



2018 Pilot Source Study

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FAA Briefing

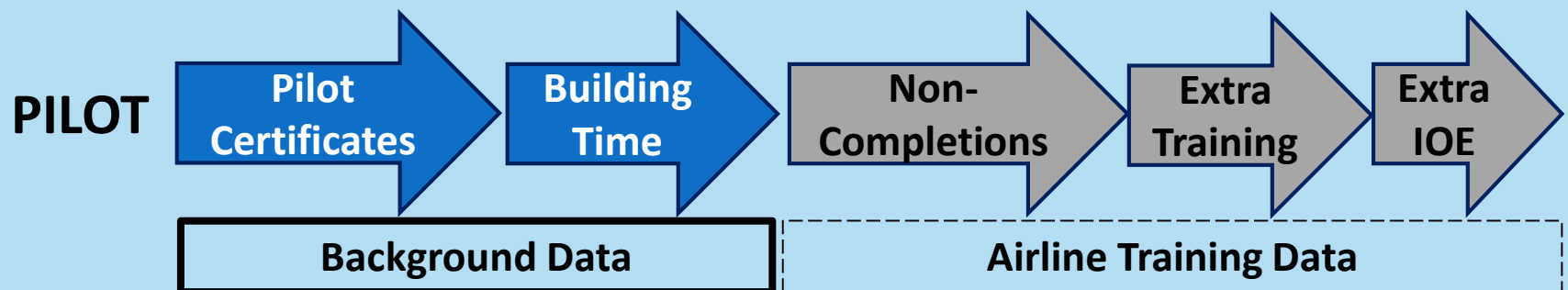
December 3, 2018





PILOT SOURCE STUDY RESEARCH QUESTION

How do new US Regional Airline Pilots
Perform in Airline Training, based on their
Background And Flight Experience?





HISTORY – 2010 Pilot Source Study

Commissioned to respond to the FAA's 2010 Advanced Notice of Proposed Rulemaking (ANPRM)





HISTORY – 2012 Pilot Source Study

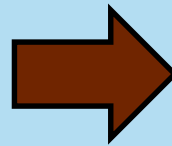
Response to the FAA's 2012 Notice of Proposed Rulemaking (NPRM)





HISTORY – 2015 Pilot Source Study

**Aug 1, 2010
Public Law
111-216**



Aug 1, 2013
First Officer
Qualification Rule
(FOQ Rule)



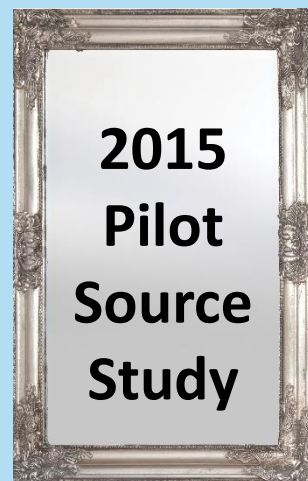
**2015 Research Question: What is the effect of
PL 111-216 and the FOQ Rule on pilot hiring
and pilot training in US regional airlines?**



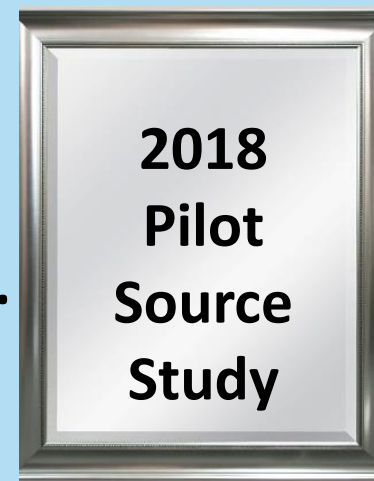
2018 Pilot Source Study



2
Yrs.



3
Yrs.



2018 Research Question: Where there any changes in Pilot **Backgrounds** or their **Training Performance** since the 2015 Study? Was the 2015 study too early in the transition from pre-law to post-law?



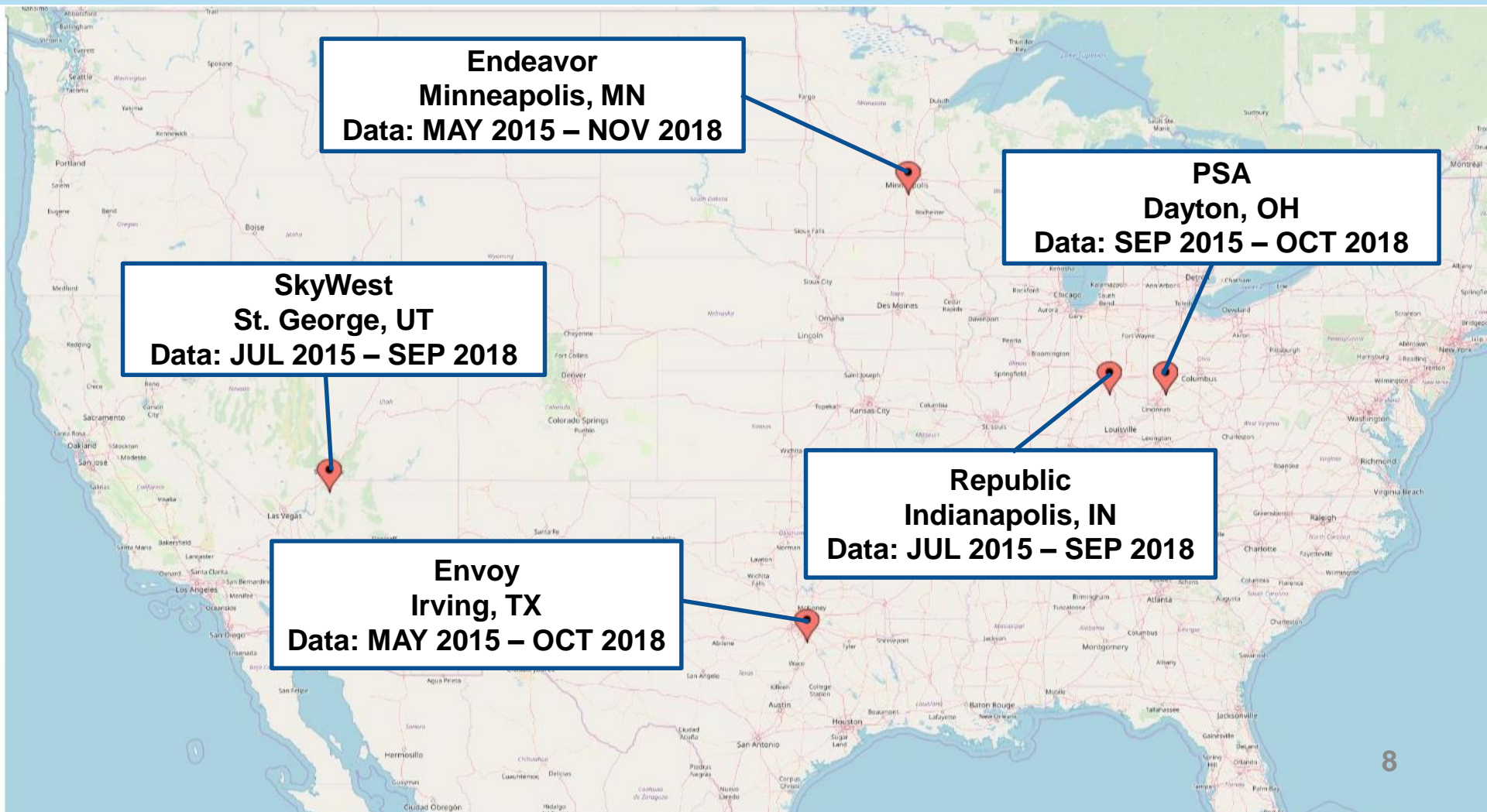
2018 Pilot Source Study SPONSORS

- AABI Collaborative Research Committee
- College of Aviation – Embry-Riddle (Daytona)
- College of Aviation – Embry-Riddle (Prescott)
- Endeavor Air
- Envoy Air
- Mountain Air Cargo
- Regional Airline Association
- Ypsilon Associates





POPULATION – 2018 Pilot Source Study





2018 Pilot Source Study

- **5 US Regional Airlines**
- **9776 Records**
- **Pilots Hired:
Summer 2015 to
Fall 2018**

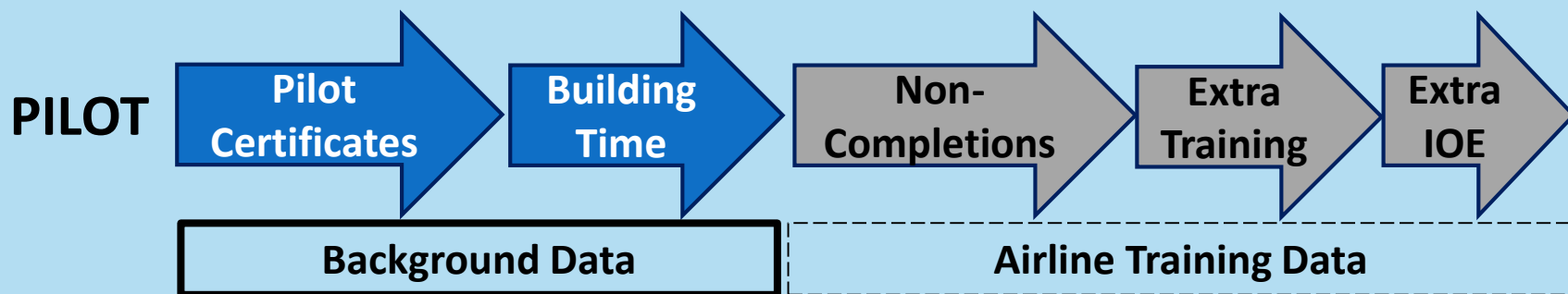
2015 Pilot Source Study

- **19 US Regional Airlines**
- **6734 Records**
- **Pilots Hired:
August 1, 2013 to
Summer 2015**



Part I

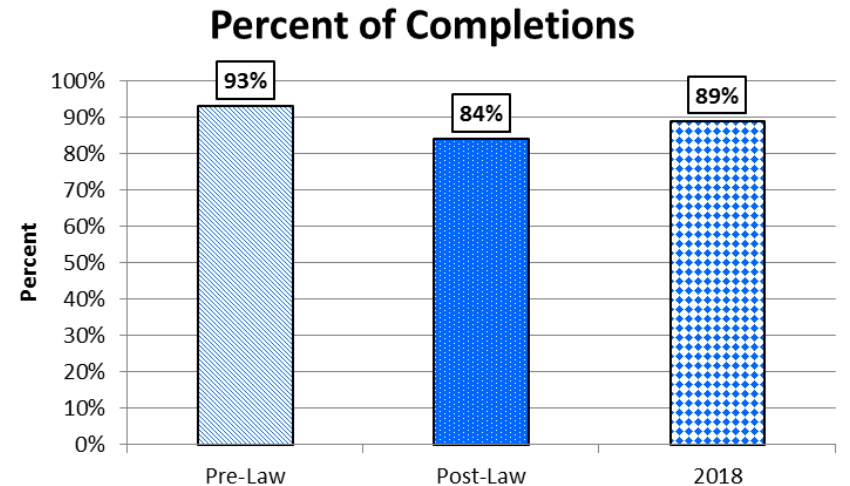
Training Data





2018 Completions

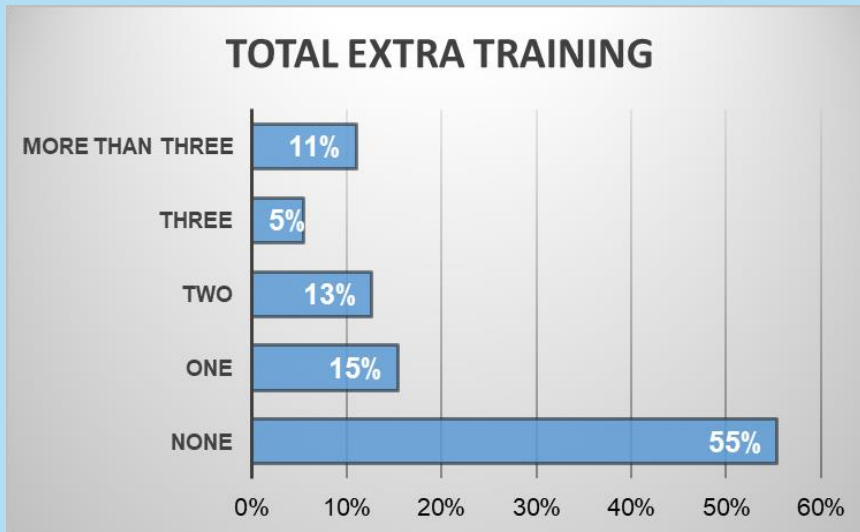
History of Completions



Note: Pre-Law data is the combination of the 2010 and 2012 Pilot Source Study; Post-Law data is the 2015 Pilot Source Study.

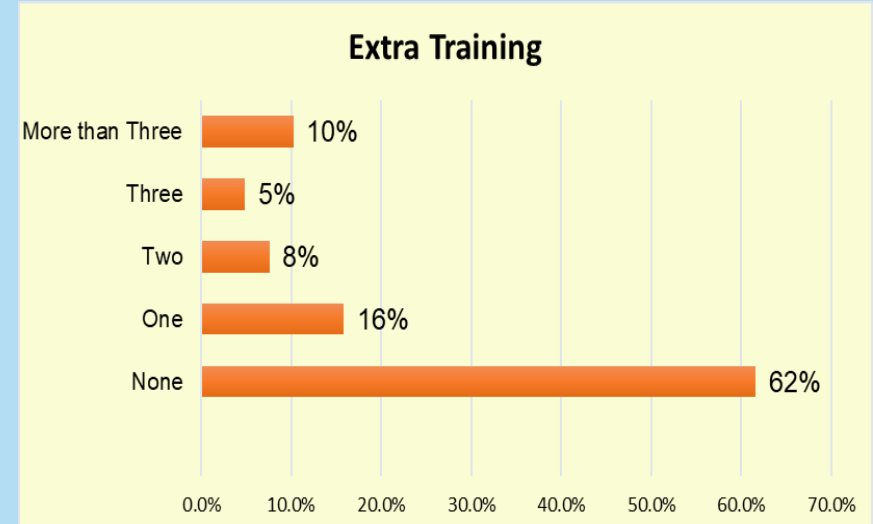


2018 Extra Training



45% Required Extra
Training

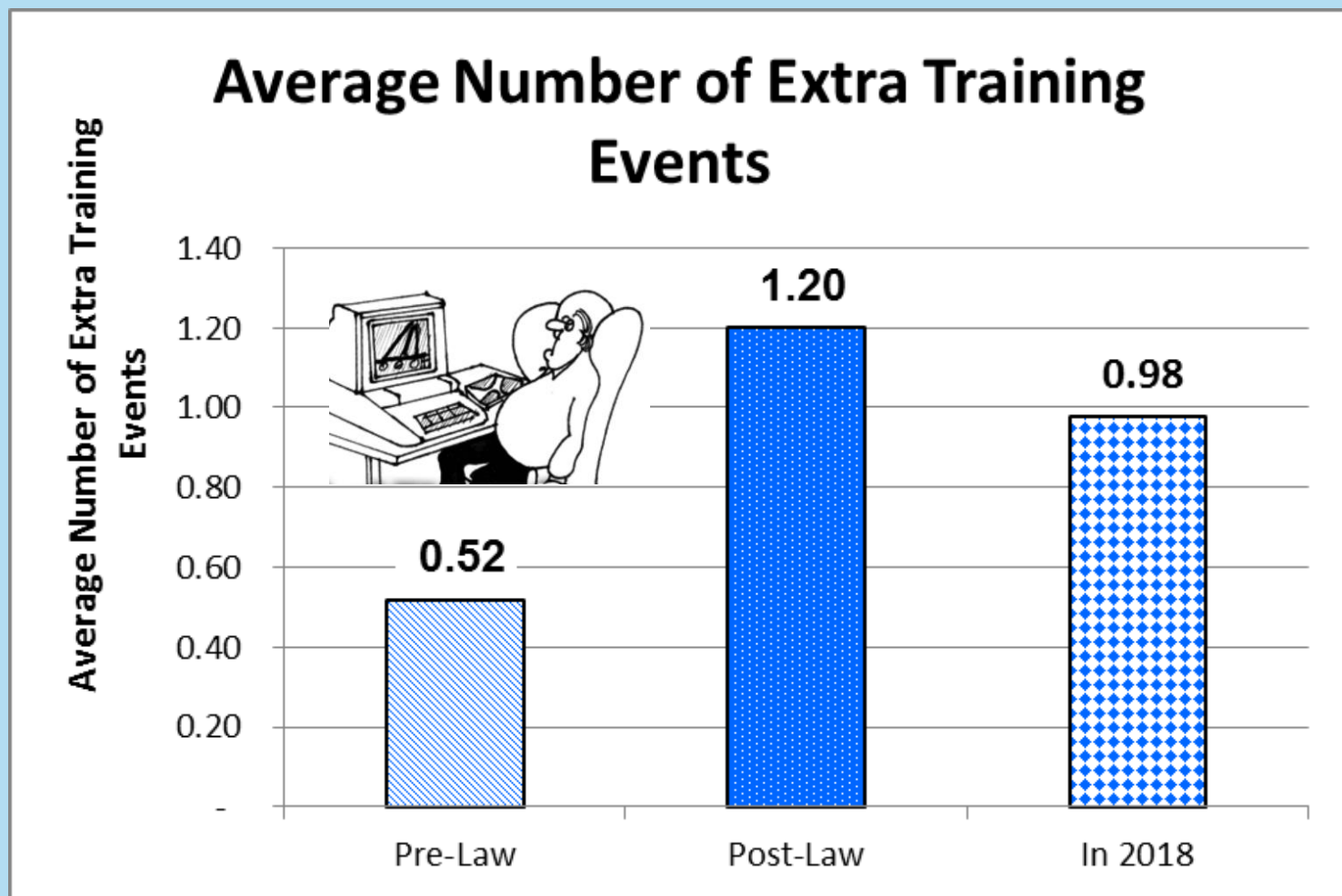
2015 Extra Training



38% Required Extra
Training



History – Average Number of Extra Training Events

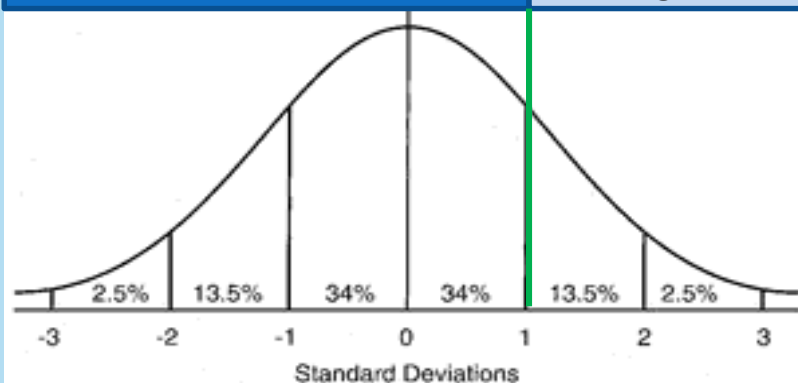




2018 Extra IOE

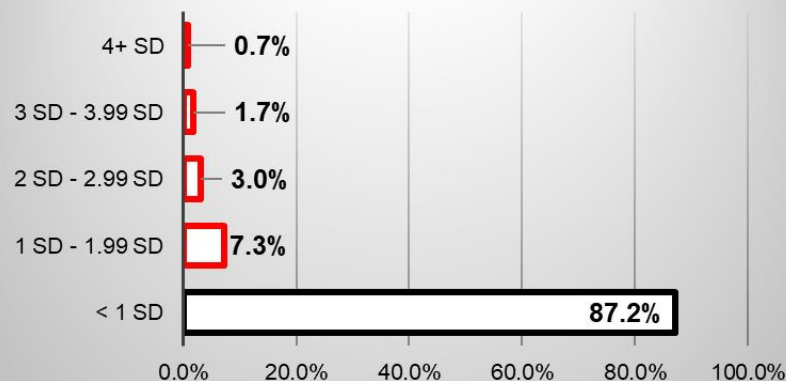
87.2% Normal IOE

12.8% Extra
IOE



N = 7562

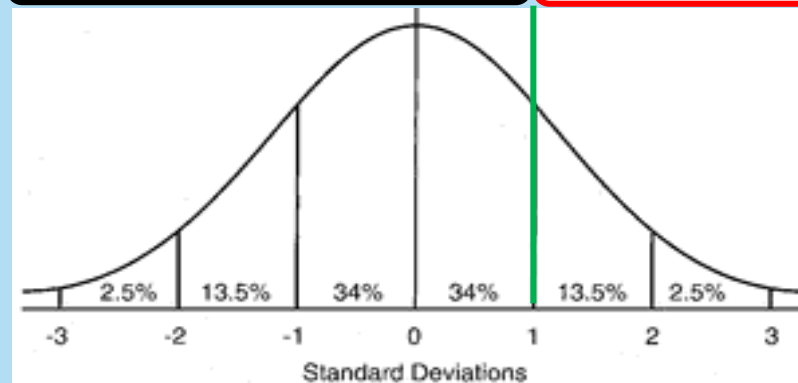
IOE Z-Score



2015 Extra IOE

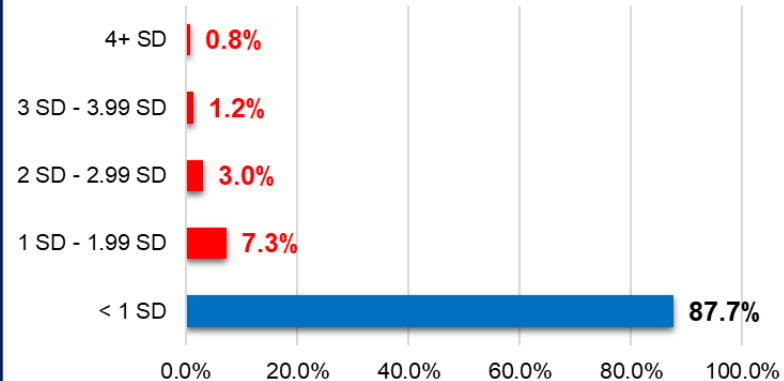
87.7% Normal IOE

12.3% Extra
IOE



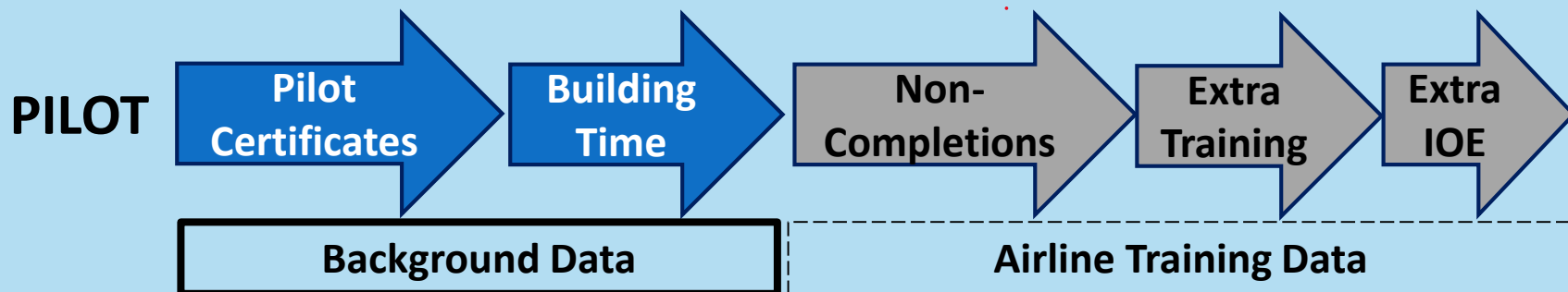
N = 4572

IOE Z-Score





Part II - Background Data



Gender
Age
Degree – Highest Level
AABI-Accredited Flight Degree
Aviation Graduate
Undergraduate GPA
Years Between Graduation and Hire
Flight Instructor
Military/Helicopter
Predominant Employment
Reported Failed FAA Check-Rides
Type ATP
Total Flight Hours
Recency Hours – Last 6 Mos / Last Year



2018 – Gender

Gender	Count	Percentage
Male	9189	94.0%
Female	546	5.6%
No Data	41	0.4%
TOTAL	9776	100%

2015 – Gender



In the USA, **about 5.12%** of airline or commercial pilots are women.

Gender Gap Grader | Airline Pilots



2018 – Gender – Performance in Training

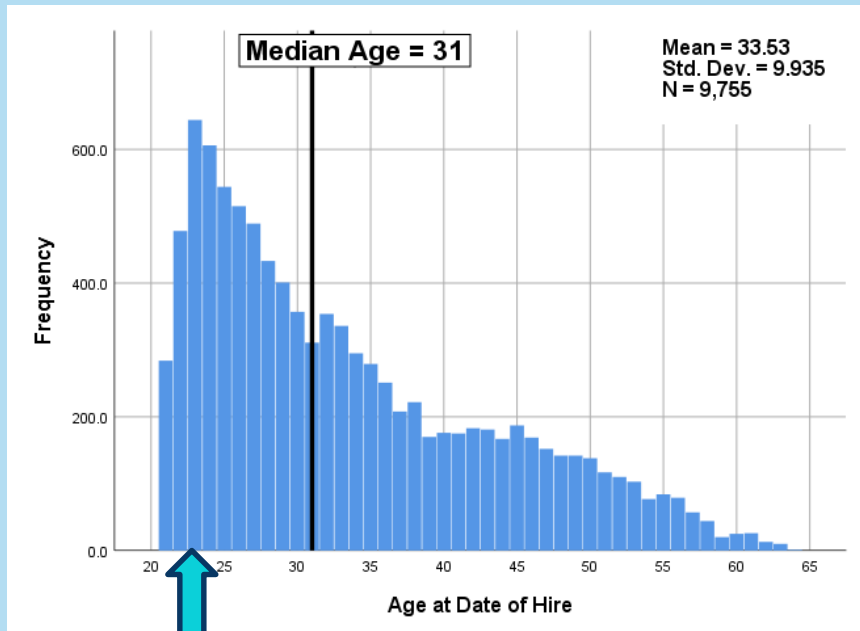
WOMEN (Compared to Men)

- Younger (Average Age 32 vs. 33.62) at Date of Hire
- More Bachelors and Masters Degrees
- Completed an AABI-Accredited Flight Degree more often
- More Aviation degrees
- Higher average GPA (3.45 vs 3.34)
- Fewer Military Pilots
- More R-ATP (1000) or ATP (1500)
- More average Extra Training (1.35 vs 1.09)

NO DIFFERENCE for Flight Instructor, Previous FAA Failures, Total Hours, **IOE Z-Scores**, or **Completions**

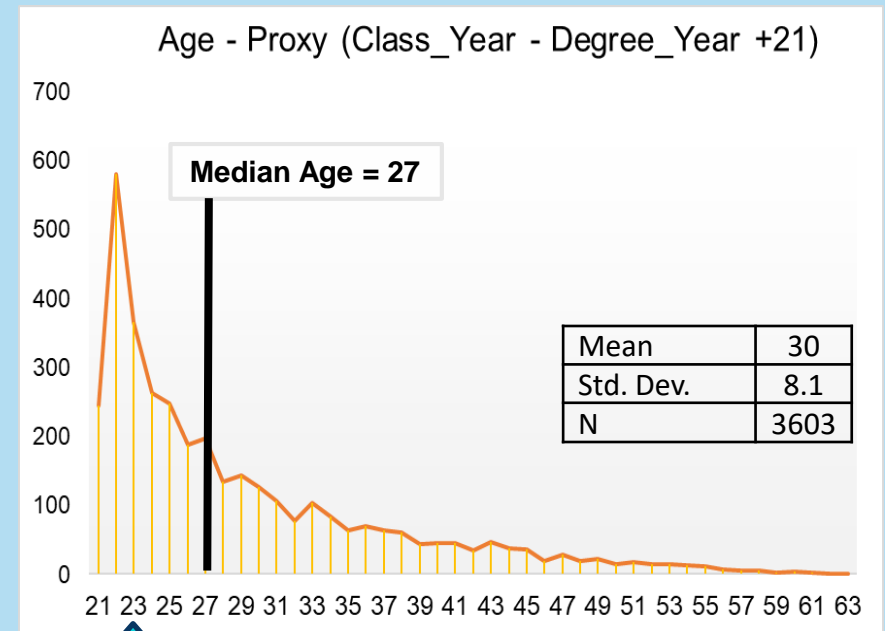


2018 – Age



\$61.153 To be eligible for an ATP, a person must be at least 23 years of age.

2015 – Age (Proxy)



In 2015: Age did not have a significant effect on non-completions and extra training events.



2018 – Age at Date of Hire – Performance in Training

Age at Date of Hire	Completed Training	Extra Training Average	Extra IOE
Younger ≤ 31	96%	1.03	No Difference
Older > 31	83%	1.18	No difference

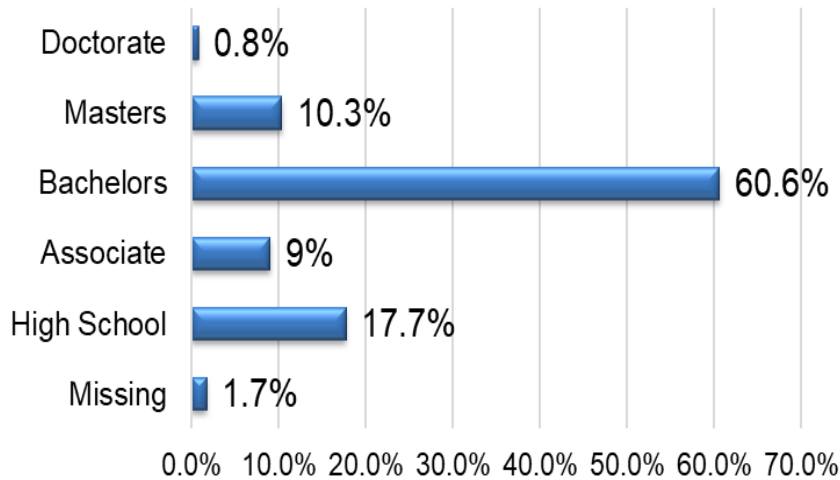
In 2018: Younger pilots had a Higher Completion Percentage.

In 2018: Age did not have a significant effect on Extra Training Average or IOE.



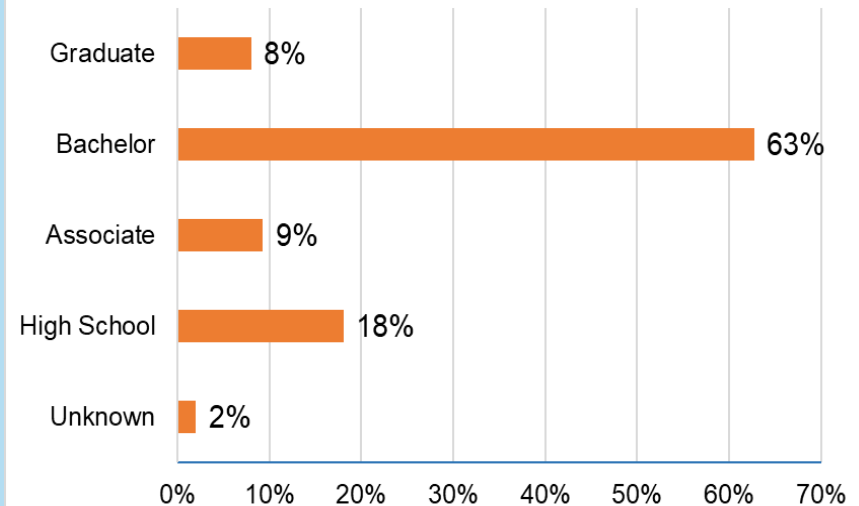
2018 – Degree, Highest Level

Degree - Highest Level



2015 – Degree, Highest Level

Degree - Highest Level



#6 in 2015: Pilots with a Bachelor's degree had fewer non-completions and fewer extra training events



2018 – Degree, Highest Level – Performance in Training

Degree, Highest Level	Completed Training	Extra Training Average	Extra IOE
Bachelor's	91%	1.00	No Difference
Associate	89%	1.06	No Difference
Masters	86%	1.33	No Difference
High School	86%	1.26	No Difference
Doctorate	70%	1.54	No Difference

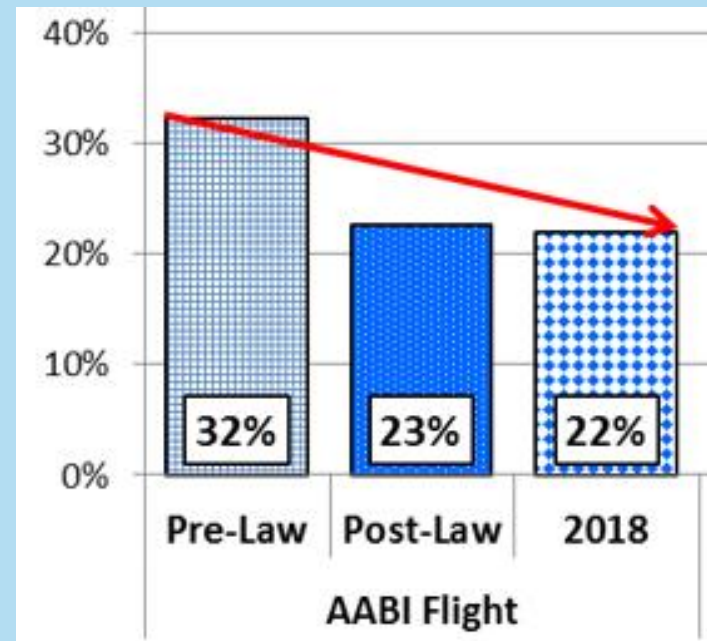
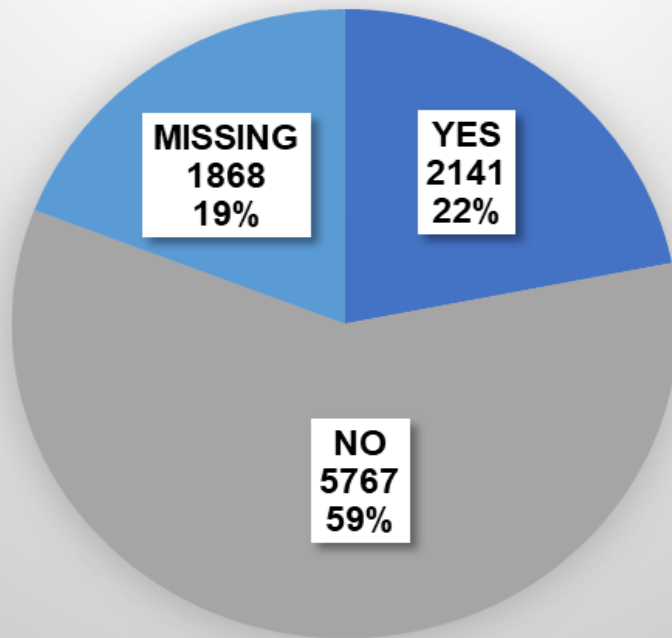
#6 in 2018: Pilots with a Bachelor's degree had a Higher Completion Percentage and a Lower Extra Training Average



2018 – AABI-Accredited Flight

History – AABI-Accredited Flight

AABI-Accredited Flight Program



#3 in 2015: Pilots who graduated from an AABI-Accredited Flight program had fewer non-completions and fewer extra training events



2018 – AABI-Accredited Flight Degree – Performance in Training

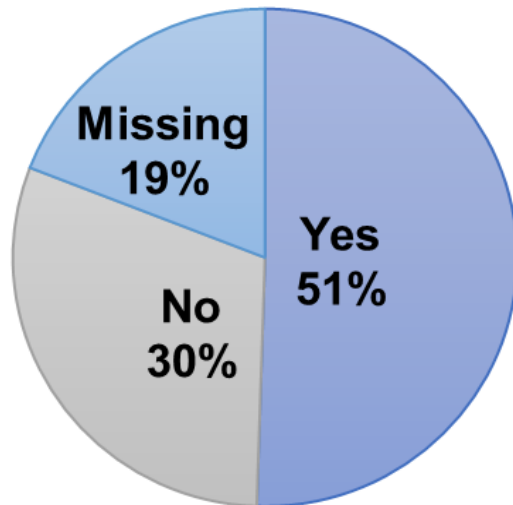
AABI-Accredited Flight Degree	Completed Training	Extra Training Average	Extra IOE
YES	93%	0.89	Slightly Less
NO	89%	1.12	Slightly More

#4 in 2018: Pilots who graduated from an AABI-Accredited Flight program had a Higher Completion Percentage and a Lower Extra Training Average. They also performed slightly better in IOE.

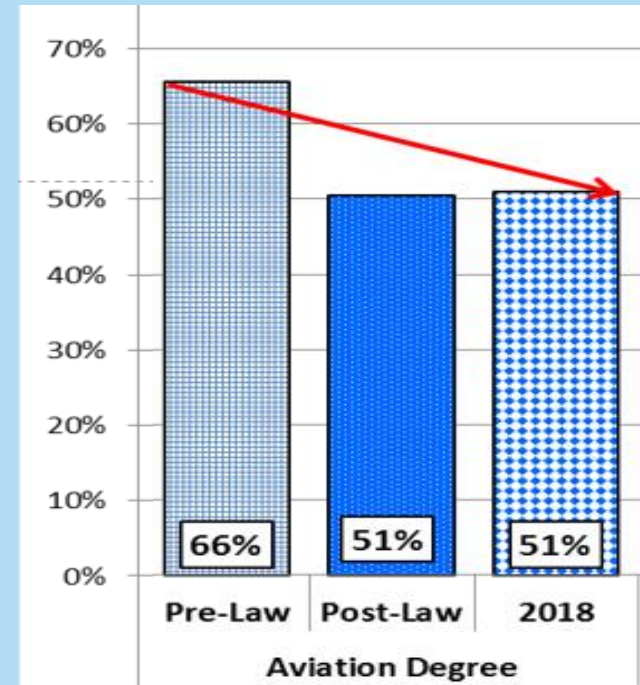


2018 – Aviation Graduate

Aviation Graduate
(Includes AABI Flight)



History – Aviation Graduate



#5 in 2015: Pilots with an Aviation Degree had fewer non-completions and fewer extra training events.



2018 – Aviation Graduate – Performance in Training

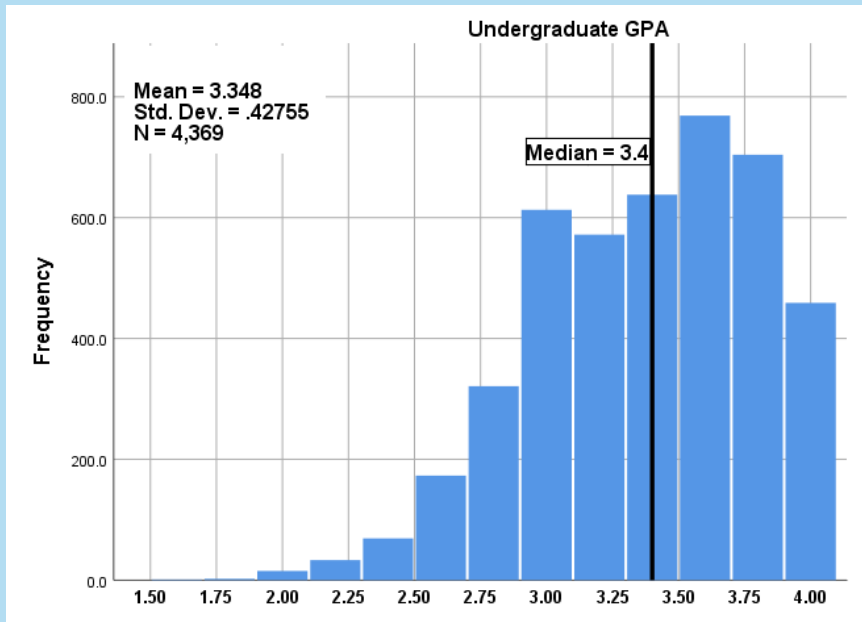
Aviation Graduate	Completed Training	Extra Training Average	Extra IOE
YES	91%	No Difference	No Difference
NO	88%	No Difference	No Difference

In 2018: Pilots who had an Aviation Degree had a Higher Completion Percentage.

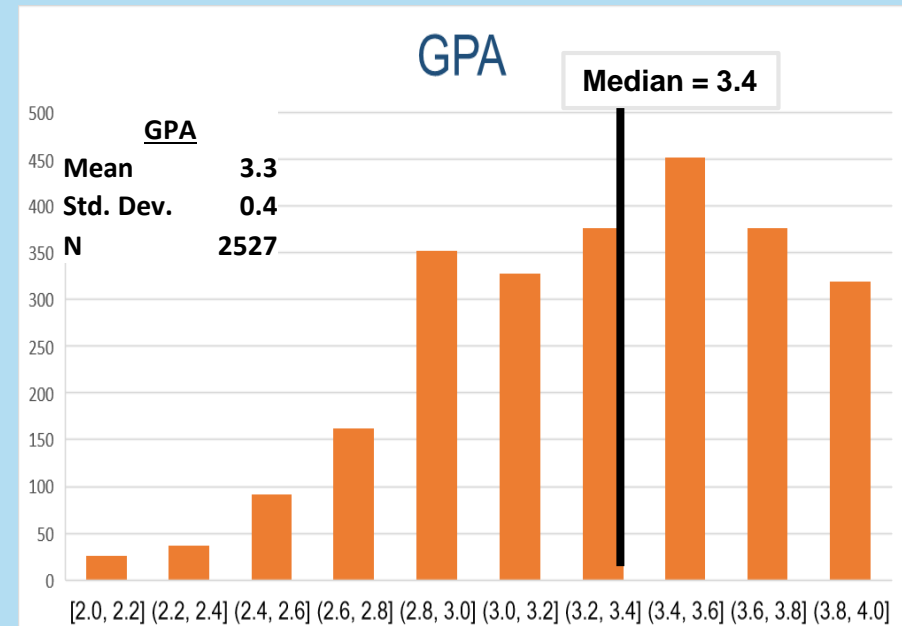
In 2018: Having an Aviation Degree did not have a significant effect on Extra Training Average or IOE.



2018 – Undergraduate GPA



2015 – Undergraduate GPA



In 2015: GPA did not have a significant effect on non-completions or extra training events.



2018 – Undergraduate GPA – Performance in Training

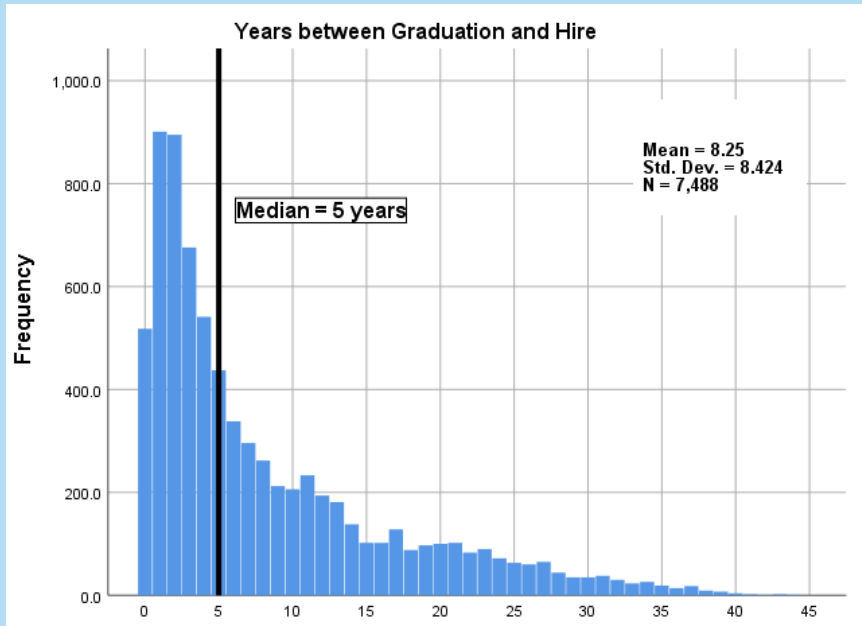
Undergraduate GPA	Completed Training	Extra Training Average	Extra IOE
> 3.8	91%	.76	No Difference
3.3 – 3.8	92%	.81	No Difference
2.9 – 3.2	89%	1.01	No Difference
< 2.9	89%	1.05	No Difference



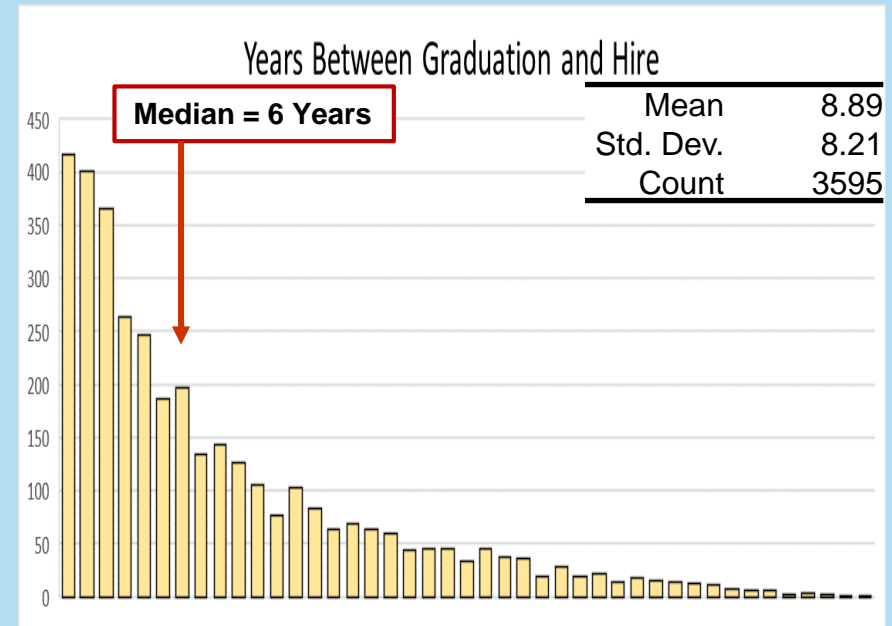
#1 in 2018: Pilots with an Undergraduate GPA of 3.3 or Higher had a Higher Completion Percentage and a Lower Extra Training Average.



2018 – Years between Graduation and Hire



2015 – Years between Graduation and Hire



#1 in 2015: Pilots with fewer than four years since graduation had fewer non-completions and fewer extra training events.



2018 – Years between Graduation and Hire – Performance in Training

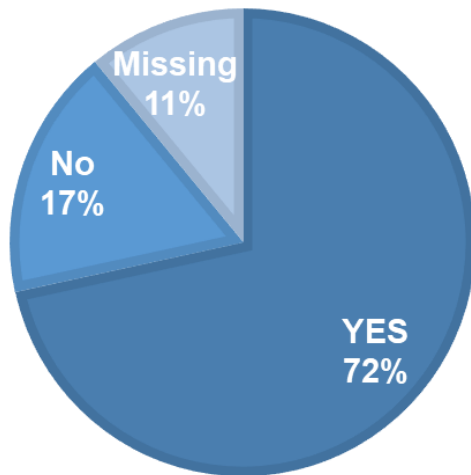
Years	Completed Training	Extra Training Average	Extra IOE
0-5	95%	0.87	No Difference
6-10	92%	0.98	No Difference
11-15	88%	1.05	No Difference
16-20	81%	1.12	No Difference
21-25	77%	1.62	No Difference
26-30	72%	1.59	No Difference
31-35	56%	1.95	No Difference
36-40	50%	1.51	No Difference
41-45	50%	3.33	Fewer

#2 in 2018: Pilots with Fewer than 5 Years between graduation and hire had a Higher Completion Percentage and a Lower Extra Training Average.

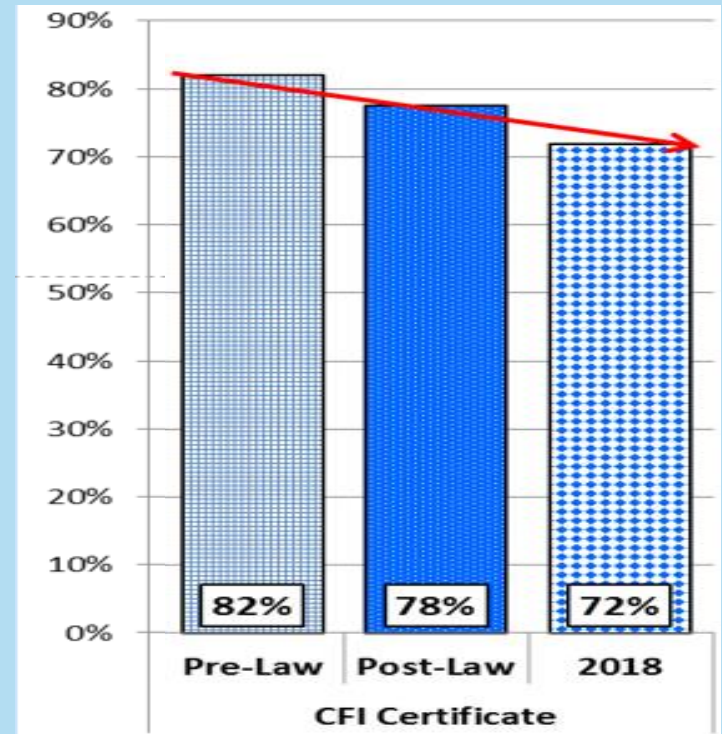


2018 – Flight Instructor

FLIGHT INSTRUCTOR




History – Flight Instructor



In 2015: Flight Instructor did not have a significant effect on non-completions and extra training events.



2018 – Flight Instructor – Performance in Training

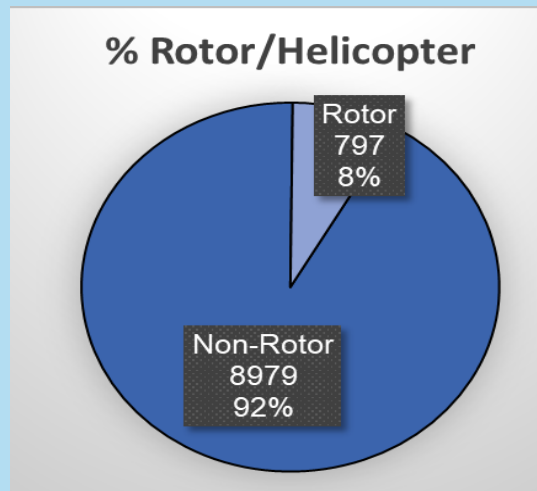
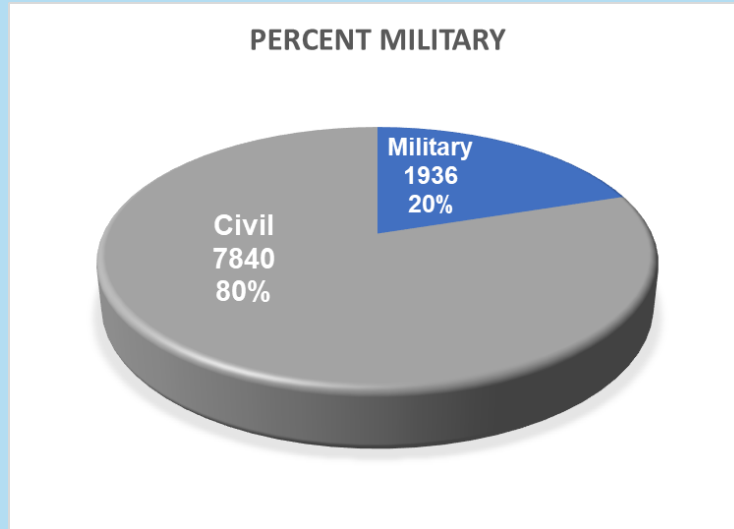
	Flight Instructor	Completed Training	Extra Training Average	Extra IOE
	YES	91%	1.09	No Difference
	NO	87%	1.29	No Difference

In 2018: Pilots who were Flight Instructors had a Higher Completion Percentage.

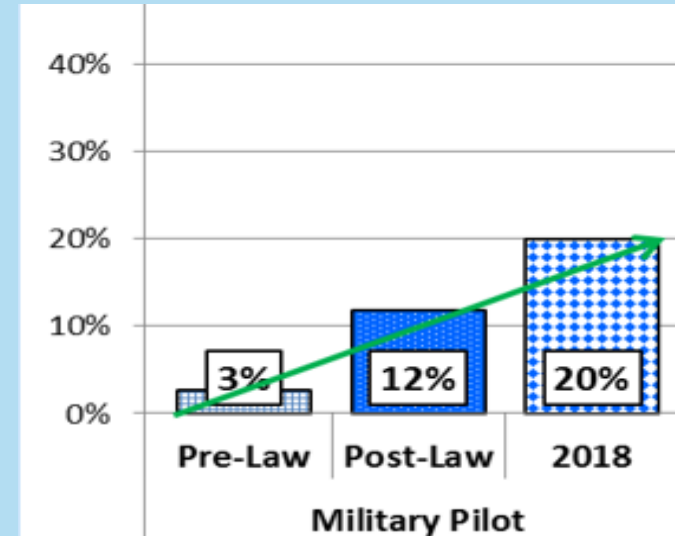
In 2018: Being a Flight Instructor did not have a significant effect on Extra Training Average or IOE.



2018 – Military / Helicopter



History – Military / Helicopter




#8 in 2015: Prior military pilots had fewer non-completions and fewer extra training events.

No 2015 Helicopter Data





2018 – Military Pilot – Performance in Training

	Military Pilot	Completed Training	Extra Training Average	Extra IOE
	YES	89%	0.89	Less
	NO	89%	1.16	More

In 2018: Prior military pilots had significantly lower Extra Training Average and less IOE Time.

In 2018: Being a Prior Military Pilot did not have a significant effect on Completions.



2018 – Rotor / Helicopter Pilot – Performance in Training



Rotor / Helicopter Pilot	Completed Training	Extra Training Average	Extra IOE
YES	89%	0.93	No Difference
NO	89%	1.12	No Difference

In 2018: Former Helicopter Pilots had a significantly lower Extra Training Average.

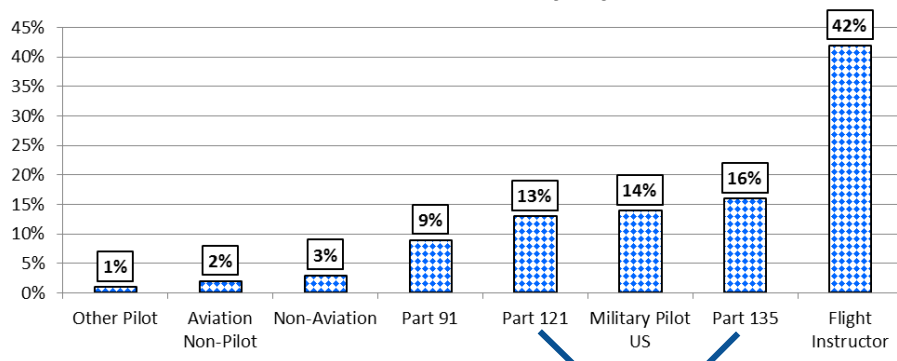
In 2018: Being a former Helicopter Pilot did not have a significant effect on Completions or IOE.



2018 – Predominant Employment

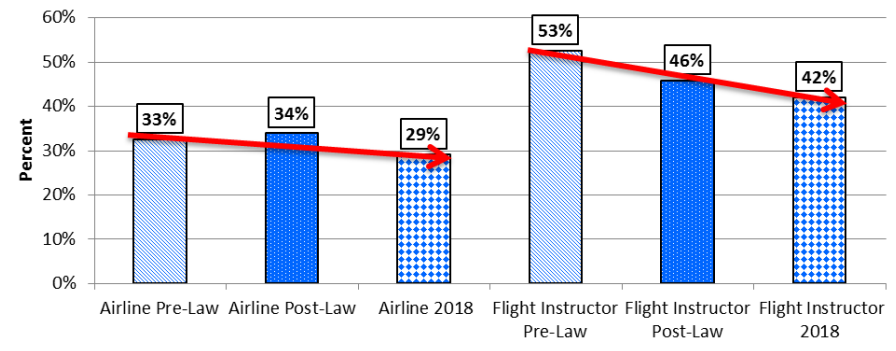
History – Predominant Employment

2018 Predominant Employment



Airline
29%

Predominant Employment Comparison



#7 in 2015: Pilots whose previous employment was in a Part 121 operation had fewer non-completions and fewer extra training events.



2018 – Part 91, Part 121, Part 135 Predominant Employment – Performance in Training

Predominant Employment	Completed Training	Extra Training Average	Extra IOE
Part 121	88%	0.86	No Difference
Part 135	89%	1.13	No Difference
Part 91	86%	1.32	No Difference

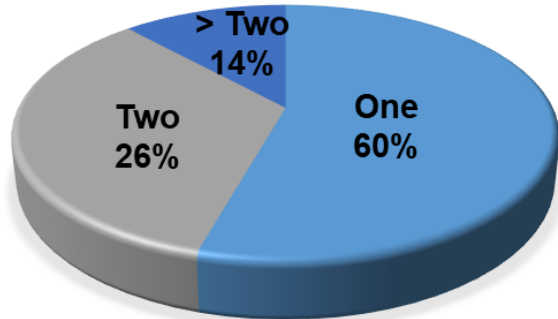
In 2018: Pilots with Former Part 121 Experience had a Lower Extra Training Average.

In 2018: Former Part 121 Experience did not have a significant effect on Completion Percentage or IOE.



2018 – Previously Reported Failed FAA Check-Rides

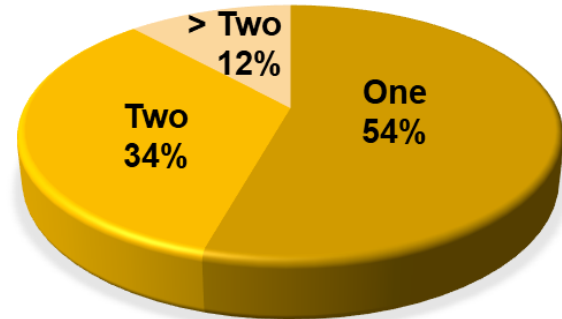
FAA FAILED CHECK RIDES



Note: In 2018, 3367 pilots (34%) reported ZERO previously failed FAA check-rides.

2015 – Previously Reported Failed FAA Check-Rides

REPORTED - PREVIOUS FAA FAILURES



Note: In 2015, no data was collected for pilots who had ZERO previously failed FAA check-rides.

In 2015: Previously failed FAA Check Rides did not have a significant effect on non-completions and extra training events.



2018 – Previously Reported Failed FAA Check-Rides – Performance in Training

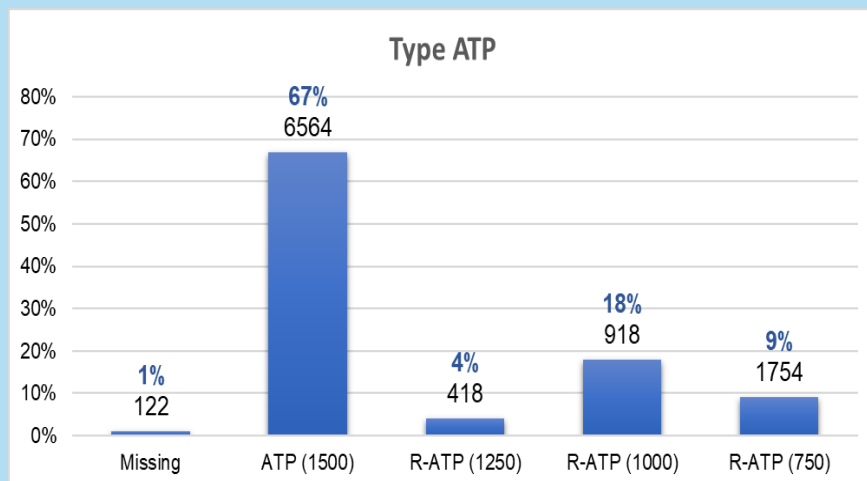
Previously Reported Failed FAA Check-Rides	Completed Training	Extra Training Average	Extra IOE
NONE	91%	1.02	LESS
One	90%	1.11	Sig more than NONE
Two	90%	1.32	Sig more than NONE
3 or More	86%	1.31	Sig more than NONE

In 2018: Pilots with NO Previously Reported FAA Failures had a significantly higher Completion Average and less IOE time.

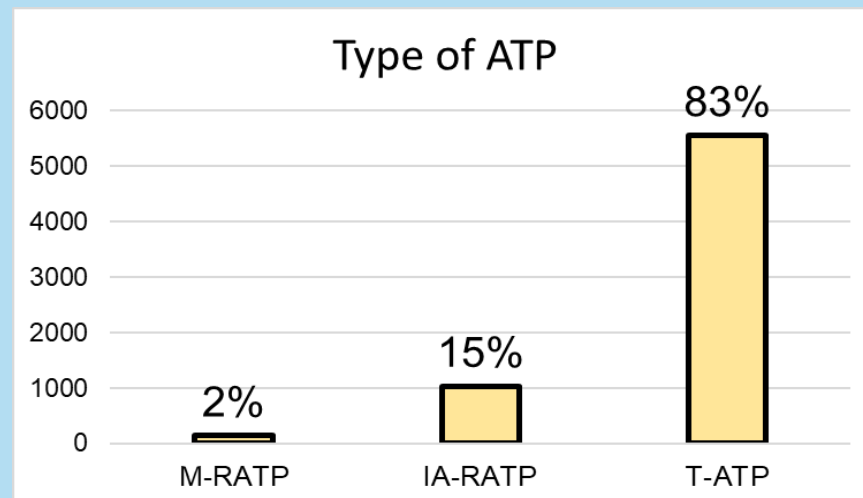
In 2018: Having NO Previously Reported FAA Failures did not have a significant effect on Extra Training Average.



2018 – Type ATP (Eligible)



2015 – Type ATP



#4 in 2015: Pilots with an Institutional Authority R-ATP had fewer non-completions and fewer extra training events



2018 – Type ATP (Eligible) – Performance in Training

Type ATP (Eligible)	Completed Training	Extra Training Average	Extra IOE
R-ATP (750)	92%	0.87	No Difference
R-ATP (1000)	95%	0.90	No Difference
R-ATP (1250)	94%	0.96	No Difference
ATP (1500)	87%	1.19	No Difference



#3 in 2018: Pilots eligible for a Military R-ATP (750 Hrs.) or an Institutional R-ATP (1000 Hrs.) had a Higher Completion Percentage and a Lower Extra Training Average.



2018 – Recency Hours – Last 6 Months / Last Year

Recency Hours Last 6 Months		Recency Hrs. Last 6 Months	Recency Hrs. Last Year
N	Reports	1690	2429
	Missing	8086	7347
Average		499	475
Median		500	430
Std. Deviation		293	327
Minimum		2	1
Maximum		3700	2028

Note: In 2018, only 42% of pilots reported recency data for either last 6 months or last year. The high recency averages suggest that pilots with substantial recency hours were more likely to report recency hours.

2015 – Recency Hours – Last 6 Months / Last Year

2015

January

S M T W T F S
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31

February

S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28

March

S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

April

S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30

May

S M T W T F S
1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31

June

S M T W T F S
1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30

July

S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

August

S M T W T F S
1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31

September

S M T W T F S
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30

October

S M T W T F S
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31

November

S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30

December

S M T W T F S
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

No 2015 Recency Data



2018 Recency Hours – Last 6 Months / Last 12 Months

Completed Training

In the Last 6 months:

- Pilots who Completed Training had slightly More recency hours than pilots who terminated in training

In the Last 12 months:

- Pilots who Completed Training had slightly More recency hours than pilots who terminated in training

Extra Training Events

In the Last 6 months:

- No significant difference

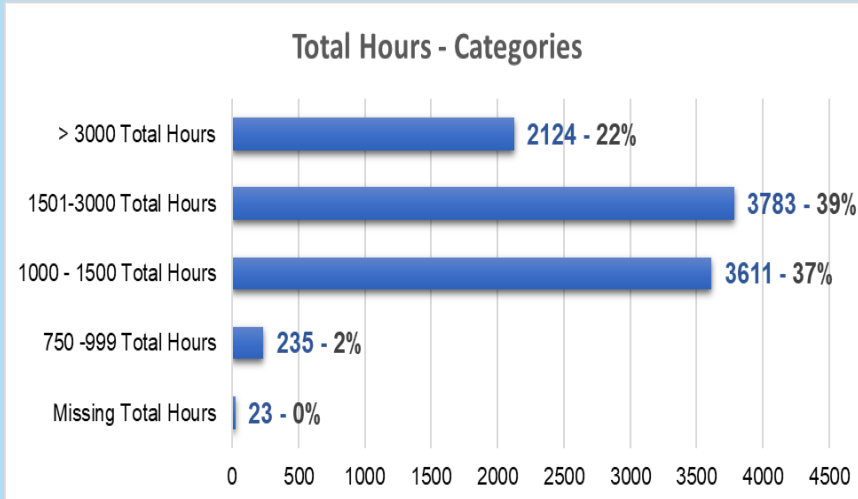
In the Last 12 months:

- Pilots with 0-2 Extra Training Events had slightly Fewer recency hours than pilots who terminated in training

**No Significant Difference in
IOE Z-Score based on Recency Hours**



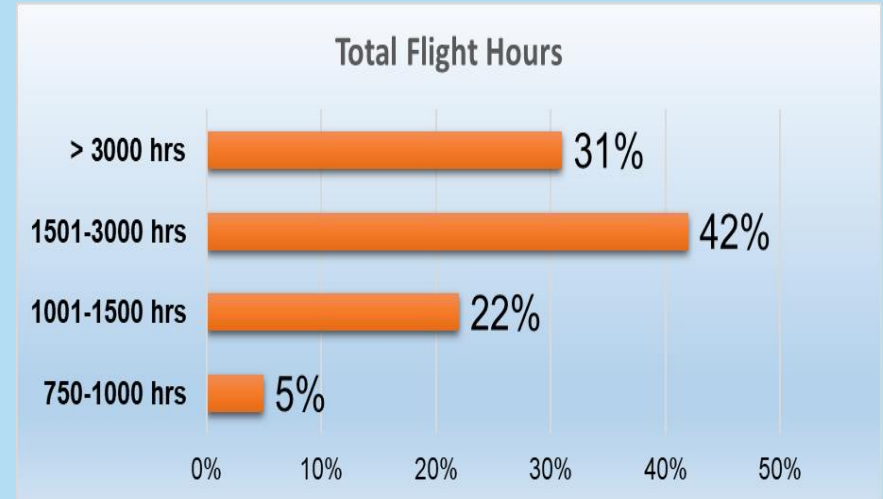
2018 – Total Flight Hours



Note: 6% (586 pilots)
of the 1501-3000
Hour group had
between 1501 and
1525 hours



2015 – Total Flight Hours



#2 in 2015: Pilots with 1,500
or fewer total flight hours
had fewer non-completions
and fewer extra training
events



2018 – Total Flight Hours – Performance in Training

Total Flight Hours	Completed Training	Extra Training Average	Extra IOE
750 – 999	96%	0.43	No Difference
1000 – 1500	94%	0.98	No Difference
1501 – 3000	88%	1.22	No Difference
3001 – 33,563	83%	1.19	No Difference

#5 in 2018: Pilots with 1500 or Fewer Total Flight Hours had a Higher Completion Percentage and a Lower Extra Training Average.

A Closer Look at the 1501-3000 Hour Pilots

Total Hours by Quartile N = 3783	1501–1567 (67) Hours N = 947	1568–1823 (256) Hours N = 943	1824–2274 (451) Hours N = 946	2275–3000 (725) Hours N = 947
Avg. Age: Date of Hire	32	33	34	37
High School	26%	24%	22%	16%
AABI-Accredited Flight Degree	13%	16%	19%	19%
Aviation Degree	51%	58%	54%	53%
Flight Instructor	82%	77%	75%	76%
Military / Rotor Pilot	9% / 3%	14% / 5%	24% / 10%	33% / 12%
Predominant Employment	Flt Instructor 53%	Flt Instructor 40%	Flt Instructor 26%	Military Pilot 26%
Avg. Years Between Graduation & Hire	6.3 years	8.2 years	9 years	11.5 years
Completed Training	88%	88%	90%	85%
Extra Training	1.25	1.34	1.19	1.08
“Normal” IOE Z-Score	88%	84%	89%	87%

No Difference. Gender, Undergraduate GPA, Bachelors = 54%



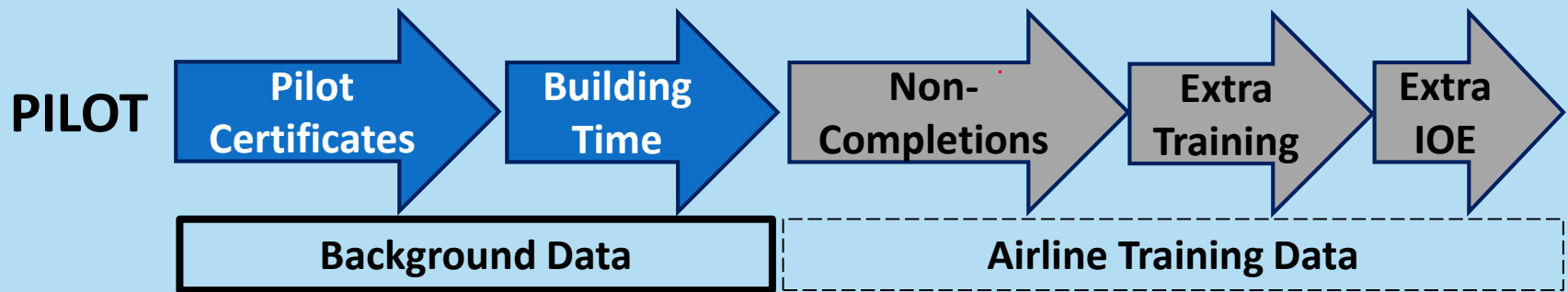
In Summary, the following pilots had
 $\geq 90\%$ Completions **AND** ≤ 1 Extra Training Event

Pilots Who ...	Completed Training	Extra Training Average
1) had an Undergraduate <u>GPA</u> of 3.3 or Higher	92%	0.76
2) <u>graduated from College</u> within 5 Years of their Hire Date	95%	0.87
3) had Either a <u>Military R-ATP</u> (750 Hrs.) or an <u>Institutional R-ATP</u> (1000 Hrs.)	95%	0.87
4) graduated from an <u>AABI-Accredited Flight Program</u>	93%	0.89
5) had 1500 <u>Total Flight Hours</u> or Fewer	94%	0.98
6) had a <u>Bachelor's Degree</u>	91%	1.00



Part III

Multi-Variate Analysis



AABI-Accredited Flight Degree?
Age at Date of Hire
Aviation Degree?
Flight Instructor?
Military Pilot?
Previous FAA Failures - Count
Total Hours
Undergraduate GPA
Years Between Graduation & Hire



Multi-Variate Analyses: Completed Training

Variables Entered into the Analyses

- AABI-Accredited Flight Degree?
- **Age at Date of Hire**
- Aviation Degree?
- Flight Instructor?
- Military Pilot?
- Previous FAA Failures - Count
- **Total Hours**
- Undergraduate GPA
- **Years Between Graduation & Hire**

Best Predictors for Completing Training

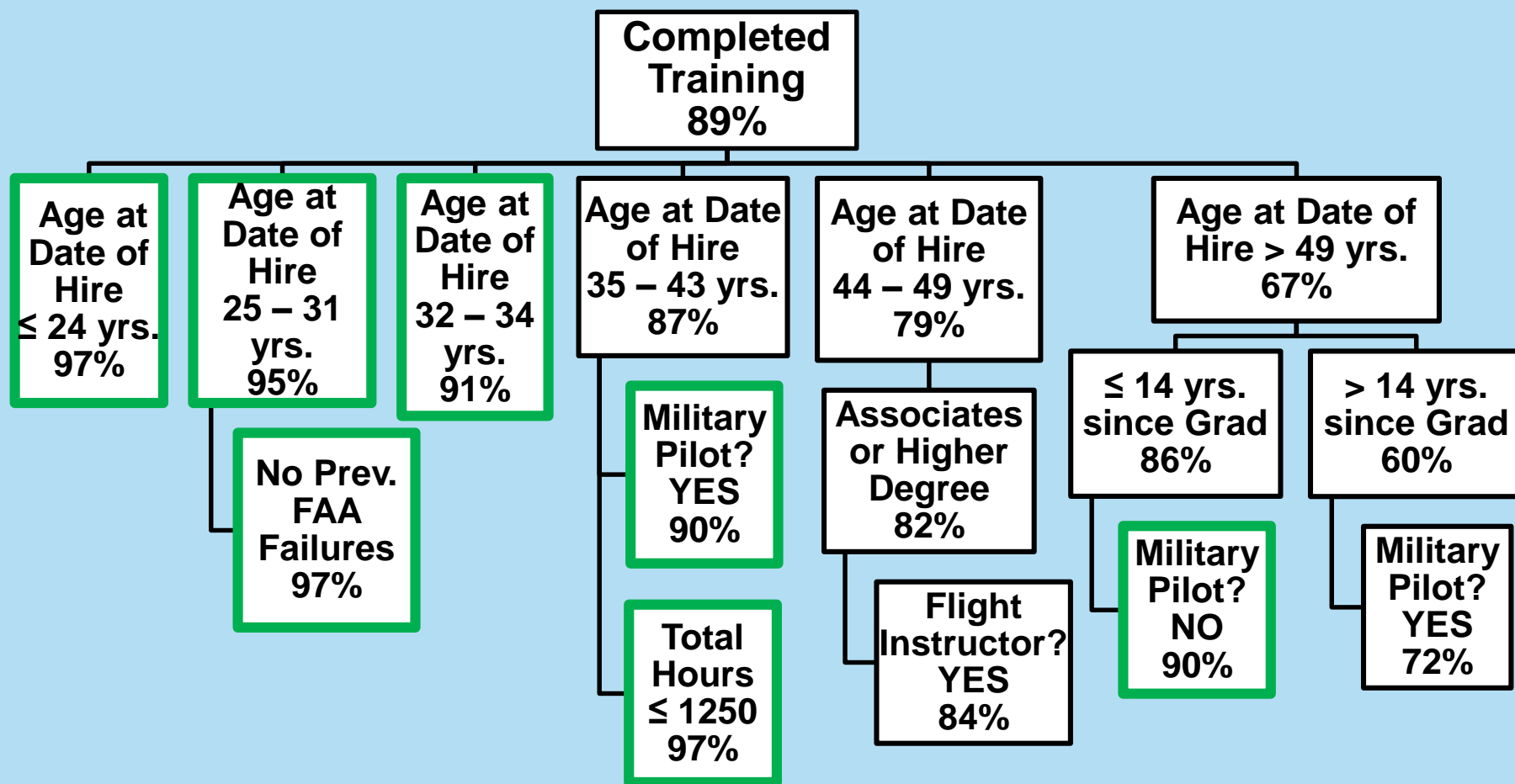
1. Age at Date of Hire

2*. Years Between Graduation & Hire

3*. Total Hours

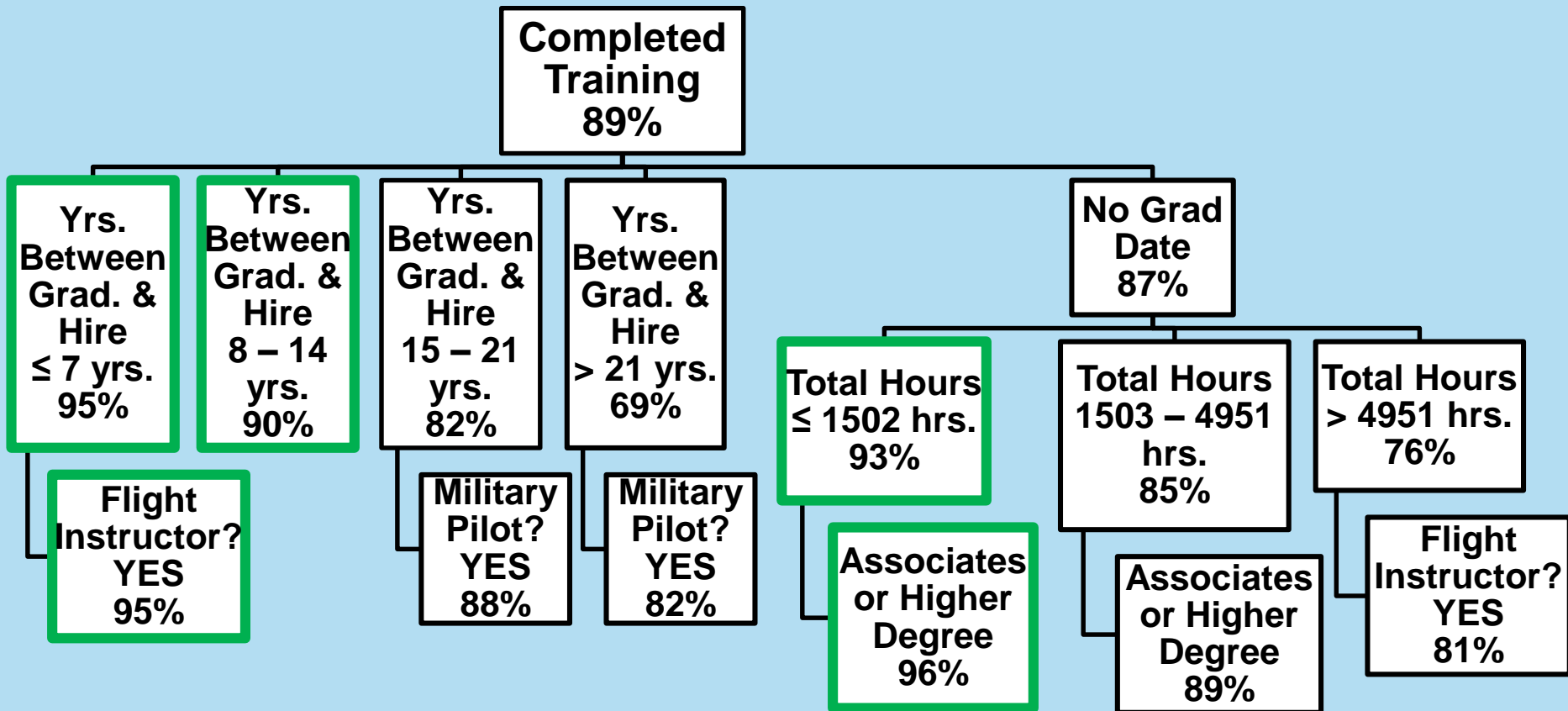


Multi-Variate Analyses: Completed Training



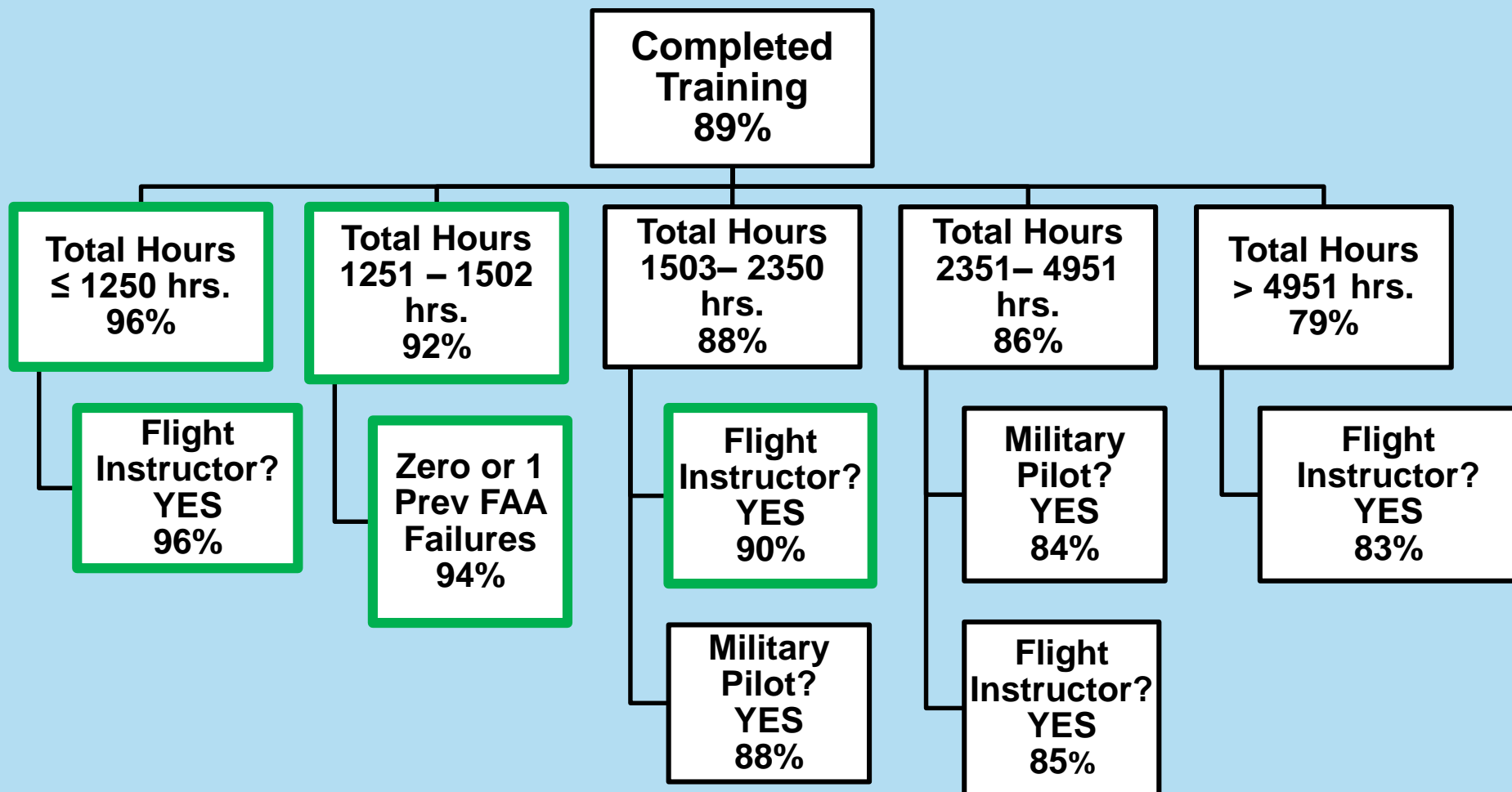


Multi-Variate Analyses: Completed Training





Multi-Variate Analyses: Completed Training



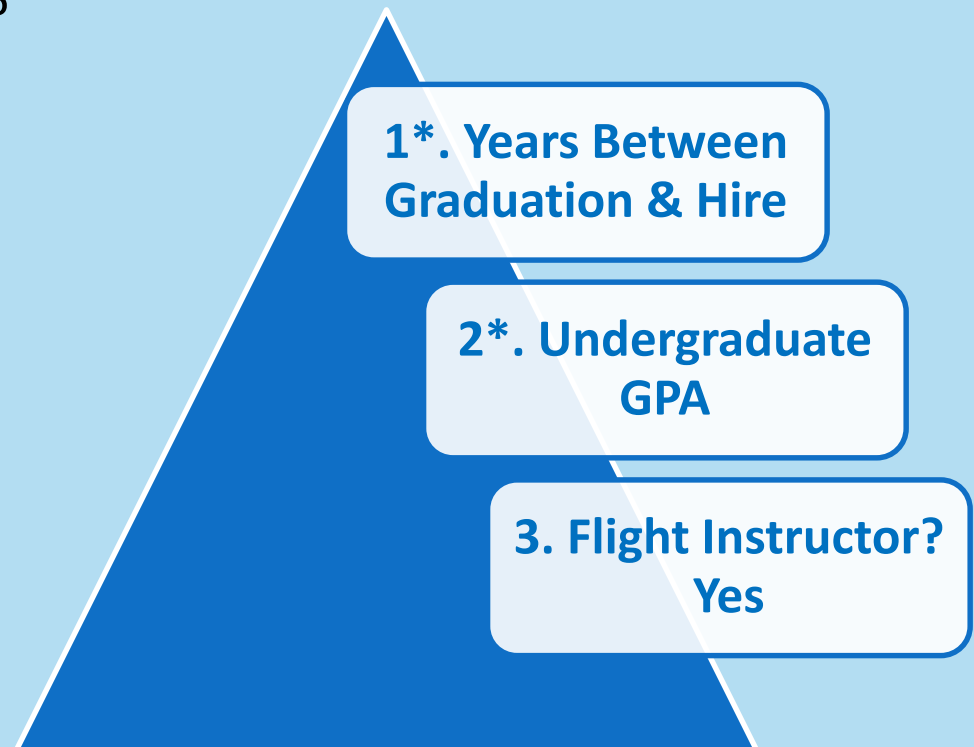


Multi-Variate Analyses: Zero – Two Extra Training Needed

Variables Entered into the Analyses

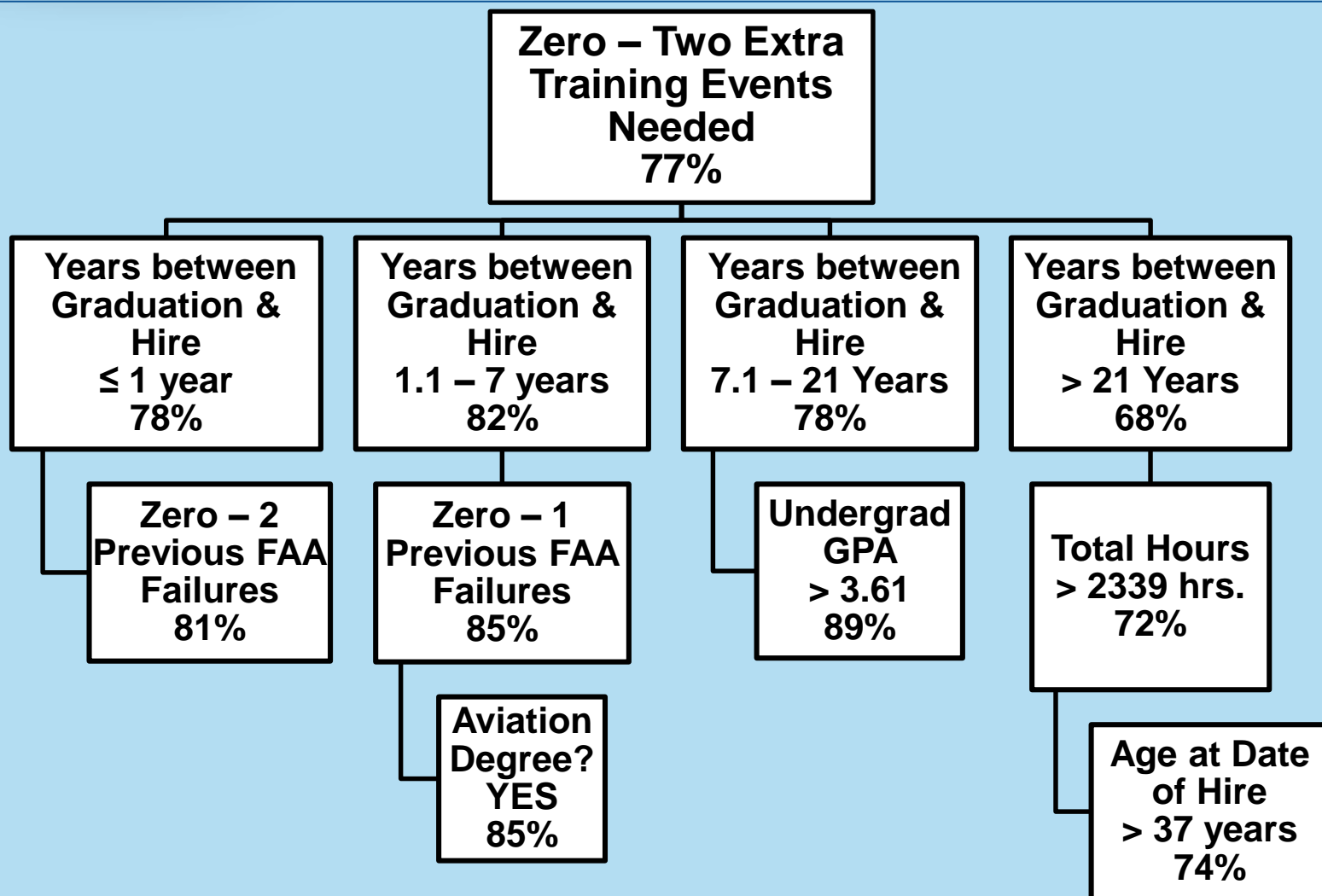
- AABI-Accredited Flight Degree?
- Age at Date of Hire
- Aviation Degree?
- **Flight Instructor?**
- Military Pilot?
- Previous FAA Failures - Count
- Total Hours
- **Undergraduate GPA**
- **Years Between Graduation & Hire**

Best Predictors for Zero – Two Extra Training Needed



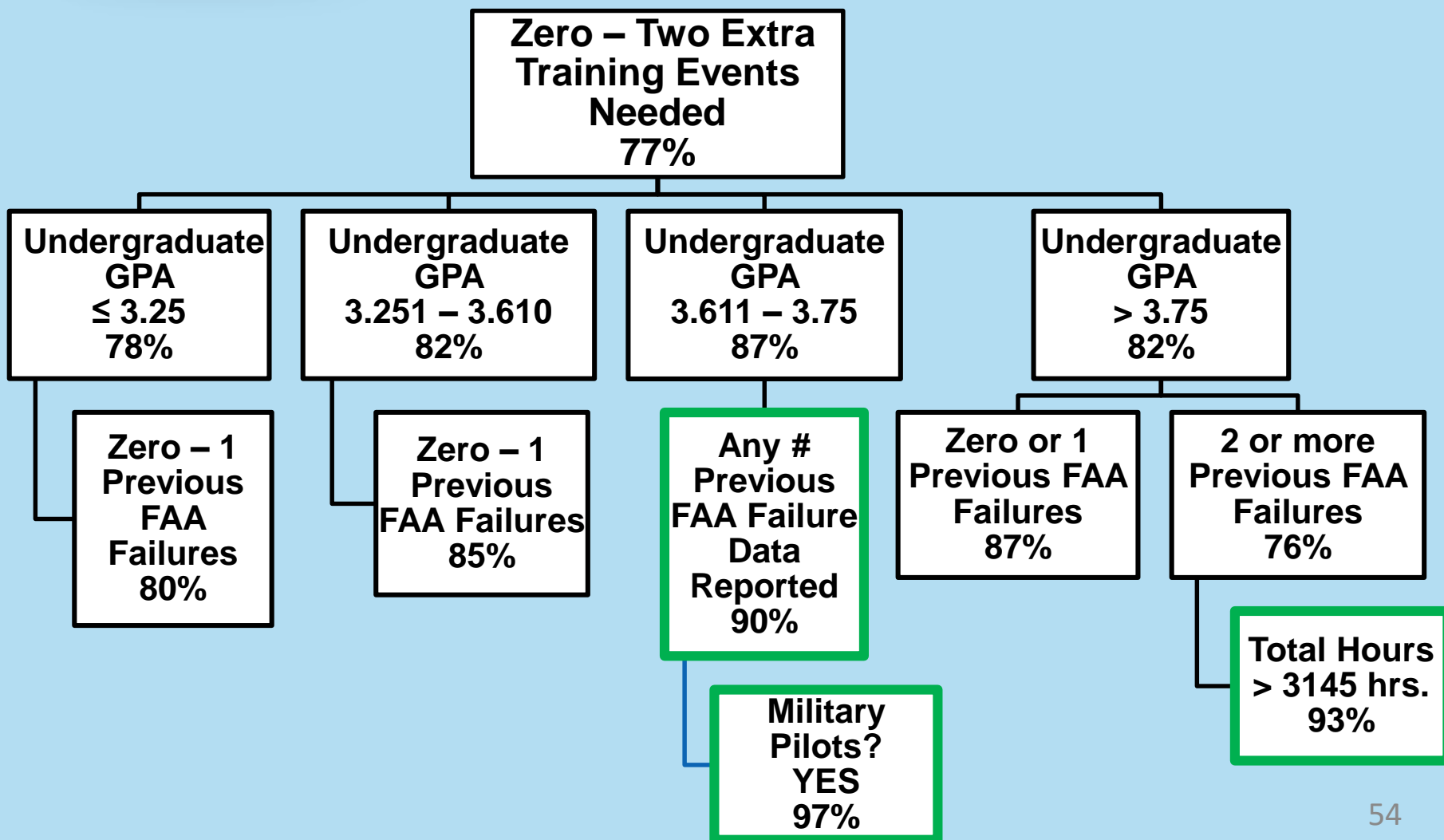


Multi-Variate Analyses: Zero – Two Extra Training Events Needed



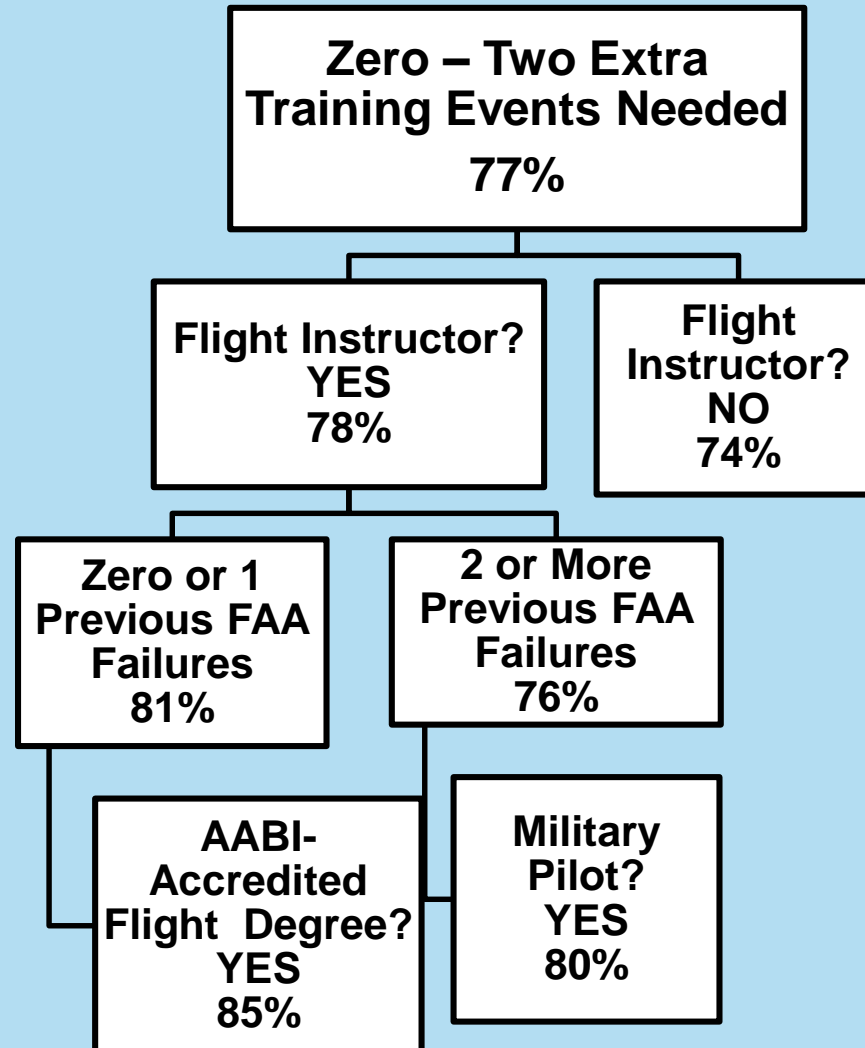


Multi-Variate Analyses: Zero – Two Extra Training Events Needed





Multi-Variate Analyses: Zero – Two Extra Training Events Needed





Multi-Variate Analyses: “Normal” IOE Z-Score

Variables Entered into the Analyses

- AABI-Accredited Flight Degree?
- **Age at Date of Hire**
- Aviation Degree?
- Flight Instructor?
- Military Pilot?
- **Previous FAA Failures - Count**
- Total Hours
- **Undergraduate GPA**
- Years Between Graduation & Hire

Best Predictors for “Normal” IOE Z-Score

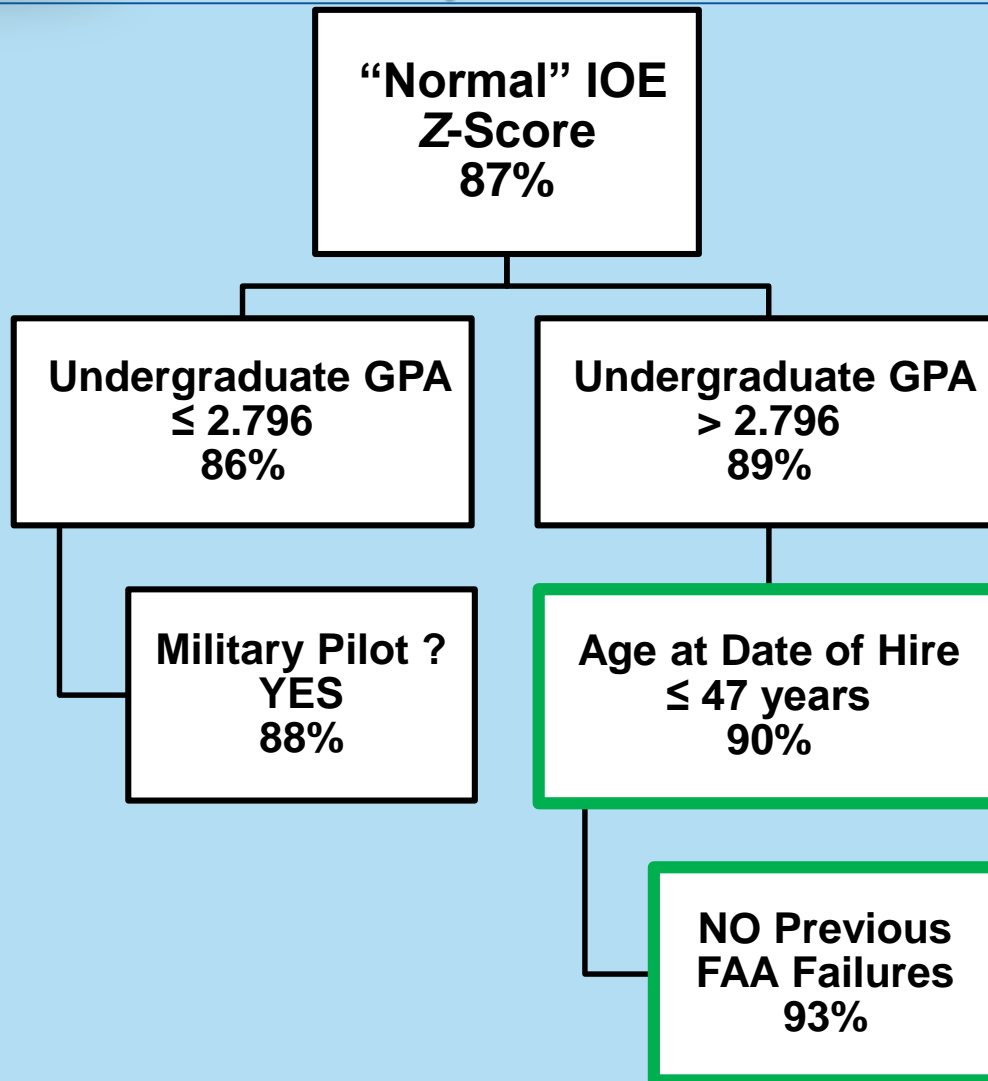
1*. Undergraduate
GPA

2. Previous FAA
Failures

3. Age at Date of
Hire

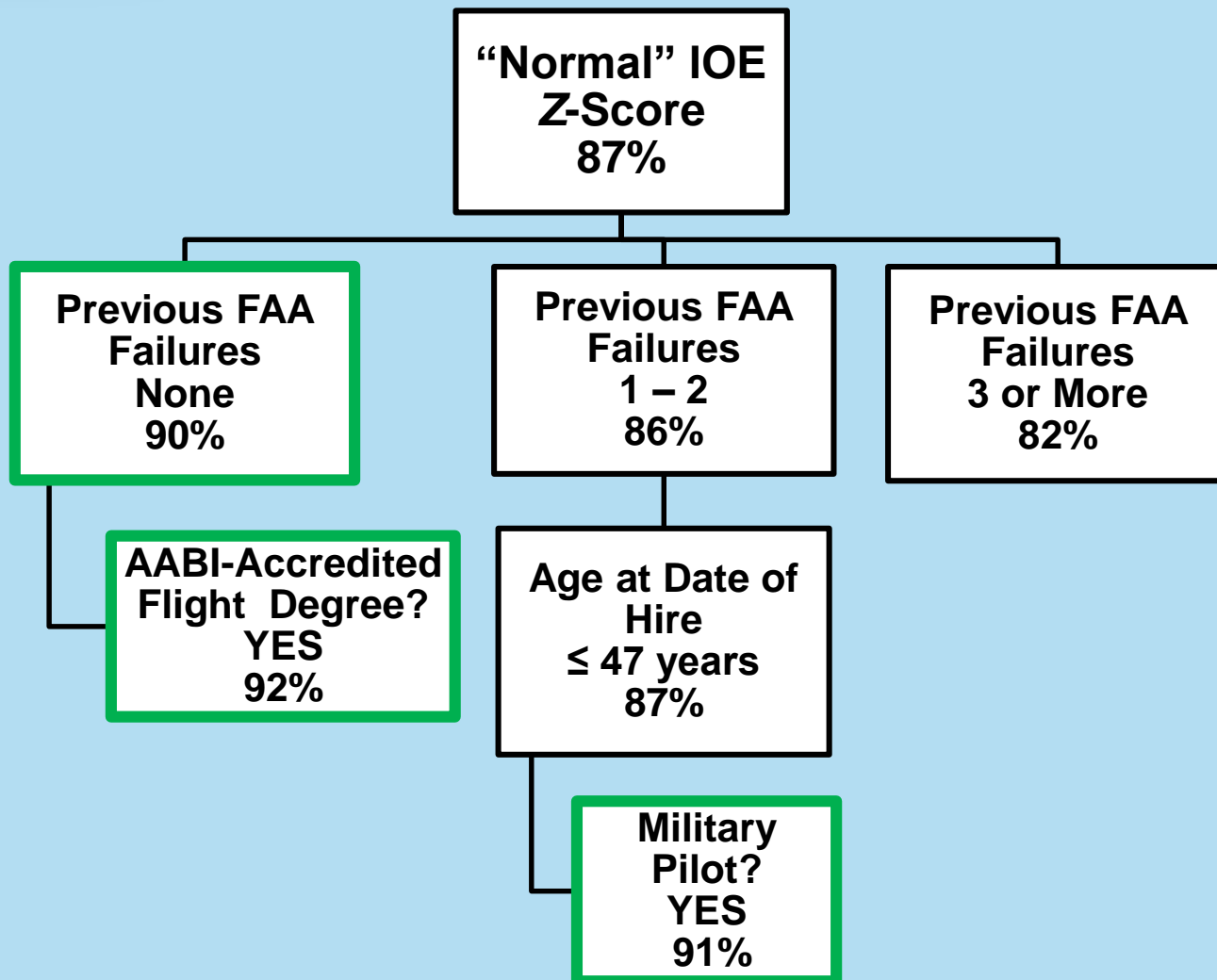


Multi-Variate Analyses: “Normal” IOE Z-Score



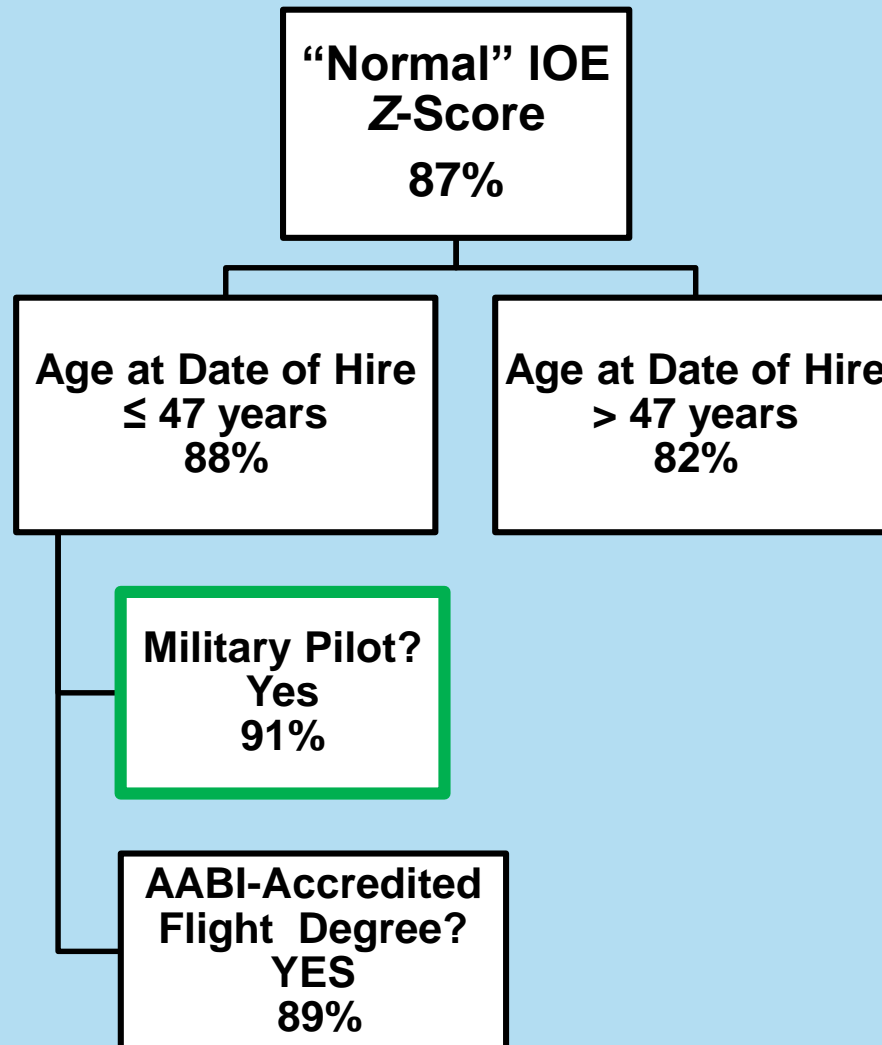


Multi-Variate Analyses: “Normal” IOE Z-Score





Multi-Variate Analyses: “Normal” IOE Z-Score





Multi-Variate Analysis Summary

In summary, six unique background variables have been found to be significant for the outcome measures of Completed Training, Zero – Two Extra Training Events, and “Normal” IOE Z-Scores. Three of these variables had different thresholds established in the CHAID algorithm. These significant variables, in order from the strongest to the weakest, are:

1. Age at Date of Hire: Younger than 35 [Completed Training]
2. Years between Graduation and Hire: Less than 14 years [Completed Training]
3. Total Hours: Less than or equal to 1,502 hours [Completed Training]
4. Years between Graduation and Hire: Less than 7 years [Zero – Two Extra Training Events]
5. Undergraduate GPA: 3.251 – 3.75 Greater than 2.8 [Zero – Two Extra Training Events]
6. FAA Previous Failures: Zero [“Normal” IOE Z-Scores]
7. Undergraduate GPA: Greater than 2.8 [“Normal” IOE Z-Scores]
8. Age at Date of Hire: Younger than 48 [“Normal” IOE Z-Scores]
9. Flight Instructor: Yes [Zero – Two Extra Training Events]



2018 Pilot Source Study

Dr. Guy M. Smith – Principal Investigator

Professor Michelle Hight – Co-Principal Investigator

Dr. MaryJo O. Smith – Senior Research Scientist, Ypsilon Associates

Jasleen Kaur – Graduate Student, Aeronautical Science

FAA Briefing

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