FARS is the Instrument! Calibrate it Carefully

Purpose of this Slide Stack:

To learn how to translate your terms into FARS terms, and to know the limitations of the FARS data when comparing by year and type.

FARS = Fatality Analysis Reporting System
Exploring some of the limitations of the Fatality Analysis Reporting System (FARS)

Joe Elliott
Motorcyclist and Scientist
Using **FARS** to Understand, and Manage the **Danger** of Motorcycling

**FARS** = Fatality Analysis Reporting System
Understand and Calibrate the Instruments!

We would spend a week exploring the limits, and calibrating, the instruments …

… to run the measurements for a few hours!
Understand and Calibrate the Instruments!

We would spend a week exploring the limits, and calibrating, the instruments ... ... to run the measurements for 11 seconds!
Translating YOUR Terms To NHTSA FARS
If you want to use the
NHTSA
www.nhtsa.gov
FARS Data Query
You Must Use THEIR Terms
If you want to use the

**NHTSA**

www.nhtsa.gov

**FARS Data Query**
You have to

Read **their** Manuals!
FARS Limitations:

1. **1991**: Comparing current data to historical data prior to **1991** can introduce errors and should be avoided.

2. **1993**: Comparing current License Status and Compliance data prior to **1993** should be avoided.

3. **2012**: Current motorcycle VMT and Registration data should not be compared to historical data prior to **2012** (prior to 2007 for Passenger Vehicle registration and VMT).

FARS Translations:

1. Use care when translating your “Motorcycle Body Type” term to FARS.

2. Use care when translating your “Person Type” term to FARS. “Motorcyclist” and “Rider” should not be used in comparisons with NHTSA documents prior to **2007**, however “Driver” and “Passenger” can be used.
The 1991 Limitation:

Why is 1991 the oldest FARS data to use confidently with historical comparisons?
Vehicle (Body Type) Classification

BODY_TYP by NHTSA vehicle category

NHTSA has precise definitions for several vehicle categories, such as passenger cars, pickups, buses, etc. For some categories, one will also need the data element TOW_VEH.

<table>
<thead>
<tr>
<th>Classification (BODY_TYP)</th>
<th>Data Year and Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Cars</td>
<td>01-09</td>
</tr>
<tr>
<td>Light Trucks &amp; Vans</td>
<td>43, 50-52, or (60 and tow_veh=0)</td>
</tr>
<tr>
<td>Large Trucks</td>
<td>53-59, or (60 and tow_veh=1)</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>15-18</td>
</tr>
<tr>
<td>Buses</td>
<td>25-29</td>
</tr>
<tr>
<td>Other/Unknown Vehicles</td>
<td>35-42, 44, 45, 99</td>
</tr>
<tr>
<td>Also, since 2004 (79 and tow_veh in 1-4) or 98 (since 2010)</td>
<td></td>
</tr>
<tr>
<td>Passenger Vehicles</td>
<td>01-09, 43, 50-52, or (60 and tow_veh=0)</td>
</tr>
<tr>
<td>or 17 (since 2010)</td>
<td></td>
</tr>
<tr>
<td>Utility Vehicles (a.k.a. On/Off Road)</td>
<td>43</td>
</tr>
<tr>
<td>Pickups</td>
<td>50</td>
</tr>
<tr>
<td>Vans</td>
<td>51</td>
</tr>
<tr>
<td>Medium Trucks</td>
<td>53, 54, 56</td>
</tr>
<tr>
<td>Heavy Trucks</td>
<td>55, 57-59, or (60 and tow_veh=1)</td>
</tr>
<tr>
<td>Combination Trucks</td>
<td>((53-56, 60) and tow_veh=1) or 57-59</td>
</tr>
<tr>
<td>Single Unit Trucks</td>
<td>(53-56, 60) and tow_veh=0</td>
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\(1^*\) Body type code 24 (van-based school bus) was added in 1993. When solely defining School Buses be sure to include body type code 24.

\(2^*\) Body type code 25 (van-based transit bus) was added in 1993. When solely defining Transit Buses be sure to include body type code 25.

\(3^*\) Body type code 94 (motorized wheelchair) was added in 1997 and deleted in 1998.

\(4^*\) "Light Trucks & Vans" is frequently referred to as just "Light Trucks."
Vehicle (Body Type) Classification

**NHTSA’s Vehicle Body Type Classification (BODY_TYP)**

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<thead>
<tr>
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<tr>
<td>Passenger Cars</td>
<td>01-09</td>
</tr>
<tr>
<td>Light Trucks &amp; Vans (4)</td>
<td>43, 50-52, or (60 and tow_veh=0)</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>15-18</td>
</tr>
<tr>
<td>Other/Unknown Vehicles</td>
<td>35-42, 44, 45, 99</td>
</tr>
<tr>
<td>Passenger Vehicles</td>
<td>01-09, 43, 50-52, or (60 and tow_veh=0)</td>
</tr>
<tr>
<td>Utility Vehicles (a.k.a.</td>
<td>45</td>
</tr>
<tr>
<td>Pickups</td>
<td>50, 51</td>
</tr>
<tr>
<td>Vans</td>
<td>51</td>
</tr>
<tr>
<td>Medium Trucks</td>
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**Footnotes:**

- “Light Trucks & Vans” is frequently referred to as just “Light Trucks.”
Vehicle (Body Type) Classification

**BODY_TYP by NHTSA vehicle category**

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Notes:
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- "Light Trucks & Vans" is frequently referred to as just "Light Trucks."
When evaluating FARS data **For Historical Comparisons**

Be suspicious of pre-1991 Data

1991 is greater than 25 years ago.

For current danger models, **1991 is far enough back in history** for evaluating current trends.
The **1993** Limitation:

Why is **1993** the oldest FARS data to use for License Status and Compliance?
NON-CDL LICENSE TYPE/STATUS
(FARS Only)

FORMAT: 1 numeric occurring 2 times.

SAS NAME: Vehicle.L_TYPE; Vehicle.L_STATUS

ELEMENT VALUES:

<table>
<thead>
<tr>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
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<tr>
<td>2</td>
<td>2</td>
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<tr>
<td>7</td>
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</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

Definition: This element identifies in two subfields the type license held by this driver and the status of the license at the time of the crash.

Source:
Official driver record and police report. Official driver records take precedence over police-reported information.

Remarks:
Prior to 1993, this element was Driver License Status and included codes “5 – Valid-Single Class” and “6 – Valid-Multiple Class.”

Starting in 2004, this element was modified to capture both non-CDL license type and status to accommodate graduated driver license (GDL) programs.

This element is used to establish the driver’s license type and status for all license classes except the commercial driver’s license (CDL). It also captures the type and status of the NON-CDL driving privilege for drivers with CDLs.

The NON-CDL License Type/Status is coded for all drivers, including drivers with a CDL.

Use the “Type” field to record whether the driver has a full driver’s license, intermediate driver’s license, learner’s permit, temporary license, or is not licensed. Use the “Status” field to record if the license is valid, suspended, revoked, expired, canceled or denied.
**NON-CDL LICENSE TYPE/STATUS**

**(FARS Only)**

**FORMAT:** 1 numeric occurring 2 times.

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</tr>
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<tbody>
<tr>
<td>0</td>
<td>Not Licensed</td>
</tr>
<tr>
<td>1</td>
<td>Full Driver License</td>
</tr>
<tr>
<td>2</td>
<td>Intermediate Driver License</td>
</tr>
<tr>
<td>7</td>
<td>Learner’s Permit</td>
</tr>
<tr>
<td>8</td>
<td>Temporary License</td>
</tr>
<tr>
<td>9</td>
<td>Unknown License Type</td>
</tr>
<tr>
<td>0</td>
<td>Not Licensed</td>
</tr>
<tr>
<td>1</td>
<td>Suspended</td>
</tr>
<tr>
<td>2</td>
<td>Revoked</td>
</tr>
<tr>
<td>3</td>
<td>Expired</td>
</tr>
<tr>
<td>4</td>
<td>Canceled or Denied</td>
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This changed CDL capture for FARS Element D10 License Compliance.
Historical Comparisons

Why use either straight counts, or counts divided by population, for **historical comparisons**.
The US Census population count is considered data that is of high Veracity*

Why?

*Veracity - Conformity to fact or truth; accuracy or precision.
   -American Heritage Dictionary
Many pay attention to assure accurate census since the beginning of our country.

**Population** is connected to many governmental concerns; the representation in government and taxation being of great importance.
Why not use Vehicle-Miles-Traveled (VMT) or Registrations for Historical Comparisons?

When using VMT, why focus on post 2011 values?
FARS Encyclopedia  
VMT Changes

Note: In August 2011, starting with 2009 data, the Federal Highway Administration implemented an enhanced methodology for estimating registered vehicles and vehicle miles traveled by vehicle type. In addition, revisions were made to 2008 and 2007 data using this enhanced methodology. As a result of the Federal Highway Administration's changes, involvement rates may differ, and in some cases significantly, from previously published rates.

The passenger vehicle (passenger cars and light trucks) registration data contained in this FARS Encyclopedia was obtained from R.L. Polk's National Vehicle Population Profile (NVPP), which is a compilation of all passenger vehicles that have been registered in compliance with State requirements. Polk recently improved the data quality of NVPP, which resulted in a complete rewrite of the data. They 1) enhanced their business rules for vehicles on the road, 2) have more consistent reporting/processing across States, and 3) upgraded their basis for vehicle coding.

Due to the enhancement in the passenger vehicle registration data for 2011 and 2012, registration counts for those years changed considerably from the counts provided for 2010 and earlier years. A comparison of Polk’s Old NVPP and New NVPP for 2011 shows that Polk’s enhancements have resulted in over a 3 percent increase in passenger vehicle registration counts from what was previously reported – passenger car registrations decreased by 5.6 percent and light truck registrations increased by 14.6 percent. This FARS Encyclopedia uses 2012 data, as well as 2011 data updated from the data presented in the 2011 FARS Encyclopedia, for passenger car and light truck registrations based on Polk’s New NVPP. Consequently, the 2011 and 2012 data for vehicle registrations and fatality rates are not strictly comparable with the data for all prior years, which were based on Polk’s Old NVPP.
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Be suspicious of tables and charts for Motorcycle VMT or registrations that compare today's statistics to pre-2012.

Due to changes in how VMT has been estimated, for motorcycle VMT, start with 2012.
Understanding Relative VMT

1. Try to count the number of cars (passenger vehicles) you see. This is more difficult than you think.
2. In your household, check the annual mileage of passengers vehicles, and ratio it with your motorcycle miles.
3. The FHWA estimates national trends by using State reported Highway Performance and Monitoring System (HPMS) data, fuel consumption data (MF-21 and MF-27), vehicle registration data (MV-1, MV-9, and MV-10), other data such as the R. L. Polk vehicle data, and a host of modeling techniques. Starting with the 2009 VM-1, an enhanced methodology was used to provide timely indictors on both travel and travel behavior changes.

How is VMT Determined?
Understand Relative VMT

1. Try to count the number of cars (passenger vehicles) you see. You will be surprised!
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On to translating terms to FARS “speak”:

How about terms you may use such as “Bike” and “Biker”?
What are the FARS definitions for Vehicle Body Type “Bike”?

What are the FARS definitions for Person Type “Biker”?
What would you call these?
**Vehicle Body Type Element V11**

42 *(Light Truck Based Motor Home [chassis mounted]*) is used to describe a frame mounted recreational unit attached to a light van or conventional chassis.

65 *(Medium/Heavy Truck Based Motor Home)* describes a recreational vehicle mounted on a single unit medium/heavy truck chassis.

73 *(Camper or Motor Home, unknown truck type)* is used when it is known the vehicle is a camper or motor home, but the truck type is unknown.

**MOTORCYCLES, MOPEDS, ALL- TERRAIN VEHICLES, ALL- TERRAIN CYCLES**

80 *(Motorcycle)* is used when a motor vehicle having a seat or saddle for the use of its operator is a two-wheeled open (e.g., no enclosed body) vehicle propelled by an internal combustion engine. Motorcycles equipped with a side car also use this code.

81 *(Moped [motorized bicycle])* is used when the vehicle is a speed-limited motor-driven cycle capable of moving either by pedaling or by an internal combustion engine.

82 *(Three-Wheeled Motorcycle or Moped)* is used when the vehicle is a three-wheeled open vehicle propelled by an internal combustion engine or a three-wheeled motorized bicycle capable of moving either by pedaling or by an internal combustion engine.

83 *(Off-road Motorcycle [2-wheel])* is used when the vehicle is a two-wheeled open vehicle propelled by an internal combustion engine designed or built for off road use only.

88 *(Other Motored Cycle [mini-bike, motor scooter, pocket motorcycles “pocket bikes”])* is used when the vehicle in question does not qualify for attributes motorcycle, moped, three-wheeled motorcycle or moped (e.g., motor scooter).

89 *(Unknown Motored Cycle Type)* is used when it is known that the vehicle is a motored cycle, but no further data is available.

90 *(ATV/ATC [All-Terrain Cycle])* is used for off-road recreational vehicles which cannot be licensed for use on public roadways. ATV/ATCs have 3 or 4 wheels, a saddle type seat and handle bars for steering (no steering wheel). Does not include side-by-side ATVs (automobile type seats and steering wheel). See code 97 *(Other Vehicle Type)* for side-by-side ATV.

**OTHER VEHICLES**

Other Vehicles describes all motored vehicles that are designed primarily for off-road use.

91 *(Snowmobile)* refers to a vehicle designed to be operated over snow propelled by an internal combustion engine.

92 *(Farm Equipment Other Than Trucks)* refers to farming implements other than trucks propelled by an internal combustion engine (e.g., farm tractors, combines, etc.).
65 (Medium/Heavy Truck Based Motor Home) describes a recreational vehicle mounted on a single unit medium/heavy truck chassis.

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Paraphrasing FARS:

For vehicles that,

“Looks like a Motorcycle with a Sidecar Attached,”

FARS has always assigned

Body Type Element V11 = 80 Motorcycle
FARS, Not You, “Says”

V11 = 80
Looks like a
2-Wheeled Motorcycle
with Sidecar

V11 = 82
3-Wheeled Motorcycle
The Rosetta Stone for Translating YOUR “3-Wheeler” Term to FARS

Looks like a 2-Wheeled Motorcycle with Sidecar
V11 = 80

3-Wheeled Motorcycle
V11 = 82
What are the FARS definitions for Person Type?
**PERSON TYPE**

**FORMAT:** 2 numeric

**SAS NAME:** Person.PER_TYP

**ELEMENT VALUES:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Driver of a Motor Vehicle In-Transport</td>
</tr>
<tr>
<td>02</td>
<td>Passenger of a Motor Vehicle In-Transport</td>
</tr>
<tr>
<td>03</td>
<td>Occupant of a Motor Vehicle Not In-Transport</td>
</tr>
<tr>
<td>09</td>
<td>Unknown Occupant Type in a Motor Vehicle In-Transport</td>
</tr>
</tbody>
</table>

**Definition:** This element describes the role of this person involved in the crash.

**Remarks:**

An involved person in a crash must maintain Person Type during the crash. Once the unstabilized situation begins, a driver, passenger or non-motorist/non-occupant cannot change Person Type until the accident stabilizes.

If a person is entering or exiting a vehicle before the unstabilized situation begins, try to determine if the person has successfully changed type before control is lost. (e.g., a pedestrian getting into an automobile that begins to move, a passenger stepping off of a bus as it begins to pull away, etc.).

Attributes 01, 02 and 09 are used for occupants of a motor vehicle in-transport. This includes occupants of motor vehicles that are in motion outside the trafficway.

**09 (Unknown Occupant Type in a Motor Vehicle In-Transport)** is used when it cannot be determined if the person was the driver or passenger, but it is known that the person was an occupant of a motor vehicle in-transport.

**Consistency Checks:**

<table>
<thead>
<tr>
<th>IF</th>
<th>THEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1Q0F) PERSON TYPE equals 01, and BODY TYPE equals 80-83, 88, 89, 12-55, 99.</td>
<td>SEATING POSITION must not equal 12-55, 99.</td>
</tr>
<tr>
<td>(2M0F) PERSON TYPE equals 01, and BODY TYPE equals 01, 02, 04, 08, 10, 17, 31-33, 39-41, 45, 48, 90, 91.</td>
<td>SEATING POSITION must not equal 21-55.</td>
</tr>
<tr>
<td>(2Q0F) PERSON TYPE equals 02, 03, 09, and BODY TYPE equals 01, 02, 04, 08, 10, 17, 31-33, 39-41, 45, 48, 90, 91.</td>
<td>SEATING POSITION must not equal 31-50.</td>
</tr>
</tbody>
</table>
PERSON TYPE

FORMAT: 2 numeric

SAS NAME: Person.PER_TYP

ELEMENT VALUES:
- 01 Driver of a Motor Vehicle In-Transport
- 02 Passenger of a Motor Vehicle In-Transport
- 03 Occupant of a Motor Vehicle Not In-Transport
- 09 Unknown Occupant Type in a Motor Vehicle In-Transport

Definition: This element describes the role of this person involved in the crash.

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</tbody>
</table>
**PERSON TYPE**

**FORMAT:** 2 numeric

**SAS NAME:** Person.PER_TYP

**ELEMENT VALUES:**

01  Driver of a Motor Vehicle In-Transport  
02  Passenger of a Motor Vehicle In-Transport  
03  Occupant of a Motor Vehicle Not In-Transport  
09  Unknown Occupant Type in a Motor Vehicle In-Transport

**Definition:** This element describes the role of this person involved in the crash.

**Remarks:**

An involved person in a crash must maintain Person Type during the crash. Once the unstabilized situation begins, a driver, passenger or non-motorist/non-occupant cannot change Person Type until the accident stabilizes.

If a person is entering or exiting a vehicle before the unstabilized situation begins, try to determine if the person has successfully changed to a non-related high seat (e.g., pedestrian, bicyclist, etc.)

These are the FARS options for P7:
These FARS Pearson Type definition are used for all Vehicle Types and have never been altered.

**PERSON TYPE**

**FORMAT:** 2 numeric

**SAS NAME:** Person.PER_TYP

**ELEMENT VALUES:**

01 Driver of a Motor Vehicle In-Transport  
02 Passenger of a Motor Vehicle In-Transport  
03 Occupant of a Motor Vehicle Not In-Transport  
09 Unknown Occupant Type in a Motor Vehicle In-Transport

**Definition:** This element describes the role of this person involved in the crash.

**Remarks:**

An involved person in a crash must maintain Person Type during the crash. Once the unstabilized situation begins, a driver, passenger or non-motorist/non-occupant cannot change Person Type until the accident stabilizes.

If a person is entering or exiting a vehicle before the unstabilized situation begins, try to determine if they were a person successfully changed to a different role (e.g., from a pedestrian to a driver or passenger).
PRACTICE:
Translating YOUR Terms
To NHTSA FARS
The Rosetta Stone for Translating YOUR “Persons” Term to FARS

**Passenger** of Motorcycle-In-Transport (P7=02)

**Driver** of Motorcycle-In-Transport (P7=01)
The Rosetta Stone for Translating YOUR “Persons” Term to FARS

**Passenger** of Motorcycle-In-Transport (P7=02)

**Driver** of Motorcycle-In-Transport (P7=01)

Practice Examples:
If your term is “rider,” then use the red diamond to translate to FARS term.
If your term is “pillion,” then use the magenta diamond to translate to FARS term.
Key Findings

- In 2014 there were 4,586 motorcyclists killed—a 2-percent decrease from the 4,692 motorcyclists killed in 2013.
- There were an estimated 92,000 motorcyclists injured during 2014, a 5-percent increase from 88,000 motorcyclist injured in 2013.
- Per vehicle mile traveled, motorcyclist fatalities occurred 27 times more frequently than passenger car occupant fatalities in traffic crashes.
- Twenty-eight percent of motorcycle riders involved in fatal crashes in 2014 were riding their vehicles without valid motorcycle licenses.
- In 2014 motorcycle riders involved in fatal crashes were found to have the highest percentage of alcohol-impaired drivers than any other vehicle type (29% for motorcycles, 22% for passenger cars and light trucks, and 2% for large trucks).
- Forty-three percent of motorcycle riders who died in single-vehicle crashes in 2014 were alcohol-impaired.
- Motorcycle riders killed in traffic crashes at night were almost three times more frequently alcohol-impaired than those killed during the day.

Motorcycles

The following definitions apply to terms used throughout this fact sheet: Motorcycles are defined as two- or three-wheeled motorcycles, off-road motorcycles, mopeds, scooters, mini bikes, and pocket bikes. The motorcycle rider is the person operating the motorcycle; the passenger is a person seated on, but not operating, the motorcycle; the motorcyclist is a general term referring to either the rider or passenger. NHTSA publications prior to 2007 may not reflect this terminology. For the purpose of this fact sheet, the term alcohol-impaired defines motorcycle riders with blood alcohol concentrations (BACs) of .08 grams per deciliter (g/dL) or higher.

In this fact sheet, the 2014 motorcycle information is presented as follows:

- Overview
- Registration
- Crash Involvement
- Speeding
- Age
- Motorcycle Engine Size
- Licensing and Previous Driving Records
- Alcohol
- Helmet Use and Effectiveness

Overview

In 2014 there were 4,586 motorcyclists killed in motor vehicle traffic crashes—a decrease of 2 percent from the 4,692 motorcyclists killed in 2013. There were an estimated 92,000 motorcyclists injured during 2014, a 5-percent increase from 88,000 motorcyclists injured in 2013. In 2014 two-wheeled motorcycles accounted for 93 percent of all motorcycles in fatal crashes.

In 2014 motorcyclists accounted for 14 percent of all traffic fatalities, 4 percent of all people injured, 17 percent of all occupants (driver and passenger) fatalities, and 4 percent of all occupants injured. Of the 4,586 motorcyclists killed in traffic crashes, 94 percent (4,311) were riders and 6 percent (275) were passengers.

Table 1 presents information about motorcyclists killed and injured over the decade from 2005 to 2014. During this time both the number of injured people and people killed peaked around 2007 and 2008 but have fallen slightly since that time. The number of registered motorcycles and motorcycle vehicle miles traveled (VMT) are also presented in Table 1, along with the respective fatality and injury rates. When reviewing the registered vehicles and VMT data and rates over the 10-year period, note the change in methodology in collection of the data starting in 2007.
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There were four types of motorcycle riders involved in fatal crashes in 2014: riders were alcohol-impaired; riders were not alcohol-impaired; riders killed in single-vehicle crashes were alcohol-impaired; riders killed in single-vehicle crashes were alcohol-impaired. In 2014 two-wheeled motorcycles accounted for 93 percent of all motorcycles in fatal crashes.

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- Alcohol
- Helmet Use and Effectiveness

Prior to 2007, NHTSA Publications were inconsistent with Person Type Terms. FARS has never varied the terms for Persons.
FARS Limitations:

1. **1991:** Comparing current data to historical data prior to **1991** can introduce errors and should be avoided.

2. **1993:** Comparing current License Status and Compliance data prior to **1993** should be avoided.

3. **2012:** Current motorcycle VMT and Registration data should not be compared to historical data prior to **2012** (prior to 2007 for Passenger Vehicle registration and VMT).

FARS Translations:

1. Use care when translating your “Motorcycle Body Type” term to FARS.

2. Use care when translating your “Person Type” term to FARS. “Motorcyclist” and “Rider” should not be used in comparisons with NHTSA documents prior to **2007**, however “Driver” and “Passenger” can be used.