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Depict and Break Down the Cooperations Among Rider and Pony

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Abstract:

Even though it appears obvious that horse-related safety must be improved, no extensive research into understanding or lowering horse-related risk has been done. Four aspects of horse-related risk are covered in this essay: the danger itself, the horse, the rider, and the culture in which equestrian activities are practiced. We describe how the four fundamental risk management strategies of avoidance, transference, mitigation, and acceptance are affected by the many ways that risk is produced in each dimension. We find that acceptance and avoidance of risk associated with horses are often high. This is probably because horses are frequently portrayed as being irrationally unpredictable, frightful, and deadly. A lot of risk management is transferred, particularly when using safety equipment like helmets. Risk mitigation is the tactic that is least used, which is concerning. We emphasize the potential advantages of creating mitigation techniques that are focused on (a) making horses more predictable to humans and (b) making riders more proficient in the physical abilities that increase their resistance to injury and falls. We conclude by presenting a multidisciplinary research agenda that might lower the number of horse riders' accidents, illnesses, and fatalities worldwide.

Keywords: Biophysics, Rehabilitation, Physiology

Introduction

Relative riderhorse sizes are a topic of rising discussion as the human population grows heavier (Reilly and Dorosty 1999; Rennie and Jebb 2005; Han et al. 2015; Wang et al. 2017). The 2nd International Saddle Research Trust Workshop (Clayton et al. 2015) identified this as a top research priority. Senior members of the UK equine industry attended a meeting in 2015 that World Horse Welfare co-hosted with the British Equestrian Federation, where it was determined that "innovative ways should be developed, so that riders can assess if they are the correct weight for their horse, explore preriding fitness initiatives, and also develop guidance to support judges and officials to ensure that the horses' welfare always remains paramount" (World Horse Welfare). Few studies have successfully addressed this problem in a normal riding condition (Sloet van Oldruitenborgh-Oosterbaan et al. 1995; Powell et al. 2008; Matsuura et al. 2013 a, b, 2016; Gunnarsson et al. 2017; Stefansd ottir et al. 2017). However, studies assessing rider weight have been conducted. They have used treadmill exercise (Sloet van Oldruitenborgh-Oosterbaan et al. 1995), which does not necessarily equate with overground exercise and does not include turns and circles, or lead weights to change the total load carried (Matsuura et al. 2013a,b, 2016; Gunnarsson et al. 2017). These methods do not address potential differences in physique and balance between riders of different weights. We do not know if changes in equine performance may occur at lower rider:horse bodyweight ratios since many have used extremely high total load:horse bodyweight ratios (Matsuura et al. 2013a,b, 2016; Gunnarsson et al. 2017; Stefansd ottir et al. 2017).

As a result, despite the fact that it is commonly acknowledged that horses' wellbeing is impacted by incorrect rider size (Clayton et al. 2015), there is a paucity of trustworthy scientific data on which to make recommendations. The age, fitness, muscle development, thoracolumbar length, and presence or absence of lameness of the horse; the type, speed, and duration of work; the skill, fitness, balance, and coordination of the rider; the ability of the rider to sit straight; the fit of the saddle to the horse and rider; and the terrain over which the horse is ridden are all interrelated factors in this multifactorial issue (Clayton et al. 2015). Lameness that is undetectable in hand or on the lunge may be present in ridden horses (Licka et al. 2004; Greve and Dyson 2014; Dyson and Greve 2016). In addition, we've seen that a heavy rider may momentarily cause a horse to become lame when a lighter rider had just rode it without any issues, and that a lame horse may become much more so when ridden by a heavy rider than when ridden by a lighter rider (S. Dyson, unpublished data). Additionally, it has recently been shown that lame horses may behave differently during ridden activity compared to nonlame horses (Dyson et al. 2017, 2018a). Utilizing a ridden horse ethogram, researchers found an association between the presence of 8 out of 24 behavioral markers and musculoskeletal pain (Dyson et al. 2018a) and that the number of markers decreased when lameness was resolved by diagnostic analgesia (Dyson and Van Dijk 2018; Dyson et al. 2018b). The purpose of this study was to evaluate the gait and behavioral reactions in typical non-elite competition riding horses put through a standardized activity test while being rode by four riders with comparable skill levels but differing body weights. The study's methodology simulated the circumstances in which riders of different weights and body types may ride a horse or pony in its typical saddle in several riding facilities and equestrian disciplines.

literature review

Ryota Funakoshi (2018) The goal of the research was to better understand the regularity of the movements of the rider's pelvis, spine, and horse's back as they relate to the development of the rider's dynamic trunk alignment. The experiment used a crossover design, with the simulator-based exercise serving as the control condition. The Tokyo University of Agriculture Bio-therapy Center was the site of the trials. Twenty healthy participants between the ages of 20 and 23 made up the sample. In studies spaced by around two weeks, participants engaged in 15-minute bouts of exercise with the simulator and horseback riding with a Hokkaido pony. After riding a horse, the erector spinae showed less activity on a surface electromyography (EMG). Inferred connections between acceleration (Rider's neck/longitudinal axis [Y hereafter]) and angular velocity (Horse saddle/Y) as well as between angular velocity (Rider's pelvis/Y) and angular velocity (Horse saddle/Y) were found via exploratory data analysis of acceleration and angular velocity. Angular velocity (Rider's pelvis/Y) tends to be correlated with acceleration (Rider's neck/Y). Reduced activity in the rectus abdominis and erector spinae was seen on surface EMG after the simulator exercise. The dynamic trunk alignment of the rider was improved when on a horse with a distinct underlying mechanism that was not seen using a simulator.

Karen L. Luke (2023) One of the oldest practices in horseback riding is using a bit to communicate with and manage the horse while riding. However, others have questioned whether this technique is consistent with today's knowledge of animal welfare due to horses' resistance to bits and the high rates of stress brought on by bits. This research is one of the first to examine the wellbeing of horses, rider safety, and rider pleasure when horses are rode with and without a bit. Online surveys were conducted anonymously with 399 Australian leisure and sport horse riders from a variety of riding disciplines (94.4% of them were female; Mdn age was 46.0 years). Only 20 (5.0%) individuals reported riding without a bit, but considering that bit use is required in the majority of equestrian activities, this is probably typical of the recreational horse-riding community. Cases were matched based on horse breed and age, discipline, and rider age in both a whole sample analysis and a case-matched analysis. Whole sample analyses found horses ridden without a bit have better relative welfare scores for management, and during riding and handling compared to horses ridden with a bit (Mdn 13.0, IQR 2.0 and Mdn 11.0, IQR 5.0; Mdn 35.0, IQR 9.0 and Mdn 32.0, IQR 6.0; and Mdn 24.0, IQR 3.25 and Mdn 23.0 IQR 4.0 respectively, $p < 0.05$), but did not differ in relation to health. While bitless horses were reported to exhibit less ridden hyperreactive behaviors (bucking, spooking, rearing, and bolting) than horses that were bitted (Mdn 0.0, IQR 1.0 and Mdn 1.0, IQR 4.0, respectively, $p = 0.04$), rider safety and perceived control were comparable for both groups. In addition to reporting greater horse-rider relationships, bitless horse riders reported higher levels of satisfaction than bitted horse riders (Mdn 4.0, IQR 0.0, and Mdn 3.0, IQR 1.0, respectively, p 0.001). Those who rode horses without bits knew more about learning theory than those who rode horses with bits (55.0% vs 23.0%, $p = 0.003$). Except for rider satisfaction and knowledge of learning theory, which were not statistically significant, the findings of the case-matched analysis were similar with those of the whole group. These results imply that bitless riding is connected to increased rider satisfaction and enhanced horse-rider cooperation but not to decreased horse control or rider safety. Increased popularity of bitless riding may provide a significant chance to enhance horse welfare, especially in light of existing issues with the industry's social license to operate as a result of subpar animal care.

Fernanda Camargo (2018) Throughout their riding careers, a sizable number of equestrians will have accidents of varying degrees of severity. According to patients who attend US emergency rooms, incidents involving horses are most likely to need hospitalization. According to studies, the majority of wounded riders believed they could have avoided the collision and that their injuries were the result of rider or handler mistake. To better understand the reasons, how to avoid, and where to focus educational resources to result in a decrease in horse-related accidents, equestrians reported their injuries, which a panel of experts then assessed. Most riders reported having intermediate riding abilities, most accidents happened in the arena, and most incidents could have been avoided. In contrast to the least severe accidents, which happened when riders entered the horse's area, the most serious accidents happened when the weather was a significant factor. As contrast to unavoidable mishaps like horses slipping or falling, avoidable accidents were when gear failed. The combined findings of the injury's etiology, avoidability, and severity were used to create the educational impact index. The authors propose that educational efforts should concentrate on three categories since they were the major causes of accidents with the greatest educational effect index: other people, frightened horses, and tack/equipment issues.

Arianna Seghezzi (2020) One of the most difficult logistical problems resulting from B2C e-commerce is last-mile delivery. Online businesses must adhere to strict standards for service quality; also, because of the characteristics of e-commerce goods, such as their compact dimensions, last-mile delivery is the most costly step in the delivery process. An unique and potential solution in this situation is crowdsourcing logistics, in which deliveries are delegated to a network of "common" individuals through an open call. The urban society may greatly benefit from this solution. However, it has to be financially viable for businesses in order to spread. In this line, the research looks at the financial viability of a crowdsourced logistics project called "pony express" in an urban setting. In order to quantify the cost of deliveries made possible by crowdsourcing services and to compare it to the cost of "conventional" pony express couriers, a model has been created.

Emilie Franzén Lindgren (2023) Introduction There are 500,000 persons who regularly ride horses in Sweden. It is considered to be among the riskiest sports. Between 1997 and 2014, there were three deaths and 1756 acute injuries annually in Sweden involving horses. This study's main goal was to describe the range of equestrian-related injuries treated at a significant Swedish trauma center. The investigation of the relationship between age and such outcomes as well as the identification of trends in clinical outcomes were the secondary goals. Materials and procedures The Karolinska University Hospital's electronic medical records system was searched for patients treated for injuries sustained while competing in equestrian sports between July 2010 and July 2020. Using the trauma registry at the hospital, further data were acquired. There were no exclusion criteria used. To describe the injury spectrum, descriptive statistics were employed. Four groups of age were divided, and the Kruskal-Wallis H test or the Chi-squared test were used to compare them. Analysis of the relationships between age and results was done using logistic regression. Results A total of 3036 patients were involved, and 3325 of the injuries had equestrian connections. Inpatient admissions to hospitals were 24.9%. One person died in the batch. Regression analysis revealed significant relationships between age and increased probability of thoracic injury (p 0.001), vertebral fractures ($p = 0.001$), and lower extremity injuries (p 0.001). Conclusions Activities with horses have certain dangers. The high admission rate is evidence that injuries are treated seriously by the medical community and that morbidity is significant. The damage spectrum varies depending on one's age. Age seems to be a risk factor for thoracic injuries and vertebral fractures. Age does not seem to be the most critical factor in deciding whether surgery or ICU hospitalization is necessary.

Material and Methods

Horses and Riders

The National Equestrian Center Strömsholm in Sweden was the site of this investigation. The Netherlands' Wageningen University and Research Centers' Animal Sciences Group's Animal Care and Use committee gave its approval for the study. For this research, 16 horses (5–15 years old; 4 mares and 12 geldings) were chosen. The riding school has separate stables or stands for each horse. They were turned out every day and rode every day. According to their age and degree of activity, horses were given concentrates and roughage, and unlimited access to water was provided. The National Equestrian Centre's 16 equestrian students (aged between 21 and 27; 2 males and 14 women) consented to take part in the research. The pupils were in their second year of education and had advanced to the 1.10 m level in show jumping and a basic level in dressage. At the beginning of the experiment, the student riders had no prior experience with the horses.

Testing for Temperament Using Behavioral Tests

A new object test and a handling test were used to assess the temperament of horses. Horses were fitted with Polar Vantage heart rate monitors in their stables for the new object test. A dependable handler brought the horse into a trusted indoor arena after recording its resting heart rate for two minutes, and the horse was left in what is known as a "starting box" in one of the arena's corners. The horse was allowed to calm down for around two minutes before being let out of the starting box via an automated sliding door and given full reign of the indoor arena. An open blue and white umbrella was dropped from the ceiling after two minutes. The behavior of the horse was observed on camera for 2 minutes before to and 5 minutes after its exposure to the umbrella. The heart rate monitor was then unplugged when the horse was captured and brought back to the stable. The Polar Vantage heart rate monitor was also attached to the horse for the handling test. One dependable handler brought the horse into the indoor arena after taking a baseline heart rate reading in the stable. There, the horse was prompted to follow the handler as he walked over several plywood plates (2 4 m) that were laying on the floor. Although horses were not compelled to follow, the handler maintained a gentle strain on the lead line to help the animal go ahead. Another effort was made if the horses reared, backed up, or shied. There were a limit of three tries per horse. Both tests were recorded on video, and the Observer software system (Version 4.1) was used to evaluate the videos. Tables 1 and 2 show behavioral measurements obtained from the novel-object test and handling tests. See Visser et al. (2001) and Visser et al. (2002) for further information on how the tests were conducted and the measurements that were taken.

Testing for Riders' Personality

A questionnaire was completed by each rider in order to create a personality profile. The traditional psychological tests LOC (Locus of Control), SOC (Sense of Coherence), SCAT (Sport Competition Anxiety Test), SE (Self-Esteem), and SC (Self-Consciousness) were all included in the personality profile. The assessments were chosen from a variety of tests that have previously been utilized in research (Fallby et al., 2006; Koivula et al., 2002) to examine athletes.On the basis of their capacity to assess the control concept, two of the tests—LOC and SOC—were chosen for further examination. Rotter (1966) created the I-E Locus of Control Scale (LOC), which consists of 29 total items: 23 test items and 6 filler items. A high LOC score indicates that the individual thinks external "forces" (an external locus of control) are in charge of the situation, while a low score indicates that the person does not believe.

TablE 1: List of Variables in Horses Recorded in the Novel Object Test with Adult Horses (N D 16)

Variable	*Definition*
SN[a]	Snorting (forceful expulsion of air through the nostrils incidentally preceded by a raspy inhalation sound)
FNO[b]	Focused on the novel object (ears, eyes, and head pointed in direction of novel object)
HL[b]	Head low (horse held its nose below its belly line)
LTNO[b]	Latency time to touch the novel object for the first time
TC[b]	Percentage of time trotting and cantering
TU[b]	Percentage of time tail up (tail root above horizontal line)
HRNO	Mean heart rate during NO exposure
HRVNO	Heart rate variability (rMSSD) during NO exposure

a. Frequency. B Percentage of total time.

Table 2: List of Variables in Horses Recorded in the Handling Test With Adult Horses (N D 16)

Variable	Definition
NT[a]	Total number of attempts needed to cross the bridge
RB[a]	Reluctance behavior (pawing, rearing, striking, head shaking, walking sideways, pulling backwards) while approaching the bridge
SSB[b]	Percentage of time standing still in front of the bridge
HRHAN	Mean heart rate during approach and bridge crossing
HRVHAN	Heart rate variability (rMSSD) during approach and bridge crossing

a Frequency. b Percentage of total time.

The way one interacts with and influences the circumstance determines the outcome (internal locus of control). According to Antonovsky (1987, 1993), the Sense of Coherence Scale (SOC), which consists of 29 items, gauges how much the respondents believe the world is understandable, controllable, and meaningful.

Riding Test

Each of the 16 riders rode all 16 horses in a conventional course (a total of 256 rides) four weeks after the horses underwent temperament testing. The horse-rider duo had to overcome a variety of obstacles as part of this required course in order to gauge and assess their cooperation. On the course, participants had to walk over wooden planks, leap a short fence, trot through traffic cones during roadwork, and more.

Table 3: List of Variables Used to Assess the Level of Evasive Behavior During Riding

Variable	Definition
Head shaking	Frequency of head shaking
Defecating	Frequency of defecating
Standstill	Frequency of unintended stops
Tail switching	Frequency of tail switching
Backwards	Frequency of walking backwards
Shying	Frequency of shying

and moving by a spot where a chainsaw recording was playing. Over the course of four days, riders rode each horse in a random sequence. Horse behavior was recorded on camera throughout the ride, and evasive actions were graded (Table 3). Following the ride, the riders were asked to complete two surveys (Tables 4 and 5) regarding the horse's temperament and their cooperation with the animal. The line-rating technique, in which riders had to provide a mark on a 10-cm scale between 0 (the least) and 10 (the most), was used to qualitatively rate the temperamental traits of the horse as well as the features of collaboration between rider and horse. The horserider team was examined simultaneously by an outside judge who has extensive experience as a show jumper, trainer, and judge, using the same questionnaire about collaboration as the riders.

Table 4: List of Variables Scored by Riders in Assessing Horses' Temperament Immediately After Riding a Standard Course (N D 16)

Variable	Definition
Rreins	Receptive to the reins: rapidity and intensity of the horse's reaction to the bit and reins
Rlegs	Receptive to the legs: rapidity and intensity of the horse's reaction to the rider's legs
Sdist	Sensitive to disturbances: rapidity and intensity of the horse's reaction to disturbances in the environment
Spook	Spooky: how often and intensive the horse is shying for something
Live	Lively: how active and alert and/or playful the horse is
Conf	Confident: how safe and secure the horse seems to be
Arider	Attentive to the rider: how observant the horse is to the rider
Asurr	Attentive to surroundings: how observant the horse is to the environment
Curio	Curious: the tendency of the horse to explore different things in the environment
Brave	Brave: the tendency of the horse to pass frightening objects and events

Table 5: List of Items Included in the Questionnaires Filled in by Both the Riders and the External Judge

Variable	Definition
Rider's control	Rider's control of the horse
Obedience	Obedience of the horse
Obey task	Horse will obey the task
Riding ability	Response to the rider's aids
Interplay	Interplay between rider and the horse

(Questionnaire 2, Table 5). During the rides, all riders wore heart rate measuring devices (Polar Vantage) that measured mean heart rate every 5 s.

Result and Discussion

In this essay, we conducted a thorough assessment of four factors that are vital to understanding the hazards horses provide to riders. Despite being shown separately, they are mutually inclusive inside a complex socio-technical network and interspecies interaction that have been historically, socially, and culturally shaped. We discovered that study on risk reveals the subtleties of what may go wrong, how often it might happen, and what the repercussions are in connection to the dimensions of risk, horses, riders, and culture. Research on horses also emphasizes problems and makes the case for why horses pose risks. These biases favor accepting and avoiding risks as risk management strategies. Further study is needed to determine the degree to which horses' behavior may be made more predictable and how riders can improve their capacity to do so in order to fully benefit from risk-management tactics of mitigation. Research is also needed to determine how well riders perform and evaluate their own physical abilities, which boost their resistance to horse-related injury when riding. Finally, we took into account the inescapable and all-pervasive cultural backdrop that influences riders' actions, beliefs, values, and attitudes toward danger and safety. Variable rates of voluntary helmet wear indicate that internal change and external regulation are both necessary to improve the safety of equine cultures and equestrianism as a whole. Overall, we discovered that the risk management tactic of mitigation has a great deal of promise for lowering horse-related risk. We provided a list of study topics for every component of risk associated with horses. Together, they make up a multidisciplinary research agenda that might drastically lower accidents, injuries, and fatalities among millions of horseback riders worldwide. These questions span many disciplines, thus they also call for information from a variety of sources, including but not limited to:

Surveys and questionnaires— in order to create quantifiable data for advocacy and policy creation regarding horse and rider safety as well as to get a broader perspective on a variety of concerns.

Interviews and focus groups— to examine contentious issues related to risk and the rider's and horse's safety.

Ethnographic research— to research equestrians' real activities and find risk-management tactics that are in line with their goals, worldviews, and ethics.

Media analysis— to determine the links between specific incidences and dangers and equestrians' attitudes, beliefs, and behaviors, as well as how they are reported (or not reported) **Physiometry—** Psychometric studies on anxiety, risk-taking tendency, and experience seeking. Measuring rider posture and identifying physical characteristics positively linked with safety or resistance to being unseated.

amongst riders and equestrian discipline—help determine target populations and customize behavior modification strategies. Analysis of accident and injury reports, including data from inquests, insurance claims, and hospital admissions, to allow the triangulation of objective and self-report data, particularly around risk .

Inferential modeling - to ascertain the animal connection, target group archetyping, and risk and safety predictors.

In order to ensure that data are translated into practical safety intervention tools that can reduce the number of horse-related injuries and deaths, researchers should concentrate on developing programs that (a) raise awareness of avoidable horse-related injury and death, and (b) lower horse-related risk. These are some instances of such programs:

- Ethical techniques and behavioral interventions to increase the predictability of horses ,
- Interventions to improve riders' ability to predict horse behaviour ,
- Horse safety assessment and decision-making support tools ,
- Rider safety skills assessment tools ,
- Validated measure of horse training/riding style ,
- Behavior change for safe equestrian cultures

Conclusion:

Horse/Human Related Safety/Risk This article has shown that danger associated with horses is produced by a complex socio-technical network that includes risk, horses, people, and culture. Although these aspects have been acknowledged and, in some instances, studied, the construction of horse-related risk has traditionally been anthropocentric; it begins in horses and affects people. Furthermore, safety is primarily thought of as a human-only issue, despite the fact that in horses, a need for safety is a strong motivator of 'unpredictable' behavior (and a fantastic reward for behavioral treatments). There is a clear benefit to the broad adoption of a more anthrozoological approach to horse-related risk that also considers human-related risk and human/horse safety in order to overcome these prejudices. This study has discovered untapped potential to reduce horse-related risk via behavioral, physical, and sociocultural treatments that might make horses safer mounts, people safer riders, and equestrianism a safer culture, with human-horse safety as the ultimate aim.

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