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Internet survey on injuries in canine weight pull training and competing

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Short Report

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Internet survey on injuries in canine weight pull training and competing.

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15 Abstract

16 **Objective:** Weight pull is a canine sport where a dog uses a custom x-back harness
17 attached to a cart to pull weight for 5 meters. The sport of weight pull is gaining in
18 popularity, but we know relatively little about the injuries a dog may incur. This information
19 is critical to improving the safety of the sport. **Methods:** We used an anonymous Qualtrics
20 survey that asked about their experience as a weight pull handler as well as the training and
21 competing experience and injuries of up to three dogs. **Results**: 95 humans reported on
22 162 dogs. 10 injuries were reported and 4 of those injuries required veterinary attention.
23 The only injury reported was injury to a toe or toenail. We found that number of trials,
24 weeks per year trained, minutes per training session, session per year with chains and
25 sessions per year with a cart was significant for injury. We had a significant Chi-square for
26 trials per year, weeks per year training, minutes per session training, and training sessions
27 with chains. This came to one injury per 294 weeks of training, 357 sessions with chains,
28 667 weight pull trials or 303 minutes per training session. **Conclusions and Clinical**
29 **relevance**: We found that weight pull competing and training has no reported knee, spine,
30 neck or shoulder injuries, but there was a risk of toe or toenail injury. In general, more toe
31 injuries were found in dogs that competed in 28 or more trials and trained more than 26
32 weeks per year.

33 Key words: training, breed, weight pull, digit injuries

Introduction

Sports that grew out of traditional dog working activities including pulling carts, sleds and travois have been around for years. Weight pull is a canine sport where a dog uses a custom x-back harness attached to a cart to pull weight for 16 feet (5 meters). Dogs compete in body weight and in experience classes and the purpose is to pull a multiple of times the body weight for points or to out-pull other dogs in the weight class, depending on the organization's rules. There are at least 51 breed specific and all-breed organizations that offer weight pull competitions in the US, Australia, Canada and Europe. The sport of weight pull is gaining in popularity, but we know relatively little about the types of injuries a dog may incur, the severity of the injury and factors that may contribute to injuries in the sport of weight pull. This information is critical to improving the safety of the sport.

Previous research has identified some factors that contribute to risk for injury. Age of the dog is one factor. In sled dog races, the chance of injury drops with each year of age of the dog (von Pfeil et al. 2015). In agreement, Cullen et al. (Cullen et al. 2013a, b) and Sellon et al. (Sellon and Marcellin-Little 2022; Sellon et al. 2018) found that dogs with more years of experience in agility had a lower risk of injury. However, in Swedish sporting dogs (obedience, rally, agility, utility)(Essner et al. 2024) and American Flyball (Blake et al. 2023) or agility (Kerr et al. 2014) the age of the dog increased the odds of being injured. Handler experience in agility (5-10 years) also appears to reduce the risk of injury (Cullen et al. 2013a, b). Certain breeds like Border Collies (Essner et al. 2024; Markley et al. 2021; Sellon et al. 2018), Belgian Malinois (Essner et al. 2024) and Labrador retrievers have been identified as having a higher risk of injury in some sports (Lafuente and Whyle 2018).

The objective of this study was to take into account previously identified risk factors and interrogate the types of injuries and possible risk factors like dog training years, handler experience, training volume, type of training, volume of competition and dog breed. We hypothesized that injuries in weight pull would be rare and minor and most highly related to inexperienced handlers and high volume of training.

Methods

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (protocol number STUDY00001180, 24 March 2026) of Auburn University, Auburn, AL, USA. We developed an anonymous survey using Qualtrics for weight pull competitors that allowed them to enter information about themselves and their experience in weight pull as well as the training and competing experience and injuries of up to three dogs (see Supplementary material in the appendix). The survey was distributed on Facebook via our lab page, my personal Facebook page, and two weight pull Facebook groups. We allowed and encouraged sharing.

Data processing

Answers to questions that were uninterpretable (for example: saying “lots” to a question about number of training sessions per year) were marked as “U”. If the participant provided a range, the largest number was used as the answer. We calculated the number of injuries per 1000 by dividing the number of injuries by the sum of all responses.

Data analysis

SPSS version 29.0.0.0 was used for all statistical analysis. Data was reported as frequencies or mean±standard deviation, where appropriate. A multivariate Generalized Linear Model for injury and variables (years human competed, years the dog competed, number of titles, years the dog trained, weeks per year the dog trained, minutes per training session, number of sessions with chains, number of sessions with carts, number of trials the dog competed) with owner number as a covariate. A bivariate Pearson Product Moment correlation was run for all variables. We took the variables that were significant in the Generalized Linear Model and the Pearson Product Moment Correlation for injury and created a binary variable for each variable based on the median (1=median or below, 2=above the median). This data was analyzed using a Pearson Chi-Square analysis with a 2-sided asymptotic significance. We also did a risk estimate to calculate the odds ratio.

Results

Participants:

95 humans reported on 162 dogs. Six failed to report location information and 40 failed to report breed information. 75% of participants resided in the USA, 14% were in Canada, and 4% in Europe (see figure 1A). 37 breeds were represented and 11% were mixed breeds (Figure 1B). The humans reported that they had been competing in weight pull for 9±8 years (n=90, range: 0.33 to 48 years). 46% of participants reported competing in weight pull with 4 or more dogs.

Competing:

Participants reported competing with 15 different sport organizations (See figure 2A), with 52% reported competing with only 1 organization, 35% reported competing with 2-3 organizations and 12% reported competing with 4-7 organizations (Figure 2B). Our participants ranged in the amount of experience the dog had with 13% reporting zero weight pull titles to date and 35% reporting 10 or more titles to date for the dog (Figure 2C). Participants reported that the dog competed in 59±88 (range: 0-500 trials, n=111) weight pull trials.

Training:

Most participants reported that they trained on their own (75%, n=91). Only 3% (n=4) reported that they participated in formal classes and 21% (n=26) reported they did both formal classes and trained on their own (n=41 not reported). Participants reported each dog trained/competed 4±3 years (range: 0-12 years, n=120) to date. Participants were asked how many weeks per year they trained for weight pull. They reported 26±17 weeks per year (range: 0-52 weeks per year, n=114). Minutes per session was difficult to quantify for many but the average was 27±18 minutes per session (range: 0-120 min, n=115, 7 participants reported an answer that was uninterpretable, 40 did not report any answer). We also asked about training with chain pulling or carts. Participants reported that they did 32±44 sessions per year pulling chains (0-260 sessions per year, n=108, 13 responses were uninterpretable, 41 were not reported) and 111 reported that they did 16±20 sessions per year (range: 0-80 sessions/year, 10 were uninterpretable, 41 did not report) using the cart.

Injuries:

10 injuries were reported and 4 of those injuries required veterinary attention (38 not reported). Although we asked about a variety of injuries including knee, hip, spine, neck, shoulder, the only injury reported by all was injury to a toe or toenail. For the participants that reported an injury, 4 injuries were in American Bulldogs, 1 injury in the American Pitbull Terrier, 4 injuries in the American Staffordshire Terrier, and 1 injury in a Rat Terrier. We ran a multivariate GLM with injury as a fixed factor for all variables with owner number as a covariate. Number of trials ($F(1,87)$: 4.47, $p=0.037$, ETAsq=0.049), Week per year trained ($F(1,87)$: 6.0, $p=0.02$, ETAsq=0.065), minutes per session ($F(1,87)$: 4.33, $p=0.04$, ETAsq=0.047), session with chains per year ($F(1,87)$: 17.73, $p<0.001$, ETaSq=0.169), sessions per year with carts ($F(1,87)$: 4.11, $p=0.046$, ETAsq=0.045) were significant for injury. The years of competition experience for the dog ($F(1,87)$: 0.21, $p=0.65$) and the years of competition experience for the human ($F(1,87)$: 0.17, $p=0.69$) were not significant for injury.

We also did a Pearson Product moment correlation and found that injury significantly related to sessions per year with chains ($r=0.31$, $p=0.001$, $n=108$) and the number of weight pull trials reported for the dog ($r=0.22$, $p=0.02$, $n=111$). We converted these variables into a binary using the median as the break point. Using this data and the injury data, we conducted a Chi-square test and calculated the odds ratio. See table 1 for the summary. This calculates to 1 injury per 294 weeks of training, 178 sessions with a cart, 357 sessions with chains, 667 weight pull trials and 303 minutes per training session.

Discussion:

This is the first study investigating injuries in the sport of weight pull. We found that weight pull competing and training had no reported knee, spine, neck or shoulder injuries, but there were 10 toe or toenail injuries reported. Eighty percent of those injuries were in American Bulldogs or American Staffordshire Terriers. In general, more toe injuries were found in dogs that competed and trained more. Handler experience and years the dog trained were not related to injury. Overall, injury in weight pull competition and training was relatively rare and consisted of toe or toenail injuries, most of which did not require veterinary attention.

In our study, 6% of dogs were injured either competing or training for weight pull. In contrast, studies in canine agility report 32-41% of dogs having injuries (Cullen et al. 2013a; Markley et al. 2021) and Swedish dog sports reported that 59% of dogs had an injury in their lifetime related to competition or training (Essner et al. 2024). The number of years that the dog trained was not significant for injury or correlated to injury. Additionally, there was no negative effect of age of the dog/years of training such as that reported in flyball (Blake et al. 2023) and agility (Kerr et al. 2014). Handler experience was also not significant for injury in the current study. Breed of dog is also a common risk factor for injuries in sport. In the current study, 80% of the reported injuries were in American Bulldogs or American Staffordshire Terriers. However, these breeds represented less than 13% of the total dogs in the study.

Toe injuries are quite common in sport. Cullen et al. (Cullen et al. 2013a) reported 13% of injuries were to the phalanges in agility, but Kerr et al. (Kerr et al. 2014) reported 24% of dogs having front paw injuries in agility. To further evaluate the risk factors for toe or toenail injuries in weight pull we considered a number of risk factors including the number of years the dog has trained, the handler experience, the breed of dog, the training volume and type of training and the number of competitions.

For the current study, the risk factors that contributed to toe or toenail injuries in weight pull were the number of trials the dog competed, the number of weeks per year trained, the number of minutes per training session, the training sessions with chains per year, and the number of sessions per year with carts. This is calculated to 1 injury per 294 weeks of training, 178 sessions with a cart, 357 sessions with chains, 667 weight pull trials and 303 minutes per training session. Overall, this suggests that more exposure to weight pull competition and training does increase the dog's risk of injury, but the risk is quite low and the injury is minor.

There are several limitations for the current study. One limitation is that data was collected as a retrospective, online, anonymous questionnaire distributed through social media. This could result in biased data based on people self-identifying as weight pull competitors. It may also be biased by more handlers that had not experienced dog injuries responded to

the survey. It is also possible that people would be less likely to report minor injuries like sprains and strains.

In conclusion, this is the first study to evaluate the number and types of injuries that occur in the competition and training for the sport of weight pull. We found that out of 162 dogs, 10 injuries to the toe or toenail were reported. Four of those injuries required veterinary intervention. This percentage of injury was significantly lower and the type of injury less serious than that reported for common dog sports like agility. American Bulldogs or American Staffordshire Terriers were the most commonly injured in weight pull. Overall, the risk of injury was higher in dogs with more exposure to weight pull training and competition.

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Authors contributions: All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Dr. Heidi Kluess. The first draft of the manuscript was written by Dr. Heidi Kluess and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability: Data set is available at https://heidikluess.wixsite.com/data-kluess-lab

Ethics approval: This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (protocol number STUDY00001180, 24 March 2026) of Auburn University, Auburn, AL, USA.

Consent to participate: Consent to participate was obtained.

Consent to publish: The authors affirm that human research participants provided informed consent for publication

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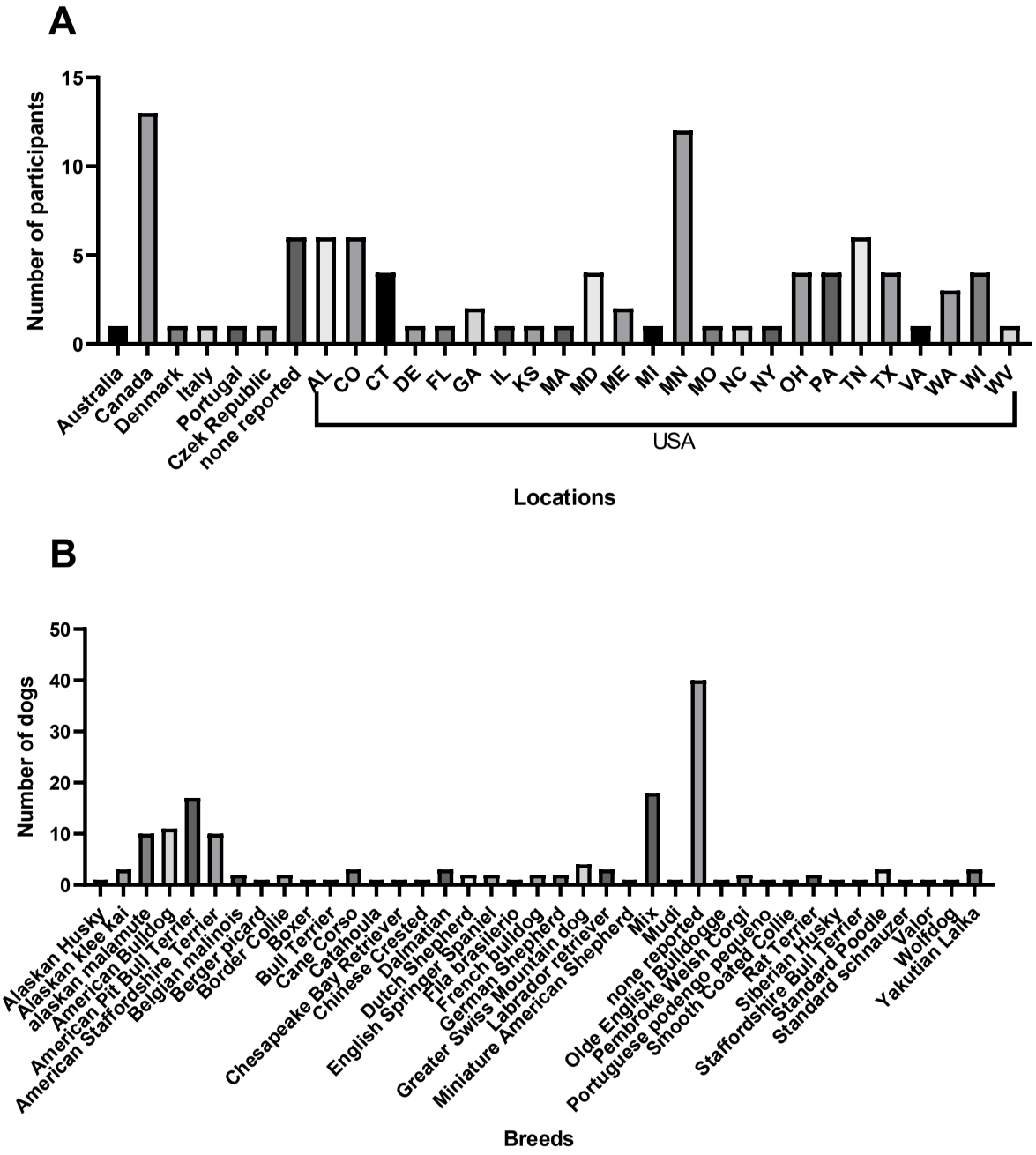
248 Figure legends:

249 **Figure 1**: Demographics for participants in the study. (A) Number of participants per
250 location reported. (B) Number of dogs for each breed or mixed breed reported.

251 **Figure 2**: Participant reported organization, number of organizations and weight pull titles.
252 (A) Number of participants that reported participating in events with specific organizations.
253 (B) The number of participants that reported competing with 1-7 organizations. (C) The
254 number of titles per dog.

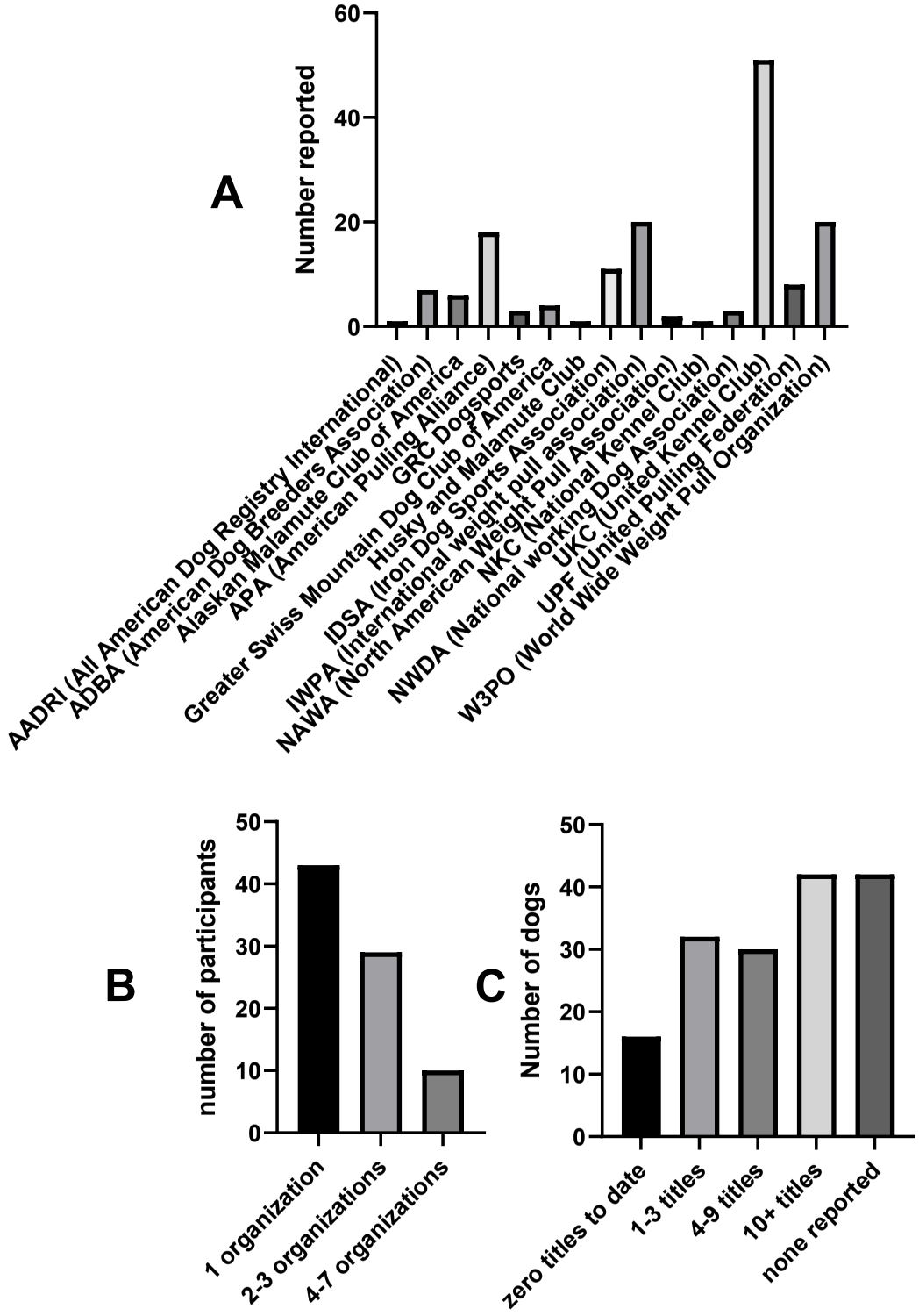
255

256 Figure 1



257

258 Figure 2



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260 Table 1: summary of Chi-Square and odds ratio

261

	Chi-Square	Odds ratio
Trials per year	χ^2=4.09, p=0.05, n=109	28 or more trials per year had 4.6 times the odds of getting a toe injury
Weeks per year training	χ^2=8.22, p=0.006, 111	26 or more weeks per year training were 12 times the odds of getting a toe injury
Minutes per session training	χ^2=4.44, p=0.047, n=112	25 or more minutes per session were 4.9 times the odds of getting a toe injury
Training sessions per year with a cart	χ^2=2.19, p=0.19, n=109	More than 5 training sessions with cart resulted in 2.8 times the odds of having a toe injury
Training sessions per year with chains	χ^2=11.04, p=0.001	18 or more sessions with chains were 1.2 times the odds of getting a toe injury

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Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Weightpullinjurysurveyfinalversion42026.docx