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Perceptions of and Experiences with Advanced Driver Assistance Systems Among New and Used Vehicle Purchasers, Renters, and Borrowers

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Title

Perceptions of and Experiences with Advanced Driver Assistance Systems Among New and Used Vehicle Purchasers, Renters, and Borrowers

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Foreword

Advanced Driver Assistance Systems (ADAS) are designed to provide driving support and make driving safer and more comfortable by intervening when needed to prevent crashes. However, it is important for drivers to understand what these technologies can and cannot do. Many studies by the AAA Foundation for Traffic Safety as well as others have examined drivers' understanding of and experiences with ADAS among recent purchasers of new vehicles. However, vehicles can be driven by other people besides their original purchaser.

This report presents the results of a large survey that examined knowledge of and experiences with ADAS, as well as the experience of acquiring the vehicle itself, among purchasers of used vehicles and among people who recently rented or borrowed a vehicle, in addition to purchasers of new vehicles. This report should be of interest to automobile manufacturers, dealers, and vehicle rental companies, as well as driver education professionals and other stakeholders who work to improve traffic safety.

C. Y. David Yang, Ph.D.

President and Executive Director
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About the Sponsor

AAA Foundation for Traffic Safety
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Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this report was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

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Executive Summary

Advanced Driver Assistance Systems (ADAS) comprise several different vehicle technologies that work independently and in concert to warn drivers of potential safety hazards, take action to prevent or mitigate a collision, or to provide continuous driving support. It is important for drivers of ADAS-equipped vehicles to understand these technologies and use them appropriately. Although used vehicles account for the majority of passenger vehicle sales in the United States, and people sometimes drive vehicles that they do not personally own, most research about user experiences with ADAS has focused explicitly or implicitly on owners of new vehicles. The current study sought to investigate understanding of and experiences with ADAS among individuals who drive ADAS-equipped vehicles of which they were not the original owner, including owners of used vehicles as well as renters and borrowers of vehicles equipped with ADAS.

A web-based survey was administered to a convenience sample of drivers recruited online from a commercial crowdsourcing platform. The questionnaire investigated drivers' general understanding of ADAS; experiences of purchasing, renting, or borrowing vehicles; and awareness and use of ADAS in vehicles that they had driven recently. Questions about ADAS focused mainly on two specific technologies: Adaptive Cruise Control (ACC) and Lane Centering Assistance (LCA). A total of 3,466 respondents completed the survey.

When differences between purchasers of new versus used vehicles were examined, purchasers of new vehicles were a few years older and reported having higher incomes. The vast majority of respondents who purchased new vehicles had purchased them from the manufacturer's dealership, compared with fewer than half of used vehicle purchasers. Both new and used vehicle purchasers reported similar rates of use of and familiarity with ACC and LCA prior to the purchase of their primary vehicle; however, respondents who purchased new vehicles reported that sellers spent slightly more time providing information about ACC and LCA and more often shared positive opinions about these technologies. Fewer than one in six purchasers in either group reported that the seller told them about the operating requirements for the systems or when they might not work as expected.

At the time of purchase, new vehicle purchasers self-reported having a better understanding of ACC (but not LCA) than did purchasers of used vehicles. New vehicle purchasers also self-reported having a better understanding of both technologies at the time of the survey (after having owned their vehicle for some time). In contrast, when respondents' understanding of these technologies was measured directly, no such differences were observed, as both groups demonstrated moderate but incomplete understanding of the systems. Both groups of purchasers reported similar rates of use of and attitudes toward ACC and LCA.

The project also investigated the experiences of respondents who had recently rented or borrowed a vehicle, including whether information about ACC and LCA had been shared with them. The respondents reported that most of the vehicles they borrowed and rented were equipped with ACC and LCA, and when equipped, a majority of respondents reported they had used the systems. The proportion of borrowers who reported that someone talked to them about the ACC or LCA in the vehicle was about twice the proportion among renters, though in both groups these proportions were small. In addition, borrowers reported longer conversations than renters about ACC and LCA.

Respondents provided information about how they learned about ACC and LCA in the vehicles they purchased, borrowed, and rented. Almost three-quarters of new and used purchasers tried to learn about the ACC in their primary vehicle. Of these, most reported learning by driving with the system or consulting the owner's manual. Most borrowers and renters did not read about ACC or LCA in the owner's manual, but borrowers were more likely to do so than renters.

Finally, the research examined when and how users prefer to learn about ADAS. A majority of respondents said they would want to learn about ADAS when purchasing a new vehicle (92%) or used vehicle (73%), and they would prefer to learn about ADAS before test-driving a vehicle and during the purchase experience. Fewer respondents expressed interest in learning about ADAS when borrowing, renting, or driving vehicles for work. The respondents' preferred sources of information were very consistent across situations, with approximately one in four wanting printed materials and a similar number wanting to learn from videos.

Based on these findings, implications for stakeholders are noted. Manufacturers should provide straightforward means for anyone to determine what specific ADAS features are equipped on a vehicle. They should also provide simple resources such as quick start guides to inform vehicle users about the ADAS features on that specific vehicle. Dealerships should provide vehicle-specific information about ADAS to purchasers of vehicles, including used vehicles, and customize the level of information provided to the purchasers' interests. However, more research is needed to determine the optimal form and content of such information as well as the best method and timing of providing it to the vehicle user.

Introduction

Overview

Advanced Driver Assistance Systems (ADAS) comprise several different vehicle technologies that work independently and in concert to warn drivers of potential safety hazards, take action to prevent or mitigate a collision, or to provide continuous driving support (AAA et al., 2022). Analyses of crashes involving vehicles equipped with collision warning or avoidance technologies report significant safety benefits (Cicchino, 2018a, 2018b, 2019; Leslie et al., 2021; Spicer et al., 2018), even without consideration of whether a driver is aware that the vehicle is equipped with ADAS or their level of understanding about what the ADAS does. However, less is known about how the use of ADAS that provide continuous driving support, typically considered convenience features, impacts safety and crash risk. These systems include Adaptive Cruise Control (ACC) and Lane Centering Assistance (LCA). ACC is a common ADAS feature that maintains both the vehicle's maximum speed and following distance when a vehicle is detected ahead, while LCA provides continuous steering to keep the vehicle in or near the center of the lane. Prior research suggests users of systems that provide continuous support, such as ACC or ACC combined with LCA have a greater tendency to over-trust and use ADAS in unintended ways (e.g., disengaging visually and manually from the driving or supervisory task; Dunn et al., 2019; Mueller et al., 2024).

An individual's level of ADAS understanding can vary widely, from not being aware whether the vehicle is equipped with a technology, to knowing the purpose and basic function of the ADAS, to a fuller understanding including the system's capabilities and limitations. The safety benefits of ADAS may increase when drivers have a good understanding of the technologies and use them appropriately. During a driving simulator study, researchers found that drivers with a stronger understanding of ACC reacted more quickly in several situations in which the ACC did not respond (Gaspar et al., 2021). On the other hand, a lack of understanding may contribute to drivers turning off crash warning or avoidance systems (Reagan et al., 2018) or to inappropriate use of and overreliance on ADAS features (Mueller et al., 2024).

To date, most research about the users of ADAS has either focused on owners/purchasers of new vehicles either explicitly (e.g., by surveying new owners) or implicitly (e.g., by examining types of interventions most likely to be implemented in dealerships). However, used vehicles account for about 70% of passenger vehicle sales in the U.S. (Bureau of Transportation Statistics, 2025) and little is known about these consumers and how information about ADAS is shared with them during the purchase of a used vehicle. Similarly, there has been little consideration of drivers who rent or borrow vehicles equipped with ADAS. One study found that nearly two in five drivers involved in fatal crashes were driving a vehicle of which they were not the registered

owner, and found some suggestive evidence that lack of familiarity with the vehicle may increase crash risk (Tefft et al., 2019). The overall objective of this project was to understand whether individuals who are not the original owners, namely used vehicle purchasers and temporary vehicle users, differ from new vehicle owners in ADAS awareness, understanding, and experiences.

ADAS Awareness, Interaction, and Understanding

Awareness and understanding of ADAS, and interaction with ADAS, may differ between owners of ADAS-equipped vehicles and others who may use the vehicle such as renters or borrowers. They may also differ between owners who purchase a vehicle new versus used, and between purchasers who interact directly with the seller versus those who do not. Several issues that may vary between these different groups of vehicle users could potentially impact safe use of the technologies. First, drivers must be aware that the system is on the vehicle in order to use it. Surveys have found that a significant proportion of drivers are unaware of the technologies on their vehicles. A survey of more than 1,300 drivers in the Netherlands reported that between 65% and 83% of those who owned vehicles with ADAS were unaware of the ADAS on their vehicles (Harms et al., 2020; see also DeGuzman & Donmez, 2021b; McDonald et al., 2018). Even when drivers owned a vehicle with an ADAS technology, many reported never having used it. DeGuzman and Donmez (2021a), for example, reported about 12% of respondents who owned ACC reported they had never used the system.

Second, even when drivers are aware of and use a given ADAS technology, research demonstrates they often do not understand important aspects of the systems, and drivers often misuse or abuse the technology. Mason and colleagues (2024) found substantial gaps in driver understanding of common ADAS technologies. Some drivers reported high confidence in their understanding despite having low understanding scores. Novakazi et al. (2020) interviewed Volvo Cars employees selected based on their patterns of use or non-use of ADAS and identified three broad groups of users: “skeptics,” who do not trust and do not use ADAS because they perceive the system performance as unreliable; “conscious users,” who have appropriate trust and situational usage, understanding that system performance will vary by context; and “enthusiasts,” who use the system as often as possible, sometimes in ways that are not intended, and over-trust the system.

A third aspect that needs to be better understood is how drivers learn about ADAS during their experiences of purchasing or temporarily using a vehicle. Drivers do not frequently cite the presence of ADAS as a motivating factor for purchase (Nandavar et al., 2023). Lubkowski et al. (2021) conducted a survey of a convenience sample of 223 ADAS owners employed by a U.S. company. Nearly all had purchased their vehicle from a dealership and three quarters of the participants reported they had received ADAS training from the dealership. One sixth of those who said they had received training said

that it was formal, while the others received “an informal overview given by a salesperson without going into detail.” Additionally, participants who received formal training reported higher ratings of training efficacy, that is, salespeople were knowledgeable and training was valuable and accurate. Another study reported that ACC owners “who asked staff for information had significantly higher trust in ACC than those who did not ask staff for information” (DeGuzman & Donmez, 2021b).

ADAS Among Different Vehicle User Groups

Research on these issues is limited with respect to differences between new vehicle purchasers, used vehicle purchasers, and other users such as drivers who rent or borrow vehicles. Initial research suggests potential differences between these groups with respect to the factors outlined above.

In terms of ADAS awareness, one study (Reagan et al., 2023) investigated differences between purchasers of new and used vehicles with four types of ADAS: Forward Collision Warning–Automatic Emergency Braking, Lane Departure Warning (LDW), ACC, and Blind Spot Warning (BSW). New purchasers were only slightly more aware of the presence of ADAS on their vehicles (about 81% averaged across four ADAS) than purchasers of used vehicles (about 71%), but the difference between new and used purchasers was statistically significant for only one system (LDW).

ADAS understanding may also differ between the driver groups. The same survey-based study (Reagan et al., 2023) compared knowledge and understanding for new and used purchasers. The purchasers were asked to describe the four ADAS and how each worked. More new purchasers were able to provide an acceptable description of BSW and ACC than used purchasers. Additionally, for all four ADAS systems, purchasers who were aware of the system and purchasers who were able to provide an acceptable description of the ADAS system also reported significantly higher levels of trust. Overall, new purchasers reported slightly but significantly higher trust in ADAS. Two studies by DeGuzman and Donmez (2021a, 2021b) found that owners and non-owners of vehicles with ACC and Lane Keeping Assistance (LKA) had very similar levels of knowledge about the function, capabilities, and limitations of the two systems. While owners had slightly but significantly better knowledge of ACC overall than non-owners (52% compared to 47%; DeGuzman and Donmez, 2021a), knowledge of the limitations of ACC was similar among both groups—large proportions of both groups answered many survey items incorrectly.

Finally, the purchase and learning experiences for new and used purchasers might differ, potentially leading to differences in understanding. Reagan et al. (2023) reported the stated importance of ADAS in the purchase decision varied somewhat between those who purchased new and used vehicles. Interestingly, more used purchasers said they only considered a vehicle with crash avoidance (37% used vs. 31%

new) while more new purchasers said crash avoidance had small or no influence on purchase (49% new vs. 37% used). In terms of information shared at purchase, Boelhouwer et al. (2020) surveyed more than 700 respondents in the Netherlands who had recently purchased a new or used vehicle. More than a third of the used vehicle owners reported they had not received information from the seller about the systems on their vehicle, which was significantly higher compared to only 14% of the new owners. All ADAS information topics were found to be covered slightly but significantly more extensively for new vehicle owners, who were also significantly more satisfied with the ADAS information they received.

No research was identified on knowledge or awareness of, or experience of ADAS among drivers who rent or borrow ADAS-equipped vehicles, as only the studies by DeGuzman and Donmez (2021a, 2021b) considered non-owners at all, and they excluded non-owners who had driven with ACC or LKA. Thus, there is a clear need to learn more about understanding of and experiences with ADAS among people who experience ADAS in the context of a non-owned vehicle, such as when renting or borrowing an ADAS-equipped vehicle.

Current Project Objectives

While initial research points to potential differences in ADAS awareness, understanding, use, and learning between new purchasers, used purchasers, and temporary users like borrowers and renters, much remains poorly understood. Research is needed to elucidate differences in these driver groups with respect to specific elements of ADAS understanding and confidence in that understanding, especially for higher-level ADAS that provide continuous driving support, such as ACC and LCA. Data about how purchase experiences differ between the groups and how those differences may translate to unique gaps in understanding is also needed. This information can help shape approaches to driver ADAS education, which can be tailored to the specific needs of different driver populations.

This study investigated five main research questions:

1. In what ways do purchasers of used vehicles with ADAS differ from those who purchased new vehicles with ADAS?
2. Did the experience of purchasing a used vehicle with ADAS differ from purchasing a new vehicle with ADAS?
3. How frequently did renters and borrowers of ADAS-equipped vehicles receive information about ACC and LCA?
4. How did drivers learn about ACC and LCA in the vehicles they purchased, borrowed, and rented?

5. In what purchasing and temporary-use situations do drivers want to learn about ADAS? Are drivers interested in learning about ADAS by engaging with online information?

Utilizing a large national survey that focused on users' experiences with ACC and LCA, this project addresses these knowledge gaps and provides recommendations for how vehicle manufacturers, dealerships, and other stakeholders can promote ADAS understanding.

Methods

The research team conducted a targeted review of published literature as well as information scraped from various online sources to identify issues relevant to knowledge of and experiences with ADAS among vehicle users beyond the original purchasers. The team organized the issues into a framework, which then guided the development of a survey that was administered online to a large convenience sample of drivers recruited from a crowdsourcing platform. At the end of the survey, respondents were directed to a website that provided educational information about ADAS, and measures of respondents' engagement with this information were recorded. Survey responses and engagement with the information were summarized through descriptive statistics.

Literature Review

The research team completed a targeted review to summarize the literature related to ADAS understanding and to identify other factors that may impact the safe operation of ADAS-equipped vehicles by operators who are not the original owner/purchaser of the vehicle. Topics in the review included the following:

- Drivers' awareness of ADAS features on their vehicle
- Knowledge and understanding of ADAS
- Use and misuse of ADAS
- The importance of ADAS when deciding to purchase a vehicle
- Information shared at purchase
- How vehicle users seek information about ADAS after purchasing a vehicle
- How vehicle familiarity may affect crash risk

In general, the literature review confirmed there are few published studies that have considered individuals who purchased pre-owned vehicles with ADAS or use ADAS-

equipped vehicles on a temporary basis as a borrower or renter. Information identified in the literature review is summarized in the Introduction.

Web Scraping

In parallel with the literature review, the research team performed web scraping of select social media platforms (e.g., Reddit), YouTube comments, and National Highway Traffic Safety Administration's (NHTSA's) Office of Defects Investigation vehicle owner's complaint database. Web scraping is the automated gathering of content and data from a website. Natural Language Processing (NLP) was used to collate the scraped data, followed by tokenization (separating text into smaller meaningful units) and sentiment analysis (positive, neutral, or negative experience). The web scraping identified posts asking for advice about whether to purchase vehicles with ADAS and opinions about which vehicles have the best LKA, ACC, and safety systems. Very little information directly related to purchasers of used vehicles, renters, or borrowers was identified.

Framework Development

The research team gathered the topics identified during the literature review and web scraping and organized them into categories of factors. They also considered the following:

- The population(s) of ADAS users (e.g., new or used purchasers, renters, borrowers) for whom the factor is relevant
- What time frame(s) are applicable (i.e., before, during, or after purchasing or using the vehicle)
- What types of ADAS are affected (i.e., collision warning, collision intervention, continuous driving support)
- Potential safety impact
- Barriers to gathering information about the factor (from the user's perspective)

Based on these considerations, the research team prioritized the following factors to include in the main survey instrument:

- Demographic characteristics of vehicle user
    - Age
    - Sex
    - Socioeconomic status
    - Region

- Personal characteristics
  - Interest in technology
  - Self-appraisal of skills or safety
  - Fiscal and legal responsibility for vehicle
- Driving experience with primary vehicle
  - Driving patterns and behavior
  - Previous crash experience (personal or proximal)
- Vehicle characteristics
  - Factors that influenced purchase (e.g., ADAS, reliability, safety)
  - Familiarity/experience with vehicle
  - Purchase experience
- Driving experience (secondary/other vehicles)
  - Experience borrowing or using a shared vehicle
  - Vehicle rental behavior and experiences
  - Reasons for renting or borrowing a vehicle
- ADAS characteristics
  - Driver awareness of ADAS on vehicle
  - Driver experience with ADAS
- ADAS understanding
  - ADAS training, information, education experience
  - Driver understanding of ADAS
  - Driver perceptions of and attitudes toward ADAS
  - Preferred method to learn about ADAS
  - Transfer of training (both positive and negative)

Several other important dimensions were also identified but ultimately not incorporated into the survey both to manage survey length and in some cases because

the research team did not believe the dimensions inherently lent themselves to investigation in a self-report survey. Examples of these included personal characteristics such as risk tolerance and locus of control, driving behavior such as speeding and secondary task engagement, and ADAS characteristics such as performance and durability of sensors and complexity of ADAS settings and options.

Survey Data Collection

Survey respondents were recruited through the web-based crowdsourcing platform Prolific. Individuals with Prolific accounts who were age 18 years or older, located in the United States, fluent in English, and had identified their education level were invited to complete a short screening survey to confirm eligibility for the study. The researchers used Prolific because it verifies each participant's identification and country of residence, provides initial attention and comprehension checks to foster data quality, and has been used in longitudinal studies (Kothe & Ling, 2019; Peer et al., 2022). Each user was identified through the system-assigned Prolific ID, which permitted the research team to communicate with and pay respondents without accessing any personal identifying information. Respondents accessed the Qualtrics survey instruments via links in their personal Prolific dashboard. All procedures were approved by the University of Iowa Institutional Review Board (IRB 202502414). Data collection took place during August and September 2025.

To be eligible for the main survey, screener survey respondents had to report that they had driven a vehicle equipped with LKA, LCA, or ACC within the past three months, and either:

1. Been involved in the purchase or lease of a vehicle within the last five years.

   –or–

2. Driven a vehicle that was not owned by a member of their household within the past three months.

Eligible respondents were grouped according to education level, sex, and purchase type, and the research team established quotas in Prolific for each group.

Previous driving studies with Prolific suggest that respondents tend to have higher levels of education than the general driving population. For example, 56% of respondents in a survey by Mason et al. (2023) reported having a bachelor's degree or higher level of education attainment, whereas nationally, only 36% of U.S. adults had a bachelor's degree or higher as of 2024 (U.S. Census Bureau, 2025). In the context of the current study, this is important because college graduates tend to drive newer vehicles, on average, than drivers with lower levels of education, and are more likely to live in households with as many vehicles as adult household members (unpublished analysis of

data from Hungund & Steinbach, 2025). This suggests that the prevalence of recent vehicle purchase, the likelihood of sharing a vehicle with others, and the likelihood of driving a used vehicle may be correlated with educational attainment in such a way that the research questions may be especially pertinent to drivers with relatively lower levels of educational attainment. Thus, to ensure adequate representation of respondents who were not college graduates, the research team stratified respondents according to the level of educational attainment reported in their Prolific profile information.

- No college: high school degree, GED, or did not complete high school
- Some college: some education beyond high school
- College graduate: bachelor's degree or higher

The first wave of screening included 1,000 respondents in each education level. In the screening survey, many of the respondents self-reported a higher level of education than indicated by Prolific demographic information. Specifically, about half the respondents screened in the no college group reported their current level of educational attainment to be higher. Given the underrepresentation of no college respondents and an overrepresentation of college graduates within Prolific, the research team decided to limit college graduates to no more than 50% of the respondents. In addition, the team limited respondents who had purchased a new vehicle to no more than half those who had purchased a vehicle and set limits to keep sex reasonably balanced within education level.

The surveys and educational content were hosted in the Qualtrics experience management platform. Data were collated and analyzed using R (4.2.2; R Core Team 2025) in RStudio (Posit Team, 2025) and the tidyverse ecosystem (Wickham et al., 2019).

Survey Instruments

Screening Survey. A short screening survey (provided in Appendix A) was designed to identify eligible individuals for the main survey. The survey collected basic demographic information, including age, sex, and education level. Two matrix-style questions were used to assess respondents' recent use of vehicles equipped with ADAS and whether they had been involved in the purchase of a vehicle with any of seven types of ADAS in the last five years. Additional questions identified the condition of the vehicle purchased (new or used) and whether a respondent had driven a vehicle owned by someone outside their household (e.g., vehicles borrowed, rented, or driven for work) in the past three months. Respondents were compensated $0.40 for completing the screening survey, which is typical for a survey of this approximate length using a crowdsourced approach.

Main Survey. The main survey (provided in Appendix B) was designed to gather information about respondents' understanding of, perceptions of, and experiences with ADAS, with a focus on ACC and LCA. As detailed in the following subsections, the survey collected information about demographics, the respondent's primary vehicle and its purchase, whether the seller provided information about ADAS, how the respondent learned about the ADAS on the vehicle, and recent experiences of using non-household vehicles. Respondents who completed the main survey were compensated $4.25 and most completed the survey within 25 minutes. Near the end of the main survey, respondents who reported that their primary vehicle was equipped with ACC were also asked to indicate whether they were interested in participating in a follow-up survey.

The main survey included two items added as attention checks to identify careless or inattentive responses. Survey responses that failed one or both attention checks were excluded from some analyses.

Demographics and Driving Experience. Respondents provided information about their age and sex (collected in the screening survey), race and ethnicity, household income, number of individuals living in the household, number of vehicles owned or leased by members of the household, driving frequency, and zip code.

Understanding of Adaptive Cruise Control and Lane Centering Assistance. The respondents' understanding of ACC and LCA, along with their confidence in their responses, were measured in both the main and follow-up surveys using a mental model assessment (MMA). The assessments developed by Gaspar et al. (2021) and Mason et al. (2023) were revised and expanded to include 28 true/false items that evaluated the respondents' understanding of specific functions and limitations of ACC (16 statements) and LCA (12 statements). For example:

- ACC: Provides full braking power when a frontal crash is imminent (false)
- ACC: Maintains a following gap behind a vehicle that is traveling slower than the set speed (true)
- LCA: Only steers when the vehicle is close to or crossing a lane line (false)
- LCA: Functionality may be affected by sun glare (true).

For each of the true/false items, respondents rated their confidence in their response on a 4-point scale (0-no confidence, 1-slight confidence, 2-moderate confidence, or 3-high confidence). Understanding and confidence items were aggregated into a total score and calculated as a percentage ranging from 0 (all items incorrect) to 100% (all items correct) and 0% (no confidence on any item) to 100% (high confidence for all items). The MMA was included in the first section of the survey before any items that included the names and descriptions of ADAS.

Primary Vehicle. The survey asked the respondents to provide information about the vehicle they most often drove, including vehicle model year, make, and model; vehicle condition when it became their primary vehicle (e.g., new, certified pre-owned, used); ownership status; level of involvement in purchase; whether the vehicle was equipped with any of the seven ADAS features, whether the respondent had previous experience with those ADAS, and whether they had read the owner's manual to learn more about their ADAS.

Vehicle Purchase. Respondents who had been involved in the purchase of their primary vehicle were asked about when, where, and for whom the vehicle was purchased, as well as their interaction with the seller, with a focus on the communication of information about the ACC and LCA. Additional items assessed whether the presence of ADAS influenced the decision to purchase the vehicle and level of understanding for ACC and LCA at the time of purchase and currently. Similar items in another section of the survey collected information about the recent purchase of a non-primary vehicle.

Learning about Advanced Driver Assistance Systems. Respondents answered questions about whether they have tried to learn about the ADAS in their primary vehicle, how they learned about the ADAS in their vehicle, and how the things they did contributed to their understanding. Respondents also shared their preferred methods/mediums of learning about ADAS and how much time they would be willing to spend learning about ADAS in different situations.

Temporary Use of Vehicles. This section asked respondents about their most recent experience of temporarily using another vehicle (e.g., a vehicle that they rented or borrowed). Respondents were eligible to complete the section if they reported (a) they had driven a vehicle other than their primary vehicle that was not owned by a member of their household within the last 3 months, (b) the model year of the vehicle was 2014 or newer, and (c) the vehicle was equipped with at least one ADAS. The information provided included vehicle year, make, model; vehicle owner, duration of and reason for use, whether the vehicle had any ADAS, and whether the respondent used any ADAS. In addition, the respondents shared whether the presence of ADAS had influenced their decision to use the vehicle, what information about ADAS had been communicated to them, and whether they had read the owner's manual. Finally, they answered questions about their level of understanding for ACC and LCA when they first used the vehicle and about how they tried to learn about the ADAS in the vehicle.

Experience With and Perceptions of Advanced Driver Assistance Systems. Respondents reported their use and familiarity of the seven types of ADAS, ranging from "I am not familiar with it" to "I use it regularly." They also provided ratings of how strongly they agreed or disagreed with statements (e.g., I can trust ACC, ACC is useful) about ACC and LCA. Respondents who reported their primary vehicle was equipped with ACC or LCA were asked additional questions about how their systems operate and how

frequently they use them. All respondents were asked to describe any experiences with ACC or LCA that did not align with how they expected the system to work.

Personal Characteristics. The 10-item Technology Readiness Index 2.0 (Parasuraman & Colby, 2014) was used to estimate respondents' interest in technology. Respondents also provided a rating about their confidence when doing seven types of driving activities (e.g., how confident do you feel driving in your local area?).

Motivational Message. Given the expectation that vehicle users other than the original purchaser might have less exposure to education about the ADAS in a vehicle that they might drive, the research team sought to investigate whether drivers would utilize simple educational content about ADAS if it were provided to them online, and whether such information would improve their understanding of ADAS. After answering all items in the main survey, before exiting the Qualtrics platform and returning to Prolific, each respondent received one of four randomly assigned messages seeking to motivate them to access additional educational content about ADAS. Each version of the message began with "Thank you for completing this survey. We greatly appreciate your time and effort." All four versions concluded with "If you would like to learn more about the systems included in this survey, including adaptive cruise control and lane centering assistance, this link will open to a website with additional information. You can right-click on the link to copy and save it to access the site at another time."

The four message versions were as follows:

1. Neutral message: No additional text provided
2. Safety message: "Did you know? To safely use technologies like adaptive cruise control and lane centering assistance, it is important to understand what the systems can and cannot do."
3. Technology message: "Did you know? Driver assistance systems are constantly evolving and increasing the level of automation available to drivers."
4. Mental model score message: "At the beginning of this survey, we asked you to tell us whether statements about adaptive cruise control and lane centering assistance were true or false. You answered:
    - For ACC, you correctly answered __ out of 16.
    - For LCA, you correctly answered __ out of 12."

Educational Content. Educational content (provided in Appendix C) was implemented in Qualtrics. The material was designed to take approximately 5 minutes to read in full. Accessing the material was optional, and respondents could revisit the material as many times as they wanted.

The educational content was divided into three main sections. At the start of each section, respondents were informed of the section's purpose and asked to select the topics they were interested in. At the end of each section, respondents were asked to describe other types of information they would like to know about. The sections and the topics included:

1. General ADAS: types of ADAS, sensor types, sensor limitations, and driver responsibilities
2. ACC: how ACC works, limitations of ACC, alternative names, and driver responsibilities
3. LCA: how LCA works, limitations of LCA, alternative names, and driver responsibilities, as well as a section on lane support systems that explained how LCA differed from lane departure warning and lane keeping assist systems.

The survey tracked respondent interactions with the material using information embedded in the link to the educational content and respondents' IP addresses. Data gathered included topics the respondent chose to view, time spent on each page, and how many times the respondent clicked on each page.

Follow-up Survey. To be eligible for the follow-up survey, respondents had to report having a primary vehicle equipped with ACC and indicate interest in the follow-up. In the follow-up survey (provided in Appendix D), respondents reported whether they viewed the ADAS educational content and gave feedback about the content, provided information about other ways they have tried to learn about ADAS, and completed the MMA. The median completion time for the follow-up survey was about 9 minutes, and respondents were paid $2 for their time. A total of 1,450 respondents were invited to complete the follow-up survey approximately four weeks after they completed the main survey.

Results

Sample Characteristics

A total of 12,127 respondents completed the screening survey. Of these, 5,370 (44%) reported they had driven a vehicle with ACC in the last three months, while 3,720 (31%) and 5,051 (42%) reported they had driven vehicles with LCA and LKA, respectively. Additionally, 3,325 (27%) and 4,681 (39%) reported in the last five years being involved in the purchase of a new or used vehicle, respectively, and 6,845 (56%) reported they had in the last three months, driven at least one vehicle from outside their household.

A total of 5,656 respondents meeting eligibility criteria were invited to complete the survey. Among the 3,927 respondents who agreed to participate in the main survey,

254 respondents reported they were not familiar with ACC, LCA, or LKA (even though in the screening survey, they reported they had recently driven a vehicle with at least one of those systems), and an additional 207 respondents failed the first attention check. After removing these respondents, the final sample consisted of 3,466 adults ranging from 18 to 87 years old (Table 1). Respondents were mostly female (55%) and white (75%), and most often had obtained a bachelor's degree or higher level of education (44%). The median time to complete the survey was approximately 19 minutes. Responses were collected from adults living in the United States (Figure 1).

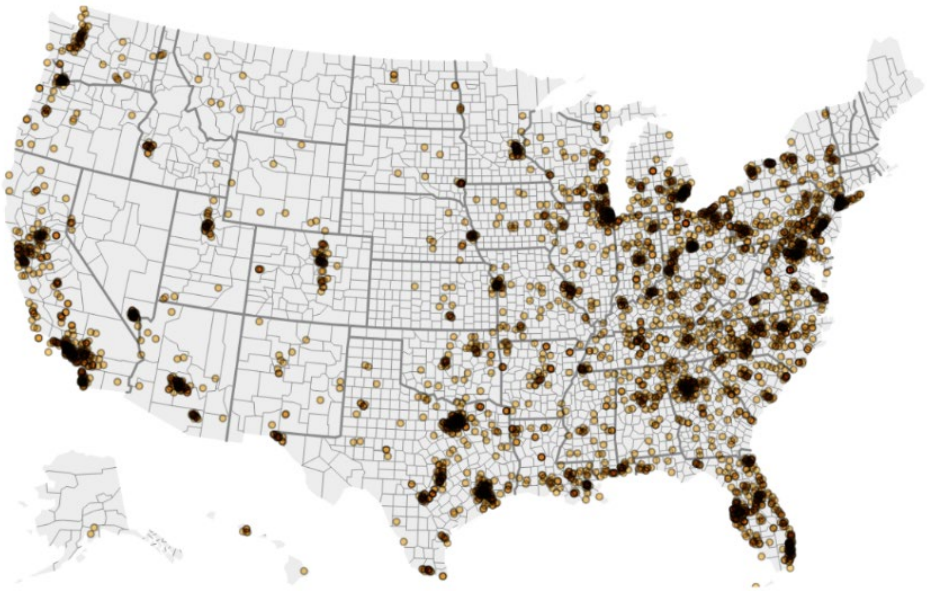

Figure 1. Respondent location aggregated by county

Table 1. Respondents' age, sex, and race and ethnicity by education level

Variable		No College (n=527)	Some College (n=1,408)	College Graduate (n=1,527)	Total Sample (n=3,466)
Age (years)					
	18–25	83 (16%)	172 (12%)	142 (9%)	392 (11%)
	26–35	166 (31%)	371 (26%)	463 (30%)	1,000 (29%)
	36–45	109 (21%)	376 (27%)	392 (26%)	877 (25%)
	46–55	100 (19%)	271 (19%)	303 (20%)	674 (19%)
	56–64	40 (8%)	125 (9%)	142 (9%)	307 (9%)
	≥65	30 (6%)	94 (7%)	85 (6%)	209 (6%)
Sex (binary)					
	Male	225 (43%)	548 (39%)	754 (50%)	1,527 (44%)
	Female	300 (57%)	846 (60%)	766 (50%)	1,912 (55%)
Race and Ethnicity					
	American Indian or Alaska Native	12 (2%)	30 (2%)	22 (1%)	64 (2%)
	Asian or Asian American	12 (2%)	64 (5%)	146 (10%)	222 (6%)
	Black or African American	72 (14%)	231 (16%)	209 (14%)	512 (15%)
	Hispanic, Latino, or Spanish origin	59 (11%)	163 (12%)	103 (7%)	325 (9%)
	Native Hawaiian or Pacific Islander	1 (<1%)	3 (<1%)	7 (<1%)	11(<1%)
	White	422 (80%)	1,059 (75%)	1,124 (74%)	2,605 (75%)
	Other	6 (1%)	13 (1%)	11 (1%)	30 (1%)

Note: The sum of group counts may not be equivalent to the total sample size due to missing values or a respondent selecting "prefer not to answer."

Research Question 1. In what ways do purchasers of used vehicles with ADAS differ from those who purchased new vehicles with ADAS?

A total of 2,267 respondents completed the primary vehicle section of the survey. Respondents were eligible to complete this section of the survey if their primary vehicle was model year 2014 or newer, was equipped with at least one ADAS, they purchased it within the past 5 years, they were involved in the decision to purchase it, and they drove it at least once per week.

Fifty-two percent of the respondents purchased a new vehicle (referred to as new purchasers) and 48% of the respondents purchased a used vehicle. As expected, the model years for vehicles purchased new (median=2023, IQR=3 years) were more recent, on average, than vehicles purchased used (median=2020, IQR=4 years; Figure 2).

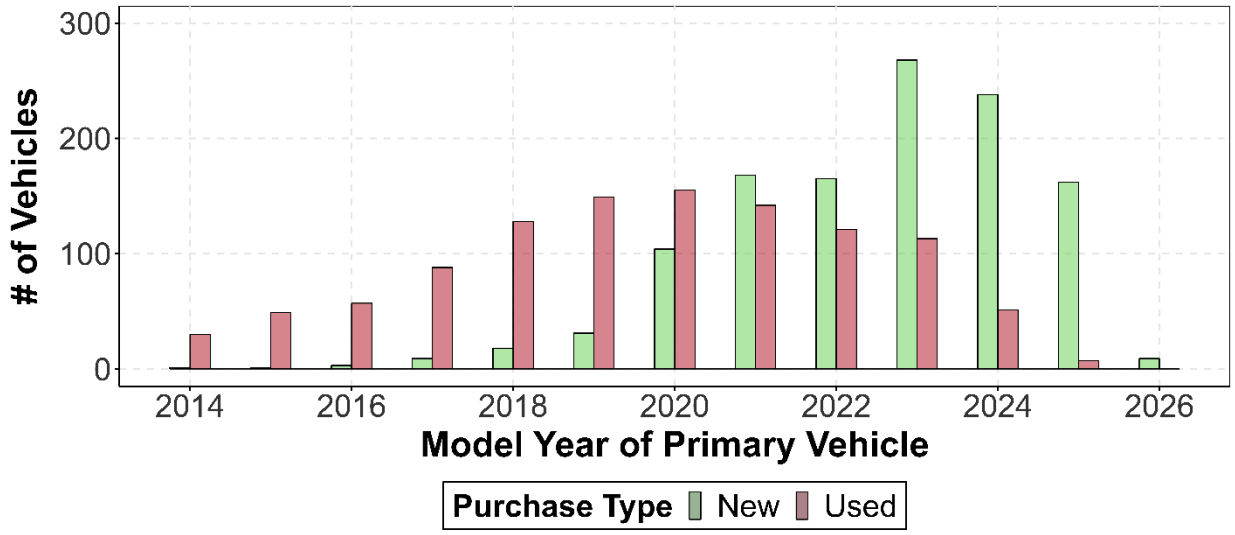

Figure 2. Model year of primary vehicles among survey respondents who purchased an ADAS-equipped vehicle of model year 2014 or newer within past 5 years

Demographics

On average, new purchasers (M=43, SD=14 years) were a few years older than used purchasers (M=40, SD=13 years). A larger percentage of used purchasers reported having an income under $50,000 (25% used vs. 15% new), while a greater percentage of new purchasers reported having an income above $100,000 (42% new vs. 29% used). Owners of new and used vehicles were similar in the number of days they reported driving their vehicle, with approximately 60% reporting driving 6–7 days per week, and in the number of vehicles owned by the household, with nearly 50% owning two vehicles (Table 2). Lastly, scores on the Technology Readiness Index were similar for new (M=2.9, SD=1.1) and used purchasers (M=2.7, SD=1.0), suggesting both groups have moderate levels of readiness to embrace and use emerging technologies.

Table 2. New and used vehicle purchasers' personal, household, and primary vehicle characteristics

Variable	New Purchasers (n=1,177)	Used Purchasers (n=1,090)
Age (years)		
18–25	88 (7%)	123 (11%)
26–35	318 (27%)	332 (30%)
36–45	305 (26%)	296 (27%)
46–55	243 (21%)	205 (19%)
56–64	125 (11%)	83 (8%)
≥65	97 (8%)	51 (5%)
Sex (binary)		
Male	526 (45%)	469 (43%)
Female	645 (55%)	616 (57%)
Education Level		
No college	146 (12%)	152 (14%)
Some college	451 (38%)	434 (40%)
College graduate	580 (49%)	504 (46%)
Income		
Under $50,000	182 (16%)	275 (25%)
$50,000–$75,000	248 (21%)	246 (23%)
$75,001–$100,000	242 (21%)	245 (22%)
$100,001–$125,000	156 (13%)	95 (9%)
More than $125,000	341 (29%)	224 (21%)
Driving Frequency (days/week)		
1–4	211 (18%)	225 (21%)
5	257 (22%)	236 (22%)
6	236 (20%)	210 (19%)
7	474 (40%)	419 (38%)
People in Household		
I live alone (1)	112 (10%)	123 (11%)
2	202 (17%)	156 (14%)
3	298 (25%)	278 (26%)
4	277 (24%)	255 (23%)
5 or more people	283 (24%)	272 (25%)
Vehicles Owned by Household		
1 vehicle	335 (28%)	330 (30%)
2 vehicles	566 (48%)	488 (45%)
3 or more vehicles	270 (23%)	261 (25%)

Note: The sum of group counts may not be equivalent to the total sample size due to missing values or a respondent selecting "prefer not to answer."

Experience with Adaptive Cruise Control and Lane Centering Assistance

More than 75% of used purchasers and 83% of new purchasers reported having ACC on their primary vehicle (Table 3), and 49% of used and 66% of new purchasers reported having LCA (Table 4). (Note that inclusion criteria for this section of the survey dictated that every participant would have had at least one ADAS on their vehicle.) Both groups reported more uncertainty about whether the vehicle had LCA compared to ACC, and used purchasers responded slightly more frequently that they were unsure whether their primary vehicle was equipped with ACC (12% vs. 8% new) or LCA (18% vs. 15% new; Table 4). New and used purchasers reported similar rates of using ACC and LCA in their primary vehicle.

Approximately three in five drivers in both groups indicated having driven a vehicle with ACC prior to their purchase of their current primary vehicle. In contrast, a higher portion of new (45%) and used purchasers (46%) were not familiar with LCA prior to purchase. New purchasers were slightly more likely to report having familiarity with ACC and using it regularly prior to purchase (34% new vs. 30% used; Table 3), while a slightly higher proportion of used purchasers reported they were familiar with ACC but did not use it regularly prior to their purchase (27% new vs. 33% used). A similar pattern was observed for respondents who purchased a vehicle with LCA. A higher percentage of new purchasers (24% new vs. 19% used; Table 4) reported being familiar with LCA and using it regularly before their purchase, while more used purchasers reported being familiar with LCA but not using it regularly (23% new vs. 28% used).

At the time of purchase, self-reported understanding of ACC was slightly higher for new purchasers, with 20% reporting they understood ACC and how it worked well enough that they would feel confident using a similar system in another vehicle, compared to 14% of used purchasers. There was little difference between new and used purchasers in the self-reported understanding of LCA at the time of purchase.

The current use of ACC and LCA was very similar for new and used purchasers. Approximately 17% of both groups reported they now use ACC almost every time they drive and 22% use it most of the time. For LCA, about 22% of both groups reported they use the system almost every time they drive and 18% use it most of the time.

Slightly more new than used purchasers said the ACC on their primary vehicle could be used in stop-and-go traffic (e.g., when driving in town or in traffic slow-downs on the highway; 35% new vs. 30% used) and that they would use it almost every time or most of the times they drove in stop-and-go traffic (30% new purchasers who have the functionality vs. 23% used). Notably, 31% of both groups reported they were not sure whether the ACC in their primary vehicle had stop-and-go functionality. Similar percentages of both new and used purchasers indicated that LCA on their primary vehicle could be used without also using ACC (59% of new purchasers and 58% of used

purchasers). More than a quarter of purchasers whose primary vehicle was equipped with LCA were not sure if they could use LCA without also using ACC.

More new purchasers selected the highest category when self-rating their current level of understanding ACC and LCA (ACC: 44% new vs. 38% used: LCA: 38% new vs. 31% used). Similar proportions of new and used purchasers reported they had experiences with ACC and LCA that did not align with their expectations (ACC: 15% new and 13% used; LCA: 14% new and 12% used).

Table 3. New and used vehicle purchasers' experience and understanding of ACC on their primary vehicle

Variable	New Purchasers (n=1,177)	Used Purchasers (n=1,090)
ACC on Primary Vehicle		
Yes	978 (83%)	829 (76%)
No	100 (8%)	130 (12%)
I am not sure	99 (8%)	131 (12%)
Driven a Vehicle with ACC Prior to Purchase		
Yes, and I used it regularly	404 (34%)	326 (30%)
Yes, but I did not use it regularly	321 (27%)	359 (33%)
No	387 (33%)	341 (31%)
I am not sure	61 (5%)	59 (5%)
Use of ACC		
Almost every time	171 (18%)	127 (16%)
Most of the time	213 (23%)	188 (24%)
Sometimes	322 (34%)	290 (36%)
Rarely	159 (17%)	124 (16%)
Never	79 (8%)	67 (8%)
Understanding of ACC at the Time of Purchase		
I didn't understand the system	109 (11%)	109 (13%)
I was familiarized with the system, but needed some help to use it	189 (19%)	175 (21%)
I was familiarized enough that I could try to figure it out without assistance	371 (38%)	332 (40%)
I understood the system and could show others how to use it	111 (11%)	99 (12%)
I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle	194 (20%)	112 (14%)
Current Understanding of ACC		
I don't understand the system	20 (2%)	18 (2%)
I am familiar with the system, but I need some help to use it	81 (8%)	80 (10%)
I understand the system	235 (24%)	221 (27%)
I understand the system well enough that I could show others how to use it	208 (22%)	192 (23%)
I understand the system and how it works, and feel confident I would be able to use similar systems in another vehicle	419 (44%)	313 (38%)
ACC can be Used in Stop-and-Go Traffic		
Yes	342 (35%)	252 (30%)
No	297 (30%)	294 (35%)
Not sure	302 (31%)	253 (31%)
Use of ACC in Stop-and-Go Traffic		
Almost every time	33 (10%)	22 (9%)
Most of the time	69 (20%)	35 (14%)
Sometimes	111 (32%)	91 (36%)
Rarely	80 (23%)	56 (22%)
Never	49 (14%)	47 (19%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.

Table 4. New and used vehicle purchasers' experience and understanding of LCA on their primary vehicle

Variable	New Purchasers (n=1,177)	Used Purchasers (n=1,090)
LCA on Primary Vehicle		
Yes	782 (66%)	531 (49%)
No	221 (19%)	365 (33%)
I am not sure	174 (15%)	194 (18%)
Driven a Vehicle with LCA Prior to Purchase		
Yes, and I used it regularly	287 (24%)	210 (19%)
Yes, but I did not use it regularly	274 (23%)	300 (28%)
No	525 (45%)	497 (46%)
I am not sure	88 (7%)	81 (7%)
Use of LCA		
Almost every time	174 (23%)	110 (22%)
Most of the time	129 (17%)	93 (18%)
Sometimes	221 (30%)	149 (30%)
Rarely	134 (18%)	95 (19%)
Never	84 (11%)	56 (11%)
Understanding of LCA at the Time of Purchase		
I didn't understand the system	82 (11%)	68 (13%)
I was familiarized with the system, but needed some help to use it	143 (19%)	115 (22%)
I was familiarized enough that I could try to figure it out without assistance	307 (40%)	200 (38%)
I understood the system and could show others how to use it	110 (14%)	66 (13%)
I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle	128 (17%)	78 (15%)
Current Understanding of LCA		
I don't understand the system	10 (1%)	19 (4%)
I am familiar with the system, but I need some help to use it	60 (8%)	64 (12%)
I understand the system	251 (33%)	164 (31%)
I understand the system well enough that I could show others how to use it	153 (20%)	116 (22%)
I understand the system and how it works, and feel confident I would be able to use similar systems in another vehicle	296 (38%)	162 (31%)
LCA Requires Use of ACC		
Yes, I can use LCA without using ACC	439 (59%)	293 (58%)
No, I cannot use LCA unless ACC is active	112 (15%)	64 (13%)
Not sure	194 (26%)	148 (29%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.

Understanding and Confidence in Understanding of ADAS

In addition to asking respondents to rate their own level of understanding of ACC and LCA, the MMA was used to measure their understanding of these technologies more objectively. Results show that both groups of purchasers had similar levels of understanding of both technologies. Both new and used purchasers answered approximately two-thirds of questions about both technologies correctly (Table 5). (Note that these were true/false questions, thus a respondent with no understanding of the systems would be expected to guess the answers to approximately half of the items correctly.)

While both groups answered similar percentages of questions correctly, used purchasers had slightly lower confidence in their understanding, particularly with regards to LCA. The Index scores for ACC and LCA indicate the extent to which respondents' understanding and their confidence in their understanding are aligned or calibrated.

Table 5. New and used vehicle purchasers' MMA understanding, confidence, and index scores

Variable	New Purchasers (n=1,177)	Used Purchasers (n=1,090)
ACC MMA Scores		
Understanding (% Correct on MMA)	64.7±16.9	65.1±16.6
Confidence (%)	65.3±19.1	62.5±18.3
Index (% Confidence/% Correct)	1.09±0.54	1.04±0.49
LCA MMA Scores		
Understanding (% Correct on MMA)	66.8±17.5	67.2±17.2
Confidence (%)	64.4±19.8	61.5±19.8
Index (% Confidence/% Correct)	1.03±0.47	0.98±0.43

Note: Values presented as M±SD

Attitudes Toward ADAS

When asked whether they could trust ACC, 79% of both new and used purchasers indicated agreement; however, new purchasers were slightly more likely than used purchasers to agree strongly (22% vs. 18%) (Figure 3). Similarly, when asked whether they believed ACC was useful, 88% of both groups agreed, with new purchasers slightly more likely than used purchasers to agree strongly (43% vs 38%). Few respondents in either group agreed that ACC was complicated, distracting, or dangerous; most respondents in both groups somewhat or strongly disagreed with these statements. New purchasers were slightly more likely than used purchasers to agree that ACC is distracting and that ACC is dangerous.

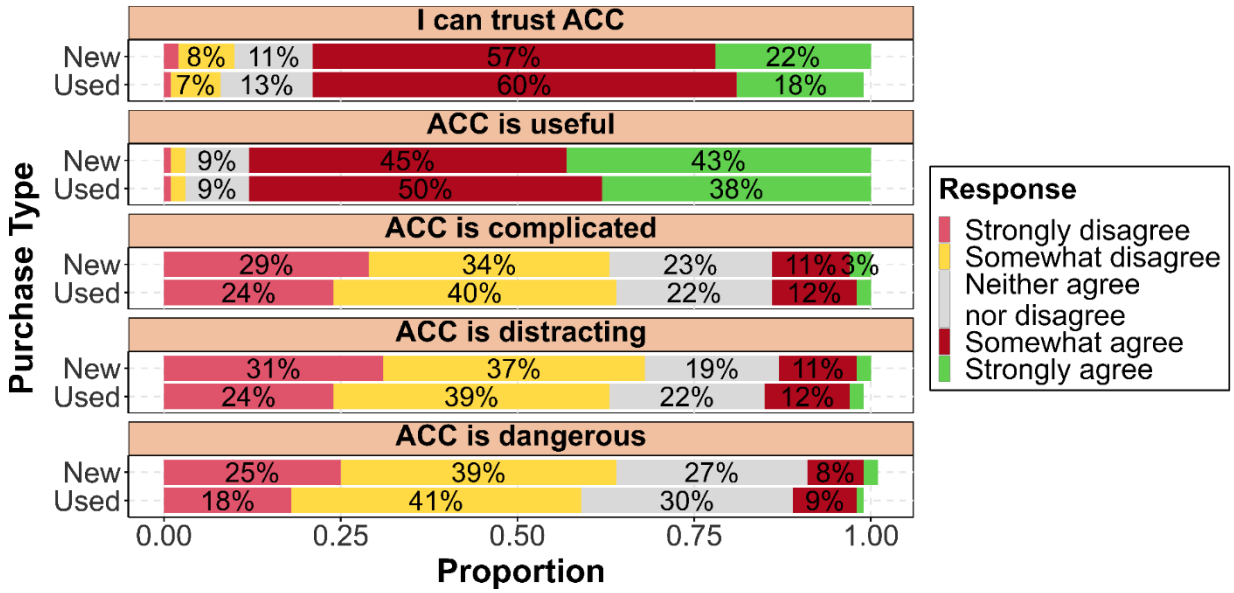

Figure 3. New and used vehicle purchasers' attitudes toward ACC

A greater percentage of new purchasers strongly agreed they trusted LCA (19% new vs. 13% used) and strongly agreed it was useful (31% new vs. 25% used) (Figure 4). As with ACC, majorities of both groups of purchasers disagreed that LCA was complicated, distracting, or dangerous. However, the proportions of respondents who agreed that LCA was distracting and dangerous, while low overall, were higher than the corresponding percentages of respondents who gave these responses regarding ACC.

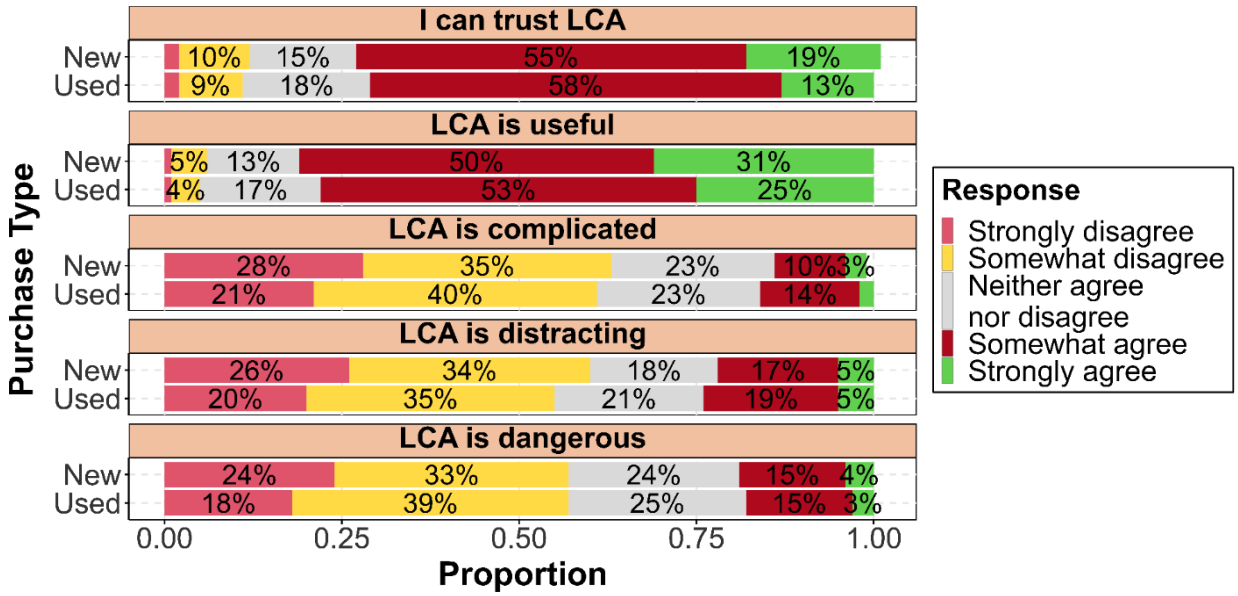

Figure 4. New and used vehicle purchasers' attitudes toward LCA

Summary

In this convenience sample of drivers who reported having purchased their primary vehicle within the past 5 years, many similarities as well as differences between purchasers of new versus used ADAS-equipped vehicles were observed. On average, purchasers of new vehicles were slightly older and had higher incomes, compared with purchasers of used vehicles.

With respect to vehicles, large majorities of both new and used vehicle purchasers indicated that their primary vehicle was equipped with ACC (note this is subject to the inclusion criteria that the vehicle was model year 2014 or later and was equipped with at least one ADAS). New vehicle purchasers were slightly more likely than used vehicle purchasers to say the vehicle had ACC (83% vs. 76%). New purchasers were much more likely than used purchasers to say the vehicle was equipped with LCA (66% vs. 49%). This difference may be attributable at least in part to the fact that new vehicles purchased by respondents were newer (i.e., more recent model year) than used vehicles, and more recent model year vehicles are more likely to be equipped with more and newer ADAS such as LCA (e.g., Highway Loss Data Institute, 2024).

Prior to the purchase of their primary vehicle, both groups of purchasers reported similar likelihood of prior exposure to ACC and LCA, with purchasers in both groups being more familiar with ACC than LCA. However, slightly more new purchasers than used purchasers reported they had used ACC and LCA regularly. New purchasers reported having a better understanding of ACC at the time of purchase and having a better current understanding of both ACC and LCA now after owning their vehicle, based on their self-ratings of their understanding. However, there were no objective differences between the groups in their understanding or confidence in their understanding, as measured by the mental model assessment. Both purchaser groups reported similar perceptions of, and rates of use, for both ACC and LCA. Overall, purchasers viewed ACC and LCA favorably. They largely agreed that the systems were useful and trustworthy, and disagreed that they were complicated, distracting, or dangerous.

Research Question 2. Did the experience of purchasing a used vehicle with ADAS differ from purchasing a new vehicle with ADAS?

As detailed in the previous section, there are several important differences between individuals who choose to purchase a new vehicle and those who choose to purchase a used vehicle. This section details differences in the purchase experience for purchasers of new and used vehicles, with a focus on interactions with and information about ADAS provided by those selling the vehicles.

Respondents who purchased new vehicles were slightly more likely than purchasers of used vehicles to indicate that the decision to purchase the vehicle was

their decision alone (46% new vs. 41% used; Table 6). The primary vehicle purchases for both groups were distributed similarly over time, with approximately one in four indicating that the purchase was within the past year, and a similar or slightly higher percentage indicating that it was between one and two years ago.

Not surprisingly, nearly all new vehicles were purchased at a branded dealership. For used vehicle purchases, 43% were purchased at a branded dealership, 19% were purchased at a dealership branded for a manufacturer different than the vehicle's make, and 19% were purchased from a business that sells only used vehicles. While a large majority of both new and used vehicle purchasers indicated that they interacted with the seller, purchasers of new vehicles were slightly more likely to indicate that they did so.

Table 6. New and used vehicle purchasers' involvement in purchase and other purchase characteristics

Variable	New Purchasers (n=1,177)	Used Purchasers (n=1,090)
Involvement in the Decision to Purchase their Primary Vehicle		
Slightly involved	29 (2%)	42 (4%)
Somewhat involved	44 (4%)	69 (6%)
Very involved	565 (48%)	529 (49%)
It was my decision alone	539 (46%)	450 (41%)
Time Since Purchase		
Within last year	282 (24%)	275 (25%)
1–2 years	348 (30%)	296 (27%)
2–3 years	224 (19%)	226 (21%)
3–4 years	156 (13%)	133 (12%)
4–5 years	167 (14%)	160 (15%)
Interacted with the Seller		
Yes	1,102 (94%)	995 (91%)
No	73 (6%)	91 (8%)
Location of Purchase		
Dealership branded with the vehicle's make	1,112 (94%)	472 (43%)
Dealership for a different vehicle manufacturer	20 (2%)	208 (19%)
Business that sells only used vehicles	2 (<1%)	203 (19%)
Previous owner (private-party sale)	2 (<1%)	71 (7%)
Dealership website	16 (1%)	25 (2%)
Manufacturer's website	10 (1%)	2 (<1%)
Online service (e.g., Carvana)	10 (1%)	54 (5%)
A family member or friend	0 (0%)	37 (3%)
Other	4 (<1%)	16 (1%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.

Adaptive Cruise Control

Among the 978 respondents who purchased new vehicles equipped with ACC, 66% reported that the seller mentioned or talked about ACC. In contrast, among the 829 purchasers of ACC-equipped used vehicles, 52% indicated that the seller mentioned or talked about ACC (Table 7). Nearly one in five purchasers in both groups did not remember whether the seller mentioned ACC; this was not unexpected given that the purchases could have occurred as long as 5 years ago.

Purchasers who indicated that the seller talked about or mentioned ACC were asked how much time the seller spent talking about the system. New purchasers tended to report that the seller spent more time talking about ACC than used purchasers did (Figure 5). For example, 61% of new vehicle purchasers who indicated that the seller mentioned ACC (i.e., 61% of 66%, or approximately 40% of all new purchasers) indicated that the seller spent "a few minutes" or longer talking about ACC, compared with 54% of used vehicle purchasers who indicated the seller mentioned ACC (or 28% of all used purchasers). More new purchasers (47%) than used purchasers (36%) reported that sellers shared a positive opinion of ACC. About half (48%) of used purchasers reported the seller did not share an opinion about ACC compared to 35% of new purchasers.

The information sellers provided about ACC varied between new and used purchasers (Table 7). More used vehicle purchasers than new vehicle purchasers indicated that the seller did not provide them with any information about ACC (25% of used vs. 13% of new) or that they did not remember (12% and 10%, respectively). Among purchasers who indicated that the seller provided them with some information about ACC, new purchasers were more likely than used purchasers to say that sellers did the following:

- Told them that the vehicle was equipped with ACC (67% new vs. 54% used)
- Described the purpose of ACC (41% new vs. 27% used)
- Provided information about what the system does (35% new vs. 22% used)
- Described how to turn it on and off (34% new vs. 23% used)
- Provided information about sensors (24% new vs. 17% used) and operating conditions/requirements (15% new vs. 9% used) for the system

Among purchasers who indicated that the seller provided them with information about ACC, approximately three-quarters of both groups indicated that the seller described the system verbally. Two-thirds of new purchasers (66%) and 59% of used purchasers indicated that the seller pointed out the controls in the vehicles. More new purchasers were provided with a demonstration of ACC (29% of new vs. 20% of used) and printed materials (23% of new vs. 15% of used).

New and used purchasers differed somewhat in the factors influencing their decision to purchase a vehicle equipped with ACC (Table 7). Just over half (52%) of new purchasers reported their decision to purchase the vehicle was influenced by it being equipped with ACC, compared to 45% of used purchasers. For new purchasers, the test drive (28% vs. 23% used) and potential safety benefits (29% vs. 22% used) influenced their decision to purchase a vehicle with ACC. Information the purchasers looked up influenced the decision to purchase a vehicle with ACC for 22% of new and 21% of used purchasers, and previous experience using ACC influenced 21% of new and 17% of used purchasers.

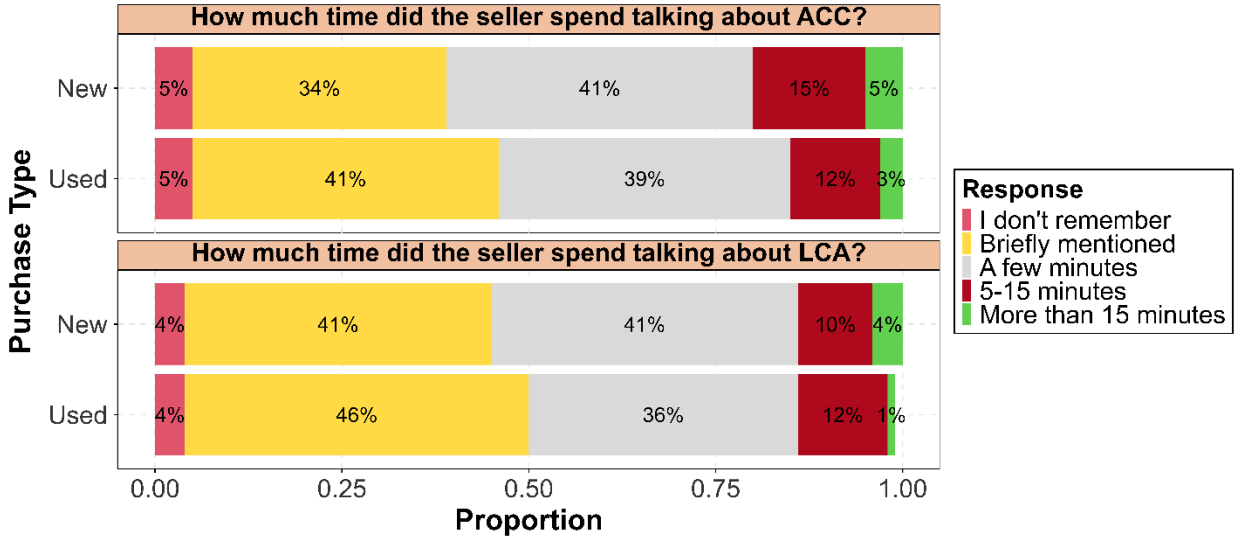

Figure 5. Amount of time the seller spent talking about ACC or LCA, among new and used vehicle purchasers who reported that seller mentioned each respective system

Table 7. New and used vehicle purchasers' ACC purchasing experience

Variable	New Purchasers (n=978)	Used Purchasers (n=829)
Seller Mentioned ACC		
Yes	601 (66%)	396 (52%)
No	132 (15%)	228 (30%)
I don't remember	177 (19%)	132 (17%)
Seller Provided Opinions about ACC		
Positive opinion (e.g., good, reliable, useful)	428 (47%)	269 (36%)
Negative opinion (e.g., annoying, unreliable)	7 (1%)	4 (1%)
Both positive and negative opinions	38 (4%)	37 (5%)
No opinion	317 (35%)	360 (48%)
I don't remember	115 (13%)	80 (11%)
Seller Provided Information about ACC*		
I was not provided any information	122 (13%)	186 (25%)
The vehicle was equipped with ACC	608 (67%)	411 (54%)
Purpose of the system	371 (41%)	208 (27%)
Information about sensors that the system used	216 (24%)	126 (17%)
Information about what the system does	316 (35%)	168 (22%)
Operating conditions/requirements for the system	137 (15%)	70 (9%)
When ACC may not work as expected	108 (12%)	49 (6%)
How to turn it on and off	307 (34%)	174 (23%)
How to adjust settings	208 (23%)	121 (16%)
I don't remember	89 (10%)	88 (12%)
How the Seller Provided Information about ACC*		
A verbal description of the system	536 (77%)	354 (74%)
Pointed out controls in the vehicle	460 (66%)	286 (59%)
A demonstration of the system	201 (29%)	97 (20%)
Provided printed materials	163 (23%)	73 (15%)
Recommended online material	61 (9%)	29 (6%)
Factors that Influenced the Decision to Purchase a Vehicle with ACC*		
ACC did not influence decision	469 (48%)	452 (55%)
A test drive	274 (28%)	192 (23%)
Recommendation from a salesperson	118 (12%)	70 (9%)
Recommendation from a friend or family	125 (13%)	92 (11%)
Looked up information	218 (22%)	170 (21%)
Advertisements	41 (4%)	28 (3%)
Safety benefits	286 (29%)	186 (23%)
Previous experience using ACC	201 (21%)	138 (17%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.

**Respondents could select all that apply.*

Lane Centering Assistance

Among the 782 respondents who purchased a new vehicle equipped with LCA, 59% reported that the seller mentioned or talked about LCA compared to 43% of the 531 respondents who purchased a used vehicle equipped with LCA (Table 8), though 15% to 16% of both groups did not remember whether the seller mentioned LCA. Similar to ACC, new vehicle purchasers reported that sellers spent slightly more time talking about LCA than used vehicle purchasers did. Among purchasers who said that the seller mentioned LCA, 55% of new vehicle purchasers (i.e., 55% of 59% = 32% of all new purchasers with LCA) indicated that sellers spent at least a few minutes talking about LCA, compared with 49% of used purchasers who said the same (i.e., 49% of 43% = 21% of all used purchasers with LCA). Sellers shared a positive opinion of LCA with 41% of new purchasers and 34% of used purchasers. Most often purchasers reported the sellers shared no opinion about LCA (35% new and 42% used).

Information that purchasers recalled sellers providing to them varied between new and used vehicle purchasers. More new vehicle purchasers (64%) than used purchasers (52%) said the seller informed them that the vehicle was equipped with LCA. New purchasers were also more likely than used purchasers to indicate that the seller described the purpose of LCA (39% new vs. 29% used), provided information about what the system does (26% new vs. 20% used), and how to turn it on and off (22% new vs. 15% used). Similar to ACC, of the sellers that provided information, sellers most often provided LCA information via a verbal description of the system (81% new and 76% used). About half of both groups said that the sellers pointed out the LCA controls to them.

Similar proportions of purchasers of LCA-equipped new and used vehicles indicated that the presence of LCA influenced their decision to purchase the vehicle (43% new and 40% used). Similar to ACC, new and used purchasers most often identified a test drive (20% new and 20% used) and the safety benefits of LCA (21% new and 18% used) as factors that influenced the decision to purchase a vehicle equipped with LCA (Table 8).

Summary

This survey identified several ways in which the experience of purchasing a vehicle with ADAS differs between purchasers of new versus used vehicles. Virtually all respondents who had purchased new vehicles reported having purchased them at the manufacturer's dealership, compared with slightly less than half of used vehicle purchasers. Used vehicles were also purchased at dealerships affiliated with other vehicle brands or from businesses that only sold used vehicles. When the vehicle was new, sellers were more likely to talk about ACC and LCA, spend more time talking about and share positive opinions about ACC and LCA, and provide more information about ACC and LCA compared to when the vehicle was used. The test drive and potential safety

benefits most frequently influenced the decision to purchase a vehicle with ACC or LCA. New purchasers were slightly more frequently influenced by these factors to purchase a vehicle with ACC compared to used purchasers. The majority of purchasers of LCA-equipped vehicles, whether new or used, indicated that LCA did not influence their decision to purchase the vehicle.

Table 8. New and used vehicle purchasers' LCA purchasing experience

Variable	New Purchasers (n=782)	Used Purchasers (n=531)
Seller Mentioned LCA		
Yes	430 (59%)	213 (43%)
No	153 (21%)	150 (31%)
I don't remember	151 (21%)	127 (26%)
Seller Provided Opinions about LCA		
Positive opinion (e.g., good, reliable, useful)	298 (41%)	166 (34%)
Negative opinion (e.g., annoying, unreliable)	13 (2%)	4 (1%)
Both positive and negative opinions	52 (7%)	35 (7%)
No opinion	253 (35%)	204 (42%)
I don't remember	108 (15%)	76 (16%)
Seller Provided Information about LCA*		
I was not provided any information	102 (14%)	120 (25%)
The vehicle was equipped with LCA	462 (64%)	256 (52%)
Purpose of the system	284 (39%)	143 (29%)
Information about sensors that the system used	141 (19%)	70 (14%)
Information about what the system does	186 (26%)	96 (20%)
Operating conditions/requirements for the system	103 (14%)	34 (7%)
When LCA may not work as expected	75 (10%)	33 (7%)
How to turn it on and off	162 (22%)	74 (15%)
How to adjust settings	101 (14%)	55 (11%)
How the Seller Provided Information about LCA*		
A verbal description of the system	430 (81%)	231 (76%)
Pointed out controls in the vehicle	272 (51%)	151 (50%)
A demonstration of the system	144 (27%)	66 (22%)
Provided printed materials	110 (21%)	46 (15%)
Recommended online material	45 (8%)	23 (8%)
I don't remember	13 (2%)	14 (5%)
Factors that Influenced the Decision to Purchase a Vehicle with LCA*		
LCA did not influence decision	444 (57%)	316 (60%)
A test drive	154 (20%)	107 (20%)
Recommendation from a salesperson	82 (11%)	44 (8%)
Recommendation from a friend or family	92 (12%)	43 (8%)
Looked up information	113 (15%)	67 (13%)
Advertisements	39 (5%)	22 (4%)
Safety benefits	166 (21%)	97 (18%)
Previous experience using LCA	88 (11%)	62 (12%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.
**Respondents could select all that apply.*

Research Question 3. How frequently did renters and borrowers of ADAS-equipped vehicles receive information about ACC and LCA?

This section summarizes information provided by respondents who reported having driven a vehicle not owned by a member of their household within the past 3 months, and their experiences with that vehicle. For the respondents who reported that they borrowed or rented a vehicle equipped with ACC or LCA, the results describe whether and how information about the system(s) was provided, and where applicable, compares the borrowing and renting experiences.

Among the final sample of respondents for the overall survey (n=3,466), 66% reported they had driven at least one non-household vehicle within the past 3 months, including 20% who had driven two different non-household vehicles and 10% who had driven three or more. They were asked to report the model year of the vehicle and the ADAS with which it was equipped. Those who indicated that the vehicle was model year 2014 or newer and was equipped with at least one ADAS were asked additional questions about the non-household vehicle they had driven most recently. Results in this section of the report are based on the 1,490 respondents who completed this section of the survey.

When asked to describe the non-household vehicle that they drove most recently, the most common response was a vehicle owned by a family member (44%), followed by a rental vehicle (25%). Less common responses included a vehicle owned by a friend (17%), owned by their employer (8%), or a loaner from a mechanic or dealership (4%) (Table 9). Throughout the remainder of this section, “borrower” is used to refer to respondents who drove a vehicle owned by a non-household family member or friend, and “renter” is used to refer to those who drove a vehicle owned by a rental company.

Borrowers were younger than renters; 48% of borrowers were 35 years of age or younger, compared with 26% of renters. Borrowers most frequently reported using the vehicle for 1 or 2 days (39%), whereas renters most often used the vehicle for 3–5 days (47%). Renters often reported using a vehicle for vacation (60%), because their vehicle was being repaired (19%), or for a work trip (17%). To a lesser extent, borrowers also frequently reported using a vehicle because their vehicle was under repair (31%) or for vacation (26%). Additionally, many borrowers described other situations when they drove vehicles belonging to friends or family because the owners were unable or did not want to drive. The vehicles used by renters were newer, with 66% being model year 2024 or newer, compared to only 21% of vehicles used by borrowers. About one-third of borrowed vehicles were older than model year 2020, compared with only 5% of the rental vehicles.

Similar proportions of borrowers (73%) and renters (69%) reported the vehicle they borrowed or rented had ACC, and 56% of both groups indicated that the vehicle was equipped with LCA (Table 9). Both groups reported more uncertainty about whether the vehicle had LCA compared to ACC, and renters responded slightly more frequently that

they were not sure whether the vehicle was equipped with ACC (23% of renters vs. 16% of borrowers) or LCA (33% of renters vs. 24% of borrowers). Although most respondents reported using ACC and LCA when the vehicle they borrowed or rented was equipped with the system(s), higher proportions of renters than borrowers reported using these systems.

Table 9. Personal and vehicle characteristics of survey respondents who borrowed or rented an ADAS-equipped vehicle of model year 2014 or newer within the past 3 months

Variable		Borrowers (n=909)	Renters (n=379)
Age (years)			
	18–25	148 (16%)	18 (5%)
	26–35	293 (32%)	81 (21%)
	36–45	225 (25%)	110 (29%)
	46–55	149 (16%)	108 (28%)
	56–64	66 (7%)	43 (11%)
	≥65	28 (3%)	19 (5%)
Sex (binary)			
	Male	379 (42%)	185 (49%)
	Female	518 (57%)	192 (51%)
How many days did you drive this vehicle?			
	1 or 2 days	355 (39%)	84 (22%)
	3–5 days	269 (30%)	177 (47%)
	6–10 days	162 (18%)	73 (19%)
	11–20 days	61 (7%)	28 (7%)
	More than 20 days	56 (6%)	17 (4%)
Why did you drive this vehicle?*			
	Work trip	92 (10%)	66 (17%)
	Vacation	290 (26%)	226 (60%)
	Did not want to add mileage to my personal vehicle	97 (11%)	40 (11%)
	My vehicle was under repair	281 (31%)	71 (19%)
	To test drive a vehicle	88 (10%)	12 (3%)
	Needed a vehicle with specific capabilities (e.g., a truck bed)	103 (11%)	18 (5%)
	I do not own a vehicle and needed to use one	24 (3%)	8 (2%)
	Other	180 (20%)	8 (2%)
Vehicle Equipped with ACC			
	Yes	668 (73%)	261 (69%)
	No	95 (10%)	29 (8%)
	I am not sure	146 (16%)	89 (23%)
Vehicle Equipped with LCA			
	Yes	510 (56%)	212 (56%)
	No	184 (20%)	42 (11%)
	I am not sure	215 (24%)	125 (33%)
Used ACC in the Vehicle			
	Yes	423 (64%)	201 (78%)
	No	239 (36%)	58 (22%)
Used LCA in the Vehicle			
	Yes	328 (65%)	163 (77%)
	No	177 (35%)	48 (23%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.
**Respondents could select all that apply.*

Adaptive Cruise Control

Among borrowers and renters who reported that the vehicle they borrowed or rented was equipped with ACC, more borrowers (29%) than renters (21%) reported that ACC influenced their decision to use the vehicle. More borrowers than renters noted that someone mentioned or talked about ACC when they first used the vehicle (40% of borrowers vs. 19% of renters). Furthermore, among those who said someone talked to them about ACC, borrowers reported spending longer amounts of time talking about ACC compared to these renters (Figure 6). When ACC was talked about, 25% of borrowers (i.e., 10% of all borrowers) said someone talked about ACC for 5 minutes or longer. Most renters who reported that someone talked about ACC said it was only briefly mentioned (65%). Only 12% of renters who said someone talked to them about ACC (i.e., 2% of all renters) said ACC was talked about for 5 minutes or longer.

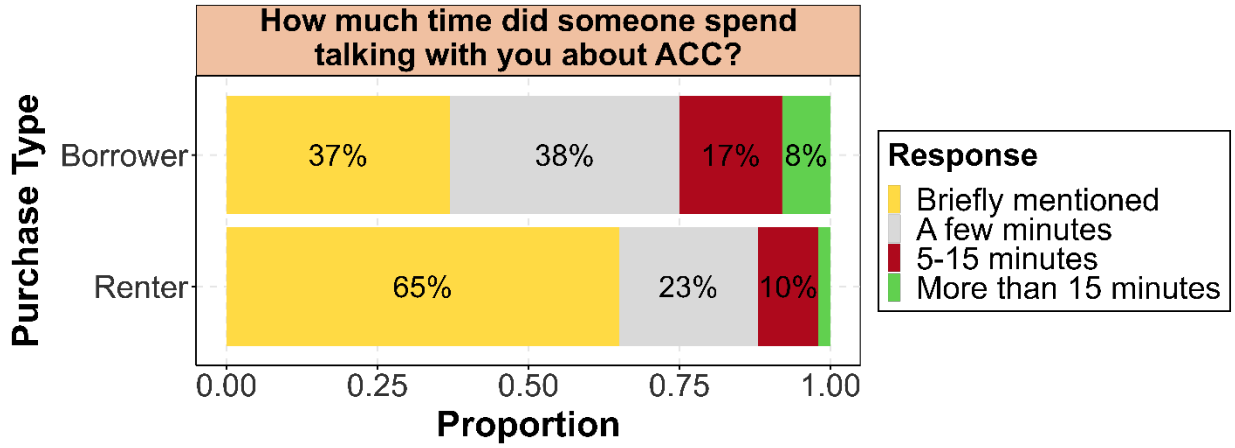

Figure 6. Amount of time someone talked with respondent about ACC, among borrowers and renters who reported that ACC was mentioned

Lane Centering Assistance

Among borrowers and renters who reported that the vehicle they borrowed or rented was equipped with LCA, slightly more borrowers reported that LCA influenced their decision to use the vehicle (28% vs. 23% of renters). When temporarily using a vehicle equipped with LCA, more borrowers than renters noted that the owner or someone else mentioned the system (37% of borrowers compared to 18% of renters). Among those who reported that someone mentioned or talked to them about LCA, borrowers reported longer conversations than renters (Figure 7), with 58% of these borrowers (21% of all borrowers) reporting someone talked to them for at least a few minutes, compared to 34% of renters who said LCA was mentioned (6% of all renters). As with ACC, a higher proportion of borrowers than renters reported conversations of 5 minutes or longer about LCA; however, these were a small minority of borrowers and

renters who reported any mention of LCA and amounted to fewer than one in ten borrowers and only about 2% of renters.

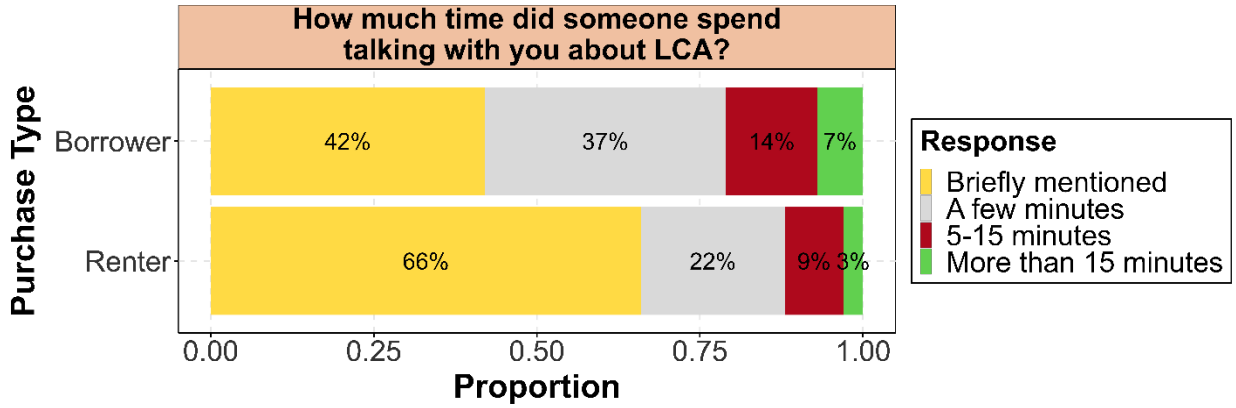

Figure 7. Amount of time someone talked with respondent about LCA, among new and used vehicle purchasers who reported that LCA was mentioned

Summary

This section examined the experiences of respondents who drove a non-household vehicle in the last three months, with a focus on those who borrowed or rented vehicles equipped with ACC and LCA. Temporary users primarily drove vehicles borrowed from family members or friends or rental vehicles. Compared to renters, borrowers were younger, used the vehicles for shorter periods of time, and the borrowed vehicles were older. More borrowers than renters reported that someone (e.g., vehicle owner or rental agent) talked to them about ACC and LCA and borrowers reported longer conversations about ACC and LCA than renters did; however, fewer than 10% of borrowers and even fewer renters reported that anyone spent 5 minutes or longer talking about either system.

Research Question 4. How did drivers learn about ACC and LCA in the vehicles they purchased, borrowed, and rented?

Respondents provided information about how they learned about ACC and/or LCA in new vehicles (n=1,068) or used vehicles (n=892) they purchased, vehicles they recently borrowed (n=726), and vehicles they recently rented (n=296). Note that the purchaser groups overlap with borrowers and renters because respondents who had both purchased and borrowed or rented an eligible vehicle were asked to respond to both respective sections of the survey.

Respondents who purchased vehicles were much more likely than borrowers or renters to say that the vehicle came with an owner's manual (Table 10). Almost all new vehicle purchasers (97%) and 89% of used vehicle purchasers said the vehicle came with

an owner's manual. In contrast, 59% of borrowers and 47% of renters said the vehicle had an owner's manual. It should be noted, however, that few borrowers and renters reported that the vehicle did not have an owner's manual, whereas many said that they were unsure, suggesting that many borrowers and renters did not proactively seek out the owner's manual during their temporary use of the vehicle. Among purchasers, about half of both groups indicated that they read about ACC and LCA in the owner's manual, whereas far fewer borrowers or renters indicated that they did so.

The response rates for the survey items that asked borrowers and renters whether they tried to learn about ACC or LCA in the borrowed and rented vehicles (and associated follow-up questions) were very low, as fewer than 20% of borrowers and renters responded to these questions; thus those statistics are not reported due to concerns that they may be unreliable.

Table 10. Learning about ACC and LCA in purchased, borrowed, and rented vehicles

Variable	New Purchasers (n=1,068)	Used Purchasers (n=892)	Borrowers (n=726)	Renters (n=296)
Vehicle had an Owner's Manual				
Yes	1035 (97%)	794 (89%)	429 (59%)	139 (47%)
No	7 (1%)	58 (7%)	41 (6%)	33 (11%)
Not Sure	26 (2%)	40 (4%)	251 (35%)	122 (41%)
Read about ACC in the Owner's Manual				
Yes	484 (51%)	356 (48%)	110 (28%)	24 (20%)
No	458 (48%)	382 (52%)	287 (72%)	98 (80%)
Read about LCA in the Owner's Manual				
Yes	353 (46%)	219 (47%)	84 (26%)	19 (17%)
No	407 (54%)	250 (53%)	230 (73%)	93 (83%)
Attempted to Learn about ACC				
Yes	714 (73%)	610 (74%)	Not reported due to sample size	
No	248 (25%)	212 (26%)		
Attempted to Learn about LCA				
Yes	353 (46%)	219 (47%)	Not reported due to sample size	
No	407 (54%)	250 (53%)		

Note: Respondents were not required to respond to these items. Non-responses are not reported.

Adaptive Cruise Control

Among purchasers who reported their primary vehicles had an owner's manual, similar proportions of new (51%) and used vehicle purchasers (48%) consulted the owner's manual for information about ACC (Table 10). For the borrowed and rented

vehicles equipped with ACC for which the respondent said there was an owner's manual, 28% of borrowers and 20% of renters (i.e., about 16% of all borrowers and 9% of all renters of ACC-equipped vehicles) consulted the owner's manual to learn more about ACC.

Of the 73% of new purchasers and 74% of used purchasers who attempted to learn about ACC in their primary vehicle, a majority said they tried to learn by driving with the system (Figure 8). New and used purchasers also used the owner's manual (48% new and 45% used), websites or online videos (30% new and 32% used), and tried to learn from friends or family (17% of new and 20% used) or sales staff at the dealership (19% new and 12% used). New and used purchasers reported using similar methods to learn about ACC in their vehicle, with the most notable difference being the proportion who learned at the dealership.

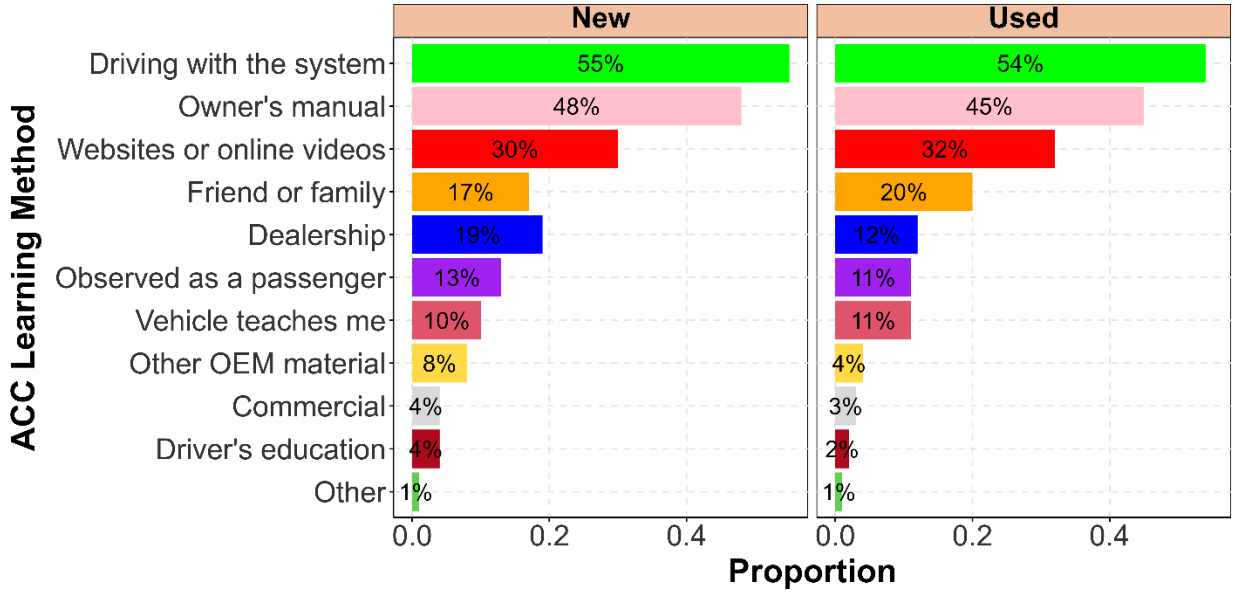

Figure 8. Ways that purchasers of new and used ACC-equipped vehicles tried to learn about ACC

Lane Centering Assistance

When purchasers reported their primary vehicle was equipped with LCA and had an owner's manual, 46% of new vehicle purchasers and 47% of used vehicle purchasers said they read about LCA in their owner's manual (Table 10). For the borrowed and rented vehicles equipped with LCA that had an owner's manual, 26% of borrowers and 17% of renters (i.e., about 16% of all LCA borrowers and 9% of all LCA renters) consulted the owner's manual to learn more about LCA.

For the 46% of new purchasers and 47% of used purchasers who attempted to learn about LCA in their primary vehicle, a majority learned by driving with the system (Figure 9). New and used purchasers also learned about LCA in their vehicle by

consulting the owner's manual (42% new vs. 45% used), searching for information online (29% new vs. 35% used), from friends or family (16% new vs. 17% used), or from sales staff at the dealership (18% new vs. 15% used). New and used purchasers reported using similar methods to learn about LCA in their vehicle, with the most notable difference being the rate at which they searched for information online.

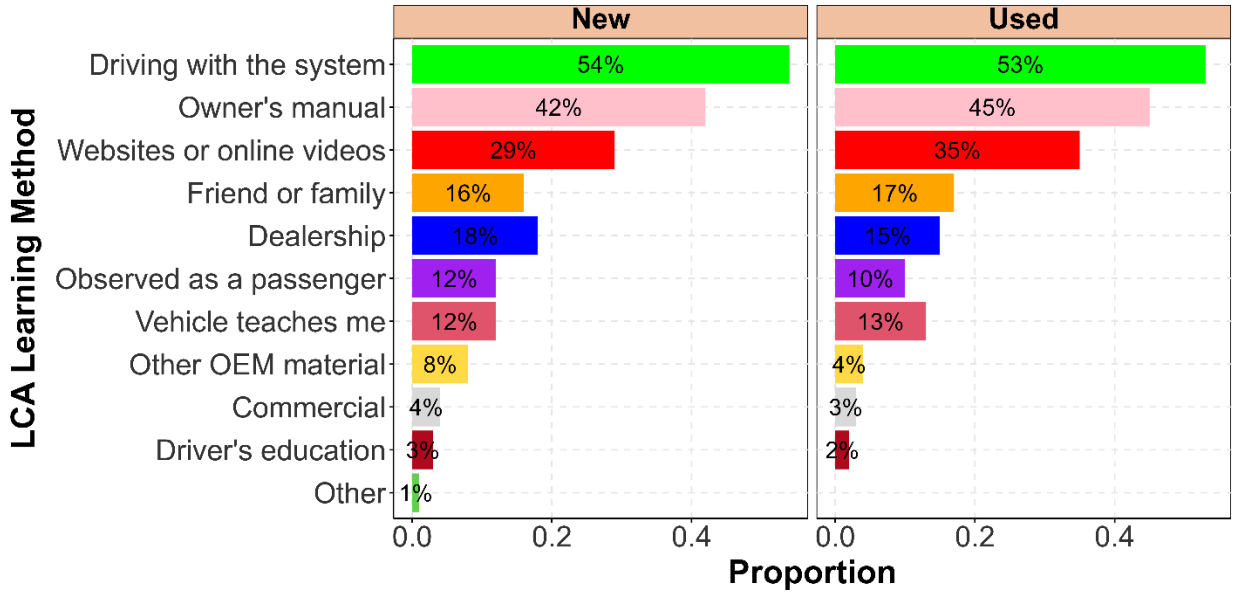

Figure 9. Ways that purchasers of new and used LCA-equipped vehicles tried to learn about LCA

Lastly, new and used purchasers rated how much each source of information contributed to their understanding of the systems in their vehicle (Figure 10). There were no notable differences between new and used purchasers as they both reported that driving with the system contributed the most to their understanding of ADAS.

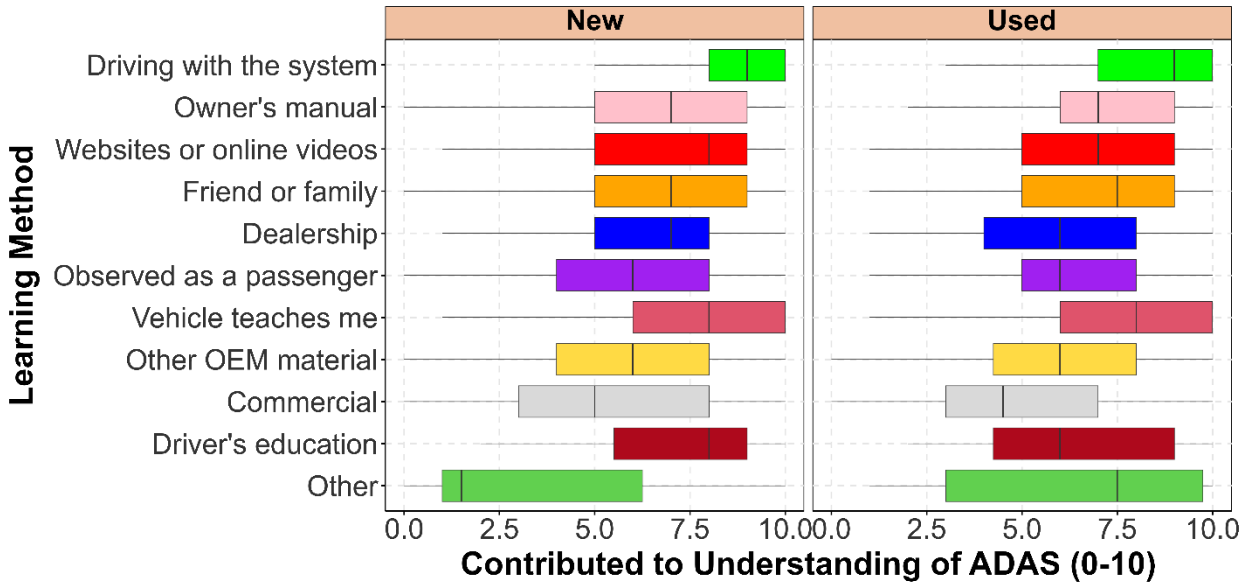

Figure 10. How much each source contributed to new and used purchasers' understanding of ADAS

Summary

Similar proportions of new and used vehicle purchasers said they tried to learn about the ACC and LCA in their primary vehicles, but more than a quarter of ACC owners and more than half of LCA owners reported they did not try to learn about the systems. To learn about these systems, purchasers most often relied on direct experience, owner's manuals, or online resources. Driving with ACC and/or LCA was not only the most common learning method, but it also contributed the most to respondents' perceived understanding of the systems. Most borrowers and renters did not read about ACC or LCA in the owner's manual (many said they did not know whether the vehicle had an owner's manual, suggesting they did not seek it out), but borrowers were somewhat more likely to do so than renters.

Research Question 5. In what purchasing and temporary-use situations do drivers want to learn about ADAS? Are drivers interested in learning about ADAS by engaging with online information?

Preferences for Learning about ADAS in Different Situations

In the last section of the survey, respondents were asked to indicate whether they would be interested in learning about the systems in a vehicle in several different use cases including:

- Purchasing or leasing a new vehicle
- Purchasing or leasing a used vehicle

- Renting a vehicle
- Borrowing a vehicle
- Driving a vehicle for work

For each situation in which they indicated interest in learning about the systems in the vehicle, respondents were then asked how they would like to receive information about the systems in the vehicle, and how much time they would be willing to spend to learn about the systems.

Among the 3,355 respondents who completed this section of the survey, the vast majority (96%) indicated interest in learning about the systems in their vehicle in at least one use case. Interest in learning about the vehicle's systems was highest when purchasing or leasing a new vehicle (88%), followed by purchasing or leasing a used vehicle (70%). Interest was much lower in situations characterized by temporary use of the vehicle, including renting a vehicle (44%), borrowing a vehicle (36%), or driving the vehicle for work (36%) (Table 11).

Table 11. Percentage of respondents interested in learning about systems in a vehicle in relation to different use cases

Use Case*	Number (%) of Respondents (n=3,355)
Purchasing or leasing a new vehicle	2,949 (88%)
Purchasing or leasing a used vehicle	2,357 (70%)
Renting a vehicle	1,490 (44%)
Borrowing a vehicle	1,211 (36%)
Driving a vehicle for work	1,213 (36%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.
**Respondents could select all that apply.*

Among the those who indicated that they would be interested in learning about the systems in a vehicle in different use cases, Table 12 shows how much time respondents indicated they would be willing to spend learning and Figure 11 shows the ways they would like to receive the information.

Among respondents interested in learning about vehicle systems in each respective use case, the amount of time they would be willing to spend was generally highest when purchasing or leasing a vehicle, with 28% to 29% indicating willingness to spend more than 30 minutes learning and nearly half (47%) willing to spend more than 15 minutes (Table 12). Willingness to spend time learning about the vehicle systems was considerably lower in the temporary vehicle use cases, with only 8% to 9% willing to spend more than 30 minutes when borrowing or renting a vehicle and 17% when driving a vehicle for work.

Table 12. How much time respondents would be willing to spend learning about ADAS in different use cases, among those who indicated any interest in learning

	Purchasing or leasing a new vehicle (n=2,949)	Purchasing or leasing a used vehicle (n=2,357)	Renting a vehicle (n=1,490)	Borrowing a vehicle (n=1,211)	Driving a vehicle for work (n=1,213)
1–2 minutes	82 (3%)	62 (3%)	87 (6%)	110 (9%)	68 (6%)
3–5 minutes	413 (14%)	338 (14%)	365 (24%)	300 (25%)	231 (19%)
6–10 minutes	516 (17%)	414 (18%)	386 (26%)	327 (27%)	260 (21%)
11–15 minutes	525 (18%)	415 (18%)	310 (21%)	227 (19%)	235 (19%)
16–30 minutes	542 (18%)	449 (19%)	206 (14%)	131 (11%)	195 (16%)
More than 30 minutes	852 (29%)	663 (28%)	127 (9%)	101 (8%)	211 (17%)

Note: Respondents were not required to respond to these items. Non-responses are not reported.
**Respondents could select all that apply.*

When examining how respondents would like to receive information about the systems among those who indicated interest in learning, patterns were similar across all use cases. The most frequently selected options were receiving printed materials or watching videos, which accounted for 25% to 28% of responses and 21% to 25% of responses, respectively, across all use cases examined (Figure 11). The next most commonly selected option was a QR code in the vehicle, which accounted for 13% to 17% of responses across all use cases. Receiving information about the vehicle's systems via the vehicle's infotainment system and via email received similar levels of interest, accounting for 11% to 13% of responses across all use cases. Few respondents indicated that they wanted to receive information by text message, except in the case of borrowing a vehicle. In the case of borrowing a vehicle, receiving information by text message accounted for 16% of responses, more than for any other use case. Receiving information from a class organized by the dealer or rental company was by far the least popular option across all use cases.

Respondents were asked to select all scenarios when they would like to receive information about the systems in their vehicle or a vehicle they may purchase or lease. About two-thirds of respondents said they preferred to receive information about ADAS prior to test driving a vehicle (66%) and during the purchasing experience (67%). About 39% said they would want to receive information about ADAS after becoming more familiar with the vehicle and 19% said they would prefer to receive information at the dealership during vehicle maintenance.

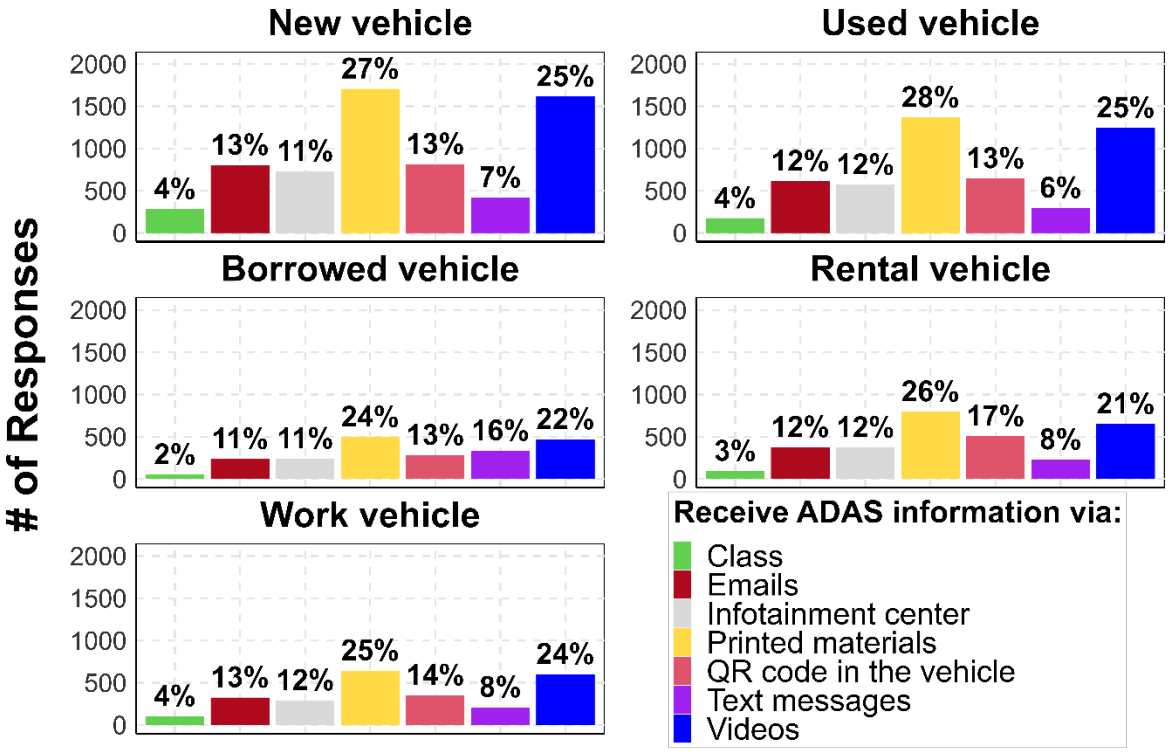

Figure 11. Ways that respondents would like to receive ADAS information in different use cases, among those who indicated any interest in learning

Respondent Engagement with ADAS Educational Information

A total of 3,582 respondents reached the section of the main survey that provided a message and a link to the site with ADAS educational content. Altogether 397 respondents (11% of those provided with a message) clicked the link to visit the ADAS educational content. A total of 464 visits were logged, with 357 respondents making a single visit and 33 respondents making two visits.

For 199 visits (43%), the respondent clicked the link to open the site but did not proceed to access any ADAS information. For 97 visits (16%), the respondent clicked through the educational content without selecting any learning topics. During 75 visits (16%) the respondent accessed some information about ADAS but did not reach the end of the content. Respondents viewed some ADAS information and reached the end of the site for 93 visits (20%). In total, 156 respondents accessed some ADAS information. The interquartile range of time these respondents spent on the site was 65 to 302 seconds.

Respondents ages 18–25 were the least likely to access the ADAS educational content (only 2% of those provided with a message) while respondents ages 65+ were most likely to do so (8% of those provided with a message; Table 13).

Males and females accessed ADAS information in similar proportions. Only 2% of respondents who had not attended college and 4% of respondents who had some college education accessed ADAS information, compared to 6% of the respondents who had graduated college.

The type of message shown to respondents seemed to affect the likelihood of clicking the link to the ADAS educational content. Fourteen percent of the respondents who were provided with the neutral message visited the site, as did about 10% of the respondents who were provided with the safety and technology messages. However, only 6% of respondents who were provided with a message that included their mental model score clicked the link.

Respondents were classified based on understanding and confidence (see Mason et al, 2023). Specifically, weak or strong understanding was defined as MMA scores below or above the median, respectively, and confident or unconfident as MMA confidence ratings above or below the median, respectively. Compared to the other three groups, a slightly higher proportion of the weak confident group viewed ADAS educational content. This finding was somewhat surprising, as it suggests interest in learning about ADAS despite being confident in their current level of understanding.

Overall, only 5% of the respondents provided with a message about the ADAS educational content whose primary vehicle was equipped with ACC or LCA accessed information from the site. No clear trends in accessing ADAS information were observed for different levels of self-reported understanding of ACC and LCA.

The follow-up survey aimed to capture whether and how respondents learned about ADAS after completing the initial survey, gather feedback about the ADAS educational content provided by the research team, and assess whether MMA scores and confidence changed after additional learning. Only 6% (n=57) of the 973 respondents who completed the follow-up survey had accessed the ADAS educational content. Given the small number of participants who accessed the educational content and the low level of engagement with the content even among them, changes in knowledge associated with viewing the educational content could not be assessed.

Table 13. Characteristics of respondents who were shown messages with a link to ADAS educational content, who clicked on the link, and who accessed information about ADAS on the site

Variable		Received Message	Opened ADAS Educational Content	Accessed ADAS Information
	Total	3,582	397 (11%)	156 (4%)
Age (years)				
	18–25	418	26 (6%)	10 (2%)
	26–35	1,047	101 (10%)	36 (3%)
	36–45	905	116 (13%)	45 (5%)
	46–55	685	85 (12%)	28 (4%)
	56–64	311	35 (11%)	20 (6%)
	≥65	216	34 (16%)	17 (8%)
Sex (binary)				
	Male	1,584	196 (12%)	82 (5%)
	Female	1,969	195 (10%)	72 (4%)
Education Level				
	No college	560	41 (7%)	11 (2%)
	Some college	1,440	136 (9%)	53 (4%)
	College graduate	1,582	220 (14%)	92 (6%)
Message Type[a]				
	Neutral	888	123 (14%)	41 (5%)
	Safety	889	88 (10%)	36 (4%)
	Technology	885	101 (11%)	41 (5%)
	Mental Model Score	890	59 (6%)	24 (3%)
MMA Understanding and Confidence				
	Weak unconfident	1,070	98 (9%)	38 (4%)
	Weak confident	736	105 (14%)	49 (7%)
	Strong unconfident	734	76 (10%)	23 (3%)
	Strong confident	1,042	118 (11%)	46 (4%)

[a] *Thirty respondents did not click on the "Next" button on the message screen and as a result, Qualtrics did not log information about which message was shown.*

Summary

This research question explored when and how ADAS users prefer to learn about ADAS and whether respondents would engage with ADAS information online. The findings suggest that context affects how individuals would want to engage with ADAS information. Nearly 90% of respondents said they would want to learn about ADAS when purchasing a new vehicle and 70% said they would want to learn when purchasing a used vehicle. The amount of time respondents would be willing to learn about ADAS

when purchasing a vehicle was similar for both new and used vehicles. Notably, more than a quarter of the respondents said they would be willing to spend more than 30 minutes learning about ADAS when purchasing a new or used vehicle and nearly half said they would be willing to spend more than 15 minutes. Most respondents would prefer to learn about ADAS before test-driving a vehicle and during the purchase experience. Considerably fewer respondents expressed interest in learning about ADAS in temporary vehicle use cases, such as borrowing, renting, or driving vehicles for work, and those who were interested in learning about the vehicle's systems in these use cases were willing to spend less time learning than when purchasing a vehicle. Printed materials and videos were by far the most popular ways that respondents indicated they wanted to receive information, though no single option was selected by more than 28% of respondents in any of the five use cases examined. Classes provided by a vehicle dealer or rental agency had very low interest, with only 2% to 4% of respondents selecting this option for any use case.

Very few respondents were interested in learning about ADAS from the educational content. Only 11% accessed the content at all, few respondents viewed any ADAS information, and three-quarters of these spent less than 5 minutes viewing it. Respondents who were shown a message that included their MMA scores visited the educational content at a lower rate than respondents who were shown other messages.

Discussion

This research aimed to learn more about experiences with ADAS-equipped vehicles among drivers who were not the original purchaser of the vehicle. This included buyers of used vehicles as well as people who use vehicles on a temporary basis such as when renting a vehicle, borrowing a vehicle from a family member or friend, or driving an employer-owned vehicle for work. An online survey gathered information from a convenience sample of nearly 3,500 drivers who had purchased an ADAS-equipped vehicle in the past 5 years and/or had driven a non-household vehicle within the past 3 months. The survey focused on ACC and LCA, which drivers actively engage and which provide continuous driving support, rather than systems that drivers interact with only in special circumstances (e.g., collision warning or intervention systems).

Demographically, purchasers of new and used vehicles were similar. They differed the most by household income, with more new vehicle purchasers reporting annual income above $100,000 and more used vehicle purchasers reporting annual income below $50,000. New vehicle purchasers were only slightly older than used vehicle purchasers, a finding that contrasts with Reagan et al. (2023), possibly due to differences in approaches to survey recruitment and/or changes in the availability of ADAS in the used vehicle market since the time of the earlier study.

In terms of awareness, new and used vehicle purchasers were equally likely to be unsure whether their vehicle was equipped with ACC or LCA: nearly one-third of both groups was unsure. Similarly, nearly one-third of both new and used vehicle purchasers did not know whether the ACC on their primary vehicle had stop-and-go functionality, and slightly more than one-fourth of both groups did not know whether their vehicle's LCA could be used without the simultaneous use of ACC. These findings align with previous research about owners' gaps in knowledge about their systems (e.g., DeGuzman & Donmez, 2021a) and suggest similar levels of awareness—or lack of awareness—among new and used vehicle purchasers.

Purchasers of new vehicles self-reported slightly higher levels of understanding of ACC and LCA than used vehicle purchasers did. However, when assessed using objective measures of knowledge rather than self-ratings, there were no measurable differences between groups. Used vehicle purchasers reported slightly less confidence in their knowledge of ACC and LCA than new vehicle purchasers. New vehicle purchasers were slightly more likely to agree with positive statements and slightly more likely to disagree with negative statements about ACC and LCA. New and used vehicle purchasers reported very similar rates of ACC and LCA usage: about one fourth of ACC owners and about 30% of LCA owners reported they rarely or never use the systems, while about 40% of both groups said they always or almost always use them.

More than 60% of both new and used vehicle purchasers reported they had driven a vehicle with ACC before purchasing their primary vehicle. New purchasers were only slightly more likely to report that they had used ACC regularly prior to the purchase. Interestingly, only about one in five respondents who purchased an ACC-equipped vehicle reported that previous experience using ACC influenced their decision to purchase a vehicle equipped with ACC. More new vehicle purchasers reported that safety benefits and a test drive influenced their decision to purchase a vehicle with ACC. Though ACC is not widely considered to be a crash avoidance system, Reagan et al. (2023) reported that fewer new purchasers and more used purchasers wanted vehicles with crash avoidance features. One possibility is that new purchasers may largely assume that new vehicles will have the latest crash avoidance features and thus that crash avoidance features do not differentiate new vehicles as much as they do with used vehicles. Roughly half of purchasers said that ACC did not influence their decision to purchase their ACC-equipped primary vehicle and about 60% said the same of LCA, which aligns with previous findings that ADAS features are not of high importance for many buyers (Reagan et al., 2023; Nandavar et al., 2023; Harms et al, 2020).

Like findings reported by Boelhouwer et al. (2020) and Harms et al. (2020), many of the respondents who purchased vehicles with ACC reported that the sellers did not mention the systems. Used vehicle purchasers were even more likely to say that the seller did not mention the system. The pattern for LCA was similar. Very few purchasers reported that sellers spent more than a few minutes talking about ACC and LCA. Similar

to Boelhouwer et al. (2020), sellers commonly provided verbal descriptions; in addition, most of the sellers pointed out controls when providing information about ACC and LCA. New vehicle purchasers were more likely to report the seller provided a demonstration of ACC or LCA. However, very few new vehicle purchasers (10%–15%) or used vehicle purchasers (6%–9%) recalled the seller having talked to them about the operating conditions of the systems or when the systems might not behave as expected, which arguably is among the most safety-critical information for a driver who is not already knowledgeable about and experienced with using these systems.

Most purchasers reported they tried to learn about ACC or LCA by driving with the system or consulting the owner's manual, which aligns with what others have reported (e.g., Harms et al., 2020; Kaye et al., 2022; Mason et al., 2023). When asked how they would like to receive information about the ADAS in a vehicle they recently purchased, they preferred to receive printed materials or a video. Respondents also preferred these information sources when borrowing, renting, or driving a work vehicle. A more formal approach to learning about ADAS is via a classroom setting. Some dealerships offer classes to provide drivers with information about the ADAS and other technologies in their newly acquired vehicles. Notably, however, very few respondents said they would be interested in receiving information during a class organized by the dealer or rental company, and this was by far the least popular of all possible learning modes examined.

More than 60% of respondents who purchased used vehicles, which included certified pre-owned vehicles, bought their vehicles at dealerships, and only 7% were private-party sales directly from the previous owner. This finding suggests dealership-based ADAS education and information could reach large numbers of used vehicle purchasers in addition to new purchasers. One caveat, however, is people without college education are underrepresented in this sample of respondents and these individuals may be less likely to purchase vehicles from dealerships. As the vehicle fleet ages and ADAS become more prevalent on more older vehicles that are more likely to be sold and purchased outside a dealership setting, consumers need access to ADAS information through other avenues.

One interesting finding was that fewer than half the purchases were the decision of a single person, and this was slightly more common for new vehicle purchases. A recent project that interviewed ADAS users involved in crashes or near-crashes observed that several participants had been only minimally involved in the decision to purchase the vehicle, which had been coordinated by their spouse (Reyes & Roe, 2025). Future research should consider how joint decision making and vehicle sharing intersect with learning about and using ADAS.

Very little research has explored temporary vehicle use, especially among individuals who borrow a vehicle and do not go through a formal process of renting a vehicle. This study shares several insights that help stakeholders understand different

use cases, ADAS use rates, and experiences of individuals who drove borrowed and rented vehicles. When it comes to borrowing and renting vehicles, this study found that drivers have significant exposure to ACC and LCA. The circumstances for renting and borrowing a vehicle are often different. Individuals frequently reported renting vehicles while on vacation or a work trip, whereas they typically borrowed vehicles from a friend or family member because their vehicle was under repair, they were on vacation, or they needed a vehicle with specific capabilities such as a truck bed. While the survey captured most of the reasons for renting a vehicle, 20% of borrowers reported having another reason for borrowing a vehicle. A majority of the renters and borrowers who were aware that the vehicle was equipped with ACC or LCA reported that they used the systems.

Borrowers typically used the vehicle for fewer days than renters, but renters more often were not told about ACC or LCA in the vehicle. This is notable because rental vehicles are typically newer and more likely to have ADAS compared to borrowed vehicles. Furthermore, renters who reported that someone from the rental company had talked to them about ACC or LCA said the system(s) were only briefly mentioned. Renters may benefit from learning about the vehicle's ACC and LCA features, as they often drive the vehicle for an extended period of time while on vacation or a work trip, potentially driving on road types where they might desire to use ACC or LCA. However, rental company employees themselves may not be aware of the ADAS equipped on a particular vehicle, and thus not be able to provide much support to renters.

Borrowers reported being told more about ADAS than renters, potentially because the vehicle was borrowed from someone with whom they had a personal relationship, such as a family member or a friend. Additionally, because the owner is familiar with both the vehicle being borrowed and the borrower, they may be able to provide more information about the systems tailored to the borrower and the context in which the vehicle is being used. The reasons respondents provided for driving a borrowed vehicle suggest that in many cases the owner of the vehicle was riding along with the borrower. Although not captured in this survey, borrowers may routinely borrow the same vehicle and eventually become familiar with the ADAS on the vehicle.

Limitations

This study had several limitations. While the use of Prolific to recruit respondents allowed the research team convenient access to a large sample of willing participants from across the U.S., this sample was not fully representative of the U.S. driving population. Individuals without education beyond high school and older adults were notably underrepresented. The extent to which key survey constructs (e.g., knowledge about ADAS) might differ within key survey subgroups between survey participants versus the general population (e.g., survey participants who purchased used vehicles versus the general population of used vehicle purchasers) is unknown. It is also possible

that some individuals who are regularly paid to complete surveys may focus on quick completion and not provide accurate information. Though the researchers observed that some respondents provided inconsistent information, this may have been a result of the design of the survey and the wide range of topics covered. On the other hand, very few respondents were excluded from the sample for not meeting inclusion criteria or failing attention checks.

The study depended on the respondents reporting which ADAS features were on their primary vehicle and (if applicable) the vehicle they borrowed or rented. It is likely that at least some of the respondents were mistaken about the features that were or were not on the vehicles. Respondents were able to indicate in the survey when they were not sure whether the vehicle had an ADAS and these respondents were excluded from subsequent analyses where applicable. This may be a particularly important limitation with respect to the portions of the survey focused on renting or borrowing vehicles. To be eligible to complete these sections of the survey, the renter or borrower had to have indicated that the vehicle they rented or borrowed was equipped with at least one of the seven ADAS queried: a renter or borrower who indicated that they were unsure for all seven ADAS, or who reported incorrectly that the vehicle had none of the ADAS when it really did, would not have been asked any of the subsequent questions about their rental/borrowing experience. In the current study the practical implications may be limited, as a vehicle user who is unaware that the vehicle is equipped with ACC or LCA is unlikely to use these technologies. However, general statistics about the characteristics of renters and borrowers, and extent of information provided to them when renting or borrowing, should be interpreted in the context of this limitation. Independent determination of whether the respondents' vehicles were actually equipped with the systems of interest was beyond the scope of this research.

This project helped fill a gap in the literature by considering the experiences of individuals who temporarily used vehicles with ACC and LCA (i.e., borrowers and renters). Many respondents who borrowed and rented vehicles also owned primary vehicles with ACC or LCA. However, respondents who had recently driven a non-household vehicle were eligible to participate regardless of whether their primary vehicle had ADAS; though it is possible that the ability to discern whether a rental or borrowed vehicle was equipped with ADAS is itself correlated with prior experience with ADAS (e.g., having ADAS on one's primary vehicle). It is unknown whether the findings for this sample of respondents (e.g., the proportion of borrowers and renters who used ACC or LCA) would generalize to broader populations of borrowers and renters. This could be addressed in future research.

The analyses conducted in the current study were descriptive in nature; no effort was made to adjust for covariates that could explain differences between groups. This could be done with inferential modelling. However, many of the observed differences,

especially between purchasers of new versus used vehicles, were quite small even without adjustment for any covariates.

Finally, the researchers conducted a follow-up survey to investigate whether and how respondents sought information about ADAS after completing the initial survey, including how they used the ADAS educational content provided by the research team. However, few respondents (only about one in ten) even accessed the educational content provided by the research team, and even among them, few completed it and only one in four spent more than five minutes viewing it. Given this very low level of engagement with the content, the data collected from the follow-up survey could not be meaningfully summarized to measure its impact. The fact that only roughly one in ten drivers elected to view such information when it was provided to them does not suggest that such online resources are necessarily a promising means of reaching and educating drivers about the technology in their vehicles; however, this should be tempered somewhat by the fact that the information was presented at the end of a lengthy survey. It is possible that uptake might have been higher in a different context.

Implications

The results of this research suggest that there is a need for vehicle manufacturers to provide straightforward means for everyone—including purchasers, sellers, vehicle rental company staff, vehicle renters, borrowers, and others who may use a vehicle—to determine which ADAS features are equipped on a vehicle. Several campaigns and information sources aim to educate and inform the general public about ADAS (e.g., MyCarDoesWhat.com, NHTSA, Clearing the Confusion). The campaigns and information sources have developed accessible material that provide definitions, descriptions of system capabilities and features, and other useful information. Unfortunately, a driver cannot use these materials to determine whether their vehicle is equipped with specific ADAS. Even owner's manuals do not always clearly indicate whether a particular ADAS is equipped on a particular vehicle, instead providing information about the many optional systems available on any trim level of a particular vehicle with the caveat "if equipped." Findings from this study show that a small but meaningful portion of purchasers (8%–18%) are not certain if their primary vehicle is equipped with ACC or LCA. Higher proportions (16%–33%) of individuals who had recent rented or borrowed a vehicle were not sure whether it had ACC or LCA. Raising driver awareness of which ADAS the vehicle is equipped with is a crucial first step toward drivers using these features responsibly.

Unfortunately, there is no accessible process for the general public or researchers to readily determine whether a specific vehicle is equipped with ADAS (Pradhan et al., 2022). Vehicle manufacturers and vendors keep vehicle information behind paywalls, so sellers and others have to pay for resources like Monroney labels and build sheets. NHTSA conducts their own market research to partially populate ADAS information in

their Product Information Catalog and Vehicle Listing (vPIC) tool (National Center for Statistics and Analysis, 2025), while research about the effectiveness of ADAS is conducted using an independent third party to keep the ADAS information provided by manufacturers confidential (PARTS, 2023). Making information about which ADAS are equipped on a specific vehicle available to the general public would be beneficial to a wide variety of stakeholders including its original purchaser, potential subsequent purchasers, other users of the vehicle besides purchasers/owners, as well as stakeholders such as researchers and regulators.

Relatedly, there is a need for vehicle manufacturers to provide simple, accessible, easy-to-understand resources, such as "quick start guides" or similar resources, to inform vehicle users about the ADAS features on each specific vehicle. As one illustration of this need, among survey respondents who reported that their primary vehicle had ACC or LCA, a sizeable proportion did not know whether their ACC had stop-and-go functionality or if their LCA required the use of ACC. Owner's manuals have been the primary means through which vehicle manufacturers communicate detailed information about ADAS to users. However, owner's manuals often include information for all permutations of features across trim levels and do not inform the owner which features are equipped on their specific vehicle. The findings of this study also demonstrate that many users are only willing to spend a small amount of time learning about ADAS, especially when using a vehicle on a temporary basis. In a small on-road study by Greatbatch et al. (2025) that was designed to mimic renting or borrow a vehicle for short-term use, the majority of participants engaged with a quick start guide and in-vehicle tutorial designed by the research team and reported that they would like to have such resources available to them when renting a vehicle in the future.

Ideally, quick start guides and similar resources for the ADAS features on a given vehicle, developed by the manufacturer based on the build sheet, would provide basic information for each feature, including the following:

- The name of the feature
- A brief overview of what ADAS feature does and does not do
- Activation and deactivation
- System limitations
- References to the specific section(s) of the owner's manual
- QR codes for online resources (e.g., a video that demonstrates the functions and limitations of the ADAS on the vehicle).

Dealerships and other sellers can use such resources to facilitate conversations with purchasers and increase owner awareness of ADAS. Such resources should be kept in the vehicle (or integrated into the vehicle, c.f. Greatbatch et al., 2025) for future reference, for sharing with others who might use the vehicle, and for passing on to

future owners. Rental companies could likewise inform their renters about the systems on the vehicle they are using. Then, renters who want additional information (which the current study estimates are a minority of renters) can easily access it through the owner's manual or through the online resources.

Finally, the results of this research suggest that it would be beneficial to purchasers of new and used vehicles for dealerships to provide vehicle-specific information about ADAS and customize the level of information provided to match the purchasers' interests. Approximately one-third to one-half of respondents who purchased new and used vehicles reported the seller did not provide information about ACC and LCA. Nearly all new vehicles and more than 60% of used vehicles in the current study were purchased at dealerships. Purchasers reported a range of interest in ADAS features, but differences between new and used purchasers were small. Between 48% and 60% of purchasers reported that ACC or LCA did not influence their purchase decision. On the other hand, between 20% and 29% received demonstrations of ACC or LCA, and 20% to 28% of purchasers reported that a test drive influenced their decision to purchase a vehicle with ACC or LCA. Similar proportions of purchasers reported that potential safety benefits influenced to decision to buy a vehicle equipped with ACC or LCA.

Dealerships may directly benefit from providing information about ADAS because some purchasing decisions are influenced by ADAS features. Most respondents in this study said they would want to learn about ADAS when purchasing a vehicle (92% when purchasing a new vehicle and 73% when purchasing a used vehicle) and many would be willing to spend more than 30 minutes learning about system features. Notably, a sizeable majority said they would want to learn about the ADAS prior to test driving a vehicle (66%) and during the purchasing experience (67%). There was less interest in learning about ADAS after becoming more familiar with the vehicle, and very few respondents said they would be interested in learning about ADAS in a class organized by the dealer. Even when purchasers have little interest in ADAS, dealerships should spend at least a few minutes during delivery talking about the ADAS with the purchaser(s) and others (e.g., family members) who will use the vehicle. At a minimum, they could inform purchasers of the ADAS equipped on the vehicle and direct them to additional resources to help them learn about the systems, again highlighting the value of quick start guides and similar resources. Directing purchasers to additional resources may also be a practical approach for non-branded dealerships that sell used vehicles, where the dealer may not have detailed knowledge of the specific systems in every individual vehicle that they sell.

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Appendix

The following documents are provided as supplementary materials.

A. Screening Survey
B. Main Survey
C. ADAS Educational Information
D. Follow-Up Survey

Appendix A: Screening Survey

Consent

Screening Survey for the Perceptions and Attitudes of Driver Assistance Systems Study

Researchers at the University of Iowa are surveying drivers about their experiences with different vehicle technologies. If you are eligible for our study, we will invite you to participate in a survey. We will use your responses to the questions below to determine your eligibility for the survey. You will receive $0.40 for responding to the questions below.

If eligible, the survey is estimated to take 25 minutes to complete. If you complete the full survey, you will be paid $4.25 for your time.

We will not collect your name or any identifying information about you. It will not be possible to link you to your responses on the survey. Taking part in this research study is completely voluntary. If you do not wish to participate in this study, you may simply exit out of your Internet browser. If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu. We encourage you to ask questions. If you have any questions about the research study itself, please contact: Justin Mason (justin-mason@uiowa.edu or

319-467-1614), an Assistant Research Scientist at the University of Iowa.

Thank you very much for your consideration of this research study.

- ○ Yes, I agree to participate
- ○ No, I do not want to participate

Prolific ID

What is your Prolific ID?
Please note that this response should autofill with the correct ID

${e://Field/PROLIFIC_PID}

Screening Survey Items

What is your age?

Enter age in years

What is your sex?

- ○ Male
- ○ Female
- ○ Prefer not to answer

In the last 3 months, have you driven a vehicle with any of the following vehicle technologies? Select all that apply:

	Yes	No	I don't know
Blind Spot Warning Detects vehicles in the blind spot and warns the driver.	○	○	○
Rear Cross Traffic Detection Detects vehicles approaching the rear of the vehicle while in reverse gear and alerts the driver.	○	○	○
Forward Collision Warning Detects a potential collision with a vehicle ahead and alerts the driver. Some systems may also begin to brake the vehicle.	○	○	○
Lane Departure Warning Warns the driver when the vehicle approaches or crosses lane markings.	○	○	○
Lane Keeping Assistance Steers to prevent the vehicle from driving out of its lane. This system is also known as **Lane Departure Prevention**.	○	○	○

	Yes	No	I don't know
Lane Centering Assistance Provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.	○	○	○
Adaptive Cruise Control (ACC) Maintains a driver-selected gap when following another vehicle and a set speed when not.	○	○	○

In the last 5 years, were you involved in the purchase or lease of a vehicle equipped with any of the following vehicle technologies? Select all that apply:

	Yes	No	I don't know
Blind Spot Warning Detects vehicles in the blind spot and warns the driver.	○	○	○
Rear Cross Traffic Detection Detects vehicles approaching the rear of the vehicle while in reverse gear and alerts the driver.	○	○	○

	Yes	No	I don't know
Forward Collision Warning Detects a potential collision with a vehicle ahead and alerts the driver. Some systems may also begin to brake the vehicle.	○	○	○
Lane Departure Warning Warns the driver when the vehicle approaches or crosses lane markings.	○	○	○
Lane Keeping Assistance Steers to prevent the vehicle from driving out of its lane. This system is also known as **Lane Departure Prevention**.	○	○	○
Lane Centering Assistance Provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.	○	○	○
Adaptive Cruise Control (ACC) Maintains a driver-selected gap when following another vehicle and a set speed when not.	○	○	○

If you were involved in the purchase or lease of a vehicle in the last 5 years, which best describes the condition of the vehicle

when it was purchased or leased?

- ○ I was not involved in the purchase or lease of a vehicle in the last 5 years
- ○ New
- ○ Certified pre-owned
- ○ Used, not certified pre-owned
- ○ Used, not sure if certified pre-owned
- ○ Unsure

Now please think about vehicles other than the vehicle you drive most often, that you have recently driven but are not owned by a member of your household. For example, vehicles that you borrowed, rented, or drove for work. In the last 3 months, how many vehicles outside of your household did you drive?

- ○ 0
- ○ 1
- ○ 2 or more

Which of the following best describes the education you have received?

- ○ I did not complete high school
- ○ I completed high school or equivalent, e.g., General Educational Development (GED)
- ○ I have some education beyond high school
- ○ I have a Bachelor's degree (i.e., a 4-year degree) or higher

Participant Compensation

Please click submit responses in the blue box below. This will return you back to Prolific.

Appendix B: Main Survey

Consent

Perceptions and Attitudes of Driver Assistance Systems Survey.

We invite you to participate in a research study being conducted by investigators at The University of Iowa. The survey will ask you questions about your experiences and usage of different vehicle technologies, your knowledge of their functions, types of training you have obtained, as well as general information about you. The purpose of the study is to understand how this knowledge varies across different populations.

If you agree to participate, we would like you to complete the online questionnaire available below. Your response to this survey is completely voluntary. Some questions will require a response from you.

We estimate that the survey should take no more than 25 minutes to complete. If you complete the survey, you will be paid $4.25 for your time.

We will not collect your name or any information that could identify you. It will not be possible to link you to your responses on the survey.

Taking part in this research study is completely voluntary. If you do not wish to participate in this study, you may simply exit from your Internet browser.

If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu.

We encourage you to ask questions. If you have any questions about the research study itself, please contact: Justin Mason (justin-mason@uiowa.edu or 319-467-1614), an Assistant Research Scientist at the University of Iowa.

Thank you very much for your consideration of this research study.

- ○ Yes, I agree to participate
- ○ No, I do not want to participate

Prolific ID

What is your Prolific ID?
Please note that this response should autofill with the correct ID

${e://Field/PROLIFIC_PID}

Demographics and Determining Block Eligibility

In a typical week, how many days do you drive?

What is your zip code? (e.g., 55055)

How do you identify? Select all that apply.

- ☐ American Indian or Alaska Native

- [ ] Asian or Asian American
- [ ] Black or African American
- [ ] Hispanic, Latino, or Spanish origin
- [ ] Native Hawaiian or Other Pacific Islander
- [ ] White
- [ ] Other
- [ ] Prefer not to answer

What is your annual household income?

- ○ Under $50,000
- ○ $50,001 to $75,000
- ○ $75,001 to $100,000
- ○ $100,001 to $125,000
- ○ More than $125,000
- ○ Prefer not to answer

This item asks about a system commonly called **adaptive cruise control (ACC)**. Some vehicle manufacturers use different names for this type of system. You may or may not have experience with this system. Do your best to respond to the items below.

For the following statements about **adaptive cruise control**, indicate whether you think the item is True or False. Also, please indicate how confident you are in your response.

(Note: order of statements was randomized for each respondent.)

	The statement about adaptive cruise control is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
Pressing the accelerator allows the vehicle to drive faster than the set speed	○	○	○	○	○	○
Maintains a gap based on the following distance (e.g., 2 car lengths) between your vehicle and the vehicle ahead	○	○	○	○	○	○
Identifies red traffic lights and stops the vehicle	○	○	○	○	○	○
Uses sensors that are not affected by weather conditions or poor visibility	○	○	○	○	○	○
Maintains a gap based on the following time (e.g., 2-seconds) between your vehicle and the vehicle ahead	○	○	○	○	○	○
Provides steering input to keep the vehicle in its lane	○	○	○	○	○	○
Reduces the amount of attention the driver needs to pay to driving	○	○	○	○	○	○
May fail to detect a vehicle that cuts into the lane ahead of your vehicle	○	○	○	○	○	○
Resumes the set speed if it no longer detects a vehicle ahead	○	○	○	○	○	○
May fail to detect motorcycles driving near the edge of the lane	○	○	○	○	○	○
Works like conventional cruise control when there are no vehicles detected in the lane ahead of you	○	○	○	○	○	○
May lose track of the vehicle ahead when driving through a sharp curve	○	○	○	○	○	○
Provides full braking power when a frontal collision is imminent	○	○	○	○	○	○
May fail to detect vehicles ahead traveling at much slower speeds	○	○	○	○	○	○
Detects and brakes for objects (e.g., construction cones) in the road	○	○	○	○	○	○
Maintains a following gap behind a vehicle that is traveling slower than the set speed	○	○	○	○	○	○

This item asks about a system commonly called **lane centering assistance**. Some vehicle manufacturers use different names for this type of system. You may or may not have experience with this system. Do your best to respond to the items below.

For the following statements about **lane centering assistance**, determine if the item is True or False. Also, please indicate how confident you are in your response.

(Note: order of statements was randomized for each respondent.)

	The statement about lane centering assistance is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
The vehicle may deviate from the center of the lane in sharp curves	○	○	○	○	○	○
Will not work if the front-facing cameras are blocked	○	○	○	○	○	○
Reduces the amount of attention the driver needs to pay to driving	○	○	○	○	○	○
The vehicle may swerve in areas where lanes are merging and diverging	○	○	○	○	○	○
Changes lanes automatically	○	○	○	○	○	○
Requires the driver to hold the steering wheel	○	○	○	○	○	○
Only steers when the vehicle is close to or crossing a lane line	○	○	○	○	○	○
Executes evasive maneuvers to avoid collisions	○	○	○	○	○	○
Provides steering to keep the vehicle near the center of the lane	○	○	○	○	○	○
Functionality may be affected by sun glare	○	○	○	○	○	○
If the driver can see the lane lines, the system will work correctly	○	○	○	○	○	○
After reading this statement, select true and high confidence	○	○	○	○	○	○

	The statement about lane centering assistance is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
Uses sensors that are not affected by weather conditions or poor visibility	○	○	○	○	○	○

Have you used or are you familiar with any of the following systems?

We consider you to be familiar with a system if you have driven a vehicle with the system. Please note that different automotive manufacturers may refer to their systems by different names.

	I use it regularly	I have used it, but I do not use it regularly	I am familiar with it, but have not used it	I am not familiar with it
Blind Spot Warning Detects vehicles in the blind spot and warns the driver.	○	○	○	○
Rear Cross Traffic Detection Detects vehicles approaching the rear of the vehicle while in reverse gear and alerts the driver.	○	○	○	○

	I use it regularly	I have used it, but I do not use it regularly	I am familiar with it, but have not used it	I am not familiar with it
Forward Collision Warning Detects a potential collision with a vehicle ahead and alerts the driver. Some systems may also begin to brake the vehicle.	○	○	○	○
Lane Departure Warning Warns the driver when the vehicle approaches or crosses lane markings.	○	○	○	○
Lane Keeping Assistance Steers to prevent the vehicle from driving out of its lane. This system is also known as **Lane Departure Prevention**.	○	○	○	○
Lane Centering Assistance Provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.	○	○	○	○
Adaptive Cruise Control (ACC) Maintains a driver-selected gap when following another vehicle and a set speed when not.	○	○	○	○

Not counting yourself, how many people live in your household?

How many vehicles are owned or leased by you or members of your household?

Think about the vehicle that you drive the most (i.e., your primary vehicle). Which of the following statements is the most accurate?

- I own, co-own, or lease my primary vehicle
- My primary vehicle is owned by someone else

The vehicle I drive most often...

- is owned by my employer
- is owned by a family member
- is owned by a friend
- is a rental
- Other

Now please think about vehicles **other than your primary vehicle** that you have recently driven but are not owned by a member of your household. For example, vehicles that you borrowed, rented, or drove for work.

In the last 3 months, how many vehicles outside of your household did you drive?

In the last 5 years, were you involved in the decision to purchase or lease a vehicle? This could be a vehicle that you purchased or leased for yourself or that was purchased by or for someone else (e.g., family member). Select all that apply.

- [ ] No, I was not involved in the purchase of a vehicle in the last 5 years
- [ ] Yes, I was involved in the purchase or lease of my current primary vehicle
- [ ] Yes, I was involved in the purchase or lease of a vehicle that is not my current primary vehicle

Primary Vehicle Information

This section of the survey asks about **the vehicle you most often drive** (i.e., your primary vehicle). If you regularly drive two different vehicles, out of these two vehicles, please consider the vehicle you most recently drove.

What is the year, make and model of your primary vehicle?

Year (e.g., 2022)

Make (e.g., Toyota)

Model (e.g., Camry)

Which best describes the condition of the ${q://QID130/ChoiceTextEntryValue/1} ${q://QID130/ChoiceTextEntryValue/2} when it became your primary vehicle?

- New
- Certified pre-owned
- Used, not certified pre-owned
- Used, not sure if certified pre-owned
- Unsure

How involved were you in the decision to purchase, lease, or rent this vehicle?

- Not at all involved
- Slightly involved
- Somewhat involved
- Very involved
- It was my decision alone (nobody else was involved)

Does this vehicle have any of the following systems?

	Yes	No	I am not sure
Blind Spot Warning			

	Yes	No	I am not sure
Rear Cross Traffic Detection	○	○	○
Forward Collision Warning	○	○	○
Lane Departure Warning	○	○	○
Lane Keeping Assistance or Lane Departure Prevention	○	○	○
Lane Centering Assistance	○	○	○
Adaptive Cruise Control	○	○	○

Did this vehicle come with an owner's manual (physical or digital copy)?

- ○ Yes
- ○ No
- ○ I'm not sure

Did you read the owner's manual (physical or digital copy) to understand more about the systems in your primary vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○

	Yes	No
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

Prior to driving your primary vehicle, had you ever driven a vehicle with any of these systems?

	Yes, and I used it regularly	Yes, but I did not use it regularly	No	I am not sure
Blind Spot Warning Detects vehicles in the blind spot and warns the driver.	○	○	○	○
Rear Cross Traffic Detection Detects vehicles approaching the rear of the vehicle while in reverse gear and alerts the driver.	○	○	○	○
Forward Collision Warning Detects a potential collision with a vehicle ahead and alerts the driver. Some systems may also begin to brake the vehicle.	○	○	○	○
Lane Departure Warning Warns the driver when the vehicle approaches or crosses lane markings.	○	○	○	○
Lane Keeping Assistance Steers to prevent the vehicle from driving out of its lane. This system is also known as **Lane Departure Prevention**.	○	○	○	○
Lane Centering Assistance Provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.	○	○	○	○

	Yes, and I used it regularly	Yes, but I did not use it regularly	No	I am not sure
Adaptive Cruise Control (ACC) Maintains a driver-selected gap when following another vehicle and a set speed when not.	○	○	○	○

Primary Vehicle- Purchase Experience

This section of the survey asks about the purchase of your primary vehicle.

When was your primary vehicle purchased or leased?

- ○ Within the last year
- ○ Within the last 2 years
- ○ Within the last 3 years
- ○ Within the last 4 years
- ○ Within the last 5 years
- ○ More than 5 years ago

How many months ago did you purchase or lease this vehicle?

When you purchased or leased this vehicle, who did you think would most often drive

the vehicle?

- ○ Myself
- ○ Someone else in my household
- ○ A friend or family member not in my household
- ○ Someone else

Was this individual with you when you decided to purchase or lease the vehicle?

- ○ Yes
- ○ No

Where did you buy or lease this vehicle?

- ○ A ${q://QID130/ChoiceTextEntryValue/2} dealership
- ○ A dealership for a different vehicle manufacturer
- ○ A business that sells only used vehicles
- ○ Directly from the previous owner (i.e., private-party sale)
- ○ A dealership website
- ○ A manufacturer's website
- ○ An online service (e.g., Carvana, Cars Direct, Truecar)
- ○ A family member or friend
- ○ Other

Did the fact that the vehicle had this system influence your decision to purchase or lease this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

While deciding to purchase or lease this vehicle did you interact with the seller (e.g., salesperson)?

- ○ Yes
- ○ No

Did the seller mention or talk about the system(s) in this vehicle?

	Yes	No	I don't remember
» Blind Spot Warning	○	○	○
» Rear Cross Traffic Detection	○	○	○
» Forward Collision Warning	○	○	○
» Lane Departure Warning	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○
» Lane Centering Assistance	○	○	○
» Adaptive Cruise Control	○	○	○

During your vehicle buying experience, how much time did the seller spend talking about the system(s)?

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	I don't remember
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○
» Lane Departure Warning	○	○	○	○	○

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	I don't remember
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○
» Adaptive Cruise Control	○	○	○	○	○

Primary Vehicle- Purchase Experience- ACC

The next few questions will ask about the purchasing experience of your primary vehicle with respect to **adaptive cruise control** (**ACC**).

Which of the following influenced your decision to purchase a primary vehicle with **adaptive cruise control**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information
- ☐ Advertisements
- ☐ Safety benefits
- ☐ Previous experience using adaptive cruise control

- [ ] Other (please describe)

What type of information did the seller provide about the **adaptive cruise control** system in your primary vehicle? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera, radar)
- [ ] Information about what the system does (e.g., maintains a set speed and gap)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 25 mph)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other
- [ ] I don't remember
- [ ] I was not provided any information about adaptive cruise control

How did the seller provide information about the **adaptive cruise control** system in your primary vehicle? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle

- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other

- [ ] I don't remember

Did the seller express an opinion about the **adaptive cruise control** system in your primary vehicle?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)

- ○ I don't remember

How would you rate your level of understanding of the **adaptive cruise control** system in your primary vehicle at the time of purchase?

- ○ I didn't understand the system

- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Primary Vehicle- Purchase Experience- LCA

The next few questions will ask about your purchasing experience of your primary vehicle with respect to **lane centering assistance**.

Which of the following influenced your decision to purchase a primary vehicle with **lane centering assistance**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information
- ☐ Advertisements
- ☐ Safety benefits
- ☐ Previous experience using lane centering assistance
- ☐ Other (please describe)

What type of information did the seller provide about the **lane centering assistance** system in your primary vehicle? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera)
- [ ] Information about what the system does (e.g., what warnings looked, sounded, or felt like; whether systems had steering or braking interventions)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 40 mph, works best in dry daytime conditions)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other

- [ ] I don't remember
- [ ] I was not provided any information about lane centering assistance

How did the seller provide information about the **lane centering assistance** system in your primary vehicle? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle
- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material

- [ ] Other
- [ ] I don't remember

Did the seller express an opinion about the **lane centering assistance** system in your primary vehicle?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)
- ○ I don't remember

How would you rate your level of understanding of the **lane centering assistance** system in your primary vehicle at the time of purchase?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it

- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Primary Vehicle- Current Understanding and Learning about ADAS

The next few items ask about your experiences with the system(s) in the ${q://QID130/ChoiceTextEntryValue/1} ${q://QID130/ChoiceTextEntryValue/2} **since it became your primary vehicle**.

Select the response that best reflects your level of understanding of the system(s) in your vehicle today.

	I don't understand the system	I am familiar with the system, but I need some help to use it	I understand the system	I understand the system well enough that I could show others how to use it	I understand the system and how it works, and feel confident I would be able to use similar systems in another vehicle
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○
» Lane Departure Warning	○	○	○	○	○

» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○
» Adaptive Cruise Control	○	○	○	○	○

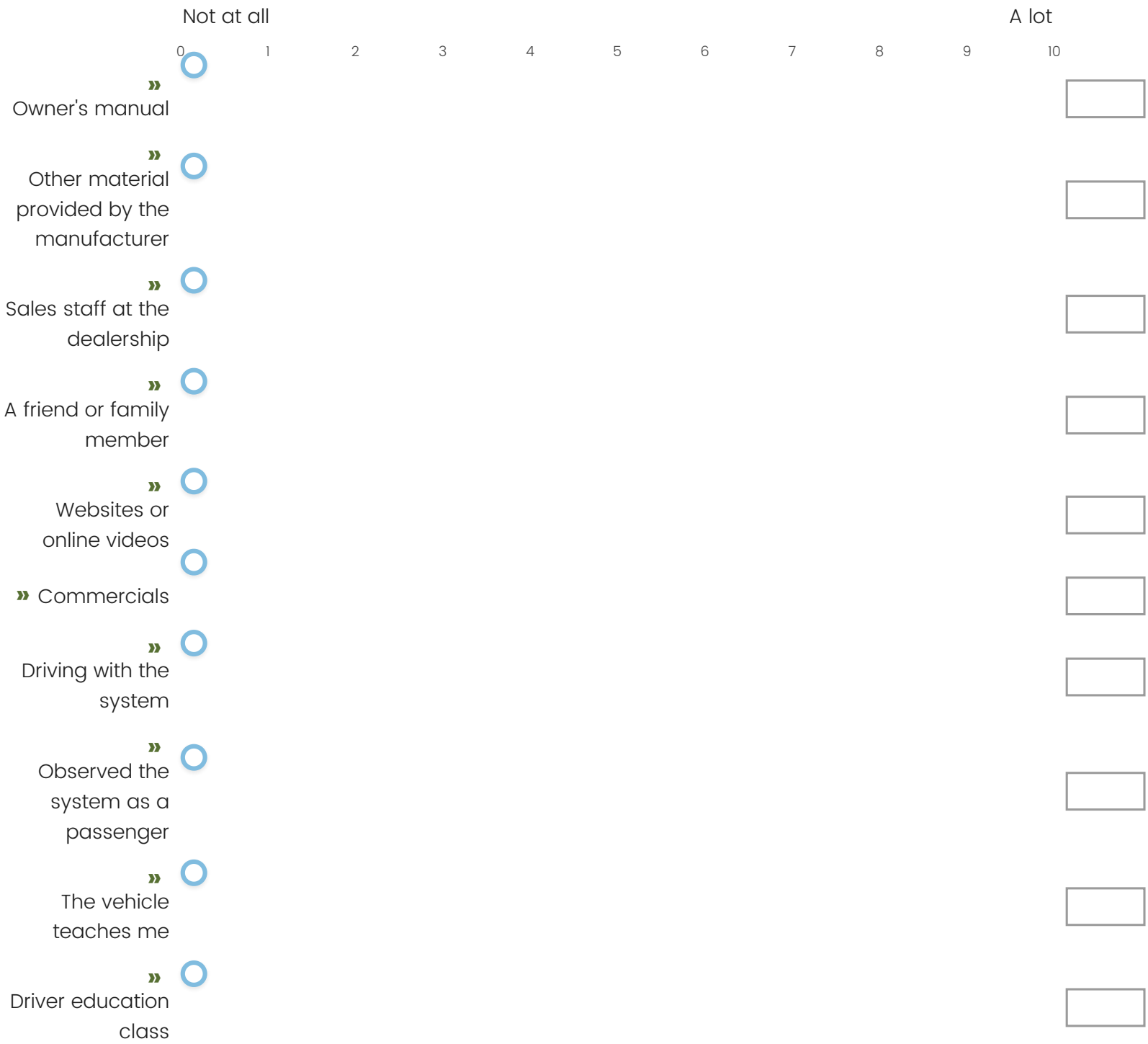
Have you tried to learn about the system(s) in your primary vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

How have you tried to learn about the system(s) in this vehicle?
Select all that apply.

	Owner's manual	Other material provided by the manufacturer	Sales staff at the dealership	A friend or family member	Websites or online videos	Commercials	Driving with the system	Observed the system as a passenger	The vehicle teaches me	Driver education class	Other
» Blind Spot Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Rear Cross Traffic Detection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Forward Collision Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Departure Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Keeping Assistance or Lane Departure Prevention	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Centering Assistance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Adaptive Cruise Control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

How much did information from each source contribute to your understanding of the system(s) in your primary vehicle?



	Not at all										A lot
	0	1	2	3	4	5	6	7	8	9	10
» Other											

Primary Vehicle- Not Purchase

This section of the survey asks more questions about your primary vehicle.

When did the ${q://QID130/ChoiceTextEntryValue/1} ${q://QID130/ChoiceTextEntryValue/2} become your primary vehicle?

- ○ Within the last year
- ○ Within the last 2 years
- ○ Within the last 3 years
- ○ Within the last 4 years
- ○ Within the last 5 years
- ○ More than 5 years ago

Did the fact that the vehicle had this system influence your decision to use this vehicle?

	Yes	No
» Blind Spot Warning	○	○
»	○	○

	Yes	No
Rear Cross Traffic Detection		
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

When you first used this vehicle, did anyone mention or talk about the systems that are available in this vehicle?

	Yes	No	I don't remember
» Blind Spot Warning	○	○	○
» Rear Cross Traffic Detection	○	○	○
» Forward Collision Warning	○	○	○
» Lane Departure Warning	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○
» Lane Centering Assistance	○	○	○
» Adaptive Cruise Control	○	○	○

How much time did they spend talking about the system(s)?

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	I don't remember
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○
» Lane Departure Warning	○	○	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○
» Adaptive Cruise Control	○	○	○	○	○

Primary Vehicle- Not Purchase- Experience ACC

The next few questions will ask about your experience with respect to **adaptive cruise control** (**ACC**) in your primary vehicle.

Which of the following influenced your decision to use a primary vehicle with **adaptive cruise control**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information

- [ ] Advertisements
- [ ] Safety benefits
- [ ] Previous experience using adaptive cruise control
- [ ] Other (please describe)

You indicated that someone spoke to you about the **adaptive cruise control** system when you first used your primary vehicle. What type of information did they provide? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera, radar)
- [ ] Information about what the system does (e.g., maintains a set speed and gap)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 25 mph)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other
- [ ] I don't remember
- [ ] I was not provided any information about adaptive cruise control

How was the information about the **adaptive cruise control** system in your primary vehicle given? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle
- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other

- [ ] I don't remember

Did the person who provided the information about the **adaptive cruise control** system in your primary vehicle express an opinion about the system?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)

- ○ I don't remember

How would you rate your level of understanding of the **adaptive cruise control** system when you first used this vehicle?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Primary Vehicle- Not Purchase- Experience LCA

The next few questions will ask about your experience with respect to **lane centering assistance** in your primary vehicle.

Which of the following influenced your decision to use a primary vehicle with **lane centering assistance**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information
- ☐ Advertisements
- ☐ Safety benefits
- ☐ Previous experience using lane centering assistance

- [ ] Other (please describe)

You indicated that someone spoke to you about the **lane centering assistance** system when you first used your primary vehicle. What type of information did they provide? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera)
- [ ] Information about what the system does (e.g., what warnings looked, sounded, or felt like; whether systems had steering or braking interventions)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 40 mph, works best in dry daytime conditions)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other
- [ ] I don't remember
- [ ] I was not provided any information about lane centering assistance

How was the information about the **lane centering assistance** system in your primary

vehicle given? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle
- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other

- [ ] I don't remember

Did the person who provided the information about the **lane centering assistance** system in your primary vehicle express an opinion about the system?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)

- ○ I don't remember

How would you rate your level of understanding of the **lane centering assistance** system when you first used this vehicle?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Recent Purchase- Purchase Experience

Earlier you indicated that you were involved in the purchase of a vehicle that is not your current primary vehicle. This section asks about that purchase.

If you have been involved in more than one purchase of a non-primary vehicle, please answer these questions for the most recent purchase.

When were you last involved in the purchase or lease of a vehicle that is not your current primary vehicle?

- ○ Within the last year
- ○ Within the last 2 years
- ○ Within the last 3 years
- ○ Within the last 4 years
- ○ Within the last 5 years
- ○ I was not involved in the purchase of a non-primary vehicle within the last 5 years

How many months ago was the vehicle purchased or leased?

How involved were you in the decision to purchase or lease this vehicle?

- Not at all involved
- Slightly involved
- Somewhat involved
- Very involved
- It was my decision alone (nobody else was involved)

What is the year, make and model of this vehicle?

Year (e.g., 2022)

Make (e.g., Toyota)

Model (e.g., Camry)

Does the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2} have any of the following

systems?

	Yes	No	I am not sure
Blind Spot Warning	○	○	○
Rear Cross Traffic Detection	○	○	○
Forward Collision Warning	○	○	○
Lane Departure Warning	○	○	○
Lane Keeping Assistance or Lane Departure Prevention	○	○	○
Lane Centering Assistance	○	○	○
Adaptive Cruise Control	○	○	○

Which best describes the condition of the vehicle when it was purchased or leased?

- ○ New
- ○ Certified pre-owned
- ○ Used, not certified pre-owned
- ○ Used, not sure if certified pre-owned
- ○ Unsure

Which best describes **your use** of the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2}?

- ○ This is not the vehicle I drive most often, but I drive it at least once per week
- ○ This is not the vehicle I drive most often, but I drive it at least once per month

- ○ This is not the vehicle I drive most often, but I drive it at least once every 3 months
- ○ I have not driven this vehicle in the last 3 months

When you purchased or leased this vehicle, who did you think would be most often driving the vehicle?

- ○ Myself
- ○ Someone else in my household
- ○ A friend or family member not in my household
- ○ Someone else

Was this individual with you when you decided to purchase or lease the vehicle?

- ○ Yes
- ○ No

Where was this vehicle purchased or leased?

- ○ A ${q://QID223/ChoiceTextEntryValue/2} dealership
- ○ A dealership for a different vehicle manufacturer
- ○ A business that sells only used vehicles
- ○ Directly from the previous owner (i.e., private-party sale)
- ○ A dealership website
- ○ A manufacturer's website
- ○ An online service (e.g., Carvana, Cars Direct, Truecar)
- ○ A family member or friend

- ○ Other

While deciding to purchase or lease this vehicle, did you interact with the seller (e.g., salesperson)?

- ○ Yes
- ○ No

Did this vehicle come with an owner's manual (physical or digital copy)?

- ○ Yes
- ○ No
- ○ I'm not sure

Did you read an owner's manual (physical or digital copy) to understand more about the system(s) in this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○

	Yes	No
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

Prior to being involved in the purchase or lease of the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2}, had you ever driven a vehicle with any of these systems?

	Yes, and I used it regularly	Yes, but I did not use it regularly	No	I am not sure
Blind Spot Warning Detects vehicles in the blind spot and warns the driver.	○	○	○	○
Rear Cross Traffic Detection Detects vehicles approaching the rear of the vehicle while in reverse gear and alerts the driver.	○	○	○	○
Forward Collision Warning Detects a potential collision with a vehicle ahead and alerts the driver. Some systems may also begin to brake the vehicle.	○	○	○	○
Lane Departure Warning Warns the driver when the vehicle approaches or crosses lane markings.	○	○	○	○
Lane Keeping Assistance Steers to prevent the vehicle from driving out of its lane. This system is also known as **Lane Departure Prevention**.	○	○	○	○

	Yes, and I used it regularly	Yes, but I did not use it regularly	No	I am not sure
Lane Centering Assistance Provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.	○	○	○	○
Adaptive Cruise Control (ACC) Maintains a driver-selected gap when following another vehicle and a set speed when not.	○	○	○	○

Did the fact that the vehicle had this system influence the decision to purchase or lease this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

Did the seller mention or talk about the systems in this vehicle?

	Yes	No	I don't remember
» Blind Spot Warning	○	○	○
» Rear Cross Traffic Detection	○	○	○
» Forward Collision Warning	○	○	○
» Lane Departure Warning	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○
» Lane Centering Assistance	○	○	○
» Adaptive Cruise Control	○	○	○

During the vehicle buying experience, how much time did the seller spend talking about the system(s)?

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	I don't remember
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	I don't remember
» Lane Departure Warning	○	○	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○
» Adaptive Cruise Control	○	○	○	○	○

Recent Purchase- Purchase Experience- ACC

The next few questions will ask about the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2} with respect to **adaptive cruise control** (**ACC**).

Which of the following influenced the decision to purchase a vehicle with **adaptive cruise control**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information
- ☐ Advertisements
- ☐ Safety benefits
- ☐ Previous experience using adaptive cruise control

- [ ] Other (please describe)

What type of information did the seller provide about the **adaptive cruise control system** in this vehicle? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera, radar)
- [ ] Information about what the system does (e.g., maintains a set speed and gap)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 25 mph)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other
- [ ] I don't remember
- [ ] I was not provided any information about adaptive cruise control

How did the seller provide information about the **adaptive cruise control** system in this vehicle? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle

- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other
- [ ] I don't remember

Did the seller express an opinion about the **adaptive cruise control** system in this vehicle?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)
- ○ I don't remember

How would you rate your level of understanding of the **adaptive cruise control** system at the time of purchase?

- ○ I didn't understand the system

- ○ I was familiarized with the system but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Recent Purchase- Purchase Experience- LCA

The next few questions will ask about the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2} with respect to **lane centering assistance**.

Which of the following influenced the decision to purchase a vehicle with **lane centering assistance**? Select all that apply.

- ☐ A test drive
- ☐ Recommendation from salesperson
- ☐ Recommendation from friend or family
- ☐ Looked up information
- ☐ Advertisements
- ☐ Safety benefits
- ☐ Previous experience using lane centering assistance
- ☐ Other (please describe)

What type of information did the seller provide about the **lane centering assistance** system in this vehicle? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera)
- [ ] Information about what the system does (what warnings looked, sounded, or felt like; whether systems had steering or braking interventions)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 40 mph, works best in dry daytime conditions)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other

- [ ] I don't remember
- [ ] I was not provided any information about lane centering assistance

How did the seller provide information about the **lane centering assistance** system in this vehicle? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle
- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material

- [ ] Other
- [ ] I don't remember

Did the seller express an opinion about the **lane centering assistance** system in this vehicle?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)
- ○ I don't remember

How would you rate your level of understanding of the **lane centering assistance** system at the time of purchase?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it

- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Recent Purchase- Current Understanding and Learning about ADAS

The next few items ask about your experiences with the system(s) in the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2} **since the time of purchase**.

Select the response that best reflects your level of understanding of the system(s) in this vehicle today.

	I don't understand the system	I am familiar with the system, but I need some help to use it	I understand the system	I understand the system well enough that I could show others how to use it	I understand the system and how it works, and feel confident I would be able to use similar systems in another vehicle
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○
» Lane Departure Warning	○	○	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○

» Adaptive Cruise Control	○	○	○	○	○

Have you tried to learn about the system(s) in this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

How have you tried to learn about the system(s) in this vehicle? Select all that apply.

	Owner's manual	Other material provided by the manufacturer	Sales staff at the dealership	A friend or family member	Websites or online videos	Commercials	Driving with the system	Observed the system as a passenger	The vehicle teaches me	Driver education class	Other
» Blind Spot Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Rear Cross Traffic Detection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Forward Collision Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Departure Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Keeping Assistance or Lane Departure Prevention	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Centering Assistance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Adaptive Cruise Control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

How much did information from each source contribute to your understanding of the system(s) in this vehicle?

	Not at all 0	1	2	3	4	6	7	8	9	A lot 10	
» Owner's manual	○										☐
» Other material provided by the manufacturer	○										☐
» Sales staff at the dealership	○										☐
» A friend or family member	○										☐
» Websites or online videos	○										☐
» Commercials	○										☐
» Driving with the system	○										☐
» Observed the system as a passenger	○										☐
» The vehicle teaches me	○										☐
» Driver education class	○										☐
» Other	○										☐

Infrequent Vehicle- Experience

Earlier you indicated that in the last three months you had driven at least one vehicle that is not your primary vehicle and that you do not own. For example, this could be a vehicle that you borrowed, rented, or drove for work.

This section of the survey asks about the vehicle that you do not own that you **drove most recently**.

Is this a different vehicle than the ${q://QID223/ChoiceTextEntryValue/1} ${q://QID223/ChoiceTextEntryValue/2} for which you have already provided information?

- ○ Yes
- ○ No

You indicated that your primary vehicle is a rental. This section of the survey asks about the rental vehicle that you consider to be your primary vehicle or the rental vehicle that you drove most recently.

What is the year, make and model of this vehicle?

Year (e.g., 2022)

Make (e.g., Toyota)

Model (e.g., Camry)

This vehicle...

- ○ is owned by my employer
- ○ is owned by a family member
- ○ is owned by a friend
- ○ is a rental
- ○ is a "loaner" vehicle borrowed from a mechanic or dealership
- ○ Other

In the last 3 months, how many days did you drive this vehicle?

- ○ 1 or 2 days
- ○ 3-5 days
- ○ 6-10 days
- ○ 11-20 days
- ○ More than 20 days

Why did you drive this vehicle? Select all that apply.

- [ ] Work trip
- [ ] Vacation
- [ ] Did not want to add mileage to my personal vehicle
- [ ] My vehicle was under repair
- [ ] To test drive a vehicle
- [ ] Needed a vehicle with specific capabilities (e.g., a truck bed)
- [ ] I do not own a vehicle and needed to use one
- [ ] Other _____

Did this vehicle have any of the following systems?

	Yes	No	I am not sure
Blind Spot Warning	○	○	○
Rear Cross Traffic Detection	○	○	○
Forward Collision Warning	○	○	○
Lane Departure Warning	○	○	○
Lane Keeping Assistance or Lane Departure Prevention	○	○	○
Lane Centering Assistance	○	○	○
Adaptive Cruise Control	○	○	○

Did you use any of the following system(s) in this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

Did this vehicle come with an owner's manual (physical or digital copy)?

- ○ Yes
- ○ No
- ○ I'm not sure

Did you read an owner's manual (physical or digital copy) to understand more about the system(s) in this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

Did the fact that the vehicle had this system influence your decision to use this vehicle?

	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
»	○	○

	Yes	No
Lane Keeping Assistance or Lane Departure Prevention		
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

When you first used this vehicle, did anyone mention or talk about the systems that were available in the vehicle?

	Yes	No	I don't remember
» Blind Spot Warning	○	○	○
» Rear Cross Traffic Detection	○	○	○
» Forward Collision Warning	○	○	○
» Lane Departure Warning	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○
» Lane Centering Assistance	○	○	○
» Adaptive Cruise Control	○	○	○

How much time did they spend talking about the system(s)?

	Briefly mentioned	A few minutes	5-15 minutes	More than 15 minutes	Unsure
» Blind Spot Warning	○	○	○	○	○
» Rear Cross Traffic Detection	○	○	○	○	○
» Forward Collision Warning	○	○	○	○	○
» Lane Departure Warning	○	○	○	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○	○	○	○
» Lane Centering Assistance	○	○	○	○	○
» Adaptive Cruise Control	○	○	○	○	○

Infrequent Vehicle- Experience- ACC

The next few questions will ask about your experience with the **adaptive cruise control (ACC)** system on this vehicle.

You indicated that someone spoke to you about the **adaptive cruise control** system when you first used this vehicle. What type of information did they provide? Select all

that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera, radar)
- [ ] Information about what the system does (e.g., maintains a set speed and gap)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 25 mph)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other

- [ ] I don't remember
- [ ] I was not provided any information about adaptive cruise control

How was the information about the **adaptive cruise control** system given? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle
- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other

- [ ] I don't remember

Did the person who provided the information about the **adaptive cruise control** express an opinion about the system?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ [ ] Other (please describe)
- ○ I don't remember

How would you rate your level of understanding of the **adaptive cruise control** system when you first used this vehicle?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Infrequent Vehicle- Experience- LCA

The next few questions will ask about your experience with the **lane centering**

assistance system on this vehicle.

You indicated that someone spoke to you about the **lane centering assistance** system when you first used this vehicle. What type of information did they provide? Select all that apply.

- [ ] They told me the vehicle was equipped with the system
- [ ] They described the purpose of the system
- [ ] Information about sensors that the system used (e.g., camera)
- [ ] Information about what the system does (e.g., what warnings looked, sounded, or felt like; whether systems had steering or braking interventions)
- [ ] Information about operating conditions/requirements for the system (e.g., only works above 40 mph, works best in dry daytime conditions)
- [ ] Information about when the system may not work as expected (e.g., during heavy rain)
- [ ] How to turn it on and off
- [ ] How to adjust settings
- [ ] Other

- [ ] I don't remember
- [ ] I was not provided any information about lane centering assistance

How was the information about the **lane centering assistance** system given? Select all that apply.

- [ ] Provided a verbal description of the system
- [ ] Pointed out controls (on/off buttons, system settings menus, etc.) in the vehicle

- [ ] Provided a demonstration of the system
- [ ] Provided printed materials (e.g., quick start guide or owner's manual)
- [ ] Recommended online material
- [ ] Other
- [ ] I don't remember

Did the person who provided the information about the **lane centering assistance** express an opinion about the system?

- ○ Yes, they shared positive opinions about the system (e.g., good, reliable, useful, safety-inducing, protective, works well)
- ○ Yes, they shared negative opinions about the system (e.g., annoying, unreliable, too many false alerts, too sensitive)
- ○ The seller described both positive and negative opinions about the system
- ○ No, they did not express an opinion
- ○ Other (please describe)
- ○ I don't remember

How would you rate your level of understanding of the **lane centering assistance** system when you first used this vehicle?

- ○ I didn't understand the system
- ○ I was familiarized with the system, but needed some help to use it
- ○ I was familiarized enough that I could try to figure it out without assistance
- ○ I understood the system and could show others how to use it
- ○ I understood the system and how it works, and felt confident I would be able to use similar systems in another vehicle

Infrequent Vehicle- Current Understanding and Learning about ADAS

The next few items ask about your experiences with the system(s) in the ${q://QID278/ChoiceTextEntryValue/1} ${q://QID278/ChoiceTextEntryValue/2}.

Did you try to learn about the system(s) in this vehicle?

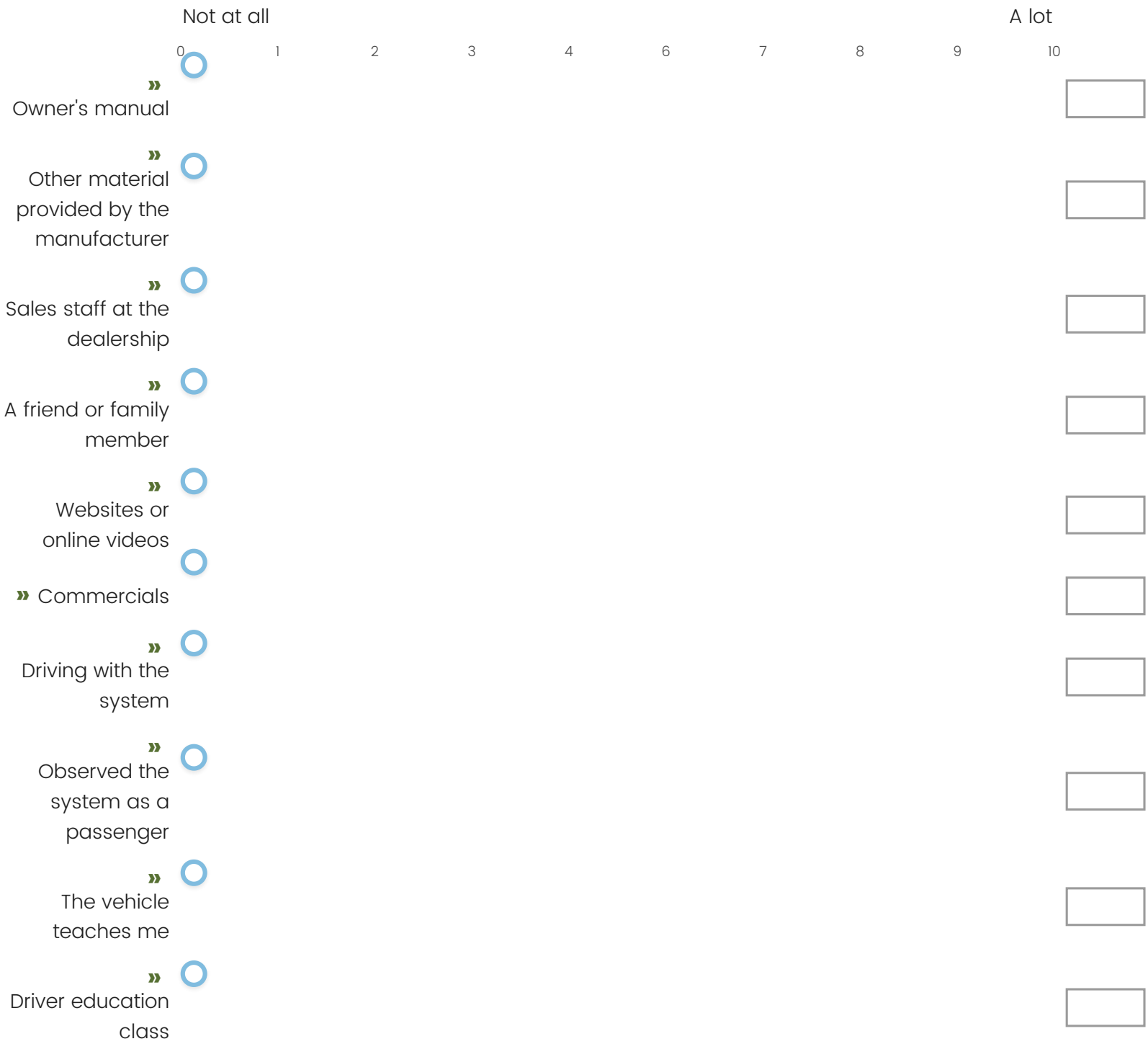
	Yes	No
» Blind Spot Warning	○	○
» Rear Cross Traffic Detection	○	○
» Forward Collision Warning	○	○
» Lane Departure Warning	○	○
» Lane Keeping Assistance or Lane Departure Prevention	○	○
» Lane Centering Assistance	○	○
» Adaptive Cruise Control	○	○

How did you try to learn about the system(s) in this vehicle?

Select all that apply.

	Owner's manual	Other material provided by the manufacturer	Sales staff at the dealership	A friend or family member	Websites or online videos	Commercials	Driving with the system	Observed the system as a passenger	The vehicle teaches me	Driver education class	Other
» Blind Spot Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Rear Cross Traffic Detection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Forward Collision Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Departure Warning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Keeping Assistance or Lane Departure Prevention	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Lane Centering Assistance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Adaptive Cruise Control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

How much did information from each source contribute to your understanding of the system(s) in this vehicle?



» Other

ADAS Learning Preferences

This section asks about your **preferences for learning** about systems in vehicles that you may drive.

In which situations would you want to learn about systems in a vehicle? Select all that apply.

- [ ] When purchasing or leasing a new vehicle
- [ ] When purchasing or leasing a used vehicle
- [ ] When renting a vehicle
- [ ] When borrowing a vehicle
- [ ] When driving a vehicle for work
- [ ] I am not interested in learning about the systems

In each situation, how would you prefer to receive information about the systems? Select all that apply.

	Text messages	Emails	Videos	Printed materials	QR code in the vehicle	Infotainment center	A class organized by the dealer or rental company
» When purchasing or leasing a new vehicle	☐	☐	☐	☐	☐	☐	☐
» When purchasing or leasing a used vehicle	☐	☐	☐	☐	☐	☐	☐
» When renting a vehicle	☐	☐	☐	☐	☐	☐	☐
» When borrowing a vehicle	☐	☐	☐	☐	☐	☐	☐
» When driving a vehicle for work	☐	☐	☐	☐	☐	☐	☐
» I am not interested in learning about the systems	☐	☐	☐	☐	☐	☐	☐

In each of these situations, how much time would you be willing to spend to learn about the systems?

	1-2 minutes	3-5 minutes	6-10 minutes	11-15 minutes	16-30 minutes	More than 30 minutes	I would not spend time learning about the systems
» When purchasing or leasing a new vehicle	○	○	○	○	○	○	○
» When purchasing or leasing a used vehicle	○	○	○	○	○	○	○
» When renting a vehicle	○	○	○	○	○	○	○
» When borrowing a vehicle	○	○	○	○	○	○	○
» When driving a vehicle for work	○	○	○	○	○	○	○
» I am not interested in learning about the systems	○	○	○	○	○	○	○

When would you prefer to receive information about the systems in your vehicle or a vehicle you may purchase or lease? Select all that apply.

- ☐ Prior to test driving the vehicle
- ☐ During the purchasing process
- ☐ After the purchase, once I have become familiar with the vehicle
- ☐ At the dealership during vehicle maintenance
- ☐ I am not interested in receiving information about the systems
- ☐ [ ] Other

ADAS- ACC

This section asks about a system commonly called **adaptive cruise control (ACC)**.

Adaptive cruise control maintains a driver-selected gap when following another vehicle and a set speed when not.

Please rate your overall agreement with the following statements regarding **adaptive cruise control (ACC)**:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I can trust ACC	○	○	○	○	○
I am familiar with ACC	○	○	○	○	○
I understand ACC	○	○	○	○	○
ACC is dangerous	○	○	○	○	○
ACC is useful	○	○	○	○	○
ACC is distracting	○	○	○	○	○
ACC is complicated	○	○	○	○	○

Considering your trips on roads with speed limits of 50 mph or greater, how often do you use **adaptive cruise control** in your primary vehicle?

- ○ Almost every time
- ○ Most of the time
- ○ Sometimes
- ○ Rarely
- ○ Never
- ○ Not applicable, because I rarely drive on this type of road

Can the **adaptive cruise control** system in your primary vehicle be used in stop-and-go traffic, like in-town driving or traffic slow-downs on highways?

- ○ Yes
- ○ No
- ○ Not sure

When driving in stop-and-go traffic, how often do you use the **adaptive cruise control**?

- ○ Almost every time
- ○ Most of the time
- ○ Sometimes
- ○ Rarely
- ○ Never
- ○ Not applicable, because I rarely drive in this type of traffic

Have you had any experiences with **adaptive cruise control** that did not align with how you thought the system was supposed to work?

- ○ Not applicable, I have never used adaptive cruise control
- ○ No
- ○ Yes

Please describe your experiences when **adaptive cruise control** did not align with how you thought the system was supposed to work.

ADAS- LCA

This section asks about a system commonly called **lane centering assistance**.

Lane centering assistance provides continuous steering to keep the vehicle in or near the center of the lane. This system is sometimes used with adaptive cruise control.

Please rate your overall agreement with the following statements regarding **lane centering assistance**:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I can trust lane centering assistance	○	○	○	○	○
I am familiar with lane centering assistance	○	○	○	○	○

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I understand lane centering assistance	○	○	○	○	○
Lane centering assistance is dangerous	○	○	○	○	○
Lane centering assistance is useful	○	○	○	○	○
Lane centering assistance is distracting	○	○	○	○	○
Lane centering assistance is complicated	○	○	○	○	○

Considering your trips on roads with speed limits of 50 mph or greater, how often do you use **lane centering assistance** in your primary vehicle?

- ○ Almost every time
- ○ Most of the time
- ○ Sometimes
- ○ Rarely
- ○ Never
- ○ Not applicable, because I rarely drive on this type of road

In your primary vehicle, can the **lane centering assistance** system be used independently without engaging adaptive cruise control?

- ○ Yes, I can use lane centering assistance without using adaptive cruise control
- ○ No, I cannot use lane centering assistance unless adaptive cruise control is active

- ○ Not sure

Have you had any experiences with **lane centering assistance** that did not align with how you thought the system was supposed to work?

- ○ Not applicable, I have never used lane centering assistance
- ○ No
- ○ Yes

Please describe your experiences when **lane centering assistance** did not align with how you thought the system was supposed to work.

Personal Characteristics

This is the last section of the survey. It asks about your perceptions towards technology and different types of driving activities.

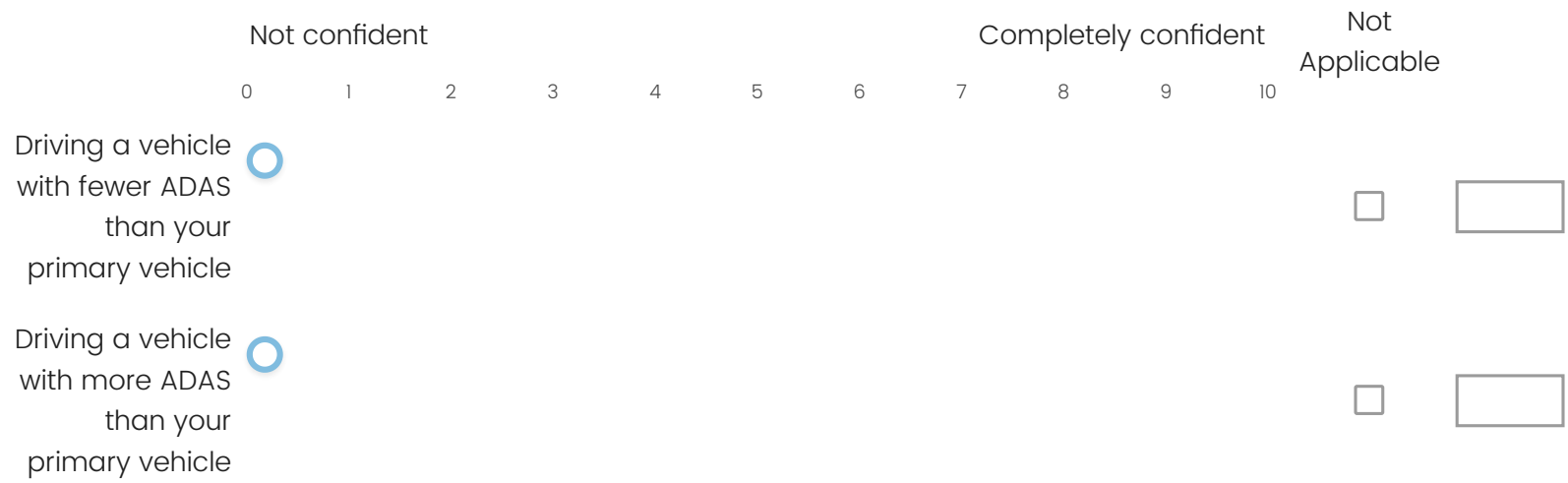
Please rate your overall agreement with the following statements regarding technology (internet, computer, mobile devices, etc.):

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Technology gives me more freedom to be mobile.	○	○	○	○	○
Technology makes me more productive in my personal life.	○	○	○	○	○
Other people come to me for advice on new technologies.	○	○	○	○	○
In general, I am among the first in my circle of friends to acquire new technology.	○	○	○	○	○
I keep up with the latest technological developments in my areas of interest.	○	○	○	○	○
Technical support lines are not helpful because they don't explain things in terms I understand.	○	○	○	○	○
Sometimes, I think that technology is not designed for use by ordinary people.	○	○	○	○	○
People are too dependent on technology to do things for them.	○	○	○	○	○
Technology distracts people to a point that is harmful.	○	○	○	○	○
Technology lowers the quality of relationships by reducing personal interaction.	○	○	○	○	○

We often differ in our preferred method to learn about ADAS. When asked for your favorite color, you need to select red.
Based on the text above, what is your favorite color?

- ○ Green
- ○ Red
- ○ Yellow

How confident do you feel doing the following activities? Please provide a response from 0-10, where 0 is not confident and 10 is completely confident. If the activity is not applicable for you, please indicate that using the checkbox.



Some participants from this research study will be invited to complete a follow-up survey in 4 weeks. That survey is estimated to take about 10 minutes to complete, and the compensation is $2. Would you like to be considered for the follow-up survey?

- ○ Yes, I am interested
- ○ No, I am not interested

Neutral Message

Thank you for completing this survey. We greatly appreciate your time and effort.

If you would like to learn more about the systems included in this survey, including adaptive cruise control and lane centering assistance, this link will open to a website with additional information. You can right click on the link to copy and save it to access the site at another time.

https://uiowa.qualtrics.com/jfe/form/SV_5o06a90WFfblZK6?

LoginID=${e://Field/LoginID}

To return to Prolific, click "next page".

Safety Message

Thank you for completing this survey! We greatly appreciate your time and effort.

Did you know? To safely use technologies like adaptive cruise control and lane centering assistance, it is important to understand what the systems can and cannot do.

If you would like to learn more about the systems included in this survey, including adaptive cruise control and lane centering assistance, this link will open to a website with additional information. You can right click on the link to copy and save it to access the site at another time.

https://uiowa.qualtrics.com/jfe/form/SV_5o06a90WFfblZK6?
LoginID=${e://Field/LoginID}

To return to Prolific, click "next page".

Tech Message

Thank you for completing this survey! We greatly appreciate your time and effort.

Did you know? Driver assistance systems are constantly evolving and increasing the level of automation available to drivers.

If you would like to learn more about the systems included in this survey, including adaptive cruise control and lane centering assistance, this link will open to a website with additional information. You can right click on the link to copy and save it to access the site at another time.

https://uiowa.qualtrics.com/jfe/form/SV_5o06a90WFfblZK6?LoginID=${e://Field/LoginID}

To return to Prolific, click "next page".

MM Score Message

Thank you for completing this survey! We greatly appreciate your time and effort.

At the beginning of this survey, we asked you to tell us whether statements about adaptive cruise control and lane centering assistance were true or false. You answered:

For ACC, you correctly answered ${gr://SC_0MMwWymfRdFl1Lo/Score} out of 16.
For LCA, you correctly answered ${gr://SC_9tYiEKfihwRyU8S/Score} out of 12.

If you would like to learn more about the systems included in this survey, including adaptive cruise control and lane centering assistance, this link will open to a website with additional information. You can right click on the link to copy and save it to access the site at another time.

https://uiowa.qualtrics.com/jfe/form/SV_5o06a90WFfblZK6?LoginID=${e://Field/LoginID}

To return to Prolific, click "next page".

Participant Compensation

Please click submit responses in the blue box below. This will return you back to Prolific.

Appendix C: ADAS Educational Information

Default Question Block

This page provides information about advanced driver assistance systems, including adaptive cruise control and lane centering assistance. Using this page is an optional activity.

You can copy the link below and save it to revisit the page at a later time.

https://uiowa.qualtrics.com/jfe/form/SV_5o06a90WFfblZK6?LoginID=${e://Field/LoginID}

If you haven't already submitted your survey in Prolific, please take the time to do that now.

☐ I submitted my survey responses.

Overview of advanced driver assistance systems (ADAS)

Advanced driver assistance systems (ADAS) are features that assist or support the driver. These systems monitor the driving environment and may

- warn of potential collisions,

- provide momentary braking or steering to prevent a crash or reduce its severity, or
- continuously control vehicle speed, following distance, or lane position.

This site includes information about these general ADAS topics. Select all the topics you want to view.

- [ ] Types of ADAS
- [ ] Types of sensors used by ADAS
- [ ] Sensor limitations
- [ ] Driver responsibilities when using ADAS
- [ ] None of these

Types of ADAS

Collision Warning

These systems monitor the driving environment and may warn the driver of potential collisions.

Examples of Collision Warning ADAS

Name	Description
Blind Spot Warning (BSW)	Detects vehicles in the blind spot while driving and notifies the driver to their presence. Some systems provide an additional warning if the driver activates the turn signal.

Forward Collision Warning (FCW)	Detects a potential collision with a vehicle ahead and alerts the driver. Some systems also provide alerts for pedestrians or other objects.
Lane Departure Warning (LDW)	Monitors vehicle's position within the driving lane and alerts driver as the vehicle approaches or crosses lane markers.

Collision Intervention

These systems monitor the driving environment and may provide momentary braking or steering to prevent a crash or reduce its severity.

Examples of Collision Intervention ADAS

Name	Description
Automatic Emergency Braking (AEB)	Detects potential collisions with a vehicle ahead, provides forward collision warning, and automatically brakes to avoid a collision or lessen the severity of impact. Some systems also detect pedestrians or other objects.
Lane Keeping Assistance (LKA)	Provides steering support to assist the driver in keeping the vehicle in the lane. The system reacts only when the vehicle approaches or crosses a lane line or road edge.

Driving Control Assistance

These systems monitor the driving environment and are activated by drivers to provide continuous control of speed, following distance, or lane position.

Examples of Driving Control Assistance ADAS

Name	Description
Adaptive Cruise Control (ACC)	Cruise control that also assists with acceleration and/or braking to maintain a driver-selected gap to the vehicle in front. Some systems can come to a stop and continue while others cannot.
Lane Centering Assistance (LCA)	Provides steering support to assist the driver in continuously maintaining the vehicle at or near the center of the lane.
Active Driving Assistance	Simultaneous use of Lane Centering Assistance and Adaptive Cruise Control features. The driver must constantly supervise this support feature and maintain responsibility for driving.

Source: https://advocacy.consumerreports.org/wp-content/uploads/2022/07/Clearing-the-Confusion-One-Pager-2022.pdf

Types of sensors used by ADAS

ADAS features use sensors like cameras and radar to detect the environment around the vehicle. They're often found in the top center of the windshield, in the front grille, and in the bumpers. It is important to keep those areas clean to help the sensors work properly. Dirt, snow, or debris can block their view or reduce the sensor range.

Cameras located in the windshield near the rearview mirror are often used with Lane Departure Warning, Lane Keeping Assistance, Lane Centering Assistance, Active Driving Assistance, and others.

Radar sensors located in the front grille and cameras are often used with Forward Collision Warning, Automatic Emergency Braking, Adaptive Cruise Control, Active Driving Assistance and others.

Sensors located on the front and rear bumpers are often used to

identify vehicles or objects within a certain proximity to the vehicle.

Sensor limitations

Even when the sensors are clean, ADAS features still have limits. **Some systems may not detect smaller vehicles or motorcyclists, bicyclists, or pedestrians.**

ADAS may not function properly if:

- Obstructed by rain, snow, or other materials
- There is strong sunlight or reflections into the camera
- There is a rapid transition from light to dark conditions or vice versa (e.g., going into a tunnel)
- Lane markings are not visible due to excessive wear, have been adjusted due to road construction, or are changing quickly (e.g., lanes branching off, crossing over, merging)

Driver responsibilities when using ADAS

- The driver is always responsible for operating the vehicle in a safe manner and paying attention to the road, even while driving with ADAS. These systems are not automated driving.
- Drivers can learn more about the ADAS on their vehicles by looking at the window sticker from the purchase, contacting a dealership for that brand, consulting the owner's manual, and consulting automotive review websites to learn which systems are standard and optional for a specific trim level.

Adaptive Cruise Control (ACC)

Adaptive Cruise Control assists the driver by maintaining a set speed or a set gap (following distance) from the vehicle ahead. The driver selects the desired speed and gap and can adjust them whenever ACC is activated.

What ACC topics would you like to learn about? Select all that apply.

- [ ] How ACC works
- [ ] Limitations of ACC
- [ ] Other names for ACC
- [ ] Driver responsibilities
- [ ] None of these

How Adaptive Cruise Control works

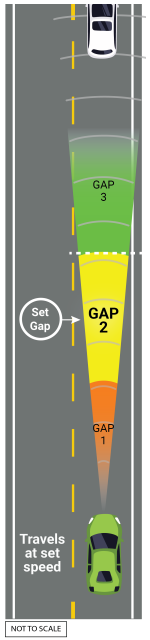
The driver selects their preferred following gap according to how closely they want to follow the vehicle ahead. The gaps are measured in time intervals, e.g., 1, 1.5, and 2 seconds.

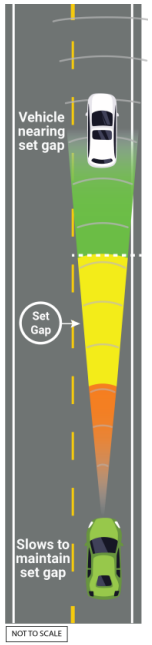
Adaptive cruise control does not work the same in all vehicles. The number and length of time gaps vary by manufacturer. The ACC systems in some vehicles are designed to operate at highway speeds only; however, some systems can also operate in stop-and-go traffic situations.

The images below show how a vehicle using ACC (the green vehicle) responds when vehicles are detected ahead. The gray curved lines represent the sensor's range, while the colored zones represent three different following gaps.

ACC maintains set speed

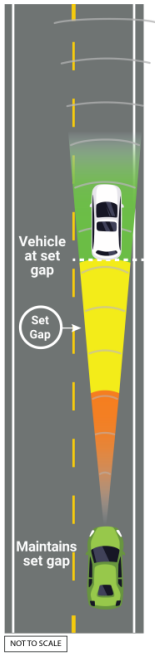
1. The ACC vehicle detects a vehicle ahead that is **traveling faster** than the ACC vehicle's set speed. The ACC **maintains the set speed**.





ACC slows

2. The ACC vehicle detects a vehicle ahead that is **traveling slower** than the ACC set speed. The ACC **begins to slow the vehicle** and establish the desired following gap.



ACC maintains set gap

3. The ACC vehicle continues to track the vehicle ahead and changes speed to **maintain the set gap**.

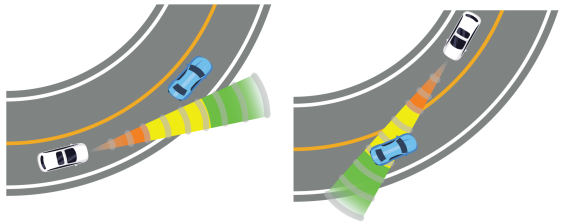
Limitations of Adaptive Cruise Control

Braking: ACC can only provide a limited amount of braking. The driver must apply the brakes in situations that require immediate braking or harder braking. If the accelerator is pressed when ACC is on, this action will override the speed control and will not maintain the desired following gap or set speed. When the accelerator is released, the previous settings will be resumed.

Sensor obstruction: If the sensors are obstructed by dirt, snow, ice, decals, or poor weather conditions, this will affect the system's ability to "see" objects in front of the vehicle.

Detecting other vehicles in your lane: The radar sensors used by most ACC features point straight ahead, but the lane of travel is not always straight, so this may affect what the sensor can detect. ACC may respond differently in the following situations:

- On a sharp curve, it may identify a vehicle in an adjacent lane and slow down or it may fail to detect a vehicle in your own lane causing it to speed up at the wrong time.



- The left image shows the ACC sensor not detecting a vehicle in the lane ahead. In this situation, the vehicle may accelerate.
- The right image shows the ACC sensor detecting a vehicle in the oncoming lane. In this situation the ACC may brake.

- Vehicles turning or merging into or out of your lane may not be recognized until they are fully within the range of the radar sensor
- Hills or changes in roadway elevation
- Extremely slow moving vehicles
- Smaller vehicles like motorcycles
- Vehicles not in the center of the lane
- Stopped vehicles or objects in the roadway (construction cone, ball, tire, etc.)

Other names for Adaptive Cruise Control

Vehicle manufacturers have a wide variety of names for ACC features, including:

- Dynamic radar cruise control
- Active cruise control
- Smart cruise control with stop & go
- Intelligent adaptive cruise control
- Dynamic radar cruise control with full-speed range
- Adaptive cruise control (advanced)
- Automatic cruise control
- Cooperative adaptive cruise control
- Radar cruise control
- Traffic-aware cruise control
- Distronic cruise control

Driver responsibilities when using Addptive Cruise Control

- Drivers are always responsible for the safe operation of their vehicle.
- To engage ACC, drivers need to set speed, set following gap, and continue to steer the vehicle.

- Drivers need to respond to traffic lights and cancel ACC as necessary.
- Drivers should learn about the ACC on their vehicle by consulting the owner's manual or dealer to learn about the specifics of their system.
    - Know at what speed ACC can be set
    - Know if the ACC will brake in stop-and-go traffic or if braking is required at a certain speed
    - Know about the following gaps (how many, lengths)
    - Know where the sensors are located and keep them clean

Was there something else you wanted to learn about Adaptive Cruise Control that was not included in the previous topics?

- ○ No
- ○ Yes

Please describe what types of information you want to know about ACC:

Lane Centering Assistance (LCA)

Lane Centering Assistance uses forward facing cameras to identify lane markings around the vehicle and provide steering support to maintain the vehicle at or near the center of the lane. LCA is a “hands-on feature” and requires the driver to pay attention to their surroundings and remain prepared to take control at any time.

What LCA topics would you like to learn about? Select all that apply.

- [ ] How LCA works
- [ ] Types of lane support systems
- [ ] Limitations of LCA
- [ ] Other names for LCA
- [ ] Driver responsibilities when using LCA
- [ ] None of these

How Lane Centering Assistance works

Most Lane Centering Assistance features use forward-facing cameras to identify lane markings. When lane markings are detected and the vehicle is traveling above the minimum speed, the driver can activate LCA to provide continuous steering support that positions the vehicle at or near the center of the lane. The driver is able to steer and override the steering from the

LCA feature. In some vehicles, LCA can only be used when Adaptive Cruise Control is also active.

When driving in curves, LCA may veer away from the center of the lane. When the width of the lane changes, for example, in areas were lanes are diverging or converging, the vehicle may steer to center itself between the detected boundaries. LCA is not designed to change lanes or avoid collisions.

Types of lane support systems

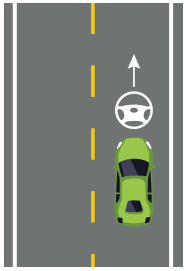
Lane Centering Assistance is just one type of lane support system. Like LCA, Lane Departure Warning and Lane Keeping Assistance use similar sensors to detect lane lanes, but they function differently. It is important to understand what lane support systems a vehicle is equipped with, and vehicles may be equipped with one, two, or all three:

Lane Departure Warning

Provides **alerts** when vehicle is **approaching or crossing lane markings**.
**Driver must steer to correct lane position*

Lane Keeping Assistance

Provides **momentary** steering support when vehicle is **approaching or crossing lane markings**
**Prevents lane departure but does not center the vehicle in the lane*



Lane Centering Assistance

Provides **continuous** steering support to **maintain the vehicle at or near the center of the lane**

Limitations of Lane Centering Assistance

LCA may not behave as expected in the following situations:

- If visibility is reduced—such as during heavy rain, snow, or fog
- The camera or sensors are obstructed, dirty, or damaged
- In intense lighting conditions, like direct sunlight, which can interfere with the camera's ability to detect lane lines accurately
- When lane lines are unclear due to wear or construction
- When lanes merge or split
- Driving in sharp curves
- Driving in high wind conditions
- Rapid transitions in lighting conditions (like entering or exiting a tunnel)
- Using a spare tire

Other names for Lane Centering Assistance

Vehicle manufacturers have a wide variety of names for LCA features, including:

- Lane tracing assist
- Lane following assist
- Lane keeping systems
- Lane keep assist
- Lane guidance
- Active lane keeping
- Active steering assist
- Steering assistant

- Intelligent lane intervention

Driver responsibilities when using Lane Centering Assistance

- Drivers are always responsible for the safe operation of their vehicle
- Drivers need to keep their hands on the steering wheel, change lanes, pay attention to their surroundings, and be prepared to take control at any time to avoid collisions.
- Drivers should learn about the Lane Centering Assistance on their vehicle by consulting the owner's manual or dealer to learn about the specifics of their system.
    - Know if the vehicle is equipped with Lane Departure Warning, Lane Keeping Assistance, and/or Lane Centering Assistance
    - Know the conditions for when the system(s) will work
        - Speed range
        - Lane line requirements
    - Know how to make adjustments to lane support settings
    - Know where the lane support sensors are and keep them clean

Was there something else you wanted to learn about Lane Centering Assistance that was not included in the previous topics?

- ○ No
- ○ Yes

Please describe what types of information you want to know about LCA:

Appendix D: Follow-Up Survey

Consent

Perceptions and Attitudes of Driver Assistance Systems Follow-up Survey

We invite you to participate in a research study being conducted by investigators at The University of Iowa. The survey will ask you questions about the information you received last month about advanced driver assistance systems, including adaptive cruise control and lane centering assistance. The research team wants to learn about the reasons why drivers did or did not access information about vehicle technologies and whether drivers who accessed the information found it useful.

If you agree to participate, we would like you to complete the online questionnaire available below. Your response to this survey is completely voluntary. Some questions will require a response from you.

We estimate that the survey should take no more than 10 minutes to complete. If you complete the survey, you will be paid $2 for your time.

We will not collect your name or any information that could identify you. It will not be possible to link you to your responses on the survey.

Taking part in this research study is completely voluntary. If you do not wish to participate in this study, you may simply exit from your Internet browser.

If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu.

We encourage you to ask questions. If you have any questions about the research study itself, please contact: Justin Mason (justin-mason@uiowa.edu or 319-467-1614), an Assistant Research Scientist at the University of Iowa.

Thank you very much for your consideration of this research study.

- ○ Yes, I agree to participate
- ○ No, I do not want to participate

Prolific ID

What is your Prolific ID?
Please note that this response should autofill with the correct ID

${e://Field/PROLIFIC_PID}

Primary Vehicle- Current Understanding and Learning about ADAS

Do you still drive the same primary vehicle that you did four weeks ago?

- ○ Yes
- ○ No
- ○ I don't have a primary vehicle

Does your primary vehicle have any of the following systems?

	Yes	No	I am not sure
Lane Keeping Assistance or Lane Departure Prevention	○	○	○
Lane Centering Assistance	○	○	○
Adaptive Cruise Control	○	○	○

The next few items ask you about the information about advanced driver assistance systems you were provided last month. This information was provided to you via a link at the end of the survey you completed.

Did you read the information?

- ○ Yes, all of it
- ○ Yes, most of it
- ○ Yes, I skimmed it
- ○ No, I did not read it

I think the information was

- ○ Not at all useful
- ○ Slightly useful
- ○ Moderately useful
- ○ Very useful

- ○ Extremely useful

The information provided was

- ○ Not detailed enough
- ○ Just the right level of detail
- ○ Too detailed

From the information provided to me, I learned things that I did not already know about my adaptive cruise control system.

- ○ Yes
- ○ No

From the information provided to me, I learned things that I did not already know about my lane centering system.

- ○ Yes
- ○ No
- ○ I do not have a lane centering system

Why didn't you read the information? (click all that apply)

- ○ I already know everything I need to about the systems
- ○ I don't want to know more about the systems
- ○ I did not have the time

○ [ ] Other

Besides for the information we provided to you, have you tried to learn about adaptive cruise control or lane centering systems?

○ Yes
○ No

How have you tried to learn about the system(s)? Select all that apply.

	Lane Keeping Assistance or Lane Departure Prevention	Lane Centering Assistance	Adaptive Cruise Control
Owner's manual	☐	☐	☐
Other material provided by the manufacturer	☐	☐	☐
Sales staff at the dealership	☐	☐	☐
A friend or family member	☐	☐	☐
Websites or online videos	☐	☐	☐
Commercials	☐	☐	☐
Driving with the system	☐	☐	☐
Observed the system as a passenger	☐	☐	☐
The vehicle teaches me	☐	☐	☐

	Lane Keeping Assistance or Lane Departure Prevention	Lane Centering Assistance	Adaptive Cruise Control
Driver education class	☐	☐	☐
Other	☐	☐	☐

How much did information from each source contribute to your understanding of the system(s)?

	Not at all 0	1	2	3	4	5	6	7	8	9	A lot 10
» Owner's manual	○										☐
» Other material provided by the manufacturer	○										☐
» Sales staff at the dealership	○										☐
» A friend or family member	○										☐
» Websites or online videos	○										☐
» Commercials	○										☐
» Driving with the system	○										☐

	Not at all 0	1	2	3	4	5	6	7	8	9	A lot 10	
» Observed the system as a passenger	○											☐
» The vehicle teaches me	○											☐
» Driver education class	○											☐
» Other	○											☐

Select the response that best reflects your level of understanding of the system(s) in your vehicle today.

	I don't understand the system	I am familiar with the system, but I need some help to use it	I understand the system	I understand the system well enough that I could show others how to use it	I understand the system and how it works, and feel confident I would be able to use similar systems in another vehicle
Adaptive Cruise Control	○	○	○	○	○
Lane Centering Assistance	○	○	○	○	○

Compared to four weeks ago, I use adaptive cruise control

- ○ More frequently
- ○ The same as before
- ○ Less frequently

Compared to four weeks ago, I use lane centering

- ○ More frequently
- ○ The same as before
- ○ Less frequently
- ○ I don't have a lane centering system

MMA

This item asks about a system commonly called **adaptive cruise control (ACC)**. Some vehicle manufacturers use different names for this type of system. You may or may not have experience with this system. Do your best to respond to the items below.

For the following statements about **adaptive cruise control**, indicate whether you think the item is True or False. Also, please indicate how confident you are in your response.

(Note: order of statements was randomized for each respondent.)

	The statement about adaptive cruise control is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
Pressing the accelerator allows the vehicle to drive faster than the set speed	○	○	○	○	○	○
May fail to detect a vehicle that cuts into the lane ahead of your vehicle	○	○	○	○	○	○
Maintains a gap based on the following distance (e.g., 2 car lengths) between your vehicle and the vehicle ahead	○	○	○	○	○	○
Provides steering input to keep the vehicle in its lane	○	○	○	○	○	○
Maintains a following gap behind a vehicle that is traveling slower than the set speed	○	○	○	○	○	○
Reduces the amount of attention the driver needs to pay to driving	○	○	○	○	○	○
Maintains a gap based on the following time (e.g., 2-seconds) between your vehicle and the vehicle ahead	○	○	○	○	○	○
May fail to detect motorcycles driving near the edge of the lane	○	○	○	○	○	○
Works like conventional cruise control when there are no vehicles detected in the lane ahead of you	○	○	○	○	○	○
Resumes the set speed if it no longer detects a vehicle ahead	○	○	○	○	○	○
May fail to detect vehicles ahead traveling at much slower speeds	○	○	○	○	○	○
Identifies red traffic lights and stops the vehicle	○	○	○	○	○	○
Uses sensors that are not affected by weather conditions or poor visibility	○	○	○	○	○	○
Provides full braking power when a frontal collision is imminent	○	○	○	○	○	○
Detects and brakes for objects (e.g., construction cones) in the road	○	○	○	○	○	○
May lose track of the vehicle ahead when driving through a sharp curve	○	○	○	○	○	○

This item asks about a system commonly called **lane centering assistance**. Some vehicle manufacturers use different names for this type of system. You may or may not have experience with this system. Do your best to respond to the items below.

For the following statements about **lane centering assistance**, determine if the item is True or False. Also, please indicate how confident you are in your response.

(Note: order of statements was randomized for each respondent.)

	The statement about lane centering assistance is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
Executes evasive maneuvers to avoid collisions	○	○	○	○	○	○
Reduces the amount of attention the driver needs to pay to driving	○	○	○	○	○	○
Requires the driver to hold the steering wheel	○	○	○	○	○	○
The vehicle may swerve in areas where lanes are merging and diverging	○	○	○	○	○	○
If the driver can see the lane lines, the system will work correctly	○	○	○	○	○	○
Only steers when the vehicle is close to or crossing a lane line	○	○	○	○	○	○
The vehicle may deviate from the center of the lane in sharp curves	○	○	○	○	○	○
Uses sensors that are not affected by weather conditions or poor visibility	○	○	○	○	○	○
Functionality may be affected by sun glare	○	○	○	○	○	○
Will not work if the front-facing cameras are blocked	○	○	○	○	○	○
Changes lanes automatically	○	○	○	○	○	○

	The statement about lane centering assistance is...		Confidence in response			
	True	False	No confidence	Slight confidence	Moderate confidence	High confidence
Provides steering to keep the vehicle near the center of the lane	○	○	○	○	○	○

Participant Compensation

Please click submit responses in the blue box below. This will return you back to Prolific.