

# Twenty Four Month Survival of Men and Women After Traumatic Brain Injury

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## Background

The body of literature examining gender differences in TBI survival is small and methodologically varied making it difficult to draw an informed conclusion about the role of gender in survival from TBI, particularly long-term survival.

## Objective

The purpose of this study is to investigate the influence of gender on survival after TBI from 24-hours post-injury to 24 months post-injury.

## ICRC Longitudinal Study

- Adult participants with one of four catastrophic injuries: spinal cord injury, traumatic brain injury, severe burn, intra-articular fracture.
- Having sustained one or more of the aforementioned injuries between 1989 and 1992.
- Have a documented acute care stay of 3 or more days due to that injury
- Residing and having been injured in Alabama

## Participants – Present Study

- Subjects drawn from database of potential participants whose medical records were abstracted to identify those eligible for the ICRC Longitudinal Study.
- At least 18 years of age at time of injury
- Diagnosed with TBI only
- 1221 participants available (884 men, 337 women)

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## Study Design

- Retrospective follow-up study
- Differences in demographic characteristics were evaluated with t-tests or chi-square
- Survival analysis performed via Cox Proportional Hazards
- Variables
  - o Gender
  - o Head injury severity (head Abbreviated Injury Scale score)
  - o Age at time of injury
  - o Type of head injury (open vs. closed)
  - o Mortality status (as determined by the National Death Index)

## Results

- 112 participants died with 24 hours of injury and were excluded from further analysis
- 134 participants, 89 men (11%) and 45 women (15%) died between 24 hours post-injury and 24 months post-injury
- Higher age at time of injury (HR 1.83, 95% CI 1.46 – 2.29) and higher head AIS score (HR 2.24, 95% CI 1.88 - 2.67) were associated with mortality.
- Gender was not associated with mortality (women vs. men: HR 1.02, 95% CI 0.71 – 1.48), nor was type of head injury (open vs. closed: HR 0.66, 95% CI 0.37 – 1.18).

## Conclusion

There is no evidence that gender plays a statistically significant role in survival after traumatic brain injury between 24 hours and 24 months post-injury. Having a more severe head injury and older age at time of injury are the factors that most strongly influence death in this time period among these participants.

The role of gender in post-TBI survival is unclear, as research provides conflicting results. Some of the conflict could arise because when measuring gender's influence on post-injury outcomes, it is difficult to segregate the effects of biology, the effects of hormones, and the effects of social role functioning. Future research should be cognizant of these subtleties and work to isolate the individual effects.

## Participant Characteristics

Characteristic	Men (N=799)	Women (N=310)	p-value
<b>Average age at time of injury (years)</b>	36 (SD 17)	43 (SD 22)	p < 0.0001
<b>Age at time of injury (categories)</b>			
18-30 years	352 (44%)	96 (31%)	
31-50 years	279 (35%)	97 (31%)	p < 0.0001
51+ years	168 (21%)	117 (38%)	
<b>Race</b>			
Black	258 (33%)	78 (25%)	
White	535 (67%)	229 (75%)	p = 0.021
<b>Marital Status</b>			
Married	287 (39%)	112 (38%)	
Single	445 (61%)	179 (62%)	p = 0.83
<b>Type of head injury</b>			
Open	89 (11%)	26 (8%)	
Closed	708 (89%)	284 (92%)	p = 0.17
<b>Injury Severity (Head)</b>			
Head AIS 2 – Moderate	295 (38%)	134 (44%)	
Head AIS 3 – Serious	256 (33%)	78 (25%)	
Head AIS 4 – Severe	165 (21%)	61 (20%)	p = 0.08
Head AIS 5 – Critical	70 (9%)	33 (11%)	
<b>Injury Etiology</b>			
Transportation Related	477 (60%)	198 (64%)	
Falls	116 (15%)	64 (21%)	
Intentional	138 (17%)	32 (10%)	p = 0.0011
Other	68 (9%)	16 (5%)	

## Hazard Ratios: Risk of death between 24 hours and 24 months post-injury

Variable	Hazard Ratio	95% CI
<b>Gender (women vs. men)</b>	1.02	0.71 – 1.48
<b>Head AIS*</b>	2.24	1.88 – 2.67
<b>Age at time of injury*</b>	1.83	1.46 – 2.29
<b>Type of head injury (open vs. closed)</b>	0.66	0.37 – 1.18

\*Statistically significant; Head AIS rankings: Moderate, Serious, Severe, Critical; Age categories: 18-30 years, 31-50 years, 51+ years