

A 9-Year Epidemiologic Study (2007–2015) on Race-Day Jockey Fall and Injury Incidence in Amateur Irish Horse Racing

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Context: Point-to-point racing may place jockeys at risk of serious injuries due to the high incidence of falls as previously reported. Despite many advances in health and safety strategies, the incidence of falls and injuries in point-to-point racing has not been reported since 2006.

Objectives: To provide a longitudinal analysis of the fall and injury incidence in point-to-point horse racing jockeys in Ireland from 2007 to 2015 and compare these findings with the previous literature.

Design: Descriptive epidemiologic study.

Setting: All injuries that occurred due to a fall at every official point-to-point race meeting from 2007 to 2015 were recorded by a medical doctor using a standardized injury report form.

Main Outcome Measure(s): Falls and injury rates and their 95% confidence intervals were calculated. Incidence rate ratios (IRRs), 95% confidence intervals and percentage change were compared between point-to-point and professional racing, between previous data and the current results, and from 2007 to 2015.

Results: An average of 67.40 injuries/1000 falls and 9.08 injuries/1000 rides occurred in point-to-point racing, and this was reduced compared with the previous analysis. Amateur jockeys sustained an overall mean of 134.77 falls/1000 rides and the yearly means decreased over the 9 years of the study. Amateur jockeys sustained a higher fall rate than professional jockeys (flat: IRR = 35.47 [31.03, 40.54]; jump: IRR = 2.72 [2.63, 2.82]); however, their injuries/1000 falls rate was lower (flat: IRR = 0.19 [0.15, 0.24]; jump: IRR = 0.33 [0.30, 0.63]). Soft tissue injuries were predominant (43.09%), with 26.06 fractures and 9.98 concussions/1000 falls occurring.

Conclusions: Although injuries have been reduced since the previous analysis, more serious injuries such as fractures and concussions were more common in point-to-point racing than professional racing, possibly due to their higher fall risk. Thus, identifying strategies to reduce the fall risk in point-to-point racing should be a priority.

Key Words: point-to-point horse racing, qualified riders, injury rate, concussions, fractures

Key Points

- In point-to-point racing, 1 fall occurred in every 7 rides, with 6.7% of these resulting in an injury.
- Since the previous analysis (1999–2006), injuries/1000 rides and injuries/1000 falls have been reduced.
- Amateur jockeys sustained more falls but fewer injuries than professional jockeys.
- The fracture and concussion incidences were higher in amateur than professional jockeys.
- Strategies to reduce the fall risk in amateur jockeys should be examined and implemented.

Although professional horse racing is recognized worldwide, amateur racing predominantly occurs in Ireland, the United Kingdom, and France.^{1,2} Also known as *point-to-point racing*, it is largely considered the nursery of jump racing, often acting as a starting point for young jockeys or horses that move on to professional jump racing. More than 100 point-to-point meetings are held during a typical racing season in Ireland, beginning in October and ending in June, predominantly on weekends and public holidays but occasionally on weekdays. This form of racing consists of steeplechase races with 12 to 22 fences over a distance of 4800 m to 6400 m across farmland as opposed to the formal race tracks seen in professional horse racing. Point-to-point races are confined

to qualified riders, commonly referred to as *amateur jockeys*. An amateur jockey does not receive a fee for riding in a race, and most amateurs work as full-time stable staff. Many professional flat and jump (national hunt) races are open to amateur jockeys; however, they are restricted to 21 rides against professional jockeys in Ireland each season (The Turf Club, personal communication, 2017).

Fall and injury incidences have been examined in professional jockeys, with published data available as recently as 2015.³ The most recent analysis² of point-to-point racing in Europe addressed the 1999–2006 time frame and examined injury and fall data from Ireland, the United Kingdom, and France. Point-to-point racing was reported to have significantly higher rates of falls, injuries, and

concussions resulting from rides than either flat or jump racing, yet the injury rate after falls was lowest in point-to-point racing.

Horse racing is considered a high-risk and dangerous sport.²⁻⁴ Previous injury data^{1,2} suggested that amateur jockeys had more falls than their professional counterparts, placing them at greater risk of more serious injuries. While advances in health and safety strategies (eg, new helmet-safety standards and concussion protocols) have been made throughout the horse-racing industry in recent years, the incidence of falls and injuries in point-to-point racing since 2006 remains unknown. Therefore, our aim was to detail the fall and injury incidences in point-to-point racing in Ireland over the 9-year period from 2007 through 2015 and to compare the fall and injury epidemiology with previous analyses of point-to-point racing from 1999 through 2006 as well as professional horse racing from 2011 through 2015 in Ireland.

METHODS

The fall and injury incidence in point-to-point horse racing in Ireland over a 9-year period (2007–2015) was examined. Ethical approval was granted by a local university research ethics committee. The Senior Medical Officer of the Turf Club manages all injury surveillance at the amateur and professional race tracks. At every official point-to-point race meeting, 2 medical doctors must be in attendance and a standardized injury report form is completed to register the injury data gathered at each race meeting. A *fall* was defined as “a rider being dislodged from a horse, regardless of the outcome.”⁵ In point-to-point racing, an *injury* was defined as that recorded in writing by the medical doctor present at the race meeting.¹ When multiple injuries occurred, each injury was noted separately.¹ The Senior Medical Officer then collated all injury report forms after each race meeting and reviewed them, contacting the medical doctor if any discrepancies were noted in the injury report form. The number of rides, official point-to-point race meetings, and amateur jockeys from 2007 through 2015 were gathered from Horse Racing Ireland fact books.^{5,6} Because the season begins in October and finishes in June, for the purposes of this paper, the year given will denote the year in which the season ended (eg, 2006–2007 season is referred to as 2007).

Data Analysis

The incidence rate was calculated/1000 rides using the following formula. The 95% confidence interval (CI) was calculated using the Poisson distribution:

$$\text{Incidence rate (IR)} = \frac{\text{Number of injuries}}{\text{Total number of rides}^*} \times 1000$$

*The total number of falls and race meetings substituted the total number of rides for the injury rate/1000 falls and /1000 race meetings.

In addition to injury, fall, fracture, and concussion rates/1000 rides, /1000 falls, and /1000 race meetings were calculated in the same manner. Poisson regression was used to examine any changes in falls/100 rides and injuries, fractures, and concussions/1000 rides, /1000 falls, and /1000 meetings over the course of the current study (2007–

2015). For the Poisson regression analysis, the results were considered significant if $P < .05$, and the incidence rate ratios (IRRs), 95% CI, and absolute percentage change between 2007 and 2015 (% change) are presented. The IRR, 95% CI, and absolute % change were calculated using average fall and injury rates between (1) previous published epidemiology results² (1999–2006) in point-to-point racing in Ireland and the current study (2007–2015), (2) professional jump racing incidence (2007–2015)³ and point-to-point incidence (with point to point being the reference), and (3) professional flat-racing incidence (2011–2015)³ and point-to-point incidence (reference). For this analysis, an IRR greater or less than 1 indicates an increase or decrease, respectively, in fall and injury incidence rates with respect to the reference variable or time. All CIs not including 1.00 were considered statistically significant. The nature of injury was reported as the overall percentage of the total injuries with 95% CI. Data were statistically analyzed using Microsoft Excel (version 2010; Redmond, WA) and STATA (version 13; STATA-Corp LLC, College Station, TX).

RESULTS

From 2007 through 2015, 494 ± 92.6 (range = 345–609) jockeys held amateur racing licenses in Ireland. The characteristics and fall and injury incidences in point-to-point horse racing are presented in Table 1. Over the last 9 years, 1257.9 ± 293.9 falls occurred in 9333.9 ± 1718.1 rides, with 84.8 ± 17.6 reported injuries. Point-to-point jockeys sustained an average of 134.77 falls/1000 rides, and falls/1000 rides were reduced over the 9-year period from 2007 through 2015 (IRR = 0.97; 95% CI = 0.95, 0.99; $P = .006$; Table 2). An average of 67.40 injuries/1000 falls and 9.08 injuries/1000 rides occurred, and while these increased over the course of the study, the differences were not significant ($P > .05$). In contrast, injuries/1000 meetings were reduced over the last 9 years (IRR = 0.97; 95% CI = 0.96, 0.98; $P < .001$). Injuries/1000 rides and /1000 falls decreased since the previous analysis of point-to-point horse racing in 1999 through 2006 (Table 2).

A significantly higher number of falls/1000 rides were noted in point-to-point racing than in flat (IRR = 35.47; 95% CI = 31.03, 40.54) and jump (IRR = 2.72; 95% CI = 2.63, 2.82) racing (Table 2). Although amateur jockeys sustained more injuries/1000 rides than professional flat jockeys, their incidence was lower than for professional jump jockeys (IRR = 0.90; 95% CI = 0.82, 0.99). Injuries/1000 falls were higher in both jump (IRR = 0.33; 95% CI = 0.30, 0.63) and flat (IRR = 0.19; 95% CI = 0.15, 0.24) than point-to-point racing.

Soft tissue injuries were predominant (45.09%), with fractures (38.55%) and concussions (14.81%) also occurring frequently (Table 3). There were 3.51 fractures/1000 rides and 26.06/1000 falls. Fractures/1000 meetings were reduced over the 9 years (IRR = 0.96; $P < .0001$). Amateur jockeys sustained more fractures/1000 rides and /1000 meetings than jump and particularly flat professional jockeys, respectively (Table 2). In contrast, fractures/1000 falls were higher in jump and flat racing than in point-to-point racing.

Concussions/1000 rides and /1000 falls nonsignificantly increased over the course of the study ($P > .05$); overall,

Table 1. Characteristics and Injury Incidence of Point-to-Point Horse Racing in Ireland, 2007 to 2015

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	Mean (95% Confidence Interval)
No.											
Amateur jockeys	597	609	554	539	510	485	418	390	345	4447	
Rides	9768	10 827	11 620	9557	9265	10 827	8370	7505	6266	84 005	
Race meetings	103	111	108	110	112	111	94	107	107	963	
Falls	1508	1604	1585	1325	1287	1255	1078	923	756	11 321	
Injuries	89	88	92	81	93	113	72	87	48	763	
Falls/1000 rides	154.38	148.15	136.40	138.64	138.91	115.91	128.79	122.98	120.65		134.77 (132.31, 137.27)
Injuries											
/1000 rides	9.11	8.13	7.2	8.48	10.04	10.44	8.60	11.5	7.66		9.08 (8.46, 9.75)
/1000 falls	59.02	54.86	58.04	61.13	72.26	90.04	66.79	94.26	63.49		67.40 (62.78, 72.35)
/1000 meetings	864.08	792.79	851.85	736.36	830.36	1018.02	765.96	813.08	448.60		792.32 (738.04, 850.58)
Fractures											
/1000 rides	3.89	2.68	2.75	2.93	5.29	4.25	2.87	4.53	2.39		3.51 (3.49, 3.54)
/1000 falls	25.20	18.08	20.19	21.13	38.07	36.65	22.26	36.84	19.84		26.06 (25.58, 26.54)
/1000 meetings	368.93	261.26	296.30	254.55	437.50	414.41	255.32	317.76	140.19		306.33 (287.58, 326.31)
Concussions											
/1000 rides	1.43	1.48	1.03	1.78	0.97	1.2	0.72	2.13	1.44		1.35 (1.34, 1.35)
/1000 falls	9.28	9.98	7.57	12.83	6.99	11.16	5.57	17.33	11.90		9.98 (9.80, 10.17)
/1000 meetings	135.92	144.14	111.11	154.55	80.36	126.13	63.83	149.53	84.11		117.34 (110.16, 124.99)

they were reduced since the previous analysis, but this result was not significant. Concussions/1000 meetings decreased over the last 9 years ($P = .002$). Concussions/1000 rides and meetings were higher in point-to-point than jump and flat racing (Table 2). However, although concussions/1000 falls were lower in amateur jockeys, this was only significant compared with flat racing. The licensed medical doctor determined that a jockey was ineligible to ride due to dehydration in 1 case over the course of the study.

DISCUSSION

Horse racing is a dangerous sport with a high risk of injury.²⁻⁴ Between 1993 and 2006, point-to-point racing had markedly higher fall and injury rates than professional horse racing.^{1,2} Since then, no epidemiologic information on race-day jockey fall and injury incidences was available, which limits our understanding of the inherent risks associated with point-to-point racing in Ireland. We provide prospective, longitudinal epidemiologic data for falls that occurred during point-to-point racing from 2007 through 2015, comparing them with previous analyses on amateur racing as well as recent professional racing data.

Our results suggest that since the previous analysis² of point-to-point horse racing in Ireland between 1999 and 2006, no differences were apparent in the incidence of falls, yet injuries occurring from rides (11.68 versus 9.08) and falls (84.00 versus 67.40) decreased. In addition, injuries at race meetings were reduced over the last 9 years. Health and safety interventions, including increasing the helmet-safety standards (British Standards Institute guideline PAS015:2011: <https://www.bsigroup.com/en-GB/blog/Personal-Protective-Equipment-Blog/Why-its-important-to-choose-the-correct-type-of-equestrian-helmet/>) and implementing a new concussion-assessment protocol, may have contributed to this overall injury risk reduction. However, because these interventions were implemented

over a number of years, the direct effect of each health and safety intervention could not be determined.

Amateur jockeys sustained a higher incidence of falls compared with jump- and particularly flat-racing jockeys. This was similarly noted by Reuda et al,² who found that amateur jockeys also sustained more falls than professional jockeys. Balendra et al¹ suggested amateur jockeys may have various skill levels, as reflected in the large number of jockey license holders along with the smaller number of rides available than to professional jockeys. Although races are not evenly distributed among jockeys, focusing on 2015 alone, we could conclude that in point-to-point racing, only 18 rides are available annually for each amateur jockey versus 116 and 143 rides available for each professional flat- and jump-racing jockey, respectively. The greater jockey numbers in point-to-point racing and fewer racing opportunities reduce racing prospects and practice for amateur jockeys. Professional jockeys could be suggested to have a higher level of riding skills, access to better horses and racetrack quality, and more opportunities to practice, which may reduce their fall risk.¹ Our findings suggest that 1 fall occurred in every 7 rides in point-to-point racing, with 6.7% of these resulting in injury. Falls were more common in point-to-point racing, but the number of falls resulting in injury was lower than in professional racing. This is highlighted by data presented previously by our research group³ showing that in jump racing, 1 fall occurred in every 20 rides, with 20% of these resulting in injury. In contrast, 1 fall occurred in every 250 rides in flat racing, and 35% of the falls resulted in injury. The increased risk of falls makes amateur racing more dangerous for those jockeys involved in point-to-point races with more opportunity for injury. Strategies should be investigated to reduce the incidence of falls in amateur racing, such as providing more opportunities to practice and maintain skill levels⁷ and ensuring that a minimum number of rides are performed annually as a requirement to hold a racing

Table 2. Incidence Rate Ratios and Differences Over Time and Among Racing Types

Measure	Differences in Point to Point, 2007–2015 ^a			Differences in Point to Point, 1999–2006 Versus 2007–2015 ^c			Differences Between Point-to-Point (2007–2015) and Jump (2011–2015) Racing			Differences Between Point-to-Point (2007–2015) and Flat (2011–2015) Racing		
	IRR	95% CI	% Change	IRR	95% CI	% Change	IRR	95% CI	% Change	IRR	95% CI	% Change
Falls/1000 rides	0.97 ^a	0.95, 0.99	–3.05	0.97	0.94, 1.00	–2.97	2.72 ^a	2.63, 2.82	172.26	35.47 ^a	31.03, 40.54	3446.58
Injuries												
/1000 rides	1.02	0.93, 1.10	1.46	0.78	0.70, 0.86	–22.26	0.90 ^a	0.82, 0.99	–10.10	6.49 ^a	5.14, 8.19	548.57
/1000 falls	1.05	1.01, 1.08	4.53	0.80 ^a	0.72, 0.89	–19.76	0.33 ^a	0.30, 0.36	–66.93	0.19 ^a	0.15, 0.24	–80.90
/1000 meetings	0.97 ^a	0.96, 0.98	–3.10				1.02	0.93, 1.13	2.10	8.42 ^a	6.67, 10.63	742.00
Fractures												
/1000 rides	1.01	0.88, 1.15	0.53				1.85 ^a	1.52, 2.24	84.75	17.55 ^a	9.85, 31.26	1655.00
/1000 falls	1.04	0.99, 1.09	3.50				0.70 ^a	0.85, 0.85	–29.95	0.48 ^a	0.27, 0.85	–52.45
/1000 meetings	0.96 ^a	0.95, 0.98	–3.59				2.16 ^a	1.78, 2.63	116.49	21.27 ^a	11.94, 37.89	2027.29
Concussions												
/1000 rides	1.01	0.81, 1.26	1.08	0.77	0.59, 1.01	–22.86	2.25 ^a	1.62, 3.12	125.00	6.75 ^a	3.42, 13.31	575.00
/1000 falls	1.05	0.97, 1.13	4.46	0.77	0.59, 1.00	–23.23	0.80	0.25, 1.12	–19.52	0.24 ^a	0.12, 0.48	–75.72
/1000 meetings	0.96 ^a	0.93, 0.98	–4.40				2.47 ^a	1.78, 3.42	147.03	10.86 ^a	5.51, 21.42	986.48

Abbreviations: CI, confidence interval; IRR, incidence rate ratio.

^a Significant difference; for differences between 2007 and 2015, significance was determined if $P < .05$. For differences between 1996–2006 and 2007–2015, point-to-point and jump and point-to-point and flat, significance was determined if the 95% CI did not cross 1.

^b Poisson regression was used to analyze injury, fracture, and concussion trends over time between 2007 and 2015.

^c Differences between 1999–2006 and 2007–2015 could not be calculated for injuries/1000 meetings, fractures/1000 rides, fractures/1000 falls, and fractures/1000 meetings as this information was not examined by Rueda et al² (2010).

Table 3. Nature of Injury in Point-to-Point Horse Racing, 2007 to 2015

Injury	No. (%)	95% Confidence Interval
Soft tissue	344 (45.09)	40.57, 50.12
Fracture	295 (38.66)	34.49, 43.33
Concussion	113 (14.81)	12.32, 17.81
Teeth	4 (0.52)	0.20, 1.39
Pneumothorax	4 (0.52)	0.20, 1.39
Spinal cord	2 (0.26)	0.07, 1.04
Liver laceration	1 (0.13)	0.02, 0.92

license. Lower levels of physical conditioning have previously been associated with an increased risk of falls,⁸ so future investigations should focus on the physical fitness levels of amateur jockeys and the implementation of intermittent fitness testing to ensure that optimal fitness levels are maintained for racing despite fewer opportunities to race.

Soft tissue injuries remain the most prevalent injury sustained during horse racing. In point-to-point racing, the proportion of total injuries that were soft tissue was lower than that reported for professional racing.³ However, this finding may indicate that amateur jockeys are at an increased risk of sustaining more serious injuries such as fractures, as is demonstrated by the higher percentage of fractures in amateurs.³ In point-to-point racing, fractures resulting from rides were more common than in professional flat and jump racing, and a fracture was 21.27 times more likely to occur in a point-to-point race meeting than a flat meeting. This high incidence of fractures in amateur jockeys may be related to the high frequency of falls in point-to-point racing.² In contrast, fractures were more frequent in flat racing when a fall actually occurred. The high incidence of low bone mass and osteopenia in professional flat and jump jockeys is commonly documented in the literature.^{9,10} It has been suggested that such jockeys may be susceptible to fractures from falls that might otherwise have left them unharmed. Comparative data are not available for amateur jockeys, and the bone status of amateur jockeys remains unknown. In contrast to professional racing, amateur racing predominantly takes place on weekends and public holidays with the occasional weekday event during a fixed season from October to June. Amateur jockeys are therefore not required to rapidly reduce their weight in preparation for racing on a daily basis. The exact reason for more fractures occurring from falls in flat racing remains unknown. However, the shorter race distances and faster speeds attained in flat racing in conjunction with the horses being closer together may also be contributing factors. Fortunately, fractures occurring at race meetings decreased from 2007 to 2015, most likely due to the corresponding reduction in falls.

Concussions occurring at race meetings were reduced between 2007 and 2015 in point-to-point racing. Similar to the fracture incidence, this may be due to the reduction in falls. In addition, the incidence of concussions as a result of a ride or fall was reduced in comparison with the previous point-to-point analysis from 1999 to 2006, but this was not statistically significant. In an attempt to decrease the impact of any head injuries, helmet-safety standards have improved since the previous analysis of point-to-point racing. A concussion was 10.86 and 2.47 times more likely to

occur during a point-to-point race meeting than during a jump or flat meeting, respectively, presumably due to the increased fall rate noted in amateur jockeys. Therefore, it is critical that efforts be focused on reducing the high incidence of falls in point-to-point racing to subsequently reduce associated injuries.

We monitored race-day falls and injuries only, without examining the incidence of falls and injuries during riding-related work and training. Future researchers should also address falls and injuries reported during work and training. Reporting procedures may have varied since the previous analysis was completed between 1999 and 2006, which may have affected some of the comparisons made in this article. Despite many health and safety interventions being implemented throughout the years, it was not possible to determine the effect of each individual intervention.

CONCLUSIONS

We presented prospective epidemiologic data on Irish amateur horse racing from 2007 to 2015, an analysis last completed in 2006. Compared with the previous analysis, the incidence of injuries was reduced. The incidence of falls also decreased during the study period. This indicates the potential benefits of implemented health and safety interventions. Although soft tissue injuries were predominant in point-to-point racing, the fracture incidence was higher in amateur jockeys than in professionals. The risk of injury from falls was less than in professional jockeys, but falls occurred more regularly in amateurs. Thus, reducing the risk of falls in amateur jockeys is essential, and strategies such as providing more riding opportunities to increase or maintain skill levels and improving fitness standards should be considered. Further research on risk factors for injury in point-to-point racing, along with the feasibility and costs of implementing injury-prevention strategies in the amateur jockey population, should be examined.

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