

# **FEMALE VS. MALE RELATIVE FATALITY RISK IN FATAL CRASHES: 1975-2018**

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## **Introduction**

Since the 1970s, vehicle safety has steadily improved. Fatalities continue to decrease as better advanced safety technologies emerge and become standard features across the board. As new technologies emerge, we should continuously review their effectiveness. Automotive testing is only required with the 50<sup>th</sup> percentile male and 5<sup>th</sup> percentile female adult crash test dummies. If this testing is sufficient to represent to population, we should see equivalent risks of fatality in similar crash scenarios for male vs. female drivers.

## **Objective**

To investigate fatality risk to females relative to males in fatal crashes.

## **Methodology**

Data from the Fatality Analysis Reporting System were used with the Double-Pair Comparison method introduced by Leonard Evans in 1986. This method allowed for isolation of a single variable in the determination of crash fatality risk. Inclusion criteria for this study required at least one fatality in the vehicle, and at least two occupants. To determine relative fatality risk for 21 year old female compared to male drivers, four fatality counts were taken (all for 21 year old drivers):

A = Female drivers killed in vehicle with control passenger

B = Control passengers killed in vehicle with female driver

C = Male drivers killed in vehicle with control passenger

D = Control passengers killed in vehicle with male driver

From these counts, the relative risk of a female driver to the control passenger,  $r1 = A/B$ , and the relative risk of a male driver to the control passenger,  $r2 = C/D$ , were used to derive the female vs. male relative risk,  $R = r1/r2$ . Fatal crash cases were grouped by vehicle type (car, truck, motorcycle), passenger seating position (front right seat, rear left seat, etc.), seat belt use, and number of vehicles involved in the crash. In each analysis, a weighted average of the value for  $R$  was taken within each driver age subset to find the overall risk for a driver. Further, driver age was grouped in five year chunks to increase sample size for additional analyses.

## **Data and Results**

In line with previous findings, the relative risk for female drivers is higher than for males until their early to mid-fifties. The largest difference is around age 30, with females 40% more likely to die in a crash. From their late fifties to around age 80, the risk for females is 20% lower. This general trend is apparent when isolating vehicle type, seatbelt use, and number of vehicles involved, supporting the combination of all groups into a single weighted risk ratio. When considering only model years since 2000, the trend remains, and increases for some ages to over 50% increased risk.

## **Conclusion**

Despite advances in vehicle safety since 1975, an age-dependent trend remains in which female drivers have a higher risk of death in a fatal crash scenario compared to males. Given recent advances in vehicle safety technologies, and a general trend towards fewer vehicle fatalities each year, the persistence of this trend requires further study.