

Report: Electric Vehicles



Climate Insights 2020

Surveying American Public Opinion on

Climate Change and the Environment

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About RFF

Resources for the Future (RFF) is an independent, nonprofit research institution in Washington, DC. Its mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement. RFF is committed to being the most widely trusted source of research insights and policy solutions leading to a healthy environment and a thriving economy. The views expressed here are those of the individual authors and may differ from those of other RFF experts, its officers, or its directors.

About the Project

This report is the fifth in a series by researchers at Stanford University, Resources for the Future, and ReconMR examining American public opinion on issues related to climate change. Since 1997, Stanford University Professor Jon Krosnick has explored American public opinion on these issues through a series of rigorous national surveys of random samples of American adults, often in collaboration with RFF.

This survey was conducted by Stanford University, Resources for the Future, and ReconMR. Random Digit Dial telephone interviews were conducted with a representative sample of 502 adults living in the United States between May 28 and August 10, 2020.

This Climate Insights report focuses on the factors that cause some people to be reluctant to buy all-electric cars. This series is accompanied by an **interactive data tool**, which can be used to view specific data from the survey. Please visit www.rff.org/climateinsights or <https://climatepublicopinion.stanford.edu/> for more information and to access the data tool, report series, blog posts, and more.



Note: Since 1997, Stanford University Professor Jon Krosnick has led surveys exploring American public opinion on issues related to climate change, human activity, government policies to address climate change, and more, through a series of rigorous national surveys of random samples of American adults. When this research program began, "global warming" was the term in common parlance. That term was used throughout the surveys over the decades and was always defined for respondents, so it was properly understood. In recent years, the term "climate change" has risen in popularity, so both terms are used in this report interchangeably. When describing survey question wordings and results, the term "global warming" is used, to match the term referenced during interviews. Empirical studies have shown that survey respondents interpret the terms "global warming" and "climate change" to have equivalent meanings (Villar and Krosnick 2011).

Acknowledgments

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The data included in this report comes from sources with varying sharing policies. Please check the references for more information, and email krosnick@stanford.edu with any questions.

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Introduction

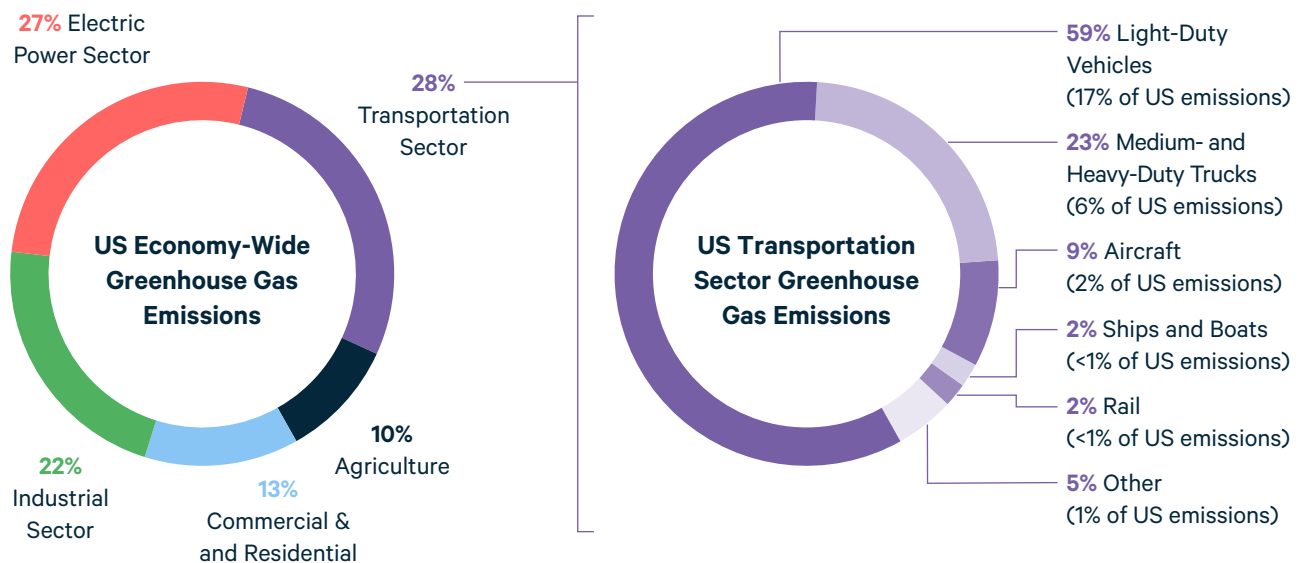
According to findings describe in prior installments of reports on the Climate Insights 2020 survey of American public opinion, large majorities of Americans believe that the earth has been warming over the past 100 years; that this warming will continue in the future if unaddressed; that it will constitute a nationally and globally serious problem; and that governments, businesses, and individuals should take steps to curb this warming and its likely effects.

According to some natural scientists and economists, one potential step to reduce emissions and mitigate climate change would be the widespread adoption of all-electric vehicles (EVs), which can be powered by electricity generated by sunlight, wind, and water. According to the US Environmental Protection Agency (see below), transportation emits more greenhouse gases than any other sector in the US, attributable to transportation's near-complete dependence on fossil fuels. Thus, emissions can be

dramatically reduced by widespread adoption of EVs. Perhaps partly for this reason, manufacturing and sales of EVs have been increasing in recent years. Still, thus far, such sales represent a small share of consumer automobile purchases in the United States.

There are various possible reasons for the slow adoption of this technology. Since most people who might buy an EV already own a car, purchasing one is what economists call a consumer durable replacement decision. According to rational choice theory, consumers will be inclined to replace their gasoline-powered cars with EVs when the latter is expected to yield higher expected utility than the former over the course of ownership. However, recent psychological research has shown that not all consumers think this way. There are considerable psychological costs entailed by durable replacement decisions, and these psychological costs are barriers to the adoption of new technologically innovative products like EVs (for a review, e.g., see Guiltman 2010).

Figure 1. US Greenhouse Gas Emissions (2018)



Data from EPA "Inventory of US Greenhouse Gas Emissions and Sinks" (2018)

Perhaps consumers have developed attachments to their current gasoline-powered cars, creating additional psychic value, referred to as the endowment effect in behavioral economics (Kahneman, Knetsch, & Thaler 1990), and the mere ownership effect in psychology (Beggan, 1992). This additional value makes consumers less likely to replace their current cars, exhibiting the behavior of loss aversion. Additionally, consumers may be uncertain of their evaluations of the expected benefits and costs of a new product like an EV. That uncertainty, to many consumers who are typically risk-averse, may decrease the attractiveness of buying an EV and cause a delay in consumer adoption of such cars.

In addition, some public reluctance to purchase EVs may be derived from functionality. For example, although the charging capacity of EV batteries has been increasing, the miles-per-charge of such vehicles remains more limited than the distance capacity of gasoline-powered vehicles. Furthermore, the United States is blanketed with gasoline stations, giving gasoline-powered vehicles significant flexibility to travel distances that are limited only by the purchasing power of their drivers. In contrast, EVs can only be recharged in locations that offer the necessary infrastructure, and recharging takes time that travelers may not always have available. The attempt by the now-defunct EV firm Better Place to locate battery-swapping stations across the country was meant to solve this problem, but the company's plan did not come to fruition, blamed partly range anxiety—the fear that EVs cannot drive the distances that passengers require and will therefore, leave them stranded (Noel and Sovacool, 2016).

However, even people whose travel patterns do not rule out EVs may hesitate before purchasing them for a variety of other reasons, some more rational than others. For example, prospective car buyers might perceive EVs to cost more to maintain than gasoline-powered vehicles. Prospective buyers might believe that there are fewer mechanics qualified to fix all-electric cars than can fix gasoline-powered vehicles, which would impose the inconveniences of additional distance, time, and cost when maintenance is required. Buyers might think that the acceleration of EVs cannot match that of gasoline-powered vehicles. Buyers might think that EVs depreciate more quickly than do gasoline-powered vehicles.

In light of these possible hesitations, it is interesting that both US President Donald Trump and former Vice President Joe Biden have recently expressed support for government efforts to promote use of all-electric vehicles. For example, during the first presidential debate on September 29, 2020, both candidates said they favor enhanced use of electric vehicles. Mr. Biden has pledged to build 500,000 charging stations on highways, to increase the proportion of federally owned and operated vehicles that are all-electric, and to provide tax credits to incentivize consumer purchases of such vehicles (Biden, 2020). During the debate, Mr. Trump also expressed his support for EVs: “I’m OK with electric cars, too. I’m all for electric cars. I’ve given big incentives for electric cars” (Kolodny, 2020).

With electric vehicles seeming to secure bipartisan support from leaders, it is of interest to explore the openness of American consumers to purchasing all-electric


vehicles and to identify the sources of consumer hesitation impeding such purchases. To that end, we conducted a national survey asking American adults about their openness to purchasing all-electric vehicles in the future and their perceptions of various attributes of such vehicles. These questions allowed us to quantify the various hesitations and to estimate the impact of each belief on likelihood of purchasing all-electric vehicles in the future.

Understanding those sources of consumer hesitation may shed light on factors currently impeding expansion of the EV market in the United States. Many factors are presumed to influence consumer purchases, such as the cost of a product; the product's safety, reliability and effectiveness; advertising and marketing to promote the product; brand appeal packaging; and more. Building on consumer choice theory, we hypothesized that product safety concern, economic costs, product features, normative considerations, and prior exposure may predict the public's hesitation to purchase EVs (e.g., Ewing & Sarigollu, 2000).

Furthermore, when purchasing expensive and technically complex products such as EVs, consumers are confronted with many competitive alternatives, and considering each alternative requires digesting extensive descriptions of the specifications and functionalities of the product. Gathering, processing, comparing, and integrating the large array of information about each attribute of competing alternatives involves substantial cognitive work and psychological involvement (e.g., Abramson, and Desai, 1993), which may diminish consumers' incentives to venture into a new market. Consequently, consumers without the experience or time to thoughtfully 'comparison shop' may hesitate before buying EVs so as to avoid expending the effort required to gather, sift, and process the technical specifications. Alternatively, these individuals may form intentions about purchasing EVs based on a small set of considerations to minimize their effort and rather rely on heuristic shortcuts in guiding their decisions (e.g., Kahneman, 2000).

We also explored whether decisionmaking about EVs might differ between men and women. Many studies suggest that women are more risk-averse than men (Eckel, & Grossman, 2008) and invest more conservatively than men (Bajtelsmit, & Bernasek, 1996), which suggests that women may be more hesitant to adopt EVs than men. Furthermore, women place different weight than men on various product attributes when making purchasing decisions (Arslanagic, Pestek, & Kadic-Magljalic, 2014; Blakewell, & Mitchell, 2006). We therefore explored whether men and women might differ in the weight placed on different attributes that might influence openness to purchasing EVs.

Past scholarship has explored factors that inhibit purchasing of EVs in the United States and abroad, informed by elaborate psychological theories in some cases. For example, Nayum and Klockner (2014) estimated the parameters of a mediated structural equation model pointing to the roles of awareness, social norms, personal norms, attitudes, intentions, knowledge, and more (see also Priessner, Sposato, and Hampl, 2018). Barbarossa et al. (2015) provided evidence of the impact of eco-friendly self-identity, concern about the environmental consequences of consumption, and moral obligation (see also Thøgersen, and Ebsen, 2019). Schmalfuss, Muhl, and Krems



**Understanding the sources
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United States.**

(2017) and Thogersen and Ebsen (2019) showed that direct experience with EVs generally made people more positive toward them, thus reducing purchase resistance. Jansson, Nordlund, and Westin (2017) documented the impact of attitudes and social influence on purchase resistance.

Provocative as these papers are, they are thick on abstract theory, often rely on data collected outside the United States (e.g., Barbarossa et al., 2015; Jansson, Nordlund, & Westin, 2017; Priessner, Sposato, & Hampl, 2018; Thogersen, & Ebsen, 2019), and when done in the United States, did not involve representative samples of prospective car buyers. We took advantage of representative sample survey data and implemented a much simpler analytic approach by estimating the impact of perceptions of the advantages and disadvantages of EVs on consumer openness to purchasing them. In that sense, our

study is more akin to that done by Carley, Krause, Lane, and Graham (2013), whose analysis explored perceptions of two disadvantages of EVs: range restriction and charging time, both of which were shown to inhibit purchasing intentions. We expand on their approach by exploring a wider range of potential disadvantages of EVs to identify the drivers of resistance to purchasing them.

These issues were explored using the data from our national telephone survey, conducted from May 28 to August 10, 2020. In this report, we describe the results obtained from statistical analyses of the data and spell out the implications of those results. A separate methodology report, which can be found [here](#) under "Methodology and Data," describes the methods of the survey data collection and the measures included in it to address all-electric vehicles.

EXPERT INSIGHT

During the past decade, we have seen a dramatic increase in the number of plug-in hybrid and all-electric vehicles on the road. As both all-electric and plug-in hybrid prices have declined and performance has improved with the help of government subsidies, the power of EVs in the auto industry is growing. In fact, Tesla is the most valuable car company in the United States, and, as of mid-October 2020, is worth more than Ford and General Motors combined.

However, EVs still make up a small market share of new passenger vehicles. Compared to gas-powered cars, there are relatively few options and charging stations remain scarce in many places in the United States. Gas-powered vehicles will likely continue dominating the market for some time, but EVs may replace gas-powered vehicles in the long-term. When that time comes will be influenced by the presence of

government subsidies, advances in battery technology, and consumer behavior. But overall, the transition from one vehicle technology to another will most likely be gradual.

On the political side, something to watch is California Governor Gavin Newsom's executive order announcing that, by 2035, California will require all new passenger vehicles sold in the state to produce no direct emissions. California is the first jurisdiction to do this in the United States, and the action follows similar announcements that a few countries have made, such as France and Germany. Considering that California accounts for about 10 percent of US sales, it will be interesting to see what will happen to the EV market if CA follows through. Political action like this on the state and federal level will likely have an influence on the future of EVs.

—**Joshua Linn**, RFF Senior Fellow

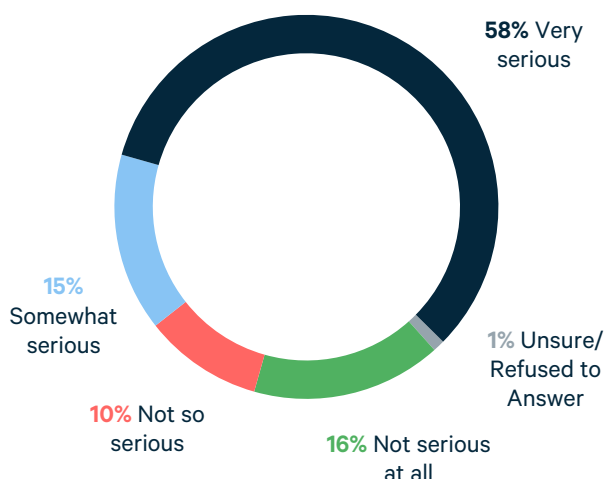


Why May Americans Be Resistant to Electric Vehicles?

Opinions on Global Warming

Nearly one-quarter (26%) of Americans believe that unchecked global warming will not be a problem for the United States (16%) or believe it will be a “not so serious” problem (10%). These individuals may be less motivated to consider buying an EV than the 15% who believe that unchecked global warming will be a somewhat serious problem and the 58% who think that unchecked global warming will be a very serious problem.

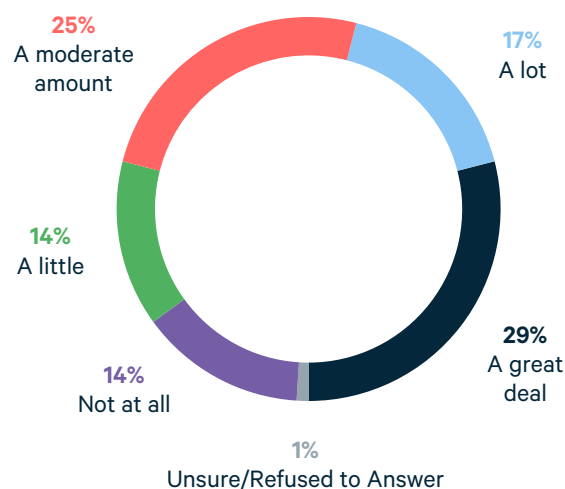
Figure 2. Americans’ beliefs about how serious a problem global warming will be for the United States



Distributions of Perceptions of EVs

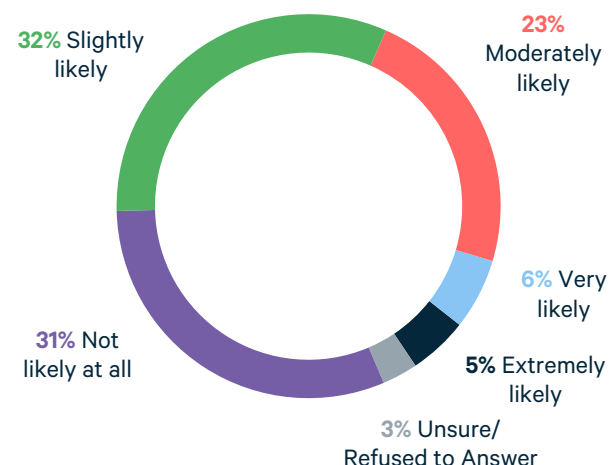
Environmental benefits. More than one-quarter (28%) of Americans believe that driving an EV will not help the environment at all (14%) or that it will help the environment “a little” (14%). These individuals may be less motivated to consider buying an all-electric car than the one-quarter of Americans (25%) who believe that driving an all-electric car will help the environment “a moderate amount,” the 17% who believe that it will help the environment “a lot,” and the 29% who believe that it will help the environment “a great deal.”

Figure 3. How much Americans think driving an all-electric car helps the environment



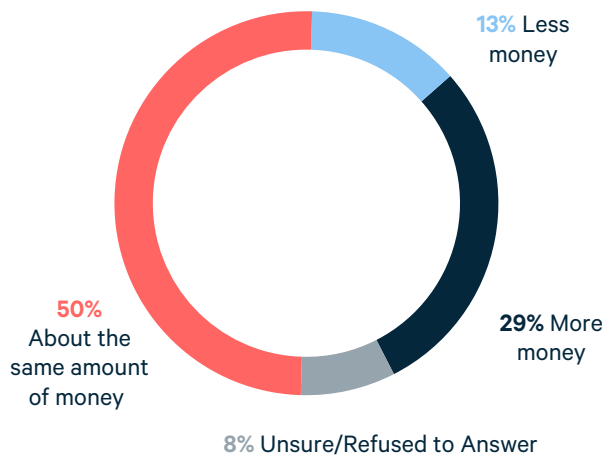
Safety. About one-third (34%) of Americans believe that EV batteries are extremely likely (5%), very likely (6%), or moderately likely (23%) to catch on fire. These individuals may be less motivated to consider buying an EV than the nearly two-thirds of Americans who believe that batteries catching on fire is either slightly likely (32%) or not likely at all (31%).

Figure 4. How likely Americans think it is that EV batteries will catch on fire



Economics. Nearly one-third (29%) of Americans believe that maintaining EVs is more costly than maintaining gasoline-powered cars, and these individuals may be less open to purchasing an EV than the 13% and 50% of Americans who believe that maintenance of all-electric cars is less costly than or as costly as maintaining gasoline-powered cars, respectively.

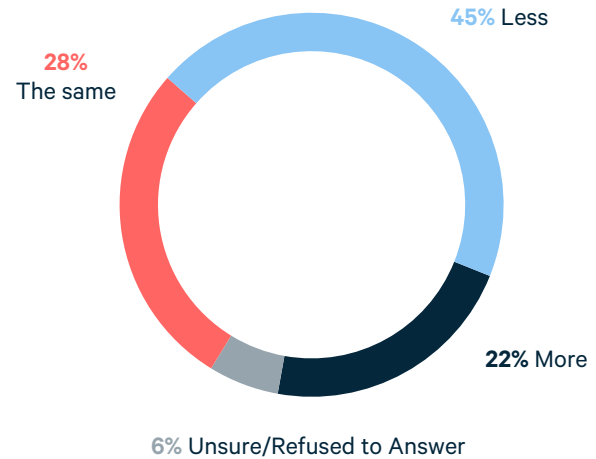
Figure 5. Americans' beliefs about maintenance costs of EVs relative to gasoline-powered cars



22% of Americans believe that driving EVs is more costly than driving gasoline-powered cars, and these people may be less motivated to buy an EV than are the 45% and 28% of Americans who believe that driving EVs is less costly than or as costly as driving gasoline-powered cars, respectively.

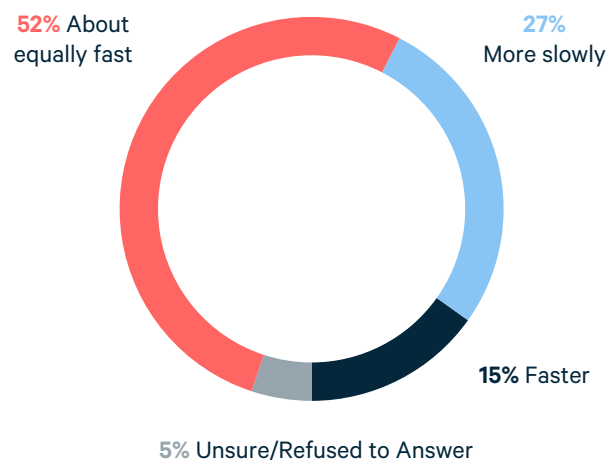
45% of Americans think that it is cheaper to drive an EV one mile than a gasoline car.

Figure 6. Americans' beliefs about whether the electricity to drive an EV one mile costs more, less, or the same as gas to drive a gasoline-powered vehicle one mile



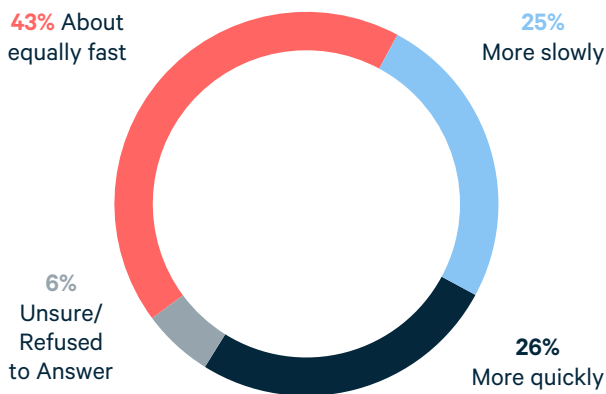
15% of Americans believe that all-electric cars lose value more quickly than gas-powered cars. These people may be less motivated to purchase an EV than the 27% who think that EVs lose value more **slowly** than gas-powered cars and the 52% who believe that depreciation of all-electric cars and gasoline-powered cars is about the same.

Figure 7. Percentage of Americans who think EVs lose value faster, more slowly, or at the same rate as gasoline-powered vehicles



Performance and efficiency. One-quarter of Americans (25%) believe that all-electric cars have poorer acceleration than gasoline-powered cars. These people may be less motivated to buy EVs than the 26% who believe that all-electric cars have better acceleration than gasoline-powered cars and the 43% who perceive no difference in acceleration between all-electric cars and gasoline-powered cars.

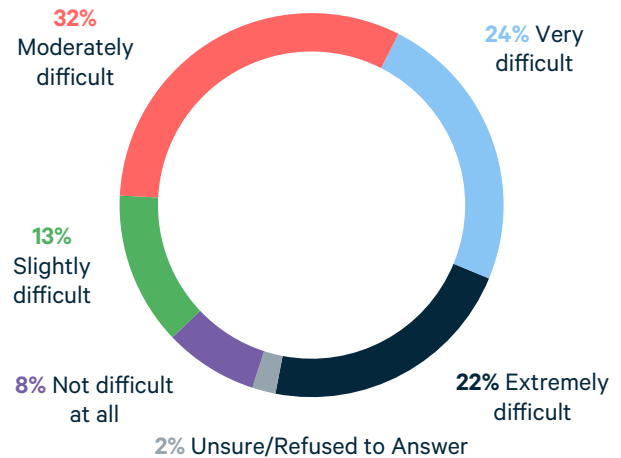
Figure 8. Americans' beliefs about whether EVs accelerate more quickly or more slowly than gasoline-powered vehicles



22% of Americans believe that charging EV batteries is extremely difficult, 24% believe it is very difficult, and 32% perceive it to be moderately difficult. If perceived difficulty of charging EV batteries factors into the decision to purchase, these 78% of Americans may be more reluctant to buy EVs than are the 13% and 8% who believe battery charging is slightly difficult and not difficult at all, respectively.

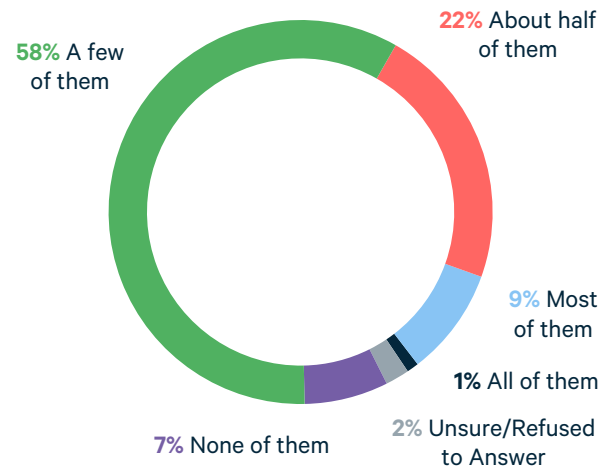
78% of Americans think finding an EV charging station is at least moderately difficult.

Figure 9. Americans' beliefs about how difficult it is to find an EV charging station



58% of Americans believe that “a few” auto mechanics can repair EVs, and 7% believe that “essentially none” can. These Americans may be more reluctant to buy EVs than those who believe that “about half,” “most,” or “all” mechanics can fix them (22%, 9%, and 1%, respectively).

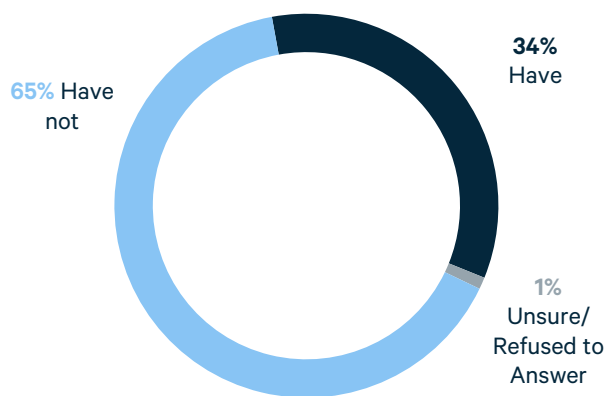
Figure 10. Americans' beliefs about how many mechanics can fix EVs



A little more than half of Americans who anticipate purchasing a car in the future will consider buying an all-electric car.

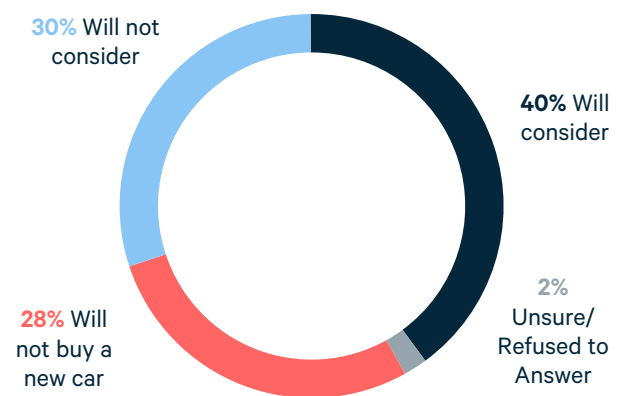
Prior exposure. 65% of Americans have not driven or known someone who has driven an all-electric car or truck. These people—representing about two-thirds of Americans—may be more reluctant to buy an EV than are the 34% who have driven one or know someone who has driven one.

Figure 11. Percentage of Americans who have or have not driven an EV or known someone who has



Openness to buying an EV. 40% of Americans said they will buy a car in the future and will consider buying an all-electric car, 30% said they will buy a car in the future but will not consider buying an all-electric car, and 28% said they will not buy a car in the future. Thus, of future car buyers, 57% said they will consider buying an EV.

Figure 12. Percentage of Americans who will or will not consider buying an EV



EXPERT INSIGHT

It appears that many people would at least consider buying an EV. This is striking, because EVs represent about 2% of all new vehicle sales. It begs the question, what is preventing those *considering* an EV from actually *buying* an EV? It may be a combination of reasons. First, only a few dozen EV models are available, compared to hundreds of gasoline models. This really restricts options. Second, EVs remain more expensive than an equivalent gasoline vehicle. Third, battery range remains a concern, as a typical mass-

market EV still only gets 200 to 300 miles per charge. This is much smaller than the range of a typical gasoline vehicle.

It seems that many people think charging is a challenge (Figure 9), even though the number of EV charging stations has increased a lot over time. This could be due to a lack of awareness of where charging stations are located. Gas stations are large and obvious, while EV charging stations are less obvious.

—Benjamin Leard, RFF University Fellow



A man with a beard, wearing a light-colored shirt, stands next to a blue electric car. The car's front charging port is open, and a white charging cable is plugged in. The background is a blurred green landscape. The text is overlaid on the image.

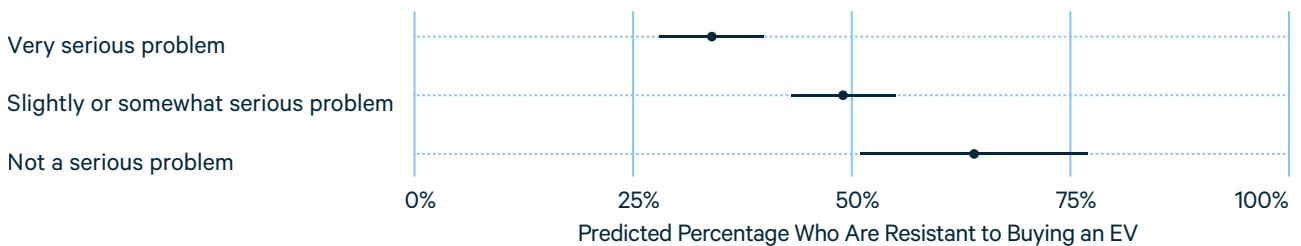
65% of respondents have
neither driven nor known
someone who has driven
an all-electric car or truck.

Predicting Resistance to Purchasing EVs

Global warming. In the OLS regression predicting purchase openness (see [technical report](#)), the strongest predictor of reluctance is the belief that global warming will not be a serious problem for the

United States in the future. The more serious people believe global warming will be in the future, the more likely they are to consider buying EVs.

Figure 13. Predicting reluctance to buy an EV: Effects of global warming beliefs

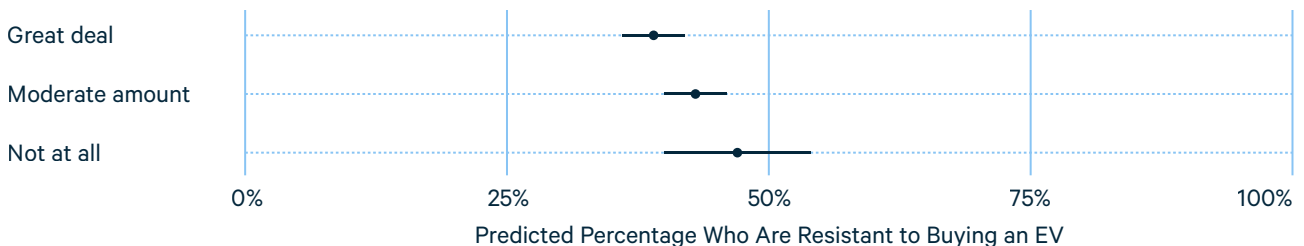


Environmental protection. Controlling for beliefs about global warming, the perception that driving EVs does not help the environment did not inhibit intentions to purchase such cars. When the perception that driving EVs does not help the environment was included among the predictors

in the regression equation but beliefs about global warming were not, beliefs about environmental protection were a marginally significant inhibitor to purchase intentions, as expected. Thus, it seems that beliefs about global warming are the motivator behind this relation involving environmental protection.

Figure 14. Predicting reluctance to buy an EV: Effects of beliefs about environmental benefits

Controlling for global warming beliefs



Not controlling for global warming beliefs

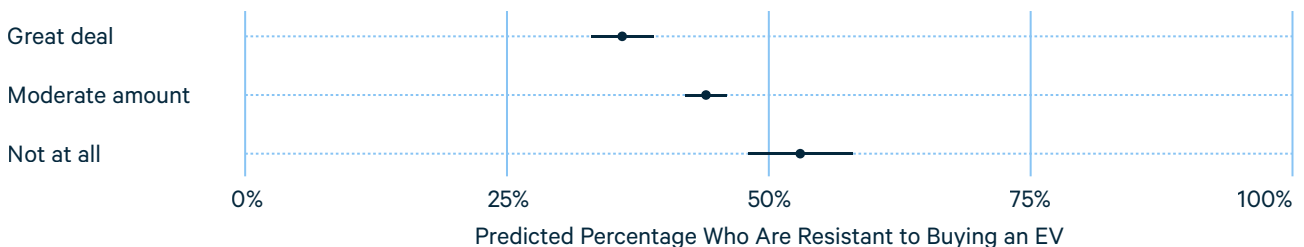
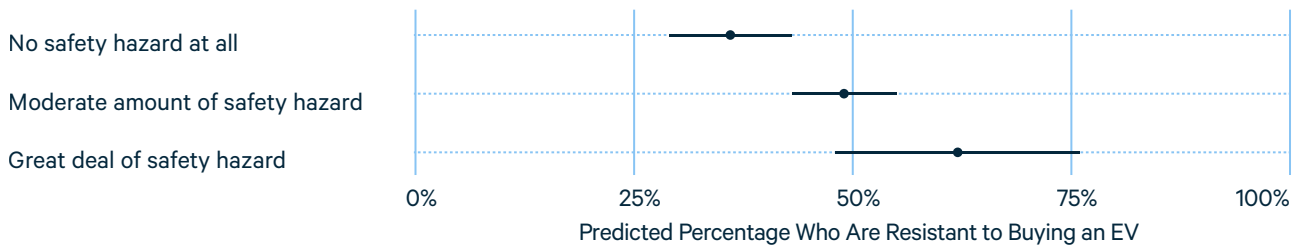


Figure 15. Predicting reluctance to buy an EV: Effects of beliefs about safety



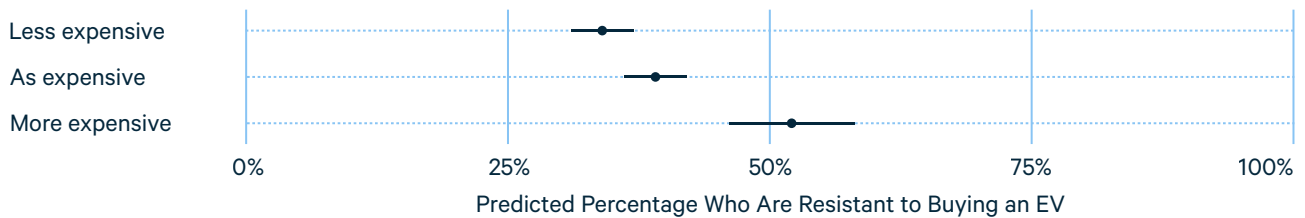
Safety. The perception that batteries pose a safety hazard substantially reduced people's openness to purchasing EVs.

Economic costs. Perceived greater maintenance costs of EVs as compared to gas-powered vehicles

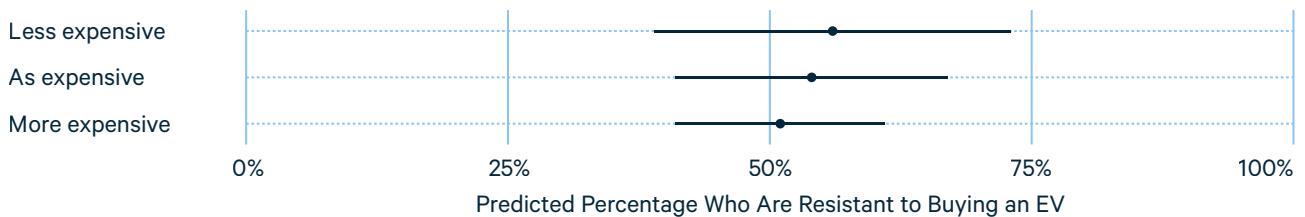
was another predictor of purchasing reluctance. Believing that EVs are more expensive to maintain was a deterrent to purchasing as well. The perception that EVs are more expensive to operate and depreciate more quickly than gasoline-powered cars did not inhibit purchasing intentions.

Figure 16. Predicting reluctance to buy an EV: Effects of perceived cost

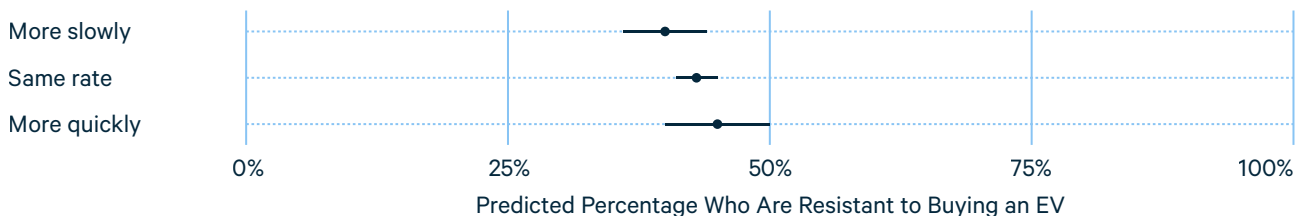
Cost to maintain EVs relative to gasoline-powered cars




Cost to operate EVs relative to gasoline-powered cars



How fast EVs lose value relative to gasoline-powered cars

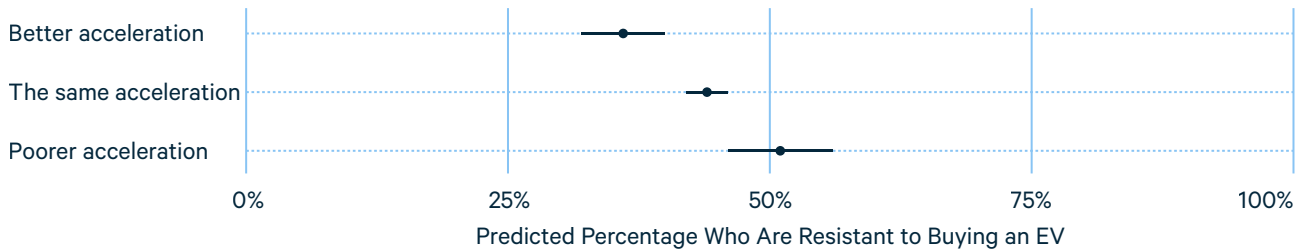




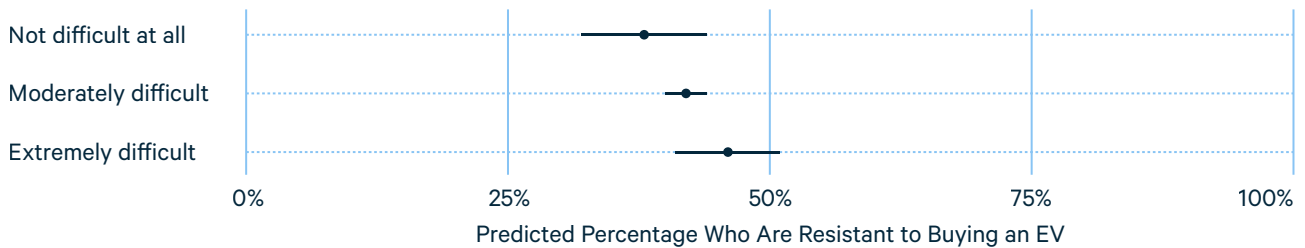
The perception that batteries pose a safety hazard **substantially** **reduced** people's openness to purchasing all-electric vehicles.

Figure 17. Predicting reluctance to buy an EV: Effects of beliefs about acceleration, charging difficulty, and availability of mechanics

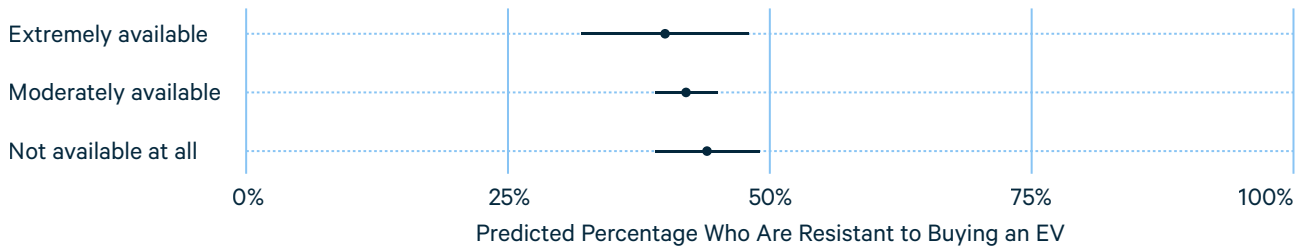
EV acceleration relative to gasoline-powered cars



Difficulty of charging EV batteries



Availability of mechanics who can repair EVs



Performance and efficiency. The perception that EVs have better acceleration than gasoline-powered cars predicted the openness to purchasing all-electric cars marginally significantly. Perceiving worse acceleration was not a deterrent.

The perceived difficulty of charging batteries and the perceived lack of car mechanics knowledgeable in EV repair did not inhibit purchasing intentions.

Prior exposure. Prior experience driving EVs did not enhance openness to purchasing all-electric cars.

Figure 18. Predicting reluctance to buy an EV: Effects of prior experience driving EVs or knowing someone who had an EV



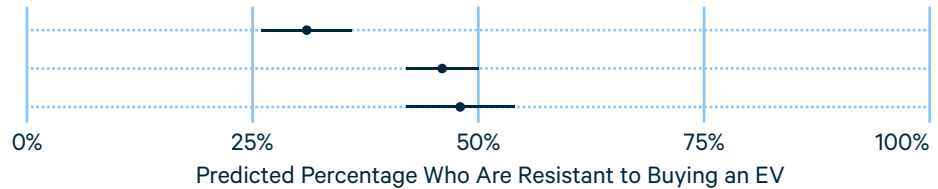
Other predictors. Liberals are less resistant than moderates to purchasing EVs. Democrats are marginally significantly more resistant than are Independents. People ages 55 to 64 were significantly more resistant than people ages 18 to 25. High school graduates were significantly more reluctant

than people who had not graduated from high school. People in the Northeast region of the United States were marginally significantly less resistant to purchasing EVs. Sex, Hispanic ethnicity, race, income, and marital status were unrelated to resistance.

Figure 19. Predicting reluctance to buy an EV: Effects of other factors

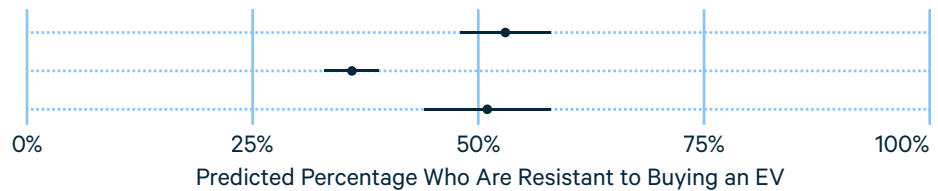
Ideology

Liberals
Moderates
Conservatives



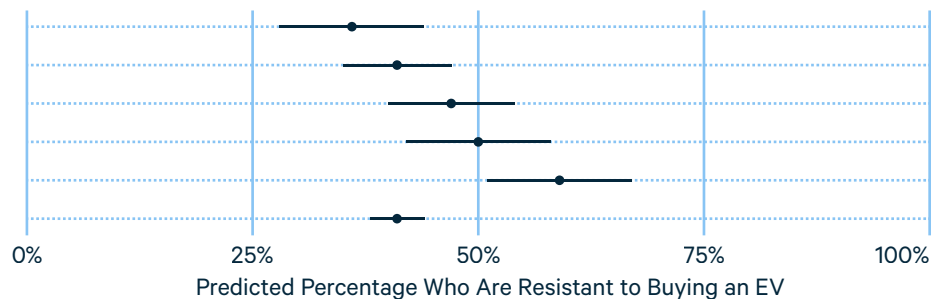
Political Party

Democrats
Independents
Republicans



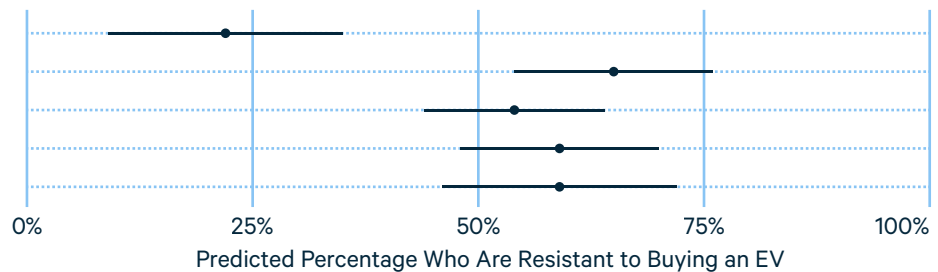
Age

Ages 18–24
Ages 25–34
Ages 35–44
Ages 45–54
Ages 55–64
Ages 65+



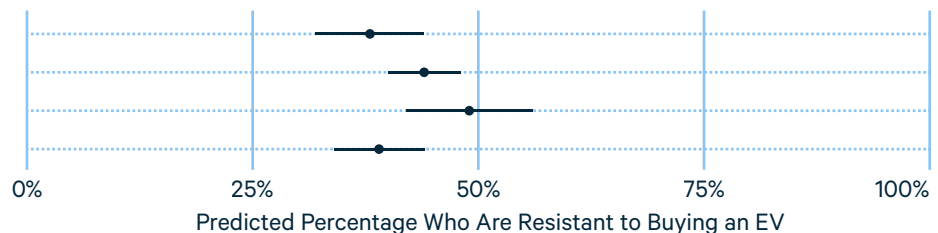
Education

Did not graduate from high school
Graduated from high school
Some college
Graduated from college
Post-college education



Region

Northeast
South
Midwest
West



Moderators of the Predictors of Resistance to Purchasing EVs

Moderation by Sex

Men and women* differed in terms of the predictors of their openness to purchasing all-electric cars (for regression coefficient estimates testing moderation, see the [Climate Insights 2020: Electric Vehicles technical report](#)).

Belief that global warming will be a serious problem significantly enhanced openness to buying an EV in the future among women, and did not among men.

The perception that driving EVs does not help the environment inhibited intentions to purchase such cars among men and did not among women.

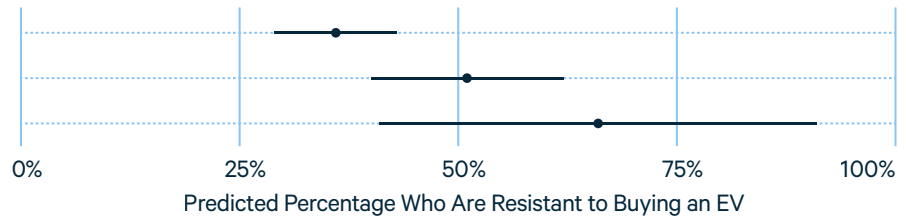
Figure 20. Predicting reluctance to buy an EV: Effect of global warming beliefs by sex

Women

Very serious problem

Slightly or somewhat serious problem

Not a serious problem



Men

Very serious problem

Slightly or somewhat serious problem

Not a serious problem

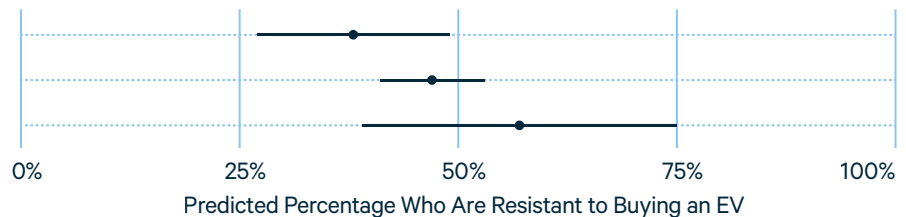


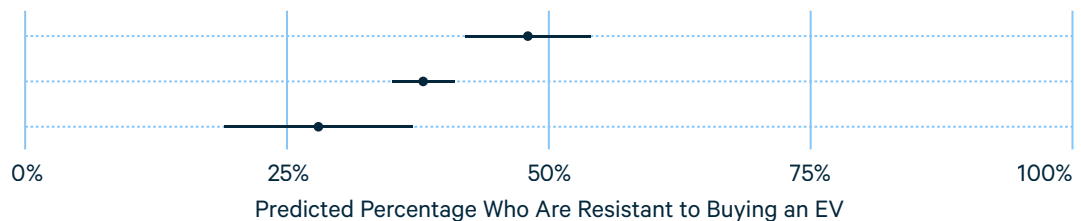
Figure 21. Predicting reluctance to buy an EV: Effect of environmental benefit beliefs by sex

Women

Great deal

Moderate amount

Not at all

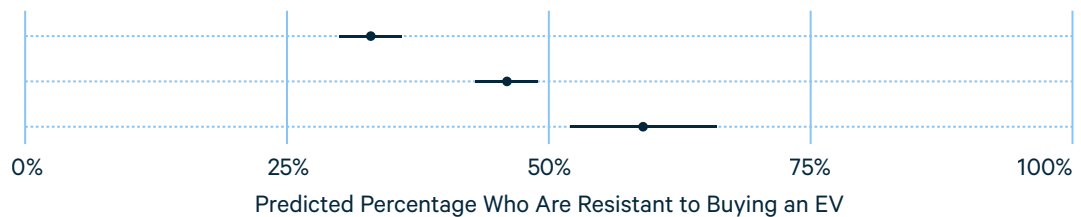


Men

Great deal

Moderate amount

Not at all

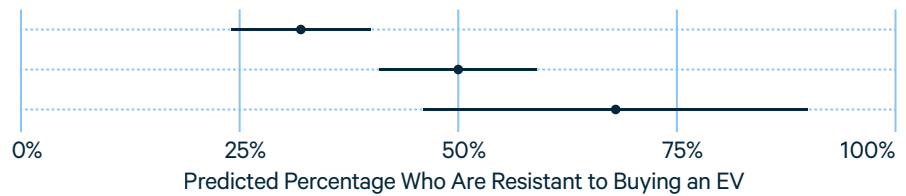


*Respondents were asked, "Are you male or female?" Hereafter, respondents who said they were female are referred to as "women," while respondents who said they were male are referred to as "men."

Figure 22. Predicting reluctance to buy an EV: Effect of safety beliefs by sex

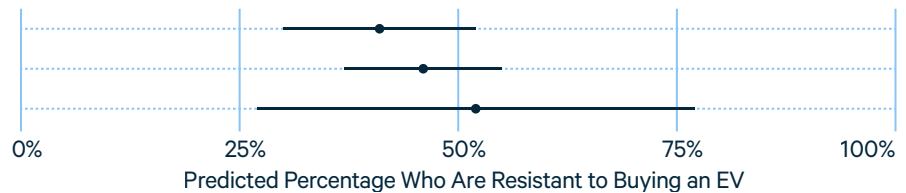
Women

No safety hazard at all
Moderate amount of safety hazard
Great deal of safety hazard



Men

No safety hazard at all
Moderate amount of safety hazard
Great deal of safety hazard



The perception that EV batteries pose a safety hazard substantially reduced people's openness to purchasing EVs among women but did not among men.

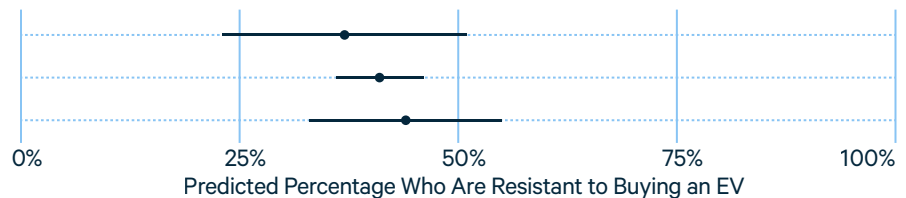
Perceived greater EV maintenance costs were a strong predictor of reluctance to buy these

cars among men, but did not increase reluctance among women. In contrast, the perception that EVs depreciate more quickly inhibited purchasing intentions among women to a high degree, but did not have the same effect among men.

Figure 23. Predicting reluctance to buy an EV: Effect of cost and depreciation beliefs by sex

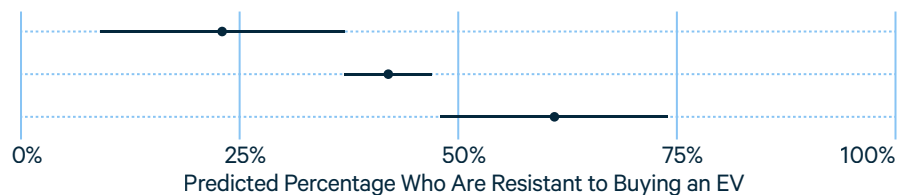
Women

EVs have lower maintenance costs
EVs have same maintenance costs
EVs have greater maintenance costs



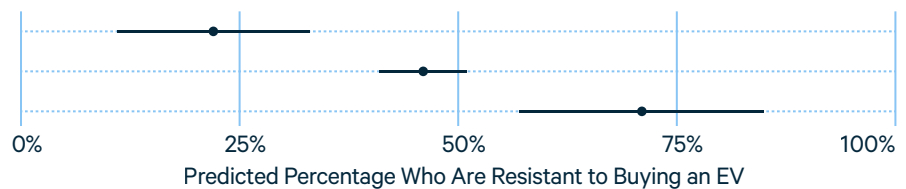
Men

EVs have lower maintenance costs
EVs have same maintenance costs
EVs have greater maintenance costs



Women

EVs lose value more slowly
EVs lose value at same rate
EVs lose value more quickly



Men

EVs lose value more slowly
EVs lose value at same rate
EVs lose value more quickly

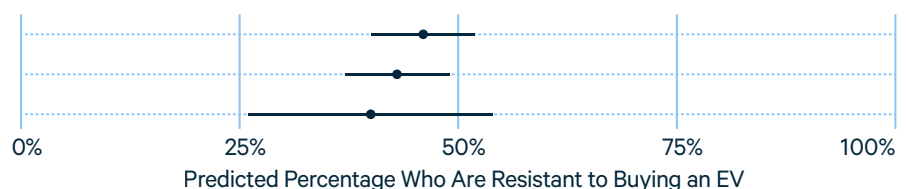
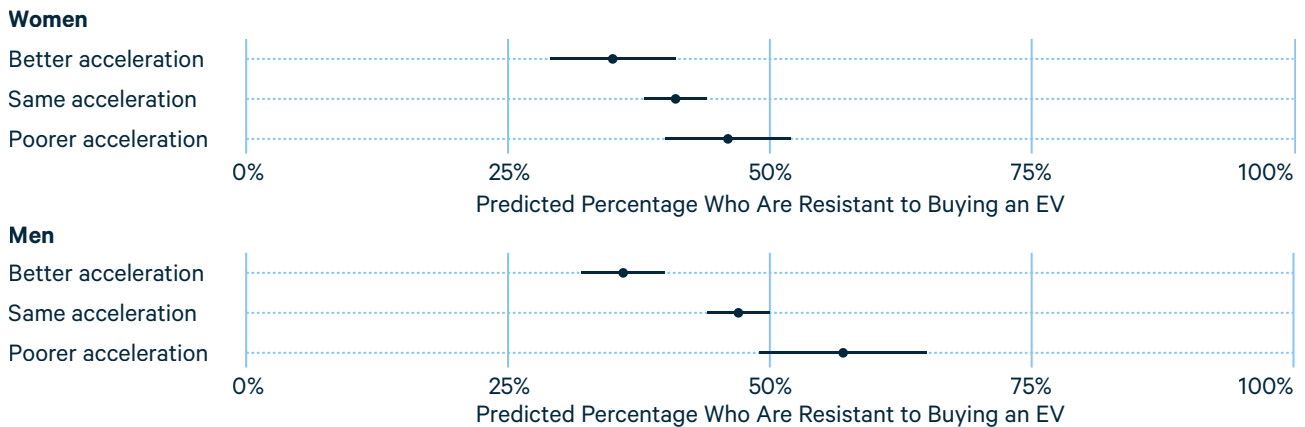


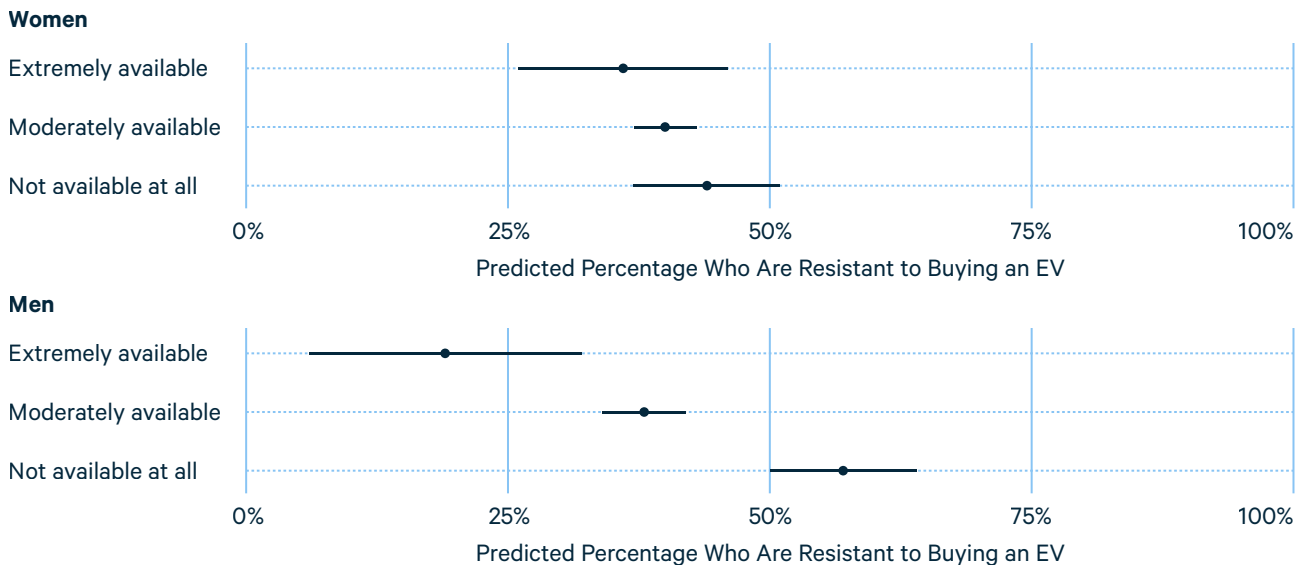
Figure 24. Predicting reluctance to buy an EV: Effect of acceleration beliefs by sex



The perception that EVs have poorer acceleration than gasoline-powered cars predicted the resistance to EVs among men but did not predict resistance

among women. Perceived unavailability of car mechanics to repair EVs decreased purchasing intentions among men but did not among women.

Figure 25. Predicting reluctance to buy an EV: Effect of beliefs about availability of mechanics who can fix EVs by sex



Moderation by Education

More educated people differed from less educated people in terms of the criteria that drive their reluctance to purchase EVs.

For example, the belief that global warming will be a serious problem significantly enhances openness to

buying an EV among people who did not graduate from college more than among people who did.

The perception that EV batteries pose a safety hazard substantially reduced the openness to purchasing EVs among people without a college degree but did not reduce openness among college graduates.

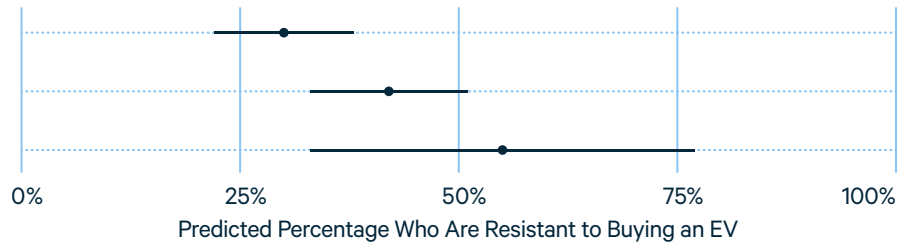
Figure 26. Predicting reluctance to buy an EV: Effect of global warming beliefs on those who did and did not graduate from college

College Graduates

Very serious problem

Slightly or somewhat serious problem

Not a serious problem



Non-College Graduates

Very serious problem

Slightly or somewhat serious problem

Not a serious problem

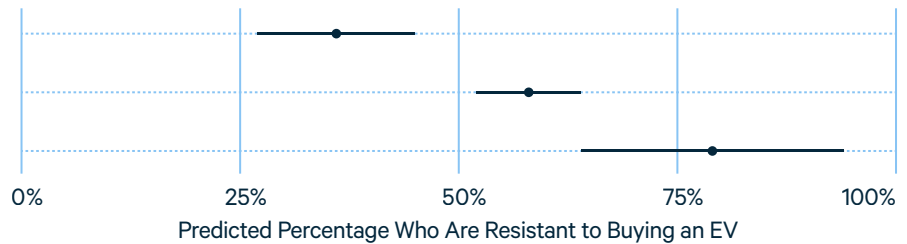


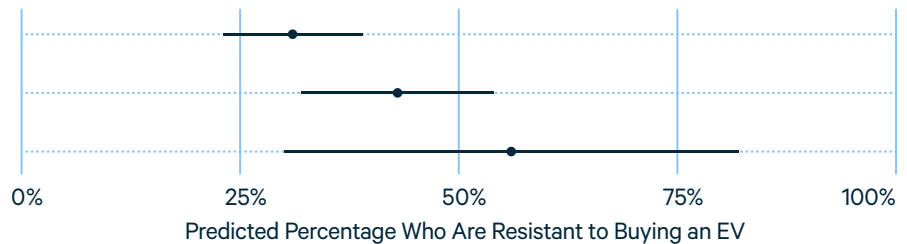
Figure 27. Predicting reluctance to buy an EV: Effect of safety beliefs on those who did and did not graduate from college

College Graduates

No safety hazard at all

Moderate amount of safety hazard

Great deal of safety hazard



Non-College Graduates

No safety hazard at all

Moderate amount of safety hazard

Great deal of safety hazard

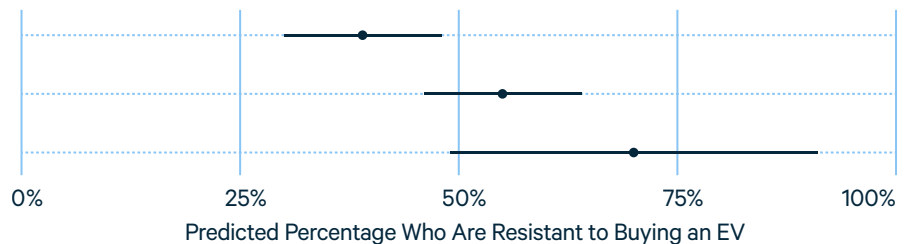
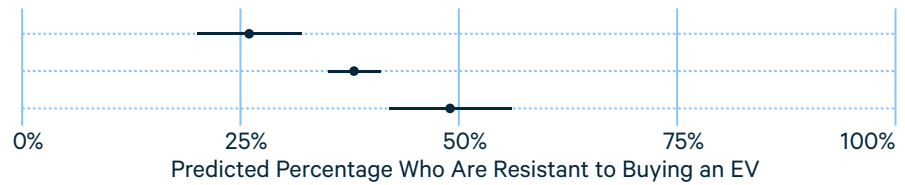


Figure 28. Predicting reluctance to buy an EV: Effect of depreciation and cost beliefs on those who did and did not graduate from college

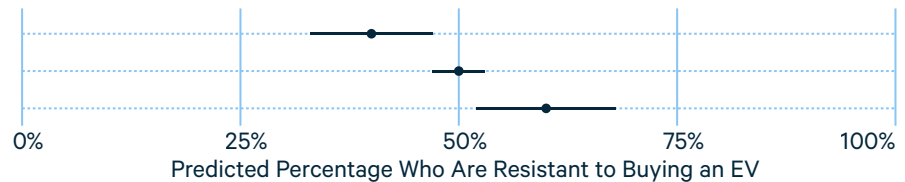
College Graduates

- EVs lose value more slowly
- EVs lose value at same rate
- EVs lose value more quickly



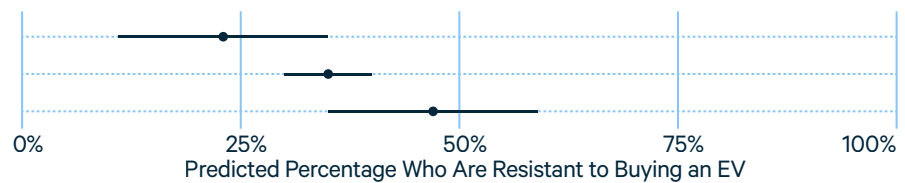
Non-College Graduates

- EVs lose value more slowly
- EVs lose value at same rate
- EVs lose value more quickly



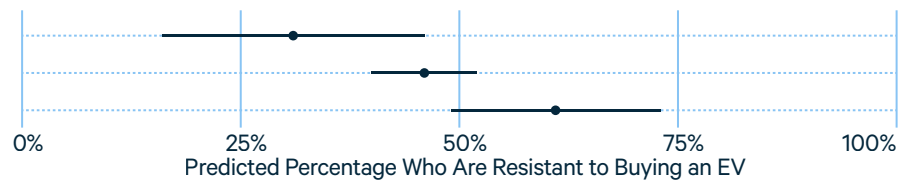
College Graduates

- EVs have lower maintenance costs
- EVs have same maintenance costs
- EVs have greater maintenance costs



Non-College Graduates

- EVs have lower maintenance costs
- EVs have same maintenance costs
- EVs have greater maintenance costs



Perceiving all-electric cars to depreciate more quickly inhibited purchasing intentions among college graduates but did not among people without college degrees.

strongly among people with and without college degrees.

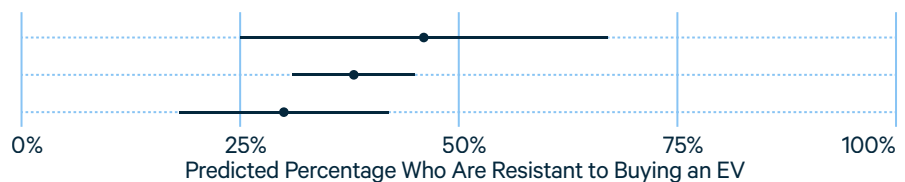
Perceiving greater maintenance costs of all-electric cars predicted reluctance to buy these cars equally

Perceived unavailability of car mechanics to repair all-electric cars substantially decreased purchasing intentions among Americans without college degrees but did not among college graduates.

Figure 29. Predicting reluctance to buy an EV: Effect of beliefs about availability of mechanics who can fix EVs on those who did and did not graduate from college

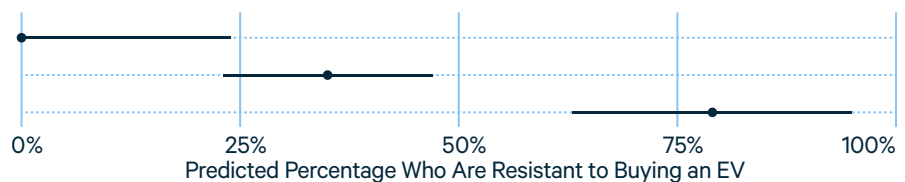
College Graduates

- Extremely available
- Moderately available
- Not available at all



Non-College Graduates

- Extremely available
- Moderately available
- Not available at all



Moderation by Prior Experience

Believing that global warming will be a serious problem significantly enhanced openness to buying EVs among Americans without prior exposure to such cars. However, belief in the severity of global warming

did not enhance openness among Americans with prior experience.

The perception that EV batteries pose a safety hazard equally reduced openness to purchasing all-electric cars among people with and without prior exposure.

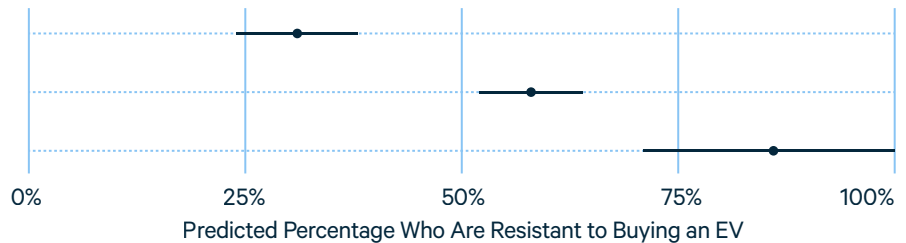
Figure 30. Predicting reluctance to buy an EV: Effect of global warming beliefs on those with and without prior experience

With No Prior Exposure

Very serious problem

Slightly or somewhat serious problem

Not a serious problem



With Prior Exposure

Very serious problem

Slightly or somewhat serious problem

Not a serious problem

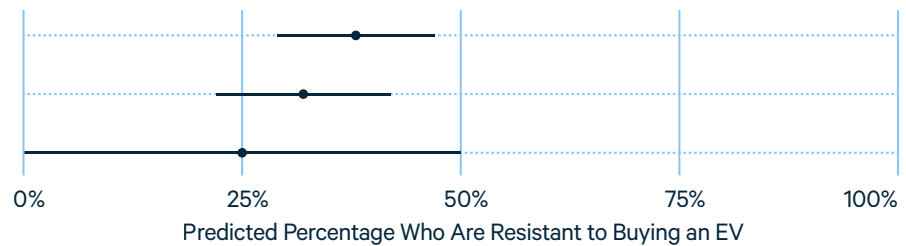


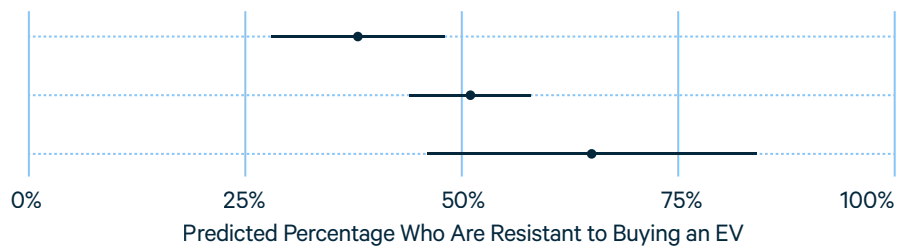
Figure 31. Predicting reluctance to buy an EV: Effect of safety beliefs on those with and without prior experience

With No Prior Exposure

No safety hazard at all

Moderate amount of safety hazard

Great deal of safety hazard



With Prior Exposure

No safety hazard at all

Moderate amount of safety hazard

Great deal of safety hazard

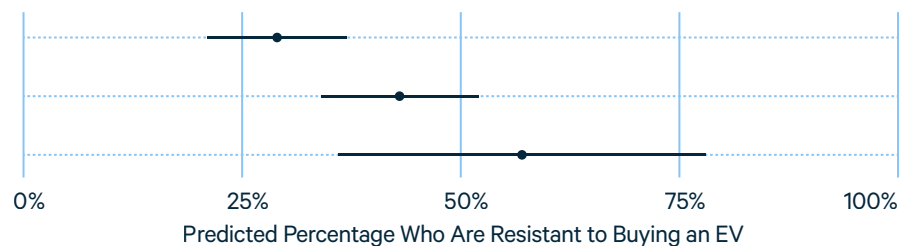
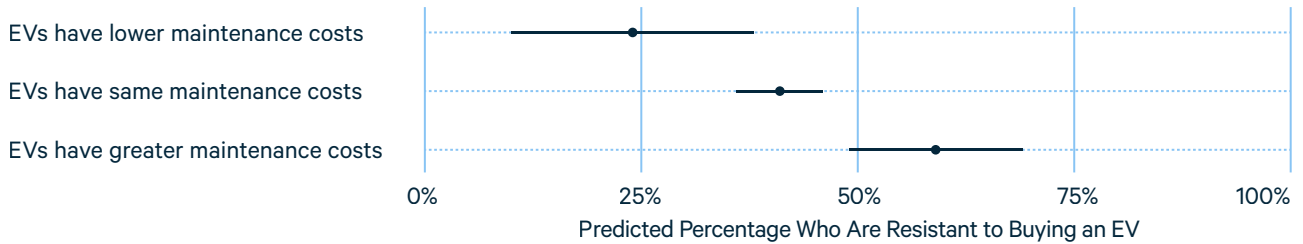
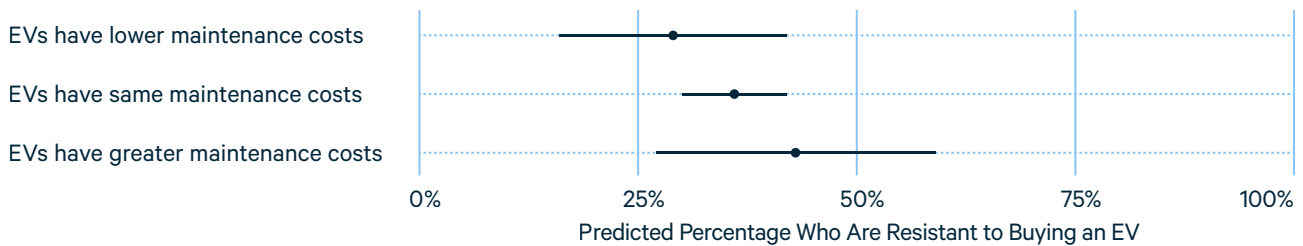


Figure 32. Predicting reluctance to buy an EV: Effect of maintenance cost beliefs on those with and without prior experience

With No Prior Exposure



With Prior Exposure

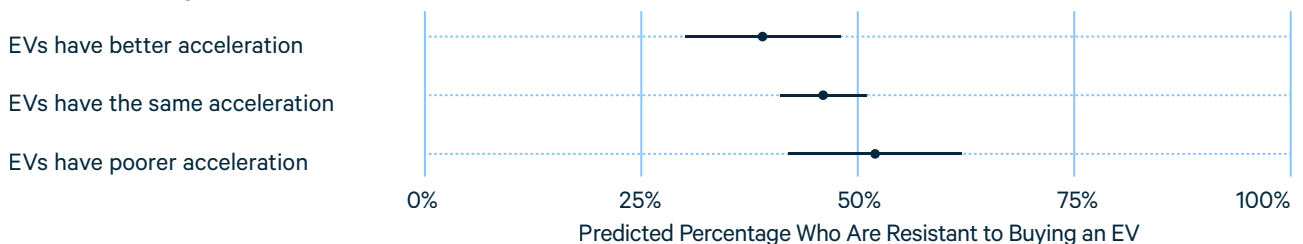


Perceived high EV maintenance costs increased hesitation to buy these cars among people without prior experience, but did not increase hesitation among people with previous exposure.

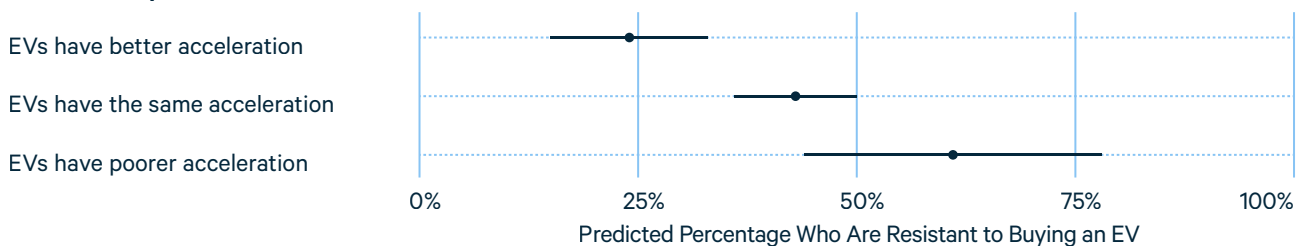
Perceived poor acceleration predicted the resistance to all-electric cars among Americans with prior exposure, but did not affect hesitation among Americans without prior exposure.

Figure 33. Predicting reluctance to buy an EV: Effect of acceleration beliefs on those with and without prior experience

With No Prior Exposure



With Prior Exposure



Conclusion

These findings shed light on how people perceive EVs and how those perceptions drive public resistance to purchasing EVs. At present, 57% of future car buyers are willing to consider an EV. Thus, there are almost as many people who are reluctant to consider buying one as there are people who would not. And that reluctance comes from a variety of different beliefs.

The most important driver of openness to purchasing an EV is belief that global warming will be a serious problem for the United States in the future. Among potential car buyers, perceptions of this threat are not maximized. So if perceptions of the threat posed by global warming increase in the coming years, openness to purchasing EVs seems likely to increase.

But even if that happens, there are other psychological sources of hesitation regarding EV purchases. When examining the full sample, we saw the following barriers appear: the perception that batteries might catch on fire, the perception that maintenance costs of EVs are higher than the cost of maintaining gas-powered cars, and the perception that EVs have weaker acceleration than do gasoline-powered vehicles.

Furthermore, when we analyzed subgroups of the population defined by sex, education, and prior exposure to EVs, we identified other beliefs that are also barriers to purchasing among subgroups: the belief that charging batteries is difficult, the belief that EVs depreciate more quickly than gasoline-powered cars, and the belief that mechanics who can fix EVs are not numerous. Thus, to the extent that all of these beliefs change in directions favorable to EVs, there is reason to believe that purchase openness will increase as well.

It is interesting to note that simply having driven an EV or knowing someone who has one does not make people more inclined to purchase an EV in the future. This suggests that if, as time passes, more people have the opportunity to experience or hear about owning an EV, we do not expect to see increased willingness to purchase based on this factor alone.

The findings reported here contribute to the literatures in marketing on consumer decisionmaking by highlighting differences in decisionmaking criteria based on a person's sex, education, and prior experience. First, perhaps contrary to the notion that women are more likely than men to hesitate to adopt new technologies, we did not see any effect of sex directly on purchasing openness when controlling for beliefs. It is interesting to note, however, that among women—but not among men—experience driving an EV or knowing someone who has done so increased openness to purchasing an EV, consistent with the notion that familiarity with a new technology reduces reluctance about it. Among women, economic and safety were key concerns, with accelerated depreciation concerns the most powerful barrier to purchasing, followed by concern about battery fires. For men, maintenance costs and mechanic availability were important sources of hesitation.



The most important driver
of openness to purchasing
an all-electric vehicle is
belief that **global warming**
will be a serious problem
for the United States in the
future.

Regarding education, the only notable difference was that concern about mechanic availability was a very powerful source of hesitation among people with lower levels of education, whereas it was not at all a deterrent among people with higher levels of education.

Interestingly, having prior experience with EVs reduced the impact of maintenance cost concerns but enhanced the impact of acceleration concerns. Also, surprisingly, being a Democrat was a source of hesitation among people without prior experience but not among Democrats with prior experience.

The findings reported here highlight opportunities for advocates of EVs to educate the public about the attributes of these vehicles. Increasing education and public awareness would likely translate into an enhanced appetite for EVs. If public inclination to make such purchases increases in the years to come, it will be interesting to then test whether the possible influences on opinion identified here were in fact responsible for the observed shifts.

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