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Grant Application: Effect Of The Prevent Injury Enhance Performance Program On Biomechanical Risk Factors And Performance Variables In Male Collegiate Lacrosse Athletes

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Application Letter

Effect of The Prevent Injury Enhance Performance Program on Biomechanical Risk Factors and Performance Variables in Male Collegiate Lacrosse Athletes

The Investigation and Research Team

This study will be designed to determine the effectiveness of the Prevent Injury Enhance Performance (PEP) program on reducing undesirable biomechanics and enhancing performance during athletic maneuvers in male lacrosse athletes. The variables being tested are associated with and increased risk of anterior cruciate ligament injury. Motion analysis data will be collected on the Portland campus in the Motion Analysis Lab prior to the spring lacrosse season. Participants will be recruited from the University of New England's men's lacrosse team (approximately 44) and will perform either the PEP program or a control program before each practice for the duration of the season. Post season motion analysis data will be collected using the same protocol to determine if the PEP program had a positive training effect on athletic maneuvers.

The research team will consist of 2 doctor of physical therapy students, an applied exercise science student, an athletic training student, and a primary mentor. The Doctor of Physical therapy students, Casey Cottle and Sebastian Stoltzfus will be responsible for recruitment of subjects, data collection, processing, and analysis, and preparing the presentation and manuscript. The Applied Exercise Science student Chad Lyons and the Athletic Training student will be responsible for administering the training program before each practice throughout the lacrosse season, collecting performance data and assisting with data collection and processing.

Background, Significance, and Specific Aims

The majority of anterior cruciate ligament (ACL) injuries are the result of a non-contact movement while either landing from a jump or cutting laterally (Levine JW, 2012). Women have a higher risk of ACL tears than men, but men still have a high incidence of ACL tears, 3.24 per 100 (Mountcastle SB, 2007). A majority of research has focused on young, female athletes due to this difference, but research on men is important given the high overall number of men tearing their ACL. Research has demonstrated the value and preventive potential of neuromuscular and proprioceptive training programs, specifically the PEP program which has been shown to decrease ACL tears by as much as 88% in female soccer players (Mandelbaum BR, 2005). ACL injury rates have been shown to be higher in men's lacrosse than in men's basketball and soccer, having comparable injury rates to women's lacrosse (Mihata LC, 2006). This makes men's lacrosse players ideal subjects to study.

Certain biomechanical risk factors have been shown to put an individual at increased risk of ACL tear. These include increased knee valgus moments, greater knee extension moments, combined with decreased knee flexion, decreased hip flexion and internal tibial rotation (Hughes, 2014). If these variables decrease over the course of a lacrosse season compared to a control group, it would suggest that the PEP program is effective in decreasing mechanics associated with ACL injury.

Specific Aims:

- 1) Determine if the PEP program reduces poor biomechanics during a jump landing and cutting maneuver;
- 2) Determine if the PEP program is effective in improving athletic performance during the shuttle run, T test, and 40 yard dash.

Advancement of Inter-professional Education and Collaborative Practice

This project brings together three distinct health care professions (physical therapy, applied exercise science, and athletic training) and their respective knowledge bases with the common goal of injury prevention and excellence in athletics. Athletic trainers and exercise scientists are experts in recognizing and re-training poor movement patterns on the field. Physical therapists are experts at reducing risk of injury with targeted training programs such as the PEP program. This project provides a venue for collaboration among these professions with a common goal of increasing the well-being of an at risk athletic population. With the recent and exciting shift of the health care model towards inter-professional care and prevention, each profession should be involved in the study, and implementation of preventative care for athletes. The knowledge gained from this project will advance all three professions by improving the recognition of undesirable movements and designing effective preventative training programs.

Project Design

This experiment is designed to determine the efficacy of the PEP program on reducing biomechanical variables associated with ACL injury. All 44 members of the UNE mens lacrosse team will have the opportunity to participate in this study. Prior to the lacrosse season these variables will be measured in the motion analysis lab while each subject performs 10 repetitions of a cutting maneuvers and a single leg landing per leg. The participants will be randomly assigned to the intervention group (PEP program) or a control group (standard lacrosse practice warm up). Subjects will be asked to perform their respective program before each practice during the regular lacrosse season. The training programs will be administered by the athletic training and applied exercise science students. Within two weeks of the end of the season, the same biomechanical variables will be remeasured, analyzed, and compared to the preseason data to determine if the PEP program was successful in reducing these variables compared to the control program.

This study will also investigate efficacy of the PEP program on improving athletic performance will also be investigated. The performance measures that will be analyzed are the shuttle run, T test, and 40 yard dash. These measures will be taken by the athletic training and applied exercise science students prior to and at the conclusion of the lacrosse season.

Final Product

The results of this study will be presented at Fall Research and Scholarship Day 2015, and subsequent professional conferences if accepted. In addition to an oral presentation this study will also produce a manuscript to be submitted for publication.

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Timeline

9/15: (Week of) Recruitment of two Athletic Training/ Applied Exercise Science students. Casey Cottle, and Michael Lawrence will be present at the Biddeford campus. [no cost]

10/1: Completion of IRB and informed consent. Casey Cottle, Michael Lawrence , and Sebastian Stoltzfus will be present. [no cost]

Late October/Early November: After a fall season lacrosse practice, players will be given a verbal and demonstrative description of the study and handed informed consent paperwork. Casey Cottle and both undergraduate researchers will be present at the Biddeford campus. [no cost]

Late October/Early November: Informed consent forms and contact info will be collected from each participant both undergraduate researchers will be present at the Biddeford campus. [no cost]

1/15-2/15: Initial data collection for all participants Casey Cottle and Michael Lawrence will be present in the motion analysis lab on the Portland campus {estimated cost \$1100}

2/7: Both undergraduate researchers will practice administering the training protocol for PEP and control groups. All research members will be present at the Biddeford campus Campus. [no cost]

For the duration of the Lacrosse season participants will perform a training protocol (PEP or control) before each practice administered by an undergraduate researcher. Practices will take place on the Biddeford campus. Data from the initial collection will be processed during this time by Casey Cottle, and Sebastian Stoltzfus remotely. [no cost]

4/23- 5 /6: Final Data collection for all participants. Casey Cottle Michael, Lawrence, Chad Lyon and Sebastian Stoltzfus will be present in the motion analysis lab on the Portland campus. {estimated cost \$1100}

Data from both data collection will be processed and analyzed during this time by Casey Cottle, and Sebastian Stoltzfus. The project will be polished for presentation and a manuscript will be written for review/ publication. {submission fee- estimated cost \$75}

Fall scholarship and research day- All research team members will present completed project at the fall research symposium for health sciences [no cost]

Proposed Budget

The expenses required for this study include various disposable lab supplies for body preparation and subjects compensation of 20\$ per subject per data collection.

Item	Unit cost	Number of units	Total Cost
Disposable lab supplies	\$5	88	\$440
Subject Compensation	\$20 Honorarium	88	1760
Physical Therapy Support	\$200		-\$200
Total requested			<u>\$2000.00</u>

Budget Justification

In order for us to attain the appropriate variables we are researching, our group is using motion analysis. Disposable lab supplies will include retro-reflective markers, self-adhesive Velcro circles, tough skin, and alcohol wipes. With motion analysis, the subject must have retro-reflective markers placed on the lower extremities and the trunk. These markers require self-adhesive Velcro circles to stay in place. To ensure the markers will remain in place for the entire data collection session, the skin is prepared using alcohol wipes and tough skin. To participate in our study, subjects will need to travel to the motion analysis lab on the Portland campus. As members of the lacrosse team tend to live in Biddeford, this involves approximately 50 miles of driving for each data collection. Each data collection takes approximately 2 hours. To provide incentive for subject participation and to improve subject retention we intend to provide 20\$ of compensation per data collection to cover the cost of transportation. The UNE mens lacrosse team will have 44 players this spring and every member of the team will have an opportunity to participate in the study.