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# A Survey of Public Opinion about Flying Cars

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SUSTAINABLE WORLDWIDE TRANSPORTATION

UNIVERSITY OF MICHIGAN

# A SURVEY OF PUBLIC OPINION ABOUT FLYING CARS

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16. Abstract

Until recently, flying cars have existed primarily in the realm of science fiction, although patents for such vehicles extend to the early years of aviation. However, recently there has been a rapid increase in interest in flying cars from companies ranging from large, international manufacturers to a variety of start-ups.

In addition to major technological, traffic-control, and licensing issues that still will need to be addressed, a big unknown is what consumers think of the concept of flying cars, and what the desirable parameters are for such a novel approach to mobility. Consequently, this study was designed to survey Americans regarding their views about flying cars. Among the issues examined were the likely benefits, major concerns, preferred source of energy, desirable minimum range, amount of flight-training required, takeoff and landing requirements, seating capacity, affordability, and overall interest in operating or using such vehicles.

The data consist of responses from 508 adults in the United States to an online survey. The report presents detailed summaries by gender and age that can be used to inform the decisions of designers and regulators of the initial generation of flying cars. The overall conclusion from the findings is that, despite the fact that most Americans are very concerned about the safety of flying cars, most would still ultimately like to use them.

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# Contents

# Introduction

Until recently, flying cars have existed primarily in the realm of science fiction, although patents for such vehicles extend to the early years of aviation (e.g., Curtiss, 1919). In addition to the continuing, long-term involvement of some dedicated individuals like Paul Moller since the 1960s (e.g., Raphael, 2000), several major vehicle and aircraft manufacturers have experimented with this concept over the years (e.g., Ford in the 1950s [Tate, 2014], and Boeing in the 1980s [Zoltan, 2015]). A brief history of flying cars is outlined in Popular Mechanics (2015).

The current flying-car scene includes some established companies such as Airbus (2017) and a range of startups (e.g., Zee Aero—started by Google cofounder Larry Page [Heath, 2017], AeroMobil [2017], and Terrafugia [2017]). A recent overview of some of the major players in this field is contained in Vance and Stone (2016).

In addition to major technological, traffic-control, and licensing issues that still will need to be addressed, a big unknown is what consumers think of the concept of flying cars, and what the desirable parameters are for such a novel approach to mobility. Consequently, this study was designed to survey American adults regarding their views about flying cars. Among the issues examined were the likely benefits, major concerns, preferred source of energy, desirable minimum range, amount of flight-training required, takeoff and landing requirements, seating capacity, affordability, and overall interest in operating or using such vehicles.

# Method

## Survey instrument

An online survey was conducted using SurveyMonkey (www.surveymonkey.com). A questionnaire was developed to examine several topics related to public opinion about flying cars. The text of the questionnaire is included in the Appendix. The survey was performed in April 2017.

## Respondents

SurveyMonkey's Audience tool was used to recruit respondents 18 years and older from SurveyMonkey's respondent database in the United States. Fully completed surveys were received from 508 respondents. The margin of error at the 95% confidence level for the overall results is +/- 4.3%. Demographic breakdowns for the respondents are presented in Table 1. The age and gender breakdowns are similar to the latest U.S. Census age and gender demographics. Figure 1 shows each U.S. Census region and the corresponding states.

Table 1
Demographic breakdowns for the 508 respondents.

| Demographic aspect | | Percent |
|---|---|---|
| Gender | Female | 52.0 |
| | Male | 48.0 |
| Age group | 18 to 29 | 21.3 |
| | 30 to 44 | 25.4 |
| | 45 to 59 | 27.4 |
| | 60 or older | 26.0 |
| Income | $0 to $24,999 | 17.3 |
| | $25,000 to $49,999 | 15.2 |
| | $50,000 to $74,999 | 16.3 |
| | $75,000 to $99,999 | 14.0 |
| | $100,000 to $124,999 | 7.5 |
| | $125,000 to $149,999 | 4.9 |
| | $150,000 to $174,999 | 4.1 |
| | $175,000 to $199,999 | 1.8 |
| | $200,000 or more | 5.3 |
| | Prefer not to answer | 13.6 |
| U.S. Census region | New England | 4.4 |
| | Middle Atlantic | 11.7 |
| | North Central | 23.8 |
| | South Atlantic | 17.2 |
| | South Central | 11.1 |
| | Mountain | 7.1 |
| | Pacific | 24.6 |

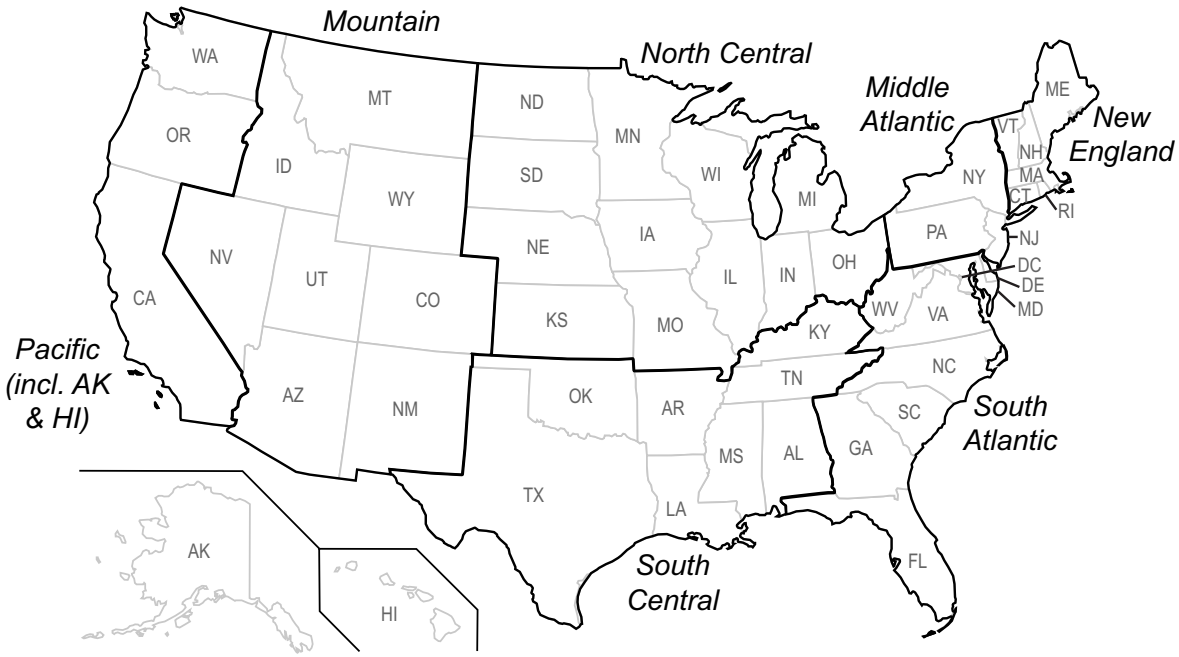


Figure 1. U.S. Census regions.

# Results

## Familiarity with the concept of flying cars

Table 2 presents a summary of responses to the question that asked whether respondents had ever heard of the concept of flying cars prior to participating in this survey. About two-thirds of respondents (64.8%) were familiar with the concept, with males more likely to be familiar than females.

Table 2
Familiar with the concept of flying cars. (The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Yes | 52.7 | 77.9 | 68.5 | 63.6 | 61.9 | 65.9 | ***64.8*** |
| No | 47.3 | 22.1 | 31.5 | 36.4 | 38.1 | 34.1 | ***35.2*** |

## Likely benefits of flying cars

Table 3 summarizes the findings concerning the likely benefits of flying cars. Overall, shorter travel time was the top choice for three-quarters of respondents.

Table 3
Percentages of respondents who ranked each response as the most likely benefit (#1 rank).

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Shorter travel time | 71.2 | 79.1 | 66.7 | 76.7 | 82.0 | 72.7 | ***75.0*** |
| Fewer crashes | 10.6 | 9.0 | 9.3 | 11.6 | 5.0 | 13.6 | ***9.8*** |
| Better fuel economy | 9.8 | 6.6 | 12.0 | 6.2 | 7.2 | 8.3 | ***8.3*** |
| Lower emissions | 8.3 | 5.3 | 12.0 | 5.4 | 5.8 | 5.3 | ***6.9*** |

**Concerns related to flying cars**

Five questions gauged respondents' level of concern regarding safety-related issues for flying cars. Overall safety was of primary concern (62.8% of respondents were *very concerned*; Table 4), followed by performance in congested airspace (61.8%; Table 5), performance in poor weather (61.0%; Table 6), performance at night (48.2%; Table 7), and learning to use (32.9%; Table 8).

For each of these five issues, a larger percentage of females than males were *very concerned*. Also, for four out of these five issues, the percentage of respondents who were *very concerned* increased with age. (For the remaining issue—performance of flying cars in congested airspace—the percentage was highest for the 45-59 year olds.)

Table 4
Level of concern with the overall safety of flying cars.
(The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very concerned | 65.2 | 60.2 | 55.6 | 58.9 | 66.9 | 68.2 | ***62.8*** |
| Moderately concerned | 20.5 | 20.1 | 25.0 | 20.2 | 18.7 | 18.2 | ***20.3*** |
| Slightly concerned | 10.2 | 11.9 | 13.9 | 15.5 | 8.6 | 6.8 | ***11.0*** |
| Not at all concerned | 4.2 | 7.8 | 5.6 | 5.4 | 5.8 | 6.8 | ***5.9*** |

Table 5
Level of concern with the performance of flying cars in congested airspace.
(The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very concerned | 65.9 | 57.4 | 52.8 | 57.4 | 68.3 | 66.7 | ***61.8*** |
| Moderately concerned | 20.8 | 22.5 | 27.8 | 21.7 | 18.7 | 19.7 | ***21.7*** |
| Slightly concerned | 7.2 | 9.8 | 11.1 | 10.9 | 4.3 | 8.3 | ***8.5*** |
| Not at all concerned | 6.1 | 10.2 | 8.3 | 10.1 | 8.6 | 5.3 | ***8.1*** |

Table 6
Level of concern with the performance of flying cars in poor weather.
(The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very concerned | 64.8 | 57.0 | 56.5 | 56.6 | 63.3 | 66.7 | ***61.0*** |
| Moderately concerned | 20.5 | 23.0 | 25.0 | 21.7 | 21.6 | 18.9 | ***21.7*** |
| Slightly concerned | 8.3 | 10.7 | 12.0 | 10.9 | 6.5 | 9.1 | ***9.4*** |
| Not at all concerned | 6.4 | 9.4 | 6.5 | 10.9 | 8.6 | 5.3 | ***7.9*** |

Table 7
Level of concern with the performance of flying cars at night.
(The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very concerned | 50.8 | 45.5 | 38.0 | 41.9 | 52.5 | 58.3 | ***48.2*** |
| Moderately concerned | 23.1 | 23.0 | 28.7 | 22.5 | 20.1 | 22.0 | ***23.0*** |
| Slightly concerned | 18.2 | 15.6 | 21.3 | 19.4 | 18.7 | 9.1 | ***16.9*** |
| Not at all concerned | 8.0 | 16.0 | 12.0 | 16.3 | 8.6 | 10.6 | ***11.8*** |

Table 8
Level of concern with learning to use a flying car.
(The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very concerned | 34.1 | 31.6 | 26.9 | 31.8 | 35.3 | 36.4 | ***32.9*** |
| Moderately concerned | 31.4 | 28.3 | 28.7 | 29.5 | 32.4 | 28.8 | ***29.9*** |
| Slightly concerned | 19.7 | 16.8 | 26.9 | 18.6 | 11.5 | 18.2 | ***18.3*** |
| Not at all concerned | 14.8 | 23.4 | 17.6 | 20.2 | 20.9 | 16.7 | ***18.9*** |

**Importance of having a parachute for flying cars**

The findings concerning the importance of having a parachute for the vehicle (not for the individual occupants) are summarized in Table 9. About four-fifth of respondents (79.4%) considered this requirement either *extremely important* or *very important*. (These systems already exist, and are also known as airframe parachutes [Cirrus Aircraft, 2017], aircraft recovery parachutes [Flying Magazine, 2016], or whole-aircraft parachutes [Air & Space, 2011].)

Table 9
Level of importance of having a parachute for flying cars. (The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Extremely important | 59.8 | 57.0 | 51.9 | 55.8 | 64.7 | 59.8 | ***58.5*** |
| Very important | 22.7 | 18.9 | 22.2 | 24.0 | 18.0 | 19.7 | ***20.9*** |
| Moderately important | 11.7 | 15.6 | 22.2 | 11.6 | 10.1 | 12.1 | ***13.6*** |
| Slightly important | 2.3 | 2.9 | 1.9 | 5.4 | 1.4 | 1.5 | ***2.6*** |
| Not at all important | 3.4 | 5.7 | 1.9 | 3.1 | 5.8 | 6.8 | ***4.5*** |

**Source of energy for flying cars**

Table 10 summarizes respondents' preferences for the source of energy for flying cars. About three-fifths (59.8%) indicated electric as the preferred choice, and this preference increased with decreasing age.

Table 10
Preferred source of energy for flying cars. (The entries are percentages.)

| Source | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Electric | 60.6 | 59.0 | 73.1 | 62.0 | 59.0 | 49.2 | ***59.8*** |
| Gasoline (or diesel) | 18.9 | 23.0 | 15.7 | 20.2 | 20.9 | 25.8 | ***20.9*** |
| Solar | 6.8 | 2.9 | 2.8 | 3.1 | 3.6 | 9.8 | ***4.9*** |
| Hydrogen / Fuel cell | 0.4 | 4.5 | 1.9 | 2.3 | 2.9 | 2.3 | ***2.4*** |
| Other | 13.3 | 9.8 | 6.5 | 12.4 | 13.7 | 12.9 | ***11.6*** |

**Minimum range for flying cars before needing to be refueled or recharged**

When respondents were asked to select a reasonable minimum range for flying cars before needing to be refueled or recharged (see Table 11), the most frequent response was 400 miles (41.3%). This was followed by 200 miles (25.8%), with 32.9% desiring at least 600 miles.

Table 11
Reasonable minimum range for flying cars before needing to be refueled or recharged.
(The entries are percentages.)

| Range | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| 200 miles | 20.1 | 32.0 | 21.3 | 21.7 | 26.6 | 32.6 | ***25.8*** |
| 400 miles | 45.5 | 36.9 | 42.6 | 42.6 | 38.1 | 42.4 | **41.3** |
| 600 miles | 19.3 | 18.0 | 24.1 | 17.8 | 18.7 | 15.2 | ***18.7*** |
| 800 miles | 15.2 | 13.1 | 12.0 | 17.8 | 16.5 | 9.8 | ***14.2*** |

**Flight-training hours for flying cars**

About half of respondents (50.2%) would be *definitely interested* in attending training if 20 hours of flight training were required, with males being more interested than females, and with interest decreasing with increasing age (see Table 12). For training sessions requiring either 30, 40, or 50 hours, about a third of respondents indicated that they were *definitely interested*. (The full set of response options for this question were *definitely interested*, *moderately interested*, *slightly interested*, and *not at all interested*.)

Table 12
Percentages of respondents who would be *definitely interested* in attending training,
by the number of flight-training hours.

| Flight-training hours | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| 20 hours | 42.4 | 58.6 | 60.2 | 50.4 | 48.2 | 43.9 | ***50.2*** |
| 30 hours | 28.8 | 38.9 | 40.7 | 38.8 | 30.9 | 25.8 | ***33.7*** |
| 40 hours | 24.2 | 35.7 | 34.3 | 38.8 | 27.3 | 19.7 | ***29.7*** |
| 60 hours | 31.4 | 39.3 | 34.3 | 38.8 | 38.8 | 28.8 | ***35.2*** |

**Takeoff and landing requirement for flying cars**

Vertical takeoff and landing (like a helicopter) was preferred by a ratio of about 5 to 1 over takeoffs requiring a straight, flat strip (like an airplane). The corresponding percentages were 83.1 and 16.9, respectively (see Table 13). Males tended to prefer vertical takeoffs and landings more so than females.

Table 13
Preferred takeoff and landing requirement. (The entries are percentages.)

| Takeoff and landing requirement | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Vertical (like a helicopter) | 80.3 | 86.1 | 81.5 | 74.4 | 84.9 | 90.9 | ***83.1*** |
| Straight, flat strip (like an airplane) | 19.7 | 13.9 | 18.5 | 25.6 | 15.1 | 9.1 | ***16.9*** |

**Seating capacity of flying cars**

A seating capacity of 3-4 people was the most preferred option (see Table 14), with about three-fifths of respondents (61.8%) selecting this option. The second most preferred option was 1-2 people (22.2%), followed by 5-8 people (15.9%). Males tended to prefer the option of 1-2 people more than did females, while the converse was the case for the option of 5-8 people. As the age of respondents increased so did the preference for the option of 1-2 people, while the preference for the option of 5-8 people decreased.

Table 14
Preferred seating capacity. (The entries are percentages.)

| Seating capacity | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| 1-2 people | 17.4 | 27.5 | 12.0 | 12.4 | 25.2 | 37.1 | ***22.2*** |
| 3-4 people | 64.0 | 59.4 | 65.7 | 68.2 | 59.7 | 54.5 | ***61.8*** |
| 5-8 people | 18.6 | 13.1 | 22.2 | 19.4 | 15.1 | 8.3 | ***15.9*** |

**Interest in using taxi-like versions of flying cars**

When asked about their interest in using taxi-like versions of flying cars (Table 15), respondents preferred fully autonomous flying cars (self-driving and self-flying) to those operated by a professional with an appropriate pilot license. The corresponding percentages of those who indicated that they were *very interested* were 43.5% and 15.9%, respectively. (The full set of response options for this and the following question were *very interested*, *moderately interested*, *slightly interested*, and *not at all interested*.)

Table 15
Percentages of respondents *very interested* in riding in taxi-like versions of flying cars operated fully autonomously (self-driving and self-flying) and operated by a professional with an appropriate pilot license.

| Operation mode | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Operated fully autonomously (self-driving and self-flying) | 44.7 | 42.2 | 36.1 | 37.2 | 43.2 | 56.1 | ***43.5*** |
| Operated by a professional with an appropriate pilot license | 14.0 | 18.0 | 8.3 | 12.4 | 23.0 | 18.2 | ***15.9*** |

**Interest in operating personally owned flying cars**

When asked about their interest in operating personally owned flying cars (Table 16), respondents preferred fully autonomous flying cars (self-driving and self-flying) to those operated by them after obtaining an appropriate pilot license. The corresponding percentages of those who indicated that they were *very interested* were 40.9% and 26.2%, respectively.

Table 16
Percentages of respondents *very interested* in riding in personally owned flying cars operated fully autonomously (self-driving and self-flying) and in operating them after obtaining an appropriate pilot license.

| Operation mode | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Operated fully autonomously (self-driving and self-flying) | 43.9 | 37.7 | 35.2 | 28.7 | 47.5 | 50.8 | ***40.9*** |
| Operated after obtaining an appropriate pilot license | 27.7 | 24.6 | 18.5 | 20.9 | 31.7 | 31.8 | ***26.2*** |

**Affordability of flying cars**

Affordability of flying cars was gauged in two questions, one dealing with the purchase price and one with the insurance cost. The full set of response options for both questions were *definitely affordable*, *probably affordable*, *probably not affordable*, and *definitely not affordable*.

About a quarter of respondents (24.2%) indicated that a purchase-price range of $100,000 to $200,000 would be *definitely affordable* (with males indicating this more often than females), but that percentage dropped to below 4% for each of the three higher price ranges offered (Table 17).

Table 17
Percentage of respondents who indicated that flying cars would be *definitely affordable* to them, by purchase-price range.

| Purchase-price range | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| $100,000-$200,000 | 18.6 | 30.3 | 26.9 | 24.0 | 23.7 | 22.7 | ***24.2*** |
| $200,000-$400,000 | 3.0 | 3.3 | 6.5 | 0.8 | 2.9 | 3.0 | ***3.1*** |
| $400,000-$600,000 | 2.7 | 2.5 | 4.6 | 0.8 | 2.9 | 2.3 | ***2.6*** |
| $600,000-$1,000,000 | 1.1 | 3.3 | 3.7 | 1.6 | 1.4 | 2.3 | ***2.2*** |

About a third of respondents (31.5%) indicated that flying-car insurance of twice the current cost of typical car insurance would be *definitely affordable*, but that percentage dropped to below 4% for insurance cost for each of the two higher multiples of the current cost offered (Table 18). (Males tended to find all possible insurance costs as more affordable than females.)

Table 18
Percentage of respondents who indicated that flying-car insurance would be *definitely affordable*, by insurance cost.

| Multiple of current insurance cost | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| 2 times | 24.6 | 38.9 | 31.5 | 31.8 | 33.8 | 28.8 | ***31.5*** |
| 4 times | 2.3 | 5.3 | 2.8 | 2.3 | 3.6 | 6.1 | ***3.7*** |
| 6 times | 1.5 | 2.9 | 1.9 | 0.8 | 2.2 | 3.8 | ***2.2*** |

**Overall evaluation of flying cars**

The final two questions related to respondents' overall evaluation of flying cars. When asked about their general opinion regarding flying cars, about a sixth (16.7%) indicated that their view was *very positive*, with males more frequently saying they felt *very positive* than females, and with *very positive* ratings decreasing with increasing age (see Table 19).

Table 19
General opinion about flying cars. (The entries are percentages.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| Very positive | 12.9 | 20.9 | 21.3 | 20.2 | 13.7 | 12.9 | ***16.7*** |
| Somewhat positive | 25.4 | 30.7 | 28.7 | 28.7 | 25.9 | 28.8 | ***28.0*** |
| Neutral | 28.0 | 23.4 | 31.5 | 25.6 | 24.5 | 22.7 | ***25.8*** |
| Somewhat negative | 19.7 | 11.9 | 12.0 | 15.5 | 15.1 | 20.5 | ***15.9*** |
| Very negative | 14.0 | 13.1 | 6.5 | 10.1 | 20.9 | 15.2 | ***13.6*** |

Overall desire to use flying cars was evaluated on a 101-point scale, with the following three anchor points: 0: *definitely do not want to use a flying car;* 50: *neutral;* and 100: *definitely want to use a flying car.* The median response was 60, while the 25$^{th}$ and 75$^{th}$ percentiles were 24 and 81, respectively (see Table 20). The median responses indicate that males wanted to use flying cars more than females, and that overall desire to use flying cars increased with decreasing age.

Table 20
Overall desire to use flying cars. (The entries are based on a 0-100 point scale.)

| Response | Gender | | Age | | | | ***Total*** |
|---|---|---|---|---|---|---|---|
| | Female | Male | 18-29 | 30-44 | 45-59 | 60+ | |
| 25$^{th}$ percentile | 14 | 44 | 50 | 40 | 3 | 13 | ***24*** |
| 50$^{th}$ percentile (median) | 51 | 70 | 68 | 65 | 60 | 50 | ***60*** |
| 75$^{th}$ percentile | 75 | 90 | 90 | 85 | 80 | 75 | ***81*** |

## Key Findings

- About two-thirds of respondents were familiar with the concept of flying cars prior to participating in this survey.
- Three-quarters of respondents ranked shorter travel time as the most likely benefit of flying cars (out of four likely benefits that were evaluated).
- About three-fifths of respondents were *very concerned* about the overall safety of flying cars.
- About four-fifth of respondents considered having a parachute for flying cars (not the individual occupants) to be either *extremely important* or *very important*.
- About three-fifth of respondents selected electricity as the preferred energy source for flying cars.
- About two-fifths of respondents preferred a minimum range of 400 miles (the most frequently selected range) for flying cars before needing to be refueled or recharged.
- About half of respondents indicated that they would be interested in attending training for obtaining an appropriate pilot license if 20 flight-training hours were required.
- Vertical takeoff and landing (like a helicopter) was preferred over a straight, flat strip (like an airplane) by about 5 to 1.
- A seating capacity of 3-4 people was the most preferred option for flying cars.
- For taxi-like versions, fully autonomous flying cars (self-driving and self-flying) were preferred over those operated by a professional with an appropriate pilot license.
- For personally owned versions, fully autonomous flying cars (self-driving and self-flying) were also preferred over those operated after obtaining an appropriate pilot license.
- About a quarter of respondents considered a purchase price of $100,000 to $200,000 to be *definitely affordable*.
- About a third of respondents considered flying-car insurance costing two times current typical car insurance to be *definitely affordable*.
- General opinions concerning flying cars were *very positive* for about a sixth of respondents, and most respondents have a desire to use them.
- Males tended to have more positive general opinions about flying cars than females, and positive ratings increased with decreasing age.

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# Appendix: Questionnaire

### Flying-car survey

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**INTRODUCTION**

We are performing a survey of people's opinions and preferences concerning a technology that, until recently, sounded like science fiction: flying cars. However, substantial efforts are now being devoted by several companies with a goal to make flying cars a reality. For example, Airbus (a major aerospace company that manufactures large commercial aircraft) recently announced that it plans to test a prototype of a flying car by the end of this year.

Because flying cars are still only prototypes, we can only give you some general information about the concept:

First, in addition to a driver's license, operating a flying car would require a pilot's license (exactly what type has not yet been decided).

Second, for takeoffs and landings, manufacturers are exploring two basic options:

- a straight, flat runway (like an airplane)
- vertical takeoffs and landings (like a helicopter)

Third, flying cars might be either personally owned, or owned by companies or governments that would offer taxi-like transportation.

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Q1. Had you ever heard of flying cars before participating in this survey?

☐ Yes

☐ No

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Q2. How concerned are you about the following issues related to flying cars?

Please rate your concern for each issue using the following scale:

1 = Very concerned
2 = Moderately concerned
3 = Slightly concerned
4 = Not at all concerned

Overall safety: ____

Learning to use a flying car: ____

Performance of flying cars at night: ____

Performance of flying cars in poor weather: ____

Performance of flying cars in congested airspace: ____

Q3. Please rank the following in terms of the likely benefits of flying cars (compared to conventional cars) from (1) the most likely benefit to (4) the least likely benefit.

____ Shorter travel time

____ Lower emissions

____ Fewer crashes

____ Better fuel economy

Q4. How important it is for you that a flying car have a parachute in case of an emergency? This would be a parachute for the vehicle itself, not for the individual occupants.

- ☐ Extremely important
- ☐ Very important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not at all important

Q5. Which source of energy would you prefer for flying cars?

Please select one option:

- ☐ Gasoline (or diesel)
- ☐ Electric
- ☐ Other (please specify): _____

Q6. In your opinion, what would be a reasonable minimum range for flying cars before needing to be refueled or recharged?

Please select one option:

- ☐ 200 miles
- ☐ 400 miles
- ☐ 600 miles
- ☐ 800 miles

Q7. It is not yet clear how many flight-training hours would be required to obtain a license to operate flying cars.

For each number of possible flight-training hours required, please indicate your level of interest in attending training for that length using the following scale:

1 = Definitely interested
2 = Moderately interested
3 = Slightly interested
4 = Not at all interested

20 hours: ____

30 hours: ____

40 hours: ____

50 hours: ____

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For each set of options, please select your top choice.

Q8. Take-off and landing requirement:

- ☐ Straight, flat strip (like an airplane)
- ☐ Vertical (like a helicopter)

Q9. Seating capacity:

- ☐ 1-2 people
- ☐ 3-4 people
- ☐ 5-8 people

Q10. **For taxi-like versions:**

For the following questions, please rate your level of interest using the following scale:

1 = Not at all interested
2 = Slightly interested
3 = Moderately interested
4 = Very interested

How interested would you be in riding in a flying vehicle if...

...a professional with an appropriate pilot license operated it? ____

...it were operated fully autonomously (self-driving and self-flying)? ____

Q11. **For personally owned flying cars:**

For the following questions, please rate your level of interest using the following scale:

1 = Not at all interested
2 = Slightly interested
3 = Moderately interested
4 = Very interested

How interested would you be in operating a personally owned flying car if...

...it required an appropriate pilot license and you operated the flying car yourself? ____

...it were operated fully autonomously (self-driving and self-flying)? ____

Q12. **For personally owned flying cars:**

It is not yet clear how much flying cars will cost. For each range of prices listed, please rate the level of affordability for you using the following scale:

1 = Definitely affordable
2 = Probably affordable
3 = Probably not affordable
4 = Definitely not affordable

$100,000-$200,000: ____

$200,000-$400,000: ____

$400,000-$600,000: ____

$600,000-$1,000,000: ____

Q13. **For personally owned flying cars:**

Insurance for flying cars will be more expensive than for conventional cars. For each multiple of the current cost of typical car insurance listed below, please rate the level of affordability for you using the following scale:

1 = Definitely affordable
2 = Probably affordable
3 = Probably not affordable
4 = Definitely not affordable

2 x insurance cost: ____

4 x insurance cost: ____

6 x insurance cost: ____

Q14. Overall, what is your general opinion regarding flying cars?

- ☐ Very positive
- ☐ Somewhat positive
- ☐ Neutral
- ☐ Somewhat negative
- ☐ Very negative

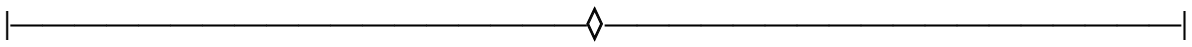
Q15. Using the slider below, please indicate how much you generally want to use a flying car.

*[The online survey presented a slider, initially centered at 50, that allowed respondents to slide the marker to any number from 0 to 100.]*

**0: Definitely do not want to use a flying car**

**50: Neutral**

**100: Definitely want to use a flying car**



**CONCLUSION**

**Thank you for participating in this survey!**