Aviation Accident Causes Among Sport Pilots as Compared to Class 3 Private Pilots from 2004–2017

John R. Mulvey

BACKGROUND: In September 2004 a new pilot certificate, sport pilot, was established, which enabled pilots to fly with a valid driver's license in lieu of a valid third-class medical certificate. In 2016 Mills and DeJohn published a paper in which they demonstrated that sport pilots had a higher accident rate than private pilots with Class 3 medical certificates. They concluded that this privilege should not be extended to a broader range of pilots due to the higher accident rate. They failed to investigate why these pilots crashed. This short communication aims to fill that gap.

METHODS: The NTSB database was reviewed for the entire period that sport pilot has been available, and reasons for the accidents were determined, both for sport pilots and private pilots with Class 3 medicals.

RESULTS: Sport pilot accidents were caused by medical incapacitation 3.7% of the time. Private pilots with Class 3 medicals had accidents that cited medical incapacitation 2.5% of the time.

DISCUSSION: Medical incapacitation represents either a probable cause or contributing factor in aviation accidents less than 5% of the time. There is a slightly higher rate of this incapacitation among pilots not receiving regular aeromedical evaluations, but the difference was not statistically significant.

KEYWORDS: Class 3 medical, driver's license medical.

Mulvey JR. *Aviation accident causes among sport pilots as compared to Class 3 private pilots from 2004–2017*. Aerosp Med Hum Perform. 2018; 89(11):1002–1004.

In the early days of aviation there was no medical supervision or prequalifying examination requirement for aircrew; after all, in the early 20th century powered aviation was a brand new technology. The first attempt to establish medical standards for aircrew was by Germany in 1910, with the rest of Europe soon following suit.[4] This was strictly limited to military aviators and the United States was close behind, developing physical exam techniques in 1912 followed by full aeromedical standards for military aviators in May 1917.[4,8]

Civil aviation did not receive the same consideration until the passage of the Air Commerce Act in 1926, which established a requirement to develop medical standards for civil aviation.[7] Section 66 of this Act went into full effect on 31 December 1926,[4] and medical standards for aircrew have been applied to our civil aviators ever since.

In 2004, after extensive effort by EAA, AOPA, and other alphabet organizations, the concept of sport pilot was enacted, allowing pilots to fly a restricted category of aircraft with a valid driver's license in lieu of an FAA medical certificate under the caveat that the airman had never been denied a medical certificate by the FAA.[1] Anecdotally, many Class 3 aviators (private pilots) have chosen to switch to sport pilot to avoid the expense of recurring physical examinations by Aviation Medical Examiners (AMEs), especially if they developed a medical condition that might require they complete the cumbersome waiver process to continue flying on their Class 3 medical.

Since then, in May 2017, Basic Med became available, allowing any private pilot to fly any aircraft up to 6000 lb gross weight, with no more than six occupants (five passengers), visual flight rules (VFR) or instrument flight rules (IFR) at less than 18,000 ft MSL, and not exceeding 250 kn, all within the United States.[3] The airman must see his or her personal physician every 4 yr; this physician completes a form very similar to the 8500 that AMEs complete now, but it is given to the pilot to keep with his

From Elkton, MD.

This manuscript was received for review in January 2018. It was accepted for publication in August 2018.

Address correspondence to: John R. Mulvey, M.D., 151 Lance Court, Elkton, MD 21921; fencinflyer@comcast.net.

DOI: https://doi.org/10.3357/AMHP.5083.2018

Table I. Sport Pilot Results.

CAUSE	RAW VALUE	PERCENTAGE	CAUSE	RAW VALUE	PERCENTAGE
Medical	6	3.7	Taxi error	3	1.9
Engine failure	51	31.7	Controller error	3	1.9
Stall/spin	32	20.0	Over gross	2	1.2
Airframe issue	16	9.9	VFR/IMC	2	1.2
CFIT	10	6.2	Tailwind TO	2	1.2
Windshear/X-wind, or TRW	9	5.6	Midair	2	1.2
Rejected TO	5	3.1	Lost pilot	2	1.2
Fuel management	5	3.1			

VFR: visual flight rules; IMC: instrument meteorological conditions; CFIT: controlled flight into terrain; TRW: thunderstorms; TO: takeoff.

or her logbook.[3] This spirit of this requirement is to assure that the airman has a physician who is familiar with their medical condition and can intervene should a medical condition arise. Additionally, the pilot must take a computer-based course every 2 yr teaching how to self-certify to their fitness to fly on any given flight.[3]

In July 2016 Mills and De John of the Civil Aviation Medical Institute published an analysis of accident rates of selected light sport aircraft compared with general aviation (Class 3 pilots).[6] In this paper they noted the accident rate among sport pilots was significantly higher than that among Class 3 pilots, suggesting that caution should be exercised when making the decision to expand the sport pilot privileges to more complex aircraft. Unfortunately, these authors did not analyze why these pilots had their accidents; they simply looked at accident rates. This paper is an attempt to fill in that gap.

METHODS

The NTSB Database was queried from September 2004, when the sport pilot certification went into effect, to June 2017. There were two sets of queries, each of which looked at Part 91 General Aviation Personal Flying, Airplanes Only, and limited to reports for which a probable cause had been determined. No distinction was made between accidents or incidents, as the NTSB investigates and reports on both. The first query was limited to sport pilots and returned 165 results. The second was limited to "Class 3 medical" and returned 1378 results. All the sport pilot results were analyzed and a representative random sample of 774 of the Class 3 medical results were analyzed. The randomized sample was obtained by downloading all the accidents, then choosing either every listing on the page or every other listing per page, depending on whether the day was an odd or even day. The results are presented below.

RESULTS

Among the sport pilots, four were found not to meet criteria for sport pilot. One was a noncertified pilot who had stopped flying due to previous diabetes and was unable to get his Class 3 medical back; this pilot would not have been allowed to fly under these rules. The other 3 were Class 3 pilots who had a sport pilot as a passenger.

Among the Class 3 pilots, six were eliminated from the analysis: one whose last medical expired 10 yr before the incident, one was a myocardial infarction patient who had been denied a certificate, two had no medical certificate, one with advanced arteriosclerotic coronary artery disease (ASCAD) who was incapacitated in flight but had no medical and was flying as a recreational pilot, and one was flying under sport pilot rules. This left 161 sport pilot accidents and 768 Class 3 accidents in the analysis. The results are displayed in **Table I** and **Table II**.

DISCUSSION

As the above data show, the medical incapacitation rate among sport pilots (3.7%) is slightly higher than the Class 3 medical incapacitation rate (2.5%), but this value is not statistically significant ($P = 0.095$ by the Chi-squared method). The author only assigned a medical cause when the NTSB did, either as a probable cause or as a contributing factor. There were accidents in which there were medical issues, but the NTSB specifically stated that they could not attribute the accident to the medical condition. Medical issues included coronary artery disease, sedating medications, arrhythmia, uncontrolled diabetes, and two pilots with degraded night

Table II. Third Class Results.

CAUSE	RAW VALUE	PERCENTAGE	CAUSE	RAW VALUE	PERCENTAGE
Medical	19	2.5	Intoxicated	14	1.8
Engine failure	137	17.8	Over gross	12	1.6
Stall/spin	92	12.0	FIKI	11	1.4
Fuel management	66	8.6	Carb ice	9	1.2
CFIT	52	6.8	Taxi error	8	1.0
Unknown	45	5.6	Engine fire	7	0.9
Spatial disorientation	39	5.0	Tailwind TO	4	0.5
Buzzing	38	4.9	Controller error	4	0.5
Airframe issue	38	4.9	Gyro/vacuum	4	0.5
Windshear, X-wind, or TRW	28	3.6	Mountain wave	3	0.4
Go around	18	2.3	Electrical fire	2	0.3
Hard or long landing	15	2.0	Hypoxia	2	0.3
VFR into IMC	80	10.4			

FIKI: flight into known icing; CFIT: controlled flight into terrain; TRW: thunderstorms; TO: takeoff; VFR: visual flight rules; IMC: instrument meteorological conditions.

vision due to cataracts. The most common medical reason was ASCAD and arrhythmia. Airframe issues included control surface malfunctions, open door, landing gear failure, and pressurization failures.

Medical incapacitation in this study represented a very small percentage of accident causes, but these accidents were usually fatal. The only exception in this set of data was a Class 3 pilot with insulin requiring diabetes who made a precautionary landing in a field due to a hypoglycemic episode. In August 1987 Charles Booze Jr. wrote a Technical Report for the FAA addressing incapacitation in the general aviation flight environment.[2] This paper observed that there were approximately three accidents per thousand that were known to result from medical incapacitation. The author observed that this is less than would be expected based on general population morbidity/mortality data. McLoughlin and Jenkins, in 2003, also questioned the value of periodic medical examinations of aircrew in Britain, specifically stating that the current system was of little value in predicting future incapacitation. They suggested that the frequency and content of these exams could be changed based on the medical evidence without compromising flight safety.[5]

This paper suggests that medical incapacitation among regularly examined general aviation pilots, like general aviation pilots who do not receive a medical exam, represents less than 5% of the accident causes among these pilots. The sport pilot category has presented a wonderful opportunity to assess the value of regular aviation medical examinations. Consider that the category not only created a group of airmen who do not require a regular physical exam, but the odds were literally stacked against these airmen, as pilots with potentially disqualifying conditions anecdotally have often chosen to simply continue flying under the sport pilot rules. Despite this, the incapacitation rate leading to an accident was not statistically different from those pilots who did receive a regular flight physical.

Note that VFR into instrument meteorological conditions (IMC) was a significant cause of accidents among Class 3 pilots but was quite rare among sport pilots; this may relate to the different mission of the sport pilot. The latter is not as likely to be using his or her aircraft on long trips and is less likely to be lured into "get-home-itis" that causes VFR into IMC accidents. Engine failures and stall/spin accidents lead the causes in both groups, with a higher percentage among sport pilots. This paper did not analyze the different demographics of sport pilots versus Class 3 private pilots; this would be a fertile field for future research. Another area that should be researched is the number of pilots who choose to fly sport pilot (or Basic Med) specifically because they wish to avoid medical supervision, either due to new medical conditions or personal choices. Any of us who speak with fellow pilots know this happens, but quantitating it would be a very challenging and very useful endeavor.

In conclusion, sport pilots without regular medical examinations did have a slightly higher medical incapacitation rate than did a random sampling of private pilots who were receiving these exams, but in both cases the rates were less than 5% and the difference was not statistically significant. This suggests that a greater impact on the accident rate is possible by addressing other causes. The accidents pilots have due to medical incapacitation were much more likely to be fatal ones within this set of analyzed accidents.

ACKNOWLEDGMENTS

Author and affiliation: John R. Mulvey, M.D., Elkton, MD.

REFERENCES

1. 14 CFR Part 61 Subpart J. Sport pilots. Oklahoma City (OK): Federal Aviation Administration; 2004.
2. Booze CF Jr. Sudden in-flight incapacitation in general aviation. DOT/FAA/AM/87/7 FAA. Oklahoma City (OK): Civil Aeromedical Institute, Office of Aviation Medicine; 1987
3. FESSA. FAA extension. Safety and Security Act of 2016. Public Law 114-190, 114th Congress; 2016.
4. History of flight medicine. [Accessed 10 Dec. 2017.] Available from www.Goflightmedicine.com/aerospace-medicine/history-of-flight-medicine/.
5. McLoughlin DC, Jenkins DI. Aircrew periodic medical examinations. Occup Med (Lond). 2003; 53(1):11–14.
6. Mills WD, DeJohn CA. Personal flying accident rates of selected light sport aircraft compared with general aviation aircraft. Aerosp Med Hum Perform. 2016; 87(7):652–654.
7. Statutes at large of the United States of America from December 1925 to March 1927. Vol. XLIV. 69th Congress. [Accessed Sept. 2018.] Available from http://libraryonline.erau.edu/online-full-text/books-online/aircommerceact1926.pdf.
8. War Department Air Service, Division of Military Aeronautics. Air Service Medical Manual. Washington (DC): War Department; 1918:17.