2018 Pilot Source Study

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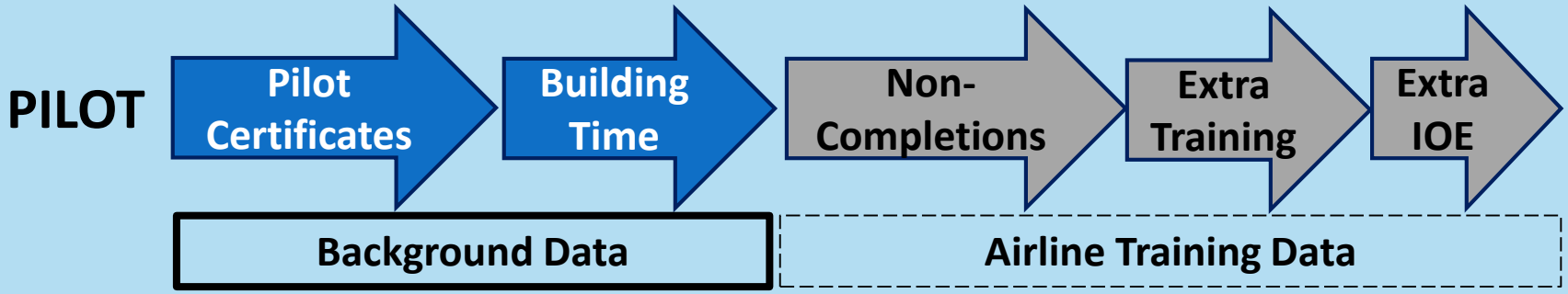
FAA Briefing

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**?



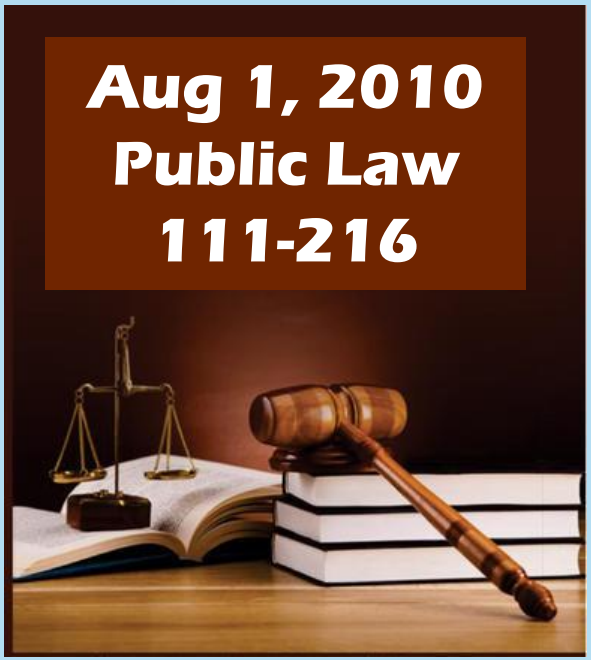
HISTORY – 2010 Pilot Source Study

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, 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

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

2 Yrs.

2015 Pilot Source Study

3 Yrs.

2018 Pilot Source Study

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

2018 PILOT SOURCE STUDY

POPULATION – 2018 Pilot Source Study

Endeavor
Minneapolis, MN
Data: MAY 2015 – NOV 2018

PSA
Dayton, OH
Data: SEP 2015 – OCT 2018

SkyWest
St. George, UT
Data: JUL 2015 – SEP 2018

Republic
Indianapolis, IN
Data: JUL 2015 – SEP 2018

Envoy
Irving, TX
Data: MAY 2015 – OCT 2018

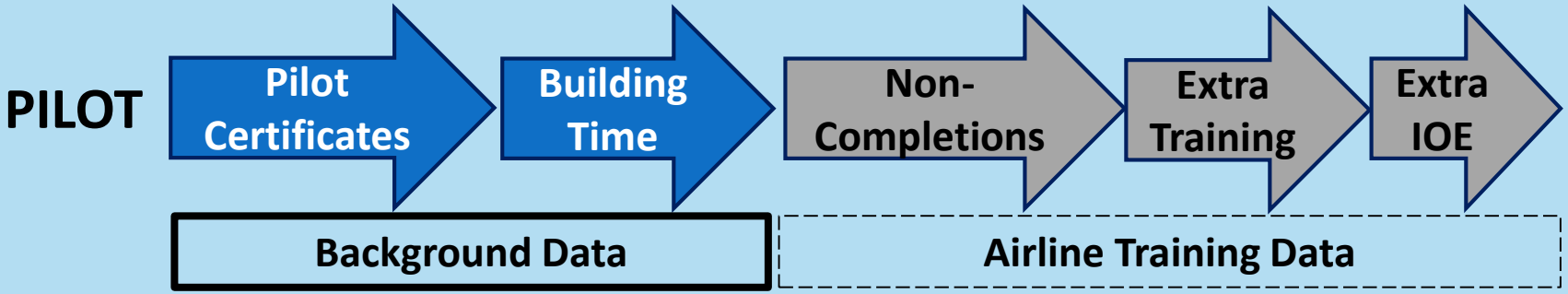
2018 Pilot Source Study

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

2015 Pilot Source Study

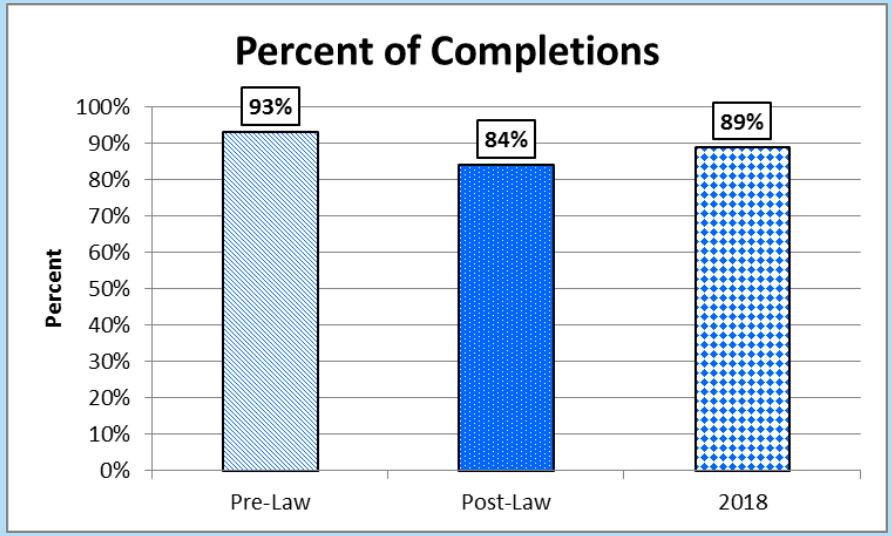
- 19 US Regional Airlines
- 6734 Records
- Pilots Hired:
  August 1, 2013 to
  Summer 2015

Part I
Training Data



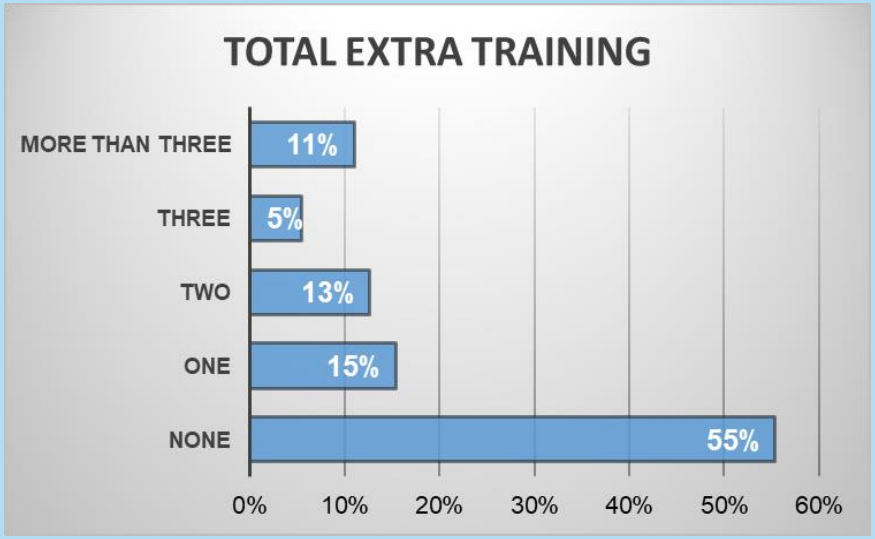
2018 Completions

History of Completions



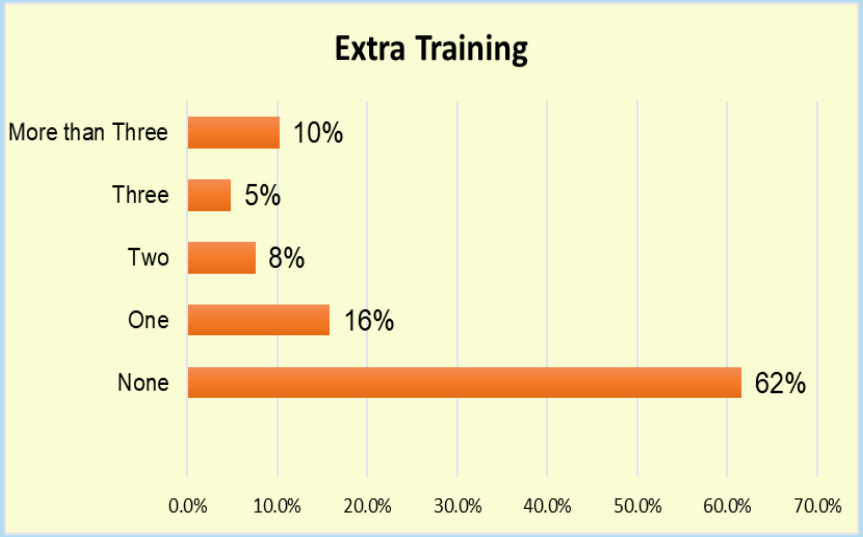
Note: Pre-Law data is the combination of the 2010 and 2012 Pilot Source Study; Post-Law data is the 2015 Pilot Source Study.

2018 Extra Training



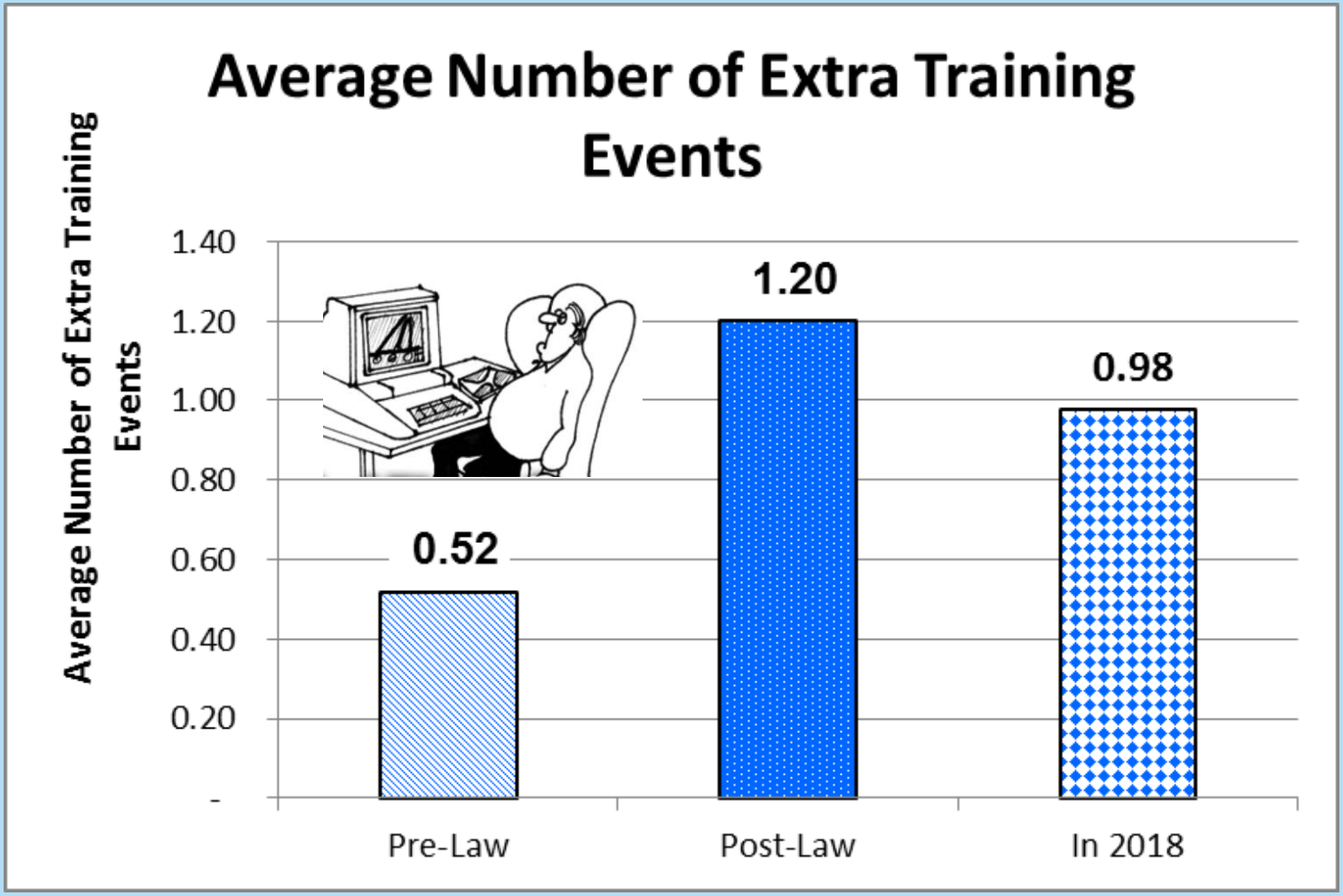
45% Required Extra Training

2015 Extra Training



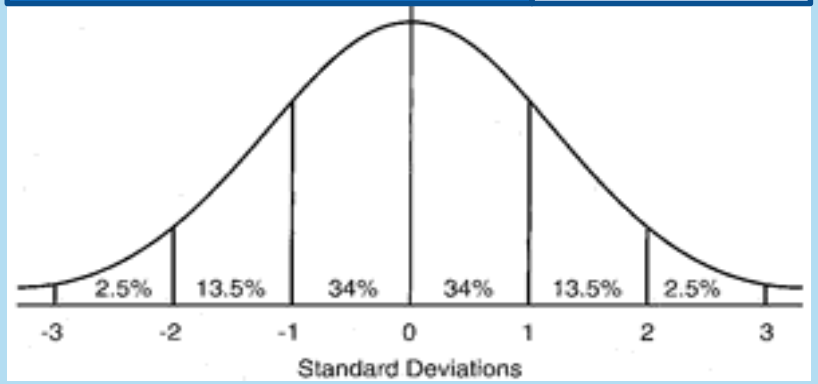
38% Required Extra Training

History – Average Number of Extra Training Events

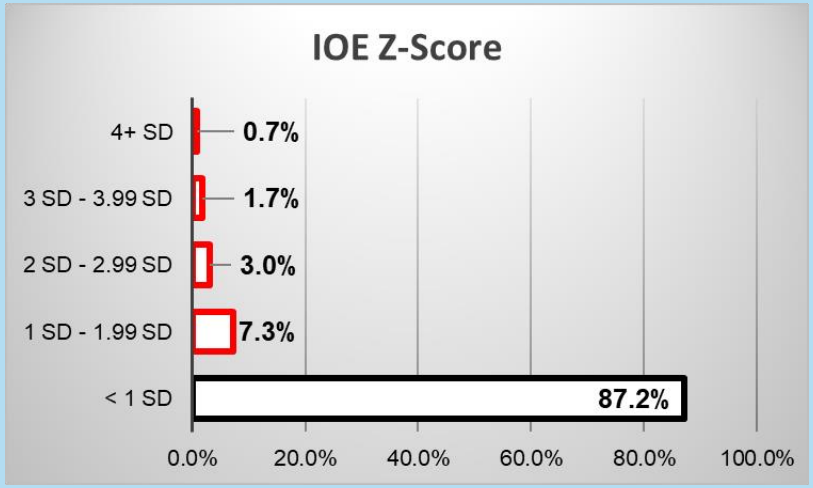


2018 Extra IOE

87.2% Normal IOE	12.8% Extra IOE

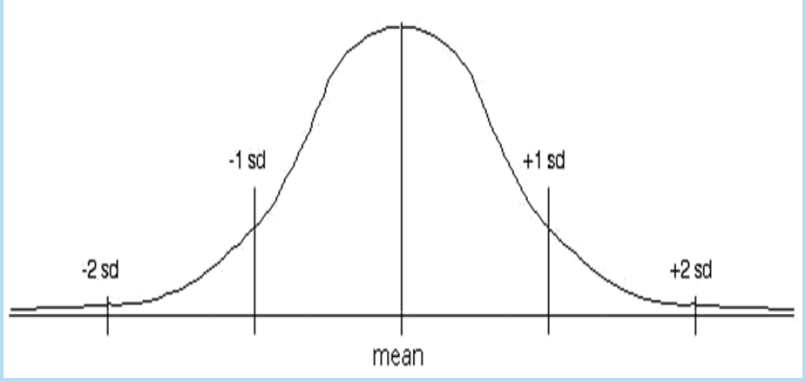


N = 7562

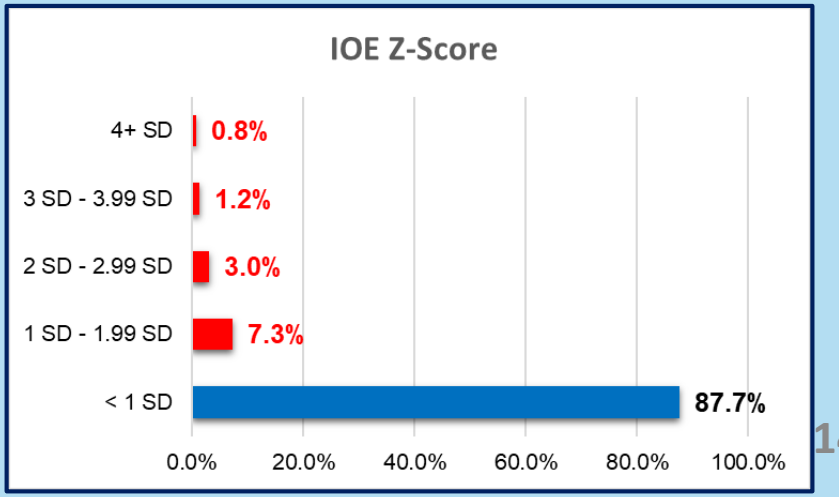


2015 Extra IOE

87.7% Normal IOE	12.3% Extra IOE



N = 4572



Part II - Background Data

PILOT

Pilot Certificates → **Building Time** → **Non-Completions** → **Extra Training** → **Extra IOE**

Background Data

Airline Training Data

Gender

Age

Degree – Highest Level

AABI-Accredited Flight

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%

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

Gender Gap Grader | Airline Pilots

2015 – Gender

No Gender Data

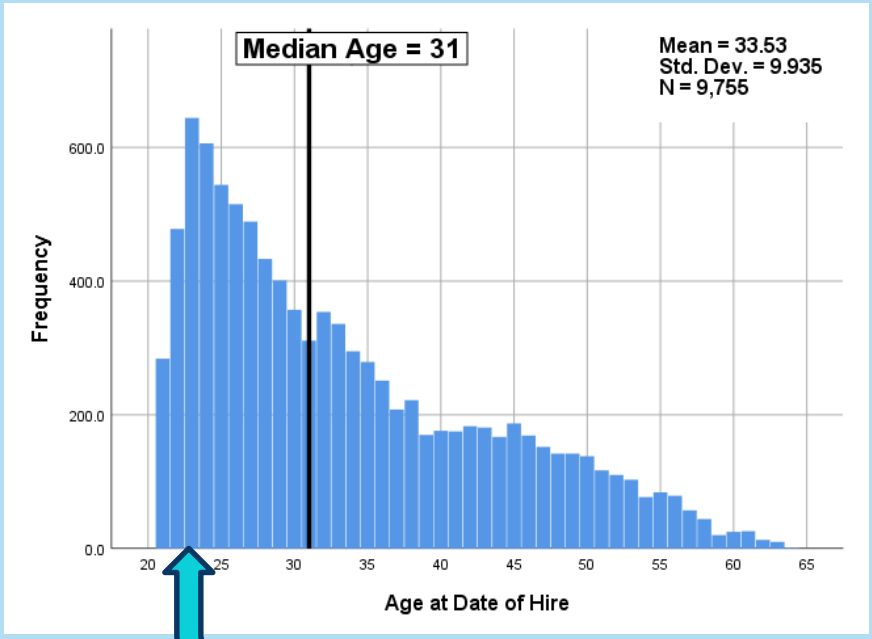
2018 – Gender Performance in Training

WOMEN (Compared to Men)

- Younger (Average Age 32 vs. 33.62) at Date of Hire
- More Bachelors and Masters Degrees
- Attended AABI Flight Programs 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)

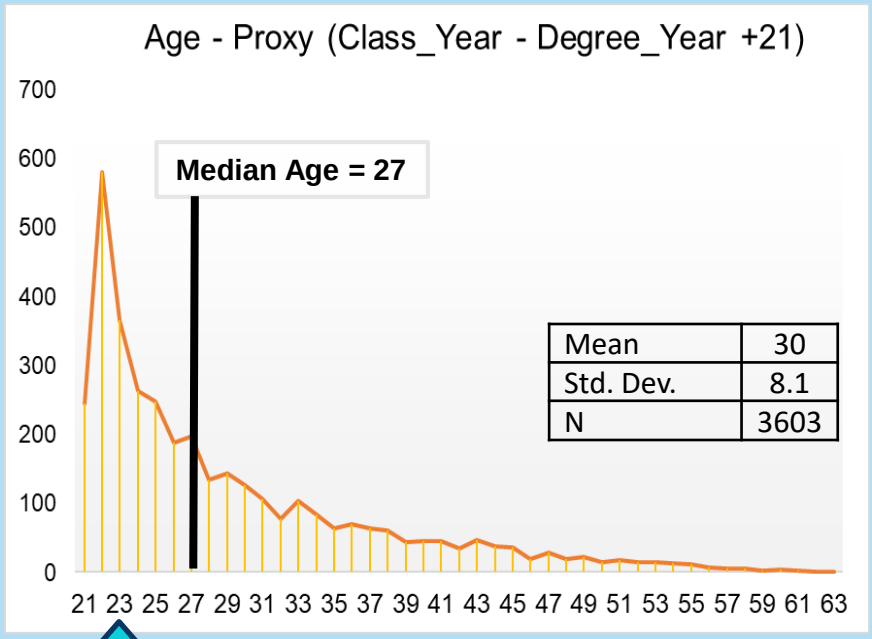
NO DIFFERENCE for Flight Instructor, Previous FAA Failures, Total Hours, **IOE Z-Scores,** or **Completions**

2018 – Age



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

2015 – Age (Proxy)



23

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

2018 – Age Performance in Training

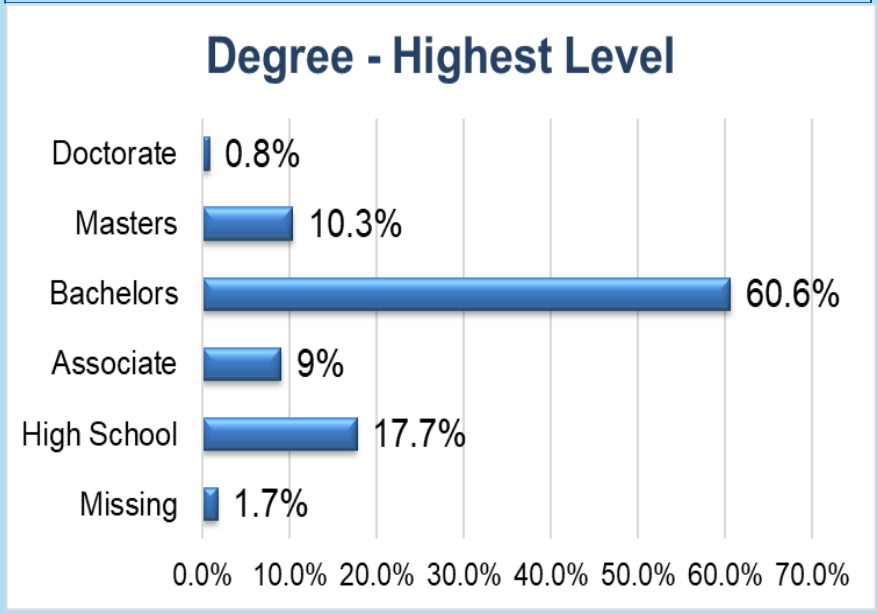
	Completed Training	Extra Training Average	Extra IOE
Younger ≤ 31	**96%**	1.03	No Difference
Older > 31	83%	1.18	No difference

In 2018: Younger pilots had a Higher Completion Percentage.

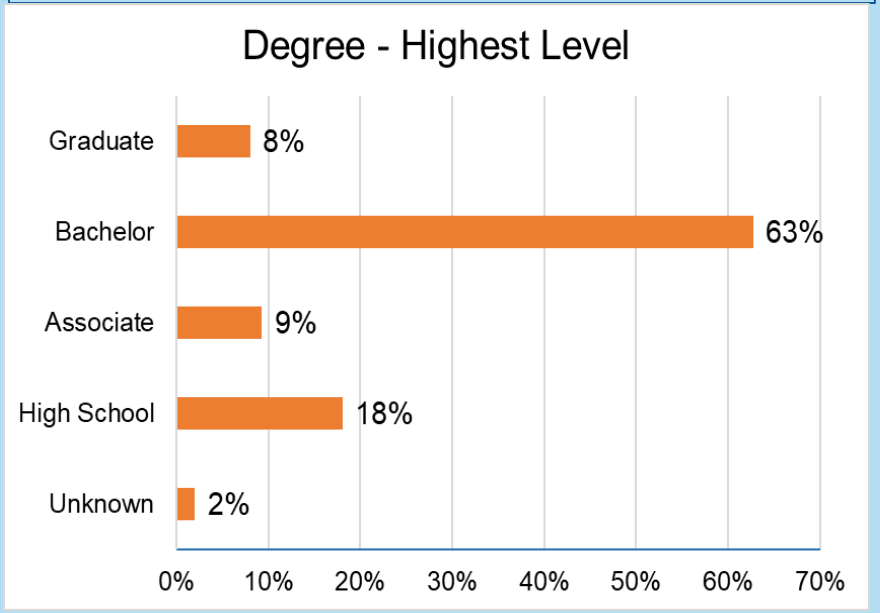
In 2018: Age did not have a significant effect on Extra Training Average or IOE.

2018 PILOT SOURCE STUDY

2018 – Degree, Highest Level



2015 – Degree, Highest Level



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

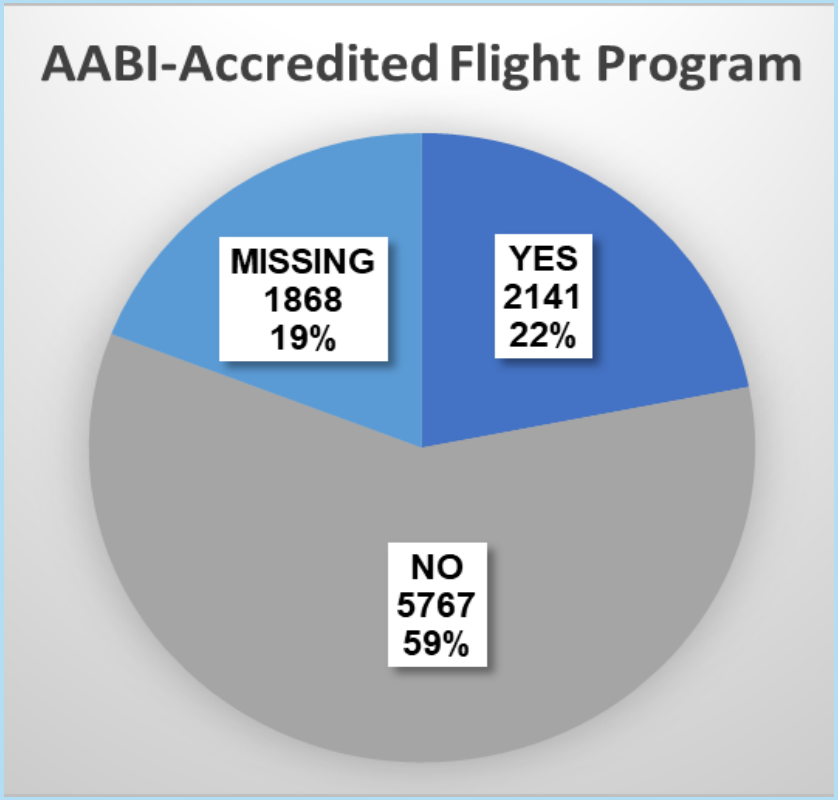
2018
PILOT SOURCE STUDY

2018 – Degree, Highest Level – Performance in Training

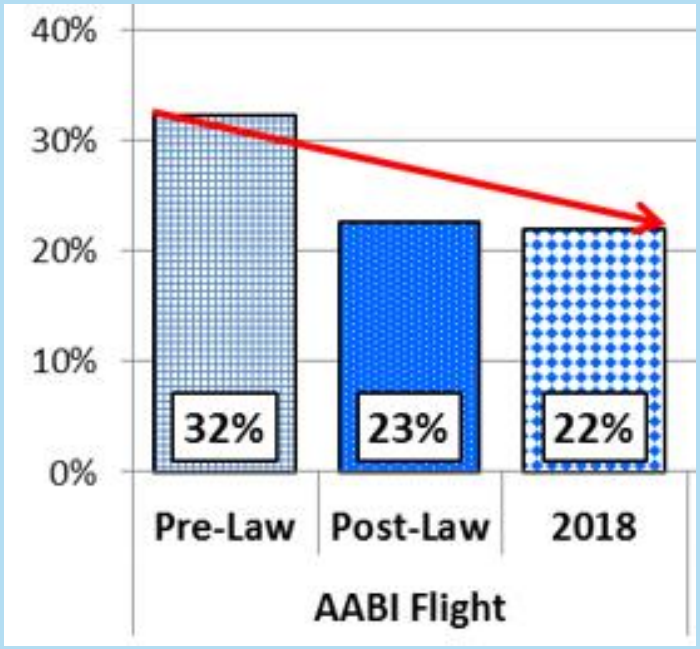
	Completed Training	Extra Training Average	Extra IOE
Bachelor's	**91%**	**1.00**	No Difference
Associate	89%	1.06	No Difference
Masters	86%	**1.33**	No Difference
High School	86%	**1.26**	No Difference
Doctorate	**70%**	**1.54**	No Difference

#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



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

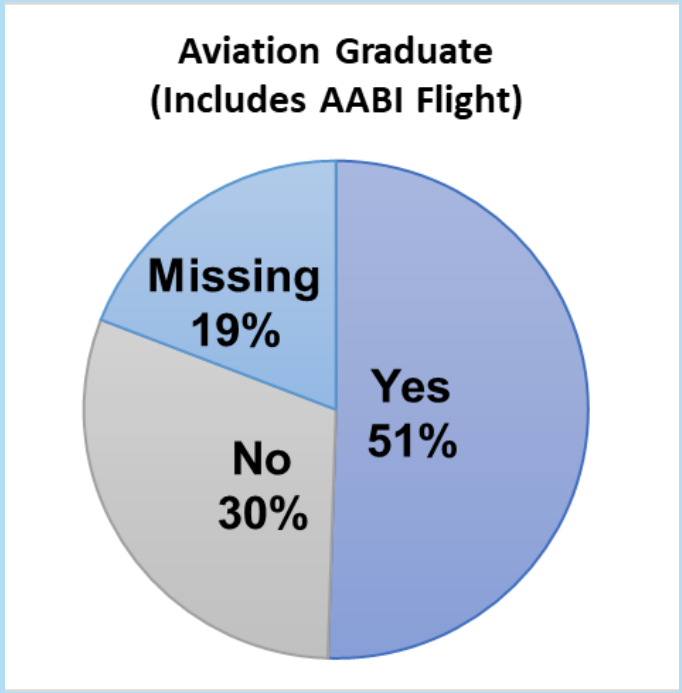
2018
PILOT SOURCE STUDY

2018 – AABI-Accredited Flight – Performance in Training

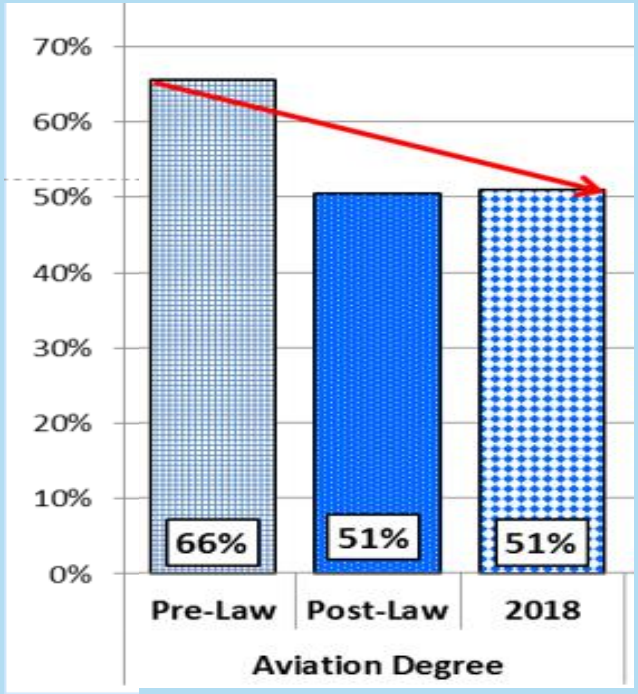
AABI Flight	Completed Training	Extra Training Average	Extra IOE
YES	**93%**	**0.89**	Slightly Less
NO	89%	1.12	Slightly More

#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



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

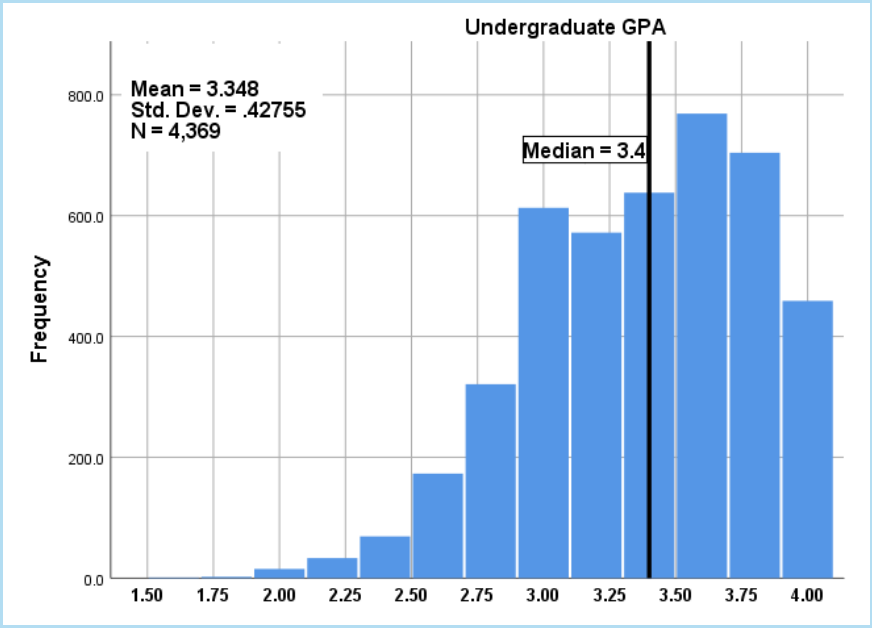
Aviation Graduate	Completed Training	Extra Training Average	Extra IOE
YES	**91%**	No Difference	No Difference
NO	88%	No Difference	No Difference

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

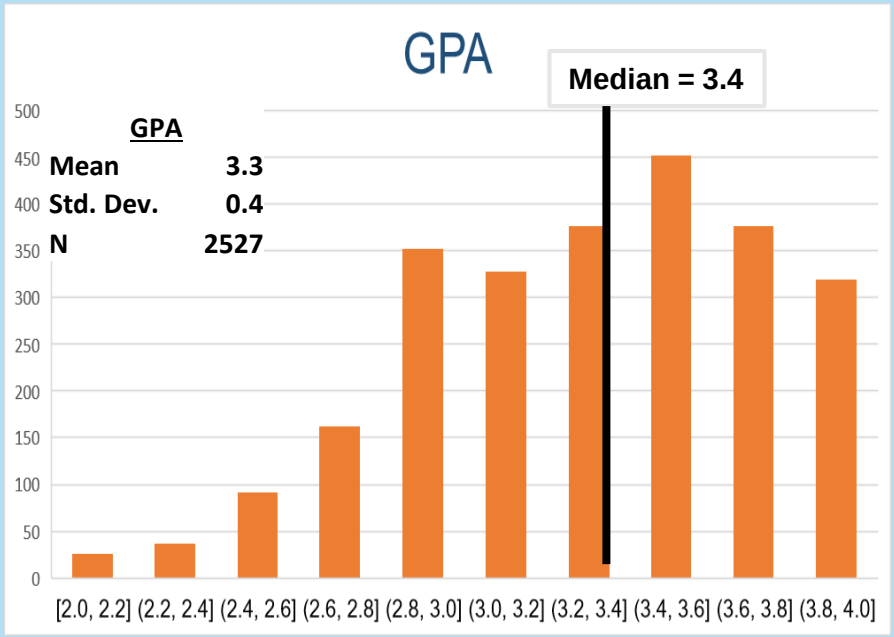
In 2018: Having an Aviation Degree did not have a significant effect on Extra Training Average or IOE.

2018
PILOT SOURCE STUDY

2018 – Undergraduate GPA



2015 – Undergraduate GPA



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

2018
PILOT SOURCE STUDY

2018 – Undergraduate GPA – Performance in Training

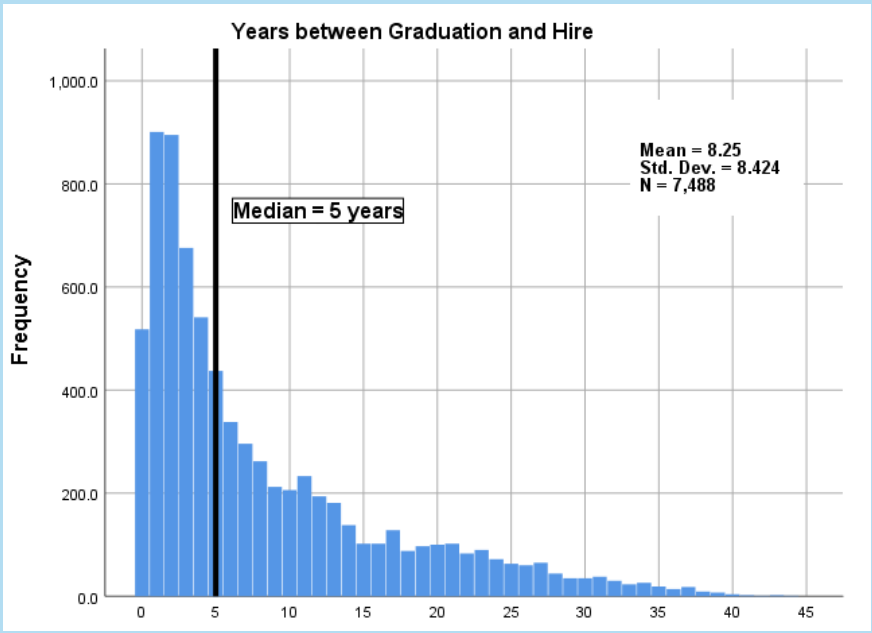
GPA	Completed Training	Extra Training Average	Extra IOE
> 3.8	91%	.76	No Difference
3.3 – 3.8	92%	.81	No Difference
2.9 – 3.2	89%	1.01	No Difference
< 2.9	89%	1.05	No Difference

BEST

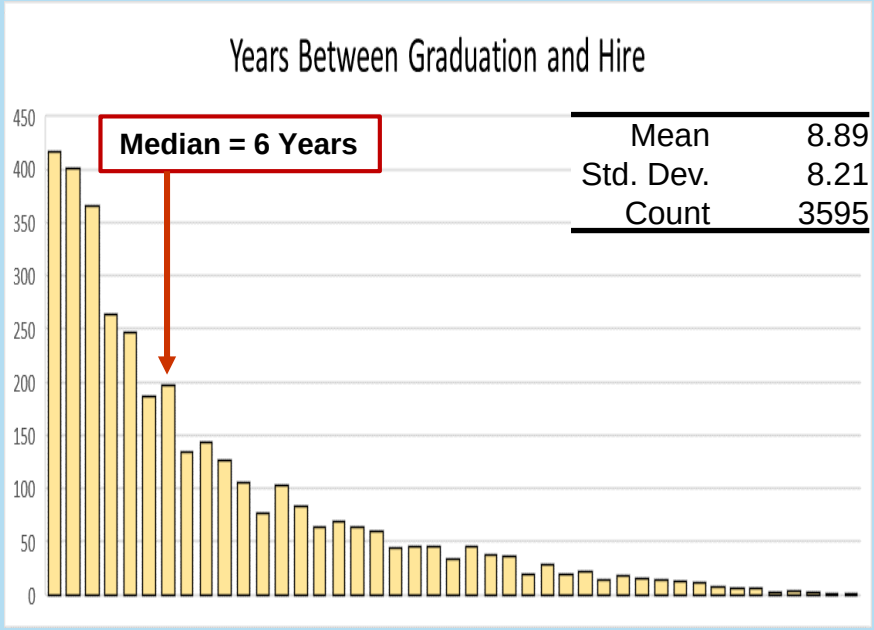
#1 in 2018: Pilots with an Undergraduate GPA of 3.3 or Higher had a Higher Completion Percentage and a Lower Extra Training Average.

2018 PILOT SOURCE STUDY

2018 – Years between Graduation and Hire



2015 – Years between Graduation and Hire



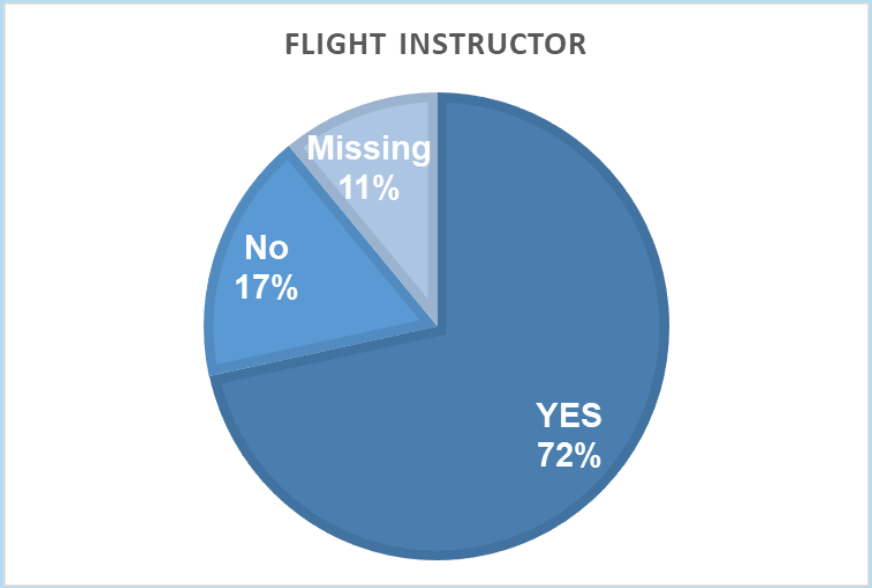
#1 in 2015: Pilots with fewer than four years since graduation had fewer non-completions and fewer extra training events.

2018 – Years between Graduation and Hire – Performance in Training

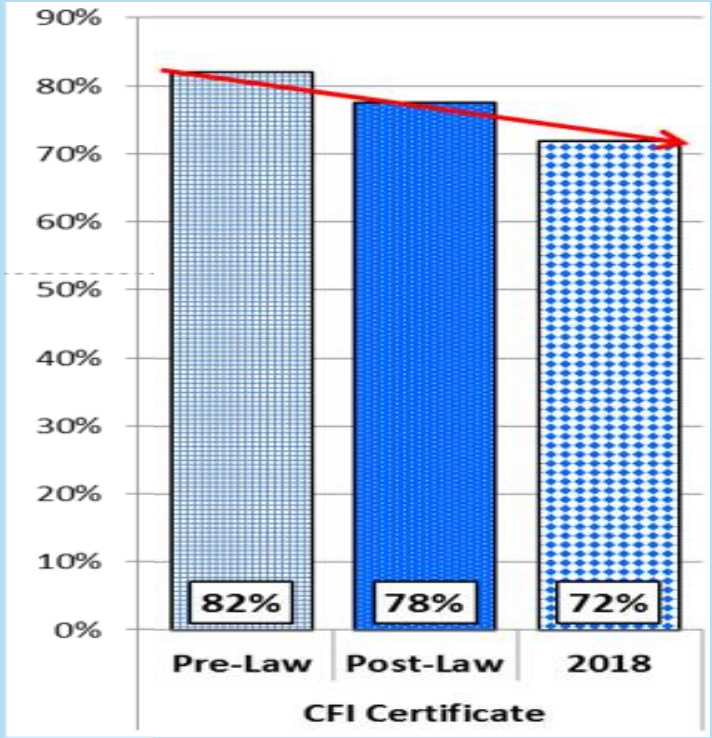
Years	Completed Training	Extra Training Average	Extra IOE
0-5	**95%**	**0.87**	No Difference
6-10	**92%**	**0.98**	No Difference
11-15	88%	1.05	No Difference
16-20	81%	1.12	No Difference
21-25	77%	**1.62**	No Difference
26-30	72%	**1.59**	No Difference
31-35	**56%**	**1.95**	No Difference
36-40	**50%**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



History – Flight Instructor



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

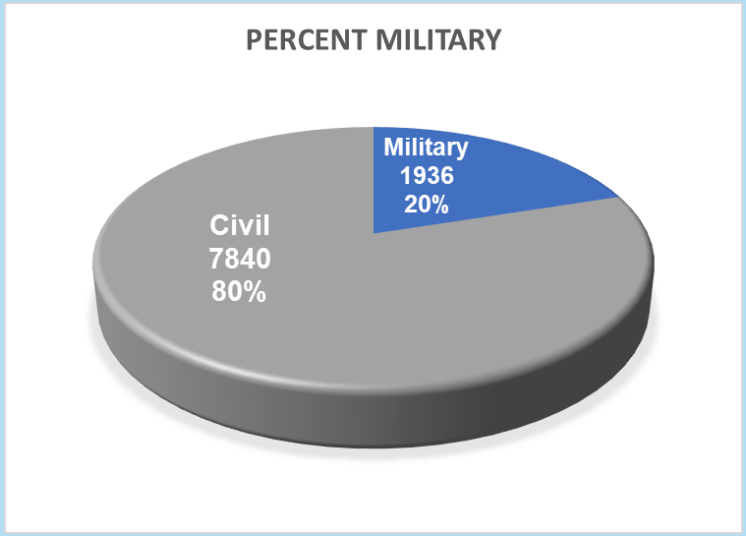
2018 – Flight Instructor – Performance in Training

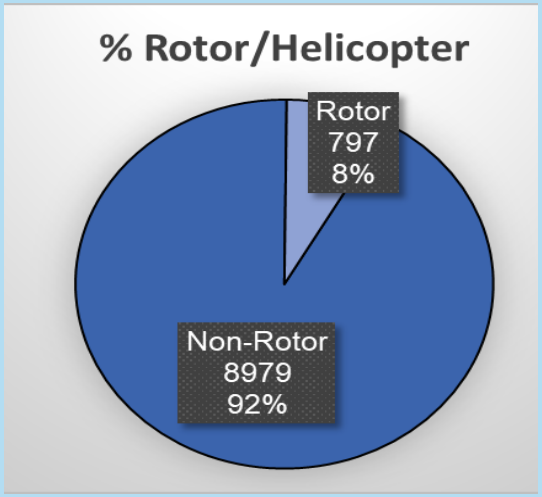
	Completed Training	Extra Training Average	Extra IOE
YES	**91%**	1.09	No Difference
NO	87%	**1.29**	No Difference

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

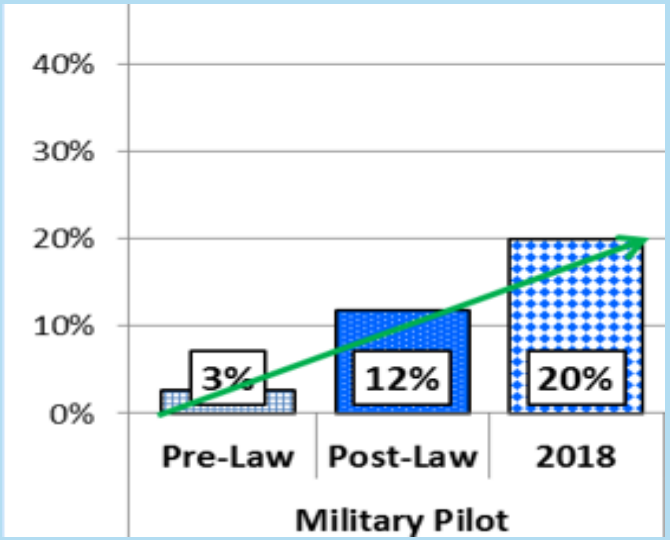
In 2018: Being a Flight Instructor did not have a significant effect on Extra Training Average or IOE.

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
PILOT SOURCE STUDY

2018 – Military Pilot – Performance in Training

	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

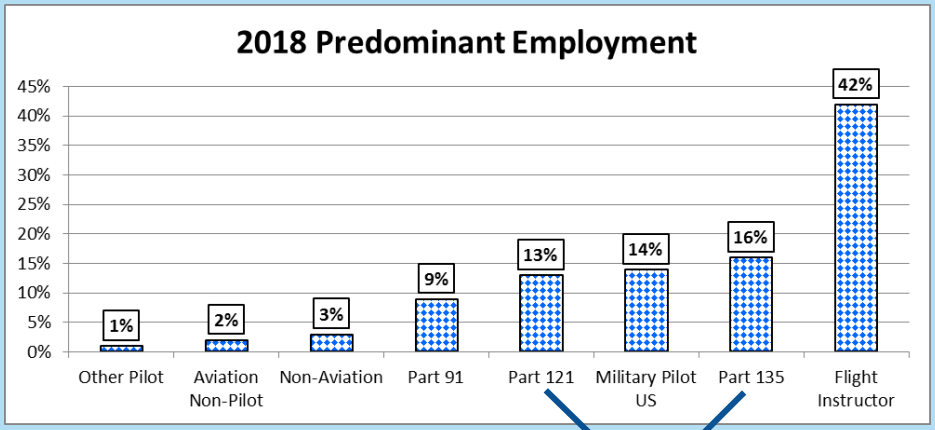
	Completed Training	Extra Training Average	Extra IOE
YES	89%	**0.93**	No Difference
NO	89%	1.12	No Difference

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

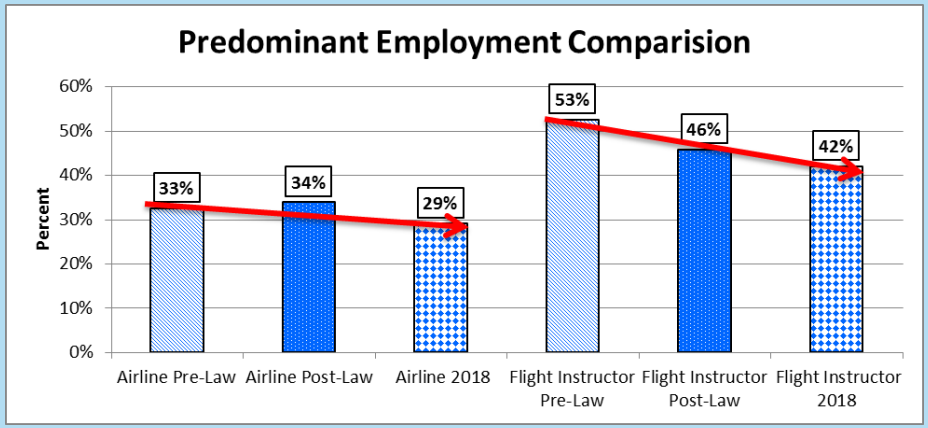
In 2018: Being a former Helicopter Pilot did not have a significant effect on Completions or IOE.

2018 – Predominant Employment

History – Predominant Employment



Airline 29%



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

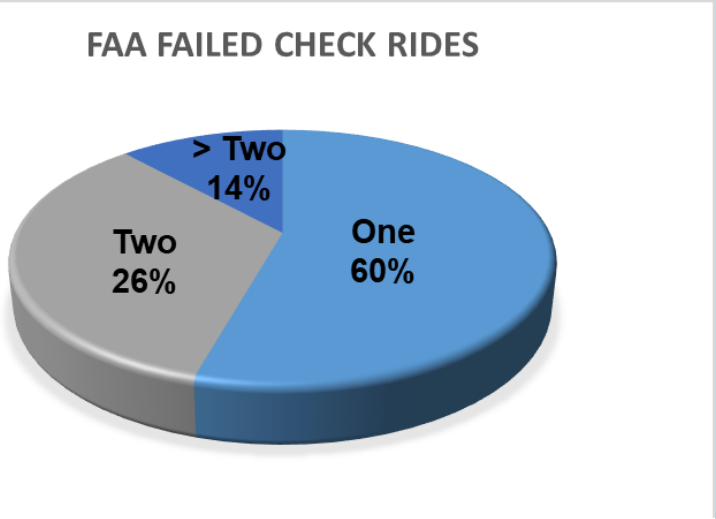
2018 – Part 91, Part 121, Part 135 Previous Employment – Performance in Training

	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.

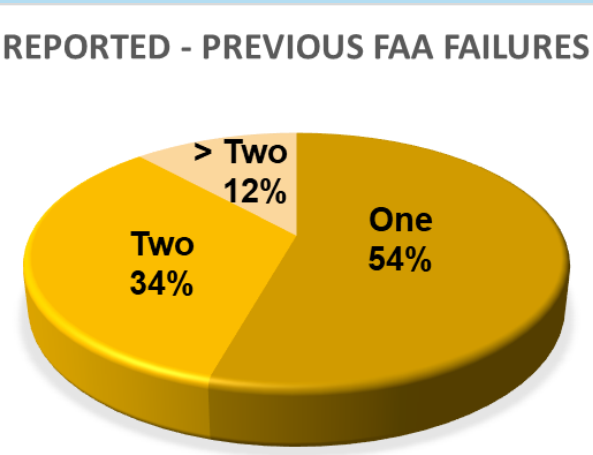
In 2018: Former Part 121 Experience did not have a significant effect on Completion Percentage or IOE.

2018 – Previously Reported Failed FAA Check-Rides



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

2015 – Previously Reported Failed FAA Check-Rides



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 FAA Failures – Performance in Training

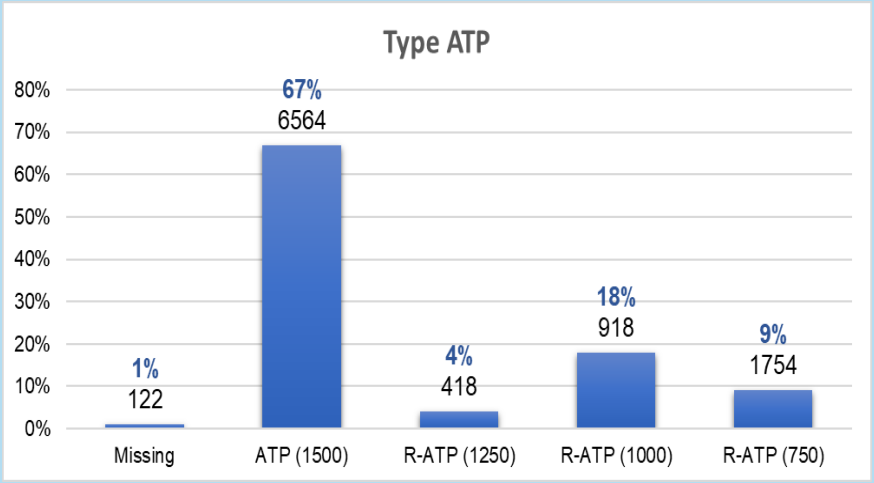
	Completed Training	Extra Training Average	Extra IOE
NONE	**91%**	1.02	**LESS**
One	**90%**	1.11	Sig more than NONE
Two	**90%**	**1.32**	Sig more than NONE
3 or More	86%	**1.31**	Sig more than NONE

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

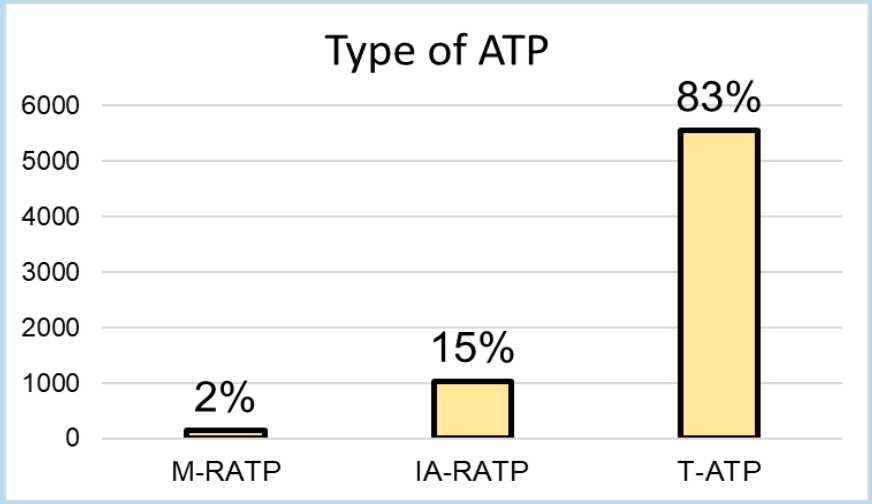
In 2018: Having NO Previously Reported FAA Failures did not have a significant effect on Extra Training Average.

2018 PILOT SOURCE STUDY

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

	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
R-ATP (1500)	87%	1.19	No Difference

BEST

#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 PILOT SOURCE STUDY

2018 – Recency Hours – Last 6 Months / Last Year

		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

No 2015 Recency Data

2018 Recency Hours – Past 6 Months / Past 12 Months

Completed Training

In the Past 6 months:

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

In the Past 12 months:

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

Extra Training Events

In the Past 6 months:

- No significant difference

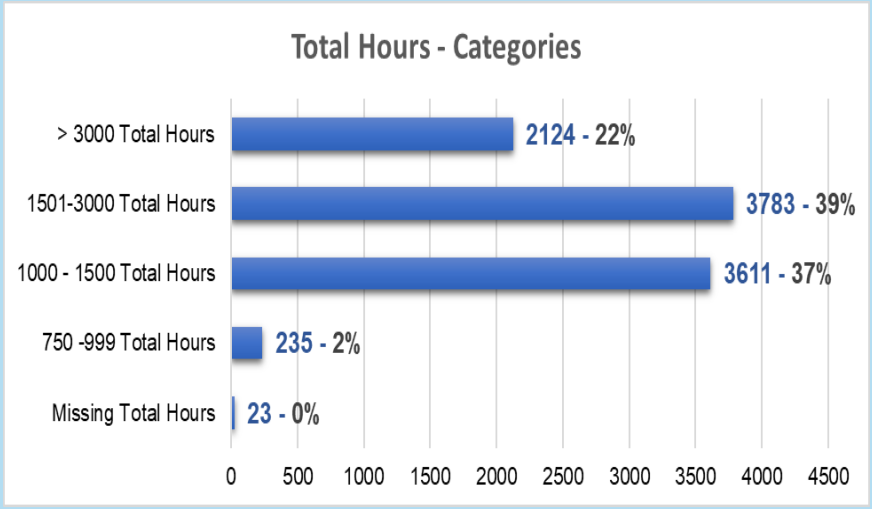
In the Past 12 months:

- 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

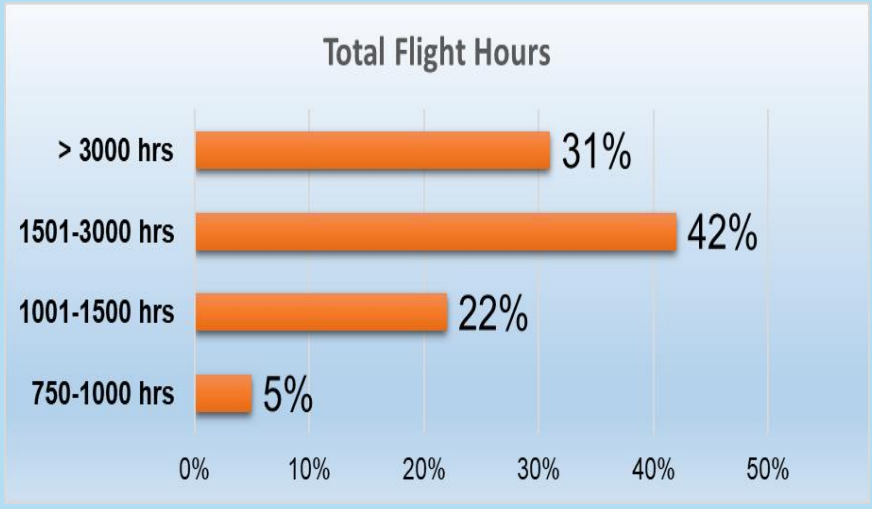
2018
PILOT SOURCE STUDY

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 PILOT SOURCE STUDY

2018 – Total Flight Hours – Performance in Training

	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 Flight	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%

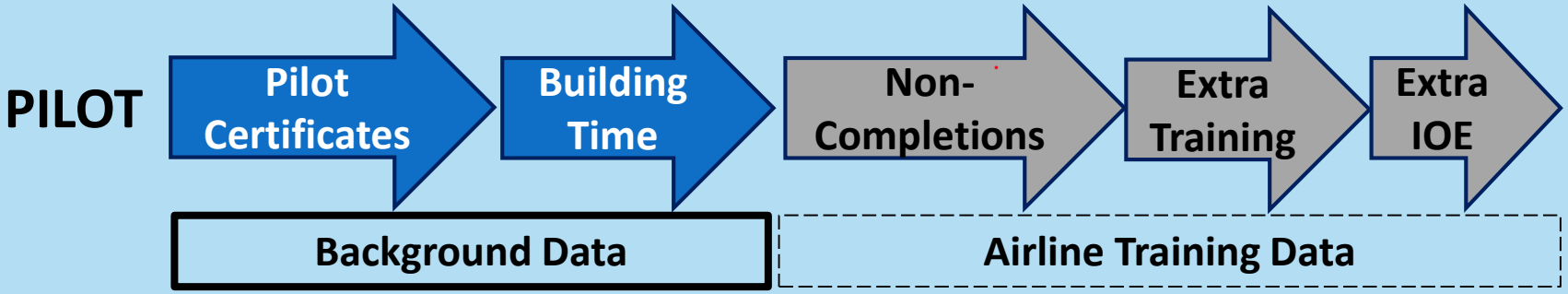
No Difference: Gender, Undergraduate GPA, Bachelors = 54%

2018 PILOT SOURCE STUDY

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

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

Part III
Multi-Variate Analysis



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

Multi-Variate Analyses: Completed Training

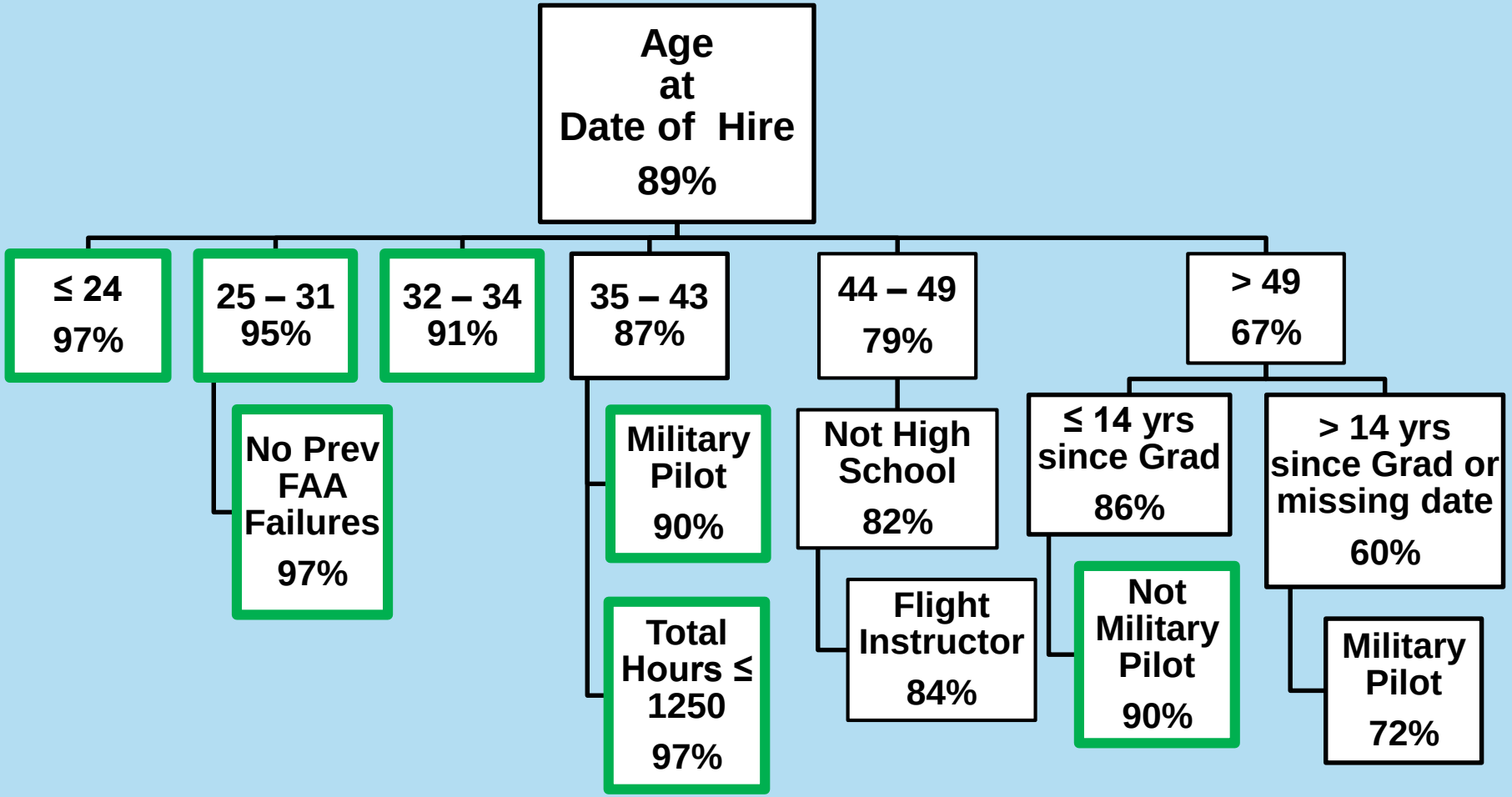
Variables Entered into the Analyses

- AABI Flight?
- 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
2*. Years Between Graduation & Hire
3*. Total Hours

Multi-Variate Analyses: Completed Training



Multi-Variate Analyses: Completed Training

Years between Graduation and Hire
89%

- **≤7 years** 95%
  - **Flight Instructor** 95%
- **8 – 14 years** 90%
- **15 – 21 years** 82%
  - **Military Pilot** 88%
- **> 21 years** 69%
  - **Military Pilot** 82%
- **No Grad Date** 87%
  - **Total Hours ≤ 1502** 93%
    - **Not High School** 96%
  - **Total Hours 1503 – 4951** 85%
    - **Not High School** 89%
  - **Total Hours > 4951** 76%
    - **Flight Instructor** 81%

Multi-Variate Analyses: Completed Training

Total Hours
89%

- **≤1250**
  96%
  - **Flight Instructor**
    96%
- **1251 – 1502**
  92%
  - **Zero or 1 Prev FAA Failures**
    94%
- **1503– 2350**
  88%
  - **Flight Instructor**
    90%
  - **Military Pilot**
    88%
- **2351– 4951**
  86%
  - **Military Pilot**
    84%
  - **Flight Instructor**
    85%
- **>4951**
  79%
  - **Flight Instructor**
    83%

Multi-Variate Analyses: Zero thru 2 Extra Training Needed

Variables Entered into the Analyses

- AABI Flight?
- 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 Extra Training Needed

1*. Years Between Graduation & Hire

2*. Undergraduate GPA

3. Flight Instructor?

Multi-Variate Analyses: Zero thru 2 Extra Training Needed

Years between Graduation & Hire
68%

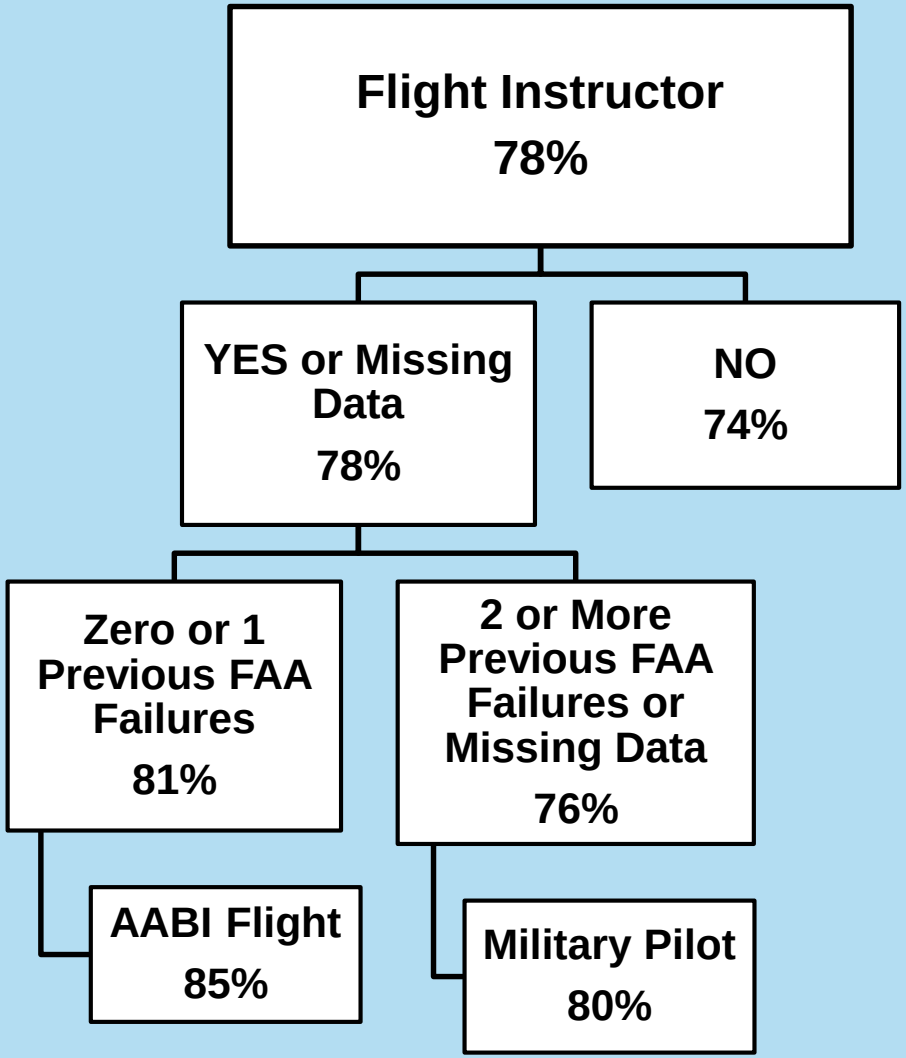
- **≤ 1 year** — 78%
  - **Zero thru 2 Previous FAA Failures** — 81%
- **2 – 7 years** — 82%
  - **Zero thru 1 Previous FAA Failures** — 85%
    - **Aviation Degree** — 85%
- **8 – 21 Years** — 78%
  - **Undergrad GPA > 3.61** — 89%
- **> 21 Years** — 68%
  - **Total Hours > 2339 or missing** — 72%
    - **Age at Date of Hire > 37 or missing** — 74%
- **Missing Data** — 74%
  - **Undergraduate GPA ≥ 3.0** — 88%%

Multi-Variate Analyses: Zero thru 2 Extra Training Needed

Undergraduate GPA
77%

- **≤ 3.25** — **78%**
  - **Zero thru 1 Previous FAA Failures** — **80%**
- **3.251 – 3.610** — **82%**
  - **Zero thru 1 Previous FAA Failures** — **85%**
- **3.611 – 3.75** — **87%**
  - **Any # Previous FAA Failure Data Reported** — **90%**
- **> 3.75** — **82%**
  - **Zero or 1 Previous FAA Failures** — **87%**
  - **2 or more Previous FAA Failures or missing** — **75%**
    - **Total Hours > 3145** — **93%**
- **Missing Data** — **75%**
  - **AABI Flight** — **80%**

Multi-Variate Analyses: Zero thru 2 Extra Training Needed



Multi-Variate Analyses: "Normal" IOE Z-Score

Variables Entered into the Analyses

- AABI Flight?
- 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

2018
PILOT SOURCE STUDY

Multi-Variate Analyses: "Normal" IOE Z-Score

Undergraduate GPA
87%

- **≤ 2.796 or Missing Data**
  86%
  - **Military Pilot**
    88%
- **> 2.796**
  89%
  - **Age at Date of Hire ≤ 47**
    90%
    - **NO Prev FAA Failures**
      93%

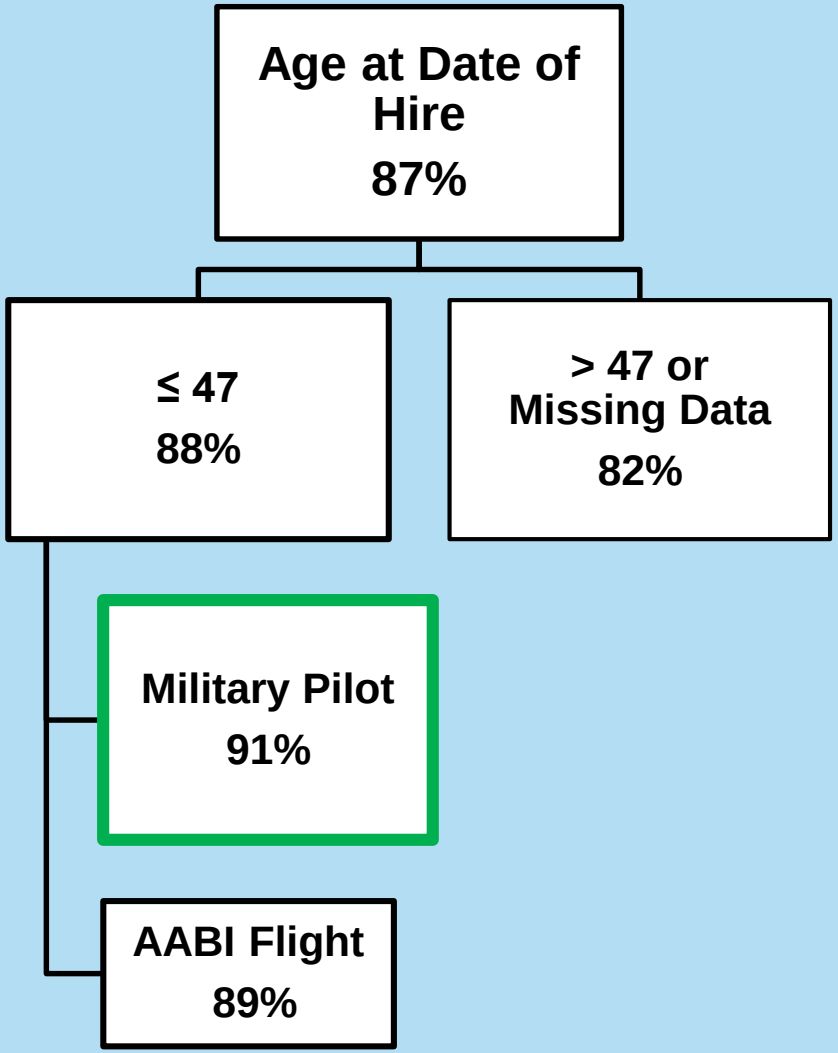
2018 PILOT SOURCE STUDY

Multi-Variate Analyses: "Normal" IOE Z-Score

Previous FAA Failures
87%

- **None** — **90%**
  - **AABI Flight** — **92%**
- **1 – 2 or Missing Data** — **86%**
  - **Age at Date of Hire ≤ 47** — **87%**
    - **Military Pilot** — **91%**
- **3 or More** — **82%**

Multi-Variate Analyses: "Normal" IOE Z-Score



Multi-Variate Analysis Summary

In addition to the univariate significant variables, the following variables provide additional prediction and classification for success:

- Age: Younger
- Flight Instructor: Yes
- Military Pilot: Yes
- Previous FAA Failures: Fewer

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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