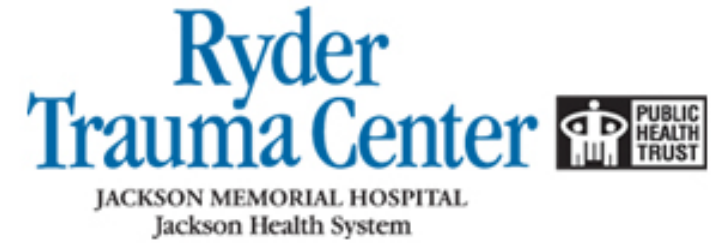




UNIVERSITY OF MIAMI
MILLER SCHOOL
of MEDICINE



Alcohol/Illicit Substance Use and Riding Behavior Among Motorcycle Crash Fatalities

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TRAUMA | TREATMENT | TRAINING
Funded by the Florida Department of Transportation

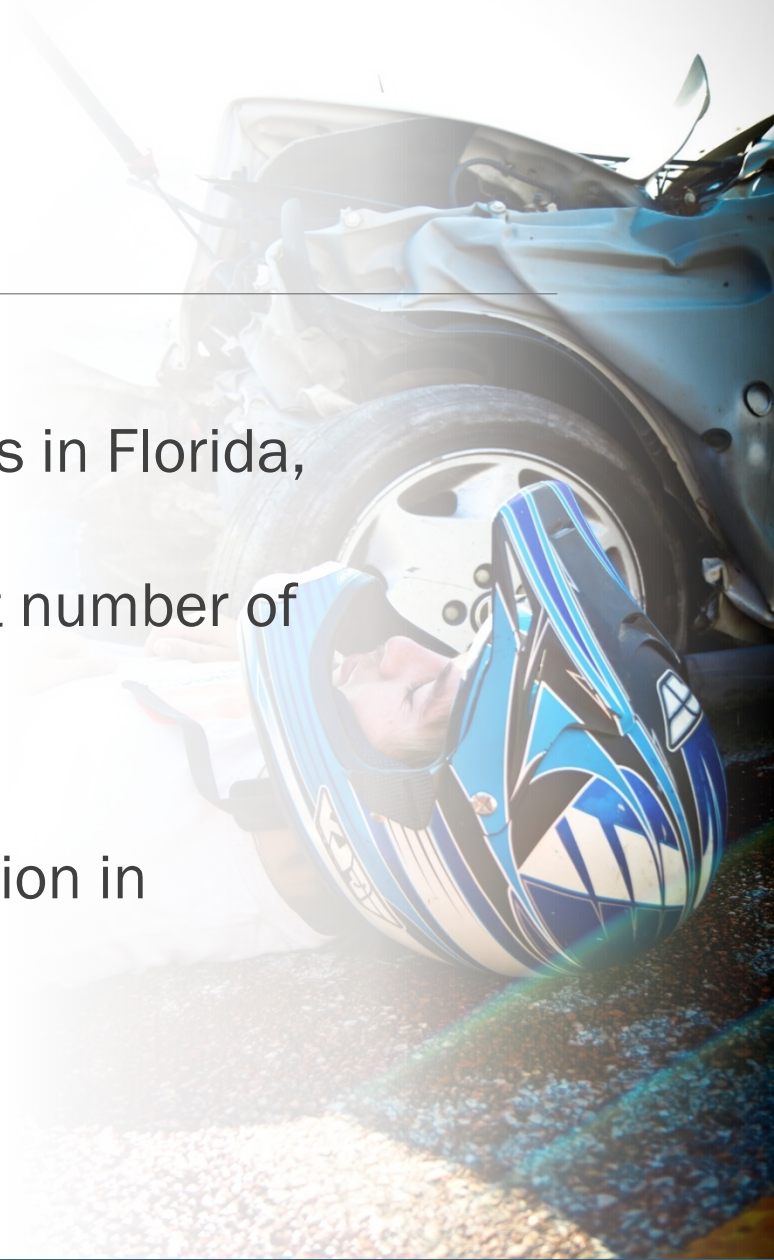
Introduction

In 2018:

- Motorcycle fatalities made up 17% of all traffic fatalities in Florida, but comprised 2% of all traffic crashes
- Florida had 574 motorcycle fatalities, It has the highest number of motorcycle crash fatalities in the USA

Goal:

- See how alcohol/illicit substance use effects risk aversion in motorcycle and scooter riders in fatal crashes



Sources

Miami-Dade Motorcycle and Scooter Fatalities from 2009 – 2014

Sources:

Signal Four Analytics

- Florida Traffic Crash Reports

Miami-Dade Medical Examiners Office

- Toxicology reports

Toxicology Reports

Typical Substances Detecting:

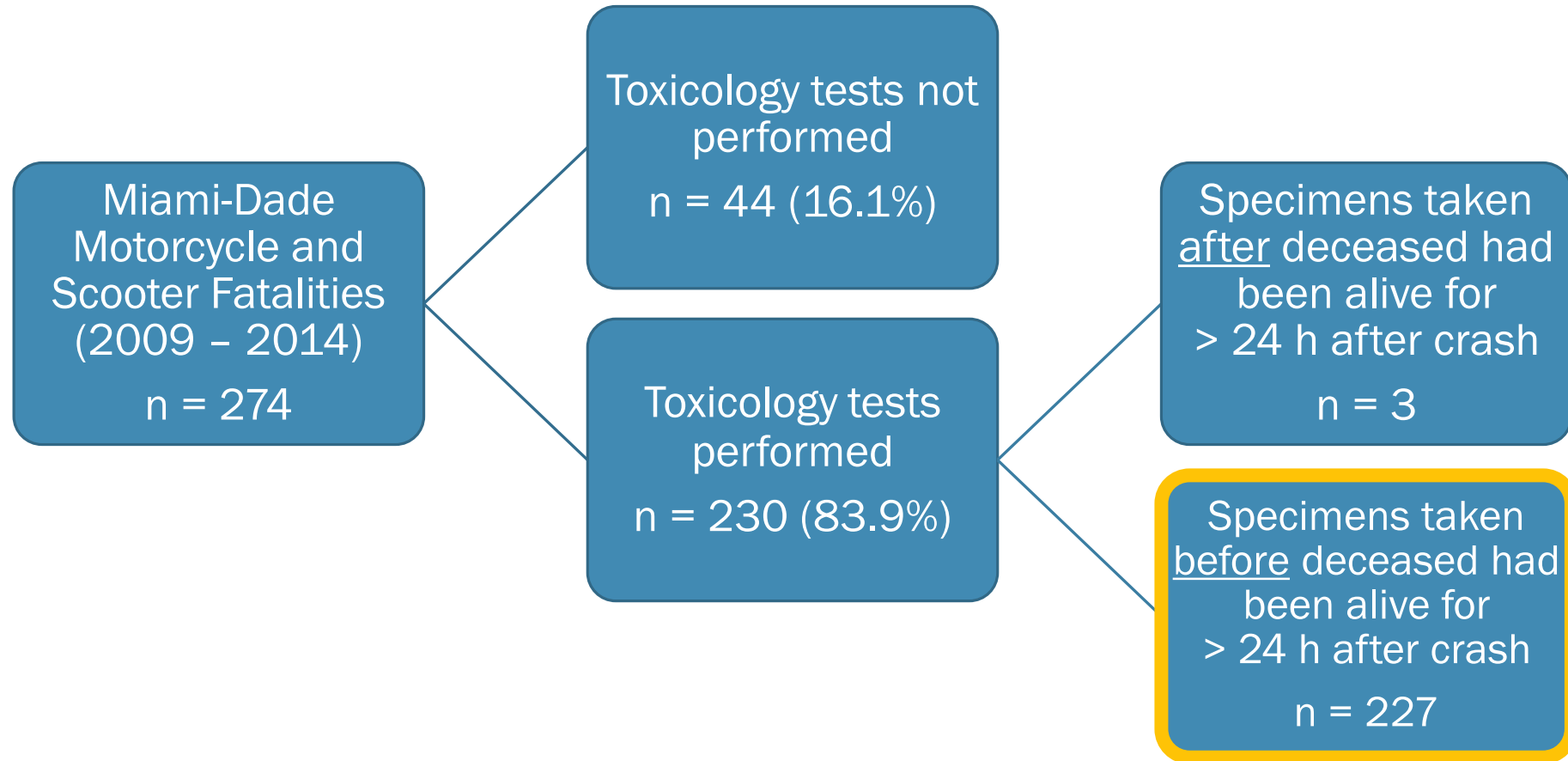
- Volatiles (Ethanol)
- Amphetamines
- Diphenhydramine (Antihistamines)
- Benzodiazepines (Sedatives)
- Cocaine and metabolites
- Opiates

Typical specimens tested:

- Blood
- Urine
- Ocular Fluid

Cannabis was not reported on these reports until 2015

Inclusion criteria



Positive Detection?

We defined a fatality as having a positive detection any of the substances listed were detected:

- Alcohol (any amount, excluding false positives due to post-mortem fermentation)
- Cocaine or its metabolites
- Methamphetamine
- Florida Schedule I drug
 - Methylone
 - Ethylone
 - Methiopropamine
 - 6-Monoacetylmorphine (heroin metabolite)

Other drugs were excluded from the “Positive Detection” as they could have been administered by EMS/Hospital Staff, Prescriptions, OTC, etc...

Post-Mortem Fermentation

Occurs after death in some cases of traumatic injury where there was environmental contamination

Occurs when organisms in the blood metabolize the glucose in the blood

Can release sufficient ethanol to affect BAC

- Usually 0.01% - 0.02%

“False Positives” - cases where the presence of alcohol was likely solely due to post-mortem fermentation

- Grouped with the negative detection group for the purposes of analysis
- Verified by a board-certified medical toxicologist

Demographics

Of our population of 227 fatalities:

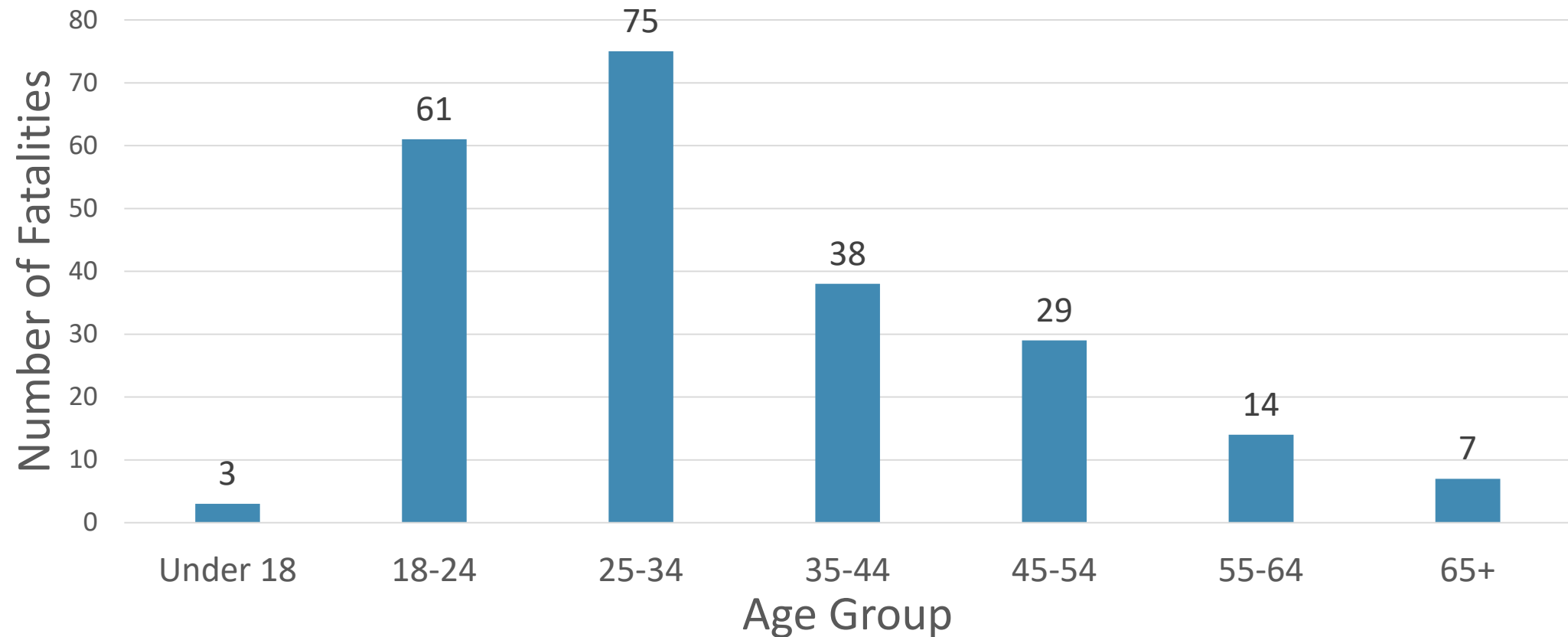
Male	Female
95.6% (n = 217)	4.4% (n = 10)

Motorcycle	Scooter
91.6% (n = 208)	8.4% (n = 19)

Scene	In Transport	Hospital
59.5% (n = 135)	7.5% (n = 17)	33.0% (n = 75)

Demographics, Age

Mean Age: 34.6 yrs.



Detections

56.4% (n=128) had ANY substance detected (incl. false positives and non-illicit drugs)

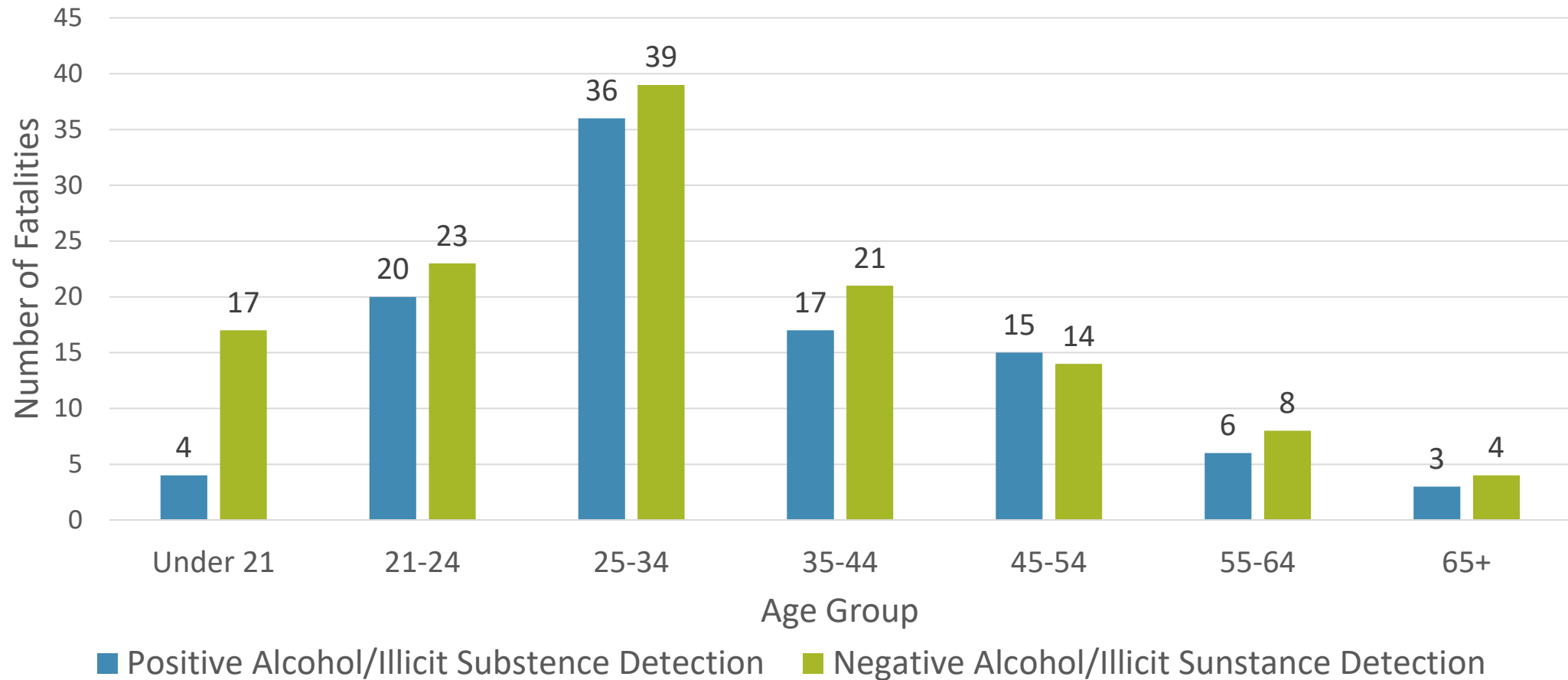
- 5 “false positives”

44.5% (n=101) had a positive alcohol/illicit substance detection

- 18.8% (n=19) tested positive for both alcohol and an illicit substance

Substance	Detections
Ethanol	80
Cocaine + metabolites	36
Methylone	2
Ethylone	1
Methiopropamine	1
6-Monoacetylmorphine (Heroin Metabolite)	1
Methamphetamine	1

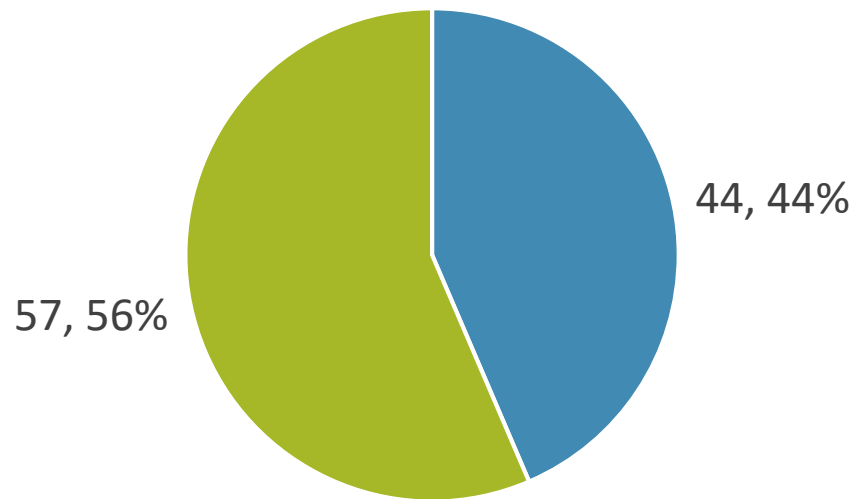
Detections, By Age



Safety Behavior – Helmet Use

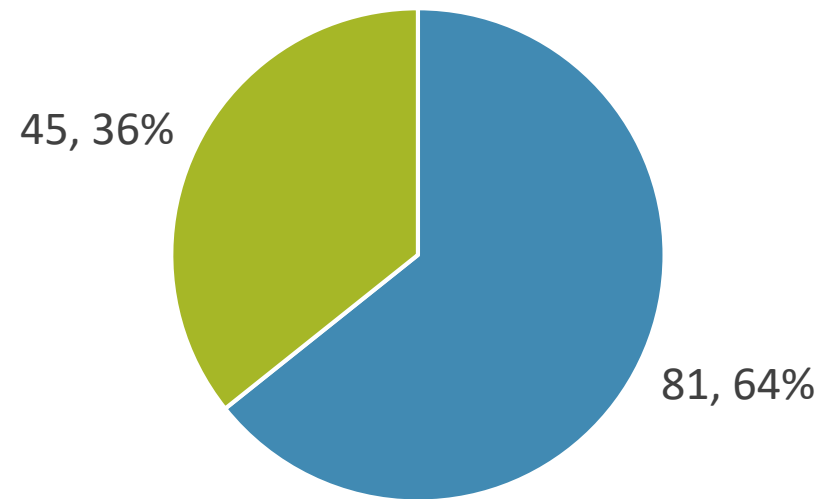
Statistically Significant (p = 0.002)

**Positive Alcohol/Illicit Substance Detection
(n = 101)**



■ Helmet Used ■ No Helmet Use

**Negative Alcohol/Illicit Substance Detection
(n = 126)**

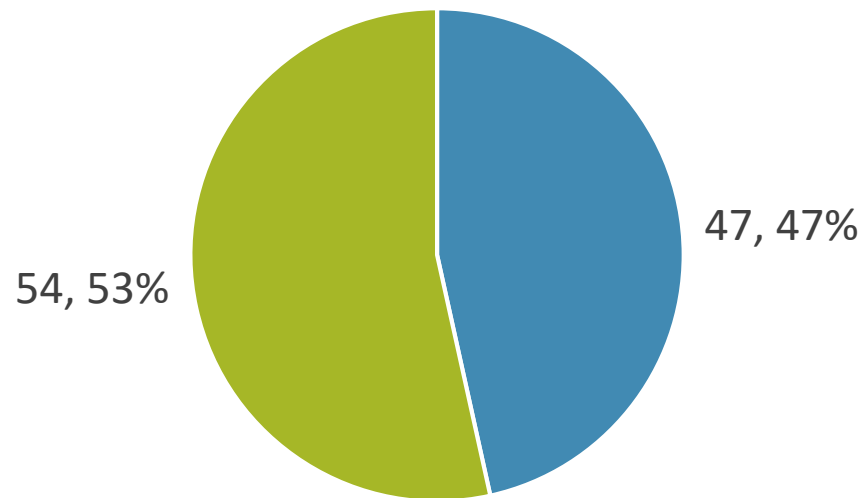


■ Helmet Used ■ No Helmet Use

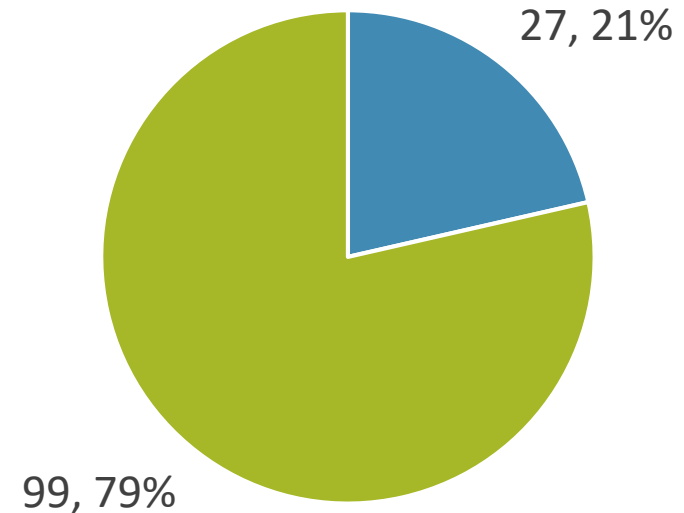
Safety Behavior – Type of Crash

Statistically Significant ($p < 0.001$)

**Positive Alcohol/Illicit Substance Detection
(n = 101)**



**Negative Alcohol/Illicit Substance Detection
(n = 126)**



■ Single-Vehicle Crash ■ Multi-Vehicle Crash

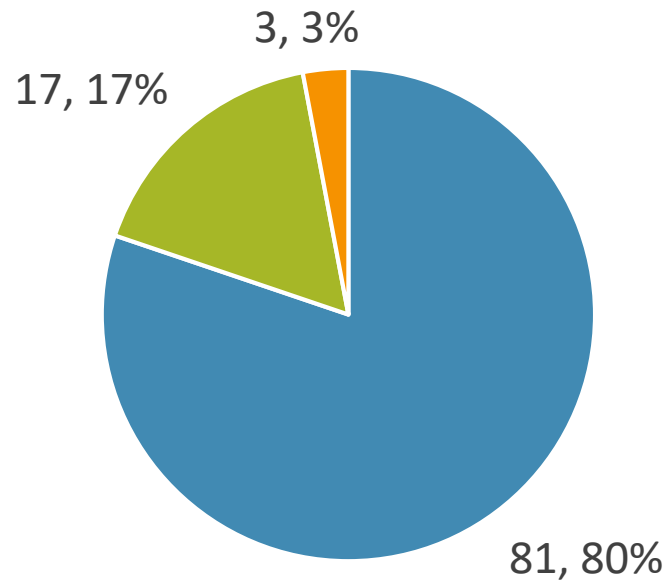
■ Single-Vehicle Crash ■ Multi-Vehicle Crash

Safety Behavior – Motorcycle Fault

Statistically Significant ($p < 0.001$)

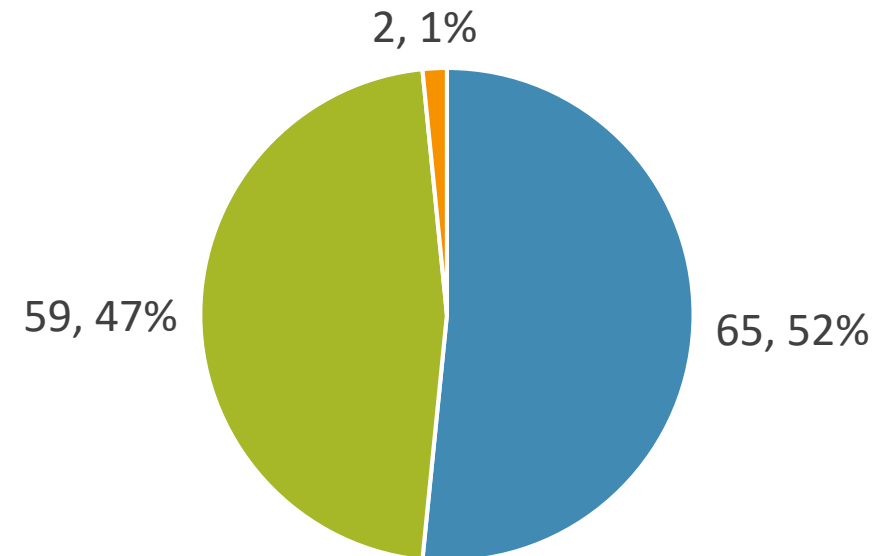
Positive Alcohol/Illicit Substance Detection

(n = 101)



Negative Alcohol/Illicit Substance Detection

(n = 126)

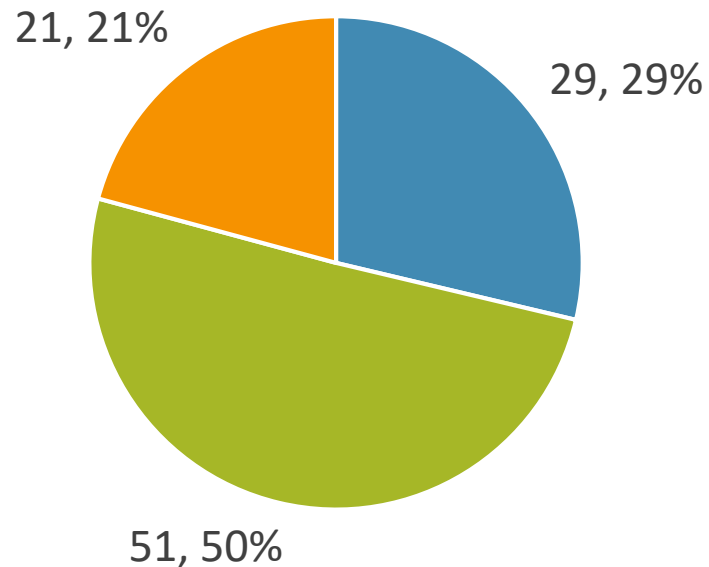


■ MC At Fault ■ MC Not At Fault ■ Unknown ■ MC At Fault ■ MC Not At Fault ■ Unknown

Safety Behavior – Speeding

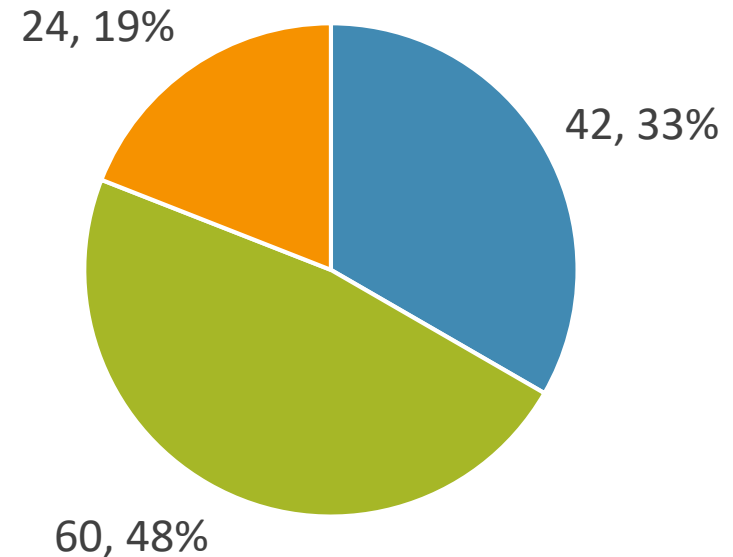
Not Statistically Significant (p = 0.748)

**Positive Alcohol/Illicit Substance Detection
(n = 101)**



■ Speeding ■ Not Speeding ■ Unknown

**Negative Alcohol/Illicit Substance Detection
(n = 126)**



■ Speeding ■ Not Speeding ■ Unknown

Correlations

Performed a binary logistic regression

Compared the BAC Levels to Helmet use and Multi-Vehicle Crashes:

- Negative correlation between BAC and helmet use ($r = -0.253$, $p = 0.002$)
- Negative correlation between BAC and multi-vehicle crashes ($r = -0.279$, $p < 0.001$)

Higher BAC correlates with less helmet use and more single vehicle crashes

Injuries

Association for the Advancement of Automotive Medicine's Abbreviated Injury Scale (AIS)

- Determine body region of most severe injury

58.2% (n = 103) had the most severe injury in head and neck region

- Also had most of the lethal injuries

35% (n = 62) had the most severe injury in the chest region

Most (80%, n = 141) of the injuries were severe

Conclusions

Alcohol/illicit substance use has a negative effect on the risk aversion behavior of riders in fatal motorcycle crashes.

A positive alcohol/illicit substance detection is:

- Associated with a riding without a helmet, being in a single-vehicle crash, and being at fault of the crash
- Not Associated with speeding

Higher BAC is correlated with less helmet use and more single-vehicle crashes

The majority of the fatalities had the head and neck region as the most severely injured region

Additional legislation, including a universal helmet law, and better motorcycle safety enforcement may help mitigate these fatalities

Questions?

Thank you!
