National Safety Council

North America Fixed-Site Amusement Ride Safety Report, 2022 Update

Prepared for

IAAPA, The Global Association for the Attractions Industry

IAAPA NORTH AMERICA

September 2023

National Safety Council

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PREFACE

Safety is the number-one priority of the attractions industry. Complete and accurate data demonstrate this fact and provide a means of evaluating over time. Since 2002, IAAPA appreciated working with the National Safety Council to collect verifiable ride safety statistics to share with members and the public.

The *North America Fixed-Site Amusement Ride Safety Report* serves as the benchmark for continuous improvement in safety within the attractions industry. Thank you for supporting this useful and important research!

Best regards,

Michael Shelton
VP and Executive Director
IAAPA North America

Chris Oliver
Vice President, Engineering & Safety
Universal Orlando
IAAPA North America Safety
Subcommittee Chair

1. BACKGROUND AND SCOPE

This report presents the results of work done by the National Safety Council (NSC) under contract to IAAPA, the global association for the attractions industry. It includes estimates by NSC for calendar years 2003 through 2022.

Since 2003, NSC has produced the annual *North America Fixed-Site Amusement Ride Safety Report* for IAAPA, collecting and analyzing ridership, attendance, and patron injury data from facilities that operate fixed-site amusement rides. Beginning with the 2016 data year, Canadian parks were included in the ride safety survey. The survey includes amusement and theme parks, tourist attractions, and family entertainment centers. The results of the survey follow.

1.1 Ride Safety Project Design

A total of 700 contacts representing a sample of the 437 U.S. and Canadian fixed-site amusement facilities in North America were invited to participate in the 2022 survey of patron injuries. Contacts in the IAAPA North America database (both members and non-members) were emailed and invited to complete a structured questionnaire (Appendix E) via an online link, or by downloading the questionnaire and returning it to the National Safety Council.

All facilities received an initial email survey packet in January 2023, while non-respondents received additional follow-up monthly emails through June 2023. IAAPA member facilities also received follow-up requests from IAAPA staff urging participation. Respondents had the option of completing the ride injury survey online or returning the completed paper version of the survey form. Facilities were asked to report attendance and ridership, as well as the number of patron injuries.

Two distinct analyses were conducted, one based on attendance and the other on ridership data. However, not all facilities were able to provide both attendance and ridership information, resulting in variations in the selection of facilities for each analysis.

1.1.1 Definitions

The definitions (Appendix A) utilized in this research remain consistent with previous years'. The North America Fixed-Site Amusement Ride Safety Report is based on a survey conducted among operators of Permanent Ride Facilities, commonly known as amusement parks and theme parks. The study encompasses three types of fixed-site rides: Children's Rides, Family/Adult Rides, and Roller Coasters. Moreover, the study presents findings on two types of injuries, categorized by the severity of health consequences as outlined in Appendix A.

1.1.2 Confidentiality

All data provided by individual parks and attractions for this project were exclusively used for statistical purposes and treated with strict confidentiality. Once the data are edited, verified, and entered into the database for analysis, any individual facility identification is securely removed. Following the completion of the project, all records (paper and electronic) that include raw injury data are destroyed. Some select park participation and attendance data are retained to support administration of future project years. No park-specific data are reported with all analyses aggregated. NSC provides IAAPA park participation information but does not provide IAAPA access to the park's or attraction's data.

1.2 Ride Safety Survey Response

A total of 154 facilities responded to the survey. Of the responses:

- 149 provided some or all the data requested.
- 5 were unable to report either attendance or counts of rides taken.

The 2022 survey resulted in a total of 143 parks providing attendance-based data and 121 parks providing ridership-based data. Of these, 115 parks provided both attendance and ridership data. Parks participating in the 2022 survey represent approximately 60% of total North America estimated attendance and 59% of the total estimated rides taken. The majority of responding facilities included in this analysis are IAAPA members, with 131 (88%) coming from IAAPA members and 18 (12%) from non-members.

2. EXECUTIVE SUMMARY

2.1 Background

- Since 2003, NSC has conducted an annual survey for IAAPA to collect and analyze ride, attendance, and patron injury data from facilities that operate fixed-site amusement rides.
- This project is the only data source that provides injury rates specific to fixed-site amusement parks.

2.2 Method

- Approximately 700 contacts representing a sample of 437 U.S. and Canadian fixed-site amusement facilities were invited.
- Facilities received an initial email request in January 2023.
- Non-respondents received additional monthly email reminders through June 2023.
- IAAPA staff followed-up with IAAPA members to encourage participation.

2.3 Responses

- Park participation decreased 17% from 2021.
- Park participation increased 22% from 2020.
- Park participation is stable from pre-pandemic 2019.
- 149 parks responded with data:
    - 131 (88%) members
    - 18 (12%) non-members
- Survey coverage:
    - Parks participating in this year's survey represent approximately 60% of total North America estimated attendance.
    - Parks participating in this year's survey represent approximately 59% of total estimated rides taken.

2.4 Results

- Number of injuries are up in 2022 from 2021 (+13%).
- From 2003 to 2022 injuries have decreased 29%.
- Injury rates are down in 2022 from 2021:
    - Injuries per million attendees were down 34%.
    - Injuries per million rides taken were down 19%.
- From 2003 to 2022 injury rates have decreased:
    - Injuries per million attendees were down 65%.
    - Injuries per million rides taken were down 27%.
- 19% of injuries are estimated to be serious.
- Most injuries occur on family/adult rides, followed by roller coasters.
- Proportion of injuries occurring on children's rides decreased in 2022, from 16% to 11%.
- Roller coasters have the highest injury rate per million rides taken.
- Children's rides have the second highest rates, with over half of injuries occurring while getting in or out of the ride.

3. RIDE SAFETY REPORT RESULTS

Section 3 is based on the full North America Fixed-Site Amusement Ride Safety Report 2022 sample of responding 149 usable responses. Attendance based estimates reflect the 143 parks providing attendance data, while the ridership estimates reflect 121 parks providing ridership data. Sample results are weighted to reflect the estimated 437 operating parks in North America.

3.1 Total Injuries

Separate attendance-based and ridership-based injuries analyses were performed. Since not all facilities were capable of reporting both attendance and ridership data, there were variations in the selection of facilities utilized for each analysis.

As in past years, the estimated number of injuries using the two samples resulted in similar counts. In 2022, the estimates using the sample of parks providing attendance data result in 1,349 injuries, while the ridership estimates show 1,390 injuries. Because the two estimates show close alignment and because ridership-based rates are a more appropriate measure of exposure to risk than attendance-based rates, this report will focus primarily on ridership-based estimates. Results based on the attendance-based analysis are clearly labeled.

Similar to past findings, the vast majority of injuries are in the reportable category, not serious. Family/adult rides were associated with the largest number of injuries followed by roller coasters.

The majority of injuries occur as a result of ride motion versus 33% while entering or exiting the ride.

Total Injury Estimates Based on Parks Providing Ridership Data

	North America Estimate (Ridership Providing Sample)							
	2022		2021		2020		2019	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Parks	437		431		346		436	
TOTAL INJURIES	1,390	100%	1,224	100%	341	100%	1,294	100%
Serious	259	19%	130	11%	54	16%	82	6%
Reportable	1,131	81%	1,094	89%	286	84%	1,212	94%
Children's rides	148	11%	201	16%	26	8%	157	12%
Family/adult rides	739	53%	640	52%	205	60%	688	53%
Roller coasters	503	36%	383	31%	110	32%	449	35%
Getting in/out	457	33%	406	33%	108	32%	511	40%
Ride motion	933	67%	818	67%	233	68%	783	60%

For reference to the ridership-based estimates (provided above), estimates using the attendance-based sample of parks are provided below.

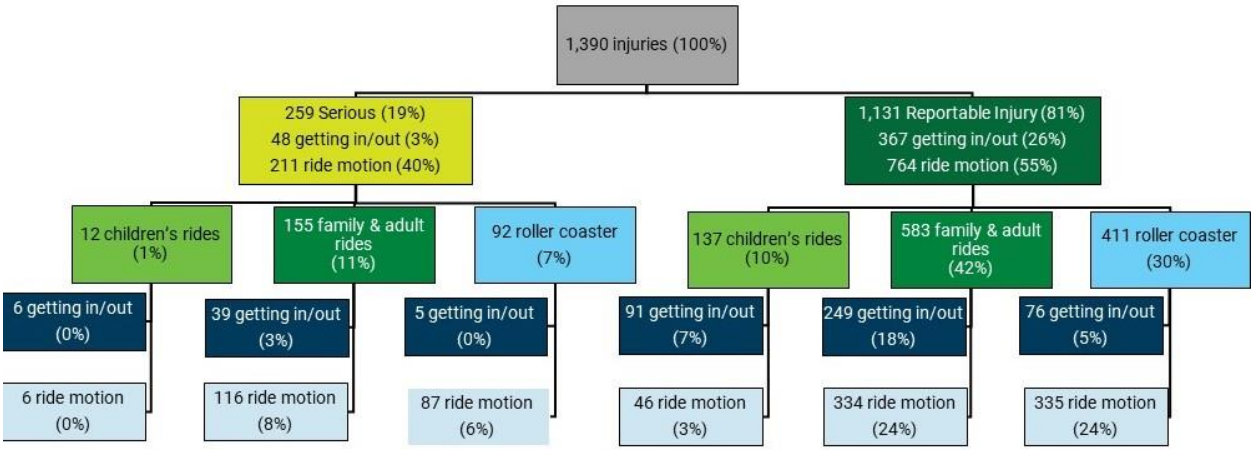
Total Injury Estimates Based on Parks Providing Attendance Data

	North America Estimate (Attendance Providing Sample)							
	2022		2021		2020		2019	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Parks	437		431		346		436	
TOTAL INJURIES	1,349	100%	1,281	100%	314	100%	1,299	100%
Serious	192	14%	170	13%	40	13%	78	6%
Reportable	1,157	86%	1,111	87%	274	87%	1,221	94%
Children's rides	106	8%	150	12%	25	8%	118	9%
Family/adult rides	793	59%	692	54%	172	55%	727	56%
Roller coasters	450	33%	438	34%	116	37%	454	35%
Getting in/out	449	33%	410	32%	100	32%	503	39%
Ride motion	900	67%	871	68%	214	68%	796	61%

3.2 Distribution of Injuries

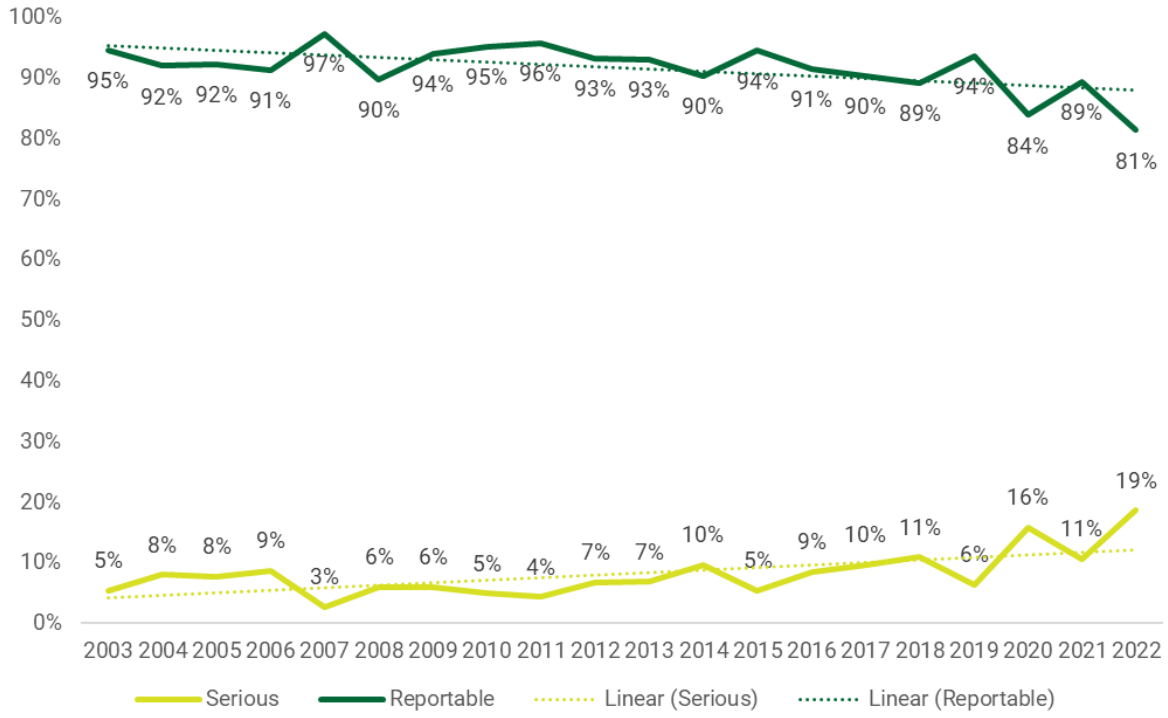
The following tree diagram summarizes the distribution of injuries in terms of severity, type of ride, and location of the injury. (Some numbers or percentages may not add exactly because of rounding of decimal places.)

Distribution of Injuries (ridership sample of parks)



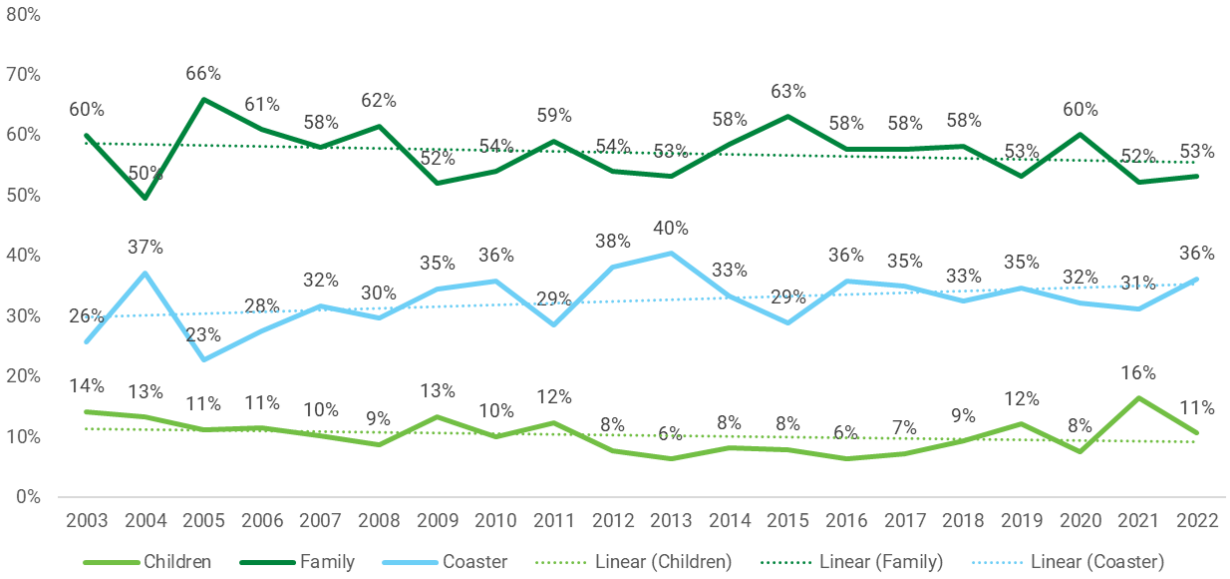
Serious versus Reportable Ride Injuries Share (ridership sample of parks)

- 19% of injuries are in the serious category.
- Over the past 10 years, the average share has been 9% serious and 91% reportable.
    - This is the third consecutive year that the share of serious injuries has been higher than the 10-year average.
    - The ratio of severe to reportable injuries vary by ride type.



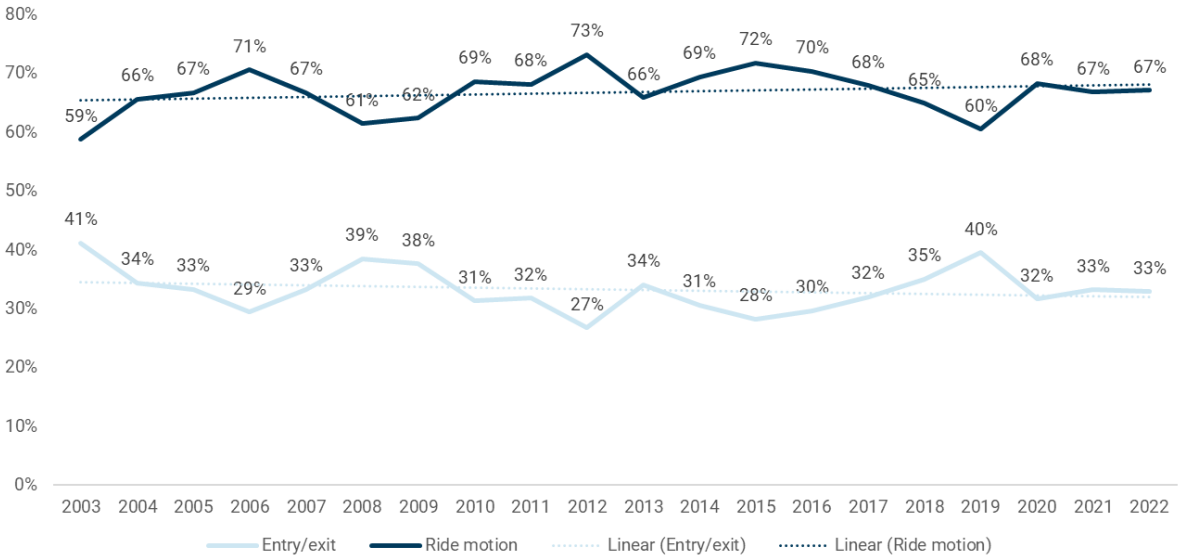
Injury Share by Ride Type (ridership sample of parks)

- Roller coasters' share of injuries is slowly increasing.
- Family/adult rides' share of injuries is slowly decreasing.
- Children's rides' share of injuries is slowly decreasing.



Injury Share by Location (ridership sample of parks)

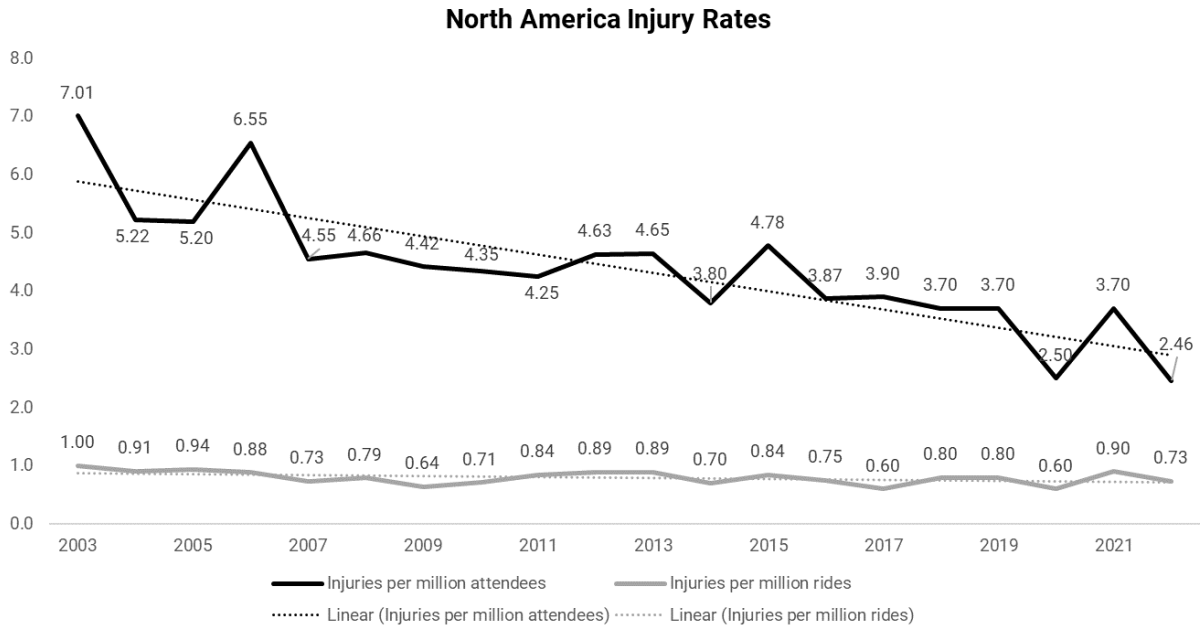
- Over the last 10 years, the ratio of entry/exit to ride motion injuries averages 33:67.
- Trends are consistent over the history of this project.



3.3 Incidence of Injuries

In addition to the absolute number of injuries and their distribution, it is helpful to consider the injury rate trends over time.

- Long-term trends show injuries per million attendees are trending down:
  - In 2022, the rate of 2.46 per million attendees is lower than the trend.
  - In 2022, the rate is significantly lower than 3.70 experienced in 2021.
- Long-term trends show injuries per million rides taken have been flat:
  - In 2022, the rate of 0.73 per million rides taken is consistent with the trend.
  - In 2022, the rate is significantly lower than 0.90 experienced in 2021.



3.4 Serious Injuries

SERIOUS INJURIES

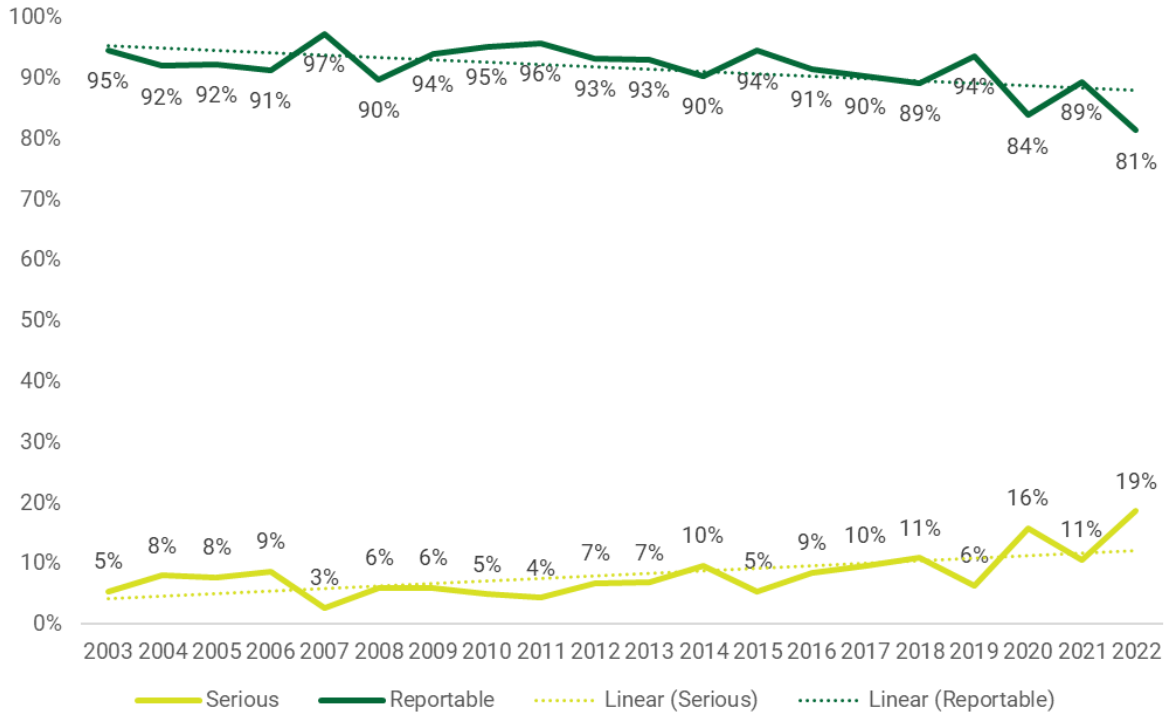
Injuries to a person that result in immediate admission and hospitalization in excess of 24 hours for purposes other than medical observation or result in fatality.

- 259 of the 1,390 injuries in 2022 were reported to be serious (19%).

	North America Estimate (Ridership Providing Sample)							
	2022		2021		2020		2019	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Parks	437		431		346		436	
TOTAL INJURIES	1,390	100%	1,224	100%	341	100%	1,294	100%
Serious	259	19%	130	11%	54	16%	82	6%
Reportable	1,131	81%	1,094	89%	286	84%	1,212	94%

Serious versus Reportable Ride Injuries Share (ridership sample of parks)

- 19% of injuries are in the serious category.
- Over the past 10 years, the average share has been 10% serious and 90% reportable.
    - This is the third consecutive year that the share of serious injuries has been higher than the 10-year trend.
    - The ratio of serious to reportable injuries varies by ride type.



Of the 259 estimated serious injuries:

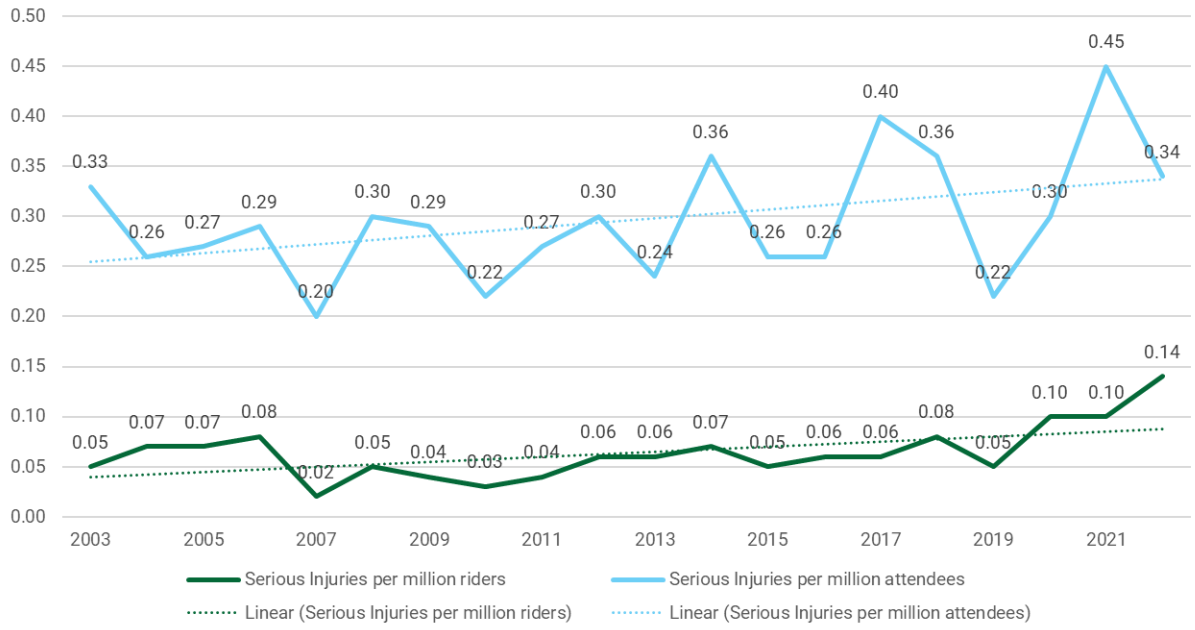
- 12 (5%) occurred on children's rides.
- 155 (60%) occurred on family/adult rides.
- 92 (35%) occurred on roller coasters.

The total number of serious injuries can be considered in terms of their incidence rates:

- 0.34 serious injuries per million attendees in 2022.
    - 0.45 in 2021
    - 10-year average: 0.32
- 0.14 serious injuries per million rides taken in 2022.
    - 0.10 in 2021
    - 10-year average: 0.08

Serious Injuries per Million Rides Taken and per Million Attendees

Because serious injuries are rare, volatility from year-to-year is expected. However, since 2003, both serious injury rate per million rides taken and per million attendees have been trending upward.

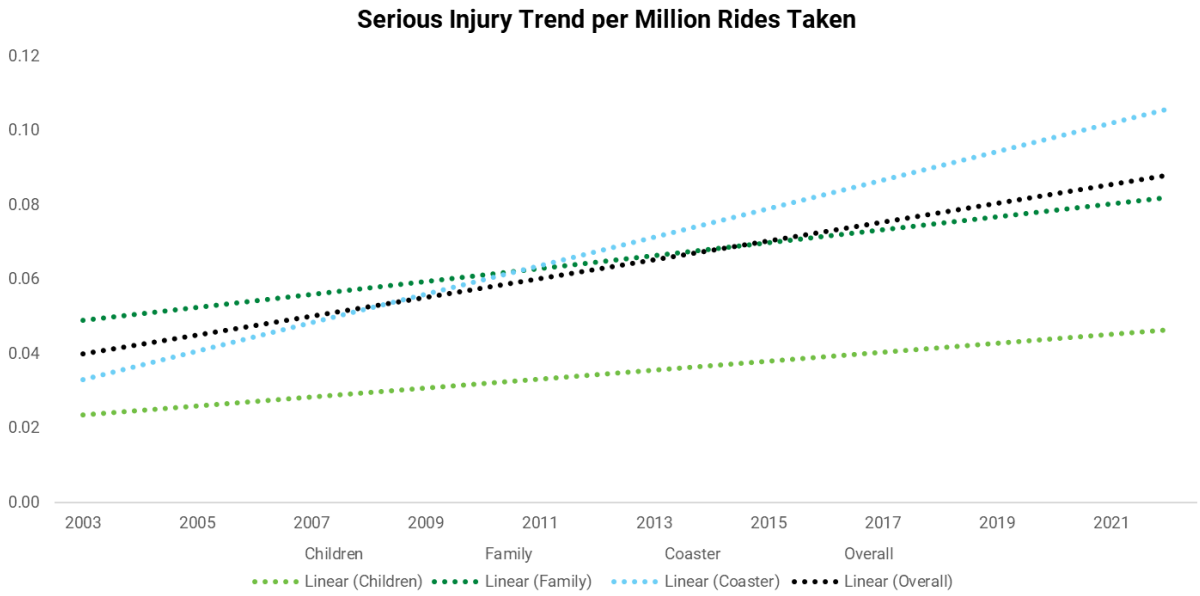


CAUTION

Very small base sizes per category per year lead to data volatility.

Linear trend lines show that the increasing serious injury rate per million rides taken (black) is resulting from:

- Increasing serious injury rates on roller coasters (blue)
- Increasing serious injury rates on family/adult rides (dark green)
- Increasing serious injury rates on children's rides (light green)



3.5 Reportable Injuries

REPORTABLE INJURIES

Other ride-related injuries that result in an injury to a person that is not 'serious' but requires medical treatment other than ordinary first aid.

1,131 of the 1,390 injuries in 2022 were reportable (81%).

Of the 1,131 estimated reportable injuries:

- 137 (12%) occurred on children's rides.
- 583 (52%) occurred on family/adult rides.
- 411 (36%) occurred on roller coasters.

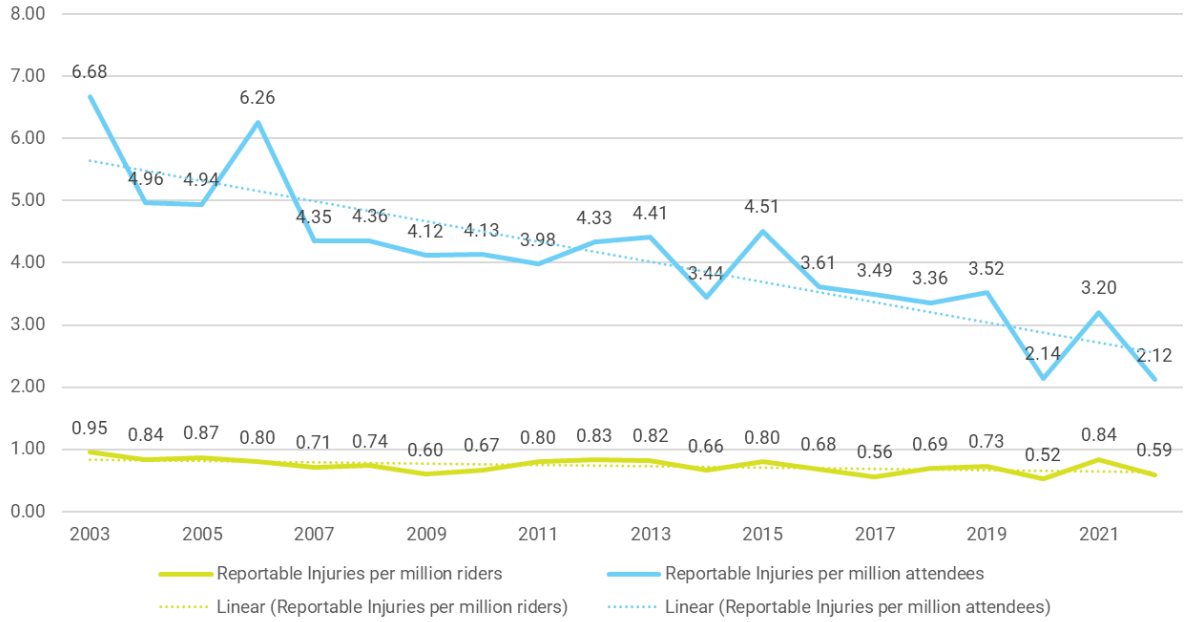
- 367 (32%) occurred while entering or leaving the ride.
- 764 (68%) occurred due to ride motion.

The total number of reportable injuries can be considered in terms of their incidence rates:

- 2.12 reportable injuries per million attendees in 2022:
    - 3.20 in 2021
    - 10-year average 3.60
- 0.59 reportable injuries per million rides taken in 2022:
    - 0.84 in 2021
    - 10-year average 0.71

Reportable Injuries per Million Rides Taken and per Million Attendees

The reportable injury rate per million rides taken has been relatively flat, while injuries per million attendees is trending down.

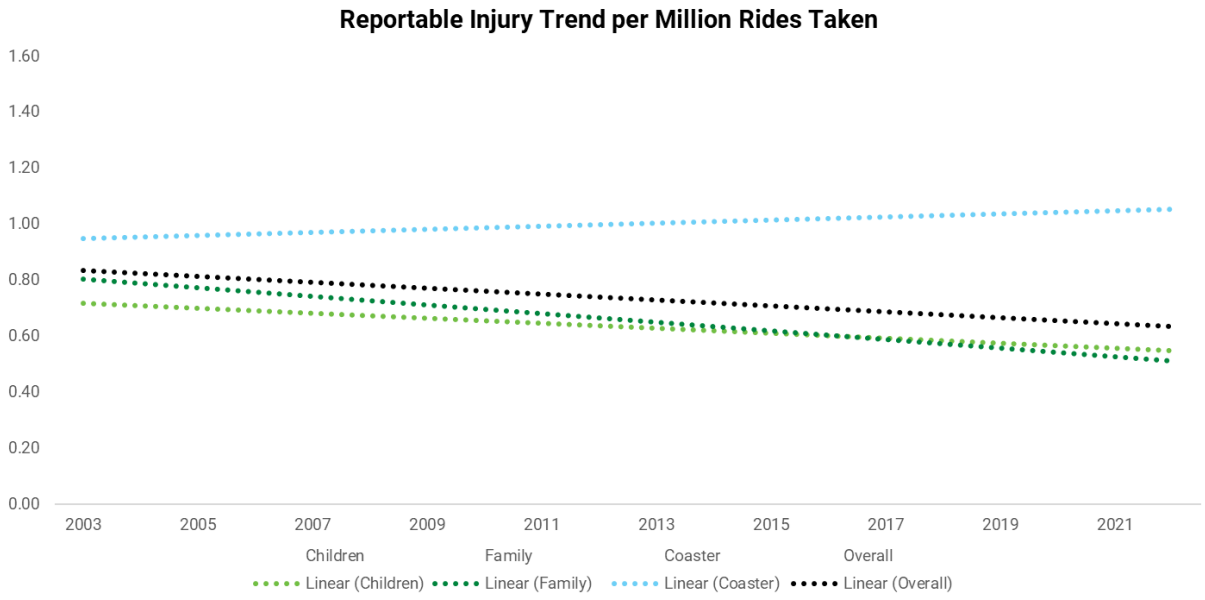


CAUTION

Very small base sizes per category per year lead to data volatility.

Linear trend lines show that the decreasing reportable injury rate per million rides taken (black) is resulting from:

- Increasing reportable injury rates on roller coasters (blue)
- Decreasing reportable injury rates on family/adult rides (dark green)
- Decreasing reportable injury rates on children's rides (light green)



3.6 Injuries on Children's Rides

CHILDREN'S RIDE

An amusement ride designed primarily for use by children up to 12 years of age.

In 2022:

- Of the total 1,390 injuries estimated, 148 occurred on children's rides (11%).
- An estimated 250.7 million children's rides were taken (13% of total).
- 66% of children's ride injuries occurred while getting in and out of the ride, while 34% occurred due to ride motion.

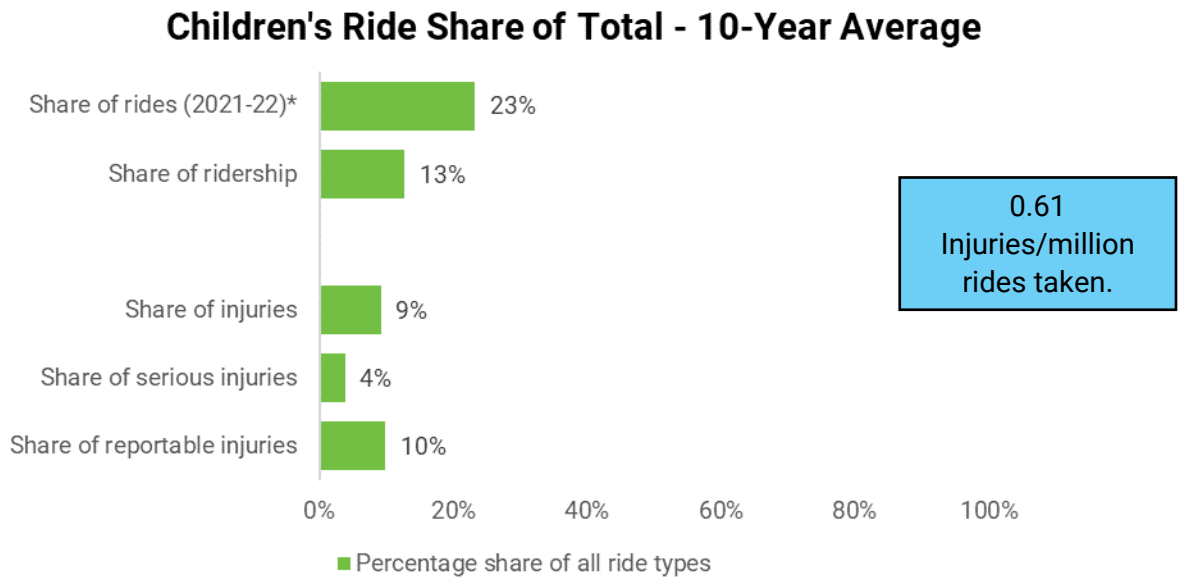
Injury rates on children's rides:

- Total injury rates are down from 2021.
- Serious injury rates are up from 2021.
- Reportable injury rates are down from 2021.

	North America Estimates			
Injury rates on children's rides	2022	2021	2020	2019
Injuries per million attendees	0.26	0.59	0.37	0.39
Injuries per million rides taken	0.73	0.90	1.00	0.78
Serious injuries per million attendees	0.06	0.03	0.02	0.00
Serious injuries per million rides taken	0.14	0.09	0.05	0.00
Reportable injuries per million attendees	0.20	0.56	0.34	0.39
Reportable injuries per million rides taken	0.59	0.79	0.95	0.79

Summarizing the three following charts, which take in a 10-year view of children's rides.

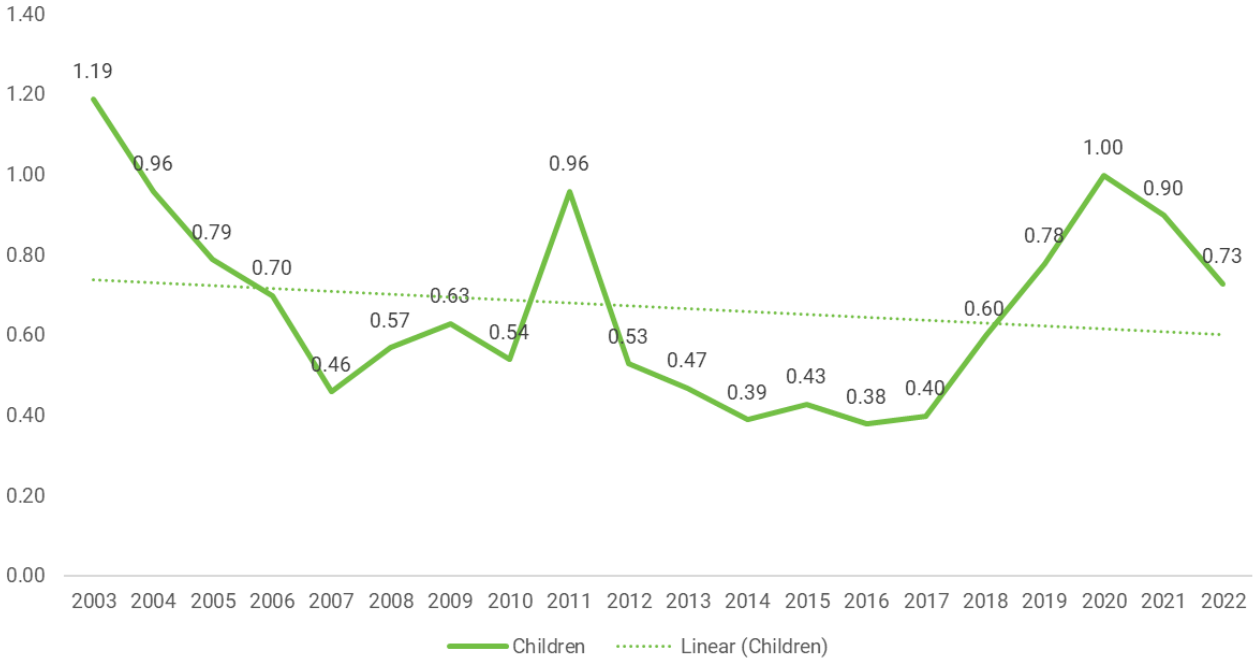
- The share of children's ride injuries (9%) is lower than the share of ridership (13%).
- Children's ride injuries per million rides taken is trending down.
- Children's ride injuries are rarely serious.
- Over half of children's ride injuries occur while entering or exiting the ride.



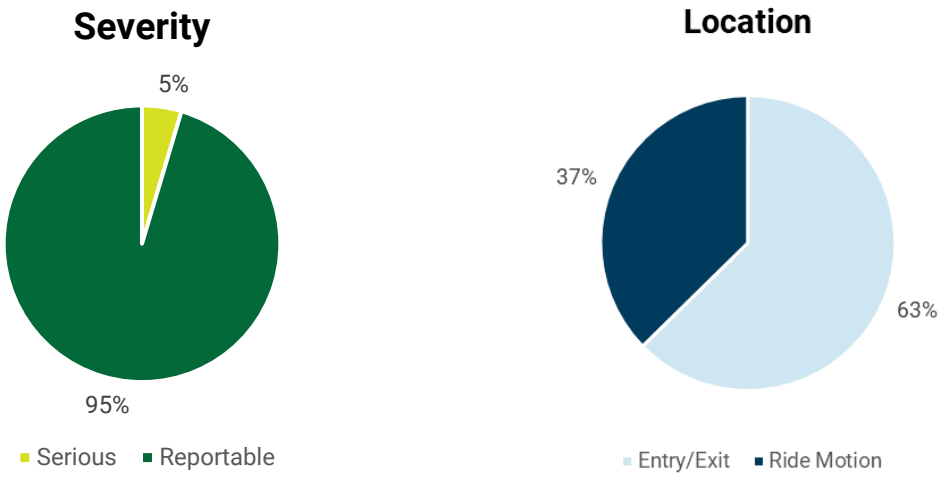
** Number of children's rides available only starting in 2021.*

Injuries per Million Children's Rides Taken

- Substantial variation in the injury rate year-to-year.
- Although injury rates have been above trend over the last four years, the overall trend is still down.



Children's Ride Injury Distribution – 10-year Average



3.7 Injuries on Family/Adult Rides

FAMILY/ADULT RIDE

Any amusement ride that is not a 'Children's Ride' or 'Roller Coaster.'

In 2022:

- Of the total 1,390 injuries estimated, 739 occurred on family/adult rides (53%).
- An estimated 1.2 billion family/adult rides were taken (63% of total).
- 40% of family/adult ride injuries occurred while getting in and out of the ride, while 60% occurred due to ride motion.

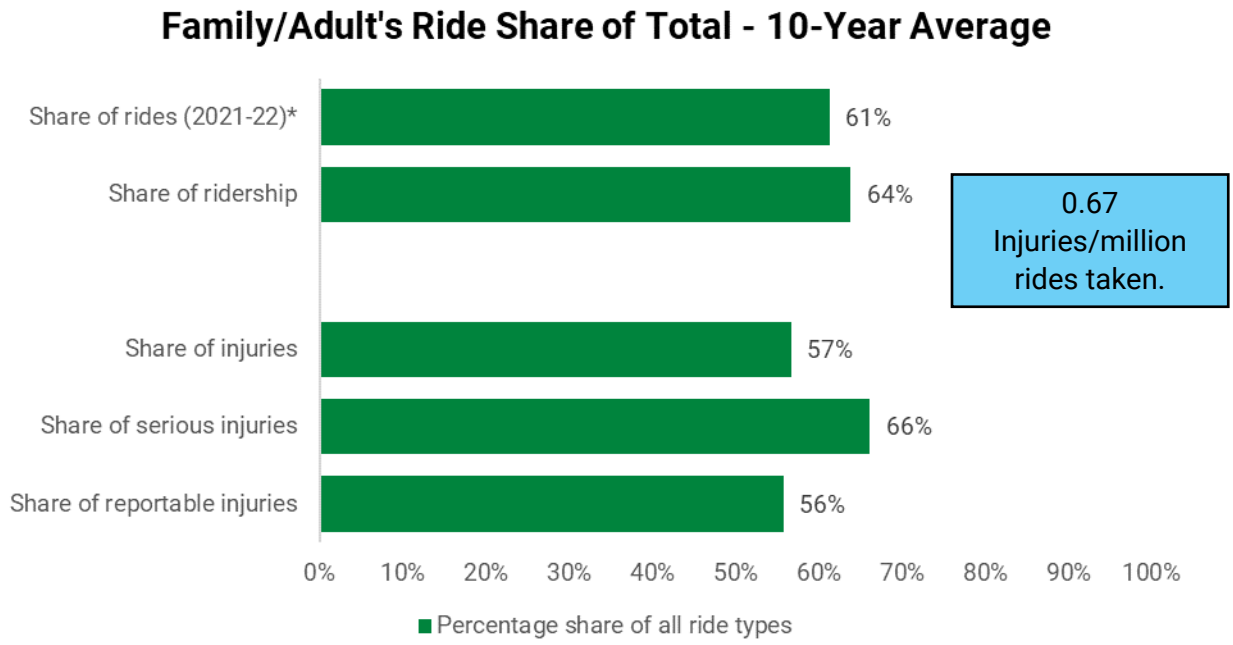
Injury rates on family/adult rides:

- Total serious and reportable injury rates are nearly all down from 2021.
- Serious injury rate per million rides taken is slightly up from 2021.

	North America Estimates			
Injury rates on family/adult rides	2022	2021	2020	2019
Injuries per million attendees	1.21	1.70	1.06	1.81
Injuries per million rides taken	0.60	0.70	0.50	0.60
Serious injuries per million attendees	0.19	0.31	0.13	0.12
Serious injuries per million rides taken	0.12	0.10	0.07	0.06
Reportable injuries per million attendees	1.02	1.39	0.93	1.69
Reportable injuries per million rides taken	0.48	0.63	0.44	0.58

Summarizing the three following charts, which take in a 10-year view of family/adult rides.

- The share of family/adult injuries (57%) is lower than the share of ridership (64%).
- Family/adult ride injuries per million rides taken is trending down.
- 12% of family/adult ride injuries are serious.
- Over half of family/adult ride injuries occur due to ride motion.

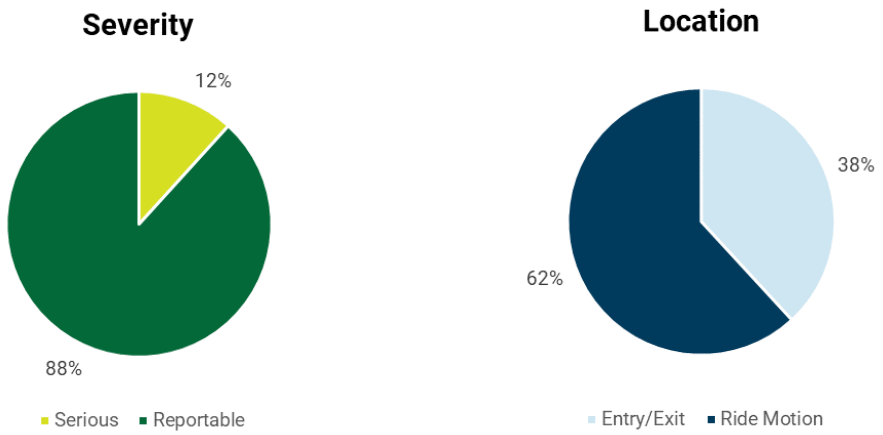


** Number of family/adult rides available only starting in 2021.*

Injuries per Million Family/Adult Rides Taken

- Substantial variation in the injury rate year-to-year.
- The overall trend is still down.

Family/Adult Ride Injury Distribution – 10-year Averge



3.8 Injuries on Roller Coasters

ROLLER COASTER

An amusement ride whose motion is constrained by an elevated, fixed railway where the ride is based on gravity and momentum derived from an initial drop, acceleration, or launch.

In 2022:

- Of the total 1,390 injuries estimated, 503 occurred on roller coasters (36%).
- An estimated 454.9 million roller coaster rides were taken (24% of total).
- 18% of roller coaster injuries occurred while getting in and out of the ride, while 77% occurred due to ride motion.

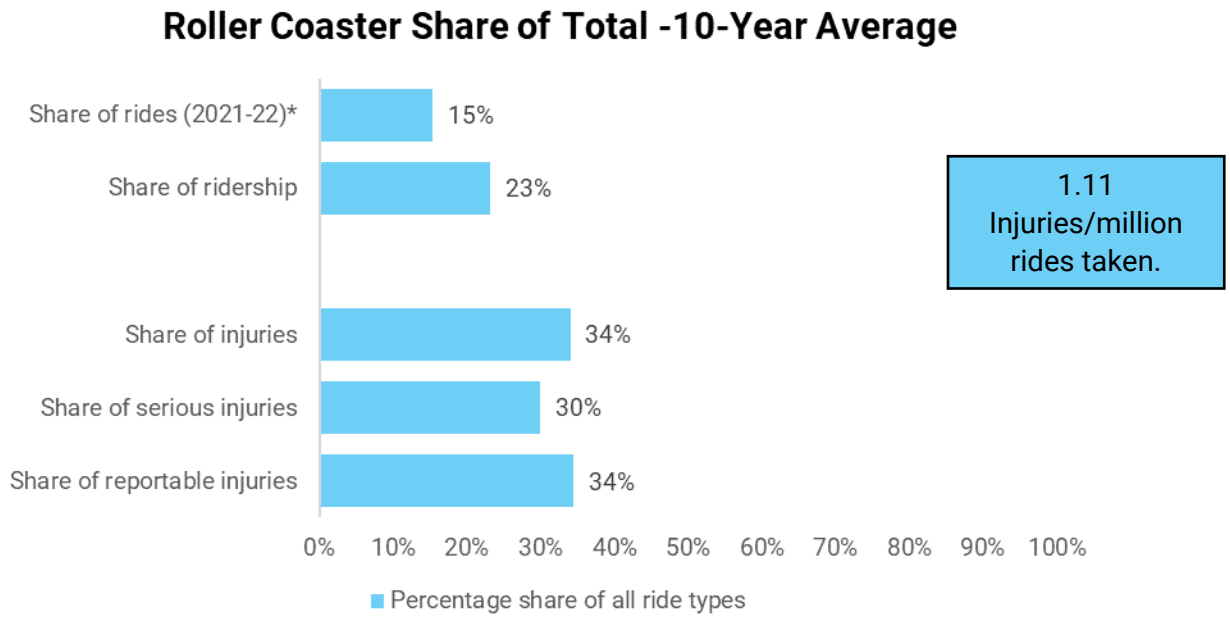
Injury rates on roller coasters:

- Total, serious, and reportable injury rates are consistently down from 2021.

	North America Estimates			
Injury rates on roller coasters	2022	2021	2020	2019
Injuries per million attendees	0.99	1.36	1.02	1.55
Injuries per million rides taken	1.12	1.40	0.90	1.30
Serious injuries per million attendees	0.09	0.11	0.15	0.10
Serious injuries per million rides taken	0.11	0.12	0.19	0.06
Reportable injuries per million attendees	0.90	1.25	0.87	1.45
Reportable injuries per million rides taken	1.01	1.23	0.72	1.26

Summarizing the three following charts, which take in a 10-year view of roller coasters.

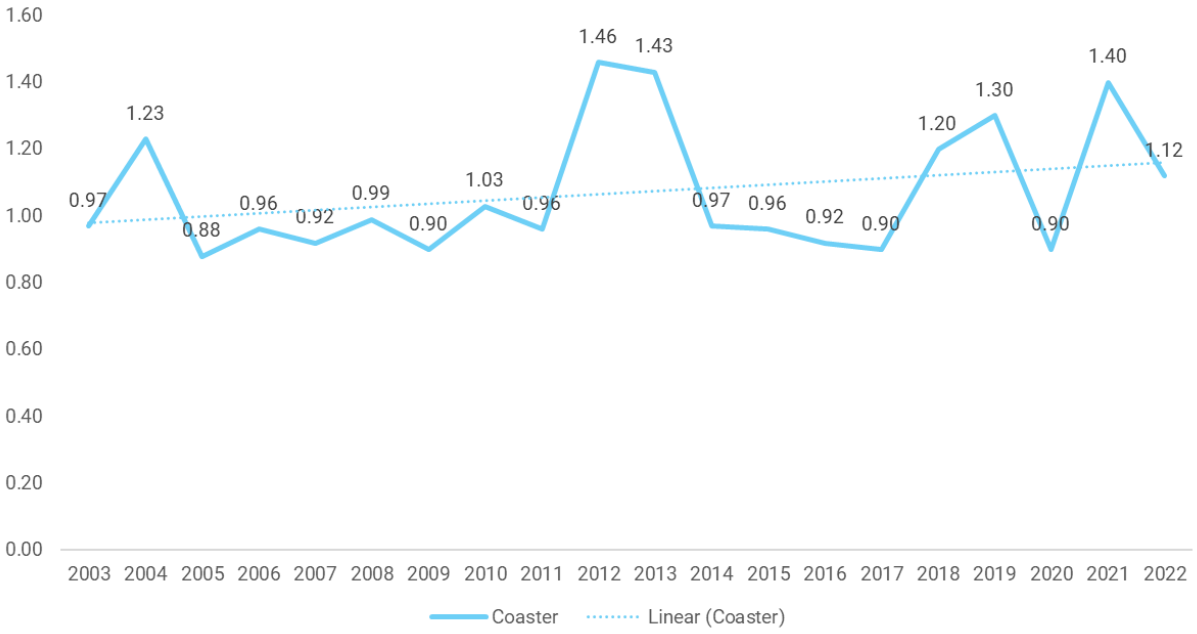
- The share of roller coaster injuries (34%) is higher than the share of ridership (23%).
- Roller coaster injuries per million rides taken is trending up.
- 10% of roller coaster ride injuries are serious.
- The vast majority (81%) of roller coaster injuries occur due to ride motion.



** Number of roller coaster rides available only starting in 2021.*

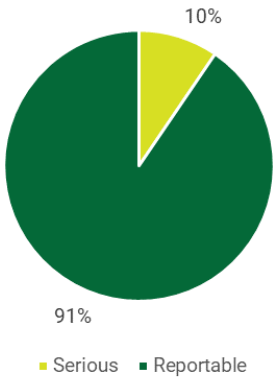
Injuries per Million Roller Coaster Rides Taken

- Substantial variation in the injury rate year-to-year.
- The overall injury rate trend is increasing.

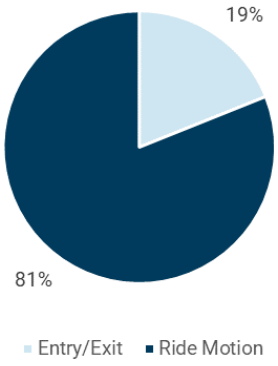


Roller Coaster Injury Distribution – 10-year Average

Severity



Location



3.9 Injury Location

GETTING IN/OUT:

Injuries occurring while boarding or disembarking a ride vehicle. These would typically be injuries involving stepping into or out of a stopped ride vehicle or a vehicle that is traveling at boarding speed in the station.

RIDE MOTION:

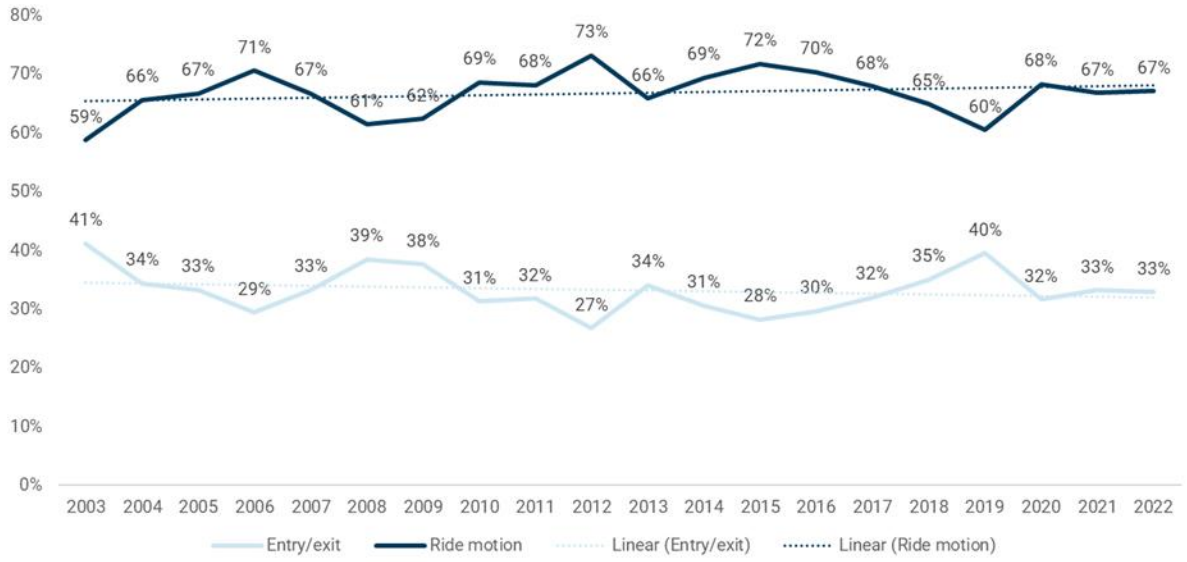
Injuries occurring during the ride experience. These would include all ride injuries except for boarding or disembarking a ride vehicle.

In 2022:

- Of the total 1,390 injuries estimated, 457 occurred while getting in or off the ride (33%), while 933 occurred due to ride motion (67%).

Injury Share by Location (ridership sample of parks)

- Over the last 10 years, the ratio of entry/exit to ride motion injuries averages 33:67.
- Trends are consistent over the history of this project.



3.10 Perceived Cause of Injuries

CAUSE OF INJURY

Multiple factors typically play a role in contributing to a guest injury incident. These factors can be classified as technical, operational, or guest behavior, defined as:

TECHNICAL: A mechanical, structural, electrical, or software fault with the ride

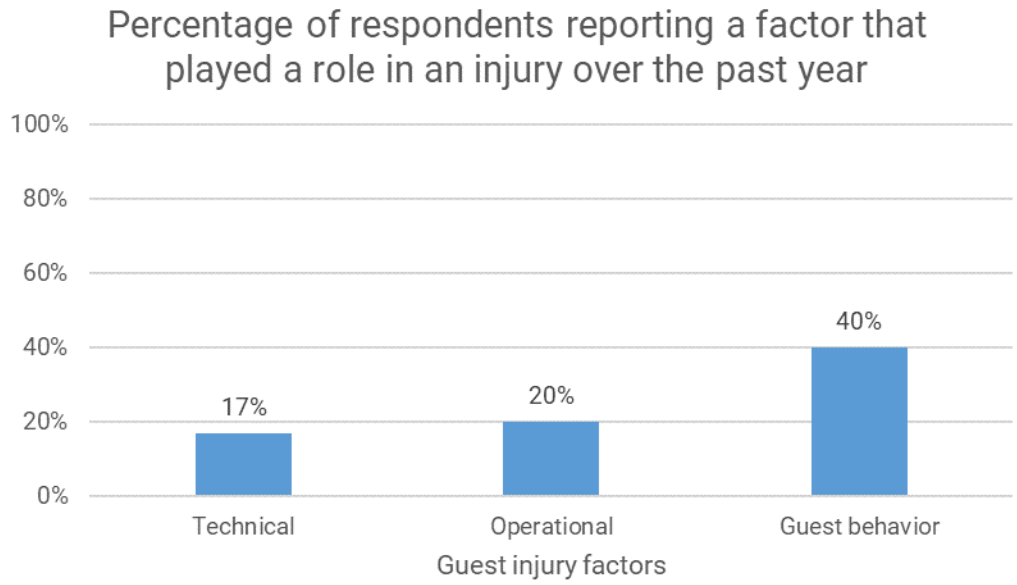
OPERATIONAL: A member of staff operates the equipment in a way that does not conform to standard safe operating procedures, or a member of staff conforms to standard procedures that are later found to be unsafe or inadequate

GUEST BEHAVIOR: A guest behaves in a way that does not conform to the rules set for safe guest behavior.

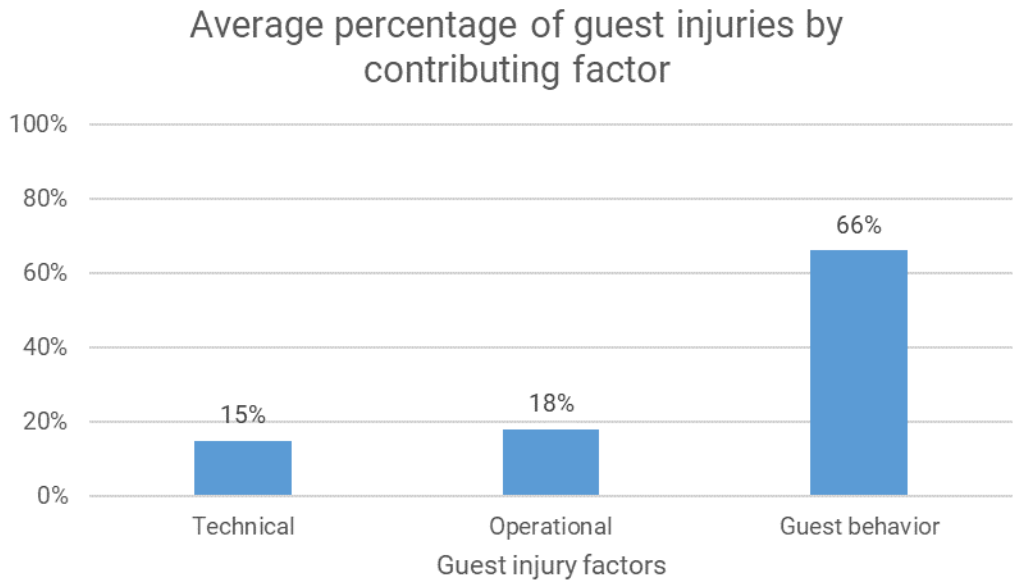
The 2022 survey includes a set of items designed to assess causal factors associated with guest injuries. This optional set of items aims to gather information on the prevalence of technical, operational, and guest behavior factors that may have contributed to the injury event. The collection of this information is intended to help identify industry best practices to mitigate these causal factors in the future.

Ninety-two respondents representing 144 parks provided at least some feedback regarding the perceived causes of guest injuries occurring at their facilities over the past year.

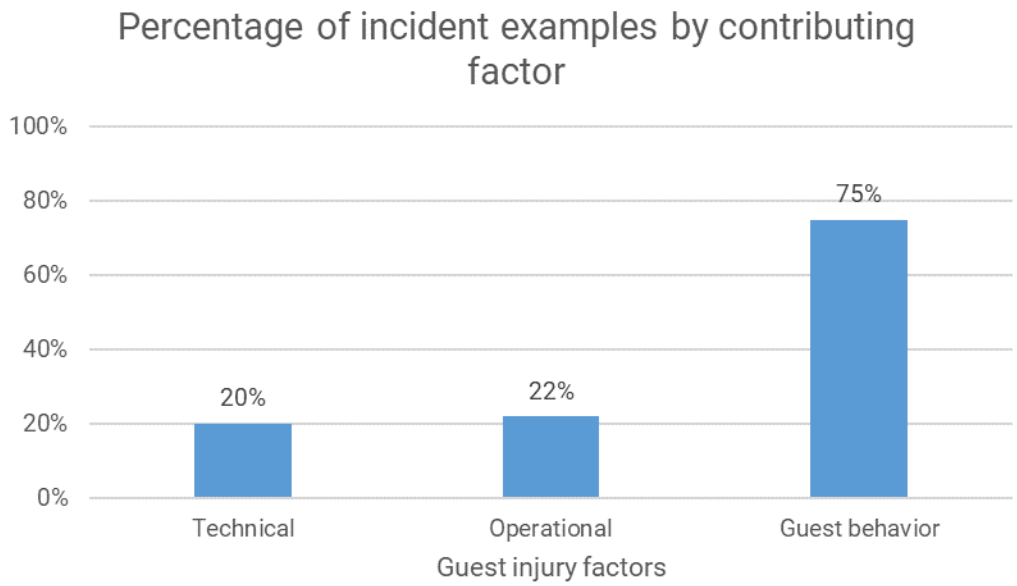
Many operators reported that two or more factors contributed to guest injuries in the past year. The largest percentage (40%) reported that guest behavior was a contributing factor, followed by 20% of respondents reporting operational factors, and 17% reporting technical factors.



Overwhelmingly, respondents reported that guest behavior contributed to 66% of the injuries over the past year. Only 18% of the injuries, on average, were attributed to operational factors and 15% to technical factors.



Forty respondents provided an example of a guest injury scenario. Seventy-five percent of the scenarios were reported as guest behavior examples, 22% as operational examples, and 20% as technical examples. The percentages sum to more than 100% because several scenarios were reported to represent more than one factor.



3.10.1Guest Behavior

The two most frequent guest behavior injury scenarios involved either loose items resulting in an injury or the guest falling or tripping.

Most loose item scenarios involved cell phones:

Loose item example
Person carrying cell phone on a roller coaster. Cell phone became dislodged from person's pocket and flew out of roller coaster, hitting another person in the forehead.

The actions taken by park operators to prevent future loose item-related injuries most often involved operational changes such as enhanced verbal communication and enforcement of rules:

Loose item – Actions taken
Became stricter on loose articles.
Continuing to verbally communicate loose article policy to guests and the availability of bins to place their loose articles in on the loading dock.
Enforce ride operator screening of guests before entering ride area along with additional signage.

Examples of falling and tripping scenarios are provided below:

Falling and tripping examples
Guest landed wrong on leg when stepping out of train coach.
Customers excited and tripped during exit or entrance to ride.
One guest was running to a ride unit and tripped while attempting to board the ride at the same time as another guest. This resulted in the guest chipping two front teeth.
Guests tripping or falling getting off or out of a ride vehicle.

Actions taken to prevent falling and tripping incidents involved staff training, improved verbal communication, and increased visual communication through signs and markings:

Falling and tripping – Actions taken
Employees trained to recognize guests that might need the assistance of a stepstool to exit ride.
Inform staff to calm customers and to make them aware of how to enter and exit safely.
Made sure that all employees were reiterating the rules multiple times, especially “walk to your assigned cars” and “watch your step.”
Painted yellow strip around the perimeter of the platform.
Increased communication, ride spiels. Have ride operators present where possible to help with unloading.
Increased signage and verbal instructions to guests.

3.10.2 Operational

Examples of scenarios reported as operational are provided below:

Operational examples
A guest's arm was injured due to the motion of a stair lift that is controlled by the operator. This was due to the arm being caught between the chair and the rail, pinching their elbow in between.
Child was exiting the ride and tripped on the seatbelt of the ride, which was sitting on the ground and face planted into the concrete.

Actions taken to prevent future incidents included a mixture of training and changing of operational practices:

Operational – Actions taken
The operator was retrained, and additional procedural clarification (including an on-site placard) was put in place to remind operators to verify that the guest is clear of the pinch areas and confirm their rider position before operating the chair.
Changes to operating procedures, including specifically where to put the seatbelt while loading/unloading.

3.10.3 Technical

Given the nature of technical factors, the examples provided are relatively case specific and provide limited opportunity to generalize to other situations:

Technical example
Log flume boats bumped into each other.
While guests were on a coaster, the ride faulted causing a harder-than-normal stop.
Fastener was able to back off and structural cable came loose while ride was in motion.
The gondola lowered further than it should have which caused a rider's foot to get stuck under the ride.

The actions taken to prevent future incidents were focused either on technical fixes or operational changes:

Technical and Operational– Actions taken
Water level was checked to ensure proper levels were in effect at the time of the incident as well as going forward.
The ride was shut down and an investigation was conducted to determine the reason for the ride fault. Ride faulted due to the ride control system not registering a sensor. The sensor was found to be functional after testing and control system was also operating correctly. Ride was reset and no additional issues were noted.
Revamped inspection of these fasteners, consulted with manufacturer on remedial actions.
Gondola sensor was adjusted at the time of incident.

APPENDIX A: MAIN DEFINITIONS

The definitions used in this research remain unchanged.

This report is based on a survey of operators of permanent ride facilities:

PARK DEFINITIONS
PERMANENT RIDE FACILITIES A park operating at a permanent location with at least one fixed-site ride. • Not water parks. • Not traveling fairgrounds that set up their rides for a limited time at each unique location.
LARGE PARK A permanent ride facility with one million or higher annual attendance.
SMALL PARK A permanent ride facility with less than one million annual attendance.
FAMILY ENTERTAINMENT CENTER A small permanent ride facility marketed toward families with small children to teenagers, often entirely indoors.

The study covers three types of fixed-site rides:

RIDE DEFINITIONS
CHILDREN'S RIDE An amusement ride designed primarily for use by children up to 12 years of age. While adults may also be able to ride, the seating will normally be tight for the 95th percentile adult male. Note: A ride should be classified as "children's ride" even if it fits other ride classifications. (Examples: small circular rides for children, miniature roller coaster, miniature swings, and children's carousels.)
ROLLER COASTER An amusement ride whose motion is constrained by an elevated, fixed railway where the ride is based on gravity and momentum derived from an initial drop, acceleration, or launch.
FAMILY/ADULT RIDE All amusement rides as defined by ASTM F747-97 that are not "Children's Rides" or "Roller Coasters" as defined by IAAPA ride classifications.
FIXED-SITE RIDES Not air-supported structures (inflatables, bouncy castles), concession go-karts, fun houses (walk through), playgrounds and slides, theatrical shows/attractions, mazes and mirror mazes, arcades and coin-operated machinery, ride queue lines, platforms, and exit ramps, midway and other park walkways.

The study reports upon two types of injuries that are defined by the severity of the health consequences as set out in the questionnaire.

INJURY DEFINITIONS
SERIOUS INJURIES Injuries to a patron that occur on a ride and result in immediate admission and hospitalization in excess of 24 hours, for purposes other than medical observation, or result in fatality.

REPORTABLE/OTHER INJURIES
All other incidents that occur on rides and result in an injury to a patron that requires medical treatment other than ordinary first aid.

In addition to these continuing descriptions, definitions of injury causes were developed to address a new question introduced in the 2022 survey:

INJURY CAUSES
TECHNICAL A mechanical, structural, electrical or software fault with the ride.
OPERATIONAL A member of staff operates the equipment in a way that does not conform to standard safe operating procedures, or a member of staff conforms to standard procedures that are later found to be unsafe or inadequate.
GUEST BEHAVIOR A guest behaves in a way that does not conform to the rules set for safe guest behavior.

APPENDIX B: ANALYSIS

149 park locations responded to the survey with data (131 members; 18 non-members). This report presents data as a weighted estimate representing all 437 parks with rides estimated to be operating in North America. The total number of parks in North America with rides was estimated by adjusting the total number of parks (with or without rides) as estimated by Euromonitor Consulting by the percentage of IAAPA member parks with rides.

The ratio of participating parks to the universe of all operating parks in North America:

Sample	Participating Parks	Estimated universe of all operating parks with rides	Ratio (sample: universe)
Parks with rides (IAAPA member and non-members)	149	437	1: 2.9

APPENDIX C: MARKET SIZE ESTIMATES

Market size indicators continue to recover from the disruptions resulting from the COVID-19 pandemic. Attendance is estimated to have increased 22% from 2021, but still down 7% from pre-pandemic 2019. Ridership has increased 48% from 2021 and 15% from pre-pandemic 2019.

	North America Estimates			
	2022	2021	2020	2019
Sites	437	431	346	436
Attendance	371.2 million	303.8 million	178.8 million	399.5 million
ALL RIDES	12,000	9,300	Unavailable*	Unavailable*
Ridership	1.92 billion	1.30 billion	0.55 billion	1.67 billion
Ridership/Attendance	5.16	4.28	3.08	4.18
CHILDREN'S RIDES	2,730	2,200	Unavailable*	Unavailable*
Ridership	250.7 million	175.9 million	35.7 million	254.1 million
Ridership/Attendance	0.62	0.69	0.52	0.84
FAMILY/ADULT RIDES	7,500	5,600	Unavailable*	Unavailable*
Ridership	1,211.5 million	837.4 million	392.6 million	1,079.2 million
Ridership/Attendance	1.85	2.06	2.41	2.69
ROLLER COASTERS	1,800	1,400	Unavailable*	Unavailable*
Ridership	454.9 million	289.8 million	120.7 million	331.7 million
Ridership/Attendance	1.00	0.90	1.06	1.13

* Number of rides was not included in previous reports.

APPENDIX D: NATIONAL SAFETY COUNCIL

The National Safety Council (NSC), America's leading nonprofit safety advocate for more than one hundred years, focuses on areas where it can make the greatest impact: workplace and roadway.

NSC starts in the workplace, giving companies resources workers can actually use around risks they are actually facing. NSC helps employers create a culture of safety that will make people safer -- from the workplace to anyplace. NSC embarked on its next chapter of safety leadership with the acquisition of ORC HSE Strategies in 2020. Employers benefit from both organizations' world-class thought leadership, dynamic on-the-ground workplace safety consulting services, and membership in NSC Networks.

Consulting

Each of NSC's Consulting Centers of Excellence were conceived, organized, and coordinated by subject matter experts, and the best consultants and service providers in the industry have been hand-picked to be on the ground with your team when needed. NSC Consulting is custom tailored to meet your individual needs.

Tools and Resources

NSC taps the expertise, talent, and passion of members and partners to develop ready-to-use tools to help companies tackle important issues affecting their workers. Every one of NSC's employees, member organizations, and strategic partners have one thing in common: a commitment to enable people to live their fullest lives.

Research

NSC uses research and data to drive better, smarter, more personal safety programs. From perception surveys and assessments to tracking the trends, NSC uses insight to create experiential education, training, and tools to mitigate risk. NSC also engages government nationally and locally to drive polices that create a culture of safety.

Safety is Personal

As a 501c3 nonprofit, chartered by Congress, with local Chapters, global networks and more than 50,000 members, NSC relies on philanthropic funds to advance the mission to keep people safe from the workplace to anyplace.

APPENDIX E: QUESTIONNAIRE

Ride Safety Report

For Calendar Year 2022

Please note that you may complete this form on-line here: https://nscsurveys.iad1.qualtrics.com/jfe/form/SV_a5d1RHRkuIdQtLM . If you have ended your ride operations for 2022, by e-mail to:

E-mail: ken.kolosh@nsc.org

Questions should be directed to Ken Kolosh (ken.kolosh@nsc.org) at the National Safety Council, or to Kelly Repass (KRepass@iaapa.org) at IAAPA.

Please note, reporting is required for any U.S. IAAPA member that operates rides to continue as a member in good standing of IAAPA.

Confidentiality: All data submitted by individual parks and attractions will be used for statistical purposes only and will be kept confidential. This form will not be retained once the data are checked and entered into the data base. The Council will, on request, make known to authorized IAAPA staff whether a specific park or attraction has reported, but will not give IAAPA access to the park's or attraction's data.

Name of the Park, Attraction, or Center

(Park name will not be kept in relation to data supplied)

Identify by name the waterpark(s) covered in this report:

Park Name 1:	_____	Park Name 9:	_____
Park Name 2:	_____	Park Name 10:	_____
Park Name 3:	_____	Park Name 11:	_____
Park Name 4:	_____	Park Name 12:	_____
Park Name 5:	_____	Park Name 13:	_____
Park Name 6:	_____	Park Name 14:	_____
Park Name 7:	_____	Park Name 15:	_____
Park Name 8:	_____	Park Name 16:	_____

What was the total number of facilities with rides? _____

If you do not operate fixed-site amusement rides at this facility, please check the box and return the form..... ☐

Exposure in 2022

(If annual data are not available for both attendance and total ridership, please provide data for at least one of the two.)

What was the total annual attendance of the facilities listed above? _____

What was the total annual number of rides taken by visitors to your facility? _____

Injuries and Incidents in 2022

This report should include the total number of all ride incidents. Including an incident in the report is not a determination that either the guest or the owner/operator was responsible for the incident.

Ride Incident Definition: An incident is considered to be a ride incident if it occurs either on the ride as it is in operation or as the patron is getting in or out of the ride vehicle. Other incidents may be included, at the owner's/operator's discretion, if they are determined to be related to the action of the ride.

Ride Type[1]	Number of Rides[2]	Annual Number of Rides Taken[3]	Reportable Serious Injuries[4]		Other Reportable Incidents[5]		Total Reportable Ride Incidents[6]	
			Getting In/Out[7]	Ride Motion[8]	Getting In/Out[7]	Ride Motion[8]	Getting In/Out[7]	Ride Motion[8]
Children's Rides								
Family and Adult Rides								
Roller Coasters								
Total								

** **IMPORTANT:** See footnotes and definitions on the back of this form. **

Cause of Guest Injuries

Multiple factors typically play a role in contributing to a guest injury incident. These factors can be classified as technical, operational, or guest behavior, defined as:

TECHNICAL: A mechanical, structural, electrical or software fault with the ride

OPERATIONAL: A member of staff operates the equipment in a way that does not conform to standard safe operating procedures, or a member of staff conforms to standard procedures that are later found to be unsafe or inadequate

GUEST BEHAVIOR: A guest behaves in a way that does not conform to the rules set for safe guest behavior.

Still thinking about injuries and incidents in 2022, did any of the guest injury incidents involve:

Technical factors	Yes |___|	No |___|
Operational factors	Yes |___|	No |___|
Guest behavior factors	Yes |___|	No |___|

(If yes to any of the above) What is your best estimate of the percentage of guest injury incidents that involved:

Technical factors	|___| %
Operational factors	|___| %
Guest behavior factors	|___| %

Please assign a % to each. Because multiple factors can play a role in contributing to an injury incident, the total among the factors may sum to more than 100%.

The next three questions are designed to help share good practices in reducing risks of injury to visitors.

Please give an example of an injury incident that occurred at your park in the past year that involved one or more of the factors listed above (technical, operational, guest behavior). Please be as specific as possible. NO SPECIFIC PARK DATA WILL BE REVEALED

Did this incident involve the following factors?

Technical factors	Yes |___|	No |___|
Operational factors	Yes |___|	No |___|
Guest behavior factors	Yes |___|	No |___|

Please give an example of the actions you have taken that were very effective in reducing the risks of this type of incident occurring again:

Contact Information

The contact information below is needed if we have a question about the data.

Submitted by (print name):
_____

Title: _____ Phone: _____ E-mail:
_____

Footnotes and Definitions

Permanent ride facility: a park, attraction or center operating at a permanent location with at least one fixed-site ride, excluding water parks.

Amusement ride: a device or combination of devices or elements that carries, conveys, or directs a person(s) over or through a fixed or restricted course or within a defined area, for the primary purpose of amusement or entertainment.

Reportable ride: mechanized amusement ride within a permanent ride facility.

Exclusions: air-supported structures (inflatables), concession go-karts, fun houses (walk through), playgrounds and slides, theatrical shows/attractions, mazes and mirror mazes, arcades and coin-operated machinery, ride queue lines, platforms, and exit ramps, midway and other park walkways.

[1]**Ride Type:** The IAAPA Ride Type Classifications are:

- **Children's Ride**. An amusement ride designed primarily for use by children up to 12 years of age. While adults may also be able to ride, the seating will normally be tight for the 95th percentile adult male. Note: A ride should be classified as "children's ride" even if it fits other ride classifications. (Examples: small circular rides for children, miniature roller coaster, miniature swings, and children's carousels.)
- **Family and Adult Ride**. All amusement rides as defined by ASTM F747-97 which are not "Children's Rides" or "Roller Coasters" as defined by IAAPA ride classifications.
- **Roller Coaster**. An amusement ride whose motion is constrained by an elevated, fixed railway where the ride is based on gravity and momentum derived from an initial drop, acceleration, or launch.

[2]**Number of Rides:** The total number of rides of each type operated at the listed facilities. (For example, if you have 5 children's rides, 10 family & adult rides, and 3 roller coasters, your total number of rides is 18.)

[3]**Annual Number of Rides Taken:** The total number of patron rides given for each ride type at the listed facilities. This would be the actual number, if measured, or estimated by multiplying the average rides taken per visitor by the total attendance of the facility. (For example, if during the year being reported your guests took 3,000 rides on your children's rides, 10,000 rides on your family & adult rides, and 7,000 rides on your roller coasters, then your total annual number of rides taken would be 20,000.)

[4]**Reportable Serious Injuries**: Injuries to a patron that occur on a ride and result in immediate admission and hospitalization in excess of 24 hours, for purposes other than medical observation, or result in fatality.

[5]**Other Reportable Incidents**: All other incidents that occur on rides and result in an injury to a patron that requires medical treatment other than ordinary first aid.

[6]**Total Reportable Ride Incidents**: The sum of Reportable Serious Injuries and Other Reportable Incidents.

[7]**Getting In/Out:** Incidents occurring while boarding or disembarking a ride vehicle. These would typically be incidents involving stepping into or out of a stopped ride vehicle or a vehicle that is traveling at boarding speed in the station.

[8]**Ride Motion:** Incidents occurring during the ride experience. These would include all ride incidents except for boarding or disembarking a ride vehicle.