#### IRB SYNOPSIS OF PROPOSAL

Every application submitted for review and approval shall have attached to it a page organized in numerical brief paragraph form as outlined below.

Analysis of Performing the back squat without shoes

1. Identify the sources of the potential subjects, derived materials or data. Describe the characteristics of the subject population, such as their anticipated number, age, sex, ethnic background, and state of health. Identify the criteria for inclusion or exclusion. Explain the rationale for the use of special classes of subjects, such as fetuses, pregnant women, children, institutionalized mentally disabled, prisoners, or others, especially those whose ability to give voluntary informed consent may be in question.

Twenty males (ages 18-24) at Texas State University with previous participation or who currently participate in resistance training will be recruited to volunteer for this research study. Any volunteer who has a current or previous musculoskeletal or knee ligament injury that limits performance and participation during the strength testing and training will be the criteria for exclusion. This study is also delimited to participants who do not have complications of diabetes mellitus. Individuals with diabetes mellitus should avoid training without shoes.

1. Describe the procedures for recruitment of subjects and the consent procedures to be followed. Include the circumstances under which consent will be solicited and obtained, who will seek it, the nature of information to be provided to prospective subjects, and the methods of documenting consent. (Include applicable consent form(s) for review.) If written consent is not to be obtained, this should be clearly stated and justified.

The strength and conditioning coaches at Texas State University will be initially contacted to discuss the research and availability of the subjects. Faculty in the HHP department will be provided with information explaining the study with contact information and asked to announce that volunteers are requested. Meetings will be scheduled with the classes and individuals to explain the purpose and procedures of the study and request for volunteers. An informed consent form will be provided to the volunteers to read and sign after explanation of the information from the PI. A signed copy will be given to the subjects.

1. Describe the project’s methodology in detail. If applicable, detail the data collection procedures, the testing instruments, the intervention(s), etc. If using a survey, questionnaire, or interview, please provide a copy of the items or questions.

The subjects will participate in an orientation session to become familiar with the back squat exercise techniques and test protocols. Prior to the testing protocol subjects will perform a warm up. The warm up will last 10-12 minutes and include a series of static stretches followed by a dynamic warm up targeting the lower body until the individual is comfortable to perform the squat lift (\*see warm up protocol). Following the warm up the experimenter will allow the individual to perform 1 set of 5 repetitions of back squats in order to become familiar with the testing procedure. During the familiarization session the experimenter will have the individual perform the squat exercise with only the olympic barbell (45 lbs.) to check for correct mechanics to further reduce the already low risk of injury.

**Testing procedure**: Subjects will be tested using random order. Each subject will be assigned a number which will serve as a reference number to compare lifting sessions after all data has been collected.

**Training.** All warm up exercises completed will be lower extremity, weight-bearing exercises. The subjects will complete 2 sets of 5 repetitions at 60% of the 1RM for each training method.

**Day 1:** Experimenter will record subject’s height, shoe size, and estimated 1 repetition maximum for the squat exercise in order to determine correct shoe size and the percentage the subject will be lifting in the following testing session. The test will be completed using the barbell free-weight squat. For the strength test, the subject will complete a warm-up and 1 set of 5 repetitions of the back squat using only the barbell. The 1RM (maximum load capable for 1 repetition) will be found to determine the lifters 60% training load. For each successful trial when finding the estimated 1RM the lifter will increase the load 10-20% with 3-5 minutes of rest between trials until the 1RM is determined.

**Day 2**: There should be a minimum of 3 days after Day 1 testing. Waiting 3-4 days before retesting will help to eliminate the possibility of delayed onset muscle soreness (DOMS) and fatigue of the muscles which could possible hinder performance or skew the reliability of the data. During the 2nd testing session the subject will perform both variations of the lower body back squat exercise and the experimenter will collect data from two force plates (AMTI- Force & Motion®, OR6-6-1000), perceived comfort scale (similar to rate of perceived exertion scale) and motion camera (DartFish®) readings. During this testing session the experimenter will place the motion cameras directly to the right side of subject capturing the sagittal view. Subjects will be instructed to wear dark clothing in order to identify reflective markers. Reflective markers will be placed on the subject’s lateral (sagittal view) right hip, knee, and ankle prior to warming up. After the warm up the subject will be instructed to stand on the force plate facing the positive “y” direction in the position the he will perform the squat. The experimenter will then place a small piece of colored tape in front, behind and both sides of the subject’s foot to identify where the subject will stand for both lifts. The experimenter will load 60% of the subject’s estimated 1RM found on day 1 of testing and then secure safety collars on the barbell outside of the weight plates. After the weight has been loaded onto the barbell and secured with collars the 3 spotters will be instructed to spot the individual until the subject racks the weight or needs assistance. The subject will then unrack the barbell themselves using the high bar (upper 1/3 trapezius) position and place their feet inside of the blue taped shoe outline. The subject will then perform 1 set of 5 repetitions @ 60% 1RM with shoes on and then return the barbell to the rack. The individual should then remove his shoes and socks for the next trail. The experimenter should allow no more than 3 minutes of recovery in between each set unless the subject requires additional recovery time. After the subject has rested spotters will be instructed to spot the individual until the subject racks the weight at the end of their lift or needs assistance. The subject will then lift the barbell from the safety rack themselves using the high bar (upper 1/3 trapezius) position and place their bare foot inside of the blue taped shoe outline. The subject will then perform 1 set of 5 repetitions @ 60% 1RM with shoes off and then rack the weights. After the subject racks the weights the experimenter and spotters will remove all weight from the barbell and put the weight plates in its appropriate place. The subject is free to put on their shoes after the barefoot testing has been collected. The subject will be instructed to complete a 3 question survey too and there is to be no communication of the answers between the subject and experimenter. The completed survey will be placed in a secured folder and not viewed until after all subjects have completed the survey. Between subjects the investigator will disinfect shoes and force plates with antifungal cleaner.

**Data Collection.** The back squat exercise will be analyzed with a 2-dimensional motion analysis system (DartFish®,), 2 force plates (AMTI- Force and Motion®, 0R6-6-1000), and software readings (BioAnalysis Software®, version 2.2). The tests for each condition will be randomized with a 2-3 minute rest period between trials. Two trials will occur with the mean values for all “center of pressure” (∆COP) forces and movement, knee flexion, hip flexion, ankle flexion, knee displacement of the 2nd, 3rd, and 4th repetition of each trial will be calculated for analysis.

**Statistical Analysis.** Dependent variables that will be examined are “center of pressure” (∆COP), ground reaction forces measures in the vertical, anterior- posterior, and medial-lateral directions (z= vertical, y=anterior and posterior, x= medial and lateral), knee flexion, hip flexion, ankle flexion, knee displacement, and perceived comfort scale. The independent variable in the study is the foot condition, trial A: with shoes, trial B: without shoes. Motion kinematics will be analyzed using DartFish® motion software and the “center of pressure” (∆COP) will be determined by using a force plate software program (BioAnalysis Software®, version 2.2). The statistical test that will be used to interpret these results will be a repeated measures t test for each dependent variable. The alpha level for all comparisons will be .05. The perceived comfort scale survey will be examined to determine preferred training method and used to determine perceived stability correlated with the subject’s motion mechanics. To determine if perceived stability correlated with motion mechanics the answers to questions #1 and 2 will be identified and compared to the statistical powers found from the repeated measures t test for each dependent variable. Question # 3 will be collected to determine the overall groups preferred method of training and if it correlated to the statistical findings.

1. Describe any potential risks — physical, psychological, social, legal or other — and state their likelihood and seriousness. Describe alternative methods, if any, that were considered and why they will not be used.

Mild muscle soreness may take place 24-48 hrs after the tests and training for those who have not participated in the back squat exercise recently.

1. Describe the procedures for protecting against or minimizing any potential risks and include an assessment of the likely effectiveness of those procedures. Include a discussion of confidentiality safeguards, where relevant, and arrangements for providing mental health or medical treatment, if needed.

Warm ups and stretching will help to relieve muscle soreness and prevent the possibility of muscle strains and sprains. The strength test and testing will be completed with a minimum of 48 hrs of rest between the tests to ensure complete muscle recovery takes place. Similar rest periods will be given between training sessions to allow for complete recovery. Three nationally certified (NSCA, ACSM, or NASM) strength coaches will be assisting with spotting the lifter during their lift, and safety bars will be positioned on both sides of the squat rack.

1. Describe and assess the potential benefits to be gained by the subjects, as well as the benefits that may accrue to society in general as a result of the proposed study.

The subject’s squat technique and motion mechanics may improve after training. The subjects will better understand lifting techniques for the back squat exercise that reduce the risk of knee injuries. The results may provide evidence that removing shoes during the back squat exercise reduces the risk of knee injuries by improving motion mechanics.

1. Clearly describe any compensation to be offered/provided to the participants. If extra credit is provided as an incentive, include the percentage of extra credit in relation to the total points offered in the class. Also, if extra credit is provided, describe alternatives to participation in your research for earning extra credit.

No incentives will be provided.

1. Discuss the risks in relation to the anticipated benefits to the subjects and society.

Minimal risk of injury exists while the significant benefits are possible. The number of ACL knee injuries occurring in females participating in sport and physical activity are 5-10 times higher than those experienced by males. Athletes need to better understand movement patterns that increase the risk of having a knee injury. Evidence is needed to determine if removing shoes during the squat exercise may reduce the risk of these injuries by improving the movement patterns that are associated with these knee injuries during training. Evidence is also needed to determine if athletes demonstrate increased proprioception and static stability during bare foot training.

1. Identify the specific sites/agencies to be used as well as approval status. Include copies of approval letters from agencies to be used (note: these are required for final approval). If they are not available at the time of IRB review, approval of the proposal will be contingent upon their receipt.

All tests and training will be conducted on the Texas State University campus in the Biomechanics/ Sports Medicine lab in Jowers Center.

1. If you are a student, indicate the relationship of the proposal to your program of work and identify your supervising/sponsor faculty member.

Pursuing a master’s degree in exercise science and being a certified strength and conditioning specialist I have found an interest in studying muscle and equipment adaptations during exercise. As a health professional it is my duty to ensure proper mechanics during all exercise activities to protect individuals from injury. The proposal has a close relationship to my future in the field of exercise and sports science. Determining the effects that training with and without shoes has on motion mechanics during the squat exercise will help strength coaches and athletes across the country understand the effects that barefoot training has on mechanics. Supervising faculty members will be from Texas State University’s Department of Health and Human Performance. Committee chair: Dr. Kevin McCurdy, other committee members: Dr. Duane Knudson, Dr. Rod Harter, & Dr. John Walker.

1. In the case of student projects, pilot studies, theses, or dissertations, evidence of approval of Supervising Professor or Faculty Sponsor should be included. Thesis and dissertation proposals must be approved by the student’s committee before proceeding to the IRB for review.

Form is attached.

1. If the proposed study has been approved by another IRB, attach a copy of the letter verifying approval/disapproval and any related correspondence. If the proposed study has not been reviewed/approved by another IRB, please state this explicitly.

This study has not been submitted for review by another IRB.

1. Identify all individuals who will have access, during or after completion, to the results of this study, whether they be published or unpublished.

Joseph Saxe, Graduate Student, Texas State

Kevin McCurdy, Associate Professor, Texas State

Duane Knudson, Professor, Texas State

Rod Harter, Professor, Texas State

John Walker, Professor, Texas State

**In addition to this synopsis, you are required to submit all relevant documentation for review. This may include, but is not necessarily limited to: 1) recruiting documents (e.g., flyers, letter, e-mails, brochures, etc.), 2) a consent form, 3) an assent form, 4) letters of approval from relevant organization(s), 5) surveys/instruments/questionnaires, esp. those created by the researcher, 6) a list of questions that the researcher may ask (e.g., focus groups questions, questions for qualitative studies, etc.), and 7) all documents in translated versions.**