Attitudes towards Sports Injury and Injury Prevention among University Athletes

By

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Abstract

Background. Adherence to injury prevention strategies remains a major challenge in the sports community despite such strategies having been proven effective in reducing the occurrence of injury. This may be because the behavioural and contextual factors of injury and injury prevention are not fully understood. **Purpose.** The study aimed to examine university athletes' attitudes toward sports injury and injury prevention and their perceived facilitators and barriers to injury prevention implementation. **Methods.** This study used a cross-sectional design and a survey as the data collection mode. Basketball, football, volleyball, soccer, and ice hockey athletes were recruited from the University of Manitoba and York University teams. **Results.** This study revealed three key findings: 1) There was a significant association between athletes' history of injury and their attitudes toward injury and injury prevention, 2) university athletes' attitudes toward injury differ from their attitudes toward injury prevention, and 3) majority of the university athletes perceive long training programs, match congestion, and time constraints as barriers, and perceive short training programs, injury prevention education, free and good equipment, trained medical staff, performance-enhanced injury prevention program, and athletes' motivation as facilitators to the implementation of injury prevention measures. **Conclusion.** Behavioural and educational intervention is needed to improve university athletes (especially those with a history of injury) attitudes toward injury and injury prevention. Also, other stakeholders in university sports need to work together and consider the perceived facilitators and barriers to injury prevention implementation to ensure adherence to injury prevention programs in real sports settings.

Keywords: sports injury, injury prevention, facilitators, barriers, injury prevention implementation, attitude, amateur athletes, high-risk sports, university athletes

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Chapter 1: Introduction

Participating in sports has many health benefits, but participation also increases the risks of injury (Emery & Tyreman, 2009). Sports injuries can occur while participating in training or during competitions (Szukics et al., 2022). Sports injuries are not without diversity, as injuries differ in terms of mechanism, how the injury presents in different athletes and how that injury can be managed (Bahr et al., 2020). Also, the frequency of sports injuries may depend on the type of sports (e.g. high-risk sports) and level of performance (e.g. amateur athletes; Backx et al., 1991; Szukics et al., 2022).

The heterogeneity of sports injuries brings high-risk sports into the spotlight. High-risk sports can be referred to as those sports that put athletes at higher risk of sustaining injuries (Aman et al., 2016). These sports are characterized by contact and a high jump rate (Backx et al., 1991). High-risk sports are basically team sports of basketball, ice hockey, handball, field hockey, soccer, volleyball and football (Aman et al., 2016; Backx et al., 1991; Emery et al., 2006). These sports are associated with high injury incidence rates and ought to be the target of preventative actions (Aman et al., 2016; Krutsch et al., 2018).

Furthermore, the incidence of sports injuries may be influenced by athletes' level of performance such as professional or amateur athletes (Szukics et al., 2022). According to the National Collegiate Athletic Association (NCAA, n.d.), amateur athletes are individuals who do not play professionally (i.e., are not in a professional team or do not receive money more than actual or necessary expenses). In the NCAA context, amateur athletes include student-athletes in high school preparing to enter college or already in college. Sports injury is widespread in this population of athletes (Emery et al., 2006; Powell & Dompier, 2004). According to the Canadian Community Health Survey report, 66% of injuries among youth were sport-related (Billette &

Janz, 2011). Internationally, sport and recreational injury accounts for 32% to 55% of all injuries in young boys and 19% to 59% of all injuries in young girls across eight countries (Pickett et al., 2005). Also, in a retrospective study by Williams et al. (2017) among collegiate football athletes, results showed that this cohort was exposed to injuries more than sixty-seven thousand times in three years. Despite the high injury rate, there is still a high level of participation in high-risk sports (Emery et al., 2006; Powell & Dompier, 2004). According to Emery et al. (2006), 94% of students in high school participated in sports. The top five sports by participation for males were basketball, hockey, football, snowboarding, and soccer, while for females, basketball, dance, volleyball, snowboarding, and soccer were most popular (Emery et al., 2006). Similarly, Powell and Dompier (2004) cohort study of 50 collegiate athletic programs showed that more than a million student-athletes participated in different sports in two years.

Sports injuries significantly impact athletes because the injury can affect their health, training ability and performance (Soligard et al., 2017). Sports injuries also affect the healthcare system (Emery et al., 2006). It was reported that 40% of youth injuries treated in Canadian hospitals' emergency departments were sports-related (Public Health Canada, 2013). Furthermore, sports injuries are estimated to cost Canadians greater than $187 million annually (Parachute, 2015; Yanchar et al., 2012). These statistics show that amateur athletes are at high risk of injury, and the effects of these injuries can be felt among athletes and at the community level.

The high rates of injury in athletes and the impact on the athletes and the community brings about many injury prevention strategies in the literature to help reduce the occurrence of injury. The three areas where injury prevention is focused on in sports are training strategies, sports rules and policies modification, and equipment recommendations (Emery & Meeuwise,

2010; Emery et al., 2020; Kroncke et al., 2008; Stephenson et al., 2021). Sports injury prevention strategies have been shown to reduce the occurrence and severity of injuries (Emery et al., 2015). However, despite all the undeniable evidence of the benefits of sports injury prevention strategies, implementation in real-world settings is a major problem (Owoeye et al., 2018). The significant factor in this issue has been shown to be low or non-adherence to prevention programs by many stakeholders, including the athletes (Owoeye et al., 2018).

It has been hypothesized that understanding the factors that influence this low or non-adherence rate may be the next logical step in this field of research (Verhagen et al., 2010). Regarding this, McGlashan and Finch (2010) have proposed that efforts should be made to understand the behavioural and social aspects of sports injury and prevention. To ensure the uptake and maintenance of injury prevention strategies, it is important to understand athletes' attitudes towards injury and safety (Finch et al., 2002). Many studies have been done to understand the knowledge, perception, and attitudes toward injury and injury prevention among high school athletes (Chrisman et al., 2013; Iversen & Friden, 2009; Kurowski et al., 2014; Register-Mihalik et al., 2013). However, few studies in the literature have considered the attitudes of university athletes toward injury and injury prevention.

Purpose of the Study

The aim of this study is to investigate the attitudes towards sports injury and injury prevention among university athletes in high-risk sports and to provide insight into athletes' perceived facilitators and barriers to injury prevention implementation. The study aims to answer the following questions:

1. Will there be an association between injury history, sex, and year in education program of athletes and their attitudes toward injury and injury prevention?
2. Will athletes' attitudes to injury differ from their attitudes to injury prevention?
3. What factors will athletes perceive as facilitators and barriers to injury prevention implementation in their team?

Hypotheses of the Study

The study hypothesizes that athletes' history of injury, sex, and year in their educational program will not be associated with their attitudes toward injury and injury prevention individually. These three hypotheses were formulated based on previous studies findings (Kurowski et al., 2014; Pierce et al., 2016; Rees et al., 2022).

The three hypotheses are written individually below:

H1: There will not be an association between athletes' history of injury and their attitudes toward injury and prevention.

H2: There will not be an association between athletes' sex and their attitudes toward injury and prevention.

H3: There will not be an association between athletes' year of educational program and their attitudes toward injury and prevention.

Study Significance

This study will be done to understand the attitudes of university athletes toward injury, injury prevention and their perception of facilitators/barriers to injury prevention implementation. Determining the attitudes of athletes towards injury, injury prevention, and

perceived barriers/ facilitators to injury prevention, may assist in our understanding of why injury prevention strategies are not frequently adopted in real-world sports settings. Also, the study findings may open up ways to improve adherence to the existing sports injury prevention programs. This may include behavioural intervention such as educating athletes on the benefit of reporting injury on time, the benefits of injury prevention programs performed by the team and generally taking care of their overall health. Finally, the findings from athletes' perceived barriers and facilitators to injury prevention implementation may provide information that will help in the future design of injury prevention programs that can be implemented successfully in real-world settings.

Chapter 2: Literature Review

Sports Injury

According to The International Olympic Committee Injury and Illness Epidemiology Consensus, injury is "tissue damage or other derangement of normal physical function due to participation in sports, resulting from rapid or repetitive transfer of kinetic energy" (Bahr et al., 2020; p. 3). Sports injury represents a great burden on the Canadian healthcare system and is most common among junior high and high school students in Canada (Emery et al., 2006; Emery & Tyreman, 2009; Richmond et al., 2020). The Canadian Community Health Survey report shows that 66% of injuries among young people (aged 12-19) were related to sports (Billette & Janz, 2011). Sports injury is also the leading cause of medical treatment and sixth leading cause of injury cost among youth in Canada (Richmond et al., 2020). Not only does an injury impact the health of an athlete but it also affects their ability to train as well as their performance (Soligard et al., 2017). In addition, injury influences their preparedness for competition and their ability to participate in competitions. This, in turn, may significantly affect their dreams and goals of becoming successful athletes (Soligard et al., 2017). This is why injury surveillance and epidemiological studies are essential to protecting athletes' health. These two elements are designed to address important aspects of sports injury including; injury mechanism, mode of onset, risk factors, and body location (Bahr et al., 2020). The following sections will elaborate on these classifications of sports injury.

Mechanism of sports injury

Injury mechanism can be described as an "inciting event" leading to an injury (Bahr & Krosshaug, 2005, p 325). From a biomechanical perspective, considering tissue properties and

load characteristics, an injury occurs when the energy transfer to the tissue and the mechanical load is more than the tissue's load tolerance (Bahr & Krosshaug, 2005). Bahr et al. (2020) stated that sports injury may result from direct participation during competition or training (e.g., a collision between players) and may occur from indirectly participating in activities related to competition or training (e.g., athlete slipping and sustaining an injury when in the training camp). Additionally, the authors mentioned that the mechanism of injury in sports could be further classified into contact and non-contact mechanism in which acute type of injury can be contact or non-contact in nature and overuse injury by nature are non-contact (Bahr et al., 2020).

Non-contact acute injury has no evidence of disruption of a player's movement patterns, for example, a basketball player landing and twisting their ankle with no contact with other players (Bahr et al., 2020). Contact mechanism of injury can be direct contact with another athlete (e.g., a soccer player sustains an anterior cruciate ligament tear as a result of a direct tackle to the knee) or with an object (e.g., a volleyball player being hit in the face by a spiked ball, resulting in a concussion). Also, it can be indirect through another athlete (e.g., anterior cruciate ligament tear in a handball player landing off-balance after being pushed on his shoulder by an opponent while in the air) or through an object (e.g., a downhill skier suffers concussion from a crash after hitting the gate with his knee; Bahr et al., 2020). All these demonstrate how acute injury can occur in sport.

Risk factors of sports injury

Earlier in the review, it was described that sports injury mechanism is the inciting event leading to an injury. Although sports injuries may appear to have been caused by a single inciting event, the beginning of an injury starts from a complex interaction between internal and external risk factors (Bahr & Krosshaug, 2005). Internal factors such as age, sex, and body

composition influence the risk of sustaining injuries, predisposing the athlete to injury. External factors such as equipment and training surface may modify injury risk, making the athlete even more susceptible to injury (Bahr & Krosshaug, 2005). The presence of internal and external risk factors makes the athlete susceptible to injury; however, the mere presence of these risk factors is insufficient to produce injury. The sum of these risk factors and their interaction leads to the athlete getting injured in a given situation (Bahr & Krosshaug, 2005). The inciting event is the final link in the series that causes an injury, and such events are regarded as necessary causes. These inciting events are usually directly associated with the onset of injury (Meeuwisse, 1994; Meeuwisse et al., 2007).

Herrington and colleagues (2019) provided detailed lists of these factors involved in the risk of injury occurrence. These are non-modifiable factors, training-related factors, health factors, motor control, environmental factors, conditioning, psychological factors, other factors, and additional demands. Non-modifiable factors include sex, age, maturation stage, body type, genetics, and past injury history of the athlete. Training-related factors are the volume, load, intensity, nature of training, training & competition schedule, and rest. Health factors comprise diet, medication, previous treatments, medical issues, general health, fatigue, and sleep. Motor control factors include habitual postures & movement patterns, muscle tone, biomechanics, sport-specific movements, and technique. Environmental factors are the playing surface, equipment, weather, and coaching. Conditioning factors comprise muscle strength, endurance, muscle length, joint range, and chronic capacity. Psychological factors include cognitive beliefs, fear, coping strategies, self-efficacy, catastrophizing, and emotional status (stress, anxiety, depression). Other factors like sport-specific skill level, ranking & status, and short and long-

term goals were also noted. Lastly, Additional demands from home, work, family, leadership, media, and sponsors were also considered risk factors for sports injury (Herrington et al., 2019).

Mode of onset of sports injury

Understanding the mode of onset of sports injury is also vital in understanding sports injury and is directly associated with injury mechanisms (Meeuwisse, 1994; Meeuwisse et al., 2007). Traditionally, injuries have been classified into those with a sudden onset and those with a gradual onset. Sudden onset injuries were considered to be those that resulted from a specific identifiable event. On the contrary, gradual-onset injuries were considered to be those that lack a definable sudden, precipitating event as the onset (Bahr et al., 2020). According to Bahr and colleagues (2020), sports injuries should be classified as overuse (gradual) or acute injury (sudden). Consideration is also given to acute injury that occurs due to overuse injury (Bahr et al., 2020). The following sentences will give some examples to explain these scenarios better. Acute injury occurs due to an exchange of large quantities of kinetic energy, like a collision between athletes. An overuse injury is a gradual retention of low-energy transfer over time (e.g., the development of tendinopathy caused by repetitive movement or stress fracture). An acute injury that results from overuse injury is a combination of both (e.g. an athlete with a repetitive training regime can develop tendinopathy or tendon weakness but also sustains an acute tendon tear during a jump; Bahr et al., 2020).

Sports injury type/location in the body

Sports injuries can be classified according to their etiology type (i.e. the cause of the injury) and location in the body. Bahr et al. (2020), in their consensus statement on methods for recording and reporting epidemiological data on injury and illness in sports, categorized sports

injury into specific regions of the body: head, neck, shoulder, upper arm, elbow, forearm, wrist and hand, chest, thoracic spine, lumbar spine, pelvis/buttock, hip/groin, thigh, knee, lower leg, ankle, and foot injuries. Some of these injuries were further classified into etiology type and even to the level of diagnosis. This was done to highlight the most significant injuries in sports. The authors mentioned the following as significant injuries: concussion was highlighted as the most common head injury; shoulder injuries were divided into acute dislocation, hematoma, and joint sprain (acromioclavicular and glenohumeral); knee injuries were classified into knee cartilage injury (meniscal cartilage injury) and knee ligament injury (medial collateral ligament injury, anterior cruciate ligament injury, posterior cruciate ligament injury, posterolateral corner and lateral collateral injury). The last significant injuries mentioned were at the ankle, consisting of lateral ligament sprain and syndesmosis pain (Bahr et al., 2020).

Sports Injury Prevention and Injury prevention programs

It has been recognized that there is a high participation in sports across all ages and this participation is highest among youth and young adults (Billette & Janz, 2011; Sheu et al., 2016). This high participation in sports brought about increased injury rates not only in youth but in the adult population as well (Emery & Tyreman, 2009; Sheu et al., 2016). Previous studies have shown that 20% of schoolchildren will miss at least one day of school per year due to sports injuries, and one in three youth seek medical attention for sports-related injuries per year (Emery et al., 2006). Even adults lose at least one day a year from work as a result of sport-related injuries (Sheu et al., 2016). Apart from the significant impact sports injury has on the health of those participating in sports, the financial impact is huge. In Canada, it has been estimated that sports injury treatment will cost Canadians greater than $187 million annually (Parachute, 2015; Yanchar et al., 2012). These health and financial burden caused by sports injury shows that there

is a need to implement evidence-based injury prevention strategies to reduce the risk of injury in youth, and also across the lifespan.

Injury prevention programs are those strategies put in place to reduce the number of injuries as well as the severity and extent of injuries (Emery et al., 2015). Injury prevention strategies in sports typically focus on modifiable risk factors and they are training strategies, rules, and equipment (Emery et al., 2020; Stephenson et al., 2021). Training strategies focus on athletes-related (motor control) risk factors such as strength, endurance and balance through neuromuscular exercise interventions. Environmental risk factors are targeted through rule modification and equipment strategies (e.g. body checking in youth ice hockey, wearing of the helmet in ice hockey, wearing of knee and ankle braces, wicket keeping or fielding close to the batter in cricket, disallowing jewelry while playing in soccer; Emery et al., 2020; Stephenson et al., 2021). These three prevention strategies will be further discussed in the following paragraphs.

Training strategies (also called neuromuscular training strategies) have been evaluated in most prospective studies (RCT, quasi-experimental, and cohort studies; Emery & Pasanen, 2019). Neuromuscular training strategies (NMT) are typically led by a coach or trainer, ideally following a comprehensive coach training workshop by a physiotherapist or a strength and conditioning coach who is an expert in delivering NMT workshops (Emery & Pasanen, 2019). Typically, NMT consists of exercises aimed at improving balance, strength, and agility (e.g., coordination, cutting and landing techniques; Emery et al., 2015). NMT programs are often introduced as part of an extended warm-up program, with other components that include aerobic, balance, strength, and agility. Ideally, levels of progression are built into each NMT exercise

component such that participants can progress as they want. However, these programs have to be feasible and fit in a real-world sports setting (Emery & Pasanen, 2019).

Rule modification and policy changes are important aspects in regulating sports, although some have been implemented specifically to reduce the risk of injury. One example of this evidence-based policy is body checking in youth ice hockey (Emery & Pasanen, 2019). Body checking is a strategy used to gain competitive advantage by changing direction or leaving the established skating lane to make contact with the body of the opponent, or using hips, shoulders, or arms to push off and separate the opponent from the puck (Emery et al., 2020). Previous findings have shown that policy change disallowing body checking is associated with fewer injuries in youth ice hockey (Emery et al., 2020).

Lastly, the use of protective equipment in sports may help to prevent musculoskeletal injury and/or severity in sports (Emery & Pasanen, 2019). Examples of this equipment are bracing/taping and wrist guards. Dizon and Reyes (2010) examined the protective effect of ankle bracing and taping among previously injured adult and youth athletes. The risk of ankle sprain re-injury was reduced by 69% and 71%, respectively. However, the evidence surrounding the preventative effect of bracing/taping did not support using them as a primary prevention strategy in healthy populations with no previous history of ankle/knee injury (Yang et al., 2005). Also, wrist guard use in snowboarding revealed a significant protective effect in reducing the risk of wrist injury, wrist fracture, and wrist sprains (Russel et al., 2007). Although there is some evidence to support the use of protective equipment in youth sports, there is also evidence that they are underused (de Nooijer et al., 2004; Kroncke et al., 2008). A combination of educational approaches (social media) and policy may be a good way to promote the use of protective equipment where required (Emery and Pasanen, 2019).

Theoretical Perspective

Although injury prevention programs have been shown to reduce the likelihood and severity of sports injury in clinical contexts, their effectiveness depends significantly upon human factors (e.g. adherence to rehabilitation; Chan et al., 2009). Social psychological theories of motivated behaviour are considered necessary in this regard because they identify the flexible factors related to individual self-regulation of behaviour (Hagger, 2010). One of these theories is the theory of planned behaviour. The theory of planned behaviour has been shown to be effective in predicting injury-related behaviour, which is why it has been applied in sports to understand injury prevention and rehabilitation (Chan & Hagger, 2012). Hence, I will utilize this theory to understand the psychological processes involved in sports injury which are directly related to sports injury prevention. The following section will further explain the theory of planned behaviour.

Theory of Planned Behaviour (TPB)

The theory of planned behaviour (TPB; Ajzen, 1985) is a popular framework that calls attention to personal and social factors' role in affecting behaviour (Crocker et al., 2021). It proposes that people's intention to engage in a behaviour is predicted by three factors: attitude towards the behaviour (which refers to the degree to which a person has a positive or negative evaluation or appraisal of the behaviour in question), subjective norms (perceived social appropriateness to perform or not perform the behaviour), and perceived behavioural control (ones' perceived confidence in his/her ability to engage in the behaviour; Ajzen, 1991). However, Ajzen (1991) mentioned that TPB could be explained at the most basic level, that behaviour is a function of salient beliefs relevant to the behaviour. It is these salient beliefs that are considered to be the prevailing determinants of a person's intentions and actions. Three types

of salient beliefs were distinguished: behavioural beliefs, which guide our attitudes toward the behaviour, normative beliefs, which constitute the underlying factors of subjective norms; and control beliefs, which provide the basis for perceptions of behavioural control (Ajzen, 1991).

The general rule is that the more favourable the attitude and subjective norm to a behaviour, and the higher the perceived behavioural control, the more robust an individual's intention to perform the behaviour under consideration should be. The importance of attitude, subjective norm, and perceived behavioural control in predicting intention is expected to differ across behaviours and situations. Hence, in some applications, it may be found that only attitudes significantly impact intentions; in others, attitudes and perceived behavioural control are sufficient to account for intentions; still, in other situations, all three predictors make independent contributions (Ajzen, 1991). Consequently, the following subheadings will describe subjective norms, perceived behavioural control, and attitude to understand better each of these factors that encompass TPB.

Subjective Norms. Subjective norm refers to the perceived social pressure to perform or not to perform a behaviour (Ajzen, 1991; Crocker et al., 2021). These pressures could be from personal or environmental sources that reflect perceptions of others, such as family, friends, health professionals, coaches, or the media, and the value they place on a behaviour (Crocker et al., 2021). The influence of others on behaviour can be termed as descriptive norms (i.e. whether others actively engage in the behaviour) and injunctive norms (whether a person perceives that others think it is important for them to engage in the behaviour or not). "Subjective norms can be further influenced by one's motivation to comply with the referent individual" (Crocker et al., 2021. p 49).

Perceived Behavioural Control. Perceived behavioural control is the extent to which a person feels they can perform a behaviour (Francis et al., 2004). There are two aspects to it: first is how much control an individual has over the behaviour (e.g. lack of time to engage in exercise or a weather condition that prevents someone from carrying out their morning jog), and the second is how confident a person feels about being able to perform the behaviour or not (e.g. an athlete not having the confidence to return to sports activities after sustaining an injury; Francis et al., 2004).

Attitude. Attitude indicates an individual evaluation (positively or negatively) of a behaviour or whether to engage in a behaviour (Crocker et al., 2021). Social psychology researchers agreed on three components of attitude. These three components are cognitive, affective, and behavioural (Larsen et al., 2008). The cognitive component indicates an individual's thoughts and beliefs about an object. The affective component can be described as how the object, person, issue, or event makes an individual feel. Lastly, the behavioural component is how cognitive and affective components influence an individual's behaviour. Any attitude comprises these three components and is consistently oriented favourably or unfavourably to an attitude object. Practically, anything imaginable might be an attitude object. As a whole, the three components are consistent with each other. A person with a positive attitude toward the environment is also likely to have a set of beliefs that sustain this position and may behave consistently (Larsen et al., 2008). Attitudes can be explicit and implicit. Explicit attitudes are those that people are consciously aware of and that clearly influence their behaviours and beliefs. Implicit attitudes are unconscious but still affect people's beliefs and behaviours (Larsen et al., 2008).

Attitude can form through cognitive experience and education. This includes all an individual knows about the attitude object, their beliefs, memories, and past images. Attitude can also form due to our emotional reaction to the object. An example is an athlete associating their love of sport with pleasant images of their family and friends cheering for them during school games when they were young. Many attitudes have little to do with reasoning; instead, they are formed to simply express our fundamental value system. Lastly, some attitudes are formed based on observing our behaviour (Larsen et al., 2008). The subheading below will describe how attitude has been measured in the literature.

***Measuring Attitude*.** All through the past century, the field of psychology explored various quantitative measurement procedures to measure attitude. Usually, a measurement procedure was unique to one study and lacked justification other than the investigator's intuition, leading to "conflicting results and different conclusions concerning the relations between attitude and other variables (Fishbein & Ajzen, 1975). Psychology researchers have since standardized methods for measuring attitudes, namely the Thurstone and Likert attitude scales (Ajzen & Fishbein, 1977; Valois & Godin, 1991). They typically measure the degree to which an individual has a positive versus a negative evaluation of the behaviour using a set of bipolar semantic differential scales (Valois & Godin, 1991). Bipolar adjectives may include pleasant-unpleasant, wise-foolish, beneficial-harmful, necessary-unnecessary, useful-useless, and, more simply, good-bad (Valois & Godin, 1991). These adjectives usually anchor a 5- or 7-point scale. The responses are aggregated and used to assign a respondent a single number representing how favourably or unfavourably the individual regards a behaviour. Several detailed guidelines exist on scale construction and analyses (Francis et al., 2004; Fishbein & Ajzen, 2009).

Psychologists have also developed validated, qualitative methods of assessing the beliefs that underlie attitudes. These standardized belief elicitation studies ask individuals what they believe to be the advantages and disadvantages of performing a behaviour (Sutton et al., 2003; Epton et al., 2015).

Attitudes of Athletes toward Injury

Athletes' attitudes toward injury risk and prevention are associated with the uptake of preventive measures among youth sports participants (Iversen & Friden, 2009). Perceived susceptibility to injury (Kroncke & Niedfeldt, 2008), social influences (De Nooijer et al., 2004), and dislike of prevention strategies (Miller et al., 2006) have all been shown to influence prevention behaviours in a variety of competitive and recreational sports. Adherence to treatment regimens, including injury rehabilitation, is also an extremely complex issue. It has been argued that more than 200 variables influence commitment to prescribed treatments (Meichenbaum & Turk, 1987).

The attitude of youth athletes regarding sports injuries has been highlighted in the literature. It has been reported that children feel that the best players should continue playing when they are hurt (Mickalide & Carr, 2012). A survey of 1000 youth athletes reported that almost half had played down an injury so they could continue playing or had felt pressured to do so (Safe Kids Worldwide, 2014). Although athletes need to have the essential knowledge to feel adequately empowered to report injury symptoms as they present (Taylor & Sanner, 2017), this alone does not guarantee better injury-reporting behaviours (Kurowski et al., 2014). Attitudes toward injury reporting are vital to prevention (Register-Mihalik et al., 2013). For example, failing to comprehend the seriousness of a concussion may prevent youth athletes from reporting

symptoms and keep them from seeking appropriate care when experiencing symptoms (Register-Mihalik et al., 2013).

Torres et al. (2013), while investigating the reporting of the history and attitudes towards concussion in a collegiate/varsity athletic population (n= 262), found that almost half of those with a history of concussion reported that they had intentionally concealed concussion symptoms to allow them to continue playing in a game. Furthermore, despite acknowledging they had been formally educated about the risks of concussion, 22% of the surveyed athletes indicated they would be "unlikely" or "very unlikely" to report a concussion to their coach or athletic trainer in the future. Torres and colleagues (2013) also note that while concussion education is clearly essential, their findings in this college/university cohort suggested that receiving education would not motivate them to report concussions in the future. It has also been suggested, regardless of whether concussion education has been received, collegiate/varsity athletes will play or train through concussion, or indeed any injury, to protect their scholarships, gain peer acceptance, as well as obtaining or maintaining coach support (Malinauskas, 2008). Likewise, Chrisman et al. (2013) also suggested that high school varsity athletes will hesitate to report their injury, particularly if there is no significant pain or observable disability.

The implication for Injury Prevention Programs.

Efforts to design and implement effective injury prevention programs in sports have been studied in the medical community for many decades (Emery et al., 2010; Gilchrist et al., 2008; Hagglund et al., 2009). The success of these programs involves many factors and depends on the identification of the injury risk, analyzing the mechanism of injury, the qualitative content of the injury prevention program, compliance, and adherence to the prescribed evidence-based programs (Fortington et al., 2015; McKay & Verhagen, 2016). In addition, insight into the

behavioural context in which injury prevention will be implemented is necessary for injury prevention programs (Finch, 2006). Taking into account the attitudes, beliefs, opinions, and perceptions of the people directly involved (coaches and athletes) in injury prevention when designing and implementing injury prevention programs may increase the odds of successful injury prevention in real-life sports settings (Fokkema et al., 2019; Shamlaye et al., 2020). These behavioural factors greatly affect compliance (Silvers-Granelli et al, 2018) and adherence (Rees et al, 2022) rates to injury prevention programs.

Compliance refers to "the act of an individual conforming to professional recommendations with regard to prescribed dosage, timing and frequency of an intervention" while adherence "is a process influenced by the environment, recognizing that behaviour is shaped by social contexts as well as personal knowledge, motivations, skills and resources" (McKay & Verhagen, 2016, p. 382). Although researchers have used these terms interchangeably, adherence is said to be more appropriate when capturing dynamic and complex changes required to assess interventions over time (Owoeye et al., 2018).

Research on adherence to Injury prevention programs among coaches and athletes is sparse in the literature, but the existing research suggests that these prevention programs are underused (Dix et al., 2021). The cost of injury prevention programs and lack of education in injuries and prevention programs have been suggested as potential barriers to implementation (Dix et al., 2021). The burden of adoption is not on the coaches alone; the athletes themselves are also key to successfully implementing an injury prevention program (Martinez et al., 2017). So, it is essential to understand the attitudes and motivations of the athletes so that efforts can be targeted in the widespread use and ultimately, adherence to injury prevention programs (Martinez et al., 2017).

The rationale of the Study

The discussions above show that sports injury, whether mild or severe, is widespread in sports. Any athlete can experience it at least once in their career. To reduce athletes' susceptibility to injury or prevent further occurrence, it requires joint efforts from several people, including sports' governing body, the coaches, sports medical professionals, and the athletes themselves. Athletes' importance when making sports decisions cannot be overemphasized, from purchasing sports equipment to developing injury prevention strategies. Although several evidence-based injury prevention strategies are available for athletes in the literature, there have been challenges in implementing these strategies in real-life sports settings (Owoeye et al., 2018). It has been suggested that understanding the behaviour of the people involved in injury prevention may help us understand why this is so (Verhagen et al., 2010). In this regard, many studies have been done to understand coaches' knowledge, attitudes, and perceptions toward injury and injury prevention. Some of these studies among coaches have shown that coaches who had educational workshops on injury prevention programs and who have previously utilized injury prevention programs in their teams have positive attitudes toward injury and injury prevention (Shamlaye et al., 2020; Soligard et al., 2010). However, there is a gap in knowledge concerning the attitudes of athletes toward injury and injury prevention, especially among university athletes. Therefore, this study will examine the attitudes of university athletes towards injury and injury prevention and also look at athletes' perceived facilitators/barriers to injury prevention implementation. This may help to understand why there are challenges in implementing injury prevention programs. The study findings may also help in designing injury prevention programs that can be implemented successfully in real-life sports settings.

Chapter 3: Methods

This chapter describes the study design, participants, recruitment process (including sample size calculation), data collection (survey questionnaire and procedure), and data analysis plans for the study.

Design and Participants

This study used a cross-sectional design, which allowed for data collection at a single point in time (Portney & Watkins, 2015). A questionnaire was utilized as the data collection method and questions were analyzed quantitatively. The study involved student-athletes, who were from the University of Manitoba Bison teams in Winnipeg, Manitoba and York University York Lions teams in Toronto, Ontario. This study's participants included male and female athletes in ice hockey, basketball, football, volleyball, and soccer. The participants included were 18 years of age and above.

Recruitment

Since the study involved human participants, ethical approval (see Appendix E) was obtained from the Research Ethics Board (REB) 1 located at the Fort Garry campus at the University of Manitoba. Convenience sampling method (Portney & Watkins, 2015) was utilized to recruit participants for the study. Data was collected through an online survey created on Survey Monkey (Survey Monkey Inc. San Mateo, USA). The survey was approximated to take 10 minutes to complete. All important information (see Appendix A) about the study was included at the beginning of the survey for the participants to read before they made an informed decision about their participation in the study. Only participants who indicated that they agreed

with the information provided were able to proceed to the survey questions. Recruitment of participants started in October and ended in December 2023.

Sample Size Determination

Sample size determination is an important aspect of research that needs to be considered during the planning stage of any study (Merrifield & Smith, 2012). It allows the researcher to produce an estimate that is expected to be equally accurate as an actual parameter in the target population (Bujang, 2021). Sample size calculation is also needed to ensure that a study is capable of detecting real associations between study factors (Merrifield & Smith, 2012).

For this study, the Taro Yamane formula was used to determine the minimum sample size. Taro Yamane formula was developed by the statistician Taro Yamane in 1967 to estimate sample size from a given population (Yamane, 1973). Using the formula below, the study sample size was estimated to be 148.

$$n = \frac{N}{1 + Ne^2}$$ (Yamane, 1973)

Where n = sample size

N = population size= 236 (total number of athletes in the five sports listed from the University of Manitoba Bisons)

e = level of significance set at 0.05

$$n = \frac{236}{1 + 236\ (0.05)^2}$$

$= 236/ 1.59 = 148.43$

$\approx$ **148**.

Procedure

Before data collection, approval was sought from the University of Manitoba Athletic Director. Also, coaches in each of the eight sports teams were contacted by email (see Appendix C) to help schedule a day when the primary investigator could meet with the athletes to discuss the research project. Out of the eight coaches contacted, only coaches in ice hockey and volleyball (both male and female teams) granted the researcher a day to meet the athletes. On each day given by those teams, all necessary information about the study was explained in detail to the athletes. Since the athletes agreed to complete the questionnaire when it was convenient for them, the survey link and recruitment poster (see Appendix D) were sent to their coaches via email which was later shared with the athletes in their group emails. The other coaches from both the basketball teams and the football team did not grant any day for an in-person meeting but only requested the researcher send the survey link and the poster to their emails, which was later shared with their athletes. There was no response from the soccer coach, so the researcher connected with one of the soccer players on the Bison team who helped share the survey link on the team WhatsApp group (WhatsApp Inc. Mountain View, USA). Because of the initial low response from the University of Manitoba Bison teams, the survey link and recruitment poster were also sent to the York Lions teams at York University.

Survey Questionnaire

The survey questionnaire (see Appendix B) for this study consists of three parts. The first part of the questionnaire is the demographic section. This section asked participants about their age, sex, team sports played, history of injuries in the past year, and their year of education program.

The second part of the survey was adapted from two validated questionnaires from previous studies (Geertsema et al., 2021; Kurowski et al., 2014). Kurowski and colleagues' (2014) injury behaviour and attitude questionnaire was used among high school athletes in high-risk sports to evaluate concussion behaviour and attitudes. Geertsema and colleagues (2021) sports injury prevention questionnaire was used among FIFA-registered female soccer players to examine injury prevention attitudes and beliefs. For the second part of this survey, five of the questions in the survey were from Kurowski et al (2014) questionnaire while the other six questions were from Geertsema et al (2021) questionnaire. This evaluated attitudes related to injury and injury prevention and was measured on a 5-point Likert scale. A favourable attitude means a higher score on an attitude question (e.g., I will never play through any condition or injury for my team to win).

The third part of the survey was adapted from Geertsema et al (2021) questionnaire that was described above. This part asked what athletes consider the facilitators or barriers to injury prevention implementation.

Data Analysis

Data was analyzed quantitatively using Statistical Package for Social Science version 29 (SPSS Inc., Chicago, USA). SPSS provides the researcher with a comprehensive set of statistical procedures encompassing many methods used in quantitative education research, measurement, and evaluation. (Stehlik-barry et al., 2022). Demographic information of participants was summarized using median, frequency and percentage. Questions in the attitudes to injury and injury prevention section was summarized using frequency and percentage. Likewise, facilitators/barriers to injury prevention implementation section of the survey was summarized

using frequency and percentage. Attitude item scores of the participants were summarized using the median.

For the hypotheses testing, the level of significance was set at $p < 0.05$ (Portney &Watkins, 2015). Univariate analysis of variance (ANOVA) was used to determine the association between participants' sex and their attitudes towards injury and prevention, participants' injury history and their attitudes towards injury and prevention, and lastly, participants' year of education program and their attitudes towards injury and prevention. Mean and standard deviation were used to find the differences in the association found between the variables. To determine the effect size observed for the ANOVA tests, Cohen's f ($f = 0.10$ indicates a small effect; $f = 0.25$ indicates a medium effect; $f = 0.40$ indicates a large effect) and partial eta-squared ($\eta^2 = 0.01$ indicates a small effect; $\eta^2 = 0.06$ indicates a medium effect; $\eta^2 = 0.14$ indicates a large effect) were used.

Chapter 4: Results

The results are presented to address the research questions. A total of one hundred and sixteen (116) participants opened the online survey. One (1) out of the one hundred and sixteen (116) questionnaires returned were not valid owing to non-response in most parts of the survey. Therefore, one hundred and fifteen (115) questionnaires were available for the analysis. The response rate, a key metric in assessing participant engagement, was calculated based on the total number of invited participants across two Universities (University of Manitoba and York University). The formula used for this calculation is expressed as:

$$Response\ Rate = \frac{Number\ of\ Completed\ Responses}{Total\ Number\ of\ Invited\ Participants} \times 100$$

In this study, recruitment information was sent to the high-risk sports teams (basketball, football, soccer, volleyball, and ice hockey teams) in the two universities mentioned above, with the University of Manitoba teams having an athlete count of 236 and York University having an athlete count of 286. Therefore, the total number of invited participants was 236+ 286= 522. The response rate was then computed using the collected data of 115 responses, resulting in a response rate of approximately 22%.

The age range of participants was 18-28 with a median age of 21 years. Regarding the sex of participants, the majority of the participants were male with a percentage of 56.5%. Also, all five sports (i.e., football, volleyball, basketball, ice hockey, and soccer) were represented among the participants. Furthermore, participants' year in their education program varied from year 1 to year 6, with the majority of the participants being in their third year. Most of the participants (72.2%) have had one or more injuries in the past year that led them to be unable to

participate in a game or training session. The injuries reported by participants were located in the head, knee, thigh, ankle, shoulder, and hip/groin.

Research Question One

1. Will there be an association between injury history, sex, and year in education program of athletes and their attitudes toward injury and injury prevention?

Descriptive analysis

A descriptive analysis of the participants' attitudes toward injury and injury prevention was carried out. This is summarized in Table 1, Table 2, and Figure 1. The results show that more participants believe they are often (43, 37.4%) or always (40, 34.8%) at high risk of sustaining an injury. Also, only twelve (10.4%) participants reported they would always immediately report having an injury to a coach or athletic therapist even if it meant sitting out of a game. However, thirty-four (29.6%) participants responded that they would rarely report to a coach or athletic therapist about an injury during a championship game even if they knew the injury might lead to a severe one.

The majority of the participants felt it was very important (55, 47.8%) for them as an athlete to try to prevent injury. Yet, few of the participants felt they were extremely (6, 5.2%) informed about injury prevention programs. On balance, most of the participants felt positive (74, 64.3%) about injury prevention measures.

Table 1

Attitudes towards sports injury and injury prevention of participants (n=115)

Variables	Frequency (n)	Percentage (%)
As an athlete, I am at high risk of sustaining an injury		
Never	1	0.9
Rarely	5	4.3
Sometimes	26	22.6
Often	43	37.4
Always	40	34.8
I would immediately report having an injury to a coach, athletic therapist or other healthcare professionals if I knew it meant I would have to sit out of a game.		
Never	5	4.3
Rarely	32	27.8
Sometimes	37	32.2
Often	29	25.2
Always	12	10.4
I would play through any condition or injury for my team to win.		
Always	21	18.3
Often	48	41.7
Sometimes	30	26.1
Rarely	13	11.3
Never	3	2.6
I would report having an injury to a coach, athletic therapist or other healthcare professionals even if I knew it meant I would have to sit out a practice or two.		
Never	1	0.9
Rarely	24	20.9
Sometimes	40	34.8
Often	37	32.2
Always	13	11.3
The motivation of the coach affects the athletes' motivation to do injury prevention exercises		
disagree	8	7.0
neutral	31	27.0
agree	56	48.7
strongly agree	20	17.4

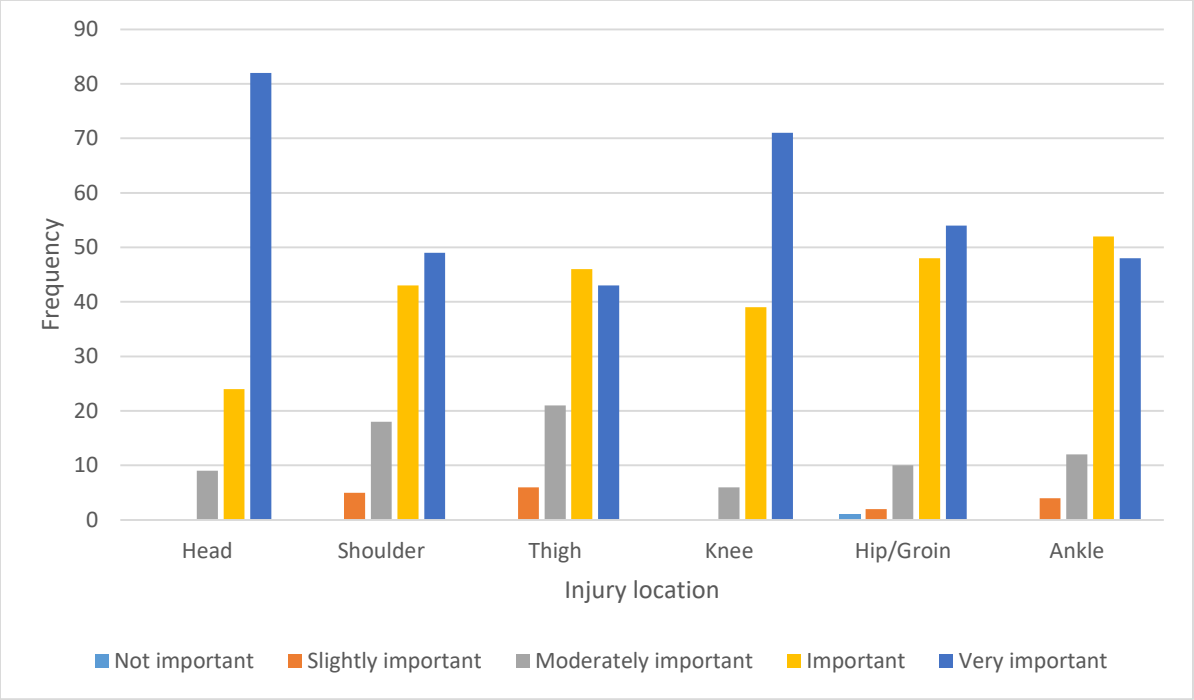
Table 2

Attitudes towards sports injury and injury prevention of participants (cont'd)

Variables	Frequency (n)	Percentage (%)
I feel that it is important to be thoroughly evaluated by a medical personnel after an injury to make sure I recover completely		
Never	1	0.9
Rarely	6	5.2
Sometimes	15	13.0
Often	44	38.3
Always	49	42.6
During a championship game, you get injured. It hurts but does not really hinder your ability to play. Knowing that it would result in a more severe injury, I would report the injury to a coach or athletic therapist.		
Never	19	16.5
Rarely	34	29.6
Sometimes	30	26.1
Often	23	20.0
Always	9	7.8
How important is it for you as an athlete to try to prevent injuries?		
Slightly important	1	0.9
Moderately Important	21	18.3
Important	38	33.0
Very important	55	47.8
I feel informed about injury prevention programs.		
Not at all	11	9.6
Slightly	28	24.3
Moderately	47	40.9
Very	23	20.0
Extremely	6	5.2
How do you feel about injury prevention measures		
Neutral	9	7.8
Positive	74	64.3
Very positive	32	27.8

Figure 1

Participants' attitude to the prevention of injury in different body locations



Inferential analysis

The association between participants' history of injury, sex, year in education program and their attitudes towards injury and prevention was tested. For the first hypothesis, the result showed a significant association between participants' history of injury and their attitudes toward injury and prevention (p=0.01). The results further showed that participants with no injury history have a higher attitude score (mean = 63.31, std deviation = 6.02) when compared to participants who recorded injury history (mean = 59.91, std deviation = 6.39). Also, a medium effect size was observed (Cohen's f = 0.25, partial $\eta^2 = 0.06$).

For the second hypothesis, the result showed no significant association between the sex of athletes and their attitudes toward injury and prevention (p = .103). A small effect size was also observed (Cohen's f = 0.15, partial $\eta^2 = 0.02$).

Lastly, the third hypothesis result showed no significant association between athletes' year in their education program and their attitudes toward injury and prevention (p = 0.974). Also, a small effect size was observed (Cohen's f = 0.10, partial $\eta 2 = 0.01$).

Research Question Two

2. Will athletes' attitudes to injury differ from their attitudes to injury prevention?

Descriptive analysis (Attitudes scores)

The scores of all attitude questions responded to by the participants are presented in Table 3. The attitude questions were based on a 5-point Likert scale, with 1 being the lowest score and 5 being the highest score per question. Of the eleven attitude questions answered by the participants, higher scores (i.e. scores ranging from 4-5) were reported in six attitude questions. The remaining five questions reported lower scores (i.e. scores ranging from 3 and below). The higher scores reported were mostly on participants' attitudes to injury prevention (questions 6,7,9, 10 and 11) while the majority of the lower scores reported were on participants' attitudes to injury (questions 2,3,4 and 5).

Table 3

Attitude questions scores (n=115)

Variables	Median
As an athlete, I am at high risk of sustaining an injury.	4.0
I would immediately report having an injury to a coach, athletic therapist or other healthcare professionals if I knew it meant I would have to sit out of a game.	3.0
I would play through any condition or injury for my team to win.	2.0
I would report having an injury to a coach, athletic therapist or other healthcare professionals even if I knew it meant I would have to sit out a practice or two.	3.0
During a championship game, you get injured. It hurts but does not really hinder your ability to play. Knowing that it would result in a more severe injury, I would report the injury to a coach or athletic therapist.	3.0
I feel that it is important to be thoroughly evaluated by a medical personnel after an injury to make sure I recover completely.	4.0
How important is it for you as an athlete to try to prevent injuries?	4.0
I feel informed about injury prevention programs.	3.0
How do you feel about injury prevention measures (e.g., stretching, specific warm-up exercise, taping)?	4.0
To what extent do you agree with this statement: “The motivation of the coach affects the athletes’ motivation to do injury prevention exercises”?	4.0
How important do you think it is to prevent the following injuries?	
Head	5.0
Shoulder	4.0
Thigh	4.0
Knee	5.0
Hip/Groin	4.0
Ankle	4.0

Research Question Three

3. What factors will athletes perceive as facilitators and barriers to injury prevention implementation in their team?

Descriptive analysis

The perceived facilitators and barriers to the implementation of injury prevention measures reported by participants are presented in Tables 4 and 5. One hundred and eleven (96.5%) participants reported that they engaged in injury prevention measures with their team in the current season. As regards participants' perception of facilitators and barriers to injury prevention measures, most participants reported that short training programs, the attitude of the coach, education of athletes and coaches on injury prevention, free and good equipment, performance-enhanced injury prevention programs, trained medical staff availability, and athlete's motivation will all facilitate the implementation of injury prevention measures in their team.

Meanwhile, the majority of the participants responded that long training programs, time constraints, and match congestion will hinder the implementation of injury prevention measures in their team.

Table 4

Participants perceived facilitators/barriers to the implementation of injury prevention measures (n=115)

Variables	Frequency (n)	Percentage (%)
Did you participate in any of the above injury prevention measures to reduce the risk of injury with your team this season?		
Yes	111	96.5
No	4	3.5
The following are some variables that might facilitate or hinder a team from using injury prevention measures. As an athlete, how do you think each of these listed variables will affects the use of injury prevention measures in your team?		
Short training program (0-15 minutes)		
Facilitates	99	86.1
Hinders	16	13.9
Long training program (more than 15 minutes)		
Facilitates	54	47.0
Hinders	61	53.0
Too many matches in short period of time		
Facilitates	16	13.9
Hinders	99	86.1
Attitude from the coach		
Facilitates	79	68.7
Hinders	36	31.3
Education of the athletes and coaches regarding injury prevention		
Facilitates	111	96.5
Hinders	4	3.5
Time constraints		
Facilitates	16	13.9
Hinders	99	86.1

Table 5

Participants perceived facilitators/barriers to the implementation of injury prevention measures (cont'd) (n=115)

Variables	Frequency (n)	Percentage (%)
Free and good equipment for injury prevention		
Facilitates	107	93.0
Hinders	8	7.0
Injury prevention program that improves performance		
Facilitates	106	92.2
Hinders	9	7.8
Trained medical staff availability (e.g. athletic therapist, sports psychologist, and dietician).		
Facilitates	108	93.9
Hinders	7	6.1
Athletes motivation		
Facilitates	105	91.3
Hinders	10	8.7

Hypothesis Testing

Hypothesis 1: there will not be an association between athletes' history of injury and their attitudes toward injury and prevention.

Set p-value: $p < 0.05$, **Test statistics:** univariate analysis of variance, **Observed p-value:** 0.01.

Inference: Since the level of significance observed for this hypothesis ($p = 0.01$) is less than the set p-value ($p = 0.05$), it is inferred that there is a significant association between athletes' history of previous injury and their attitudes toward injury and prevention.

Verdict: the null hypothesis is hereby rejected.

Hypothesis 2: there will not be an association between athletes' sex and their attitudes toward injury and prevention.

Set p-value: $p < 0.05$, **Test statistics:** univariate analysis of variance, **Observed p-value:** 0.103.

Inference: Since the level of significance observed for this hypothesis ($p = 0.103$) is greater than the set p-value ($p = 0.05$), it is inferred that there is no significant association between athletes' sex and their attitudes toward injury and prevention.

Verdict: the null hypothesis is hereby accepted.

Hypothesis 3: there will not be an association between athletes' year of educational program and their attitudes toward injury and prevention.

Set p-value: $p < 0.05$, **Test statistics:** univariate analysis of variance, **Observed p-value:** 0.974.

Inference: Since the level of significance observed for this hypothesis ($p = 0.974$) is greater than the set p-value ($p = 0.05$), it is inferred that there is no significant association between athletes' year of educational program and their attitudes toward injury and prevention.

Verdict: the null hypothesis is hereby accepted.

Chapter 5: Discussion

The purpose of this study was to investigate the attitudes of university athletes toward sports injury and injury prevention and also provide insight into athletes' perceived facilitators/barriers to the implementation of injury prevention measures. There are three key findings of this study. These key findings are 1) there was a significant association between athletes' history of injury and their attitudes toward injury and injury prevention, 2) university athletes' attitudes toward injury differ from their attitudes toward injury prevention, and 3) university athletes perceive long training programs, match congestion, and time constraints as barriers to and perceive short training programs, coach attitude, injury prevention education, free and good equipment, trained medical staff, performance-enhanced injury prevention program, and athletes' motivation as facilitators to the implementation of injury prevention measures. These key findings will be discussed in the following two sections.

Attitudes of athletes toward sports injury and injury prevention

It is clear from the results of this study that participants (university student-athletes) have varying attitudes toward sports injury and injury prevention. Our findings indicate that most university athletes believe they are often or always at high risk of sustaining injuries, implying that university athletes are aware that being an athlete makes them more prone to injuries. This is consistent with Geertsema and colleagues (2021) finding among elite female soccer players at the France 2019 FIFA Women's World Cup, in which the majority of soccer players also indicated that they were at moderate to high risk of sustaining an injury.

Interestingly, our study indicated that this belief of athletes on injury risk does not result in better injury reporting. Only a few athletes responded that they would always immediately report an injury to their coach or athletic therapist if it meant they would have to sit out of a

game. Similarly, only a few athletes said they would always report an injury that may lead to a severe injury while playing in a championship game. Also, not many athletes would always report having an injury to a coach or athletic therapist if it meant sitting out of a practice or two. This pattern of results is consistent with the previous literature (Kurowski et al., 2014; Register-Mihalik et al., 2013) that examined high school athletes. Collectively, these findings indicate that athletes will fail to report an injury because they do not want to be removed from a game or practice they deem important. Another interpretation is that our participants may not have sufficient knowledge about the long-term consequences of injuries if not treated appropriately. It could also mean that there is inadequate communication between the athletes and their coaches/ athletic therapists as regards injury reporting.

Another concerning attitude found from this study is that most of the athletes will often play through any condition or injury for their team to win. This finding agreed with other authors' findings (Kurowski et al., 2014; Malinauskas, 2008; Pearce et al., 2017). Kurowski and colleagues (2014) highlighted that only a few high school athletes would never play through any condition or injury for their team to win. Also, in the study done by Pearce and colleagues (2017) with university students, they found that although university students believe it is not safe to play with a concussion, they will still risk playing with a concussion to win. Likewise, Malinauskas (2008) highlighted that collegiate/varsity athletes will play or train through concussion or any injury to protect their scholarships or gain peer acceptance. An explanation for this finding could be the lack of knowledge by university athletes regarding the pathophysiology of injuries. In other words, university athletes may not fully understand how serious an injury actually is. Previous studies done in student-athlete populations have cited knowledge gaps as a reason why athletes risk playing following an injury (Baker et al., 2013; Malinauskas, 2008; Torres et al.,

2013). Taken together, these findings so far suggest that even though university athletes believe they have a high risk of sustaining injuries, it does not translate to better reporting behaviour or not continuing to play while injured.

Despite the above attitudes regarding injury among our study participants, their attitudes to injury prevention showed a different result. Our findings revealed that the majority of the athletes felt it was important or very important for them to try to prevent injury. This indicates that the athletes believe they are also responsible for ensuring a successful injury prevention measure. Also, most of our study participants feel positive about injury prevention measures. This can be interpreted that university athletes are receptive to engaging in injury prevention measures. Geertsema and colleagues' (2021) study revealed that elite female soccer players deem injuries at the knee and ankle to be the most important to prevent while the head, thigh, and groin are the least important parts of the body to prevent injuries. However, in our findings, most university athletes feel injuries to the head and knee are the most important to prevent, followed by the hip/groin, shoulder, ankle, and thigh. This discrepancy in the two studies could be because of the different types of sports in the two studies. Our study's participants were recruited from five sports while the other authors' study only recruited soccer players.

In addition, almost half of our study participants felt it was always important to be thoroughly evaluated by medical personnel to make sure they recovered completely after an injury. This finding projected a good attitude to recovery after an injury has occurred, which could directly help in prevention. This means that athletes' positive attitude to recovery can help prevent further and more severe injuries from occurring. Furthermore, almost half of our study's participants agreed that the motivation of the coach affects that of athletes to do injury prevention exercises. This is consistent with previous studies (Donaldson et al., 2019; Geertsema

et al., 2021; Harøy et al., 2019). This implies that athletes will be encouraged to engage in injury prevention measures when they see their coaches are also enthusiastic about injury prevention measures for the team. This finding shows the importance of coaches in the implementation and adherence to injury prevention measures. One other result from this study merits comments. Our findings show that just a few participants are extremely or very informed about injury prevention programs. Although a good number of the athletes reported they were moderately informed about injury prevention programs, this finding still suggests a need for university athletes' education on injury prevention programs. However, further exploration of how the athletes would like to receive these education programs is needed.

From our hypothesis test findings, attitudes demonstrated by university athletes toward injury and injury prevention are significantly associated with their history of injury. This finding further showed that athletes with no history of injury have better attitudes toward injury and prevention when compared to athletes who had a history of injury. This is similar to the studies among high school athletes (Kurowski et al., 2014) and university students (Pearce et al., 2017). We do not know why this is so, we can only speculate that those athletes with a history of injury now have the mindset that injuries cannot be prevented, and thus don't believe in the programs. This finding suggests that behavioural education on injury and prevention should be focused more on athletes with a history of injury. Moreover, further studies exploring the reasons behind this finding will be needed. Also, our findings showed that there was no significant association between sex, athletes' year in their educational program and their attitudes to injury and prevention. Our finding on the association between sex and athletes' attitudes differs from previous studies done among high school athletes where they found that female athletes have better self-reporting behaviours (Kurowski et al., 2014) and are more likely to engage in injury

prevention programs (Martinez et al., 2017). To our knowledge, our finding on the association between athletes' year in their education program and their attitudes have not been investigated before so cannot be compared with previous literature.

On balance, our findings indicate that although university athletes showed concerning attitudes toward injury, it did not affect their attitudes toward injury prevention, and athletes' history of injury significantly influenced the attitudes shown by university athletes toward injury and prevention and not by their sex nor by year in their educational program. Behavioural intervention should focus more on athletes with a history of injury.

Facilitators and barriers to the implementation of injury prevention measures

This study found interesting results on university athletes' perceived facilitators and barriers to the implementation of injury prevention measures in their teams. Our study findings revealed that almost all of the participants participated in one or more of their team injury prevention measures this season. This finding suggests that this cohort of university athletes take their responsibility of preventing injuries seriously, which agrees with our finding about their attitudes toward the importance of preventing injuries as athletes (most of the athletes felt it was important or very important for them to try to prevent injury). Another interpretation of this finding could be that the coaches of these teams are a motivating factor for ensuring athletes engage in injury prevention measures. This supports our earlier finding that almost fifty percent of the athletes agreed that the coach's motivation affects their motivation to do injury prevention exercises.

Furthermore, when asked about facilitators and barriers to the implementation of injury prevention measures, the majority of the athletes recognized short training programs (less than or

equal to 15 minutes) as a facilitator for their team to partake in injury prevention measures. This finding is consistent with a study done by Harøy and colleagues (2019) among male soccer players where the players agreed that their participation in an injury-prevention exercise program would increase if it took less time to complete. Also, our study participants and Harøy and colleagues (2019) study participants perceive long training programs (more than 15 minutes) as barriers to using injury prevention measures in their teams. Interestingly, our findings showed that the majority of the athletes will adopt an injury prevention exercise program if it improves their sports performance. This finding corroborates previous literature (Dix et al., 2021; Fokkema et al., 2019; Harøy et al., 2019; Richmond et al., 2020). Therefore, stakeholders involved in the development of injury prevention exercise programs for university sports should consider developing future injury-prevention exercise programs that take less time to complete and that improve performance to ensure adherence to those programs.

In addition, our findings highlight that most university athletes perceive match congestion and time constraints as barriers for their team to use injury prevention measures. Similar to previous studies (Dix et al., 2021; Donaldson et al., 2019; Rees et al., 2022), match congestion and limited training time seem to be major barriers to the implementation of injury prevention measures in team sports. This further highlights the importance of developing time-efficient injury prevention exercise programs and suggests the need for spacing of matches for the athletes to ensure proper implementation of injury prevention programs.

Almost all of our study participants indicate that the education of coaches and athletes about injury prevention will facilitate the implementation of injury prevention measures in their teams. Previous research (Dix et al., 2021; Donaldson et al., 2019, Fokkema et al., 2019) supports the importance of providing adequate education about injury prevention for athletes and

coaches. Also, previous studies have shown that only the coaches have been at the receiving end of injury prevention education (Dix et al., 2021; Shamlaye et al., 2020). Our study finding suggests that future injury prevention educations also need to feature the athletes. This education should not only be awareness of injury prevention programs but should also include the practical aspects of injury prevention programs such as workshops that will give both theoretical and practical instructions about injury prevention programs. However, future studies will be needed to investigate how the athletes would like to receive the education.

Additionally, our findings showed that most university athletes perceive free and good equipment as a facilitator to implement injury prevention measures in their teams. This finding is consistent with previous literature (Dix et al., 2021; Fokkema et al., 2019) where athletes and coaches said they would use any injury prevention measure if it's free of cost. This finding could be useful information for the higher-rank stakeholders in university sports as regards the provision of free and effective injury prevention equipment for the teams. Also, our findings revealed the importance of the availability of trained medical staff in university sports as our study participants recognized that it would facilitate the implementation of injury prevention programs. Previous studies (Harøy et al., 2019; Rees et al., 2022) have shown how having trained medical staff in sports teams contributes to not only the treatment of injuries but also to the teams' use of injury prevention programs. Two other findings from this study merit comments. First, 68.7 % of the participants perceived that the attitude of the coach is a facilitator while the remaining 31.3 % of participants perceived the attitude of the coach as a hindrance to implementing injury prevention programs in their teams. This finding can be interpreted in two ways. The participants who perceived the attitude of the coach as a facilitator to the use of injury prevention programs suggest that the coaches have good attitudes while those participants who

perceived the attitude of the coach as a hindrance to the use of injury prevention programs could indicate that the coaches have bad attitudes to injury prevention implementation. Although the percentage of participants who perceived the attitude of the coach as a facilitator is higher than those who perceived it as a hindrance, this finding still suggests a need to improve university coaches' attitudes toward the use of injury prevention programs. The second and last finding that merits comment is that the majority of the participants perceived athletes' motivation as a facilitator in implementing injury prevention programs. This can be interpreted as that increased motivation from athletes will lead to an increased use of injury prevention programs. Furthermore, these two findings could be interpreted as that both the coach and athletes need to have a positive attitude and be motivated to ensure adherence to an injury prevention program. This interpretation is consistent with the finding of a previous study by Dalen-Lorentson and colleagues (2021) among soccer players and their coaches, who showed the importance of coach and athletes' attitudes in the use of injury prevention programs and how they could contribute to each other's attitudes toward injury prevention.

Research Implications

From a theoretical perspective, incorporating the theory of planned behaviour provides a critical lens through which to view sports injury and injury prevention in sports. The traditional view revolves around clinical contexts such as the development of technologies and measures that help reduce the likelihood and severity of sports injuries (Chan et al., 2009). However, by adopting the theory of planned behaviour, this study highlights the significant role human behavioural factors (such as attitude) play in injury and injury prevention. This study recognizes athletes as important stakeholders in sports injury and injury prevention. By understanding university athletes' attitudes toward injury and injury prevention, we gain deeper insights into

how athletes' behaviour contributes to the challenges in the adoption of injury prevention strategies in real-world sports settings.

From a practical perspective, the implication of this study has direct relevance for other stakeholders in sports such as university sports governing bodies, coaches, sports researchers and clinicians. Understanding university athletes' attitudes toward injury and injury prevention enabled us to recognize the fact that university athletes can benefit from educational interventions targeted at improving knowledge about sports injury and injury prevention. This may include injury pathophysiology, injury signs and symptoms, a brief introduction to an injury prevention program, its benefits, any side effects, and practical instructions on how it works and can be done. Also, behavioural intervention might be needed for athletes especially those with a past injury history to improve their view of injury and injury prevention. This intervention could be in the form of visitation to a sports psychologist's clinic.

Our study also revealed the importance of good communication between athletes and coaches as regards reporting of injuries. This may include the coach having a good rapport with the athletes and showing good leadership within the team, which would likely improve the injury reporting frequency from the athletes to their coaches. To address the barriers to implementing injury prevention programs in university sports, our study suggests a review of the university sports season calendar to ensure spacing between matches, which gives the teams and their coaches enough time to use injury prevention programs adequately. Also, clinicians and sports researchers involved in developing injury prevention programs should consider developing time-efficient programs that will also improve the performance of athletes. This would facilitate the successful implementation of injury prevention programs in university sports teams.

The provision of free and good injury prevention equipment will ensure adherence to injury prevention measures among university athletic teams. This could include equipment for exercise programs and other injury prevention equipment like braces, shoe insoles, tapes, personal protective equipment, etc. Also, the university sports teams having sufficient trained medical staff for their care and well-being will boost the implementation of injury prevention measures in the teams.

Furthermore, our study revealed that a good attitude from the coach and athletes' motivation will facilitate the use of injury prevention measures. The provision of free injury prevention workshops, paid leaves, and free physical and mental health checkups could improve coaches' general outlook on their job which would positively impact the adoption of injury prevention measures in their teams. Athletes could also be motivated in different ways. A good attitude from coaches, and support from their coaches, medical staff, and loved ones could be motivational factors for athletes, and ensure they adhere to injury prevention measures.

Lastly, our study findings on facilitators and barriers to injury prevention implementation revealed the importance of different stakeholders (such as the athletes, coach, medical staff, sport's governing body, and sports researchers) in the implementation of injury prevention programs. These findings suggest a need for collaboration among these stakeholders. Improving the culture surrounding injury prevention (i.e. all these stakeholders working together) would likely improve adherence to injury prevention programs.

Limitations/Delimitations

Our study has some limitations. First, there was difficulty recruiting participants from University of Manitoba and data collection was challenging. This difficulty in recruiting could be

due to the busy sports season and also considering our participants are university students, priority has to be given to their academic work. However, we worked on this limitation by recruiting athletes from another Canadian university (York University) to boost our sample size and to ensure a broader representation of Canadian university athletes. In addition, there was time limitation from the researcher's end, so we could not give more time for data collection. From our data collection experience, we detected that there was faster participation when the researcher met the coaches and athletes in person as compared to the invitation via online means. This could be useful information for other researchers who are considering recruiting university athletes as their study participants.

Another limitation of this study is on injury type and location. We did not ask our participants whether the injuries they reported they had in the past year were sudden or developed gradually. Also, the study's survey only provided six injury locations, so the participants were limited in the injury locations they could report as there was no option for other injury locations. Including these two variables might have improved the interpretation of our findings concerning injury. Concerning the generalizability of the result of this study, data was only collected from Canadian university student-athletes, so caution should be taken in generalizing the results of the study to student-athletes in other countries. Also, because we targeted student-athletes in high-risk sports, caution would be needed in generalizing these results to university athletes in low-risk sports. We recommend that future studies targeting university athletes should consider investigating both athletes in high-risk and low-risk sports to allow for a broader representation of university athletes.

Despite these limitations, our study's delimitation was to investigate university athletes in the five most common high-risk sports which are basketball, volleyball, football, soccer, and ice

hockey. From our preliminary research of athletic teams in Canadian universities registered under Usports Canada, it is worth noting that these five high-risk sports are included in all Canadian universities athletic programs and represent 43% of all sports in Canadian universities (25 % for the remaining high-risk sports not common and 32% for low-risk sports; U SPORTS, n.d.). These five sports are well-represented in our findings, so we would therefore argue that our findings provide valuable information regarding the attitudes of Canadian university athletes toward sports injury and injury prevention.

Directions for future research

Although this study's findings have improved our understanding of university athletes' attitudes toward sports injury and injury prevention, they could not answer some questions which might need further investigation. Since our study only recruited university athletes in high-risk sports, we could not determine the attitudes of university athletes in low-risk sports toward sports injury and injury prevention. Future studies should consider investigating both athletes in high-risk sports and low-risk sports and check if there are any differences in their attitudes towards injury and injury prevention. We also suggest that future studies should consider investigating the differences in the attitudes of athletes based on the type of high-risk sports they engage in. In addition, we suggest future in-depth questions need to be asked to better understand university athletes' attitudes toward injury and injury prevention. These questions could include what an injury means to the athletes, factors that might prevent them from reporting an injury, what could motivate them as athletes to use injury prevention measures, what other factors may hinder their team from using injury prevention measures, and their opinion of what could be done to facilitate the use of injury prevention measures in their team. For this, future studies should consider the

use of qualitative research strategies to gain a deeper understanding of athletes' attitudes toward injury and injury prevention.

Furthermore, our study did raise some questions for future research and highlighted the importance of athletes receiving education regarding sports injury and prevention. This raises the question of how to extend this education to the athletes. Future studies should consider getting answers to this question from university athletes before employing this intervention strategy. Also, our study's finding showed that more athletes would use injury prevention training program if it is between 0-15 minutes. For this finding, further investigation is needed by conducting an experimental study to determine if this will be true in a practical setting. This experimental study will involve developing an injury prevention training program that will be of 0-15 minutes range. Lastly, our findings about injured university athletes having concerning attitudes to injury and prevention suggest that a future investigation asking in-depth questions on this is needed among the injured athletes.

Conclusion

In conclusion, this study shed light on the attitudes university athletes have toward injury and injury prevention and university athletes' perceived facilitators/barriers to the implementation of injury prevention programs in their teams. Our study showed that university athletes have a more positive attitude toward injury prevention as opposed to their more concerning attitudes toward injury which is not very good. Also, our study revealed that the history of injury of athletes influenced their attitudes to injury and injury prevention, as those athletes without a history of injury have better attitudes to injury and injury prevention when compared to athletes with a history of injury. Therefore, our study suggests behavioural and educational interventions to improve athletes' views of injury and injury prevention.

Our study recognized long training programs, match congestion, and time constraints as barriers to implementing injury prevention programs. Our study also highlights short training programs, injury prevention programs that improve performance, good attitude from coach, athletes' motivation, trained medical personnel availability, educational training for coaches and athletes, and free equipment for injury prevention as facilitators to implementing injury prevention programs. All these factors taken into consideration, together with collaboration among stakeholders would likely improve adherence to injury prevention programs in university athletic teams.

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APPENDIX A (Informed Consent Form)

Research Project Title: Attitudes towards Sports Injury and Injury Prevention among University Athletes.

Principal Investigator and contact information: Ruqoyyah Jimoh, Master's student, jimohr1@myumanitoba.ca

Research Supervisors, academic rank and contact information: Dr. Leisha Strachan, Professor, Leisha.Strachan@umanitoba.ca. Dr. Jeff Leiter, Assistant Professor, jleiter@panamclinic.com

This consent form, a copy of which you can download or print for your records and reference, is only part of the process of informed consent. It should give you a basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

This study will involve answering a series of questions about your attitudes toward sports injury and injury prevention. Your participation should take approximately 10-15 minutes. "Survey Monkey" is used to collect your responses. "Survey Monkey" is an American website; thus, responses are subject to American laws. Participation risks are minimal and similar to those associated with many email and social media websites such as Hotmail and Facebook.

The results of this research will be used to better understand the attitudes related to sports injury among Canadian University athletes. This information may help understand why there are challenges in implementing injury prevention programs and help guide future sports injury

prevention interventions, benefiting you and other fellow athletes. To compensate for time spent in the study, you will be eligible to win one of twenty sets of $20 Starbucks gift cards.

This study may pose a minimal risk or discomfort to you. This will be in the form of time spent participating in this study.

After the survey, you will be asked to provide contact information to be entered to win 1 of 20 sets of $20 Starbucks gift cards and to receive a report of the results. Within one month of the conclusion of data collection (December 2023), a draw will be held for the gift card prize and the winners will be sent the e-gift card via email. You will be given the choice of providing your email address or phone number to receive a report of the findings. You will receive the report within 4 months of the completion of the study (May 2024).

Your participation is voluntary. If you decide you no longer want to participate, you may click to the end of the survey to exit the survey. In the case that you do not wish to continue to participate while completing the survey and are interested in being in the draw for the gift card, you will have to click to the end of the survey to provide your email address where the e-gift card will be sent to if you are one of the winners. After you submit the survey and you no longer want to be a participant in the study, you can withdraw from the study by emailing the primary investigator at jimohr1@myumanitoba.ca until all data has been anonymized and analyzed (December 2023). At this point, we will not be able to identify your data to remove it from the study. You will still be included in the draw for the gift card even if you withdraw from the study.

Your responses will remain confidential. Your contact information will not be stored with your responses to the survey questions and only the principal investigator (PI) will have access to it. All contact information will only be used for the purpose described in the paragraph above. Your contact information will be stored in the University of Manitoba One Drive account belonging to the PI and destroyed once the results report has been sent to participants (May 2024). Other information you provided to answer the survey questions will eventually be destroyed by December 2028.

The study results will be disseminated through the principal investigator's thesis and may be published in a journal which will be available to other researchers and the general public.

By continuing with the survey indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way. This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any concerns or complaints about this project, you may contact any of the above-named persons or the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca.

If you have any questions or concerns about this research, you can contact Ruqoyyah Jimoh at jimohr1@myumanitoba.ca.

Agree Date ----------

Take me to the survey

I do not agree

Exit the survey

APPENDIX B (Survey Questionnaire)

GENERAL INFORMATION: Please tick (√) the appropriate boxes that best describe your answer and specify in the space provided.

Demographic information

1. What is your age? ----------
2. What is your sex? ----------
3. Which sports do you play? ☐ Basketball ☐ volleyball ☐ ice hockey ☐ soccer ☐ football
4. Which university team are you on? ----------
5. What year are you in your educational program? ----------
6. In the past 1 year, have you sustained an injury which resulted in you not being able to participate in a game or training session? Yes ☐ No ☐
7. If yes to question 5, where in your body did you sustain the injury(s) (multiple answers allowed) Head ☐ Knee ☐ Thigh ☐ Ankle ☐ Shoulder ☐ hip/Groin ☐

Attitude to Injury and Injury prevention

8. As an athlete, I am at high risk of sustaining an injury

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Always

9. I would immediately report having an injury to a coach, athletic therapist or other healthcare professionals if I knew it meant I would have to sit out of a game

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Always

10. I would play through any condition or injury for my team to win.

☐ Always
☐ Often
☐ Sometimes
☐ Rarely

☐ Never

11. I would report having an injury to a coach, athletic therapist or other healthcare professionals even if I knew it meant I would have to sit out a practice or two.

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Always

12. I feel that it is important to be thoroughly evaluated by a medical personnel after an injury to make sure I recover completely.

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Always

13. During a championship game, you get injured. It hurts but does not really hinder your ability to play. Knowing that it would result in a more severe injury, I would report the injury to a coach or athletic therapist.

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Always

14. How important is it for you as an athlete to try to prevent injuries?

☐ Not important
☐ Slightly important
☐ Moderately Important
☐ Important
☐ Very important

15. I feel informed about injury prevention programs.

☐ Not at all
☐ Slightly
☐ Moderately
☐ Very

☐ Extremely

16. How do you feel about injury prevention measures (e.g., stretching, specific warm-up exercise, taping)?

☐ Very negative
☐ Negative
☐ Neutral
☐ Positive
☐ Very positive

17. How important do you think it is to prevent the following injuries?

Head: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important.

Shoulder: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important.

Thigh: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important.

Knee: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important

Hip/Groin: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important.

Ankle: ☐ not important ☐ slightly important ☐ moderately important ☐ important ☐ very important.

18. To what extent do you agree with this statement: "The motivation of the coach affects the athletes' motivation to do injury prevention exercises"?

☐ Strongly Disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

Facilitators/ Barriers to Injury Prevention Implementation

Please use the following examples to answer questions 19 and 20.

Preventive measures: Training programs (strength, plyometric, endurance, agility, flexibility, stretching, balance/coordination, and sport-specific technique), taping, use of shoe insoles, bracing, personal protective equipment, rules and regulations enforcement, etc.

19. Did you participate in any of the above injury prevention measures to reduce the risk of injury with your team this season? ☐ Yes ☐ No
20. The following are some variables that might facilitate or hinder a team from implementing injury prevention measures. As an athlete, how do you think each of these listed variables affects the implementation of injury prevention measures in your team?

(Please tick one option that best suited your answer for each term)

	Facilitates the use of injury prevention measures	Hinders the use of injury prevention measures
Short training program (0-15 minutes)		
Long training program (more than 15 minutes)		
Too many matches in short period of time.		
Attitude from the coach		
Education of the athletes and coaches regarding injury prevention		
Time constraints		
Free and good equipment for injury prevention.		
Improvement in performance		
Trained medical staff (e.g. athletic therapist, sports psychologist, dietician).		
Athletes motivation		

APPENDIX C (Email to Coaches)

Subject: Request for your assistance in meeting with your sports team for my Master's thesis research.

Hello,

My name is Ruqoyyah Jimoh; I am a second-year Master's student at the Faculty of Kinesiology and Recreation Management. I am working on a research project titled "Attitudes towards Sports Injury and Injury Prevention among Canadian University Athletes" under the supervision of Drs. Leisha Strachan and Jeff Leiter.

I am contacting you to request your assistance in scheduling a day that will be convenient for your athletes to meet with them, discuss my study, and share my questionnaire with the athletes who agree to participate in the study. This study will be done to better understand University athletes' attitudes toward sports injury and injury prevention which may help us determine the reasons behind the challenges we have implementing injury prevention programs in sports and help guide future sports injury prevention intervention.

As my intended participants are the University of Manitoba bison sports teams, your assistance in arranging this meeting with them will be greatly appreciated.

Please contact me at this email address if you have any questions for me. Thank you, and I will look forward to your response.

Sincerely,

Ruqoyyah Jimoh

Graduate Student

Faculty of Kinesiology and Recreation Management

227 Frank Kennedy Centre

University of Manitoba

Winnipeg, MB R3T 2N2

jimohr1@myumanitoba.ca

APPENDIX D (Recruitment Poster)

RESEARCH STUDY PARTICIPANTS NEEDED!

to complete an online survey exploring the attitudes of Canadian athletes towards sports injury and injury prevention.

- Student-athletes in any Canadian University or College.
- Ages 18 years and older.
- in either basketball, volleyball, soccer, football, and ice hockey team.

FOR MORE INFO CONTACT

Ruqoyyah Jimoh
jimohr1@myumanitoba.ca

This research has been approved by REB-1.
If you have concerns or complaints about this project you may contact the above-named person or the Human Ethics officer at HumanEthics@umanitoba.ca

UM | Faculty of Kinesiology and Recreation Management

APPENDIX E (Ethics Protocol Approval)

University of Manitoba | Research Ethics and Compliance

Human Ethics - Fort Garry
208-194 Dafoe Road
Winnipeg, MB R3T 2N2
T: 204 474 8872
humanethics@umanitoba.ca

PROTOCOL APPROVAL

Effective: October 24, 2023 Expiry: October 23, 2024

Principal Investigator:	Ruqoyyah Jimoh
Advisor(s):	Leisha Strachan, Jeffrey Leiter
Protocol Number:	HE2023-0246
Protocol Title:	*Attitudes towards Sports Injury and Injury Prevention among University Athletes*

Natalie Riediger, Acting Chair, REB1

Research Ethics Board 1 has reviewed and approved the above research. The Human Ethics Office (HEO) is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*- TCPS 2 (2022).

This approval is subject to the following conditions:

i. Approval is granted for the research and purposes described in the protocol only.

ii. Any changes to the protocol or research materials must be approved by the HEO before implementation.

iii. Any deviations to the research or adverse events must be reported to the HEO immediately through an REB Event.

iv. This approval is valid for one year only. A Renewal Request must be submitted and approved prior to the above expiry date.

v. A Protocol Closure must be submitted to the HEO when the research is complete or if the research is terminated.

vi. The University of Manitoba may request to audit your research documentation to confirm compliance with this approved protocol, and with the UM *Ethics of Research Involving Humans*Ethics of Research Involving Humans policies and procedures.