A Review of Equestrian Sport Injury: Does its Prevalence Warrant More Care?

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A REVIEW OF EQUESTRIAN SPORT INJURY: DOES ITS PREVALENCE WARRANT MORE CARE?

by

Cailey Clark

B.S., Southern Illinois University, May 2022

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the Master of Science

School of Health and Human Sciences in the Graduate School
Southern Illinois University Carbondale
December 2023
A REVIEW OF EQUESTRIAN SPORT INJURY: DOES ITS PREVALENCE WARRANT MORE CARE?

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Cailey Clark

A Research Paper Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in the field of Human Sciences

Approved by:

Dr. Juliane Wallace, Chair

Graduate School
Southern Illinois University Carbondale
November 2, 2023
AN ABSTRACT OF THE RESEARCH PAPER OF

Cailey Clark, for the Master of Science degree in Human Science, presented on November 2, 2023, at Southern Illinois University Carbondale.

TITLE: A REVIEW OF EQUESTRIAN SPORT INJURY: DOES ITS PREVALENCE WARRANT MORE CARE?

MAJOR PROFESSOR: Dr. Juliane Wallace

The aim was to investigate the overall injury trends of equestrian sport injury to determine if it is prevalent enough to warrant further medical care and scientific research. A search across four databases yielded 4559 articles and after an investigation for inclusion criteria, 17 articles were deemed appropriate for this review. Strong evidence suggested that equestrian sport athletes experience injury at similar, and sometimes higher rates, than athletes of more traditional sports like football or soccer. Most equestrian athletes reported head and neck injuries, though it was not the primary cause of the few fatalities reported. Most often, injuries were due to some impact between the rider and another force (horse, ground, or other). This was experienced most prevalently through falls and being kicked or stepped on by a horse. There were also reports of both upper and lower extremity injuries, warranting less severity, but accounted for a higher number of surgeries among riders. Due to these findings, the conclusion can be drawn that equestrian sport athletes experience a significant amount of injury in their sports and need further care to improve their health for participation. Future research should focus on broadening participant population to more accurately define the injury risks associated with equestrian sport injury.
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INTRODUCTION

Equestrian sports attract millions of participants, fans, and spectators across the globe (Kuhl et al., 2014). Sports such as rodeo, show jumping, racing, polo, and more, put riders at risk for musculoskeletal and neurological injuries (Seifert et al., 2022; Gates et al., 2020; Press et al., 1995; Meyer et al., 2022). Athletes in these sports consistently put themselves at risk, as the animals they ride are unpredictable and other factors such as a rider’s experience and body position on the horse, equipment malfunctions, and surface abnormalities play a role in a high rate of injury during competition (Kuhl et al., 2014). Especially in the sport of rodeo, which involves multiple high-risk equine events, such as bareback riding, saddle bronc riding, tie-down roping, steer wrestling, team roping, and barrel racing (Forrester et al., 2021). Rodeo competitions are incredibly popular in Canada, the United States, Brazil, Chile, Argentina, Australia, and New Zealand. It is a high-risk competition because of the uncontrollable factors all equestrians face, which results in common injuries such as ligament sprains, muscle strains, fractures, joint subluxations and dislocations, and contusions. Concussions and other head injuries, however, also make up a big portion of injuries in the sport, with approximately 45% of athletes recording that they have sustained a concussion in their career. The risk of concussion and fatal injuries in horseback riding are comparable with high-impact sports such as football, soccer, rugby, motorcycle, and auto racing (Kuhl et al., 2014).

The injuries among rodeo and other equestrian athletes range in severity and chronic versus acute. In contrast to other high-risk sports, the main competitors of equestrian sport tend to be young females. Individual factors such as gender, age, and accident mechanism all play a role in the risk and severity of injury (Krüger et al., 2018). Experienced competitors in rodeo
experience an increase in rate of injury to most body parts, as compared to the injury rate of inexperienced athletes (Butterwick et al., 2002). Injury trends strongly indicate that equestrian sport injury is common and, in many cases, severe.

Show jumping is the equestrian event that ranks among the most accident-prone disciplines. This is because of the combination of falls of horse and rider (Haines et al., 2022) In professional horse racing, jockeys endure a large number of occupational injuries with one study reporting over 1,700 injuries by 706 active jockeys (Meyer et al., 2022). These equine sports are two of the most high-risk, as the fast-paced and complex nature of the sports supply more of a chance for injury (Krüger et al., 2018; Meyer et al., 2022). Hunter-jumper athletes have higher injury rates than most any other equine activity, as they are required to jump their horses over fences, which can be solid or collapsible and range from 6 inches to 6 feet in height and up to six feet high. The risk of these jumps is what causes the discipline to experience increased injury rates (Haines et al., 2022).

Traditional sport injury is more heavily studied in comparison to nontraditional sports, though studies examining both traditional and nontraditional sport injury are limited. Though, it is important to note traditional sports experience similar, and sometimes lower, injury rates as compared to equine sports, and they are receiving interest in research and medical care. For traditional sports, all 50 states and the District of Columbia have passed concussion legislation, which mandates schools to develop concussion protocols and restrict participation after a head injury (Halstead et al., 2018). For basketball players, knee and ankle injuries are more common than severe head injuries (Zhao et al., 2022). In a study of 3512 baseball players with injuries, 49% of them were upper limb injuries and unlike equestrian sports where the head is often affected, the shoulder was the anatomic region which saw most injury (Fares et al., 2019). For
American football, concussions are prevalent but many ligamentous injuries are also seen in professional football players (Olson et al., 2013).

Researchers unanimously agree that equestrian sport is a dangerous, high-risk activity that can result in injury (Kuhl et al., 2014; Gates et al., 2020; Butterwick et al., 2011). In the literature to date, there is a lack of definitive data that compares a wide variety of equestrian sport injury with the aim to identify overall risk-factors and improve the conditions of the sport. A few of the suggested factors based on existing studies are related to specific equestrian sports and fail to compare risk factors in a broader sense. This systematic review aims to identify and synthesize the variables influencing the risk and severity of injury in equestrian sport, with a secondary aim to direct future research and draw attention to this important area of study. In cohesion with those goals, this review attempts to address these three research questions: 1. What injury risks are associated with rodeo and other equestrian sports? 2. Which events are most at-risk for injury? 3. What is the level of seriousness presented in equestrian sport injury and how prevalent are the more severe injuries?
METHODS

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) approach to report the retrieval and selection of articles for review (Figure 1). Databases used included PubMed, Sage Journals, and ProQuest. The keywords searched through these four databases were *rodeo injury* and *equestrian injury*. Inclusion criteria for the articles included that they were (a) published in English, (b) peer-reviewed articles, and (c) investigated the injury patterns of equestrian sport athletes. Duplicates were removed manually once articles meeting the criteria were identified.

Articles were included if they aimed to examine injury of equestrian sports in any manner (risk-factors, populations, severity level). The injuries ranged from specifics, such as bony hypertrophy of the forearm in bareback rodeo athletes (Douthit et al., 2022), hip injuries in professional rodeo (Sinclair et al., 2020), to more general studies that focused on the overall assessment of risk and injury level over a broad range of equestrian sports. Included studies involved research that focused on adolescents, college students, amateur, and professional athletes. The goals of the review aimed to reflect risk level, severity level, and the most at-risk disciplines and included studies that were in adherence of that, regardless of the age of the study participants or specific injury.

A mix of epidemiological and logical case studies, as well as retrospective epidemiological case reviews were used to contribute to this review. To determine the eligibility of studies, the abstracts were reviewed to consider whether they met the inclusion criteria. Among the articles which abstracts seemed to meet the criteria and answer the research question, the full article was downloaded and then reviewed to be considered for inclusion. For every
article that was included in the study, the variables necessary for inclusion were extracted. These variables included the design of the study, the participants, measurements, and the notable findings of the study.
HEADING 3

RESULTS

The initial search consisted of 4,476 articles (596 from PubMed, 1692 from Sage Journals, 2188 from ProQuest). The search for rodeo injury contributed significantly to the finding of articles for the review. After the review of abstracts, 17 articles were found that met the inclusion criteria, including information regarding the three primary research questions. These articles were separated into three main categories, which consisted of “Studies Investigating Rodeo Injury” (N= 7, Table 1), “Studies Investigating Equestrian Sport Injury” (N = 2, Table 2), “Studies Investigating Injury in Specific Equestrian Populations” (N= 8, Table 3).

In the sport of rodeo, there was a total of 2305 injuries from 139,098 competitor exposures resulting in an overall injury density of 16.6 injuries per 1000 competitor exposures, as well as a risk probability of 1.69% (Sinclair et al., 2020). In collegiate rodeo, athletes have a significantly higher injury rate during competition than during practice. Though, more injuries were reported during practice than competition because like most sports, practice comprises most exposures. For college rodeo athletes, male athletes accounted for a higher number of injuries (76.5%) compared to women (23.5%), as well as an overall injury rate. In rodeo, males can compete in rough stock events and there are fewer female events which would account for the numbers (Watts et al., 2022).
In Canadian Professional Rodeo, there was a total of 451 injuries reported in 30,564 competitor exposures, which determined an overall competitor injury rate of 14.7 injuries per 1000 competitor-exposures. The rough stock events outside of bull riding (equine events) accounted for 11-16% of all rodeo injuries (steer wrestling, saddle bronc, and bareback) (Butterwick et al., 2002).
For high school rodeo, there was a total of 354 injury incidents from 43,168 competitor exposures, which resulted in a composite injury density of 8.20 per 1000 competitor exposures (95% confidence interval, 0.007-0.009). Most of these injuries were sustained by rough stock riders, accumulating 76.6% of injuries. Male-only events accounted for 86.7% of all injuries, excluding the timed-events of team roping and cutting. In the female-only events, goat tying demonstrated the highest frequency of 7.1% (Sinclair et al., 2009). Butterwick et al showed that 13 of 49 (29%) of catastrophic injuries occurred in competitors younger than 17 years, 8 of those injuries were fatalities. Two fatalities were suffered by female competitors during barrel racing. The 17 and younger age group accounted for 33% of all fatalities and 28% of all catastrophic injuries in this database (Butterwick et al., 2007). Though, this may point to a lack of experience being a cause for injury, other studies highlight that inexperienced competitors do not have an increased risk of minor or severe injury in rodeo rough stock events. In fact, experienced competitors have an increased rate of injury to most body parts when compared to the injury rate of inexperienced competitors (Butterwick et al., 2009).

In rodeo events, competitors are working in proximity with large animals, which accounts for the dangerous nature. Significant head injuries have been shown to occur in rodeo athletes at a rate of up to 15 per 1,000 rides. In comparison to traditional sport, football players suffer serious head injuries at a rate of 5.8 per 100,000 players (Seifert et al., 2022). According to Sinclair et al, while 14 different mechanisms of injury were reported, 62.9% of all injuries occurred form only 3 mechanisms. 26.6% of athletes were injured during a collision with the ground, 20/9% were injured during a collision with an animal (any animal contact other than being stomped on), and 15.4% were injured when they were stomped on by an animal after dismount (Sinclair et al., 2020).
Within the injury mechanisms of fall from horse, kick by horse, and other, equestrian injury was highest in falling and being kicked (84.2%). Of 770 included patients, 521 (67.7%) fell from a horse, 127 (16.5%) were kicked by a horse, and 127 (16.5%) fell into the “other” category for mechanism of injury (Krüger et al., 2018). Amongst equestrian event sport injury, 780 injuries were reported per 100,000 athlete exposure. Total injury rate per discipline was less than 1.2% with the highest being 3-day eventing at 1.18% and hunter-jumper at 1.11%, with the lowest being western 0.06% (western dressage, not in connection with rodeo) (Haines et al., 2022).

The inclusion of bareback rodeo athletes in this study was relevant to assessing equestrian injury, as the event requires equine involvement. Bareback athletes were found to suffer from bony hypertrophy of the forearm, a chronic injury which causes significant anatomic changes that can consist of to persist pain (Douthit et al., 2022). Hip injuries also make up a

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<th>Type of Study</th>
<th>Major Findings</th>
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<td>Seifert et al (2022)</td>
<td>Retrospective Case Study</td>
<td>• Half of patients were injured by direct contact with rodeo stock, 34 by falls</td>
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<td>• Head injuries were most common (54.3%), 28.6% of injuries required surgery.</td>
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<td>• One death</td>
</tr>
<tr>
<td>Sinclair et al (2020)</td>
<td>Retrospective Case Study</td>
<td>• Contusions, sprains, and concussions were most frequent injuries.</td>
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<td>• Neurological components, knees, and shoulders were the most injured body parts.</td>
</tr>
<tr>
<td>Watts et al (2022)</td>
<td>Descriptive Epidemiologic Study</td>
<td>• Higher rate of injury during competition versus practice</td>
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<td>Butterwick et al (2002)</td>
<td>Longitudinal Study</td>
<td>• Concussions/head injuries accounted for 8.6% of all injuries</td>
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<td>• Knee injuries were second</td>
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<tr>
<td>Sinclair et al (2009)</td>
<td>Retrospective Case Study</td>
<td>• 40.9% of injuries were sustained while dismounting/being bucked off animal</td>
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<td></td>
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<td>• Head and shoulder were most commonly injured body parts</td>
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<tr>
<td>Butterwick et al (2002)</td>
<td>Prospective Cohort Study</td>
<td>• Risk of injury to inexperienced competitors did not differ from experienced in horse riding events</td>
</tr>
<tr>
<td>Butterwick et al (2011)</td>
<td>Retrospective and Prospective Case Study</td>
<td>• Incidence rate of catastrophic injury 1989-2009 was 9.45 per 100000</td>
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portion of rodeo injury, especially in rough stock athletes. Among 82 adult male and female professional rodeo athletes, 84 hip injuries were found. Contusions, (45.2%), impingement (15.5%), and strains (13.1%) were the most common of the injuries. Athletes were most likely to sustain a hip injury during dismount (36.1%), 36.9% of injuries being due to contact with the ground (Sinclair et al., 2020).

In rodeo, a good portion of injury results from the age group 17 and younger, showing a significance in adolescent injury (Butterwick et al., 2011). Among 408 adolescent rodeo-related injuries, 28.8% involved horses. The mechanisms of injury which accounted for most injury included 41.4% from falling or being thrown from an animal, 22.4% being stepped on by an animal, 8.4% having other contact with an animal, 6.6% having contact with infrastructure, and 5.9% being kicked by an animal. Of the injuries suffered, 29.5% were a contusion or abrasion, 22.8% were a fracture, 15% were a strain or sprain, 9.1% were lacerations, and 8% were concussions. Meaning 26.9% of injuries were the head and neck, 25.9% were upper extremities, 24.6% were lower extremities, and 21.6% were the trunk (Forrester et al., 2021).

Table 2. Studies Investigating Equine Injury

<table>
<thead>
<tr>
<th>Authors</th>
<th>Type of Study</th>
<th>Major Findings</th>
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| Haines et al (2022) | Retrospective cohort study | • Hunter-jumper and 3-day eventing have an increased injury rate compared to nonjumping disciplines  
• No clinically significant difference between males and females or junior and senior equestrian athletes  
• Equestrian sports have an overall injury rate of 780 per 100,000 athlete exposure |
| Kruger et al (2018)   | Retrospective cohort study | • Falling off the horse (67.7%) and being kicked by the horse (16.7%) were the two main injury mechanisms  
• Patients falling off a horse had higher odds for being treated as inpatients, whereas patients who were kicked had higher odds for a surgical therapy/ICU treatment. |
Equestrian and rodeo injury studies reported that head injuries make up most of the injury within equine involved sports (Kuhl et al., 2014; Krüger et al., 2018; Srinivasan et al., 2014). Of 94 riders which competed at the Palm Beach International Equestrian Center, almost half of the riders (44%) reported experiencing a concussion during their careers and likely returned to competition without seeking medical clearance. All participants had experienced a fall, as well as multiple symptoms of having a head injury. This study also showed that experience did not have an influence on injury, as 48% of professionals and 44% of amateurs report head injuries (Kuhl et al., 2014). The most common reasons for neurological injuries included being kicked or stepped on by a horse (55%) and being thrown from or falling off the horse (28%). Of these statistics, only 10% reported that the horse was startled or otherwise fearful. This indicated the horse itself as the reason for injury and is not usually outside factors (Srinivasan et al., 2014).

Amongst equestrian sports, show jumping consistently ranks as one of the most accident-prone disciplines, due to the nature of jumping itself. Of show jumping athletes, 89.8% reported being injured at least once since they began involvement in the sport. In 6768 reported injuries, the most common location was the head (63.9% sustained at least on head injury during their career), followed by the trunk (68% of athletes injured their trunk at least once in their career) (Meyer et al., 2022). While horse racing is one of the most popular equine sports, it proved to be ranked lower in terms of available research. For jockeys, fractures proved to be the most experienced injury, reported by 64% of respondents. The mechanisms of injury for horse racing included 69% of injury coming from jockeys becoming unseated, 58% being from the horse falling, 23% being from the jockey getting trampled, 21% being from jockeys hitting the starting gate, and 15% being from jockeys hitting the rail. Other mechanisms proved to provide a lower rate of injury such as poor track conditions (7%), jockeys being kicked/bitten (7%), jockeys
hitting a post or other object (6%), equipment failure (5%), horses flipping over in the starting gate (4%), jockeys being dragged by the horse (2%), and other (14%) (Press et al., 1995).

Table 3. Studies Investigating Injury in Specific Equestrian Populations

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<tr>
<td>Kuhl et al (2014)</td>
<td>Cross-sectional study</td>
<td>• Almost half (44%) of equestrians experienced concussions during their careers</td>
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<td>• Riders were likely to return without medical clearance</td>
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<td>Douthit et al (2022)</td>
<td>Retrospective case study</td>
<td>• Significant anatomic difference in the grip arm of bareback athlete compared to contralateral arm</td>
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<tr>
<td>Forrester et al (2021)</td>
<td>Retrospective epidemiologic study</td>
<td>• Most injuries result from being thrown/falling from or being stepped on by an animal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Most frequent injuries were contusions or abrasions, fracture, strain/sprain, laceration, and concussion</td>
</tr>
<tr>
<td>Sinclair et al (2020)</td>
<td>Case study</td>
<td>• Athletes most likely to be injured during dismount (36.1%) and 36.9% of injuries were due to ground contact</td>
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<tr>
<td>Gates et al (2020)</td>
<td>Epidemiologic review</td>
<td>• TMLs are more common than spinal injuries</td>
</tr>
<tr>
<td>Srinivasan et al (2014)</td>
<td>Retrospective review</td>
<td>• Most injuries tend to be orthopedic</td>
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<tr>
<td>Press et al (1995)</td>
<td>Retrospective review</td>
<td>• Fractures accounted for 64% of total injuries</td>
</tr>
<tr>
<td>Meyer et al (2022)</td>
<td>Retrospective cross-sectional epidemiological study</td>
<td>• Riders who always wear a helmet/vest suffered significantly fewer head and spinal injuries</td>
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This review identified 17 articles which investigated equestrian injury trends among different events, disciplines, and age groups, with the goal to identify what injury risks are associated with rodeo and other equestrian sports, which events and disciplines are the most at risk for injury, and the level of seriousness presented in equestrian sport injuries as well as severe injury prevalence. A review of the literature suggest that equestrian injury is extremely common among participants of all disciplines. Most injuries suffered consisted of head and neck injuries, which proved to be prevalent across all disciplines and events, only lacking in horse racing jockeys (Kuhl et al., 2014; Krüger et al., 2018; Srinivasan et al., 2014; Press et al., 1995). In the sport of rodeo, adolescents (17 and younger) experienced a significant amount of injury, though it was not due to a lack of experience (Forrester et al., 2021; Butterwick et al., 2002; Sinclair et al. 2009). Among other equestrian disciplines, show jumpers and eventers experienced the highest rate of injury (Kuhl et al., 2014; Gates et al., 2020; Meyer et al.; 2022; Krüger et al., 2018; Srinivasan et al., 2014). The mechanisms of injury proved to be consistent across age group, discipline, or event. Most injuries occurred due to being kicked or stepped on by a horse and falling from the horse (Kuhl et al., 2014; Gates et al., 2020; Butterwick et al., 2011).

Most of the studies included reported and investigated head and neck injuries, which proved to be the most common of injuries among equestrian athletes. Many of these head injuries were concussions. A big issue presented in equestrian sport is that many equestrians have a lack of concussion prevention and treatment knowledge (Kuhl et al., 2014). It is likely that equestrian athletes will return to their sport without seeking medical clearance if they sustain a concussion injury, putting them at risk for further injury (Srinivasan et al., 2014). Initiative needs to be taken
on providing equestrian athletes with more head and neck injury education and assistance to prevent further injury. Riders who sustain multiple falls or injuries with repeated concussion (or sub concussive hits) risk a future neurologic decline (Srinivasan et al., 2014).

The mechanism of injury is extremely important to consider when investigating equestrian injury because it helps researchers to understand where to focus on improving education, equipment, and medical care. In respect to specific rodeo events, no specific association between injury and event exists (Sinclair et al., 2020). This suggests that the nature of horse-related sports themselves are dangerous and result in similar mechanisms of injury. In general, impact injuries (hitting the ground, being kicked/stepped on) prove to be prevalent across equine disciplines and events (Kuhl et al., 2014; Gates et al., 2020; Meyer et al.; 2022; Krüger et al., 2018; Srinivasan et al., 2014). Between being kicked and falling, the accident mechanism has proven to be ambiguous. Patients that were kicked by a horse had lower odds of being hospitalized, but higher odds of undergoing surgery and longer hospital stays, more commonly in the intensive care unit. In addition to this, while head injuries increase the risk of being hospitalized or ICU treatment, the highest odds for operation are linked to upper and lower limb injuries (Krüger et al., 2018). Lastly, even though head and neck injuries have presented themselves to be common, the highest incidence rates of catastrophic injury and of fatality in rodeo involved thoracic compression (Butterwick et al., 2011).

Protective equipment, such as helmets and vests are available to equestrian athletes in all disciplines. In rodeo, some of the research concerning the efficiency of vests is unclear. Though, protective helmets have been shown to reduce the incidence of head injuries. In addition to this, concussions and loss on consciousness occurs less frequently in those who wear helmets (Seifert et al., 2022). The head comprises the biggest share for hospitalization and intensive or immediate
care treatment, as well as the anatomical region with the most frequent surgical procedures performed. That being osteosynthesis to the orbit and midface, as well as craniotomy and cranial trepanation (performed to 6 patients) (Krüger et al., 2018). Among show jumpers, riders who always wore a safety vest when ridings suffered significantly fewer spinal injuries than riders who occasionally or never wore safety vests (Meyer et al., 2022). The equipment can have a significant impact on the injury risk and severity of the athlete and many researchers recommend use of this equipment. There were no reported cases of fatality due to head injury when a helmet was worn in the sport of rodeo (Butterwick et al., 2011).

The included studies, while limited, provide a good framework for understanding equestrian sport injury. It reflects similar injuries to traditional sports at similar rates, sometimes reporting higher rates of injuries (Kuhl et al., 2014; Seifert et al., 2022). Injury is higher in some events and disciplines as compared to others, though nearly all equestrians experience some form of injury throughout their careers. The research suggests that it is the nature of competing and interacting with 1200-pound animals that is the source of injury. Horses are unpredictable and sometimes uncontrollable animals which is cause for injury. Equestrian culture encourages riders to immediately get back on their horses following falls, which attributes for a failure to seek care and get professionally evaluated (Kuhl et al, 2014).

**Limitations**

There are certain limitations within this review that are notable to the study. The first, and most prominent, of which being that there is limited research in equestrian sport injury. The data cannot completely reflect the injury rates among equestrian athletes without a more significant number of studies to extract information from. Similarly, the data that does exist focuses on either rodeo or English equestrian sports and further separates them into disciplines and events.
To the knowledge of the author, there is no existing research that examines equestrian sport injury as a whole prior to this review. However, another limitation of this review is that only two terms were searched throughout the databases (*rodeo injury and equestrian injury*). Broadening the search to more equestrian related terms may have returned a more significant number of articles. There were only four databases searched, broadening this may have also contributed to more returned studies. Articles were also English-only text, and it is possible that publications in other languages may have contributed to the findings of this study. Lastly, this review could have potential bias, as the community of human science greatly advocates for continued improved care for all athletes in both traditional and nontraditional sport.

**Implications for Athlete Behavior, Equestrian Sport Policy, and Medical Response**

This review reflects the understanding that equestrian sports are at a high-risk for injury despite discipline, event, age, or experience of the participant. Many equestrian athletes are reluctant to receive care, due to a lack of knowledge or the nature of equestrian culture (Kuhl et al., 2014). This review aims to provide compacted research that compares injury across different equine related activities. In providing a broader view, a more solidified idea of the risk-potential for engaging in equine sports can be formulated by participants. A clear difference has been seen in equestrians who wore a helmet versus those who do not. They suffered fewer substantial injuries and an overall decreased risk of being hurt while engaging in their specified discipline (Seifert et al., 2022; Butterwick et al., 2011). Equestrian sports are individualized and the opportunity to increase one’s care largely falls to the athlete themselves. A review of the literature provides the opportunity to explore an overall look into recorded injury risks and specific mechanisms of injury to make informed decisions. Though, similarly to most sports, the potential for athletes to improve the culture and adopt enhanced safety measures is dependent on
equestrian sport policy and the medical and scientific response.

There is little publication on equestrian sport policy and return to play procedures. As the research of equestrian sport develops, the goal is to provide associations such as the Professional Rodeo Cowboys Association, Canadian Professional Rodeo Association, High School Rodeo Association, Justin Boots Sports Medicine Team, and United States Equestrian Federation with information regarding the health and potential risks of their involved athletes (Haines et al., 2022; Sinclair et al., 2020; Butterwick et al., 2002; Sinclair et al., 2009). The organizations then have the potential to implement the findings of the research into policies that improve the care of athletes. This could include heightened “return to play” procedures, more standard medical care for athletes, and strictly enforced safety procedures.

Lastly, medical professionals could benefit from a review of the literature to better understand equestrian injury and where it is likely to occur. It is the duty of the scientific and medical community to continue to advance the research in equestrian sport injury to improve the validity of the findings and create the possibility for safer participation. Little is known about the extent of medical professional involvement in equestrian sports and reviews such as this one help to promote the need of medical professionals for the athletes.
HEADING 5

CONCLUSION

This review indicates that while there is a limited amount of published evidence on equestrian sport injury, the risk for injury among equestrians is prevalent. Injury is higher in some disciplines and events, such as rough stock athletes in rodeo and hunter-jumpers among English equestrians (Seifert et al., 2022; Meyer et al., 2022; Kuhl et al., 2014; Gates et al., 2020; Meyer et al.; 2022; Srinivasan et al., 2014). The risk for head and neck injuries proved to be the most prevalent among equestrians, accounting for a good portion of the reported injuries in all events and disciplines reviewed (Kuhl et al., 2014; Gates et al., 2020; Meyer et al.; 2022; Krüger et al., 2018; Srinivasan et al., 2014). There was no connection found between athlete experience and age or injury. Both inexperienced and experienced riders had similar potential injury risks associated (Kuhl et al., 2014; Butterwick et al., 2002). Thoracic compression accounted for most fatalities in the sport of rodeo, with head and neck injuries reporting second. There was no reported fatality due to head injuries when a helmet was worn (Butterwick et al., 2011). The mechanisms of injury proved to be consistent across all equestrian disciplines, noting falls (impact with the ground, animal, or other force) and being kicked or stepped on to be some of the most common injury causing aspects of equestrian sport.

Most studies identified in this review were retrospective or epidemiologic case studies. In the future, an increase in longitudinal studies on this topic may help to improve the quality of the findings. According to the synthesis of the data, there is enough evidence to conclude that equestrian sport injury is prevalent and in need of more medical care, as well as further research. This review investigated research (up to 2022) for the injury risks associated with equestrian sport injury. While the research provided enough substantial evidence to draw conclusions about
injury risks and trends, this topic is currently underdeveloped in quantity and diversity. It is the goal of the author to call on the research community to enhance efforts in examining and investigating trends in equestrian sport injury. As well as develop more research that encompasses a broader range of equestrian sport and activity.
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