

# AUTONOMOUS VEHICLES



*In June 2016, the State Farm Mutual Automobile Insurance Company (State Farm®) Strategic Resources Department conducted an online survey with adults 18 or older to examine drivers' knowledge, attitudes, and potential behaviors regarding autonomous and semi-autonomous vehicles. This survey was the second iteration of a study first conducted in September 2013. This report highlights findings from this research.*

## Summary

Awareness of self-driving vehicles is higher than ever. Despite this increased awareness, drivers today are not any more interested than drivers in 2013 in purchasing a self-driving vehicle if they were to become widely available. Drivers are, however, more confident in the ability of self-driving vehicles to navigate safely without any human involvement. Still, few respondents would be "very comfortable" with vehicles driving themselves, whether as a driver or a passenger. Neither interest in nor perceived usefulness of fully autonomous technology increased from 2013 to 2016.

Although fully self-driving vehicles are years away, vehicles with automated features are already available. From adaptive headlights to drowsy-driver detection systems, at least seven out of ten respondents have heard of the technologies, and many express interest in having a vehicle that uses these technologies. When it comes to purchasing a vehicle with automated features, training is seen as important. When given a choice, most drivers would prefer this training come from a car dealership.

A perceived reduction in the amount of effort and attention required of drivers of semi-autonomous vehicles may lull drivers into a false sense of security. As evidence of this, respondents indicated that they'd be more likely to engage in distracted-driving behaviors, such as texting and updating social media, while behind the wheel of a semi-autonomous vehicle when the vehicle is driving itself. However, situations will almost certainly arise in which an automated vehicle must relinquish control back to the driver. This could lead to hazardous conditions and should be a primary concern in the volatile road to fully self-driving vehicles.

## **Compared to three years ago, considerably more drivers have heard of self-driving vehicles.**

After reading a short description of autonomous/self-driving vehicles, 87 percent of respondents said they had heard of these types of vehicles, which is significantly more than the 2013 result of 74 percent. In fact, every age group saw significant increases in awareness from 2013 to 2016.

## **Despite increased awareness, respondents in 2016 are no more likely to express interest in purchasing a fully autonomous vehicle than respondents in 2013.**

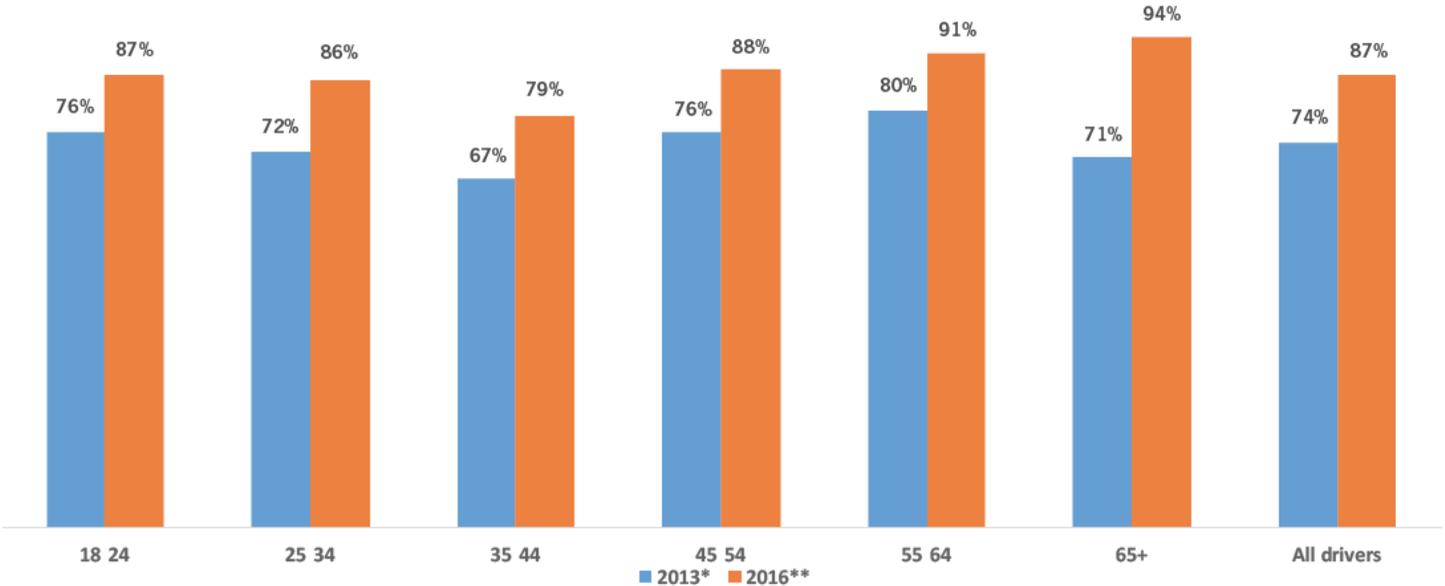
About one in five respondents said they would likely purchase a fully autonomous vehicle if they were widely available in the marketplace, while more than half were unlikely to do so. This pattern mirrors interest in purchasing fully autonomous vehicles three years ago. Male, as well as younger, respondents expressed more interest in purchasing these vehicles than female, and older respondents, respectively.

## **However, this year's respondents are slightly more confident in the ability of self-driving vehicles to safely navigate on their own than respondents in 2013.**

In 2016, 23 percent expressed confidence in autonomous vehicles navigating safely without human involvement, compared to 19 percent in 2013. Meanwhile, rates of respondents who expressed not being confident fell from 48 percent in 2013 to 38 percent in 2016. Younger respondents and men were more confident in self-driving vehicles than older respondents and women. Not surprisingly, confidence and purchase interest are related. Those who expressed more confidence were also more likely to say they would purchase a self-driving vehicle if they were to become widely available. Income level and type of area one lives in (e.g., small town, large metropolitan area) had little impact on awareness of, purchase interest, or confidence in self-driving vehicles. It is worth noting that this survey took place approximately one month after a highly publicized Tesla crash in May 2016, which may have impacted these results.

*“Auto manufacturers are continuously introducing vehicles with new features. An autonomous/self-driving vehicle will be a vehicle that is capable of sensing its surroundings and navigating without human intervention. Autonomous vehicles would use hardware such as radar, GPS, computer vision, and advanced control systems to survey the vehicle’s surroundings, identify traffic patterns and potential obstacles, and steer the vehicle from one location to another without driver involvement. Autonomous vehicles could also use sensors and wireless technology to communicate with other nearby vehicles (even those out of the driver’s view), as well as nearby signage and roadway.”*

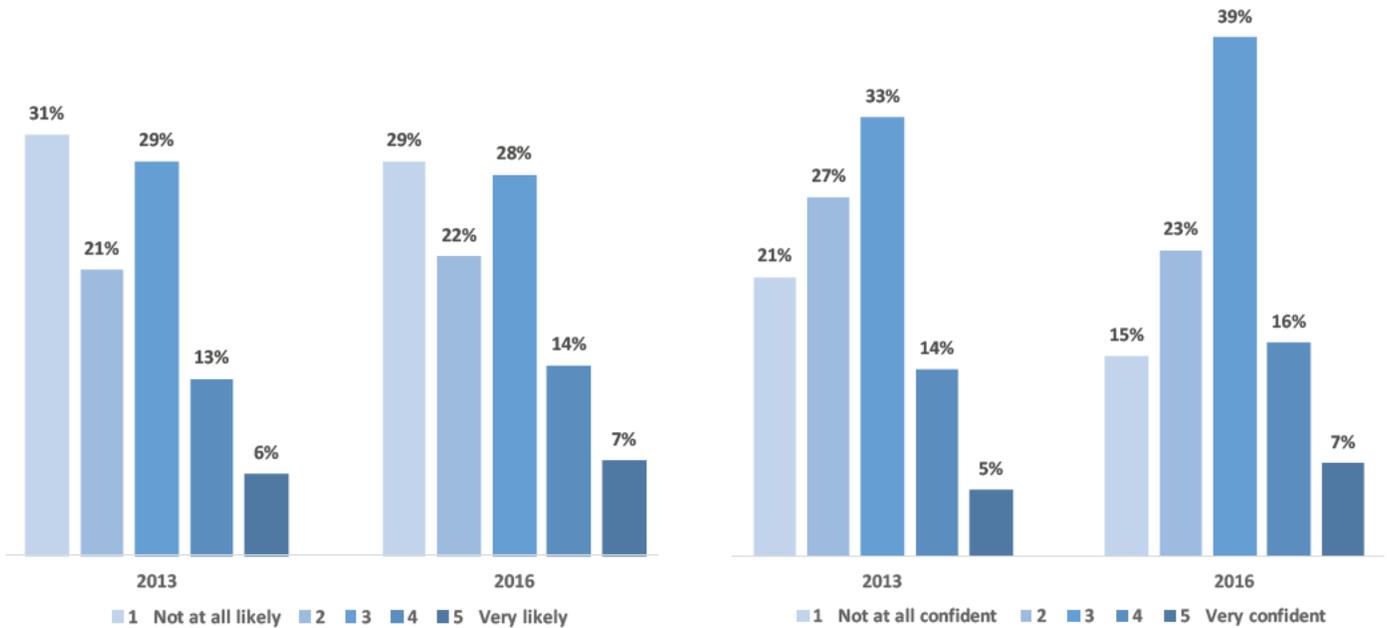
*“Prior to reading this description, had you heard of autonomous/self-driving vehicles?”*



Percentage of respondents who answered “yes.” The other response options for this survey item were “No” and “Don’t know.” Those who chose “Don’t know” were excluded from this analysis. Only respondents who reported having a valid driver’s license were used in the analyses in this report. \*N = 951 \*\*N = 948

*“How likely do you think you would be to purchase a fully autonomous vehicle if they were widely available in the marketplace?”*

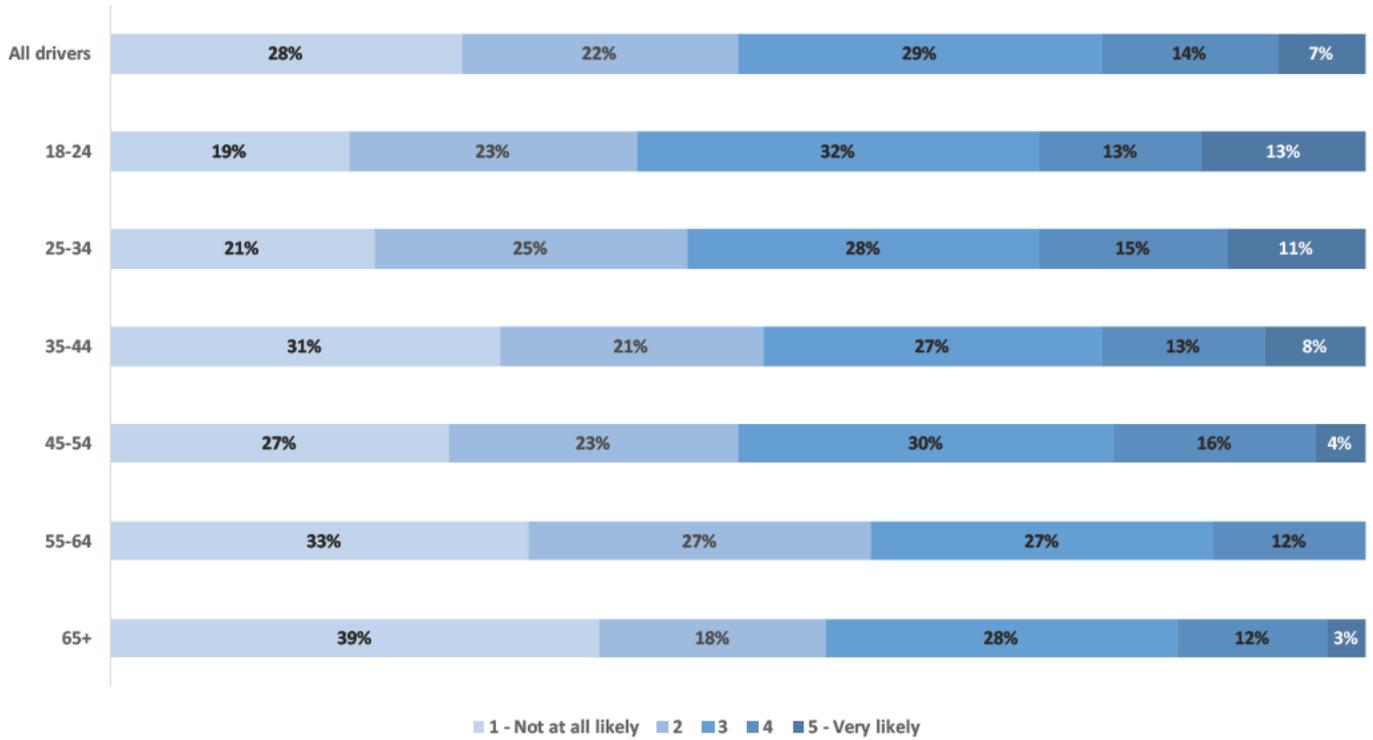
*“How confident are you in the ability of a fully autonomous vehicle to safely navigate from one location to another without any human involvement?”*



Ns range from 961 to 971

*“How likely do you think you would be to purchase a fully autonomous vehicle if they were widely available in the marketplace?”*

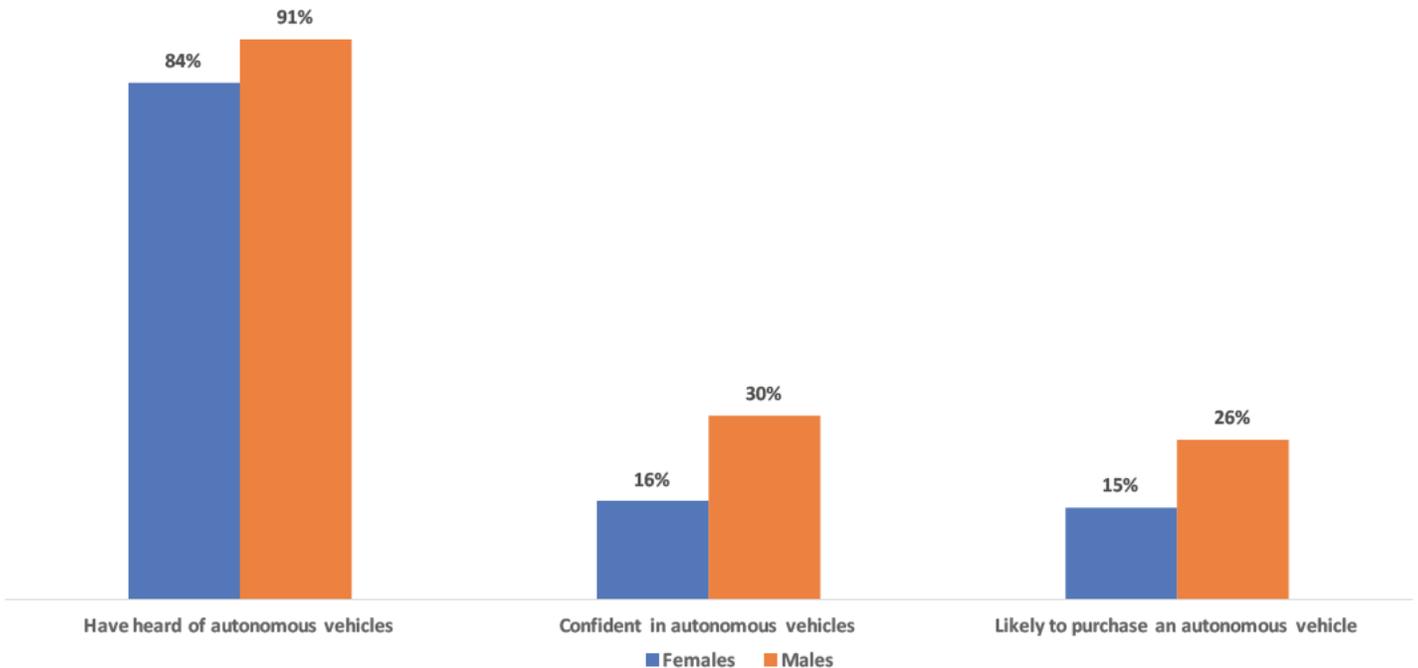
**By Age**



2016 data only, N = 961

Percentage of respondents who have heard of, are confident in, and say they would likely purchase an autonomous vehicle.\*

**By Gender**



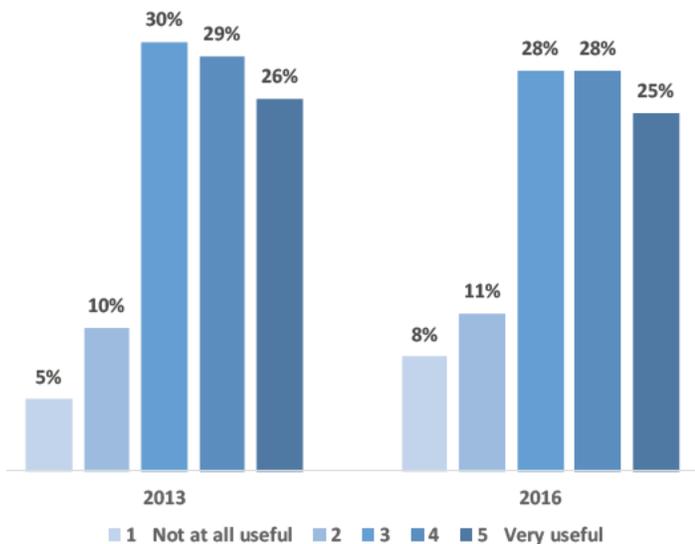
\*The full questions can be found on page 2.

**Roughly half of respondents think vehicle-to-vehicle technology would be useful in increasing vehicle safety and would be interested in having a vehicle with this technology.**

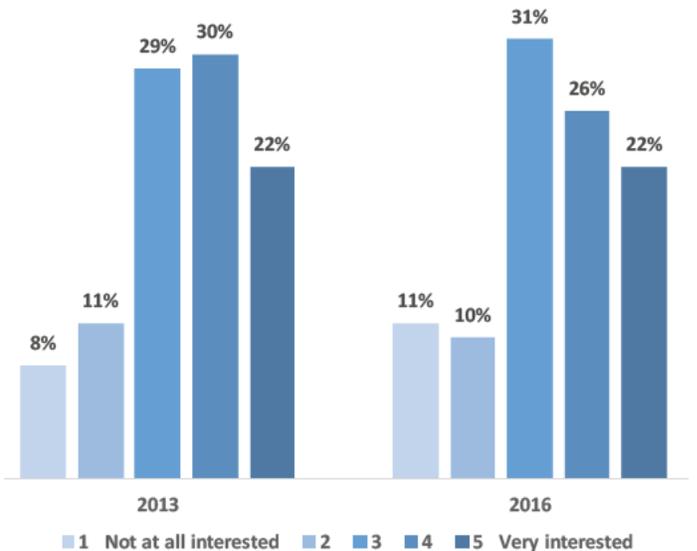
Fully autonomous vehicle technology can be broken down into two categories: Vehicle-to-vehicle technology, which allows the vehicle to communicate with other nearby vehicles, and vehicle-to-infrastructure technology, which allows vehicles to communicate with nearby signs, buildings and roadways. After reading a short description, 53 percent of respondents said vehicle-to-vehicle technology would be useful in increasing vehicle safety, compared to 19 percent who said it would not. Similarly, 48 percent of respondents expressed interest in having this technology in their vehicle, while only 21 percent were not interested. Overall, both interest and perceived usefulness in vehicle-to-vehicle technology remained consistent from 2013 to 2016.

*“Suppose a car could be equipped with technology that would allow the vehicle to communicate with other nearby vehicles (even those out of your view). Such **vehicle-to-vehicle technology** could help you avoid a car crash or assist you in your everyday driving (for example, optimizing gas mileage).”*

*“How useful do you think **vehicle-to-vehicle** technology would be in improving overall vehicle occupant safety?”*



*“How interested would you be in having such **vehicle-to-vehicle** technology on a vehicle?”*



Ns range from 961 to 971

## Interest in and perceived usefulness of vehicle-to-infrastructure technology has declined since 2013.

After reading a short description, 54 percent of respondents said this technology would be useful in increasing safety, compared to 18 percent who said it would not. Perceived usefulness of vehicle-to-infrastructure technology declined from three years ago, in which 58 percent found this technology useful while only 13 percent did not. Similarly, 49 percent of respondents expressed interest in having this technology in their own vehicle compared to 55 percent in 2013. Likewise, 21 percent were decidedly not interested, compared to only 16 percent in 2013.

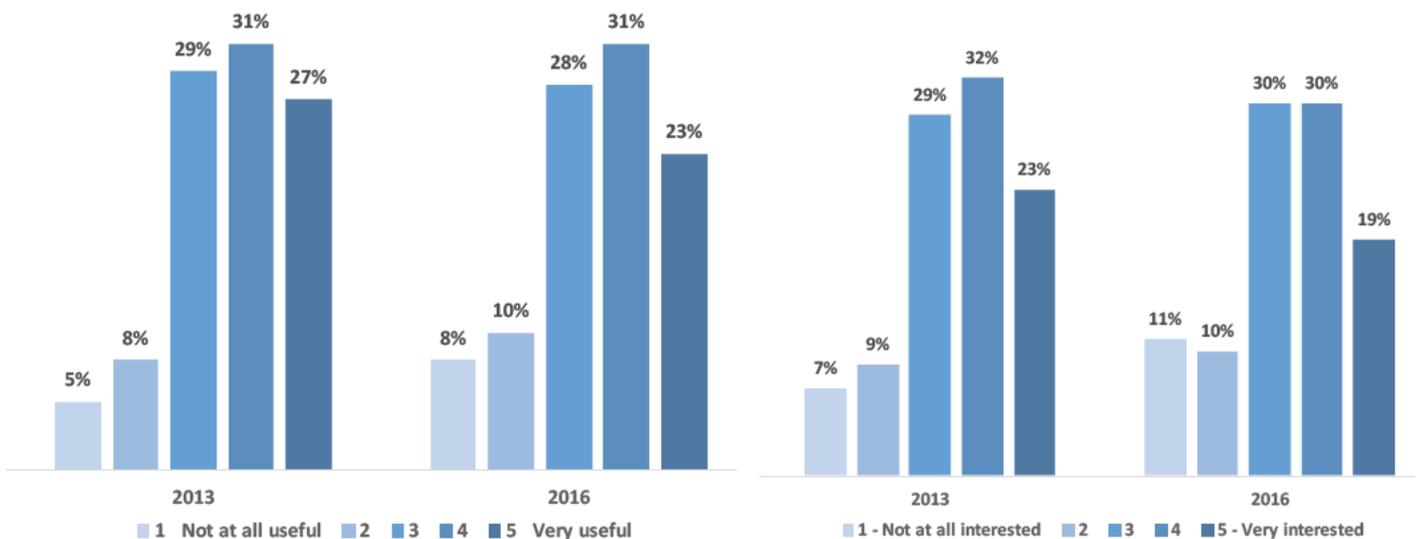
## Age plays a role in both interest in and perceived usefulness of both types of autonomous technology.

Younger respondents were more interested in both vehicle-to-vehicle and vehicle-to-infrastructure technology, as well as more likely to think these technologies would be useful than older demographics. In addition, perceived usefulness and interest were strongly related. In general, the more useful respondents found these technologies, the more likely they were to express interest in having it in their own vehicle.

*“Suppose a car could be equipped with technology that would allow the vehicle to communicate with nearby signs, buildings, and/or intelligent roadway (i.e., **vehicle-to-infrastructure** technology). Such vehicle-to-infrastructure technology could help you avoid a car crash or assist you in your everyday driving (for example, finding a parking space or warning you of hazardous road conditions).”*

*“How useful do you think **vehicle-to-infrastructure** technology would be in improving overall vehicle occupant safety?”*

*“How interested would you be in having such **vehicle-to-infrastructure** technology on a vehicle?”*



Ns range from 961 to 971

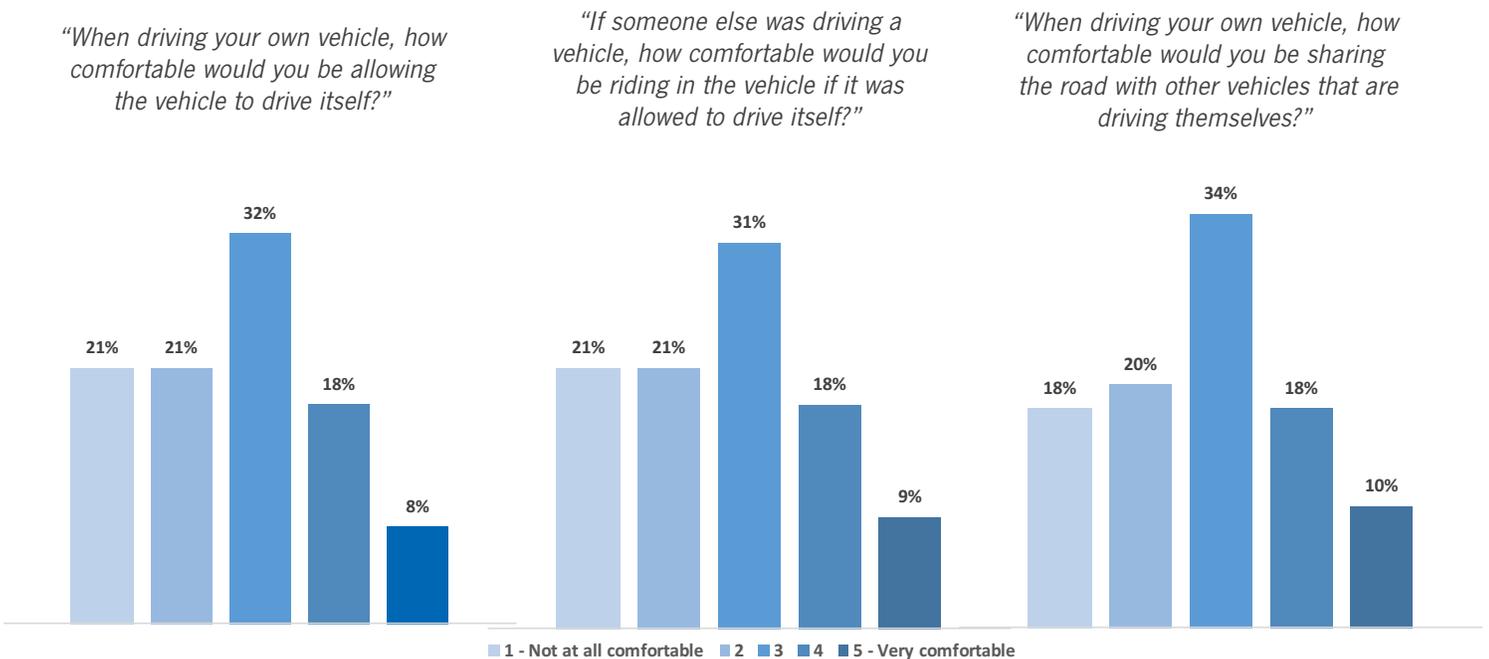
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**Regardless of whether respondents were drivers, passengers, or simply sharing the road with others, few were comfortable with vehicles driving themselves.**

Less than one in ten respondents reported being “very comfortable” with allowing their vehicle to drive itself, whether as a driver or a passenger. Similarly, only one in ten respondents reported being “very comfortable” with sharing the road with other vehicles that are driving themselves.\*

**Age, familiarity with self-driving cars in general, and knowledge of autonomous vehicle technologies are all related with comfort.**

Younger respondents and those who had heard of self-driving vehicles prior to the survey reported being more comfortable with vehicles driving themselves in all three categories (driver, passenger and sharing the road). Overall level of knowledge on individual technologies (e.g., backup assistance, adaptive headlights, etc.) was also significantly related to comfort in all three situations.

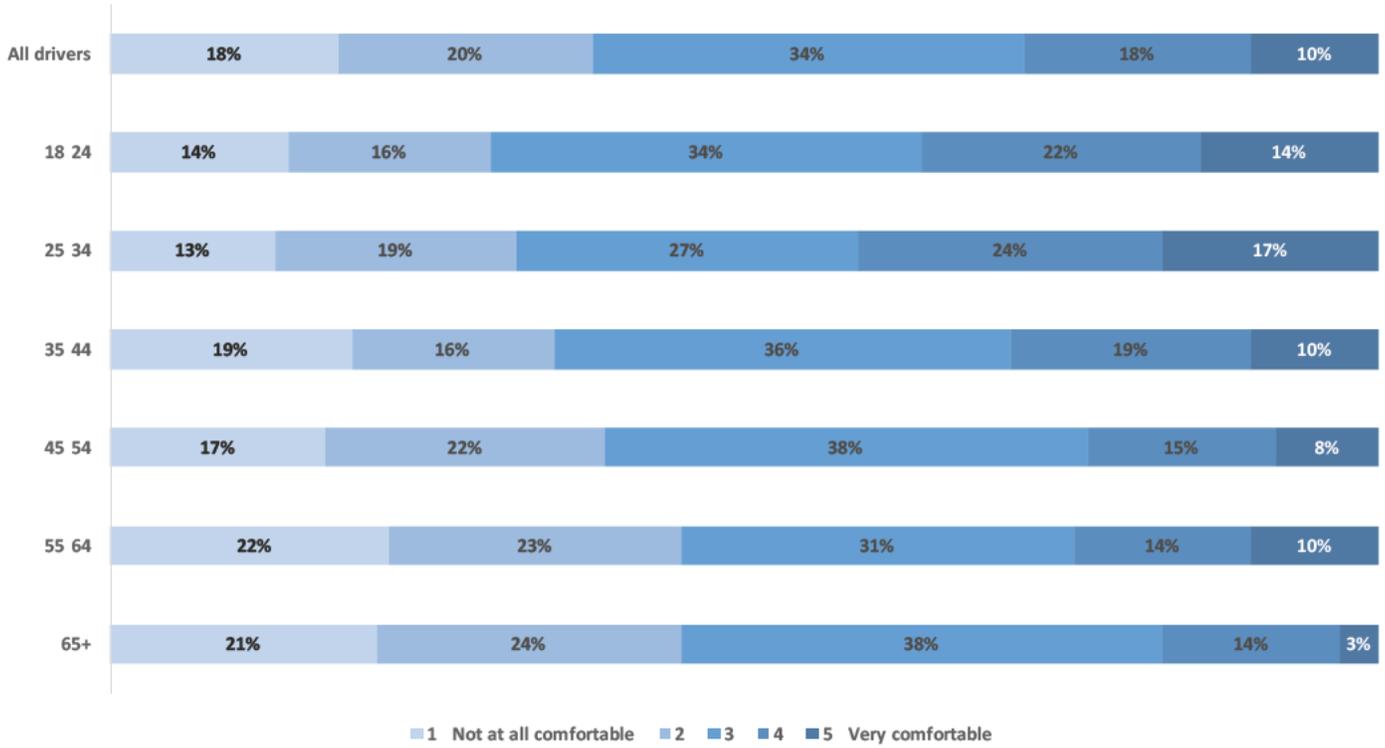


Note: The other response option for these survey items was “Don’t know.” Those who chose this option were excluded from these analyses. Ns range from 905 to 917

\*This, and all subsequent survey items were added this year. Thus, no comparisons between 2013 and 2016 can be made.

*“When driving your own vehicle, how comfortable would you be sharing the road with other vehicles that are driving themselves?”*

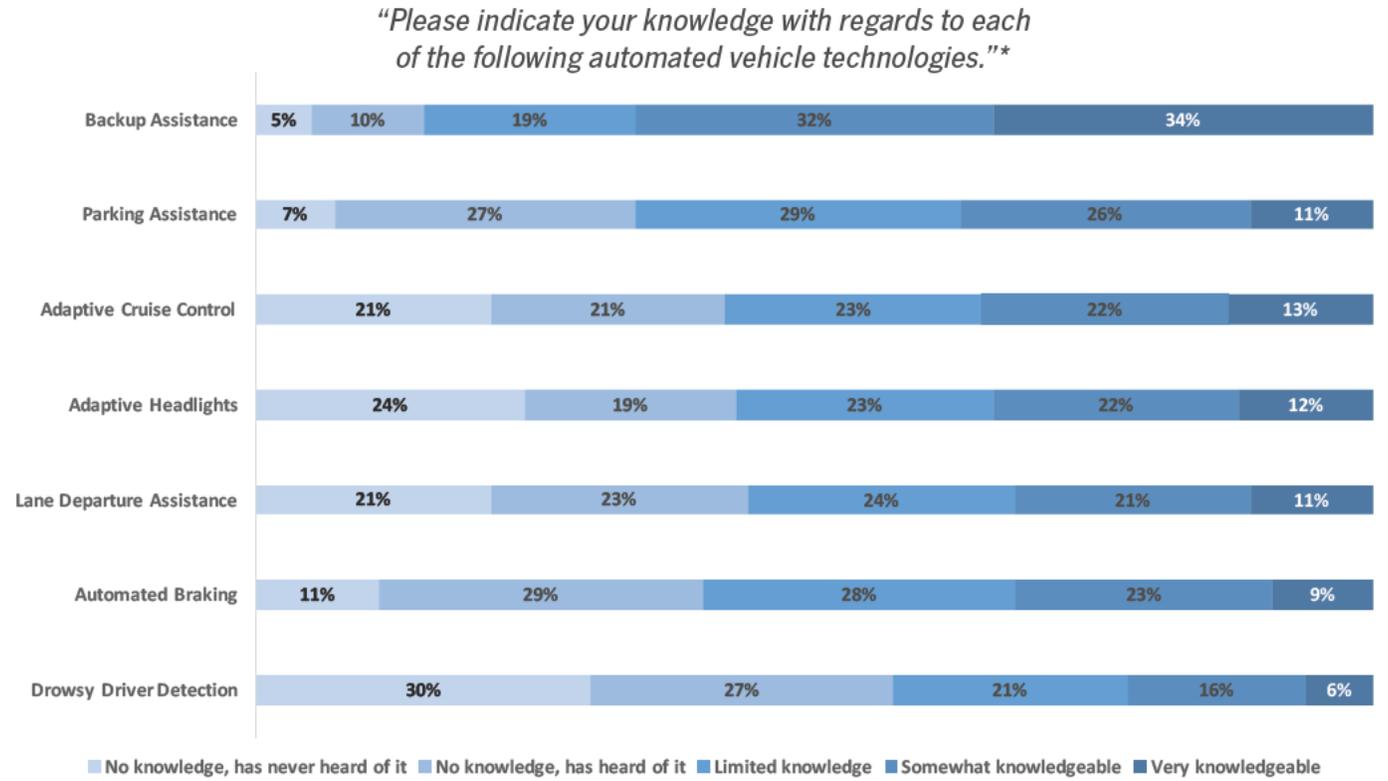
### By Age



N = 961

**Although fully autonomous vehicles are years away, vehicles with autonomous features are already available and most respondents are knowledgeable about many semi-autonomous vehicle features.**

The chart below shows some of the most common automated vehicle technologies available in today's vehicles. In general, most respondents were familiar with all of these technologies, with between 70 percent and 95 percent of respondents having at least heard of each kind of technology. The number of respondents who reported to be at least somewhat knowledgeable about these technologies ranged from 22 percent (drowsy-driver detection) to 66 percent (backup assistance).



\*Please see the appendix for the complete definitions of each kind of technology, as presented to respondents. N = 961

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## When it comes to desired functionality, drivers are most interested in backup assistance and drowsy-driver detection.

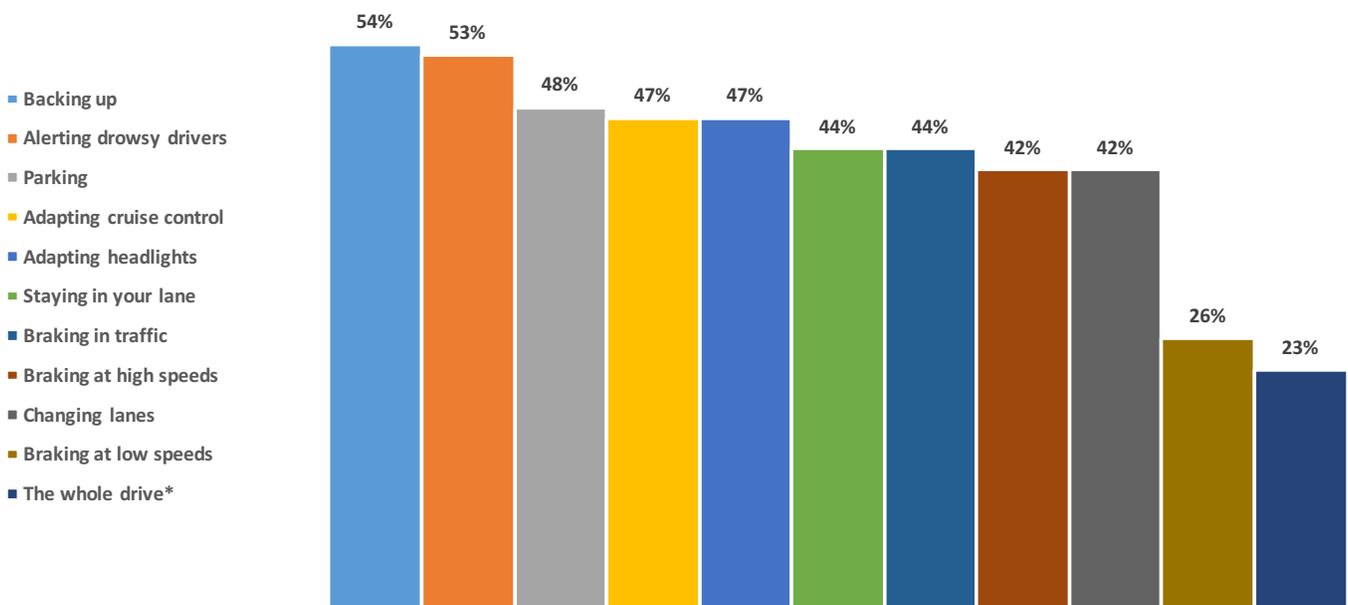
Over half of respondents reported a desire to have assistance with backing up and being alerted when drowsy. Only 26 percent expressed an interest in being assisted with low-speed braking and less than one in four wanted help with the whole drive.

On average, respondents aged 65 and older selected the most tasks to be assisted with, while respondents aged 35-44 selected the least number of tasks. Interestingly, despite respondents being the least knowledgeable about drowsy-driver detection, it was the second-most selected task that respondents were interested in having.

Interest in automated features varied by gender. Female respondents were significantly more likely to want a vehicle to automatically assist with parking, backing up, and changing lanes, while male respondents were more likely to desire assistance with braking at low speeds.

*“If you were to drive a vehicle that had some automated, self-driving technology in it, which driving tasks/maneuvers would you like your vehicle to automatically assist with?”*

### Percent of respondents who indicated a desire for each of the following automated tasks:



\*Other response options for this survey item included “Other, please specify \_\_\_\_” and “None of the above.” N = 961

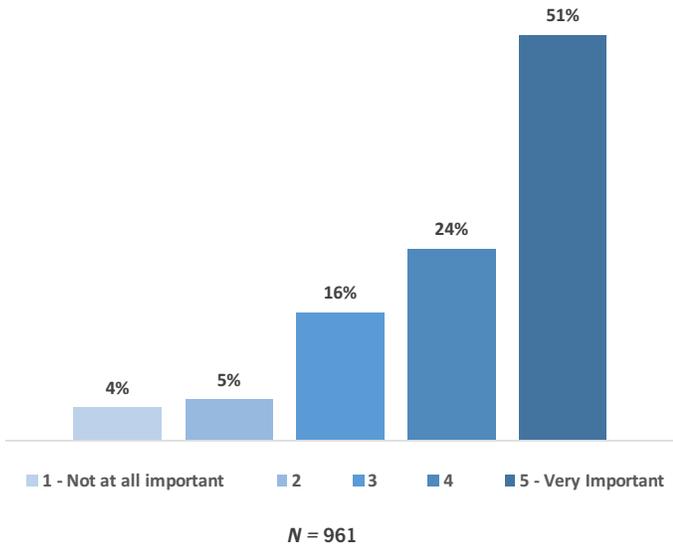
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## When purchasing a vehicle with autonomous features, training is important.

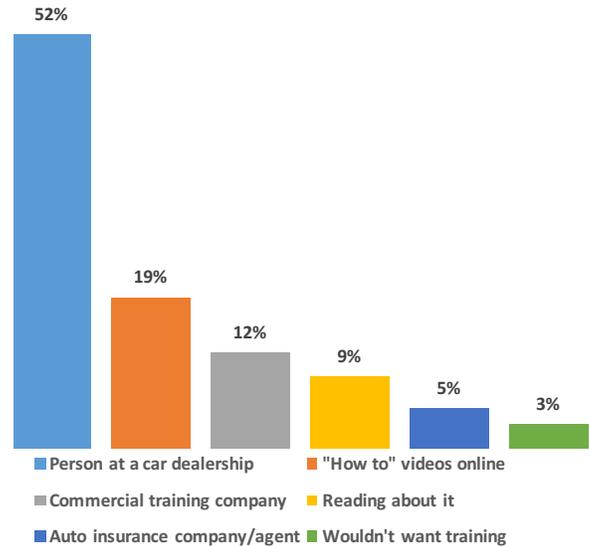
More than half of respondents said if they were considering purchasing a vehicle with autonomous features, it would be “very important” to receive training, while only four percent said that it would be “not at all important.” When drivers were given a choice, more than half wanted this training to come from a person at a car dealership. Presumably, this is so they could feel comfortable and avoid surprises on the way home, not have to wait for training, and to avoid the hassle of going through a commercial driver’s training and education company. Only three percent of respondents indicated they would not want training at all and would prefer to learn as they drive.

Age is significantly related to perceived importance of training. In general, older respondents reported considering training more important than younger people. Respondents age 65 and older were especially likely to endorse training as “very important” (64 percent) and want that training to come from a car dealership (64 percent).

*“If you were considering purchasing a vehicle with one or more automated technologies in it, how important would it be to receive training on how to use the technology?”*



*“If you wanted to learn how to operate a vehicle with automated vehicle technology, how would you most prefer to receive training?\**”



\*The other response option for this survey item was “Other, please specify \_\_\_\_.” Those who utilized this option were excluded from this analysis. Only one response option was allowed. N = 951

## Drivers are likely to engage in other tasks when the vehicle is driving itself.

Until vehicles are completely autonomous and require no human involvement, there will almost certainly be circumstances in which the vehicle requires you to take over control of driving. The reduced effort and attention required of drivers of semi-autonomous vehicles may lull drivers into a false sense of security, making several distracted-driving behaviors more likely.

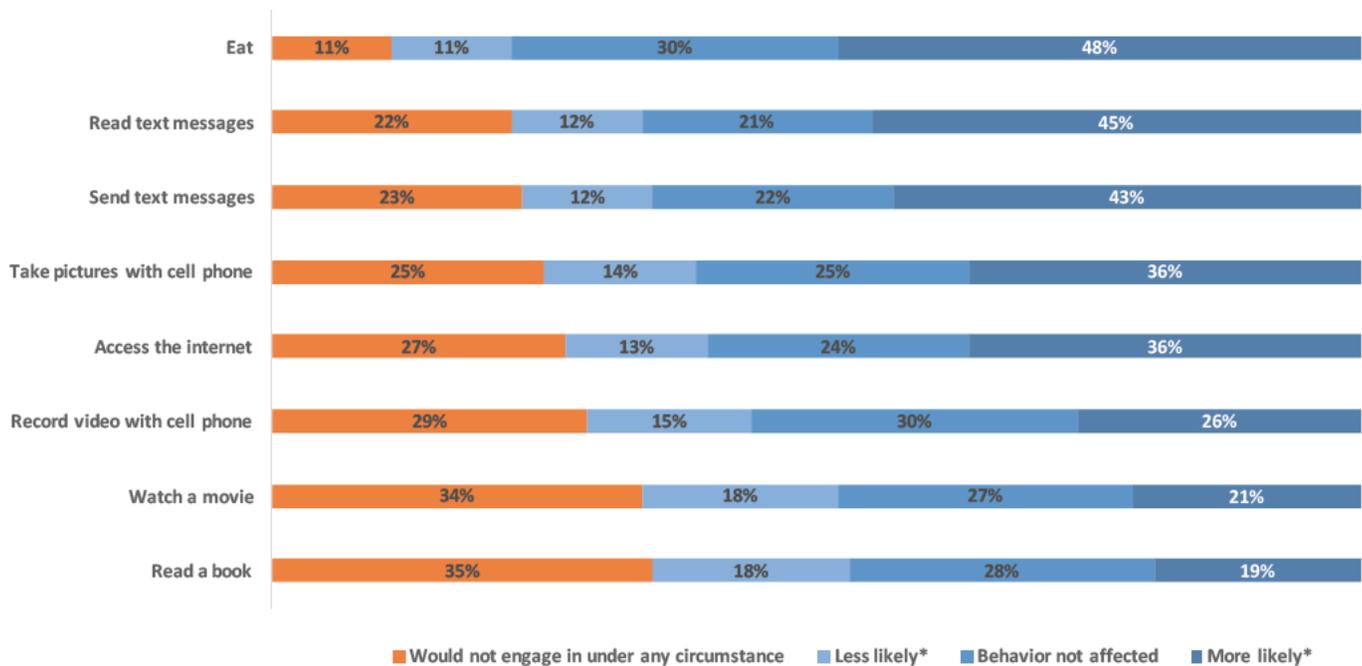
A greater number of respondents said they would be more likely to engage in each of the activities listed on the chart below, than less likely. Nearly half of respondents said they would be more likely to send and read text messages, as well as eat, during these situations.

The likelihood of engaging in these distracted-driving behaviors is positively related to the level of knowledge regarding the technologies listed on page 8 as well as respondents' comfort with self-driving cars in general.

Age plays a large role in these behavioral intentions. For example, 41 percent of respondents aged 18-24 said they would be more likely to watch a movie, while only four percent of respondents aged 65 and older said they would. Gender also plays a role in behavioral intentions. Male respondents indicated a stronger likelihood to read text messages, access the internet, record video with a cellphone, watch a movie, and read a book when the vehicle is driving itself than female respondents.

*"Suppose that you have the opportunity to drive a vehicle that has some autonomous, self-driving technology in it. In certain situations, such as driving on long stretches of highway, the vehicle can drive itself. However, while in those situations, there could be circumstances where the vehicle requires you to take over control of the driving (e.g., you encounter a congested section of road)."*

*"How much more, or less, likely would you be to engage in the following activities when the vehicle is driving itself compared to when you are driving the vehicle yourself?"*

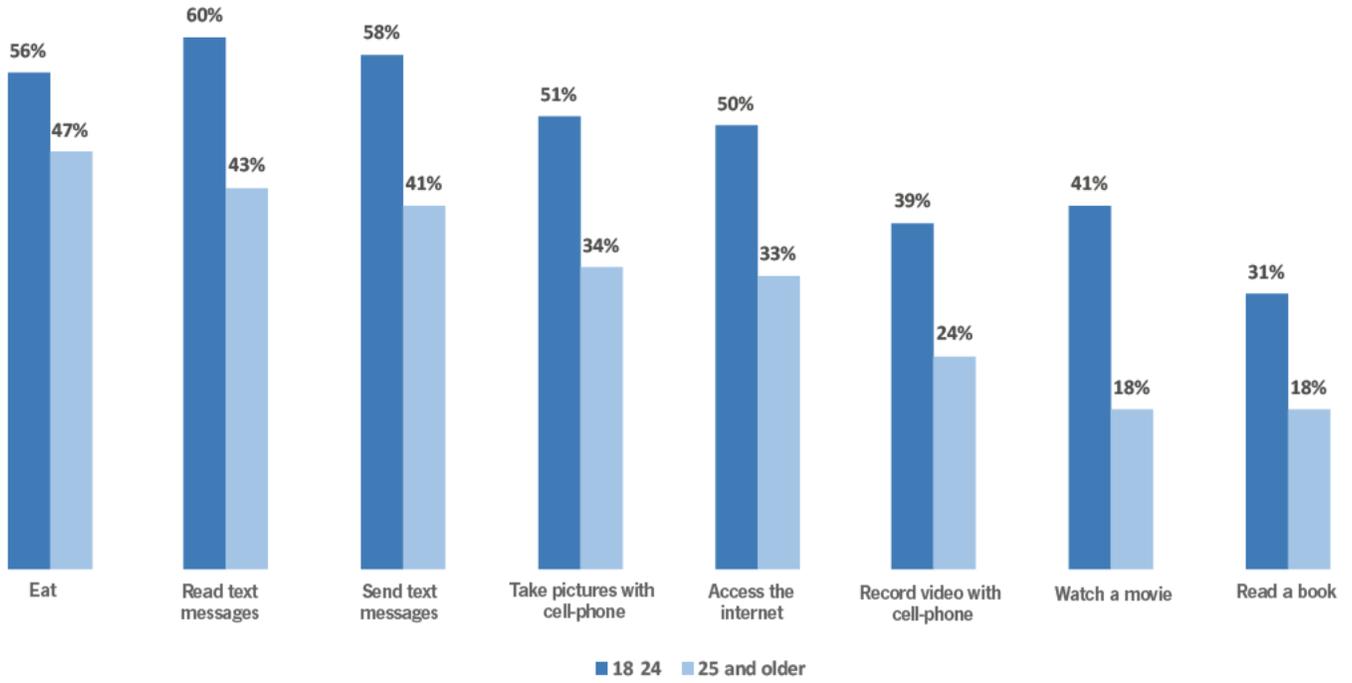


\*The "More likely" category is the result of combining the responses "A lot more likely to do when vehicle is driving itself" and "Somewhat more likely to do when vehicle is driving itself." Similarly, the "Less likely" category is the result of combining the responses "A lot less likely to do when vehicle is driving itself" and "Somewhat less likely to do when vehicle is driving itself." N = 961

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Percentage of respondents who would be “more likely”\* to engage in the following activities when the vehicle is driving itself

**By Age**

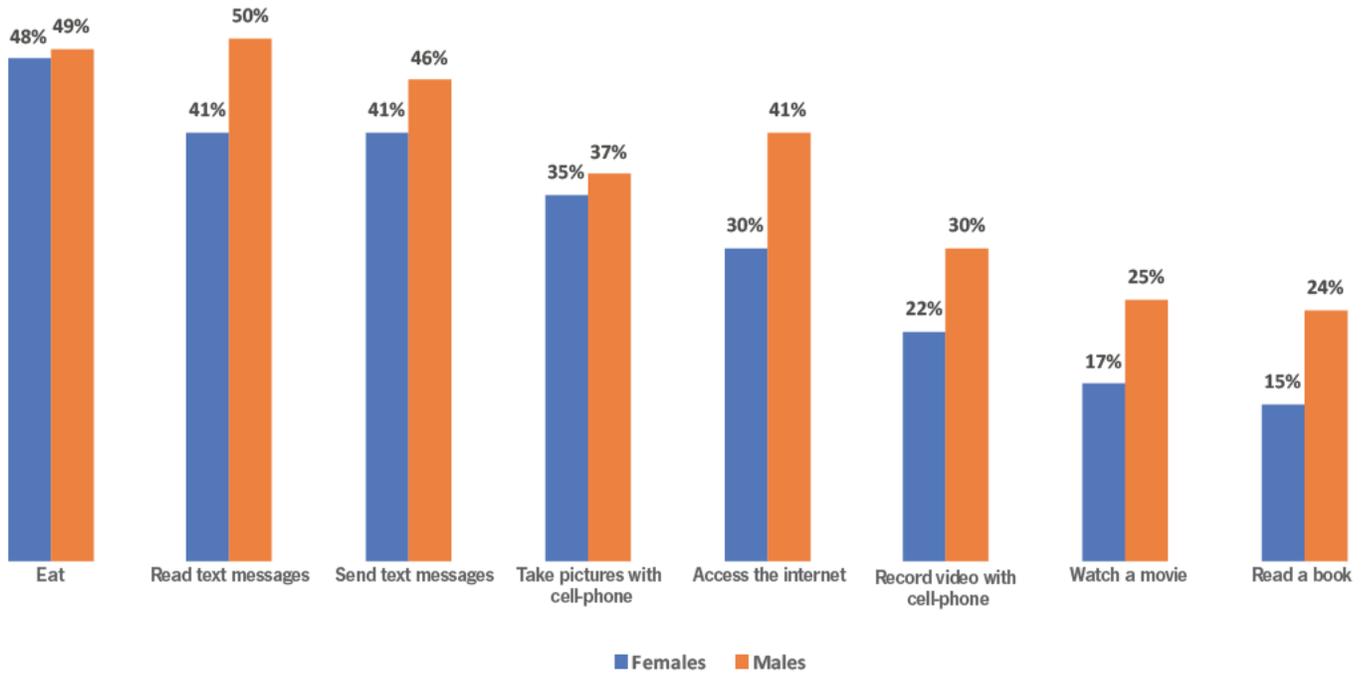


\*The “More likely” category is the result of combining the responses “A lot more likely to do when vehicle is driving itself” and “Somewhat more likely to do when vehicle is driving itself.” N = 961

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Percentage of respondents who would be “more likely”\* to engage in the following activities when the vehicle is driving itself

**By Gender**



\*The “More likely” category is the result of combining the responses “A lot more likely to do when vehicle is driving itself” and “Somewhat more likely to do when vehicle is driving itself.” N = 961

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## Methodology

In September 2013 and June 2016, the State Farm Strategic Resources Department used an outside panel vendor to conduct an online survey of U.S. consumers ages 18+. Survey responses were received from approximately 1,000 consumers each year, who identified themselves as having some insurance and financial responsibility for their household. Of the total respondents, only those who reported having a valid driver's license were used in the analyses in this report.

## Appendix

**Please indicate your knowledge with regards to each of the following automated vehicle technologies.**

- Backup assistance (e.g., sensors or camera to assist when backing up)
- Parking assistance (e.g., assistance with parallel parking)
- Adaptive cruise control (e.g., automatically adjusts speed to maintain a safe distance from other vehicles)
- Adaptive headlights (e.g., headlight brightness and area of focus changes as needed)
- Lane departure assistance (e.g., assistance to stay in your lane)
- Automated braking (e.g., the car brakes on its own)
- Drowsy-driver detection (e.g., sensors detect if driver is falling asleep and sets off warning devices)