

**UNIVERSITI TEKNOLOGI MARA**

**THE IMPACT OF BALL-ORIENTED  
SOCCER MATCH SIMULATIONS  
ON ACL INJURY RISK AND  
IMPLICATIONS FOR  
MULTICOMPONENT INJURY  
PREVENTION PROGRAMS**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Doctor of Philosophy**  
**(Sports Science and Recreation)**

**Faculty of Sports Science and Recreation**

**June 2023**

## ABSTRACT

Anterior Cruciate Ligament (ACL) injury persists to be one of the dominant and dreaded injury in soccer. With costly implications to players, teams, and practitioners, injury prevention exercises and training programmes have been researched specifically with the intention to reduce the likelihood of ACL injury. However, the implementation, adherence, understanding of injury prevention training programmes in Malaysia have been underwhelming. Several factors to the issue include a lack of injury prevalence documentation and a lack of knowledge of injury risk and prevention, among coaches, practitioners, and the players themselves. In the first part of this study, injury rates and conditions were documented from several elite soccer teams in Malaysia across different age groups to get an illustration of the injury prevalence in elite soccer. It was found that most of the injuries that occur in Malaysian elite soccer occurs in the lower limb, specifically in the knee and ankle joints. Coaches, players, and practitioners from soccer teams across various soccer competition levels were then surveyed for their knowledge, attitude, and practices of injury prevention exercise programmes. It was generally agreed that injury prevention was very important, however, the practice of evidence-based injury prevention was reported by just over a third of respondents. Only half of the responding players admitted to being well informed about injury risk factors most players admitted practicing a combination of exercises both proven and unproven efficacy towards preventing injury. This finding suggests a better player education and maintenance of injury prevention programmes as irregular sessions and monotonous sessions were the most common barriers to proper implementation of such programmes. In the second and third part of the study, several selected overground soccer match simulations were reviewed in pursuit of developing an ecologically valid soccer match simulation with the incorporation of ball utility tasks, where similar physiological responses in the newly developed Ball-Oriented Soccer Simulation (BOSS) were similar to a previously existing overground soccer match-play simulation (OSMS; HR: BOSS =  $156 \pm 5$  bpm, OSMS =  $160 \pm 7$  bpm; RPE: BOSS =  $14 \pm 1$ , OSMS =  $15 \pm 2$ ). Exertions in the BOSS revealed discrepancies between the left and right peak knee abduction moments during bipedal landings, as well as reductions in hamstrings eccentric peak torques, as well as functional hamstrings to quadriceps ratios, suggested a higher risk of injuries. Following a multicomponent injury prevention exercise program (IPEP), it was found that IPEP participants displayed improved tolerance to BOSS exertions. Biomechanical responses in the control group showed more extended knee and hip joint angles compared to the IPEP participants. The findings suggest that the BOSS may replicate similar responses to actual soccer match-play. The BOSS was then used as a fatigue protocol during the investigation towards the temporal efficacy of a multicomponent injury prevention training programme on biomechanical markers of ACL injury. It was found that a multicomponent injury prevention programme improved participants' landing mechanics and allowed a sustained landing kinematic throughout the accumulation of fatigue from soccer-specific exertions.

## ACKNOWLEDGEMENT

This doctoral thesis would not have been achievable without the kind assistance of numerous people, both in my academic and personal life, whom I would like to take this opportunity to express my gratitude to. I would firstly like to thank all my supervisors for the support, guidance and of course confidence they have shown in my work. To *Dr Raja Mohammed Firhad Raja Azidin* who has been a magnificent mentor, for providing me with endless opportunities, experiences and giving me valuable, constructive feedbacks along the way, and to *Dr Raihana Sharir* and *Dr Yeo Wee Kian* not only for sharing their research ideas and insight, but for their continued encouragement and counsel.

My thanks to all the lecturers and staffs in the *Faculty of Sports Science and Recreation, Universiti Teknologi MARA*, the *National Sports Institute, Bukit Jalil*, and the friends I have made along the way for their superb assistance and cooperation with facilities and for never failing to bring out the best in myself. I've always believed that I'm studying with the greatest.

A special mention my dear friends, for their fruitful insights, supporting and encouraging environment to continue working on this thesis. To            thank you for consistently keeping me on my toes. To            I cannot express the magnitude of appreciation I have for you for supporting me at my low point. Thank you for always inspiring me to be work diligently, patiently, and to be prepared to enter the career world. Not forgetting all the participants who volunteered in my studies, thank you so much for your contributions.

Most of all I would like to thank my family without whom none of this would have even been possible. My undying appreciation to my dear parents and            for providing me with role models, encouraging me to work harder and constantly strive to improve myself, and for their unwavering love. What enables me to work for goals despite the risk of being crushed is knowing that you are always there to pick me up should I plunge into failure. And to my siblings, no matter how horrible a day can be, I always look forward to their tantrums, shenanigans, funny stories, and house adventures.

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