

Select Risk Factors Associated with Causes of Motorcycle Crashes: Safety Report, 2018

National Transportation Safety Board

(available at: <https://smarter-usa.org/wp-content/uploads/2018/10/Select-Risk-Factors-Associated-with-Causes-of-Motorcycle-Crashes-NTSB-October-2018.pdf>)

Summary by SMARTER (www.smarterusa.org)

Key Messages

Helmets

Head injury represents the leading cause of death and disability in motorcycle crashes nationwide (NTSB 2007). When a crash occurs, a motorcyclist's single greatest protection is the proper use of a safety helmet that complies with Federal Motor Vehicle Safety Standard (FMVSS) 218, *Motorcycle Helmets*, (NTSB 2007). Therefore, the NTSB recommended that state and territorial governments with partial or no helmet laws adopt a universal helmet law requiring all motorcycle riders and passengers (no matter what age) to use a FMVSS 218-compliant helmet when motorcycling (Safety Recommendations H-07-38 through -40).¹⁷

Human Error

Human errors are identified as follows: *A perception failure* as a situation where a motorcycle rider or other vehicle driver failed to detect that a dangerous condition existed based on the strategy being used to detect dangerous conditions. *A reaction failure* is defined as a situation where the failure to react to a dangerous condition resulted in either no collision avoidance attempt or faulty collision avoidance. *A decision failure* is defined as a situation where the rider or driver failed to make the correct decision to avoid a dangerous condition. *A comprehension failure* is defined as a situation where the rider or driver perceived (detected) the dangerous condition but failed to comprehend the danger associated with that condition.

Licensing procedures

NTSB concludes that motorcycle licensing procedures have not been adequately evaluated for safety and effectiveness, which makes it difficult to determine if current licensing procedures are achieving reductions in motorcycle crashes, injuries, and fatalities or encouraging unlicensed riders to become fully licensed.

Hazard Perception

These data suggest that in most crashes the riders needed to detect and recognize the precipitating event as a dangerous condition almost as soon as the event happened to have sufficient time to complete an evasive maneuver. However, comprehension and reaction failures were both overrepresented among riders compared to other motor vehicle drivers, suggesting that the danger associated with a precipitating event was often not immediately recognized or fully understood by the rider.

Key Findings

1. The conventional, cruiser, and chopper motorcycle types were combined and represented more than half (54%) of the crash-involved and control motorcycles. Sport, race replicas accounted for another 40%, and all other motorcycle types made up the remaining 6% (p 12).
2. More than half (51%) of the crashes, and 50% of fatal crashes, took place on Fridays, Saturdays, and Sundays (p 12).
3. Crash frequencies were generally highest between 2 p.m. and 8 p.m. and lowest between 12:00 a.m. and 6 a.m. About 27% of crashes occurred at night and 66% in the daylight (p 12).
4. Crashes occur most often in an urban environment (65%), suburban environment 29%, and rural environment 6% (p 13).
5. Crashes occur most often on arterial roadways (79%), minor arterial (collector) 36%. Least often on interstate (freeways) and driveways & alleys just 2% each (p 13).
6. Most of the crashes (81%) involved another motor vehicle besides the crash-involved motorcycle, usually a passenger vehicle (p 14).
7. The single-vehicle crashes (19%) involved only the motorcycle and its rider (and in some cases a passenger), and the collision was usually with a fixed roadside object after running off the roadway (p 14).
8. Of all the crashes analyzed, 11% were fatal 89% involved nonfatal injuries (p 14).
9. Although the single-vehicle crashes represented 19% of all crashes, these crashes accounted for 50% of all fatal crashes (p 14).
10. About 15% of the crashes analyzed (26 of 177) involved a motorcycle that was exceeding the posted speed limit by at least 10 mph (p 16).
11. Single-vehicle and fatal crashes had the highest percentages of motorcycles that were traveling at least 10 mph over the posted speed limit (38% and 45%, respectively) (p. 16).
12. Human error (see definition above) attributed to either the motorcycle rider or the other vehicle driver was the primary documented contributing factor to crash causation in about 94% of the crashes analyzed (p 16).
13. Other vehicle driver errors 53% of crashes in which the primary contributing factor was a human error, compared 47% crashes for motorcycle riders. When limited to multiple-vehicle crashes, about 64% were attributed to an error or failure on the part of the other vehicle driver (p 17).
14. Perception failures were most common among other vehicle drivers. In many of these crashes, drivers reported that they failed to detect the motorcycle or to discern that a dangerous condition existed (p 17).

15. The motorcycle riders failed to react more often than other vehicle drivers, resulting in either no attempt to avoid the dangerous condition or faulty collision avoidance (p 17)
16. Motorcycle riders were also more frequently associated with comprehension failures compared to other vehicle drivers (p. 17).
17. Motorcycles that ran off the roadway with no other vehicle involvement represented about 10% of the crashes but accounted for 35% of fatal crashes (p 18).
18. About a third of the crash-involved riders never attempted to perform collision avoidance. Among the majority of riders that attempted collision avoidance, they chose an appropriate evasive maneuver for the hazardous condition about two-thirds of the time (65%), but effectively carried out the chosen maneuver only about a quarter of the time (26%) (p 19).
19. More than three-quarters of the crash-involved riders had 3 seconds or less to detect that a hazardous condition existed and attempt collision avoidance (p 19).
20. About a third of the crash-involved riders made no collision avoidance attempt before crash impact. Inadequate time to complete an attempted collision avoidance was reported by riders in about a quarter (26%) of the crashes analyzed (p 21)
21. More than a third of the crashes analyzed (34%) involved a loss of control that contributed to crash causation. Among the most common scenarios were running wide on a curve and slide outs associated with inappropriate braking (p 21)
22. About 24% of crash involved these riders did not have a valid motorcycle license. In multiple-vehicle crashes, about 21% of riders did not have a motorcycle license, compared to 7% of other vehicle drivers that did not have an automobile license (p 21)
23. Nearly all crash-involved riders that did not have a motorcycle permit or license were the registered owner of their motorcycle (p 21).
24. About 24% of crash involved riders did not have a valid motorcycle license (p 21)
25. Riders that reported having one conviction were more than 2 times as likely to be involved in a crash as those riders that reported having no convictions. The crash risk increased for riders with two or more convictions (p 22).
26. Non-ABS-equipped motorcycles had 2 times the crash risk relative to motorcycles that had this safety feature (p 23)
27. Conspicuity enhancements (rider gear, retroreflective parts) was not markedly different between the crash-involved and control (non-crash involved) riders and motorcycles (p 25)
Headlamp configuration and the presence of auxiliary lights was similar between the crash-involved motorcycles and the controls (non-crash-involved motorcycles) (p 25).

28. Thirty-four percent (34%) of the riders in the *Motorcycle Crash Causation Study* (the data source for this report – *Select Risk factors Associated with Causes of Motorcycle Crashes*) had formal motorcycle safety training (p 54).
29. About two-thirds of crash-involved riders in the *MCCS* attempted to take evasive action before the crash, but only a small proportion of them were able to execute the maneuver successfully. No evasive action was taken by nearly a third of the riders in the *MCCS* and the Hurt Report (p 54).
30. Among riders that attempted an evasive action, there were no significant performance differences between riders with formal training and those with informal training (p 54).
31. For the *MCCS* riders, about 67% of riders with formal training and 60% without formal training chose an appropriate evasive action for the situation. (P. 55) About 28% of *MCCS* riders with formal training and 32% without formal training were able to properly carry out the evasive action they chose. (P. 55) Twenty-four percent of the *MCCS* riders with formal training chose an appropriate evasive action for the situation *and* properly carried out that action to completion. This was a slightly higher percentage compared to the *MCCS* riders without training (about 21%). These differences are not statistically significant (p 55).