Personal Flying Accident Rates of Selected Light Sport Aircraft Compared with General Aviation Aircraft

William D. Mills; Charles A. DeJohn

BACKGROUND: The issue of expanding flight privileges that do not require medical oversight is currently an important topic, especially in the United States. We compared personal flying accident rates in aircraft with special light sport aircraft (SLSA) and experimental light sport aircraft (ELSA) airworthiness certificates to accident rates for personal flying in other general aviation (GA) aircraft.

METHODS: To calculate accident rates, personal flying hours were obtained from the annual FAA General Aviation and Part 135 Activity Surveys, and numbers of personal flying accidents were obtained from the NTSB accident database. Overall and fatal personal flying accident rates for the SLSA and ELSA groups and other GA aircraft were calculated and accident rates were compared.

RESULTS: The overall personal flying accident rate for SLSA and ELSA was found to be 29.8 per 100,000 flight hours and the fatal accident rate was 5.2 per 100,000 flying hours. These are both significantly greater than the overall personal flying rate of 12.7 per 100,000 h and fatal rate of 2.6 per 100,000 h for other GA aircraft.

DISCUSSION: Although this study has several limitations, the significantly higher accident rates in the sport pilot aircraft suggests caution when expanding sport pilot privileges to include larger, more complex aircraft.

KEYWORDS: sport pilot, light sport aircraft, accident rate, safety.

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The issue of expanding flight privileges that do not require medical oversight is currently an important topic, especially in the United States. The current sport pilot rules allow for operation of light sport aircraft (LSA), which are simple aircraft limited to 1320 lb gross weight and 120 kn maximum level speed with only one passenger. The salient feature of these rules is that an Federal Aviation Administration (FAA) medical certificate is not required for most pilots.[2] Current legislative efforts would expand these regulations to include complex aircraft of up to 6000 lb, 250 kn, and five passengers.[6] We compared personal flying accident rates in aircraft with special light sport aircraft (SLSA) and experimental light sport aircraft (ELSA) airworthiness certificates to accident rates for personal flying in other general aviation (GA) aircraft.

Unfortunately, the data needed to calculate accident risk (e.g., number of accidents per 100,000 flight hours) for medically uncertified pilots compared to medically certified pilots are not available. It is likely that a large but currently unknowable portion of sport pilot operations involve pilots who hold a private pilot certificate or higher, have allowed their medical certificates to expire, and are flying aircraft with standard airworthiness certificates that meet the criteria for LSA as summarized above. When the sport pilot rules were introduced in 2004 there were more than 500,000 pilots with private pilot or higher certificates who became immediately eligible to do this. Since the sport pilot rules were introduced only a total of about 5300 sport pilot certificates have been issued.[4] Little information is available regarding the total number of pilots exercising sport pilot privileges or the number of their flight hours; therefore, it is not possible to calculate accident rates for this group. Even the data needed to calculate an accident rate for only those holding sport pilot certificates are not available.

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Table I. SLSA & ELSA Accidents and Flight Hours by Year.

YEAR	ELSA ALL ACCIDENTS	ELSA FATAL	SLSA ALL ACCIDENTS	SLSA FATAL	ELSA FLIGHT HOURS	SLSA FLIGHT HOURS
2009	60	10	21	1	151,070	69,683
2010	40	8	17	5	159,474	78,604
2012	51	13	27	4	138,988	98,659
2013	30	3	26	3	119,108	96,640
Totals	181	34	91	13	568,640	343,586

Accidents and flight hours are both for "personal flying."

However, aircraft data are publicly available, which enables calculation of accident rates for LSA aircraft that have a SLSA or ELSA airworthiness certificate. SLSA aircraft are the equivalent of larger general aviation aircraft. Rather than being built to FAA standards, however, they are built to consensus standards, which are developed jointly by the FAA, industry, and pilots. ELSA are similar to SLSA aircraft, but carry an experimental airworthiness certificate and often include the newer homebuilt and kit LSA airplanes. These are differences in LSA registration categories, not pilot certification categories, and all categories can be flown by LSA pilots. This report presents the calculations and results for these rates, although it should be kept in mind that aircraft accident rates are influenced by aircraft characteristics and the nature of the flight operations as well as by pilot factors such as medical condition, training, and other issues.

A number of published articles maintain that U.S. sport pilot operations have a good safety record, but these studies do not address comparative risks or mention any specifics other than raw accident counts.[1,9] Although the data needed for direct measurement of the light sport safety record is not available, this study adds to a small body of existing surrogate measures that suggest sport pilot risk may be significantly higher than that of general aviation overall.

There have been few previous reports containing quantitative safety information for U.S. sport pilot flying operations. Insurance claims data published in 2009 showed that claims for SLSA aircraft were about twice that for the overall general aviation fleet, with claims for tailwheel SLSA about 4.5 times as great.[7] These numbers are based on rates per "policy years" instead of flight hours; therefore, they are suggestive, but do not measure flight risk directly. A recent study compared autopsy findings in fatally injured sport pilots with no medical certification and pilots flying with third-class medical certificates.[8] It found that the age-adjusted odds of identifying pathology that represents a significant flight hazard in medically uncertified sport pilots was 3.2 times higher than in medically certified pilots, but, again, there is no way to correlate this finding with actual flight risk. Other articles that address sport pilot accidents generally have not included accident rates, although accident rates were published in a 2009 study of a small dataset of SLSA with reported rates of just over 5 per 100,000 flight hours for fatal accidents, which was about twice the overall general aviation personal flying rate.[5] The current study also calculates overall accident rates as well as rates for fatal accidents and uses a more recent and larger dataset.

METHODS

We collected flight hours for two groups of aircraft that are specifically intended for sport pilot operations: aircraft with special light sport and experimental light sport airworthiness certificates. Flight hours for these groups are available from the annual FAA survey, which is used by the National Transportation Safety Board (NTSB) to calculate accident rates for their annual safety report.[3,11] In addition, the NTSB accident database includes information on airworthiness certification that allows for identification of accidents involving these two aircraft types.[10]

We calculated an estimate for the risk of personal flying accidents in SLSA and ELSA. We included data from 2009, 2010, 2012, and 2013, since 2011 data were not available and survey methodology appears to be different prior to 2009. Using the publically available NTSB database, we found a total of 272 SLSA and ELSA personal flying accidents, including 47 fatal accidents. Using Table 3.2 in the FAA survey results,[3] we found a total of 912,226 personal flying hours in SLSA and ELSA aircraft. The number of accidents and flight hours by year for SLSA and ELSA individually are summarized in **Table I**. After the 272 SLSA and ELSA accidents and 912,226 flight hours were removed, the remaining total personal flying hours for 2009, 2010, 2012, and 2013 was 31,007,896, with 3942 personal flying accidents and 804 fatal accidents.

RESULTS

The overall and fatal accident rates per 100,000 flight hours for personal flying in SLSA and ELSA calculated from the data in Table I are presented in **Table II**. The calculated overall accident rate for personal flying in the SLSA and ESLA groups was 29.8 per 100,000 flight hours and the fatal rate was 5.2 per 100,000 flight hours, compared to an overall personal flying GA accident rate of 12.7 per 100,000 flight hours and a fatal rate of 2.6 per 100,000 flight hours.

Table II. SLSA & ELSA Accident Rates per 100,000 Flight Hours by Year.

YEAR	ELSA RATE - ALL ACCIDENTS	ELSA RATE – FATAL ACCIDENTS	SLSA RATE - ALL ACCIDENTS	SLSA RATE - FATAL ACCIDENTS	COMBINED RATE – ALL ACCIDENTS	COMBINED RATE – FATAL ACCIDENTS
2009	39.72	6.62	30.14	1.44	36.69	4.98
2010	25.08	5.02	21.63	6.36	23.94	5.46
2012	36.69	9.35	27.37	4.05	32.82	7.15
2013	25.19	2.52	26.90	3.10	25.96	2.78
Overall Rates	31.83	5.98	26.49	3.78	29.82	5.15

Averages of individual rates does not equal the combined rates due to weighting effects of data in Table I.

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For these particular groups of light sport aircraft, the overall accident rate was 2.3 times higher and the fatal accident rate 2.0 times higher than the rates for other GA personal flying. Application of a z-test demonstrated that both the total ($z = 14.01$, $P < 0.001$) and fatal ($z = 4.67$, $P < 0.001$) accident rates for the SLSA/ELSA group were significantly higher than the rates for other GA personal flying accidents.

DISCUSSION

We found that the overall and fatal personal flying accident rates for SLSA and ELSA aircraft were significantly greater than that of other general aviation aircraft involved in personal flying. These results expand and improve upon previously published estimates, but are in the same range. The authors feel that these accident rates do not agree with the commonly reported assertion that sport pilot flying has a good safety record.

There are a number of other limitations in this comparison. The data used in the calculations did not include sport pilot operations using aircraft with standard airworthiness certificates, which is expected to include a larger number of aircraft than the SLSA/ELSA group, but for which data are not available. The aircraft included in these calculations are intended for sport pilot use, but our comparison is based on aircraft rather than pilots, and it is unknown how many aircraft or airmen are actually engaged in sport flying operations. However, a review of the NTSB data suggests that 159 of 272 accident pilots, or 59%, were flying without current medical certification.

In conclusion, even with the limitations mentioned above, the high accident rates in the SLSA/ELSA group calls for caution when expanding the sport pilot regulations to permit the operation of more complex, heavier, and faster aircraft with additional passengers. Additional data for sport pilots are needed in the future to enable researchers to calculate and compare actual risk of aircraft accidents for sport pilot operations and similar types of flying.

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