical activity is beneficial (Sheha et al., 2006; & Taylor et al., 2009), in actuality it can be detrimental by causing agitation to one’s body and potentially result in muscle damage (Sayers et al., & 2008; Johasson, 1999).

Nevertheless, there is strong evidence that post-stretching routines are superior (Knudson,
In conclusion most research supports the best time to stretch in the athletic cycle is post-exercise, and that dynamic stretching is the preferred form of stretch. Dynamic stretching is the best type of exercise for Judo and other explosive sports, since it is exceptional for power production and the prevention of injuries. The rising interest in Judo has highlighted the lack of research done on areas of stretching specific to Judo. This component of Judo practice is often overlooked and there is lack of knowledge on stretching techniques specific to Judo. Due to the physical force used in Judo techniques there are numerous forms of injuries that participants can receive. Judo injuries range in severity from sprains, bruises, to dislocations, ligament and cartilage tears, (Judo Advisor, 2009). Judo injuries can occur multiple places on the body such as the head, neck, shoulder, wrists, back, knees, and ankles (James, 2000; & Sports Medicine, 2009). Prevention of injury is important to Judo participants because if participants are injured it may be costly, painful, and possibility have a negative impact to their career and lively hood, recovery may also be time consuming and have negative impacts on the quality of life.
Chapter 3

METHODOLOGY

In order to create a safer learning environment for Judo participants, instructors should incorporate a routine of post dynamic stretching techniques. This project is solely intended for Judo instructors to be used as a resource to teach effective post-exercise dynamic stretching to their students. It is vital instructors integrate safe yet effective stretching practice during post-exercise, whenever practicing Judo to avert injuries. The manual included dynamic stretching techniques. This manual also provided sequenced illustrations and simplified descriptions for each dynamic stretching technique.

This post-exercise manual focused on educating Judo instructors on proper stretching techniques and how it will generate optimal performance for their Judo students. The stretching material was taken from various Judo instructors, as well as, stretching books. There are illustrations and clarifications on how to accomplish the post-exercise dynamic stretches.

The following is an outline of major sections of the manual which includes an introduction to dynamic stretching, upper body stretches, middle body stretches, and lower body stretches. For each main area, there are sub sections on what specific body part is going to be stretched and the name of the stretch. This manual was designed as a resource to aid and improve the Judo students’ performance in addition to prevention of unnecessary injuries.
I. Introduction

II. Upper Body Stretches

a. Cervical Region: (Sternocleidomastoid):
   - Side to Side
   - Down and Up
   - Circle Rotation
   - Head Rolls

b. Shoulder Region: (Deltoid)

   Brachial Region: (Biceps brachii and Triceps brachii)
   - Small Forward Circles
   - Big Forward Circles
   - Small Backward Circles
   - Big Backward Circles
   - Shoulder Shrugs
   - Shoulders Forward and Back
   - Dynamic Kneeling Shoulder Push
   - Dynamic Shoulder Push
   - Wind Mill
   - Arm Cross Over
   - Dynamic Behind and Open
   - Dynamic Flyaway
- Dynamic Rotated Flyaway

c. Carpal Region: (Wrist flexor)
   - Wrist Forward and Back
   - Circular Rotation of Wrist
   - Wrist Pull Down
   - Wrist Flexors Forward
   - Wrist Flexors Backward
   - Wrist Flexors to the Side

III. Middle Body Stretches

a. Pectoral Region: (Pectoralis Major)
   - Open Chest
   - Dynamic Chest Expansion

b. Posterior Thoracic Region: (Latissimus dorsi)
   - Cradle Roll
   - Straight Leg Roll Over
   - Dynamic Cat
   - Standing Torso Twist 1
   - Standing Torso Twist 2
   - Standing Straddle
   - Dynamic Side Reach
c. Abdominal Region: (Rectus Abdominis)
   - Cobra Stretch
   - Abdominal Stretch
   - Straddle Elbow Touches
   - Back Bend

d. Coxal Region: (Iliopsoas)
   - Circular Rotation
   - Side to Side
   - Dynamic Hip Extension
   - Lying Spinal Twist with Flexed Legs
   - Lying Spinal Twist with Straight Legs
   - Dynamic Lying Leg Lift

IV. Lower Body Stretches

a. Gluteal Region: (Gluteus maximus)
   - Lying Spinal Twist
   - Dynamic Lying Figure 4

b. Femoral Region: (Quadriceps and Hamstrings)
   Sural Region: (Gastrocnemius)
   - Lift Leg
   - Dynamic Squat and Straighten
   - Reaching Toes
• Bend and Extend
• Dynamic Sit and Reach
• Dynamic Seated Straddle
• Forward Lunge
• Dynamic Side Lying Knee Bend

c. Knee Region (Quadriceps)
• Circular Rotation of Knees

d. Talar Region: (Tibialis anterior) and Dorsum (Intrinsic muscle)
• Ankle Rotation
• Seated Ankle and Foot Rotation
• Dynamic Seated Flex and Point
Chapter 4
MANUAL

This manual is intended for Judo instructors teaching their students safe practices by using the proper stretches that are supported by current research to prevent injuries and to enhance performance. Judo reinforces and improves posture; it increase strength; flexibility; it builds skills that apply to other sports; it builds confidence and self-discipline. Almost everyone knows stretching is beneficial, but most people have not stayed up to date on the latest flexibility research and techniques. This manual has come in existence out of the lack of resources on proper stretching techniques for Judo participants. *A Post Exercise Dynamic Stretching Manual for Judo Instructors* was created because many Judo manuals and books on the market included outdated information on stretching. This manual promotes the importance of a regular dynamic stretching routine as a means of improving Judo performance and preventing injuries.

Stretching for judo is important because it prevents from injuries such as sprains, ligament and cartilage tears, dislocations, and fractures. The most important task of a Judo instructor is to keep the students safe by creating a safe environment and teaching appropriate stretching skills. In order to provide a safe environment for everyone, make sure students is spread out enough when participating in stretching techniques. Also let the students know they can stop at any time they feel pain when stretching. Always keep in mind that every student does not have the same flexibility when performing stretching.
What is easy for one person may be difficult for another person. Make sure the students go at their pace and not to overdo the stretches.

The stretches in this manual include dynamic stretches for post-exercise to be done after you have participated in either Judo practice or competition. A dynamic stretch is a slow motion that has controlled movement. The end position is not held. The dynamic stretches in this manual are specific to the sport of the Judo. The stretches will include the upper, middle, and lower body parts. The upper body consists of regions of the cervical, acromial, brachial, and carpal. The middle body consists of the pectoral, posterior thoracic, lumbar, abdominal, and coxal. The lower body consists of regions of the gluteal, femoral, sural, patellar, talus and dorsum. It is suggested that post exercise stretching of ten minutes to be selected from the variety of stretches in this manual to match the throws and muscle groups being used during Judo practice. Each stretch should consist of ten repetitions.

The stretches in this manual were designed to improve function of the main muscle groups used in Judo. There are five main Judo throws that consist of Osoto gari, Ogoshi, Seoi nage, Harai goshi, and Tomoe Nage. Osoto gari is the large outer reap throw. The main muscles used in Osoto gari consist of the biceps, triceps, wrist flexor, latissimus dorsi, rectus abdominis, gluteus maximus, illiopsoas, hamstrings, gastrocnemius, tibialis anterior, and intrinsic muscle. O goshi is the large hip throw. The main muscles that are used during O goshi are the sternocleidomastoid, deltoïd, biceps, triceps, wrist flexors, pectoralis major, latissimus dorsi, rectus abdominis, gluteus maximus, quadriceps, gastrocnemius, and intrinsic muscle. Harai goshi is sweeping hip
throw. Harai goshi throw heavily uses muscles that include the sternocleidomastoid, deltoid, biceps, triceps, wrist flexors, pectoralis major, latissimus dorsi, rectus abdominis, gluteus maximus, quadriceps, gastrocnemius, and intrinsic muscle. Seoi nage is a shoulder throw. Seoi nage throw incorporates the main muscles of the sternocleidomastoid, deltoid, biceps, triceps, wrist flexors, pectoralis major, latissimus dorsi, rectus abdominis, quadriceps, gastrocnemius, and intrinsic muscle. Tomoe nage is the circular throw which categorized as a sacrifice throw. Tomoe nage uses the following main muscles that include the sternocleidomastoid, deltoid, biceps, triceps, wrist flexors, pectoralis major, latissimus dorsi, rectus abdominis, gluteus maximus, iliopsoas, quadriceps, hamstrings, gastrocnemius, tibialis anterior, and intrinsic muscle. The muscles that are widely used for all five main Judo throws include the biceps, triceps, wrist flexors, latissimus dorsi, rectus abdominis, gastrocnemius, and intrinsic muscle. Stretching these muscles then become important for participation in Judo.
The first Judo throw is the Osoto gari throw is illustrated in figure 1. The Osoto gari throw is the large outer reap throw.

![Figure 1. Osoto Gari Throw](image1)

The next throw is O Goshi throw illustrated in figure 2. The Ogoshi throw is the large hip throw.

![Figure 2. O Goshi Throw](image2)
Harai goshi throw illustrates in figure 3. Harai Goshi throw is the sweeping hip throw.

Figure 3. Harai Goshi Throw

Seoi nage throw illustrates in figure 4. Seoi nage throw is the shoulder throw.

Figure 4. Seoi Nage Throw
Tomoe nage throw illustrates in figure 5. Tomoe gage is the circular rotation which is a sacrifice throw.

Figure 5. Tomoe Nage Throw
Table 1

Judo Throws and Muscles

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Osoto Gari (Large Outer Reap Throw)</th>
<th>O Goshi (Large Hip Throw)</th>
<th>Harai Goshi (Sweeping Hip Throw)</th>
<th>Seoi Nage (Shoulder Throw)</th>
<th>Tomoe Nage (Circular Rotation Throw)</th>
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<tr>
<td>Neck (Sternocleidomastoid)</td>
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<td>Foot (Intrinsic Muscle)</td>
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</tbody>
</table>

Table 1 illustrates all the main muscles that are being used for the Osoto gari throw, Ogoshi throw, Seoi nage throw, Harai goshi throw, and Tomoe nage throw.
The first stretch for the cervical region is Side to Side stretch which illustrates in figure 6. The main muscle that is being stretched is the sternocleidomastoid.

Upper Body (Cervical Region)

Figure 6. Side to Side

Hands on waist turn head to left side, back to center, and then turn head to right side. Repeat 10 times.
The Down and Up stretch illustrates in figure 7. The main muscle that is being stretched is the sternocleidomastoid.

Figure 7. Down and Up

Hands on hips, slowly bring head down and look on floor, slowly bring head up and look up. Repeat 10 times.
The Circle Rotation stretch illustrates in figure 8. The main muscle that is being stretched is the sternocleidomastoid.

Figure 8. Circle Rotation

Rotate your head in a circle to the right, 10 times, and then circle 10 times to the left.
The last stretch for cervical region is the Head Rolls stretch which illustrates in figures 9. The main muscle that is being stretched is the sternocleidomastoid.

Figure 9. Head Rolls

On the mat on all fours hands on matt and knees on mat, rotate your head in a circle to the right while your head is still on the mat 10 times, and then rotate directions to the left 10 times.
Upper Body (Shoulder and Brachia Regions)

The next region of stretches for the upper body is the shoulder and brachial. The first stretch in this region is the Small Forward Circles stretch which illustrates in figure 10. The main muscle that is being stretched is the deltoid.

Figure 10. Small Forward Circles

Stand with the feet shoulder-width apart. Have hands straight out to your side and rotate arms forward in small circle motion 10 times.
The Big Forward Circles stretch illustrates in figure 11. The main muscle that is being stretched is the deltoid.

![Big Forward Circles](image)

**Figure 11. Big Forward Circles**

Stand with the feet shoulder-width apart. Have hands straight out to your side and rotate arms backward in circle motion 10 times.
The Small Backward Circles stretch illustrates in figures 12. The main muscle that is being stretched is the deltoid.

![Small Backward Circles](image)

**Figure 12. Small Backward Circles**

Stand with the feet shoulder-width apart. Have hands straight out to your side and rotate arms backward in small circle motion 10 times.
The Big Backward Circles stretch illustrates in figure 13. The main muscle that is being stretched is the deltoid.

Figure 13. Big Backward Circles

Stand with the feet shoulder-width apart. Have hands straight out to your side and rotate arms backward in big circle motion 10 times.
The Shoulder Shrugs stretch illustrates in figure 14. The main muscle that is being stretched is the deltoid.

Figure 14. Shoulder Shrugs

Stand with the feet shoulder-width apart. Start in neutral position by arms down, lift both shoulders up, and then down 10 times.
The Shoulder Forward and Back stretch illustrates in figure 15. The main muscle that is being stretched is the deltoid.

Figure 15. Shoulder Forward and Back

Stand with the feet shoulder-width apart. Slowly push both shoulders forward and then push shoulders back. Then go back to staring position and repeat 10 times.
The Dynamic Kneeling Shoulder Push stretch illustrates in figure 16. The main muscle that is being stretched is the deltoid.

Figure 16. Dynamic Kneeling Shoulder Push

Kneel on the floor on the hands on knees. Gently push one shoulder toward the floor and release stretch by moving the shoulder level with the opposite shoulder, repeat 10 times and switch to other side.
The Dynamic Shoulder Push stretch illustrates in figure 17. The main muscle that is being stretched is the deltoid.

Figure 17. Dynamic Shoulder Push

Stand with the feet shoulder-width apart and arms out to shoulder height. Roll right shoulder forward and then roll shoulder back to neutral position. Then roll left shoulder forward and back to neutral position. Repeat 10 times each.
The Wind Mill stretch illustrates in figure 18. The main muscle that is being stretched is the deltoid.

Figure 18. Wind Mill

Stand with the feet shoulder-width apart. Put the left arm straight out forward and right arm straight up going back. Move arms in a circular motion, 10 times. Then alternate and have right arm forward and left arm going back, 10 times.
The Arm Cross Overs stretch illustrates in figure 19. The main muscle that is being stretched is the deltoid.

![Figure 19. The Arm Cross Overs](image)

Stand with the feet shoulder-width apart. Have your one arm straight out and slowly move the straight arm across chest and then move back to neutral position.

Repeat 10 times and switch to other side.
The Dynamic Behind and Open stretch illustrates in figure 20. The main muscles that are being stretched is the deltoid and triceps brachii.

Figure 20. Dynamic Behind and Open

Stand with the feet shoulder-width apart. Clasp the hands together behind your back and slowly lift arms upward slowly and back down 10 times.
The Dynamic Flyaway stretch illustrates in figure 21. The main muscle that is being stretched is the biceps brachii.

Figure 21. Dynamic Flyaway

Stand with the feet shoulder-width apart. Start with hands beside your body. Slowly lift the arms behind the your body, then slowly return arms beside your body. Repeat 10 times.
The last stretch in this region is the Dynamic Rotated Flyaway stretch which illustrates in figures 22. The main muscle that is being stretched is the triceps brachii.

Figure 22. Dynamic Rotated Flyaway

Stand with the feet shoulder-width apart. Have hands down beside your body and have palms face back. Lift the arms slowly behind the body and toward the ceiling while twisting palms upward. Release the stretch by returning to neutral position, repeat 10 times.
Upper Body (Carpal Region)

The next region of stretches for the upper body is the carpal. The first stretch in this region is the Wrist Forward and Back stretch which illustrates in figure 23. The main muscle that is being stretched is the wrist flexor.

Figure 23. Wrist Forward and Back

Using your left hand push down on your fngers slowly and then push back using your left hand slowly. Repeat 10 times. Then switch hands and repeat 10 times.
The Circular Rotation of Wrist stretch illustrates in figure 24. The main muscle that is being stretched is the wrist flexor.

Figure 24. Circular Rotation of Wrist

Place your left hand on right wrist and have fingers facing down. Rotate your right wrist clockwise slowly all the way around. repeat 10 times. And then rotate right wrist counterclockwise slowly all the way, repeat 10 times. Repeat with other hand.
The Wrist Pull Down stretch illustrates in figure 25. The main muscle that is being stretched is the wrist flexor.

Figure 25. Wrist Pull Down

Grab your left wrist with right hand. Position your left hand so the palms are facing the side and pull down slowly and slowly back up. Repeat 10 times. Repeat with other hand.
The Wrist Flexors Forward stretch illustrates in figure 26. The main muscle that is being stretched is the wrist flexor.

![Figure 26. Wrist Flexors Forward](image)

Go on your knees and hands. Make sure that your fingers are point away from your body and lean forward slowly and go back to neutral position. Repeat 10 times.

The Wrist Flexors Backward stretch illustrates in figure 27. The main muscle that is being stretched is the wrist flexor.

![Figure 27. Wrist Flexors Backward](image)

Go on your knees and hands. Make sure that your fingers are point toward your body and lean back slowly and go back to neutral position. Repeat 10 times.
The last stretch in this region is the Wrist Flexors to the Side stretch which illustrates in figure 28. The main muscle that is being stretched is the wrist flexor

Figure 28. Wrist Flexors to the Side

Go on your knees and hands. Make sure that your fingers are point to the side. Lean to right slowly and go back to neutral position and then lean to the left side and back to neutral position. Repeat 10 times.
Middle Body (Pectoral Region)

The first stretch for the pectoral region is Open Chest stretch which illustrates in figure 29. The main muscle that is being stretched is the pectoralis major.

Figure 29. Open Chest

Stand with the feet shoulder-width apart. Have your arms straight out infront of your body. Then push back your arms and push out your chest slowly. Then go back to neutral position and repeat 10 times.
The Dynamic Chest Expansion stretch illustrates in figure 30. The main muscle that is being stretched is the pectoralis major.

Figure 30. Dynamic Chest Expansion

Stand with the feet shoulder-width apart. Hold elbow at shoulder height with finger near the ear. Have elbows in and bring back elbows while pushing out chest. Then go back to neutral position and repeat 10 times.
Middle Body (Posterior Thoracic Region)

The first stretch for the posterior thoracic region is Cradle Roll stretch which illustrates in figure 31. The main muscle that is being stretched is the latissimus dorsi.

Figure 31. Cradle Roll

Sit on a cradle position holding your legs. Rock back and make sure you tuck your chin in. And then rock back up again. Repeat 10 times.
The Straight Leg Roll Over stretch illustrates in figure 32. The main muscle that is being stretched is the latissimus dorsi.

Figure 32. Straight Leg Roll Over

Lay on your butt with legs straight out and roll over backwards keeping your legs straight the whole time and then come back to seated position. Repeat 10 times.
The Dynamic Cat stretch illustrates in figure 33. The main muscle that is being stretched is the latissimus dorsi.

![Figure 33. Dynamic Cat](image)

On hands and knees. Slowly pull in the abdominals to round the spine while tucking your chin into chest then go back to neutral position. Repeat 10 times.

The Standing Torso Twist 1 stretch illustrates in figure 34. The main muscle that is being stretched is the latissimus dorsi.

![Figure 34. Standing Torso Twist 1](image)

Stand with the feet shoulder-width apart. Interlock your fingers in front of you with elbows out and slowly twist to the right and then slow twist to the left. Repeat 10 times.
The Standing Torso Twist 2 stretch illustrates in figure 35. The main muscle that is being stretched is the latissimus dorsi.

Figure 35. Standing Torso Twist 2

Stand with the feet shoulder-width apart. Bend the elbows and hold the arms out to the sides. Twist your body slowly to the right and then slow twist to the left side. Repeat 10 times.
The Standing Straddle stretch illustrates in figure 36. The main muscle that is being stretched is the latissimus dorsi.

Figure 36. Standing Straddle

Stand with a little wider than shoulder-width apart. Have arms straight out to side. Slowly go have your left hand touch your right foot while your right hand is straight up to ceiling. Look at your right hand. Then slow back to neutral position. Next slowly go have your right hand touch your left foot while your left hand is straight up to ceiling. Look at your left hand. Repeat 10 times.
The Dynamic Side Reach stretch illustrates in figure 37. The main muscle that is being stretched is the latissimus dorsi.

Figure 37. Dynamic Side Reach

Stand with the feet shoulder-width apart. Put your right hand on hip and your left hand straight up by your ear and slowly bend to your right side. Then put your left hand on hip and your right hand straight up by your ear and slowly bend to your left side. Repeat 10 times.
Middle Body Parts (Abdominal Region)

The first stretch for the abdominal region is Dynamic Cobra stretch which illustrates in figure 38. The main muscle that is being stretched is the rectus abdominis.

![Dynamic Cobra stretch images]

Figure 38. Dynamic Cobra

Lie on the floor face down with hands in front of your body. Slowly lift the chest and ribs off the floor by contracting your back muscles and then slowly back down to neutral position. Repeat 10 times.
The Abdominal stretch illustrates in figure 39. The main muscle that is being stretched is the rectus abdominis.

Figure 39. Abdominal Stretch

Lie face down on floor, flex your knees and move your heels to your hip. Grab your ankles and slowly lift your chest and knees off the floor. Then slowly back to starting position. Repeat 10 times.

The Straddle Elbow Touches illustrates in figure 40. The main muscle that is being stretched is the rectus abdominis.

Figure 40. Straddle Elbow Touches

Sit down on straddle postion. Hands on head with elbows out. Slowly touch your right elbow to right knee and slowly go touch your left elbow to left knee. Repeat 10 times.
The Back Bend illustrates in figure 41. The main muscle that is being stretched is the rectus abdominis.

Figure 41. Back Bend

Stand with the feet shoulder-width apart. Hands on hip. Slowly bend backwards and slowly go back up to neutral position. Repeat 10 times.
Middle Body Part (Coxal Region)

The first stretch for the coxal region is Circular Rotation stretch which illustrates in figure 42. The main muscle that is being stretched is the iliopsoas.

Figure 42. Circular Rotation

Stand slightly more than shoulder-width apart. Hands on hip. Slowly rotate hips in circular motion, 10 times. Then switch direction and repeat 10 times.
The Side to Side stretch illustrates in figure 43. The main muscle that is being stretched is the iliopsoas.

Figure 43. Side to Side

Stand with the feet shoulder-width apart. Hands on hip. Slowly push your left hip out to left side and slowly push right hip out to right side. Repeat 10 times.
The Dynamic Hip Extension stretch illustrates in figure 44. The main muscle that is being stretched is the iliopsoas.

![Dynamic Hip Extension](image)

Figure 44. Dynamic Hip Extension

Stand with both feet together. Hands on hip. Straighten one leg and extend it behind the body as far as possible. Release stretch by going back to starting position and repeat 10 times. Then switch to your other leg and repeat 10 times.
The Lying Spinal Twist with Flexed Legs stretch illustrates in figure 45. The main muscle that is being stretched is the iliopsoas.

Figure 45. Lying Spinal Twist with Flexed Legs

Lie on your back with your knees flexed and arms out to the side. Slowly lower both legs to the floor to the right and rotate your head to the left. Then go back to starting position and slowly lower both legs to floor to the left and rotate head to the right. Repeat 10 times.

The Lying Spinal Twist with Straight Legs stretch illustrates in figure 46. The main muscle that is being stretched is the iliopsoas.

Figure 46. Lying Spinal Twist with Straight Legs

Lie on back with your legs raised straight up and arms out to the sides. Slowly lower both legs to the floor to the left and slowly lower both legs to the floor to the right. Repeat 10 times.
The Dynamic Lying Leg Lift stretch illustrates in figure 47. The main muscle that is being stretched is the iliopsoas.

**Figure 47. Dynamic Lying Leg Lift**

Lie on your stomach with head turned to one side. Bend on knee until the sole of the foot faces the ceiling. Slowly lift the front thigh off the floor as high as possible. Then slowly release the stretch back to starting position. Repeat 10 times. Then repeat on other leg 10 times.
Middle Body Parts (Gluteal Region)

The first stretch for the gluteal region is the Lying Spinal Twist stretch which illustrates in figure 48. The main muscle that is being stretched is the gluteus maximus.

Figure 48. Lying Spinal Twist

Lie on your back with legs extended and have your hands straight out. Flex one knee, raise it to your chest. Slowly pull your knee across your body to the floor and then switch other direction. Repeat 10 times.
The Dynamic Lying Figure 4 stretch illustrates in figure 49. The main muscle that is being stretched is the gluteus maximus.

Figure 49. Dynamic Lying Figure 4

Lie on the floor on the back with the knees bent. Place one foot across the thigh of the opposite leg in the figure 4 position. Slowly lift the other foot off the floor and then rotate slowly the leg in circular motion. Repeat 10 times. Repeat on the other leg.
Lower Body Part (Femoral and Sural Regions)

The first stretch for the femoral and sural region is the Lift Leg stretch which illustrates in figure 50. The main muscle that is being stretched is the hamstrings.

Figure 50. Lift Leg

Stand with feet together and then slowly lift one leg up slowly as far as you can, then slowly bring leg back down. Repeat 10 times. Repeat with other leg 10 times.
The Dynamic Squat and Straighten stretch illustrates in figure 51. The main muscle that is being stretched is the hamstrings.

Figure 51. Dynamic Squat and Straighten

Stand with the feet shoulder-width apart. Hands on hips. Then slowly squat down and then straighten legs with hands on knees. Then slowly go back to starting position. Repeat 10 times.

The Reaching for Toes stretch illustrates in figure 52. The main muscle that is being stretched is the hamstrings.

Figure 52. Reaching for Toes
Stand with feet together and hands beside you. You are slowly going to reach down as far as you can towards the floor. Then slowly go back to starting position. Repeat 10 times.

The Bend and Extend stretch illustrates in figure 53. The main muscle that is being stretched is the hamstrings.

Figure 53. Bend and Extend

Lay down on your back. Bend one of your legs using both of your hands holding behind your knee. Slowly extend your bent knee straight and have your hand on your calf muscle. Slowly go back to starting position. Repeat 10 times. Repeat on other leg.

The Dynamic Sit and Reach stretch illustrates in figure 54. The main muscles that are being stretched is the hamstrings and gastrocnemius.

Figure 54. Dynamic Sit and Reach
Sit down with feet together with hands straight out. Slowly reach forward towards your toes and slowly go back to starting position. Repeat 10 times.

The Dynamic Seated Straddle stretch illustrates in figure 55. The main muscles that are being stretched are the hamstrings and gastrocnemius.

Figure 55. Dynamic Seated Straddle

Get into sitted straddle position by spreading your legs as far as you can. Slowly go down forward as far as you can with your hands in front of you. Slowly go back to starting position. Repeat 10 times.
The Forward Lunge stretch illustrates in figure 56. The main muscle that is being stretched is the quadriceps.

Figure 56. Forward Lunge

Stand with legs spread about 3 feet apart and with one foot forward, keeping your toes and heels in line with your body. Place your hands on your hips and slowly lunge forward with leg that is forward and slowly go back to starting position. Repeat 10 times. Repeat with other leg 10 times.

The Dynamic Side Lying Knee Bend stretch illustrates in figure 57. The main muscle that is being stretched is the quadriceps.

Figure 57. Dynamic Side Lying Knee Bend

Lie on one side and rest the head in the palm of the lower hand. Slowly bend the top leg at knee, bring the heel towards the gluteals and slowly back to position. Repeat 10 times. Repeat with other leg.
Lower Body Part (Knee Region)

The Rotation of Knees stretch which illustrates in figure 58. The main muscle that is being stretched is the quadriceps.

Figure 58. Rotation of Knees

Bring both your feet together with hands on knees. Slowly go clockwise direction with knees. Make sure that your knees stay bent the whole time with hands remaining on knees. Repeat 10 times. Then repeat other direction.
Lower Body Part (Talus and Dorsum Regions)

The first stretch for the Talar and Dorsum region is the Rotation of Ankles stretch which illustrates in figure 59. The main muscles that are being stretched are the tibialis anterior and intrinsic.

Figure 59. Rotation of Ankles

Have your right foot point towards the ground ands on hips. Slowly rotate your right ankle in a clockwise direction. Make sure to keep your pointed right pointed toe on ground during the whole ankle rotation. Then switch rotating your ankle counterclockwise. Repeat 10 times for each direction. Repeat it the other leg.
The Seated Ankle and Foot Rotation stretch which illustrates in figure 60. The main muscle that is being stretched are the tibialis anterior and intrinsic.

Figure 60. Seated Ankle and Foot Rotation

Bend your right foot with knees out to the side. With right hand grab your ankle and the left hand grab the sole of your foot. Rotate your ankle and foot in clockwise direction. Then switch rotating your ankle and foot counterclockwise direction. Repeat 10 times. Repeat on other leg.
The Dynamic Seated Flex and Point stretch which illustrates in figure 61. The main muscle that is being stretched is the tibialis anterior and intrinsic.

Figure 61. Dynamic Seated Flex and Point

Sit down on floor. Extend legs straight out in front of you. Flex the feet towards your body. Slowly point your feet as far from the body. Slowly go back to flex position. Repeat 10 times.

The duration of stretching all body regions should take about 33 minutes to complete. Stretching of the upper body region should take about 10 minutes. Stretching the middle body region should take about 10 minutes. Stretching for the lower body region should take about 13 minutes to complete.
Chapter 5
DISCUSSION

Recent research has found that dynamics stretching is the best type of stretch and that the best time to stretch is during post-exercise (Taylor et al., 2009; Mark, 2006; McMillian, 2006; Herman and Smith, 2008; Jaggers, 2008; Fletcher and Jones, 2004; Little and Williams, 2006; Herda, 2008; Morgan et al., 2009; Faigenbaum et al., 2006; Guissard and Reiles, 2005; Manoel, 2008; & Pearce, 2009). Current research proves that static stretching and ballistic stretch are not the preferred stretch to prevent from injuries and to enhance performance (Beedle & Mann, 2007; Sayers et al., 2008; Samuel and Holcomb, 2008; McMillion, 2006; Fletcher and Jones, 2004; Little and Williams, 2006; Herda, 2008; Yamaguchi, 2006; Bradley et al., 2007; Manoel, 2008; & Pearce, 2009). Stretching during pre-exercise can cause injury and decrease performance (Sayers et al., & 2008; Johasson, 1999; Knudson, 1998; Mark, 2006; & Crammer et al. 2004). Thus, this manual is based on the most current stretching research and was designed to enhance performance and prevent injuries.

This manual will be used by Judo instructors, given that, to the best of our knowledge, no stretching manual currently exists for this sport. This manual is intended for Judo instructors who wish to practice safe stretching during post-exercise. The purpose of this manual to enhance Judo practice and prevent injuries by describing stretches that occur post-exercise that are specific to judo training and to provide a safe and current reference for stretching for Judo. These stretches can also be used in other
martial arts and sports, but they are more specific to the sport of Judo. The manual includes stretching for the upper, middle, and lower body parts. The upper body consists of regions of the cervical, scapula, acromial, brachial, and carpal. The middle body consists of the pectoral, posterior thoracic, lumbar, abdominal, and coxal. The lower body consists of regions of the gluteal, femoral, sural, patellar, talus and dorsum.

Stretching properly may prevent injuries from occurring. Prevention of injury is important to Judo participants because if participants are injured it may be costly, painful, and possibility have a negative impact to their career and livelihood, recovery may also be time consuming and have negative impacts on the quality of life.

Future Recommendations

As a result of this project, several recommendations have been made. The recommendation contain both my hopes for this project as well as suggestions concerning if this project were to be duplicated. The following recommendations are as follows:

2. To see this stretching manual can be adapted to other martial arts.
4. Spreading the knowledge to Judo community on educating the safe stretching practice in Judo by presenting at Judo clinics.
5. Disseminate this information via the World Wide Web.
6. Making a DVD of this stretching manual.
Conclusion

In conclusion, research supports that dynamic stretching is the best type of stretch and that stretching is best done during post-exercise to prevent injuries and enhance performance. The purpose of this manual is to enhance Judo practice and prevent injuries by describing stretches that occur post-exercise that are specific to judo training, as well as to provide a safe and current reference for stretching for Judo. It is important to practice safe stretching by practicing dynamic stretching during post-exercise. There is a need for stretching in Judo injury because if participants are injured it may be costly, painful, and possibility have a negative impact to their career and livelihood, recovery may also be time consuming and have negative impacts on the quality of life. It is hoped that this manual will positively effect Judo students by motivating them to stay in the sport of Judo by practicing safe stretching routines and thus avoiding injuries.
REFERENCES


