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# The Future of Transportation Project

September 2017



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Digital Future

Center for the Digital Future

# The Future of Transportation Project

Jeffrey I. Cole, Ph.D.

Director, Center for the Digital Future at USC Annenberg School  
Founder and Organizer, World Internet Project

Brad Berens, Ph.D., Chief Strategy Officer and Project Lead

Michael Suman, Ph.D., Research Director

Phoebe Schramm, Associate Director

Liuning Zhou, Ph.D., Project Manager

Written by Harlan Lebo

Analyses (text in green boxes) by Brad Berens

Production editing by Monica Dunahee

Center for the Digital Future

# The Future of Transportation Project

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Email: [info@digitalcenter.org](mailto:info@digitalcenter.org)

Center for the Digital Future at USC Annenberg School  
11444 West Olympic Blvd, Suite 120  
Los Angeles, CA 90064  
(310) 235-4444  
[www.digitalcenter.org](http://www.digitalcenter.org)

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Center for the Digital Future

# The Future of Transportation Project

Welcome to the initial study conducted by the Center for the Digital Future on the impact of technology on Americans and their transportation.

Only two percent of the U.S. population use Uber, Lyft or similar "get-a-ride" services frequently; 67 percent never use them at all; the remaining 31 percent use them sometimes or rarely. If you are sufficiently interested in the future of transportation to be reading this report those numbers might surprise you given the pervasive press coverage of those companies. In the context of that coverage many people conclude that traditional taxi companies will soon be driven out of business with auto manufacturers following soon after as fewer people buy cars. The reality is less clear.

That is why we started the Future of Transportation Project, which expands the Center's unique longitudinal work on the impact of technology on American life. The results serve both as a reality check on the worldview constructed by the press and also as a source of actionable insight and inspiration.

Where most transportation research covers the transportation revolution from an industry perspective, we focus on the attitudes and behaviors of a representative sample of the U.S. population. Where most automotive research focuses only on car *buyers*, we are just as interested in Americans who don't have their own cars or who are thinking about giving up their cars.

The project goes far beyond Uber and Lyft and similar emerging services, and it also goes far beyond the document you are now reading, which represents only a slice of highlights from a national survey with 100 broad questions and specialized issues across demographics, geographies, gender, income level, and more.

We explore changes in long-standing forms of transportation including personal cars and public transportation, how Americans feel about technology companies like Apple and Google getting into the car business, what technologies they use and want in cars, how they feel about distracted driving and about the arrival of self-driving cars.

Perhaps most importantly, the Future of Transportation Project exists within the larger context of the Center's comprehensive, longitudinal "Surveying the Digital Future" study that started in 1999, as well as the impact of the digital revolution on a global scale (32 countries) with the World Internet Project (see Appendix 2). We are as interested in how the transportation revolution impacts the rest of the digital revolution as we are in how digital technologies affect transportation.

We hope this report becomes your first step into a partnership with us to explore these issues in more detail.



Jeffrey I. Cole, Ph.D.  
Director  
Center for the Digital Future at USC Annenberg  
Founder and Organizer, World Internet Project



Brad Berens, Ph.D.  
Chief Strategy Officer  
Center for the Digital Future at USC Annenberg  
Project Lead, Future of Transportation Project

Center for the Digital Future

## The Future of Transportation Project: Overview

This report represents only a sample of the findings from the Center's survey on transportation and technology. This study includes more than 100 questions and individual behavior statements, all of which can be analyzed based on:

- Age (and comparison of ages)
- Gender
- Income
- Education
- Region of the country
- Residence in urban vs. suburban settings
- Race/ethnicity
- Driver's license ownership
- Availability of public transportation
- Children in household
- Use of get-a-ride services
- Comparison of any these variables

For information about digging deeper into our findings, insights, and conclusions, please contact the Center at [info@digitalcenter.org](mailto:info@digitalcenter.org).

**Center for the Digital Future**  
**The Future of Technology Report**

**Highlights of findings**



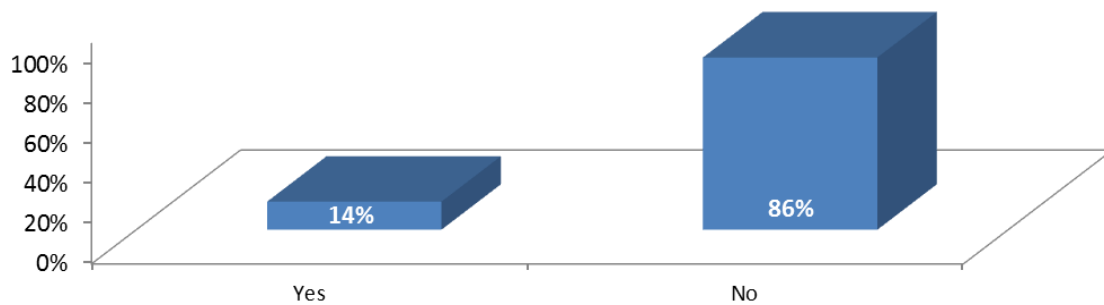
# Would Americans give up driving?

## 1. Have you considered giving up driving?

An overwhelming percentage of respondents with driver's licenses would not consider giving up driving.

### Have you considered giving up driving?

(Respondents with a driver's license)

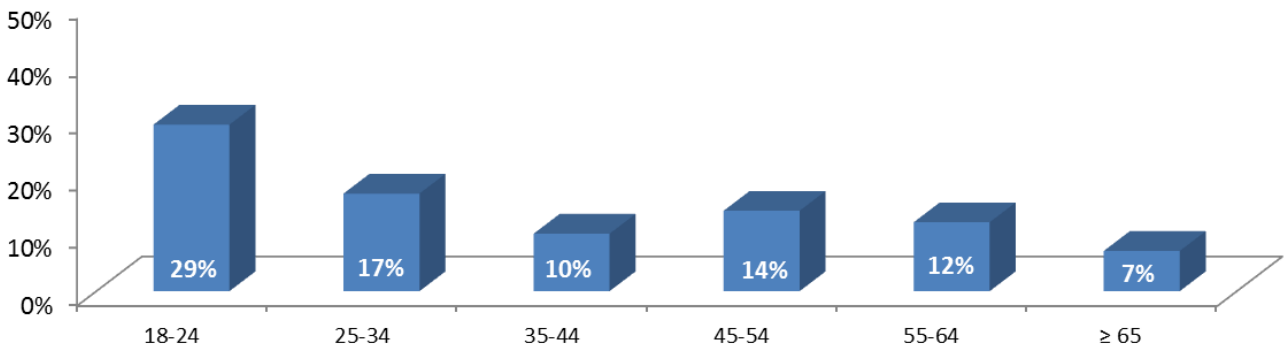


## 2. By age (Have you considered giving up driving?)

Surprisingly, younger respondents with driver's licenses (29 percent of those age 18-24) were more willing to consider giving up driving, compared to the 14 percent reported by respondents overall.

### Have you considered giving up driving?

(Respondents who said yes)



**Questions 1-2 Analysis:** You will find "Millennials don't care about owning cars" to be a popular idea in the press, although it is hard to disentangle Millennials having less money after the Great Recession of 2008 from a true generational difference in attitude about how important transportation is in a person's life, activities, and identity. In this chart, with the cohorts over 35 we see that driving is so baked into what it means to be an adult that, for example, an overwhelming 93 percent of Americans age 65 and older cannot imagine life without a car (despite the reality that the higher end of this age range is the population that should most consider giving up the car keys).

Chart #2 shows that it is really younger Millennials and Gen Z, the generation after Millennials, who are less committed to driving, with 29 percent of Americans age 18 to 24 open to giving it up altogether – that is 15 percentage points higher than the 14 percent total population.

The commonly-accepted description of Millennials defines their age range as 19 to 35 in 2017. So, it is misleading to talk about Millennial transportation preferences because there is a 12 percentage point difference between the 18-24 set and the next group, 25-34. (With Question 4, you will see the difference in response when we ask if Americans will give up owning a car rather than driving altogether.)

For most people 35 and older getting a driver's license at 16 was a key stepping stone into adult life, but the same cannot be said for a large percentage of younger people today.

– Brad Berens

### 3. Why have you considered giving up driving?

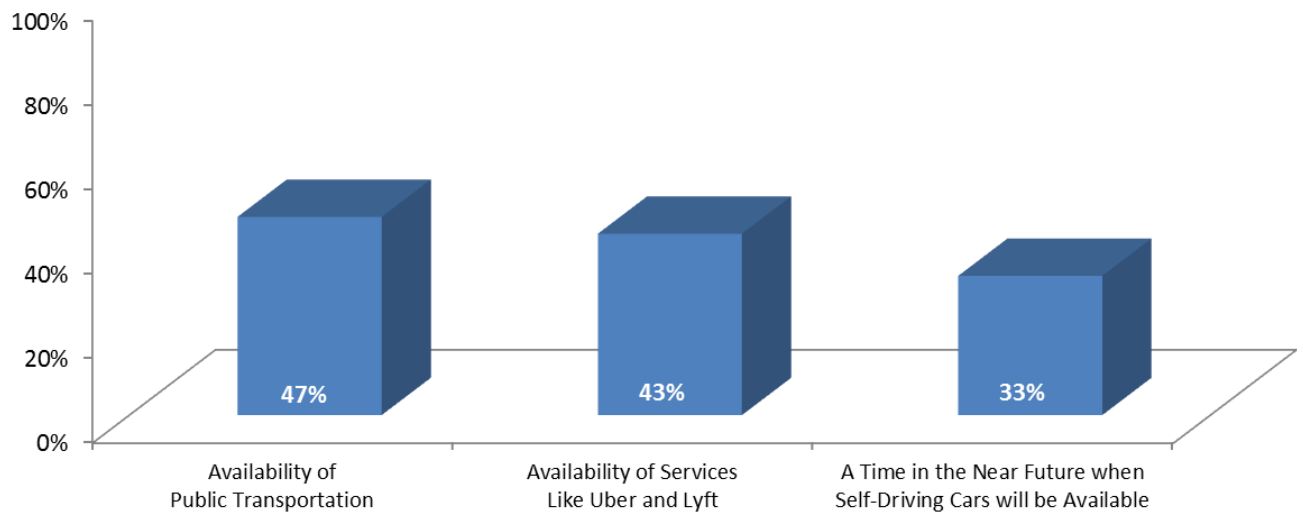
(Users of public transportation and get-a-ride services)

Why would some respondents give up driving? The availability of alternative transportation services – such as buses or subways, or get-a-ride services such as Uber or Lyft – is the primary reason why some respondents would stop driving. For instance, the largest percentage of respondents said they had considered giving up driving because they could use public transportation (47 percent).

However, a notable percentage of respondents cited emerging alternatives as reasons to consider giving up driving: 43 percent have considered giving up driving because of get-a-ride services such as Uber and Lyft, while one-third are looking to a time in the near future when self-driving cars are available.

#### Reasons for giving up driving – public transportation and get-a-ride services

(Respondents with a driver's license who have considered giving up driving)



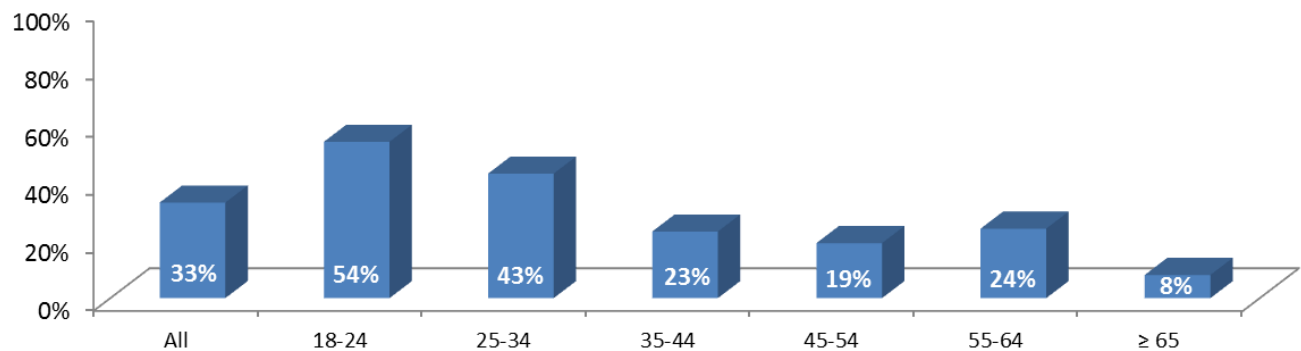
## 4. Interest in self-driving cars as a reason to consider giving up driving

Of the respondents who have considered giving up driving, one-third said they might do so when self-driving cars become available.

Younger drivers are more likely than older drivers to cite interest in self-driving cars as a reason to give up driving: for instance, more than twice the percentage of those age 18-24 (54 percent) compared to respondents age 55-64 (24 percent) would consider self-driving cars as an alternative to operating their own vehicle.

### Respondents with a license who would consider giving up driving when self-driving cars become available

(By age)



**4. Analysis:** In 2017, it is surprising that 33 percent of Americans factor in self-driving cars as they weigh whether or not to continue driving, because for the overwhelming majority of the people on the planet, self-driving cars are still a sci-fi fantasy rather than a day-to-day reality. (See "How driverless cars change EVERYTHING" later in this report.)

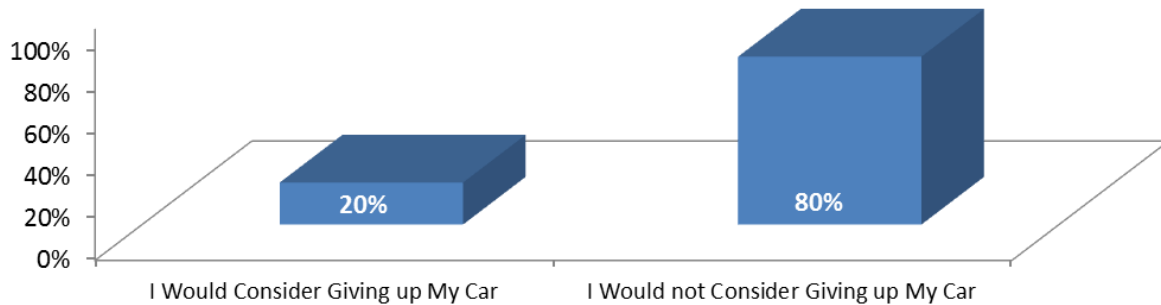
While 33 percent is surprising, the 54 percent of younger respondents (18-24) who would consider not driving (once self-driving cars are available) is downright astonishing.

Auto manufacturers should expect a significant decay in the traditional car-buying population, and their marketing departments need to start making a positive case for Americans to buy and own individual cars. Right now, the message of car advertisements is to buy **this** car, and that needs to change in order to include, "hey, you really should buy **a** car." In other words, although for many years there has been no difference between mobility and car ownership, those two concepts are beginning to separate in American minds.

## 5. Permanent alternatives to a personal car

When asked specifically about public transportation and a growing range of get-a-ride services or occasional-use car programs, 20 percent would consider giving up their own cars – this compared to 14 percent who would consider giving up driving for any reason (see #1).

**Would you use services such as Zipcar, Car2Go, Getaround, Uber, and Lyft, as well as public transportation, as a permanent alternative to having and using your own car?**  
(Respondents with a driver's license who have a car available)



**5. Analysis:** With only 20 percent of respondents open to giving up their cars, it looks like Americans are stuck to their steering wheels with Crazy Glue. Compare this 20 percent with the 14 percent of Americans with drivers licenses open to giving up driving altogether (see question #1): it seems like people want to preserve the option of driving, but they are growing skeptical of the expense and hassle of owning a car.

When we look at these results through the prism of age, we see that respondents between 18 and 44 have even higher consideration – up to 29 percent for ages 25 to 34.

Most notably, when we look at respondents who frequently or just sometimes use services like Uber, Lyft, ZipCar, or Car2Go, the 20 percent consideration **doubles** to 40 percent. Since only 16 percent of Americans use such services sometimes or frequently, this is not an acute threat to auto manufacturers in 2017, but what the 40 percent shows is that even dabbling with these services has a transformative impact on how people think about transportation. For the first time in many decades, declining to own a car is thinkable.

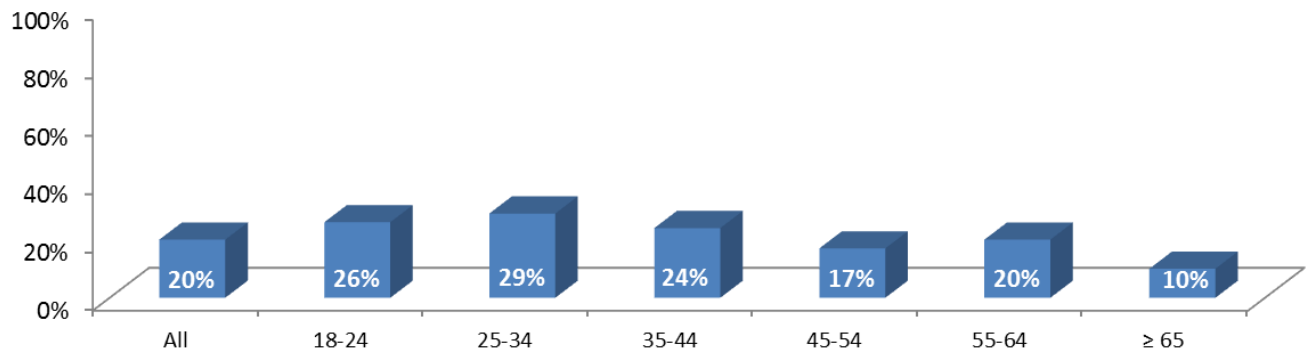
Whether or not Uber the company survives its current challenges, we believe that uberizing – frictionless ride hailing from a smart phone – is here to stay.

## 6. Permanent alternatives to a personal car (by age)

In general, as drivers get older, they are less willing to give up their cars for specific alternative transportation.

**Would you use services such as Zipcar, Car2Go, Getaround, Uber, and Lyft, as well as public transportation, as a permanent alternative to having and using your own car?**

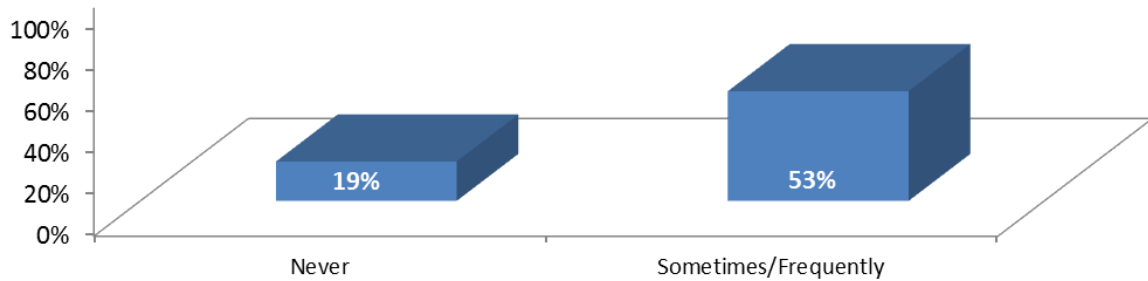
(By age: respondents with a driver's license who have a car available)



## 7. Interest in self-driving cars as a reason to consider giving up driving (Occasional or frequent use of get-a-ride services)

The use of get-a-ride services affects views about the possibility of giving up driving. More than half of those who sometimes or frequently use a get-a-ride service (53 percent) would consider giving up driving when self-piloted cars become available, compared to 19 percent who have never used get-a-ride that reported the same response.

**Respondents with a license who would consider giving up driving  
when self-driving cars become available**  
(By occasional or frequent use of get-a-ride services)



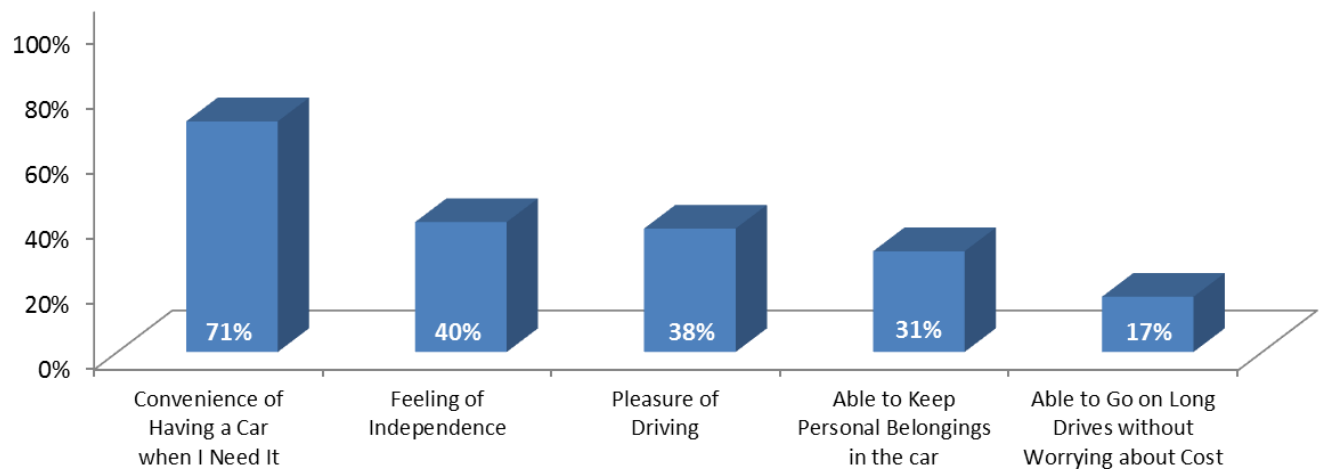
## 8. What do people who gave up their cars miss?

A very large percentage of respondents (71 percent) who no longer have a car missed the convenience of access to their vehicle.

The other largest percentages of respondents reported more subjective reasons for missing access to a car, such as the feeling of independence that driving gives them (40 percent) or the pleasure of driving (38 percent).

### Respondents who previously had access to a car but no longer do

(Top six reasons – multiple responses possible)





**8. Analysis:** *Future of Transportation Industry Fellow David Harris observed that this chart brings into focus what customers are really buying when they buy a car. They are buying time – the ability to go where they want, when they want in order to do what they want, from door to door.*

*But is it really more convenient to have your own car? As we explore the future of transportation the most important things to measure should not be mileage, safety, or aesthetics because those metrics presume that people have already committed to buying a car. Instead, we should measure how time efficient it is for a person to own a car compared to using a portfolio of services (public transportation plus get-a-ride-services) to get around. As cities and suburbs get more and more crowded with sclerotic traffic and no parking spaces available when you finally get close to your destination, often there is either no saved time or not enough saved time compared to other transportation options. If you can instantly grab a ride from your bus stop to your front door, then is owning a car worthwhile?*

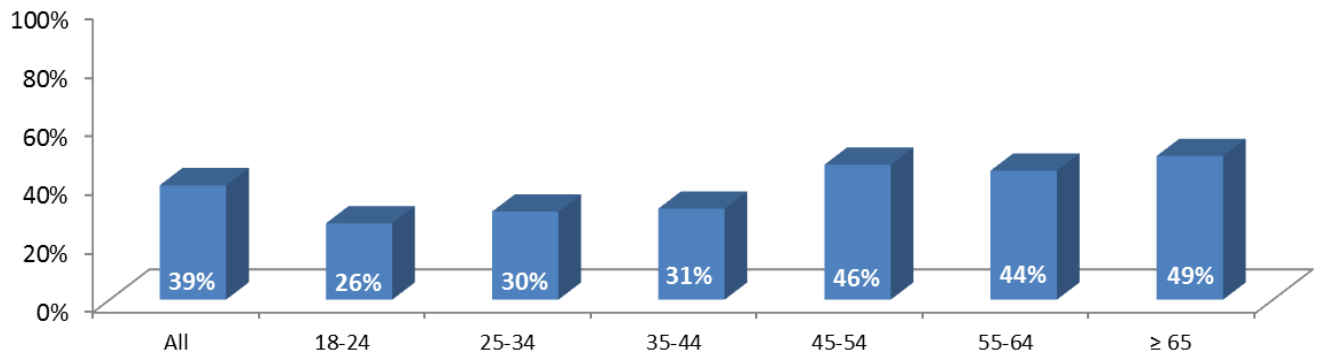
*It is not just individuals who are doing the transportation math: municipalities are working to make it easier for their citizens to choose something other than a car to get around. For example, in October of 2016 the city of Summit, New Jersey announced that it would be spending about \$200,000 per year subsidizing two-bucks-a-pop Uber rides from residents' homes to the train station and then back again that evening. Summit is a bedroom community for Manhattan, and as the town grew spaces in the train station parking lot were getting hard to come by. The city considered building another parking structure, but the estimate that came back was \$10 million. So the deal with Uber represented a huge savings.*

*Likewise, Moovel – a Daimler subsidiary – has partnered with 18 different cities to create smart phone mobility apps that let people plan door-to-door transportation without owning a car.*

## 9. Is public transportation easily available near your home?

Almost 40 percent of Americans do *not* live within range of convenient public transportation. The lack of access to public transportation is especially prominent for respondents age 45-54 (46 percent), age 55-64 (44 percent), and 65 or older (49 percent) – these compared to the 26 percent reported by those age 18-24.

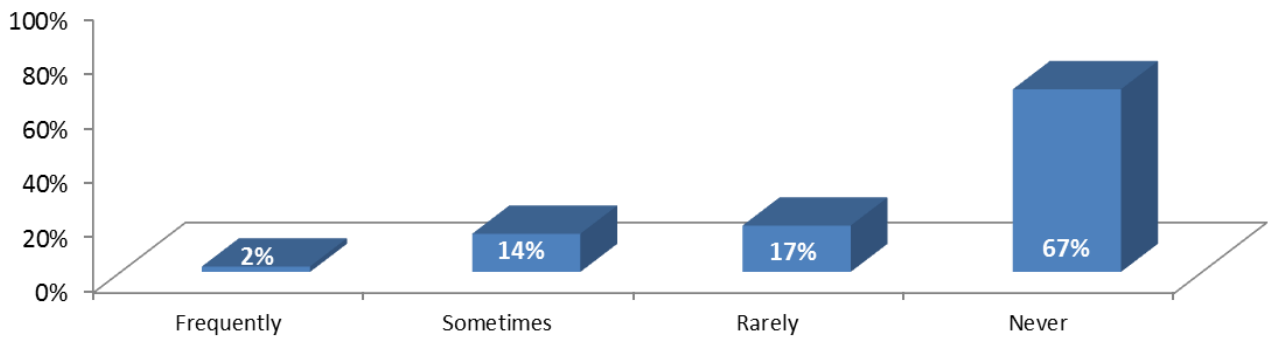
**Availability of public transportation**  
(Respondents who answered no)



## 10. How often do you use a get-a-ride service like Uber or Lyft?

Get-a-ride services such as Uber and Lyft are used by only moderate percentages of Americans; more than two-thirds of respondents have never used a get-a-ride service, and only 16 percent travel with one sometimes or frequently.

**Respondents who use a get-a-ride service**



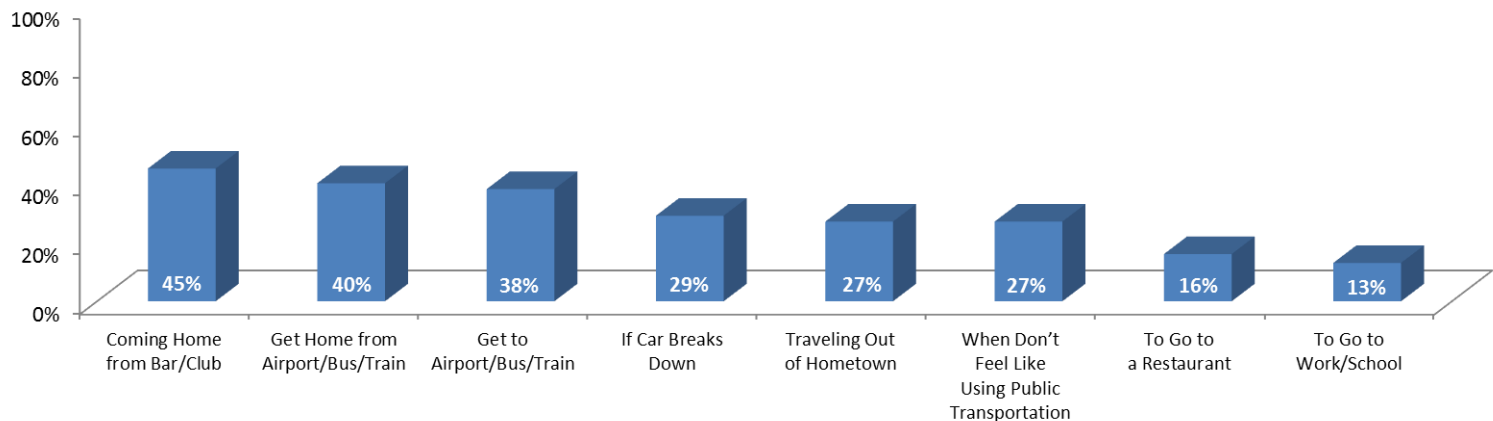
## 11. When do you use a get-a-ride service like Uber or Lyft?

Respondents report a wide range of circumstances when they use a get-a-ride service. However, the largest percentage (45 percent) use Uber or Lyft as an alternative to driving after drinking.

Other large percentages of respondents use get-a-ride to go to other forms of transportation such as airports, buses, or trains (38 percent) or to come home after using other transportation (40 percent).

More than one-quarter of respondents who use get-a-ride services do so when they do not want to use public transportation (27 percent).

**Reasons for using a get-a-ride service**  
(Respondents who use a get-a-ride service)



**11. Analysis:** *There is a tension between how people actually use get-a-ride services and the ambitions of the companies in question. Uber and Lyft have built their businesses – and secured immense venture capital investment – with the stated goal of entirely replacing people's personal cars. But as this chart shows, only 13 percent of respondents today use these services for quotidian transportation needs like travel to and from work or school.*

*Once the get-a-ride services stop subsidizing most rides (for example, according to analyst Hubert Horan, Uber covers 59 percent of the cost of the typical ride) and raise their prices, we expect get-a-ride service use to slow down.*

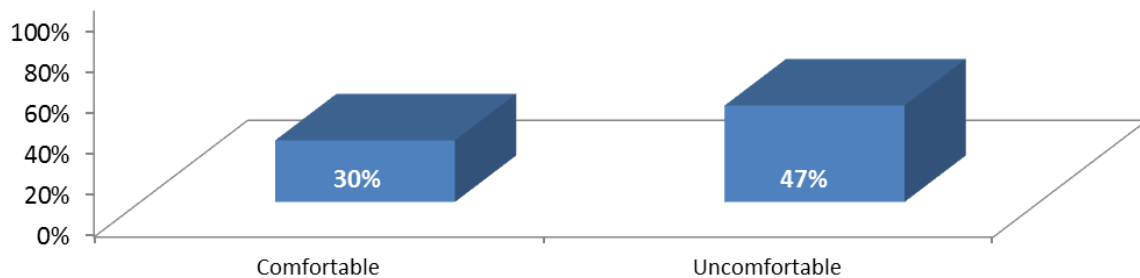
*At that point, however, we expect that people will explore partial ownership or subscription services rather than go back to buying or leasing a personal car. Even if Uber and Lyft fail entirely, the percentage of car buyers in the population will never return to its height.*

## 12. How comfortable would you be sending children in an Uber or Lyft ride without you?

Respondents who have used a get-a-ride service are not yet confident about having children use these services on their own.

Almost half of adult users of Uber or Lyft with children in their households are uncomfortable with their children using a get-a-ride service while alone.

**Comfort level sending children in an Uber or Lyft ride on their own**  
(Respondents who use a get-a-ride service with children in the household)



Much larger percentages of men (43 percent) than women (18 percent) are comfortable with letting children ride alone in a get-a-ride service car – although still less than half in both cases.

## Distracted Driving

The Future of Transportation Project surveyed behavior and views about the role of digital devices and services in cars. Here are some of the highlights:

### 13. Distracted driving (Views about digital technology in cars)

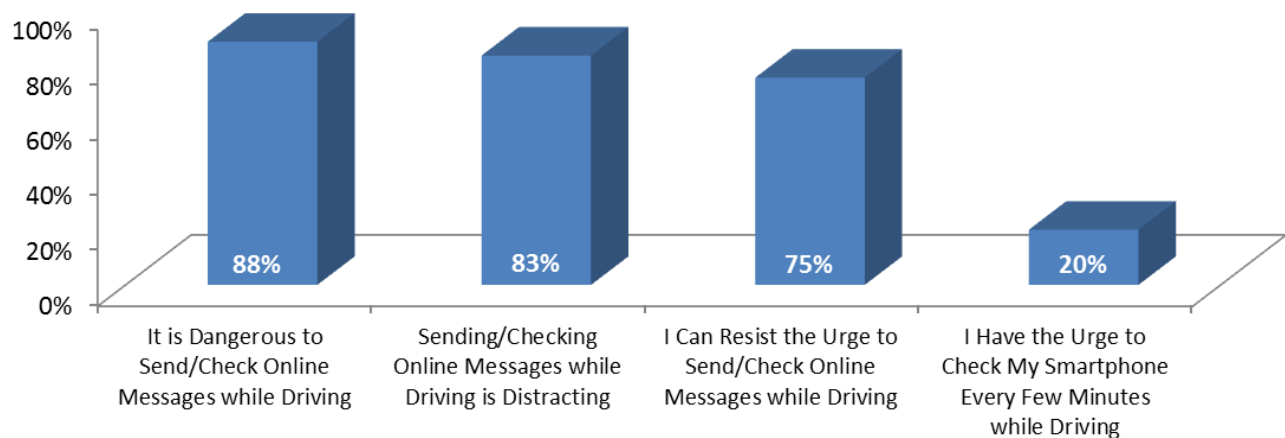
Do American drivers consider texting (and other online messaging) while behind the wheel to be a hazard? A very large percentage of respondents (88 percent) agreed.

However, in spite of overwhelming evidence in several national studies that demonstrates the dangers of texting while driving, small percentages respondents in all age ranges – six percent overall – disagree or strongly disagree that it is dangerous to use online messaging while driving.

While 88 percent of respondents considers online messaging while driving to be dangerous, a significantly smaller group – 13 percentage points smaller – said they can resist the urge to send online messages while driving.

A much smaller percentage (20 percent) noted that they feel the urge to check their smartphones every few minutes while driving.

**Views about distracted driving**  
(All respondents – somewhat or strongly agree)



## 14. Views about digital technology in cars

(should interactive devices be banned from cars?)

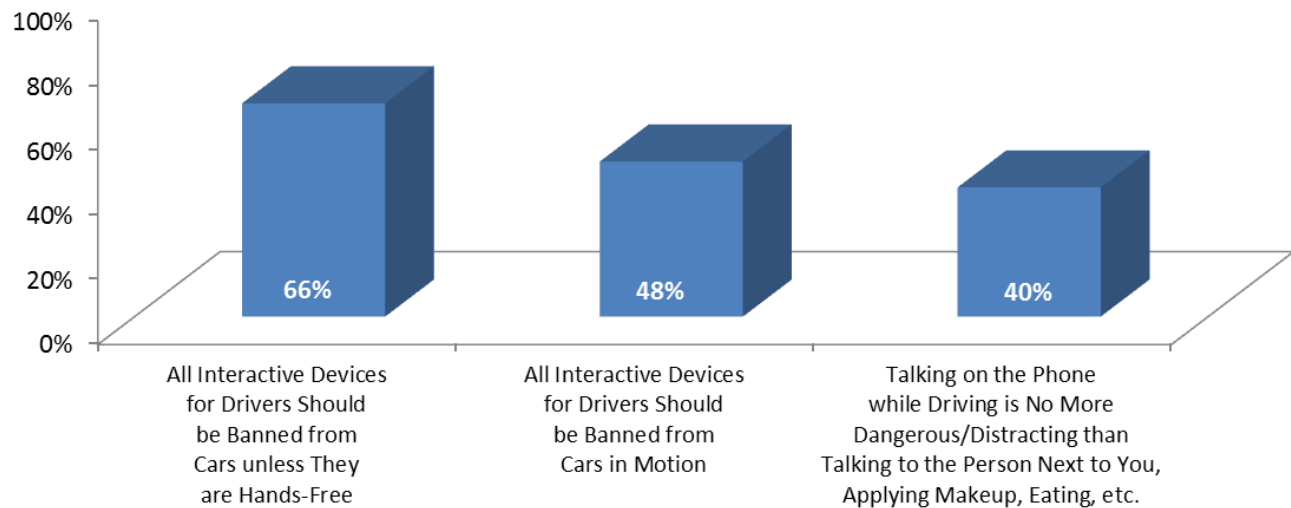
Even though large percentages of respondents consider the use of digital technology to be dangerous while driving (see the previous question), only about half (48 percent) believe that all interactive devices should be banned from cars in motion for drivers.

Almost as large a percentage of respondents (40 percent) believe that talking on the phone while driving poses no more danger or distraction than conversation in the car or other activities.

A much larger percentage of respondents (66 percent) believe that only hands-free devices should be allowed in cars.

### Should interactive devices be banned from cars?

(All respondents – somewhat or strongly agree)



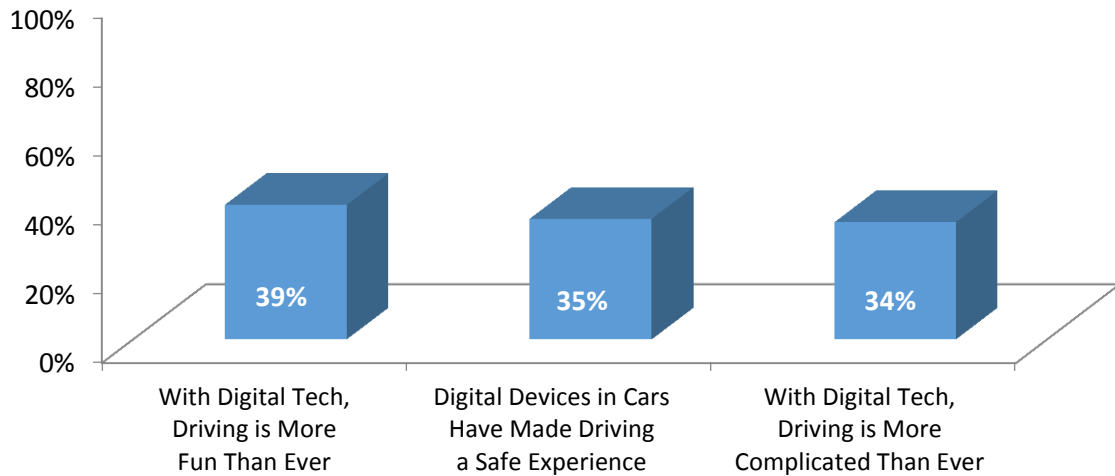
## 15. Views about digital technology in cars

(how do digital devices affect driving?)

While 39 percent of our respondents said that digital technology makes driving more fun, and a slightly lower percentage said digital devices in cars have made driving safer (35 percent), almost the same number (34 percent) said that technology has made driving more complicated than ever.

### How do digital devices affect driving?

(All respondents – somewhat or strongly agree)



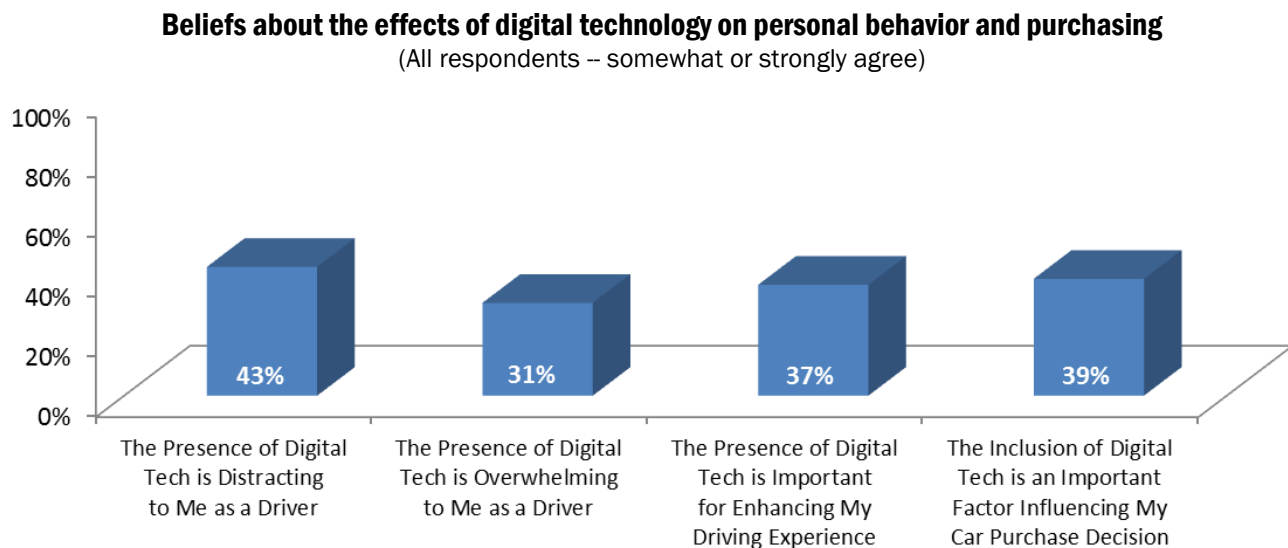
## 16. Views about digital technology in cars

(beliefs about the effects of digital technology on personal behavior and purchasing)

As in the previous section, respondents report positive and negative views about the effects of digital technology on their ability as drivers; 37 percent said that digital technology enhances the driving experience, but an even larger group (43 percent) said that digital technology is distracting.

More troubling is that 31 percent of respondents believe they are being overwhelmed as drivers by digital technology.

In spite of some respondents' concerns about digital technology, 39 percent of respondents consider digital technology for drivers as an important factor influencing their car-purchasing decisions.



**16. Analysis:** Every January I lead tours at CES, the Consumer Electronics Show in Las Vegas, and I spend a lot of time in the automotive hall. Over the years I have seen cars morph into giant mobile phones that people drive around with dashboard apps and deep integrations with digital services ranging from Pandora to Apple Car Play, from Android Auto to Amazon's Alexa.

What this chart shows us is that in-car digital technology is important to drivers and car buyers in a double-edged way. On the minus side, tech is distracting and overwhelming to large percentages of Americans. On the plus side, nearly 40 percent of Americans base their car-buying decisions in part on what technologies come with the car.

In addition to design, comfort, color, mileage, and handling, car buyers care about what they can do in the car beyond just driving. Car manufacturers will need to keep pace with their competitors while in-car technologies evolve, and as they strive to use technology as important differentiators for buyers. (We dig into some specific technologies in the coming pages.)



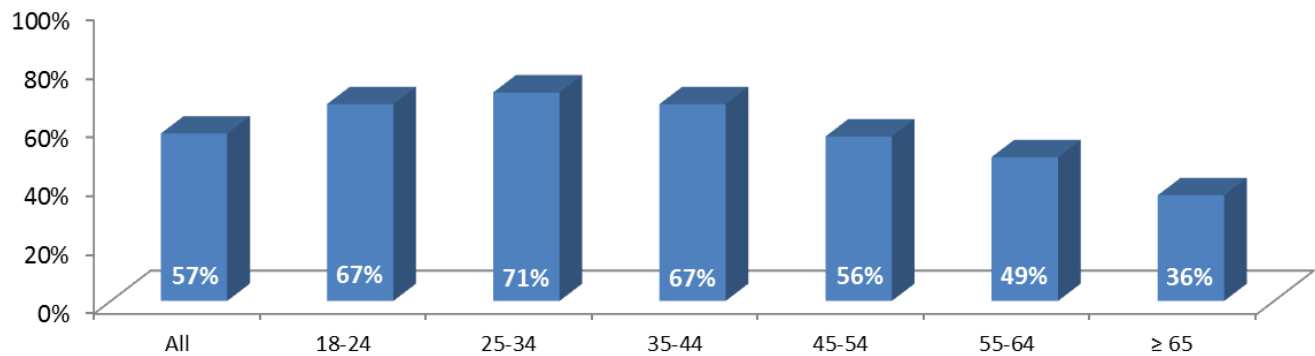
## Connected Cars, Today and Tomorrow

### 17. How important is having internet access to you while driving?

A significant majority of respondents said that having internet access while driving is somewhat or very important (57 percent).

Significant percentages of respondents in all age ranges consider internet access while driving to be important, but larger percentages of younger respondents found the internet more important while driving.

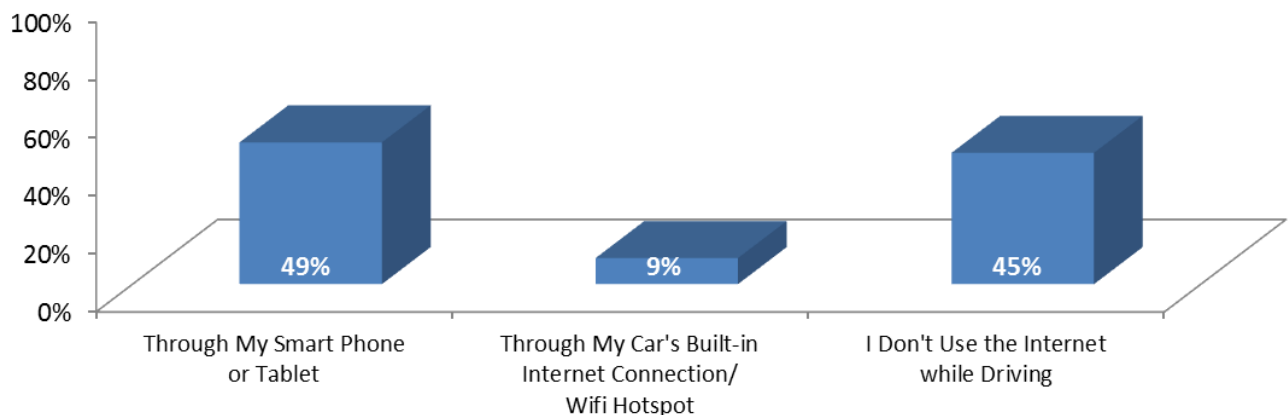
**How important is having internet access to you while driving?**  
(All respondents)



### 18. Type of connection to the internet while driving

Although a large percentage of respondents said that internet access while driving is important (see the previous question), 45 percent of respondents don't use the Internet while driving. Of those who do access the internet in their cars, most do so by using their mobile devices (49 percent), while only nine percent use a car's built-in connection to go online.

**Type of internet connection while driving**  
(All respondents – multiple responses possible)



**17-18 Analysis:** *Just a few years ago if I had asked the question, "Who does your car work for?" I would have seemed like a weirdo. The answer was obvious, "My car works for me. Duh." But that is changing, as we can see from the rise of people being online while they are on the road. A whopping 71 percent of drivers age 25-34 think it is important that they have the option of using the internet while driving.*

*In addition to the obvious safety concerns, being connected while driving means that you are leaving a trail of data exhaust in addition to gas exhaust; that data is valuable both to advertisers who want to sell you things and to companies like Google that sell highly targeted advertising. For the car manufacturers this could be a bonanza of new revenue, which will be welcome as car buying declines. But it also means that for car manufacturers there are new concerns beyond your comfort and safety when driving. In other words, now your car has a side gig helping Google create a profile of what you want and selling that information to advertisers.*

**How** *drivers connect to the internet is also important.*

*The smart phone is the everything device for anybody who has one, so although a few car manufacturers (particularly General Motors) are building in mobile internet access, today most people use their phones to get online while driving. Why bother buying a Garmin or TomTom GPS device when there is one built into your phone? This is why Apple and Google have Apple Car Play and Android Auto to make it easy for car manufacturers to integrate seamlessly with smart phones.*

*However, if manufacturers hand over the in-car digital interface to companies like Google and Apple, that could mean surrendering that valuable data about who is driving where and when, who is searching for what while they drive, and what they are listening to while they do it.*

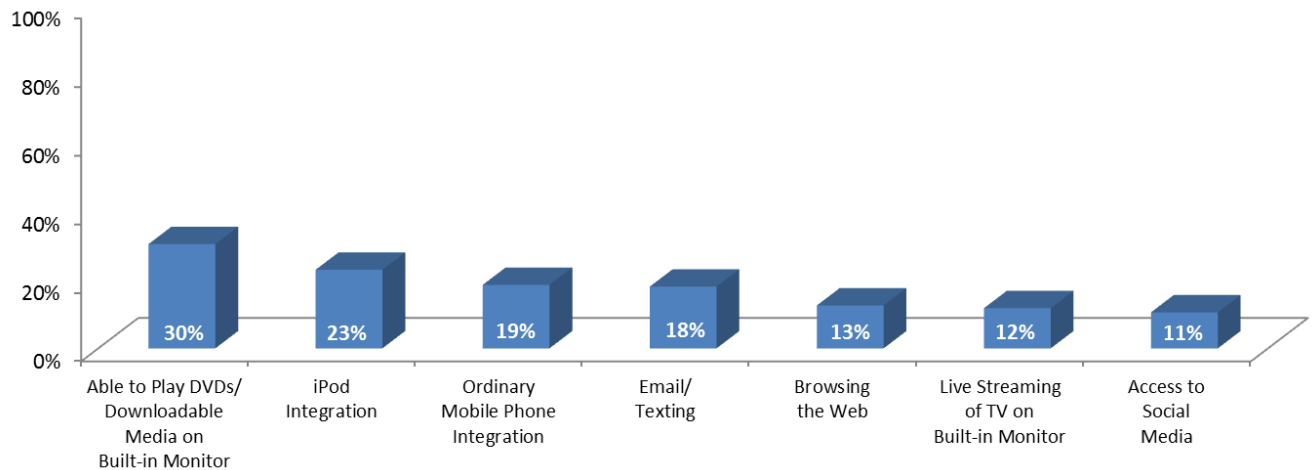
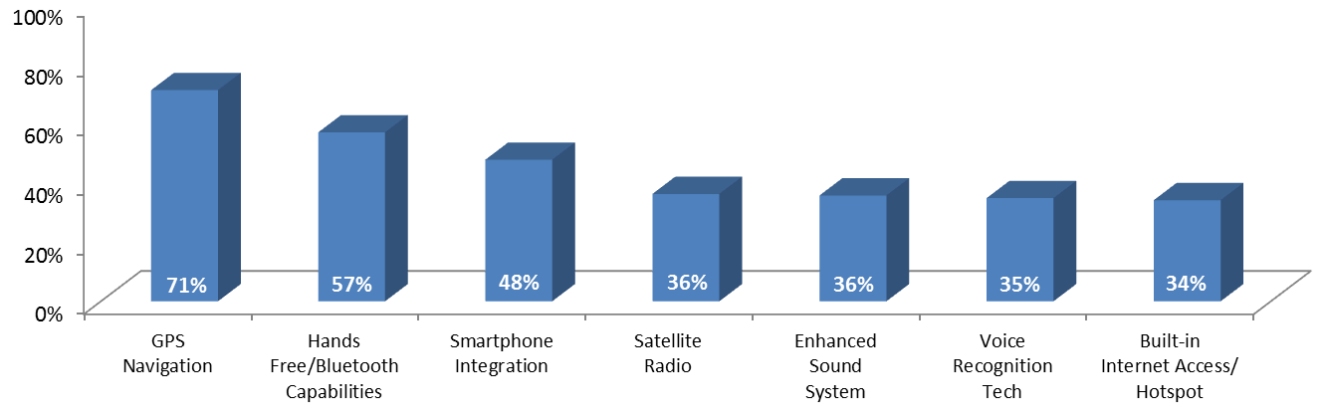
*In addition to "who does your car work for," another new question is, "whose customer is the driver?" Is the driver's primary relationship with the car manufacturer or with the digital technology company connecting the driver to the internet? This issue becomes even more crucial when you look at Question 23 and see that 63 percent of Americans are interested in buying a car made by a technology company like Google or Apple.*

## 19. Which technologies or activities are important to have in a car?

Respondents cited many technologies that they consider important to have in cars, especially GPS navigation (71 percent), and features that integrate hands-free capabilities (57 percent) or smartphones (48 percent) into driving.

### Technologies or activities that are important to have in a car

(All respondents – multiple responses possible)



**19. Analysis:** *It is no shock that the most desired in-car technology is GPS: after all, who wants to get lost?*

*But it is surprising that 35 percent of Americans think voice recognition technology is important to have in a car. Digging into the details, that 35 percent would actually be a bit higher if the lower enthusiasm for voice recognition among senior citizens (28 percent) had not dragged down the average.*

*Forty-three percent of higher income respondents (earning more than \$75,000 per year) want voice recognition in a car. These are the people who can afford to be early adopters of voice technologies like Siri on the iPhone or Alexa on the Amazon Echo device, so they probably have more experience with how useful voice recognition technology can be. Intriguingly, 40 percent of our youngest respondents – age 14-17 – want voice-recognition technology.*

*When we asked this question about desired technologies, we listed 14 options and "other." So for our respondents, voice-recognition technology was somewhat buried in a sea of options. This is worth noting, because (in Question 20) when we asked a similar question with only four options about more in-the-future technologies that respondents might like to have (versus what they think is important today), enthusiasm for voice recognition increased to 47 percent in the general population and jumped to 61 percent for the youngest respondents (14-17).*

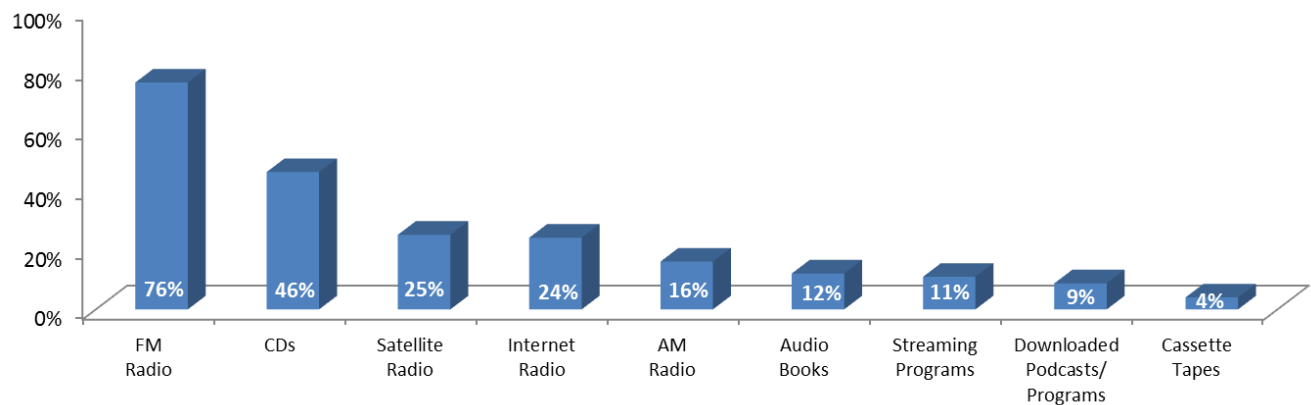
*This suggests that for Gen Z, the voice interface will be the generational interface in the same way that the touch interface was important for Millennials and the Graphical User Interface (GUI, the mouse, and folders for organizing your computer files) was important for Gen X and older. As these Gen Zers age into driving and car buying, car manufacturers should be sure to include voice recognition technologies, as it may be the preferred interactive technology for these new buyers.*

## 20. When driving, what are your preferred forms of entertainment?

Despite recent advances in digital technology in cars that include streaming content and on-board wi-fi connections, conventional media remain the most popular entertainment choices.

FM radio is the preferred choice while driving, cited by more than three-quarters of respondents (76 percent). And even though some new cars are now produced without CD players as standard equipment, CDs are still the second-most popular form of entertainment, cited by 46 percent of respondents – more than 20 percentage points higher than satellite radio or internet radio, and four times as much as programs streamed from phone or tablet.

**Preferred forms of entertainment when driving**  
(All respondents – multiple responses possible)

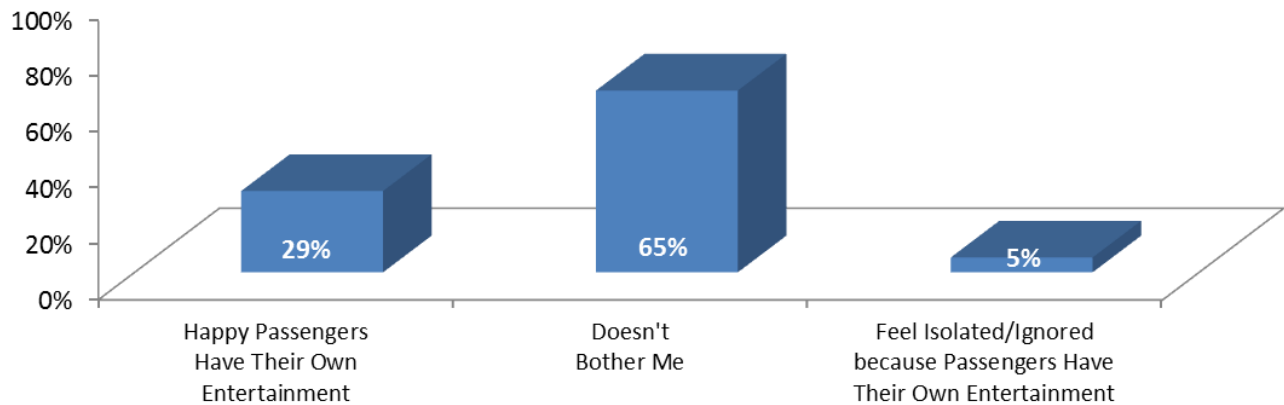


## 21. Drivers' views about passengers having their own entertainment

The Future of Transportation Project explores how drivers and passengers use entertainment while in their vehicles, including how drivers feel about passengers having their own entertainment. Almost two-thirds (65 percent) said they are not affected by their passengers' own entertainment, while 29 percent said they welcome the idea that passengers entertain themselves.

A very small percentage (five percent) said they feel isolated or ignored when their passengers have their own entertainment.

**Drivers with passengers who have their own sources of entertainment**



**21. Analysis:** *It was surprising to learn that only five percent of American drivers feel ignored or isolated because their passengers are looking at their phones. This number is in stark contrast to the nearly 64 percent of Americans who sometimes or often feel ignored because a family member is spending time on her or his smart phone, according to the Center's 17-year "Surveying the Digital Future" study.*

*This significant difference suggests that the positions of our bodies impact how we evaluate the behavior of others. If two people are facing each other and one of them is using a phone, then the other person perceives this as disrespect. In contrast, if both people are facing in the same direction -- say, looking out the windshield of a car -- then there is no perceived disrespect.*

*This question of posture and perception is important because we are looking at two likely developments in the near future: the growth of smart glasses -- people wearing screens on their faces and looking at images that combine reality with data -- and the growth of driverless cars. With smart glasses you might face somebody but not see her or him, which might cause conflict.*

*With driverless cars, as steering wheels become optional, the interior configuration of the car might change to more of a meeting room or living room. Will the percentage of people bothered by the technology use of others while in a car remain low in this situation? We think not.*

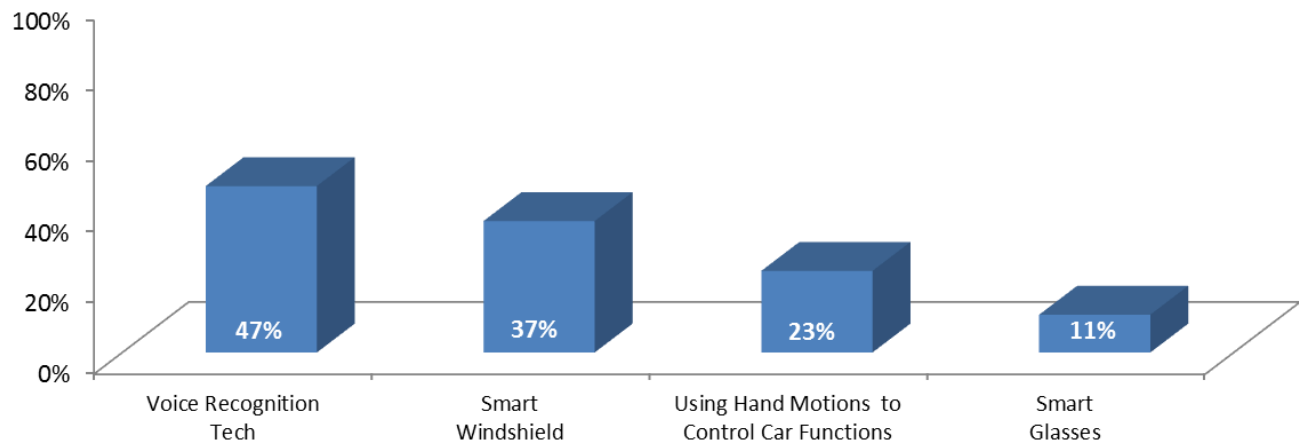
## 22. Desired future car technology

What types of technology do American drivers want – including some options that don't yet exist?

Almost one-half said they would like voice recognition (47 percent), while more than one-third (37 percent) want a smart windshield with pop-up information. Another 23 percent would like to control some functions of their car with hand motions (gesture control), while only 11 percent want smart glasses that link to driving-related information, less than one-third the percentage who were open to similar information onto a smart windshield.

### Desired technology for vehicles

(All respondents – multiple responses possible)



**22. Analysis:** Here is the full description of Smart Windshields that our respondents saw: "A Smart Windshield where pop-up information (about traffic, navigation or local points of interest) is an overlay on your windshield." Thirty-seven percent of the general population embraced this idea, and for people between the ages of 25 and 44 that number rose to 47 percent.

Compare this relative enthusiasm for smart windshields with the 43 percent of people who find today's in-car technology distracting, or the 31 percent who feel overwhelmed by in-car technology (Question 16). Likewise, 88 percent of people think it is dangerous to send or check text messages while driving (Question 13), and 66 percent of people think that all interactive devices for drivers should be banned unless they are hands-free (Question 14). (This thinking ignores research from the National Safety Council that shows hands-free in-car technology is no safer than hands on.)

We also asked how people would feel about ads on the smart windshield or coming from the car's digital voice (Siri, Alexa): 62 percent did not want the ads. This suggests that respondents want to control the type and amount of visual information that comes at them when they drive: no pop-up ads when I am making a left-hand turn across traffic, please.

Information overlaid on Smart Windshields links back to how cars get online (Questions 17 and 18), because the windshield of your car might eventually become a hyper-customized magazine that is always in reach and always contains something interesting. If your car knows where you are going, what you are looking at, and what you care about (based on the data it or Google has collected about you over the course of time), then it can also organize and present you with information about things around you that you will find interesting.

When it is a human driving a car with a smart windshield, then the information displayed on that screen will be graphic and compressed by necessity: there is a gas station two miles ahead, the meeting you are driving to just got delayed, your lunch date wants to meet at a different restaurant, we are near the pharmacy and you have a prescription waiting.

As self-driving cars move from sci-fi fantasy to everyday reality, the windshield will transmogrify into a magazine, television, and overall immersive screen. Different companies will compete to fill that screen and make money from subscriptions and advertisements. What media you can get while riding will be just as important a consideration when choosing a car (whether to buy or just to get a ride) as the car's make, color and design. We explore self-driving cars in our next section.

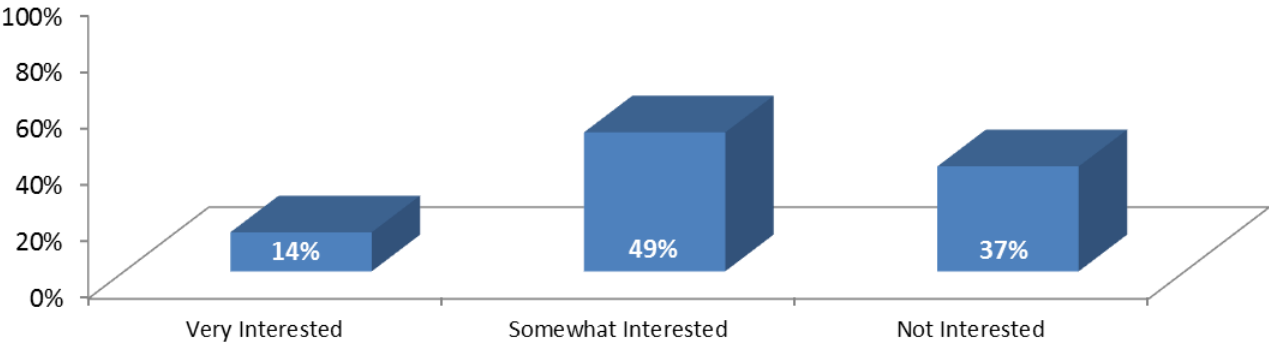


### 23. Views about technology companies as potential car producers

How would Americans react if a prominent technology company such as Amazon, Apple, Facebook, or Google decided to enter the automobile industry?

Even though only Google has announced plans to manufacture a car – a vehicle still years from production – more than 60 percent of respondents would be somewhat or very interested in getting a car made by those companies.

**Views about technology companies as potential car manufacturers**  
(All respondents)



## Self-Driving Vehicles

### How driverless cars change **EVERYTHING**

***Self-Driving Cars are emerging from a far-off science fiction future into a reality that is just around the corner, and these new vehicles will change a lot more than just how we get to work and back.***

By Jeffrey Cole

I have been talking about driverless cars for about ten years and ridiculed for most of that time. I was just getting used to seeing audiences' eyes roll and glaze over as they thought I was pitching a *Twilight Zone* episode.

Then something really interesting happened: people began to believe this wasn't just a view of the future from *The Jetsons*.

Driverless cars are here, and even the biggest skeptics can see that something of compelling importance is about to happen.

The ability of cars to drive themselves without any human intervention is the most important social development of the next twenty-five years. It will change everything. It's happening now (for example, with Uber testing self-driving cars in Pittsburgh and Phoenix), and it will be available to most people in three to four years.

The Center will explore the myriad ways that driverless cars will change our lives. The changes will start with the decline, and end with the elimination, of drunk driving, road

rage, texting while driving, and the awkward conversation with your parents or grandparents when you have to take the car keys away.



Driverless cars will grant independence to the elderly who can no longer drive, as well as to the blind and disabled who have never been able to drive. With parent's supervision, driverless cars will give freedom of movement to children to get to school, outside activities, and in the case of split households to the other parent.

However, driverless cars will not achieve their full and complete potential until no human is

allowed to drive; that moment will not come for 20 years and is full of political and social minefields (imaging the signs reading, “you’ll take my car after you take my guns!”).

Most of the benefits of cars without drivers will be seen on the roads of big cities starting in a little over three years. The hurdles come not from the technology but from government fears and regulations. Since October 2016 Tesla has manufactured Level Five driverless cars. (Level Zero cars have no driverless features; Level Five do not need a human driver at all in any situation and may not even have a steering wheel). The question is how slowly or quickly governments will allow manufacturers to turn these features on.

### **Small Changes Lead to Big Changes**

Once these cars become available in three years or so, they will quickly gain mass popularity. You’ll call for a car on your smart phone, and five minutes later the car will show up to take you wherever you need to go. Most compellingly, after dropping you off at the front door of your office, the movie theater, the mall or the football game, the car just goes away.

The magnitude of this change cannot be overstated. This is the massive appeal of driverless cars: they get you there and disappear. You’ll never again think about parking, fueling or maintenance. (I thought of this future at a recent concert where parking began at \$32!)

When people experience the total freedom of a driverless car getting you somewhere and then disappearing, even very wealthy people who could own their own driverless cars will ask themselves, “Why would I want to park and think about the car?”

Once people see the appeal of not being attached to the car and the joy of not fighting traffic, they will quickly question the need ever to buy another car. This brings up a range of new issues to consider: possible pricing models for driverless car usage, the levels of cars we will use, and how driverless car credits will become an important new form of currency.

One of the first impacts we will feel is that the driverless car will quickly become the second most important media and entertainment environment in our lives. We will consume more entertainment in the car than anywhere else other than the home.

This means cars will be designed and equipped differently than the home. Some will be set up to watch movies and television; others will be set up for meetings. Instead of traveling to a store to get your hair cut, your stylist can pick you up at home and cut your hair while you’re on the way to work.

### **From Motels to Mobile Hotels**

In little more than four years we will see one of my favorite driverless car innovations: the mobile hotel.

If your need to get from Los Angeles to San Francisco (a seven-to-eight hour drive) or New York to Chicago (about 10 to 12 hours), then you can still take a plane, train or drive yourself.

But a more interesting and entertaining option (with no TSA long lines or delay) will be to have a driverless car show up at your house at 10 pm (or anytime you like). The windows will be blacked out (which will be legal because there is no human driver). A comfortable bed will be made up with a duvet, and there will be a chocolate on the pillow. At the foot of the

bed there will be a screen, and your favorite programs will be ready to stream from the cloud.

You'll tell the car what time you want to arrive. The car will travel no faster than the speed limit (will there even be speed limits when all cars are driverless?), but it can drive slowly to have you arrive at the time you selected. You'll watch TV or movies as the car drives along. If nature calls, it will be similar to any road trip today: you'll tell the car to stop at the next restroom.

When you arrive at your destination, if you don't have a home or hotel room, then included in the costs of the mobile hotel (still lower than

an air ticket) will be a refreshment center where you can shower, change clothes and get a meal.

If you're thinking, "nobody would ever do this," then think again. When we surveyed a representative sample of the U.S. population for our upcoming study on the future of transportation, 25% of our respondents said they would be open to checking into a driverless mobile hotel – and this is for a service that doesn't exist yet! Driverless mobile hotels will quickly become one of our preferred modes of travel.

This is just a taste of some of the ways that driverless cars will change everything.

\* \* \* \* \*

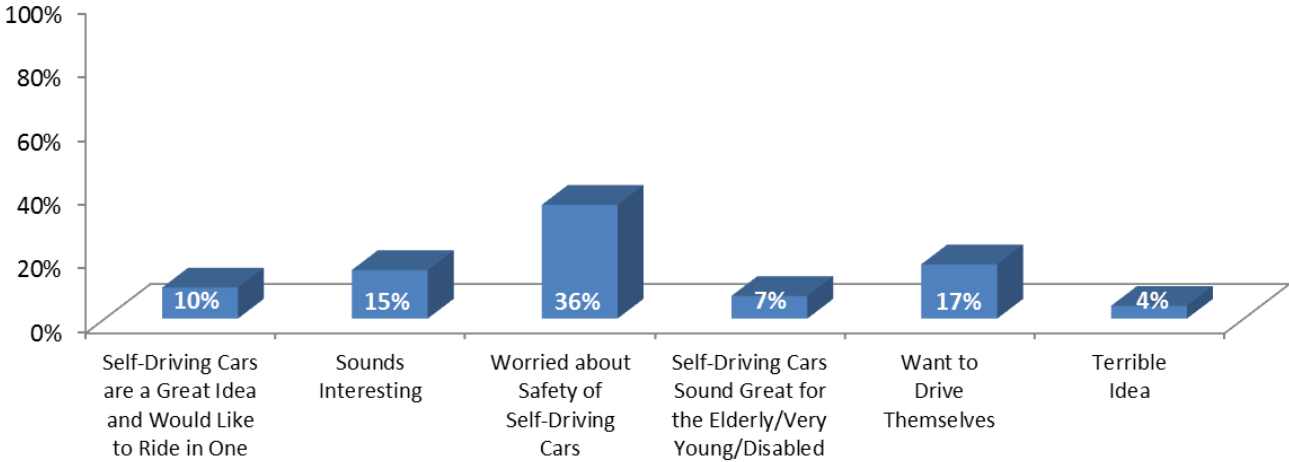
## 24. Views about self-driving cars

As a growing number of companies develop self-driving cars, and with ever-increasing media coverage, how do Americans feel about this technology?

When asked to choose the single statement that best reflects their view, more than one-third of respondents (36 percent) express concerns about self-driving cars – especially if they have to share the road with them. Another 17 percent express a related negative view of the technology, saying they want to drive themselves.

Twenty-five percent of respondents express more positive views about self-driving cars, saying either that they think they sound interesting, or that they are a great idea and would like to ride in one.

**Views about self-driving cars**  
(All respondents – single response)

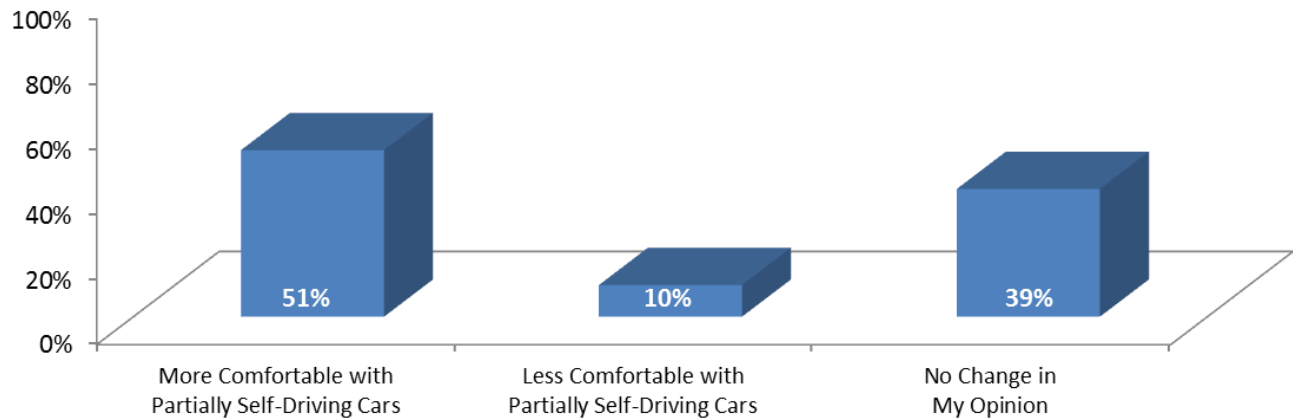


## 25. Partially self-driving cars

Does the possibility of combining self-driving technology with traditional driver control affect respondents' interest in self-driving cars? More than half of respondents (51 percent) like the idea of partially self-driving cars that include the option of traditional control operated by the driver.

However, the added option of partial driver control created no change in opinion for 39 percent of respondents. In fact, 10 percent of respondents said they are even less comfortable with a partially self-driving car than with a fully self-driving car.

**Views about partially self-driving cars**  
(All respondents – single response)



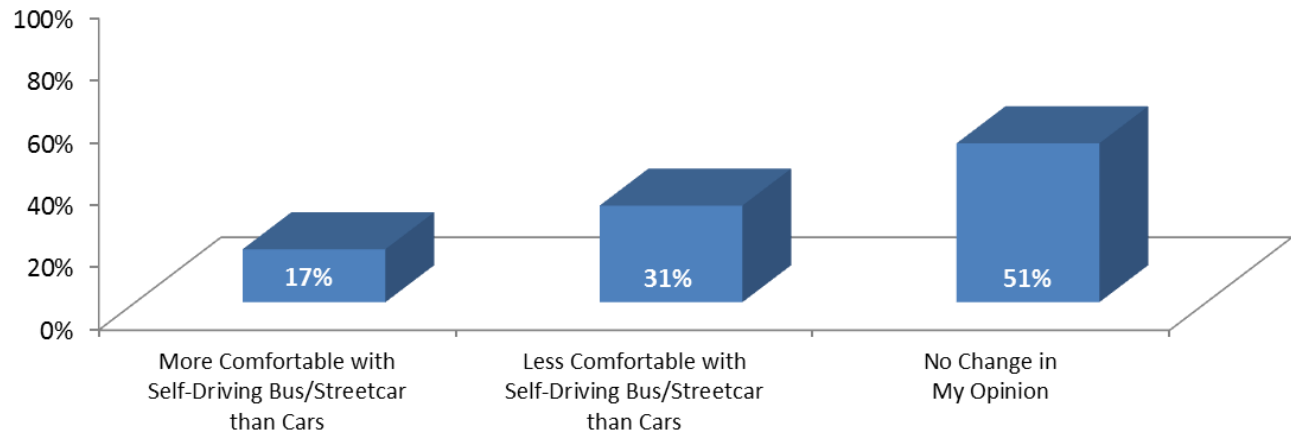
## 26. Self-driving public transit

How do respondents feel about public transit that is self-driving, such as buses, streetcars, and trams, compared to the idea of individual self-driving cars?

For more than half of respondents, their opinion about self-driving technology does not change (51 percent). But 31 percent of respondents said they are less comfortable with self-driving public transit than with self-driving cars, compared to 17 percent who are more comfortable.

### Views about self-driving public transit

(All respondents – single response)



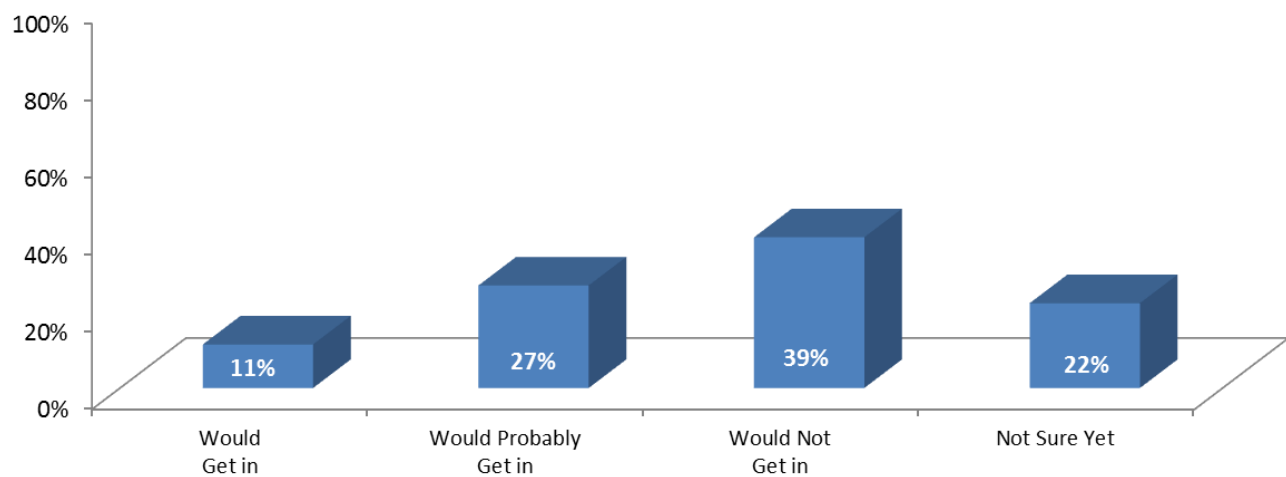
## 27. Self-driving taxis or get-a-ride

Self-driving cars, including taxis or get-a-ride services, are not yet common sights on America's roads, but more than a majority of respondents are at least open to the idea.

When respondents were asked how they would react if their call for a ride resulted in the arrival of a taxi or get-a-ride service car that was self-driving, 39 percent would not get in.

However, a total of 60 percent express at least a somewhat more positive view, and would definitely get in (11 percent), probably get in after thinking about it (27 percent), or are uncertain until they learn more about self-driving cars (22 percent).

**Views about self-driving taxis or get-a-ride**  
(All respondents – single response)



**27. Analysis:** 38 percent of respondents are either neutral or positive about getting into a self-driving car, which is a high number. This result is one of the strongest indicators that Americans are more open to surrendering the keys and the driver's seat than it seems when you ask them that question directly. (See question #1, where 86 percent of respondents would not even consider giving up driving.)

With widespread acceptance of self-driving cars, we will begin to see extraordinary changes far beyond the auto industry, what some analysts call "second order consequences." Just think, for example, about the potential impact of self-driving cars on where people work: 24 percent of our respondents said they could imagine using a self-driving "portable office with a desk and an Internet connection to get things done." For those age 18 to 24, that number rose to 36 percent. Soon, there may be no distinctions among commute time, work time, and work-from-home time (although this is not necessarily a good thing).

Twenty-seven percent of respondents said they would like to enjoy a restaurant meal delivered along with the self-driving car that comes to pick them up, and 25 percent would like to see a first-run movie in a self-driving car. "Dinner and a movie" might look very different in the near future, which presents both obstacles and opportunities for new collaboration among the automotive, restaurant, and entertainment industries.



## 28. Self-driving cars and children riding alone

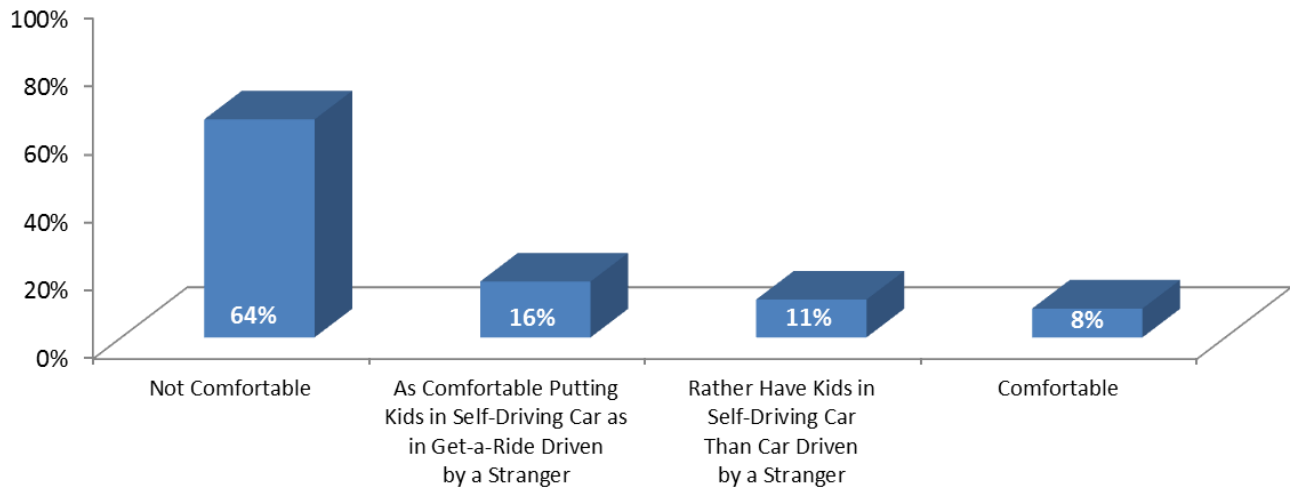
Compared to respondents' views about their own use of self-driving cars (see #27), respondents are less comfortable with the children in their households riding unattended in a self-driving car or a school bus. A large majority of respondents (64 percent) do not want to send children unattended in a self-driving car or school bus.

But a total 35 percent provided three responses that are somewhat more positive about children riding unattended in self-driving vehicles: 16 percent reported that they feel the same about children riding unattended in self-driving cars as they do about cars driven by unknown drivers, and 11 percent said that they would rather let children ride unattended in a self-driving car than in a vehicle driven by a human driver not known to them.

Only eight percent stated outright that they are comfortable with children from their household riding in a self-driving car.

### Views about self-driving cars and children riding alone

(Respondents with children in the household)

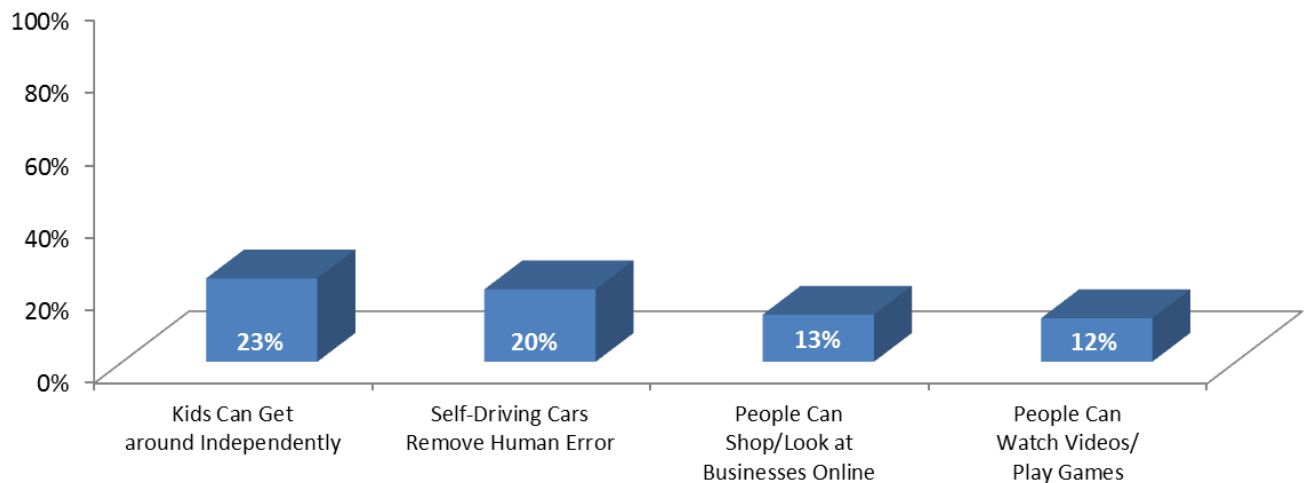
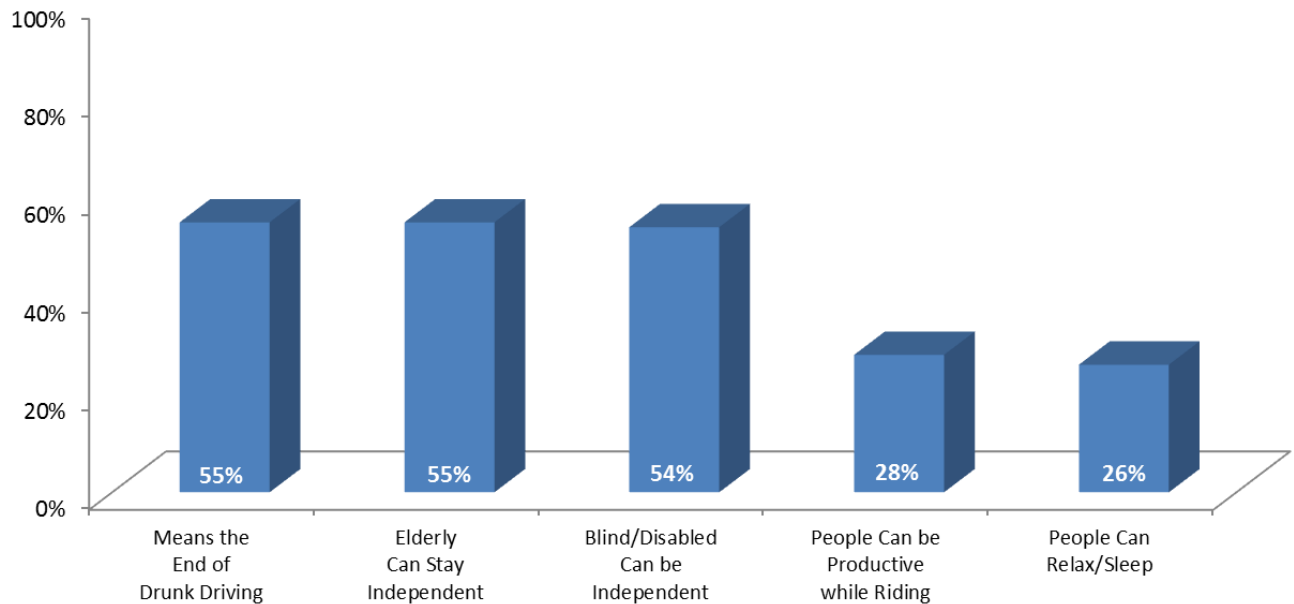


## 29. Self-driving cars: best features

What features of self-driving cars do respondents consider the most important? The largest percentages by far cite the benefits of self-driving vehicles for those who cannot – or should not – drive.

More than half of respondents said the best features of self-driving cars are the independence they provide for the elderly, blind, or disabled; or how self-driving cars provide people who have had too much to drink safe ways to travel without driving themselves while intoxicated.

**Self-driving cars: best features**  
(All respondents – multiple responses possible)



**29. Analysis:** Center founder Jeffrey Cole refers to the three most popular features of self-driving cars in this chart as "the other guy syndrome." In other words, many people looking at the list of positive self-driving car features might think, "I don't drink and drive; I'm not that old, and I'm not blind. But wow! Self-driving cars sure will be great for those other people."

This is what people think before they've had a chance to ride in a self-driving car, but just a smidgeon of direct experience with these cars will widen riders' imaginations about what can be done while on-the-go. The results will surprise everybody.

You can get a glimpse of this future by looking to the recent past: smart phones changed our behavior by absorbing more and more devices and activities. The smart phone centralized many things we already did – it is a camera, notebook, flashlight, address book, word processor, email device. . .not to mention a phone.

Smart phones also let us do old things in new ways. When parking a car in a big lot, how many people today still scribble the parking space number, floor, and address on a piece of paper? Not many. Instead, we whip out our smart phones and take pictures. It's hard to imagine using a camera so frequently and so trivially until you have one in your pocket all day every day.

Successful digital technologies also let us do entirely new things because they are platforms. Users can build on platform technologies, inventing new things that the technologies' creators never imagined. Podcasts, for example, came about when Dave Winer and Adam Curry realized that it was possible to create original content for an iPod (or mp3 player) rather than just ripping CDs.

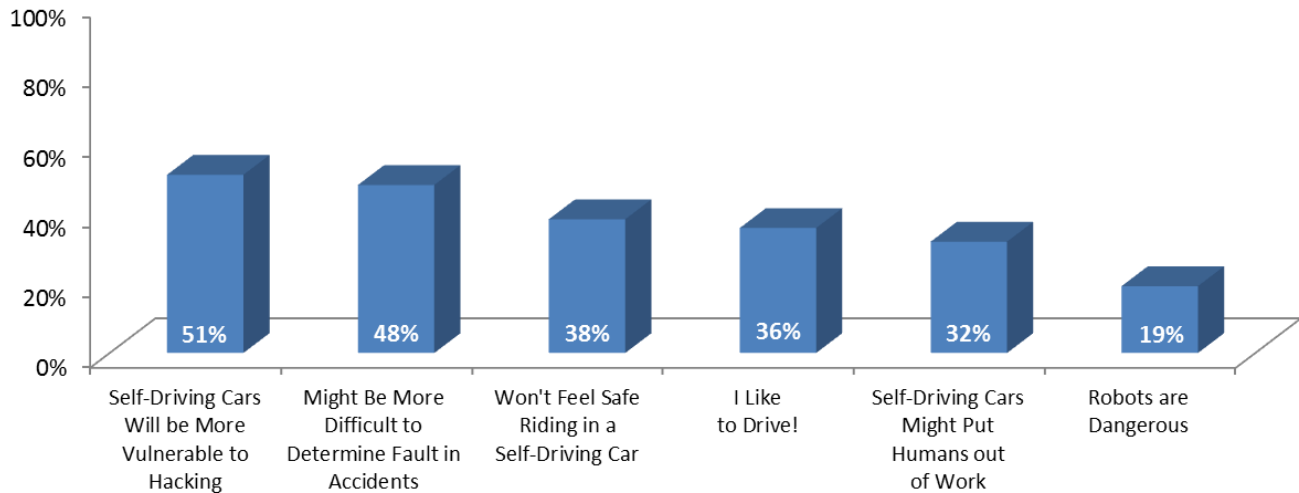
We know that self-driving cars will change the way we do the things that we already do, and we know that with self-driving cars we will do exciting new things. What we don't yet know is what the self-driving car equivalent of podcasts will be. That's both exhilarating and a bit scary.

### 30. Self-driving cars: worst features

Thirty-eight percent cited personal concerns about safety as a negative about self-driving cars, while the loss of enjoyment of individual driving was mentioned by 36 percent.

And even though a majority of respondents are concerned about the vulnerability of technology in self-driving cars, a surprisingly small percentage of respondents (19 percent) worried about sharing the road with “robots.”

**Self-driving cars – worst features**  
(All respondents – multiple responses possible)



# APPENDIX 1 | Research Methods

## Research Methods: Transportation and Technology Study

- An approximately 15 minute, self-administered online survey was used
- N=1,000
- Respondents were sampled from August 8–16, 2016.
- The sample was drawn from InnoPoll, a proprietary opt-in online survey panel with nationally representative sampling capabilities. It was screened based on nationally representative breakdowns on gender, age, and ethnicity.
- Completed interviews were allowed to fall out naturally based on the survey qualifications.
- The survey was conducted in English and sampled nationally.
- Survey qualifications:
  - Ages 14+
  - Live in the US
  - Pass quality check
- Final breakdowns of gender, age and ethnicity:

<b>Gender</b>		
Male	504	50%
Female	496	50%
<b>Age</b>		
14-17	77	8%
18-24	107	11%
25-34	149	15%
35-44	141	14%
45-54	164	16%
55-64	181	18%
65+	181	18%
<b>Hispanic Descent</b>		
Yes	151	15%
No	845	85%
<b>Ethnicity (multiple responses allowed)</b>		
White/Caucasian	759	76%
Black/African American	134	13%
Asian	66	7%
Pacific Islander	6	1%
Eastern Indian	5	1%
African	2	0%
Native American or Alaskan native	24	2%
Other race	58	6%

## APPENDIX 2 | About the Center for the Digital Future

The Center for the Digital Future at USC Annenberg is a think tank that explores current issues and coming trends in the digital realm. The Center was created in 1993, and tracks the global evolution of digital technology and platforms, studying their impact on users and non-users.

The Center is best known for the Digital Future Project, the first and longest-running longitudinal research study that explores the views and behavior of American users and non-users of digital technology. Each year exploring more than 100 major issues in five general subject areas, the Digital Future Study is the most comprehensive study of its kind.

The first Digital Future Study report, “Surveying the Digital Future,” was published by the Center in 2000; in August 2017, the Center published its 15<sup>th</sup> annual report of findings.

The Center for the Digital Future created and manages the World Internet Project, which coordinates similar research on digital technology conducted in 32 partner countries. The Center also conducts customized and proprietary studies, consulting, and marketing research to support global companies, government leadership, NGOs, and policymakers.

The Center is based in the USC Annenberg School for Communication and Journalism at the University of Southern California. Until July 2004, it was housed at UCLA in the Anderson Graduate School of Management.

### **Director Jeffrey I. Cole, Ph.D.**

The Center for the Digital Future was founded and continues to be directed by Jeffrey I. Cole, Ph.D., a scholar on communication issues who has taught and conducted research on the faculties at USC and UCLA since 1978.

### **New projects**

in 2016, the Center launched a new series of topical surveys on Americans’ behavior and views about specific industries: sports, transportation, digital money and banking, travel, and health.

### **Emerging Issues**

The Digital Future Study is not restricted to investigating a particular method of accessing the internet. The project also explores many aspects of change on the internet and its evolving applications; such as social networking, unwanted attention online, bullying, the cloud, and online dating.

For more information about the Center, visit [www.digitalcenter.org](http://www.digitalcenter.org).

Center for the Digital Future at USC Annenberg

11444 West Olympic Blvd, Suite 120

Los Angeles, CA 90064

(310) 235-4444

[www.digitalcenter.org](http://www.digitalcenter.org)

[info@digitalcenter.org](mailto:info@digitalcenter.org)



**USC Annenberg**  
School for Communication  
and Journalism

**Center for the Digital Future at Annenberg**

11444 West Olympic Boulevard, Suite 120

Los Angeles, California 90064

USA

[www.digitalcenter.org](http://www.digitalcenter.org)