Foreword

The mission of the AAA Foundation for Traffic Safety is to save lives through research and education. One of four focus areas is understanding the relationship and how emerging technologies can affect traffic safety. Research has shown that emerging driver assistance and vehicle automation technologies have the potential to prevent substantial numbers of crashes, injuries, and deaths, the life-saving potential of these technologies will not be fully realized unless consumers choose to accept them, understand how to use them, and use them properly.

This report provides new data from a survey about the opinions and experiences of a sample of drivers who own vehicles with selected advanced driver assistance systems such as Adaptive Cruise Control, Automatic Emergency Braking, and Forward Collision Warning. This report should be of interest to the automotive industry, regulatory agencies, driver education professionals, and consumer safety advocates.

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About the Sponsor

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Founded in 1947, the AAA Foundation for Traffic Safety is a nonprofit, publicly supported charitable research and education 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.

Executive Summary

Many new vehicles available for consumers to purchase today include a variety of technologies designed to improve driver convenience and safety by alerting the driver that a crash is imminent or by temporarily automating certain aspects of vehicle control such as acceleration, braking or steering. While early versions of many of these technologies could be purchased as optional equipment on expensive luxury vehicles a decade ago, in recent years they have become much more widely available on even the entry-level trims of relatively inexpensive mass-market vehicles. As these technologies become available to a growing segment of the motoring public, they have the potential to reduce rates of crashes, injuries and deaths on our roadways. However, that potential will not be fully realized unless consumers accept these technologies, understand how to use them, use them as intended, and avoid misusing them or becoming overreliant on them.

The purpose of the current study was to examine knowledge, understanding, opinions and experiences of drivers who own and regularly drive a vehicle equipped with selected technologies including forward collision warning, automatic emergency braking, lane departure warning, lane keeping assist, blind spot monitoring, rear cross-traffic alert or adaptive cruise control. Registered owners of selected model year 2016 and 2017 vehicles that included at least three of these technologies as standard equipment were mailed invitations to participate in an online survey. After confirming eligibility and reporting what technologies they actually had available on their vehicles, respondents were asked a series of in-depth questions about up to three of the technologies on their vehicle. A total of 1,212 eligible respondents completed the survey; in-depth data about experiences with specific technologies was obtained from approximately 500 respondents for each respective technology.

Results indicated that the majority of drivers generally have favorable impressions of the technologies on their vehicles, trust them, find them helpful, would want to have them in the next vehicle that they buy and would recommend the technologies to others. However, many respondents — and in some cases the majority — demonstrated misperceptions or lack of awareness about what the technologies can and cannot do. Uncertainty and confusion may impact a driver's usage of, comfort with and reliance on the technology. Additionally, the prevalence of drivers' willingness to engage in other activities, look away from the roadway or rely on the technology to the exclusion of ordinary safe driving practices (e.g., not checking blind spots before changing lanes or backing up) may indicate lack of understanding or appreciation of the fact that these technologies are designed to assist the driver but that the driver is still required to be attentive at all times to ensure safety. Finally, few respondents reported seeking information about technologies from any sources beyond the dealership, owner's manual and their own experience via trial and error; only about 1 driver in 10 reported seeking information on the internet and hardly any reported having sought information about technologies on government websites. More research is needed to determine how best to convey important information to drivers about the function, capabilities and limitations of technologies in their vehicles.

Introduction

Advanced driver assistance systems (ADAS) are designed to enhance the convenience and/or safety of driving. Some, such as adaptive cruise control (ACC), are designed mainly to make driving easier, but may also have safety implications. Others, such as forward collision warning (FCW), automated emergency braking (AEB), lane departure warning (LDW), and lane keeping assist (LKA), are designed to provide warnings or automatically take partial control of the vehicle on a temporary basis to help the driver avoid a crash.

These technologies offer great promise in increasing safety on our roadways (Wochinger et al., 2008). A study by Farmer (2008) examined crash records from the 2002-2006 National Automotive Sampling System General Estimates System (NASS GES) and Fatality Analysis Reporting System (FARS) databases. By examining the characteristics of crashes relative to the capabilities of various ADAS systems with respect to factors such as crash geometry, environmental conditions and pre-crash maneuvers, Farmer estimated that FCW had the potential to prevent 2.3 million crashes in the United States each year. LDW had the potential to prevent nearly 500,000 crashes, and blind spot monitoring (BSM) and AEB approximately 450,000. LDW and LKA systems were determined to have the greatest potential to prevent fatal crashes, with the potential to prevent up to 10,000 fatal crashes per year. These findings were subsequently updated by Jermakian (2011), who predicted that newer systems that have the ability to detect stationary objects, pedestrians and bicyclists could help to prevent even greater numbers of crashes. Cicchino (2017a-c) evaluated the real-world safety impacts of FCW, AEB, LDW and BSM systems using data from several states and found that vehicles equipped with these systems were in fact experiencing fewer of the types of crashes that these technologies seek to prevent, compared with similar vehicles not equipped with the technologies.

While there is a great potential for these systems to reduce crashes and increase the safety of drivers, it is important that they are designed and integrated in such a way that drivers accept them, understand their capabilities and limitations, and use them appropriately, but not misuse them or become overreliant upon them. Perceived usefulness, annoyance and trust can all affect whether or not a driver will be willing to purchase and use these technologies.

Braitman, McCartt, Zuby & Singer (2010) interviewed owners of Volvo and Infiniti passenger vehicles that were equipped with advanced vehicle technologies. Of the 86 drivers of the Volvo equipped with the LDW system, 40% reported annoying warning sounds as the main reason for deactivating their system, followed by 28% who cited not needing the system for certain roadways (28%) and 24% reporting false warnings as the primary reason for deactivation. An additional study that conducted interviews with older drivers found that even though ADAS systems have the potential to aid them as they face age-related limitations, nearly one-third failed to see the benefit of using these systems (Trübswetter & Bengler, 2013). Participants mentioned reliability concerns, perceived system limitations and undesired feedback (e.g., disturbing or inadequate warnings) as the most common barriers to usage. LDW systems, in particular, have been reported as being annoying to the driver (Braitman et al., 2010; Brown, 2007). However, in some cases drivers have reported that the annoyance was worth the safety benefit, and they wanted to keep the system on (Abraham, Reimer, & Mehler, 2017) and would want it in their next vehicle (Eichelberger & McCartt, 2014). Understanding what drivers are willing to tolerate

is important to ensuring driver acceptance of some of these technologies, particularly those that provide alerts or warnings.

The level of trust a driver will have in a particular technology depends, for the most part, on whether or not the system acts as the driver expects it to (i.e., according to a driver's mental model) (Itoh, 2012; Kazi et al., 2007). Many drivers, however, have misconceptions about ADAS systems and their performance capabilities, suggesting that mental models of how these systems work do not match reality (Llaneras, 2006). Jenness et al. (2008) surveyed 370 owners of vehicles with adaptive cruise control (ACC) and found that 72% of owners were not aware of some important limitations associated with this system. Approximately 25% of drivers incorrectly reported that ACC works fairly well or perfectly when driving on curvy roadways or in stop-and-go traffic. Similar results were found in a survey of 130 Volvo XC60 owners whose vehicles were equipped with ACC. When asked about their experiences using this system, nearly 30% reported being unaware of any system limitations or situations in which the system had difficulty functioning, including curves and roundabouts (Larsson, 2012). A survey of more than 1,500 owners of vehicles equipped with a radar-based backing aid system found that, across vehicle manufacturers, an average of 81% reported they were unaware of any system limitations, believing that these systems were designed to detect the proximity of pedestrians, children and pets, when in fact they were designed to detect stationary obstacles (Jenness et al., 2007). Another study examined 24 drivers who had a basic understanding of an LDW system and found that after five separate trials in a simulator in which they drove at varying speeds, 20 out of the 24 drivers mistakenly believed that the system would work at any speed; it actually only worked when the vehicle was traveling above a minimum speed (Aziz, Horiguchi, & Sawaragi, 2013).

In many instances, drivers have a tendency to expect the system to intervene, even when system limitations prevent it from doing so. These false expectations and too much trust in the system can result in an increased risk of crash. A study by Dickie and Boyle (2009) placed drivers into three groups based on their awareness of the limitations associated with ACC (i.e., aware, unaware and unsure). Drivers who were unaware or unsure of the system's limitations engaged more often in potentially hazardous behaviors, such as using the ACC on curvy roads, than did those who were aware of the system's limitations. Interestingly, these same drivers who were engaging in risky behaviors reported high levels of trust in the system.

One reason for this lack of understanding regarding the functionality and limitations surrounding ADAS may be inadequate consumer training at the time of purchase. In fact, in some cases drivers may not even be informed by a salesperson that their vehicle is equipped with certain technologies (Braitman et al., 2010; Vadeby, Wiklund, & Forward, 2011). Those aware of the technology being on the vehicle they just purchased most often leave the dealership without receiving any information and report learning by reading through the vehicle manual and by trial and error (Abraham, Lee, et al., 2017; Eichelberger & McCartt, 2014; Jenness et al., 2008). Some researchers argue that more work should be done at the dealership to ensure that owners leave with an adequate level of knowledge to safely drive their vehicle (Eby et al., 2015; Reimer, 2014). One recent case study examined the training that was given at 18 different dealerships representing three different types of markets: mass market (Ford and Chevrolet), safety-focused market (Volvo and Subaru), and the luxury market (Mercedes-Benz and BMW) (Abraham, McAnulty, et al., 2017). Three dealerships for each manufacturer were visited by research

associates posing as potential buyers who had just started looking for a vehicle. Only six of the salespeople were able to give a thorough explanation of the safety technologies, seven gave satisfactory explanations, four gave poor explanations and two gave incorrect safety-critical information regarding at least one of the systems. Not surprisingly, the salespeople from the safety market provided the greatest level of explanation, the luxury market was mostly satisfactory and the mass-market dealerships provided the lowest level of explanation. Those salespeople from dealerships representing the mass market reported that they themselves had never received any hands-on training from the dealership regarding these technologies. This is in direct contrast to both the luxury and safety markets at which dealerships had staff who were trained to answer specific questions regarding any of the technologies.

While there is a significant percentage of the general population that has interacted with or heard of advanced vehicle technologies, there is still a large percentage of the population that is unsure exactly how these systems work (McDonald et al., 2016). An online survey of more than 900 adults conducted by State Farm (2016) found that while 70-95% of respondents had at least heard of the most common advanced technologies available in today's vehicles, more than 60% reported having limited to no knowledge regarding them.

Prior to 2014, there was little to no data that comprehensively measured the driver's knowledge of a number of ADAS technologies (McDonald et al., 2016). Previous studies concentrated only on a few of the technologies (Dickie & Boyle, 2009; Larsson, 2012; Vadeby et al., 2011), while other studies targeted specific populations of the driving public (Jenness et al., 2008; Llaneras, 2006; Haberstroh et al., 2010) or owners of specific vehicles (Yannis et al., 2010; Braitman et al., 2010). The lack of data is magnified due to ADAS technologies' recent emergence into the market and their rapid evolution. Some ADAS technologies, such as ACC, have been available for years. However, the version of ACC available in prior years operated and interfaced much differently than the version available today. Additionally, it was previously only available in luxury brand and higher-end trim levels (Mosquet, Andersen, & Arora, 2015). Studies dating back to the 1990s and early 2000s have sought to measure driver understanding and acceptance of a much different version of ACC than is available and found in vehicles today (Nilsson, 1995; Stanton, Young, & McCaulder, 1997; Seppelt & Lee, 2007).

Consumer interest is growing rapidly for these types of systems. A recent longitudinal study by Deloitte (Giffi, Vitale, Robinson, & Pingitore, 2017) found that between 2014 and 2016, there was an 11% increase in respondents who indicated having a strong desire for safety features such as AEB, ACC and LKA. Similarly, AAA's 2016 Vehicle Technology Survey found 61% of U.S. drivers reported they would like to have at least one advanced vehicle technology in their next vehicle.

In recent years, an increasing number of manufacturers have been rolling out vehicles with ADAS technologies available as options or as part of a package, and some are even beginning to offer them standard. For example, Honda Sensing features a suite of safety and driver assistance technologies and is available or standard on most 2017 Honda vehicles. Additionally, it was announced that Lexus Safety System and Toyota Safety Sense would be standard on almost every new vehicle by the end of 2017. With an increasing number of makes and models offering

these technologies, in some cases even as standard equipment in base-level trims of mass-market vehicles, more motorists will be exposed to these systems.

With the desire for these systems growing and their availability in the marketplace increasing, it is imperative that we understand drivers' experiences, behaviors and the gaps in knowledge that can and should be addressed if the potential safety benefits of these technologies are to be fully realized on our roadways.

The purpose of the current study was to examine knowledge, understanding, opinions of and experiences with ADAS technologies among drivers who own and regularly drive selected model year 2016 and 2017 vehicles equipped with the systems. This study also sought to identify the ADAS educational needs for the driving public. Specifically, the research objectives of the survey were to investigate the following areas of interest:

- Purchase behavior and intent
- Attitudes regarding the system
- System learning/training
- Knowledge of system purpose, functions and limitations

Methods

The current study involved surveying a sample of drivers who own or lease vehicles equipped with selected ADAS technologies. Technologies included in this survey were adaptive cruise control (ACC), blind spot monitor (BSM), forward collision warning (FCW), automatic emergency braking (AEB), lane departure warning (LDW), lane keeping assist (LKA),and rear cross traffic alert (RCTA) (Figure 1).

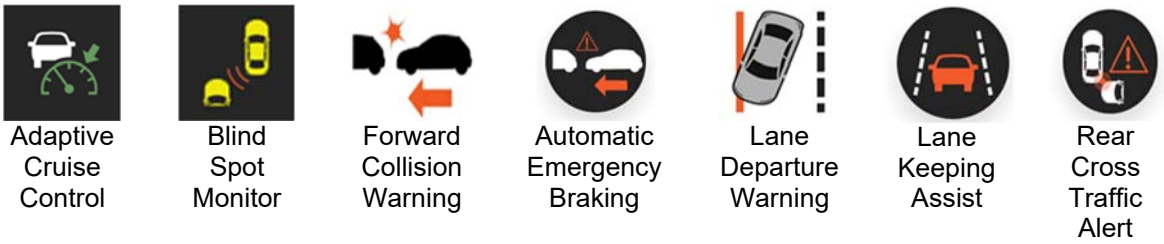

Figure 1. ADAS technologies examined in the current study. (https://mycardoeswhat.org/)

Identifying Survey Sample

The survey team employed a process developed by University of Iowa researchers for a previous study dedicated to measuring consumer understanding of advanced vehicle technologies (McDonald, Friberg, McGehee, & Askelson, 2017). This process involves two critical steps:

1. Complete a thorough market share analysis to identify the makes and models that comprise 99% of the U.S. fleet.
2. Identify the ADAS technologies available as either standard or optional for each of the trims available for those vehicles.

As previous research and consumer education efforts (McDonald et al., 2016) have identified critical limitations to consumer knowledge of vehicle technologies, researchers identified ADAS technology availability by vehicle trim level and surveyed registered owners of vehicles known to be equipped with specific technologies of interest, rather than surveying the general population and asking drivers to report what technologies their vehicles had.

Analysis of Market Share

For model year (MY) 2016, more than 98% of market share was comprised of 194 makes and models (e.g., Toyota Corolla or Honda Accord). Automobile market share data are made available by goodcarbadcar.net using data from automakers, Automotive News Data Center (ANDC), Wall Street Journal and HybridCars.com. A list of these vehicles and their associated market share can be found in Appendix A.

Identifying Vehicle Trims with ADAS Technologies

A total of 952 individual vehicle trims for 194 makes and models were identified in the model year 2016 market share analysis (e.g., Toyota Corolla L, LE, S and the Special Edition). For each trim, the specific ADAS technologies available were noted, including whether they were available on the vehicle standard, as an individual option and/or as part of a package. When possible, this information was collected from the original equipment manufacturers' (OEM) websites and the marketing brochure created by the OEM. For a small number of vehicles, this information could not be determined from OEM materials and thus was obtained from secondary sources such as other automotive websites (e.g., cargurus.com, Edmunds.com). Information indicating each vehicle's year, make, model and trim, as well as the technologies available and the source of the technology information for each vehicle, was compiled into a database and is provided in Appendix B.

A separate analysis was conducted to identify additional vehicle trims on which technologies of interest became available in MY 2017. For MY 2017, 247 trims for 49 makes and models were identified by the research team based on their large market share and/or project sponsor interest and/or because they came equipped with a large number of ADAS technologies as standard features (these selected trims for MY 2017 can be found in Appendix C). These were added to the database described above and are also included in Appendix B.

Survey Sample Selection

A sample comprising a list of names and mailing addresses of registered owners of selected vehicles was purchased from IHS Automotive, which maintains a list of registered owners of vehicles in most U.S. states.

The goals of the sampling were to:

1. Obtain as many total responses as possible for each technology examined given the constraint of fixed total sample size as dictated by survey cost and project budget.
2. Obtain responses reflecting the diversity of vehicle makes and models that offer each of the technologies.
3. Obtain roughly equal numbers of responses for each technology.

To accomplish these goals as well as to minimize the number of surveys sent to owners of vehicles equipped with few or none of the technologies of interest, the research team limited the potential sampling universe to owners of 118 vehicle trims that included at least three of the seven technologies discussed previously as standard equipment. IHS Automotive confirmed that they were able to identify registered owners of 94 of those 118 trims. (Due to the manner in which OEMs classify their VIN data, some trims are not distinguishable from one another; thus for some vehicles, it was not possible to distinguish between one trim that came equipped with technologies of interest versus another trim that did not. Thus, for the purpose of the current study, only owners of vehicles whose trim could be ascertained were included in the survey sample.)

The research team purchased from IHS Automotive a sample 10,000 registered owners of the 94 vehicle trims identified through the process outlined previously. The number of owners of each trim was sampled in proportion to that trim's share of all eligible trims in IHS Automotive's database (roughly proportional to their market share), with the minor modification that some high-market-share vehicles (e.g., Toyota Corolla) were slightly under-sampled and some lower-market-share vehicles (e.g., Tesla Model S) were slightly over-sampled to increase the diversity of vehicles sampled. Each total trim count was divided evenly across states to ensure geographic variability. Table 1 shows the number of owners of each respective trim included in the sample that the research team purchased from IHS Automotive.

Table 1. Number of vehicle owners invited to participate in survey, by vehicle make, model, trim, and model year.

Year	Make	Model	Trim	Number of Owners Invited to Participate in Survey
2016	TOYOTA	RAV4	LIMITED	240
2016	TOYOTA	RAV4	LIMITED HYBRID	109
2017	TOYOTA	COROLLA	L/LE/SE/XLE/XSE/50TH ANNIV	569
2017	TOYOTA	RAV4	LE	337
2017	TOYOTA	RAV4	XLE	335
2017	TOYOTA	HIGHLANDER	SE/XLE	193
2017	TOYOTA	RAV4	LIMITED/SE/PLATINUM	187
2017	TOYOTA	HIGHLANDER	LTD/LTD PLATINUM	99
2017	TOYOTA	HIGHLANDER	LE/LE PLUS	84
2017	TOYOTA	RAV4	LIMITED HYBRID	55
2017	TOYOTA	HIGHLANDER	HYBRID LTD/LTD PLATINUM	14
2017	TOYOTA	HIGHLANDER	HYBRID XLE	4
	TOYOTA			**2,226**
2016	HONDA	CR-V	TOURING	496
2016	HONDA	PILOT	TOURING	431
2016	HONDA	CIVIC	SEDAN TOURING	113
2016	HONDA	PILOT	ELITE	97
2016	HONDA	ACCORD-SEDAN	TOURING	80
2016	HONDA	ACCORD-COUPE	TOURING	16
2016	HONDA	CIVIC	COUPE TOURING	13
2017	HONDA	CR-V	EX-L	161
2017	HONDA	CR-V	EX	85
2017	HONDA	CR-V	TOURING	78
2017	HONDA	ACCORD SEDAN	TOURING	43
2017	HONDA	ACCORD HYBRID	HYBRID- EX-L	37
2017	HONDA	ACCORD HYBRID	HYBRID TOURING	29
2017	HONDA	ACCORD SEDAN	EX-L WITH NAV	24
2017	HONDA	CIVIC SEDAN	TOURING	19
2017	HONDA	ACCORD HYBRID	HYBRID	14
	HONDA			**1,736**
2016	CHEVROLET	TAHOE	LT	320
2016	CHEVROLET	TAHOE	LTZ	203
2016	CHEVROLET	SILVERADO 1500	HIGH COUNTRY	151
2016	CHEVROLET	SUBURBAN	LTZ	148
2016	CHEVROLET	TRAVERSE	LTZ	86
2016	CHEVROLET	IMPALA	2LTZ	71
2016	CHEVROLET	MALIBU	2LT	45
2017	CHEVROLET	TRAVERSE	PREMIER	46

	CHEVROLET			**1,070**
2016	VOLVO	XC60	T5 PLATINUM	195
2016	VOLVO	XC60	T6 PLATINUM	176
2017	VOLVO	S90	T6 INSCRIPTION	269
2017	VOLVO	S90	T5 MOMENTUM	93
2017	VOLVO	S90	T6 MOMENTUM	87
	VOLVO			**820**
2016	GMC	YUKON	DENALI	169
2016	GMC	TERRAIN	DENALI	151
2016	GMC	YUKON XL	DENALI	146
2016	GMC	ACADIA	DENALI	123
2016	GMC	YUKON	SLT	118
2016	GMC	YUKON XL	SLT	83
	GMC			**790**
2016	JEEP	GRAND CHEROKEE	SUMMIT	318
2016	JEEP	GRAND CHEROKEE	SRT	103
2017	JEEP	GRAND CHEROKEE	SUMMIT	58
	JEEP			**479**
2016	MERCEDES-BENZ	GL-CLASS	GL 550 4 MATIC	151
2016	MERCEDES-BENZ	GLE-CLASS	AMG GLE 63S	125
2016	MERCEDES-BENZ	GLE-CLASS	GLE 400 4MATIC	92
2016	MERCEDES-BENZ	E CLASS	E400 SEDANS	59
2016	MERCEDES-BENZ	GLE-CLASS	AMG GLE 63	24
2016	MERCEDES-BENZ	S-CLASS	MAYBACH 600	16
2016	MERCEDES-BENZ	GL-CLASS	AMG GL63	7
	MERCEDES-BENZ			**474**
2016	ACURA	MDX	WITH TECHNOLOGY PACKAGE	223
2016	ACURA	MDX	ADVANCED PACKAGE	73
2016	ACURA	RDX	ADVANCED PACKAGE	68
2016	ACURA	TLX	3.5 V-6 9 WITH TECH	45
2016	ACURA	TLX	2.4 8-DCT WITH TECH	35
2016	ACURA	TLX	3.5 V-6 9 WITH ADVANCED	14
	ACURA			**458**
2016	CADILLAC	ESCALADE	PREMIUM	94
2016	CADILLAC	ESCALADE	LUXURY	70
2016	CADILLAC	CTS	LUXURY	66
2016	CADILLAC	ESCALADE	PLATINUM	64
2016	CADILLAC	SRX	PREMIUM	34
2016	CADILLAC	XTS	PREMIUM	16
2016	CADILLAC	XTS	PLATINUM	14
2016	CADILLAC	CTS	PREMIUM	6
2016	CADILLAC	ATS	PERFORMANCE	4
2016	CADILLAC	ATS	PREMIUM	4
2016	CADILLAC	CTS	PERFORMANCE	4
	CADILLAC			**376**
2016	TESLA	S	ALL	173
2016	TESLA	X	ALL	91
2017	TESLA	S	ALL	24
2017	TESLA	X	ALL	11
	TESLA			**299**
2016	MAZDA	6	GRAND TOURING	114
2016	MAZDA	CX-9	GRAND TOURING	91
2016	MAZDA	CX-9	SIGNATURE	42
2017	MAZDA	3	TOURING	28
2017	MAZDA	3	TOURING 2.5	7
	MAZDA			**282**
2016	BUICK	ENCLAVE	PREMIUM	145
2016	BUICK	ENVISION	PREMIUM I	57
2016	BUICK	ENCORE	PREMIUM	49

2016	BUICK	ENVISION	PREMIUM II	22
	BUICK			**273**
2016	LAND ROVER	RANGE ROVER	5.0 SC AUTOBIOGRAPHY LWD	122
2016	LAND ROVER	RANGE ROVER	5.0L V8 SC AUTOBIOGRAPHY	119
	LAND ROVER			**241**
2016	KIA	SORENTO	SX/SX LIMITED	160
	KIA			**160**
2016	FORD	EXPLORER	PLATINUM	151
	FORD			**151**
2016	VOLKSWAGEN	PASSAT	SE	135
2016	VOLKSWAGEN	PASSAT	SEL/SEL PREMIUM	16
	VOLKSWAGEN			**151**
2016	AUDI	A3	S3 PRESTIGE	14
2016	**AUDI**			**14**
	TOTAL			**10,000**

Survey Instrument

The survey was designed to determine what ADAS technologies each potential respondent had on his or her vehicle, and then to collect in-depth information regarding their understanding of and experiences with the technologies that they reported that they had. Although the researchers had data on which technologies respondents' vehicles had as standard equipment, respondents were asked to identify which technologies they believed their vehicle to be equipped with. This was done because some respondents might not have been aware of some technologies that their vehicle did indeed have, and some respondents may have some optional technologies installed on their vehicles beyond those that were known to be included as standard equipment.

The introduction to the survey informed respondents that the survey might use different names than their vehicle manufacturer uses for the ADAS technologies in the survey. Descriptions were drawn mainly from the MyCarDoesWhat.org educational campaign website (https://mycardoeswhat.org/), with some minor modifications based on sponsor input. For the purpose of the MyCarDoesWhat.org campaign, great effort was made to ensure that the descriptions were not specific to any one system and were written in a way that readers would understand. The descriptions crafted by the MyCarDoesWhat.org campaign feature information about the purpose, function and general limitations of each technology that can be found in the majority of interfaces. For example, the MyCarDoesWhat.org campaign website description of ACC explains that the basic purpose of the technology is to maintain a certain vehicle speed and following distance from the vehicle ahead, both set by the driver. The campaign explains that many of the systems have a short, medium and long-distance setting. Rather than focusing on the details of the distance system, the campaign explains that there are general distance settings and they may vary from system to system. The descriptions for each technology can be found below in Table 2.

Table 2. ADAS technology description provided in the survey.

Description	Symbology
Adaptive Cruise Control This is not the same as 'normal' cruise control. This system tracks the vehicle directly in front of the driver and slows down or speeds up based on the driver's pre-selected speed and following distance preferences. Many versions of adaptive cruise control are designed for use at highway speeds, but some systems can also be used during in-town driving. The in-town driving adaptive cruise control is commonly referred to as 'stop and go adaptive cruise control' or 'traffic jam assist.' The system will bring the vehicle to a complete stop and return to the set speed once the vehicle ahead has continued traveling forward. Your vehicle may have one or both versions of adaptive cruise control.	
Blind Spot Monitor This system uses cameras and/or sensors to alert drivers when a vehicle is traveling in their blind spot. The alert may be a sound and/or an indicator light on the side-view mirror, rear-view mirror, A-pillar, or on the dashboard.	
Forward Collision Warning This system warns the driver that they are about to have a collision with the vehicle ahead of them. The warning can be a sound, vibration, or both and may be accompanied by a visual alert on the dashboard.	
Automatic Emergency Braking This system is designed to sense traffic that is slowing or has come to a stop ahead of your vehicle and to automatically apply the brakes if the driver fails to respond.	
Lane Departure Warning This system is designed to warn the driver with a sound, vibration, and/or indicator lights if the vehicle begins to drift out of the lane.	
Lane Keeping Assist This system is designed to automatically guide the vehicle back into the lane if the vehicle has begun to drift out of it.	
Rear Cross Traffic Alert This system is designed to warn the driver with a sound, vibration, and/or indicator lights if one or more vehicles are about to enter the vehicle's path while it is backing. Vehicles could be entering the path from the right or left.	

Blocks (or sets) of questions were created for each type of technology listed in Table 2. Each technology block asked a similar set of questions to the respondent; however, the questions were worded specific to that technology.

Respondents who reported having three or fewer of the technologies examined were assigned the technology-specific blocks of questions that corresponded to the technologies that they had. Respondents who reported having more than three of the technologies were assigned three technology blocks selected randomly from among the technologies that they reported having. To limit respondent burden, no respondent was assigned more than three technology blocks, which were presented in a random order.

The survey can be broken down by the following four major subsections briefly described below:

- Purchase behavior and intent
- Attitudes regarding the system
- System learning/training
- Knowledge of system purpose, functions and limitations

The full survey and all questions included can be found in Appendix D.

Purchase Behavior and Intent

These questions were aimed at understanding whether drivers had sought a particular technology during their car buying experience and whether they intended to purchase the technology in the future.

The following specific areas were probed, with similar questions asked for each respective technology:

- Respondent's awareness that the vehicle was equipped with the technology prior to test drive.
- Respondent's importance of selecting a vehicle with the technology when first starting to shop for a vehicle.
- Respondent's desire to have the technology again in next car purchased.
- Whether the respondent would recommend the technology to others.

Attitudes Regarding the System

These questions were intended to examine how drivers feel about the system (e.g., trust, annoyance) and whether these feelings have impacted their use of the system.

Specifically, drivers were asked to report the extent of their agreement or disagreement with the following items:

- I trust the technology.
- I think the technology makes me feel safer.
- I think the technology is distracting.
- I think the technology is annoying.
- I think the technology is useful.
- I deactivate the technology. (If so, why.)

System Learning/Training

These questions gathered information regarding the amount of training (if any) drivers received regarding the technologies, resources they used to become informed and whether or not they felt they understood how the technology worked.

In this portion of the survey, the respondent was asked:

- Whether the dealership offered any training regarding the technology.
- If so, whether the respondent completed the training.
- What sources of information the respondent used to learn about the technology.

- Whether the respondent believed that he or she could explain to others how the technology works.

Knowledge of System Purpose, Functions, and Limitations

These questions sought to identify knowledge gaps related to the purpose of the system, its functions and limitations. While the specific content of each technology's questions is different, there is a question dedicated to covering each of these categories. Additionally, drivers were asked to provide anecdotal information if they could recall a time their vehicle behaved in a manner that made them feel confused or uncertain, as this could help identify future training needs.

For each technology, the respondent was asked technology-specific questions regarding:

- The purpose of the technology
- The function of the technology
- Limitations of the technology
- Whether the respondent had ever been confused by something that the technology did.

Survey Administration

The survey was conducted in three waves. The first and second wave each had 500 potential respondents. Both waves also had a unique incentive or compensation structure. The results, in terms of response rates, were then used to inform the most effective approach for the final wave of 9,000.

All potential respondents received a letter inviting them to complete the survey. The invitation letter included information regarding the study, the online study website link and a unique code that the potential respondent was required to input to enter and complete the survey. Upon entering the web survey, a few questions were asked to ensure the respondent met the basic eligibility requirements. To be eligible, the respondent had to drive the vehicle that was targeted for the study, have a valid driver's license and drive more than one hour per week. Data collection officially began when the first wave of invitations was mailed on July 3, 2017, and remained open until Dec. 31, 2017.

Wave 1

The first wave of surveys was mailed out on July 3, 2017, to 500 potential participants. Each invitation letter included a $5 gift for the potential participant to keep, regardless of whether they completed the survey, an approach that has shown to increase response rates and reduce nonresponse bias (Lesser et al., 2001). Eight of the survey invitations were returned as undeliverable. Surveys returned as undeliverable did not have any forwarding or updated address notification. Five survey invitations were returned with a change of address notification. Those returned with an updated address notification were remailed to the most current address. Eighty-one people completed the survey. An additional four people completed most of the survey (i.e., 74%, 82%, 83% and 86% complete). Overall, a 16% response rate was observed for this first

wave (Table 3).

Wave 2

The second wave of surveys was mailed out on Aug. 24, 2017, to 500 potential participants. Each potential participant was informed that they would be compensated $20 in the form of a check, to be mailed upon completion of the survey. There were no surveys returned as undeliverable or with a change of address. Fifty people completed the survey. An additional person started the survey but completed less than half of it. A response rate of 10% was seen for this second wave.

It is important to note that Hurricane Harvey made landfall in Texas during the first week after the mailing (Aug. 24-28, 2017) and Hurricane Irma during the third week (on Sept. 10, 2017). The natural disaster may have impacted some of the Florida and Texas residents who were mailed the survey. Further examination revealed that 29% of the potential participants were identified as residents of either Florida or Texas. The United States Postal Service (USPS) stopped delivery in parts of both states for intermittent periods of time. Loss of property, loss of residence or emotional distress may have impacted Texas and Florida residents' ability to participate in this research.

Wave 3

Response rates from Wave 1 and Wave 2 were used to inform the incentive structure for the third and final wave. The $5 gift was selected as the incentive for the largest mailing of 9,000 survey invitations to be sent out on Oct. 10, 2017. Before mailing the third wave, researchers evaluated the status of the USPS in both Texas and Florida. At the time of the mailing, service had resumed to normal operation in much of Texas. However, the large number of power outages had left many areas in Florida without service. Examination of response rates of Florida residents in Waves 1 and 2 revealed that while they comprised 14.4% of the Wave 1 sample and 11.1% of the Wave 1 respondents, in Wave 2 they comprised 14.8% of the sample but only 4.1% of respondents. Due to concerns that a substantial proportion of eligible respondents located in Florida would be unable to receive survey invitations and/or complete the survey, potential participants from Florida were excluded from the Wave 3 sample; data for additional vehicle owners residing in other states were purchased from IHS Automotive to compensate for Florida respondents to whom survey invitations were not mailed.

For the third wave, 1,249 people completed the survey. An additional 57 completed between 50-98% of the survey. Ten respondents completed between 1-49% of the survey. Overall, a 13% response rate was observed for this third wave.

During the third wave of data collection, the researchers noticed a technical error resulting in the unintentional skipping of the technology-specific question blocks for some respondents. Upon discovery of the error, researchers temporarily suspended data collection to identify the affected respondents and address the error. A total of 512 respondents (approximately 6% of Wave 3 sample) were adversely affected by the error, resulting in their not being presented with the technology-specific blocks of questions that they were supposed to have been assigned. A

postcard was mailed to these 512 respondents, explaining the error and inviting them to return to the survey to complete it. Respondents who returned and completed the survey received an additional $5 in the form of a check upon completion. A total of 195 respondents returned to complete the survey for a second time. Of those, nine had previously completed at least one full block of technology-specific questions and thus responded to these questions twice. For the purposes of the final data set, these respondents' first set of responses, which was affected by the technical error, was discarded; only their second set of responses was used.

Completions and Partial Completions

When all questions were successfully answered, researchers considered these participants' surveys to be 100% complete. However, some participants did not click "enter" on the final screen; thus, their survey progress was recorded as 99%. Researchers also counted these responses as completions.

Sixty-one participants started the survey but did not complete it. Those who completed at least one technology block but less than 99% were considered partial completions. For the purposes of this technical report, those partial completions were not included in the final data set or any of the results described in the following sections.

Reminder

During each of the three waves, a reminder was delivered to respondents who had not started the survey or were in progress (i.e., less than 99% complete). For all waves, reminders were mailed for delivery between the third and sixth week following the initial mailing of each wave.

Table 3. Response rate for each wave of survey.

Rate	Wave 1	Wave 2	Wave 3
Response Rate	16.1%	10.0 %	13.4%

American Association of Public Opinion Research (AAPOR) Response Rate 3 (AAPOR, 2016).

Results

Overall Response Eligibility

The survey had 1,380 respondents. Six respondents initially entered the survey but then indicated that they did not want to participate, 94 reported that they did not drive the specific vehicle to which the survey referred on a regular basis, 63 reported that they drove less than one hour per week and five respondents reported their vehicle did not have any of the technologies included in the survey. Therefore, these 168 respondents were classified as ineligible.

Demographics

The following tables provide descriptive statistics regarding the demographic characteristics of all drivers invited to participate in the survey (as reflected in IHS' proprietary database) and of those who responded to the survey (as self-reported by the respondents).

Table 4 shows the age distribution for all drivers sampled as well as for respondents. Respondents ranged from 22 to 77 years of age. The mean age of respondents was 57 years (standard deviation 13.7 years); the median age was 59 years. Notably, while respondents tended to be older than the general population, and older drivers who were invited to participate in the survey responded at a slightly higher rate than did younger drivers, the age distribution of respondents generally reflected the age distribution of the registered owners of the vehicles included in the study and thus those invited to participate.

Table 4. Age of drivers invited to participate in survey and drivers who responded.

Age	All Drivers Invited to Participate in Survey	Drivers Who Responded to Survey
18-24	0.3%	0.8%
25-34	6.1%	4.9%
35-44	17.5%	11.4%
45-54	24.0%	20.0%
55-64	24.3%	21.9%
65-74	19.9%	22.9%
75+	8.0%	7.7%
Did not disclose	-	10.4%

As seen in Table 5, the gender of respondents matched the overall distribution of the sample. While men outnumbered women by a margin of 61% to 38% among respondents, this reflected the distribution of men and women among registered owners of the vehicles included in the study and thus those invited to participate.

Table 5. Gender of drivers invited to participate in survey and drivers who responded.

Gender	All Drivers Invited to Participate in Survey	Drivers who Responded to Survey
Female	39.2%	38.0%
Male	60.4%	61.0%
Unknown/Prefer not to answer	0.4%	1.0%

The distribution of household income for the full sample as reflected in IHS Automotive's database, as well as that reported by respondents, is provided in Table 6. The large percentage of respondents who chose not to respond (24%) makes it difficult to compare the income distribution of respondents to that of drivers invited to participate in the survey. However, it is clear that drivers invited to participate were from higher-income households than the general population, as 45% had annual household incomes of $100,000 or more, likely indicating that buyers of new cars are more likely to have higher than average incomes.

Table 6. Household income of drivers invited to participate in survey and drivers who responded.

Household Income	All Drivers Invited to Participate in Survey	Drivers who Responded to Survey
Less than $50,000	15.7%	5.7%
$50,000 - $99,999	29.0%	20.3%
$100,000 - $149,999	22.3%	17.5%
$150,000 - $199,999	16.8%	13.2%
More than $200,000	16.3%	18.9%
Unsure	0.0%	0.6%
Prefer not to answer	0.0%	23.8%

Fifty-five percent of respondents reported they were employed (outside the home), while 36% reported that they were retired. Other occupations (e.g., unemployed, homemaker, student, disabled, other) each individually accounted for less than 3% of respondents. Eighty percent of respondents reported that they were married or in a civil partnership; 74% reported not having children younger than 15 years old living in the household; 88% identified as Caucasian or white.

Respondent Vehicle

As previously described, 94 individual trims were included in the final survey sample. Table 7 details the number and percentage of respondents who completed the survey by make, model and trim. As the make, model, and trim information were known to the research team, the respondent was only asked, in the beginning of the survey, to confirm that the vehicle information was accurate and that it is the vehicle they drive most often.

Table 7. Distribution of vehicle makes, models, model years, and trims among vehicle owners who responded to the survey.

Year	Make	Model	Trim	Number of owners who responded	Percent of all survey responses
2016	TOYOTA	RAV4	LIMITED	33	2.39%
2016	TOYOTA	RAV4	LIMITED HYBRID	25	1.81%
2017	TOYOTA	COROLLA	L/LE/SE/XLE/XSE/50TH ANNIV	57	4.13%
2017	TOYOTA	RAV4	LE	39	2.83%
2017	TOYOTA	RAV4	XLE	36	2.61%
2017	TOYOTA	HIGHLANDER	SE/XLE	34	2.46%
2017	TOYOTA	RAV4	LIMITED/SE/PLATINUM	32	2.32%
2017	TOYOTA	HIGHLANDER	LTD/LTD PLATINUM	22	1.59%

2017	TOYOTA	HIGHLANDER	LE/LE PLUS	6	0.43%
2017	TOYOTA	RAV4	LIMITED HYBRID	14	1.01%
2017	TOYOTA	HIGHLANDER	HYBRID LTD/LTD PLATINUM	3	0.22%
2017	TOYOTA	HIGHLANDER	HYBRID XLE	0	0.00%
	TOYOTA			**301**	**21.81%**
2016	HONDA	CR-V	TOURING	98	7.10%
2016	HONDA	PILOT	TOURING	70	5.07%
2016	HONDA	CIVIC	SEDAN TOURING	19	1.38%
2016	HONDA	PILOT	ELITE	21	1.52%
2016	HONDA	ACCORD-SEDAN	TOURING	12	0.87%
2016	HONDA	ACCORD-COUPE	TOURING	1	0.07%
2016	HONDA	CIVIC	COUPE TOURING	5	0.36%
2017	HONDA	CR-V	EX-L	35	2.54%
2017	HONDA	CR-V	EX	15	1.09%
2017	HONDA	CR-V	TOURING	16	1.16%
2017	HONDA	ACCORD SEDAN	TOURING	6	0.43%
2017	HONDA	ACCORD HYBRID	HYBRID- EX-L	8	0.58%
2017	HONDA	ACCORD HYBRID	HYBRID TOURING	2	0.14%
2017	HONDA	ACCORD SEDAN	EX-L WITH NAV	5	0.36%
2017	HONDA	CIVIC SEDAN	TOURING	5	0.36%
2017	HONDA	ACCORD HYBRID	HYBRID	3	0.22%
	HONDA			**321**	**23.26%**
2016	CHEVROLET	TAHOE	LT	26	1.88%
2016	CHEVROLET	TAHOE	LTZ	19	1.38%
2016	CHEVROLET	SILVERADO 1500	HIGH COUNTRY	15	1.09%
2016	CHEVROLET	SUBURBAN	LTZ	9	0.65%
2016	CHEVROLET	TRAVERSE	LTZ	12	0.87%
2016	CHEVROLET	IMPALA	2LTZ	7	0.51%
2016	CHEVROLET	MALIBU	2LT	6	0.43%
2017	CHEVROLET	TRAVERSE	PREMIER	5	0.36%
	CHEVROLET			**99**	**7.17%**
2016	VOLVO	XC60	T5 PLATINUM	34	2.46%
2016	VOLVO	XC60	T6 PLATINUM	29	2.10%
2017	VOLVO	S90	T6 INSCRIPTION	49	3.55%
2017	VOLVO	S90	T5 MOMENTUM	18	1.30%
2017	VOLVO	S90	T6 MOMENTUM	11	0.80%
	VOLVO			**141**	**10.22%**
2016	GMC	YUKON	DENALI	13	0.94%
2016	GMC	TERRAIN	DENALI	20	1.45%
2016	GMC	YUKON XL	DENALI	9	0.65%
2016	GMC	ACADIA	DENALI	17	1.23%
2016	GMC	YUKON	SLT	10	0.72%
2016	GMC	YUKON XL	SLT	7	0.51%
	GMC			**76**	**5.51%**
2016	JEEP	GRAND CHEROKEE	SUMMIT	46	3.33%
2016	JEEP	GRAND CHEROKEE	SRT	16	1.16%
2017	JEEP	GRAND CHEROKEE	SUMMIT	7	0.51%
	JEEP			**69**	**5.00%**
2016	MERCEDES-BENZ	GL-CLASS	GL 550 4 MATIC	2	0.14%
2016	MERCEDES-BENZ	GLE-CLASS	AMG GLE 63S	5	0.36%
2016	MERCEDES-BENZ	GLE-CLASS	GLE 400 4MATIC	11	0.80%
2016	MERCEDES-BENZ	E CLASS	E400 SEDAN	10	0.72%
2016	MERCEDES-BENZ	GLE-CLASS	AMG GLE 63	2	0.14%
2016	MERCEDES-BENZ	S-CLASS	MAYBACH 600	1	0.07%
2016	MERCEDES-BENZ	GL-CLASS	AMG GL63	1	0.07%
	MERCEDES-BENZ			**32**	**2.32%**
2016	ACURA	MDX	WITH TECHNOLOGY PACKAGE	34	2.46%
2016	ACURA	MDX	ADVANCED PACKAGE	8	0.58%

2016	ACURA	RDX	ADVANCED PACKAGE	9	0.65%
2016	ACURA	TLX	3.5 V-6 9 WITH TECH	8	0.58%
2016	ACURA	TLX	2.4 8-DCT WITH TECH	4	0.29%
2016	ACURA	TLX	3.5 V-6 9 WITH ADVANCED	4	0.29%
	ACURA			**67**	**4.86%**
2016	CADILLAC	ESCALADE	PREMIUM	7	0.51%
2016	CADILLAC	ESCALADE	LUXURY	6	0.43%
2016	CADILLAC	CTS	LUXURY	10	0.72%
2016	CADILLAC	ESCALADE	PLATINUM	4	0.29%
2016	CADILLAC	SRX	PREMIUM	4	0.29%
2016	CADILLAC	XTS	PREMIUM	4	0.29%
2016	CADILLAC	XTS	PLATINUM	0	0.00%
2016	CADILLAC	CTS	PREMIUM	0	0.00%
2016	CADILLAC	ATS	PERFORMANCE	0	0.00%
2016	CADILLAC	ATS	PREMIUM	0	0.00%
2016	CADILLAC	CTS	PERFORMANCE	0	0.00%
	CADILLAC			**35**	**2.54%**
2016	TESLA	S	ALL	33	2.39%
2016	TESLA	X	ALL	15	1.09%
2017	TESLA	S	ALL	7	0.51%
2017	TESLA	X	ALL	4	0.29%
	TESLA			**59**	**4.28%**
2016	MAZDA	6	GRAND TOURING	14	1.01%
2016	MAZDA	CX-9	GRAND TOURING	17	1.23%
2016	MAZDA	CX-9	SIGNATURE	7	0.51%
2017	MAZDA	3	TOURING	5	0.36%
2017	MAZDA	3	TOURING 2.5	0	0.00%
	MAZDA			**43**	**3.12%**
2016	BUICK	ENCLAVE	PREMIUM	32	2.32%
2016	BUICK	ENVISION	PREMIUM I	5	0.36%
2016	BUICK	ENCORE	PREMIUM	7	0.51%
2016	BUICK	ENVISION	PREMIUM II	5	0.36%
	BUICK			**49**	**3.55%**
2016	LAND ROVER	RANGE ROVER	5.0 SC AUTOBIOGRAPHY LWD	5	0.36%
2016	LAND ROVER	RANGE ROVER	5.0L V8 SC AUTOBIOGRAPHY	4	0.29%
	LAND ROVER			**9**	**0.65%**
2016	KIA	SORENTO	SX/SX LIMITED	19	1.38%
	KIA			**19**	**1.38%**
2016	FORD	EXPLORER	PLATINUM	24	1.74%
	FORD			**24**	**1.74%**
2016	VOLKSWAGEN	PASSAT	SE	27	1.96%
2016	VOLKSWAGEN	PASSAT	SEL/SEL PREMIUM	6	0.43%
	VOLKSWAGEN			**33**	**2.39%**
2016	AUDI	A3	S3 PRESTIGE	3	0.22%
2016	**AUDI**			**3**	**0.22%**
	TOTAL			**1,380**	**100%**

Technology Ownership

Respondents were asked to report whether their vehicle was equipped with each of the technologies included in the survey. The survey provided a basic description of the technology to convey its concept to the respondent. The description explained that the respondent's vehicle manufacturer may refer to the technology by a different name or their system may have slightly different functionality, but the basic concept of the technology would be similar to the survey's definition. Figure 2 presents the self-reported technologies respondents reported that they had in

their vehicles. The technologies most respondents reported owning were FCW (89%) and LDW (89%), while the least common were AEB (64%) and LKA (64%). Notably, 17% of all respondents reported that they did not know whether or not their vehicle was equipped with AEB.

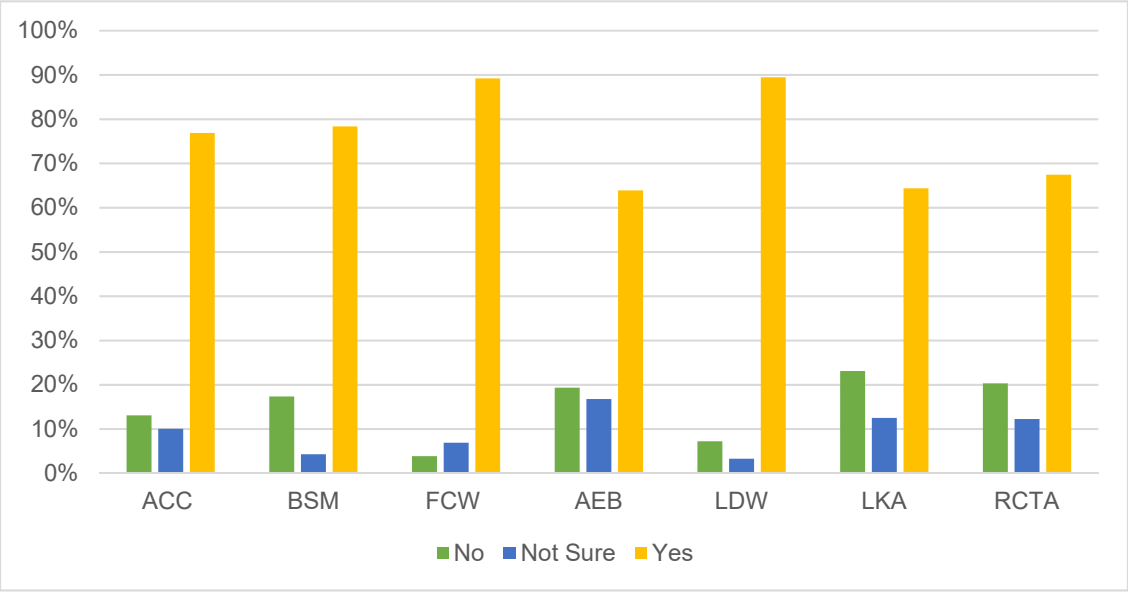

Figure 2. Respondent self-report of whether their vehicle was equipped with each of seven ADAS technologies examined.

Technology Specific Results

Based on the technologies that respondents reported they had in their vehicle, the survey randomly assigned each respondent to complete three blocks of questions regarding specific technologies that they reported having in their vehicles. Each technology-specific block of questions was answered by an average of 510 respondents (range 502 -519).

The remainder of the report features a high-level summary of findings for each technology based on a standard set of questions related to the four survey subtopics:

- Purchase behavior and intent
- Attitudes regarding the system
- System learning/training
- Knowledge of system purpose, functions and limitations

It is important to note that some of the respondents were or were not asked questions based on how they responded to a previous question. For example, if a respondent reported they had never used a technology, the survey did not ask subsequent questions regarding their usage patterns of the technology. For this reason, the numbers reported in the data tables for particular questions may not match the overall totals reported in the introduction of the technology section.

Adaptive Cruise Control (ACC)

A total of 937 respondents (77%) reported having ACC in their vehicle. Of these respondents, 514 randomly received the block of questions focused on ACC. The survey distinguished between ACC for highway driving and ACC for in-town driving (e.g., "traffic jam assist" or "stop-and-go cruise control"). Respondents who reported their vehicle was equipped with ACC that could be utilized for in-town driving conditions were asked questions specific to the usage of the ACC's in-town functionality to allow the researchers the ability to control for differences between highway and in-town ACC.

Twenty-five percent of respondents reported that their vehicle's ACC system was equipped with stop-and-go functionality and 32% reported it was not. Importantly, fully 43% of respondents indicated that they were not sure whether or not their vehicle's ACC system included stop-and-go functionality.

Purchase Behavior and Intent

Approximately 83% of respondents reported this was their first vehicle equipped with ACC (Table 8).

Table 8. Respondents reporting their current vehicle to be the first they have owned/leased with an ACC system.

Response	Count	Percent
Yes	428	83%
No	80	16%
Not sure	6	1%

Only slightly more than half of respondents were aware their vehicle was equipped with ACC before choosing to go for a test drive (Table 9).

Table 9. Respondents reporting awareness of ACC present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	265	52%
No	240	47%
Not sure	9	2%

Attitudes Regarding the System

Respondents were asked how frequently they felt comfortable looking away from the road, making a phone call or sending a text when their ACC system was activated. Only 5% reported that they were frequently or often comfortable doing so; most reported that they never felt comfortable engaging in these activities while using ACC.

Table 10. Reported frequency of feeling comfortable engaging in other activities while ACC is activated.

Response	Percent
Often	4%
Frequently	1%
Sometimes	8%
Rarely	17%
Never	71%

Approximately 11% of respondents indicated they never used their ACC system, most commonly reporting that they did not need/want the system.

Respondents were asked to rate their trust and usefulness of the system. Table 11 shows results for both highway and in-town ACC. A greater number of respondents trusted ACC for highway driving than in-town (78% vs 59%, respectively). There was an even greater difference when looking at usefulness, with 81% of respondents finding ACC for highway useful but only 47% finding it useful for in-town driving.

Table 11. Percent of respondents who trusted ACC and felt ACC was useful.

Question	Agree	Neutral	Disagree
I trust the adaptive cruise control system for highway driving.	78%	8%	11%
I think the adaptive cruise control system is useful for highway driving.	81%	8%	9%
I trust the adaptive cruise control system for in-town driving.	59%	18%	22%
I think the adaptive cruise control system is useful for in-town driving.	47%	23%	28%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

More than half (52%) of respondents reported that before they purchased their vehicle, they did not understand how ACC worked (Table 12). Forty-five percent of respondents recalled someone at the dealership offering training related to the ACC system. Of those respondents, 89% reported completing the training.

Table 12. Respondents reporting whether they understood how ACC worked prior to the purchase of their vehicle.

Response	Number	Percent
Yes	209	41%
No	269	52%
Not sure	36	7%

A large percentage (83%) reported that, now that they had driven with the technology in their vehicle for a period of time, they had a better understanding of how it worked (Table 13).

Table 13. Respondents reporting a better understanding of ACC after driving with it for a period of time.

Response	Number	Percent
Yes	428	83%
No	56	11%
Not sure	30	6%

Additionally, only 14% reported that they have, at some point, been confused about the way their ACC was behaving (Table 14).

Table 14. Respondents reporting confusion at some point with their ACC system.

Response	Number	Percent
Yes	72	14%
No	39	77%
Not sure	45	9%

A greater number of respondents reported that they could explain to others how to use ACC for highway driving compared with in-town ACC (75% vs 69%, respectively). Similarly, 80% agreed that ACC for highway driving was easy to learn, compared with 75% for in-town ACC (Table 15).

Table 15. Percent reporting ease of learning and ability to explain ACC to others

Question	Agree	Neutral	Disagree
I think the adaptive cruise control system for highway driving is easy to learn.	80%	10%	7%
I can explain to others how to use the adaptive cruise control system for highway driving.	75%	8%	14%
I think the adaptive cruise control system for in-town driving is easy to learn.	75%	8%	13%
I can explain to others how to use the adaptive cruise control system for in-town driving.	69%	12%	15%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

When respondents were asked to report all information sources they used to get information about their ACC system (Figure 3), the top sources were the owner's manual (48%) and learning by trial and error (34%). Nearly a quarter of respondents (25%) reported they had not sought any information at all regarding their ACC system.

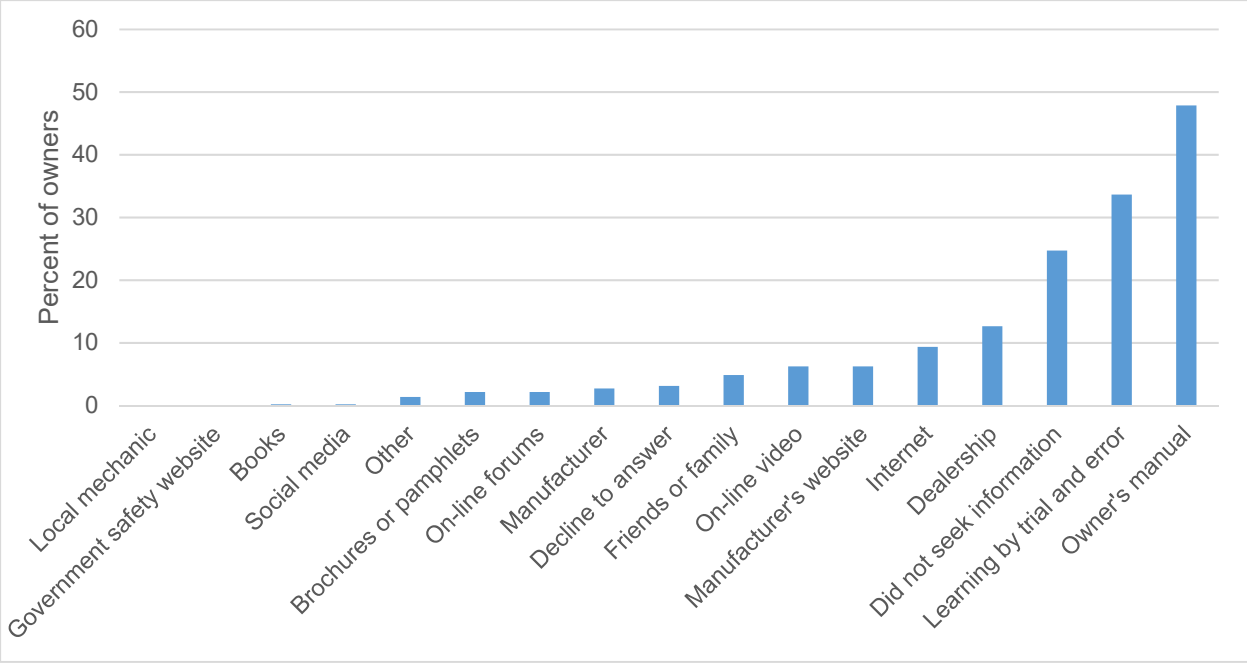

Figure 3. Percent of respondents who reported seeking information from various sources about their vehicle's ACC system.

Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions, and Limitations

Respondents were asked conceptual questions regarding their knowledge of ACC technology. The questions were specifically developed to cover a range of ACC systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. For example, the knowledge questions did not focus on specific distance interval settings for ACC systems, but rather on ACC systems having a distance interval setting. Three knowledge questions regarding ACC were included in the survey, plus one additional question for those whose vehicle had ACC in-town capability. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 16 measured knowledge regarding basic functions and limitations of ACC. More than half of respondents (58%) selected the correct answer, which was that the vehicle would accelerate when the vehicle ahead moved out of the detection zone. Notably, 42% of respondents either selected an incorrect option or stated that they did not know the answer.

Table 16. Knowledge question measuring understanding of the basic functions and limitations of ACC.

The adaptive cruise control system:	**Count**	**Percent**
Is able to successfully brake the vehicle in any situation as long as the system has detected a vehicle ahead.	123	24%
May accelerate if the vehicle ahead moves out of the detection zone.	**298**	**58%**
Works well in thick fog or heavy precipitation because it relies on radar.	4	1%
Prefer not to answer	16	3%
I am unsure of the correct response.	73	14%

The questions in Table 17 and Table 18 examined the driver's basic understanding of how ACC worked. The majority (53%) of respondents understood that the driver set the speed and time interval distance. However, only 28% understood that the distance setting was based on a time interval.

Table 17. Knowledge question measuring understanding of the basic purpose of ACC.

With an adaptive cruise control system:	Count	Percent
The driver sets the speed and selects one of the time interval distances.	**273**	**53%**
The driver sets the speed and the system determines the time interval distance based on location and speed of surrounding vehicles.	115	22%
The driver sets the speed and the system maintains a fixed time interval distance that cannot be changed.	30	6%
Prefer not to answer	17	3%
I am unsure of the correct response.	79	15%

Table 18. Knowledge question measuring understanding of the basic function of ACC.

With an adaptive cruise control system, the distance from the vehicle ahead is determined by:	Count	Percent
A setting that is roughly equivalent to a number of "car lengths."	197	38%
How many seconds it would take to travel the current gap and reach the vehicle ahead.	**145**	**28%**
Local traffic speed and density.	19	4%
I am unsure of the correct response.	136	26%
Prefer not to answer	17	3%

The question in Table 19 was asked of those respondents who indicated their vehicle was equipped with ACC in-town capability. The question measured the basic purpose of the ACC in-town system. A majority (75%) of respondents answered the question correctly, understanding that the system will bring the vehicle a stop when the vehicle ahead begins to move.

Table 19. Knowledge question measuring understanding of the basic purpose of ACC for in-town use.

Some Adaptive Cruise Control systems are designed to operate while driving in town. These systems can:	Count	Percent
Automatically detect and stop your vehicle for red stoplights.	2	2%
Automatically slow your vehicle for school zones and cross walks.	2	2%
Brake your vehicle to a stop when the traffic ahead of you stops and accelerate your vehicle when traffic begins moving again.	**97**	**75%**
I am unsure of the correct response.	27	21%
Prefer not to answer	2	2%

Blind Spot Monitor (BSM)

A total of 954 respondents (78%) reported having a BSM system in their vehicle. Of these respondents, 509 randomly received the BSM technology block.

Purchase Behavior and Intent

Approximately 68% of respondents reported this was their first vehicle equipped with BSM (Table 20).

Table 20. Respondents reporting their current vehicle to be the first they have owned/leased with a BSM system.

Response	Count	Percent
Yes	346	68%
No	157	31%
Not sure	6	1%

Sixty-nine percent of respondents were aware their vehicle was equipped with BSM before choosing to go for a test drive (Table 21).

Table 21. Respondents reporting awareness of BSM present in their vehicle prior to the test drive.

Response	Count	Percent
Yes	353	69%
No	145	28%
Not sure	11	2%

Attitudes Regarding the System

Respondents were asked to report how frequently they relied solely on their BSM system. Eleven percent reported that they often or frequently relied solely on the system without confirming that their blind spot was clear with a visual check; 55% reported that they did so at least rarely (Table 22).

Table 22. Reported frequency in solely relying on BSM system

Response	Percent
Often	6%
Frequently	5%
Sometimes	19%
Rarely	25%
Never	45%

Ninety-six percent of respondents reported never deactivating their BSM. For the 4% who indicated that they had, the most common reason given was that it was distracting.

Owners were asked to indicate whether or not they trusted the system and whether they found it useful (Table 23). More respondents found the system to be useful (94%) than those who indicated they trust the system (84%).

Table 23. Percent of respondents who trusted BSM and felt BSM was useful.

Question	Agree	Neutral	Disagree
I trust the Blind Spot Monitor system.	84%	8%	7%
I think the Blind Spot Monitor system is useful.	94%	3%	2%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

More than a quarter (28%) of respondents reported that, before they purchased their vehicle, they did not understand how the BSM system worked (Table 24). Half of respondents (50%) recalled dealership staff offering training related to the BSM system. Of those respondents, 88% reported completing the training offered to them.

Table 24. Respondents reporting whether they understood how BSM worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	343	67%
No	142	28%
Not sure	24	5%

A large percentage (90%) of owners reported that, now that they had driven with the system for a period of time, they had a better understanding of how it worked (Table 25).

Table 25. Respondents reporting a better understanding of BSM after driving with it for a period of time.

Response	Count	Percent
Yes	456	90%
No	39	8%
Not sure	14	3%

Additionally, 90% of respondents reported that they had never been confused about how their BSM system was behaving (Table 26).

Table 26. Respondents reporting confusion at some point with their BSM system.

Response	Count	Percent
Yes	35	7%
No	460	90%
Not sure	14	3%

Most respondents (94%) agreed the BSM system was easy to learn and 89% reported that they felt they could explain to others how the system worked.

Table 27. Percent reporting ease of learning and ability to explain BSM to others.

Question	Agree	Neutral	Disagree
I think the Blind Spot Monitoring system is easy to learn.	94%	3%	2%
I can explain to others how the Blind Spot Monitoring system works.	89%	5%	5%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

When respondents were asked to report all of the sources they had used to get information about their BSM system (Figure 4), the most common were the owner's manual (39%) and learning by trial and error (26%). More than 34% of respondents reported they had not sought information regarding their BSM system.

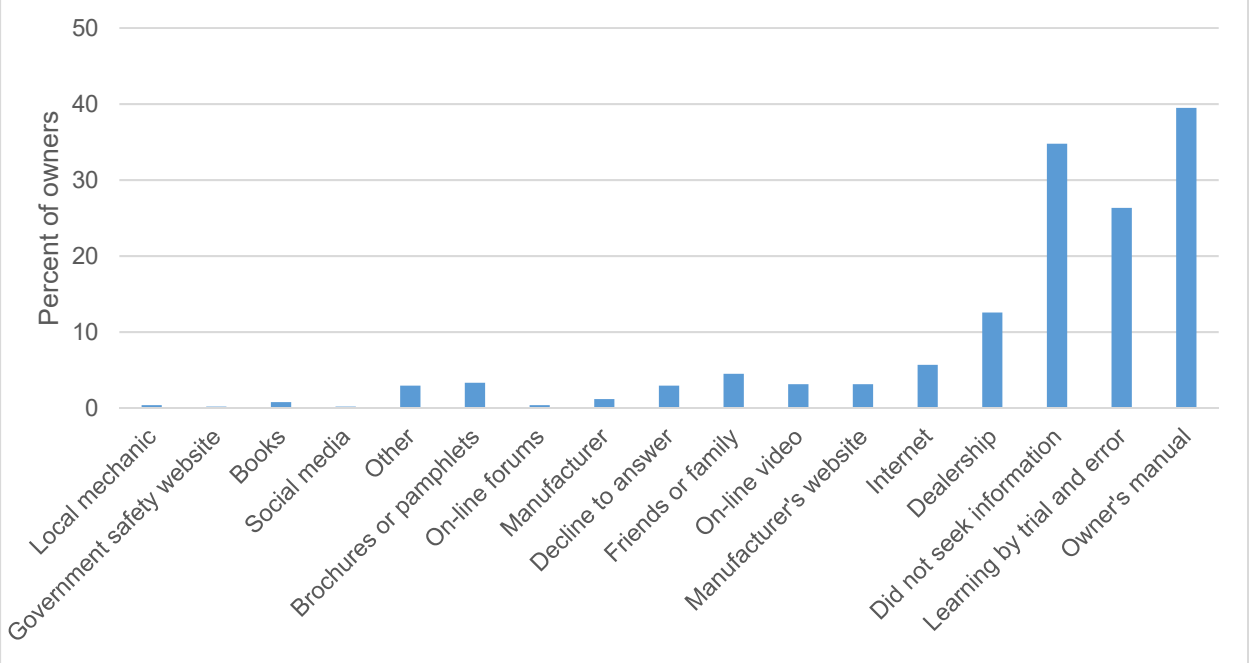

Figure 4. Percent of respondents who reported seeking information from various sources about their vehicle's BSM system.

Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions and Limitations

Respondents were asked conceptual questions regarding their knowledge of the BSM technology. The questions were specifically developed to cover a breadth of BSM systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The questions in tables 28 and 29 measured owners' knowledge of the basic purpose of BSM, as well as its functionality. Most respondents (95%) understood that it was intended to detect vehicles in one's blind spot and slightly fewer (89%) knew that it would provide some form of alert in these instances.

Table 28. Knowledge question measuring understanding of the basic purpose of BSM.

Blind Spot Monitoring systems:	Count	Percent
Detect when another vehicle is located in my vehicle's blind spot.	**484**	**95%**
Detect when my vehicle is located in another vehicle's blind spot and will sound my vehicle's horn if the other vehicle begins to move into my lane.	4	1%
Detect when my vehicle is located in another vehicle's blind spot.	8	2%
I am unsure of the correct response.	8	2%
Prefer not to answer	5	1%

Table 29. Knowledge question measuring understanding of the basic function of BSM.

It is common for Blind Spot Monitoring systems to:	Count	Percent
Alert the driver through an indicator light, a sound, or a vibration when a vehicle is in their blind spot.	**452**	**89%**
Provide an escalated warning when my vehicle is located in another vehicle's blind spot and it begins to change lanes.	20	4%
Slow my vehicle down when a vehicle is located in my blind spot.	4	1%
I am unsure of the correct response.	27	5%
Prefer not to answer	6	1%

The question in Table 30 measures respondent knowledge of the BSM system, its capabilities and limitations. Only 21% of respondents selected the correct answer. Nearly 30% of respondents were unaware of the system's limitations, incorrectly believing that BSM systems were designed to accurately detect motorcycles, bicycles and pedestrians.

Table 30. Knowledge question measuring understanding of a basic limitation of the BSM system.

Blind Spot Monitoring systems:	Count	Percent
Are designed to accurately detect motorcycles, bicycles, and pedestrians.	145	28%
Are not designed to detect vehicles passing at extremely fast speeds.	**108**	**21%**
Monitor the roadway directly behind you.	91	18%
I am unsure of the correct response.	154	30%
Prefer not to answer	11	2%

Forward Collision Warning (FCW)

A total of 1,086 respondents (89%) reported that they had an FCW system in their vehicle. Of these respondents, 519 were randomly selected to receive questions about FCW systems.

FCW – Purchase Behavior and Intent

Approximately 86% of respondents reported this is their first vehicle equipped with FCW (Table 31).

Table 31. Respondents reporting their current vehicle to be the first they have owned/leased with an FCW system.

Response	Count	Percent
Yes	445	86%
No	69	13%
Not sure	5	1%

Only slightly more than half (51%) of respondents were aware their vehicle was equipped with FCW before choosing to go for a test drive (Table 32).

Table 32. Respondents reporting awareness of FCW present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	263	51%
No	16	3%
Not sure	240	46%

Attitudes Regarding the System

Respondents were asked to report how frequently they felt comfortable looking away from the road, making a phone call or sending a text, knowing that their vehicle was equipped with an FCW system. Only 2% reported that they frequently or often felt comfortable engaging in those types of behaviors.

Table 33. Reported frequency engaging in other activities with an FCW system.

Response	Percent
Often	1%
Frequently	1%
Sometimes	5%
Rarely	17%
Never	76%

Eighty-nine percent of respondents reported never deactivating their FCW system. For the 11% who indicated that they had, the most common reason given for doing so was that they found the system annoying.

Respondents were asked to rate their trust in and usefulness of the system; responses are shown in Table 34. A larger percentage of owners felt that the system was useful (85%) than trusted the system (69%).

Table 34. Percent of respondents who trusted FCW and felt FCW was useful.

Question	Agree	Neutral	Disagree
I trust the Forward Collision Warning system.	69%	16%	14%
I think the Forward Collision Warning system is useful.	85%	7%	7%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

About half (51%) of respondents reported that, before they had purchased their vehicle, they did not understand how FCW worked (Table 35). Less than half (43%) of respondents recalled someone at the dealership offering training related to the FCW system. Of those respondents, 88% reported completing the training that was offered.

Table 35. Respondents reporting whether they understood how FCW worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	225	43%
No	263	51%
Not sure	31	6%

A large percentage of owners (86%) reported that they had a better understanding of FCW after driving with the technology for a period of time (Table 36). However, 18% of respondents reported that they had been confused or not understood why their FCW behaved the way it did in certain circumstances (Table 37).

Table 36. Respondents reporting a better understanding of FCW after driving with it for a period of time.

Response	Count	Percent
Yes	448	86%
No	43	8%
Not sure	28	5%

Table 37. Respondents reporting confusion at some point with their FCW system.

Response	Count	Percent
Yes	92	18%
No	397	76%
Not sure	30	6%

Most respondents (85%) agreed the FCW system was easy to learn and 77% indicated that they could explain to others how the system worked.

Table 38. Percent reporting ease of learning and ability to explain FCW to others.

Question	Agree	Neutral	Disagree
I think the Forward Collision Warning system is easy to learn.	85%	8%	5%
I can explain to others how the Forward Collision Warning system works.	77%	11%	11%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

When respondents were asked to report all of the sources they used to get information about their FCW system (Figure 5) the most common were the owner's manual (46%) and learning by trial and error (21%). Nearly a third of respondents (30%) reported they had not sought information regarding their FCW system.

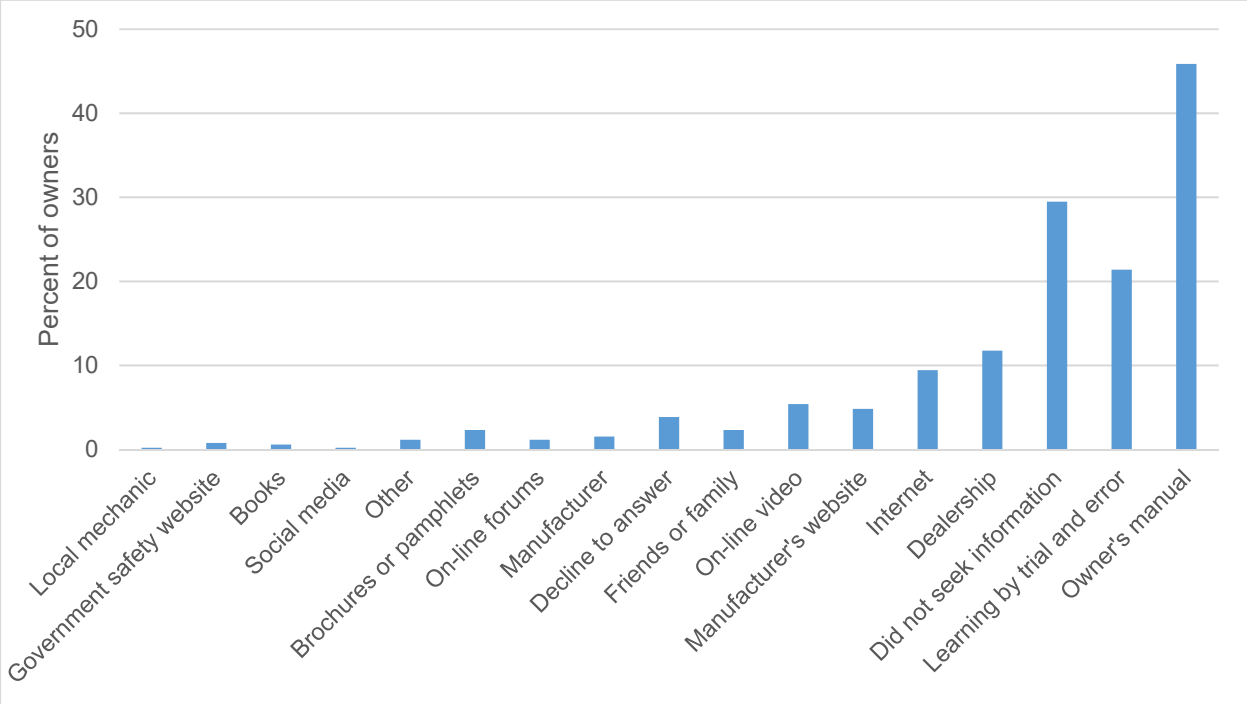

Figure 5. Percent of respondents who reported seeking information from various sources about their vehicle's FCW system.

Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions, and Limitations

Respondents were asked conceptual questions regarding their knowledge of the FCW technology. The questions were specifically developed to cover a range of FCW systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 39 measured the owners' knowledge of the basic purpose of FCW. The majority of respondents (62%) understood that the system was designed to detect and warn. However, nearly a third of owners incorrectly believed that the system would automatically apply the brakes for them.

Table 39. Knowledge question measuring understanding of the basic purpose of FCW.

Forward Collision Warning systems:	**Count**	**Percent**
Are designed to detect a crash and automatically apply the brakes if a crash is imminent.	152	29%
Are designed to detect and warn the driver of an imminent collision.	**323**	**62%**
Are designed to detect when a crash is imminent from the front, sides, and/or the rear of the vehicle.	9	2%
I am unsure of the correct response.	30	6%
Prefer not to answer	5	1%

The question in Table 40 examined the owners' knowledge regarding the basic functionality of FCW or how it works. Similar to the previous question, most respondents (65%) understood that warnings would be given to the driver in the form of sounds or visual alerts. However, 29% believed that the system would brake itself if it got too close to the vehicle ahead.

Table 40. Knowledge question measuring understanding of the basic function of FCW systems.

Forward Collision Warning systems:	**Count**	**Percent**
Can automatically apply the brakes when you are too close to the vehicle ahead.	151	29%
Can automatically steer your vehicle away from the hazard ahead.	2	0%
Can use sounds, visuals or vibrations to warn a driver that a response is needed to avoid a crash.	**339**	**65%**
I am unsure of the correct response.	22	4%
Prefer not to answer	5	1%

The question in Table 41 measured the respondents' knowledge of the system's capabilities and common limitations. While 77% selected the correct answer, indicating an understanding of the system's limitations, nearly 25% were either unsure or incorrectly believed that the system was capable of functioning in situations for which it was not meant (e.g., high glare, rain or snow).

Table 41. Knowledge question measuring understanding of a common limitation of FCW systems.

Forward Collision Warning systems:	Count	Percent
Use sensors and/or cameras and cannot be relied on exclusively.	**399**	**77%**
Work best under high glare conditions.	13	3%
Work best when it is raining or snowing.	2	0%
I am unsure of the correct response.	98	19%
Prefer not to answer	7	1%

Automatic Emergency Braking (AEB)

A total of 780 respondents (64%) reported that they had an AEB system in their vehicle. Of these respondents, 504 randomly received the AEB technology block.

Purchase Behavior and Intent

Approximately 89% of respondents reported this is their first vehicle equipped with AEB (Table 42).

Table 42. Respondents reporting their current vehicle to be the first they have owned/leased with an AEB system.

Response	Count	Percent
Yes	447	89%
No	49	10%
Not sure	8	2%

Only slightly more than half (53%) of respondents were aware their vehicle was equipped with AEB before choosing to go for a test drive (Table 43).

Table 43. Respondents reporting awareness of AEB present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	265	53%
No	220	44%
Not sure	19	4%

AEB – Attitudes Regarding the System

Respondents reported how frequently they felt comfortable looking away from the road, making a phone call or sending a text knowing that their vehicle was equipped with an AEB system. Ninety-two percent of respondents indicated that they rarely or never felt comfortable engaging in these types of activities while driving.

Table 44. Reported frequency of feeling comfortable engaging in other activities with an AEB system.

Response	Percent
Often	1%
Frequently	1%
Sometimes	5%
Rarely	17%
Never	75%

Nearly 90% of owners reported never deactivating their AEB system. For the 11% who indicated that on occasion they did so, the most common reason given was that they felt it was annoying.

Respondents were asked to rate their trust of the AEB system, as well as how useful they felt it was (Table 45). A much higher percentage of owners agreed that the system was useful (85%) than those who trusted the system (66%).

Table 45. Percent of respondents who trusted AEB and felt AEB was useful.

Question	Agree	Neutral	Disagree
I trust the Automatic Emergency Braking system.	66%	18%	14%
I think the Automatic Emergency Braking system is useful.	85%	9%	4%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

Prior to the purchase of their vehicle, nearly half of the owners (48%) reported they did not understand how AEB worked (Table 46). Only 42% recalled someone at the dealership offering training related to the AEB system. Of those, 93% reported completing the training that was offered.

Table 46. Respondents reporting whether they understood how AEB worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	233	46%
No	241	48%
Not sure	30	6%

Eighty-three percent of owners reported that, now that they had driven with the technology for a period of time, they had a better understanding of AEB (Table 47). Still, 16% reported that there had been situations in which they were confused or had not understood why their AEB behaved the way it did (Table 48).

Table 47. Respondents reporting a better understanding of AEB after driving with it for a period of time.

Response	Count	Percent
Yes	416	83%
No	56	11%
Not sure	32	6%

Table 48. Respondents reporting confusion at some point with their AEB system.

Response	Count	Percent
Yes	82	16%
No	392	78%
Not sure	30	6%

While most respondents (78%) agreed the AEB system was easy to learn, fewer respondents (69%) felt that they could explain to others how the system works.

Table 49. Percent reporting ease of learning and ability to explain AEB to others.

Question	Agree	Neutral	Disagree
I think the Automatic Emergency Braking system is easy to learn.	78%	14%	7%
I can explain to others how the Automatic Emergency Braking system works.	69%	14%	14%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

When owners were asked to report all of the information sources they had used to get information about their AEB system (Figure 6), the leading sources were the owner's manual (46%) and learning by trial and error (23%). More than a quarter of respondents (28%) reported they had not sought information regarding their AEB system.

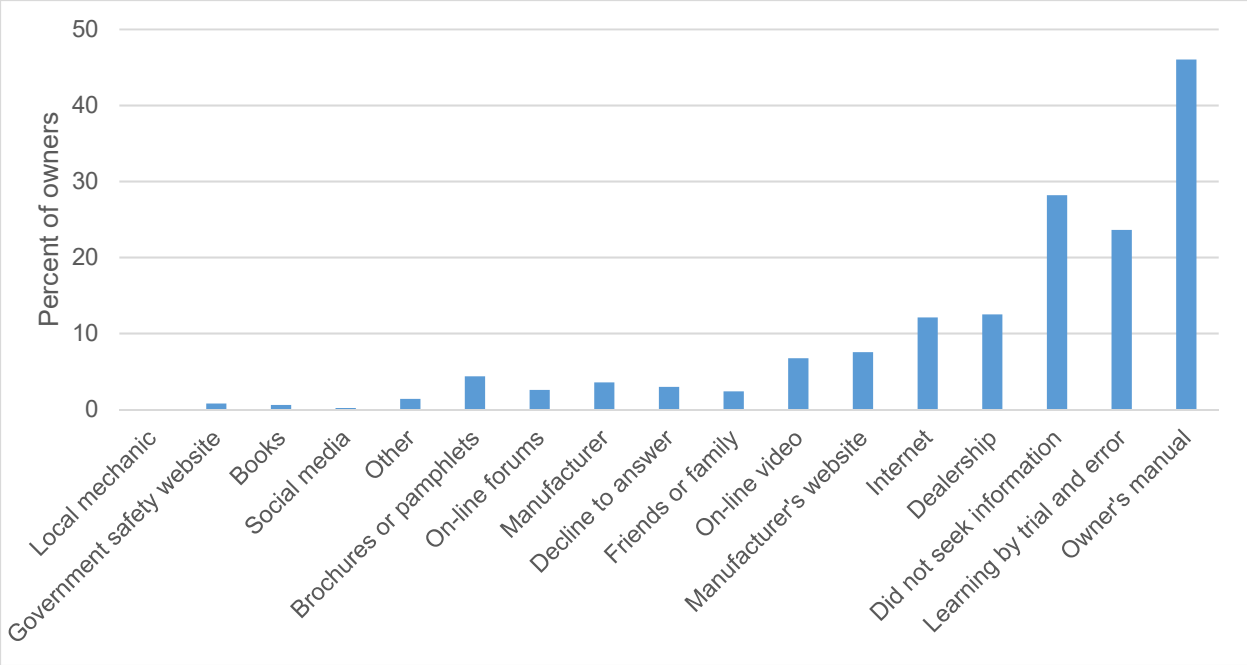

Figure 6. Percent of respondents who reported seeking information from various sources about their vehicle's AEB system.
Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions, and Limitations

Respondents were asked conceptual questions regarding their knowledge of the AEB technology. The questions were specifically developed to cover a range of AEB systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 50 measured the owners' understanding of the basic purpose of AEB. Most respondents (87%) selected the correct answer, understanding that the vehicle will alert and apply the brakes to avoid a collision. However, nearly 10% of owners mistakenly believed that the system could alert the driver of or avoid collisions that might occur in the rear of the vehicle.

Table 50. Knowledge question measuring understanding of the basic purpose of AEB.

Automatic Emergency Braking systems:	**Count**	**Percent**
Alert the driver of an imminent collision in the rear of the vehicle.	12	2%
Alert the driver of imminent collisions and automatically apply the brakes.	**436**	**87%**
Prefer not to answer	3	1%
Avoid crashes from the front, rear, and/or sides of the vehicle.	34	7%
I am unsure of the correct response.	19	4%

The question in Table 51 examined owners' knowledge regarding how AEB worked. Nearly all respondents (91%) knew that the system was monitoring the vehicle ahead using sensors and cameras.

Table 51. Knowledge question measuring understanding of the basic function of AEB.

Automatic Emergency Braking systems:	Count	Percent
Are capable of preventing all rear-end collisions.	19	4%
Are meant to slow your vehicle if you are traveling over the speed limit.	4	1%
Use sensors and/or cameras to monitor how quickly you are approaching the vehicles ahead.	**461**	**91%**
I am unsure of the correct response.	17	3%
Prefer not to answer	3	1%

The question in Table 52 measures basic knowledge of AEB, its capabilities and limitations. Only two-thirds of owners (67%) understood the limitations associated with the cameras and sensors and that they can become blocked by debris. A small percentage (4%) believed that the sensors functioned best under high glare and 21% were unsure of the correct response.

Table 52. Knowledge question measuring understanding of a common limitation of AEB systems.

Automatic Emergency Braking systems:	Count	Percent
Can be relied on to prevent all rear-end collisions.	39	8%
Function best during times of high glare (e.g., sunrise and sunset).	18	4%
Rely on sensors and/or cameras that may be blocked by dirt, ice or snow.	**337**	**67%**
I am unsure of the correct response.	105	21%
Prefer not to answer	5	1%

FCW and AEB – Supplemental Questions

Additional questions were asked specific to the FCW and AEB systems. In particular, we were interested in whether owners had experienced these systems. Approximately three-quarters of respondents (74%) who answered questions about FCW reported the system had activated to warn them of an impending collision. A smaller percentage (63%) of owners of AEB technology indicated that the system had activated the brakes to avoid a collision.

Table 53. Respondents reporting they have experienced the FCW system.

Response	Count	Percent
Yes	385	74%
No	113	22%
Not sure	9	2%
No response	12	2%

Table 54. Respondents reporting they have experienced the AEB system.

Response	Count	Percent
Yes	167	63%
No	17	33%
Not sure	320	3%

Additionally, respondents were asked to report whether having an FCW system or an AEB system had changed their driving behavior. For owners of FCW or AEB, nearly all of the respondents (94%), for each technology respectively, indicated that having the system had not caused them to drive either closer to or farther away from the vehicle in front of them.

Table 55. Respondent-reported following distance behavior with the AEB system.

Because I have a Forward Collision Warning System, I tend to travel…	Count	Percent
More closely than I would without a Forward Collision Warning system	5	1%
Less closely than I would without a Forward Collision Warning system	24	5%
The same as I would without a Forward Collision Warning system	486	94%
Not sure	4	1%

Table 56. Respondent-reported following distance behavior with an AEB system.

Because I have an Automatic Emergency Braking system, I tend to travel…	Count	Percent
More closely than I would without an Automatic Emergency Braking system	24	5%
Less closely than I would without an Automatic Emergency Braking system	3	1%
The same as I would without an Automatic Emergency Braking system	474	94%
Not sure	3	1%

Lane Departure Warning (LDW)

A total of 1,089 respondents (89%) reported having an LDW system in their vehicle. Of these respondents, 514 randomly received the questions about the LDW system.

Purchase Behavior and Intent

Approximately 88% of respondents reported this was their first vehicle equipped with LDW (Table 57).

Table 57. Respondents reporting their current vehicle to be the first they have owned/leased with an LDW system.

Response	Count	Percent
Yes	450	88%
No	59	11%
Not sure	5	1%

Half of respondents (50%) were aware their vehicle was equipped with LDW before choosing to go for a test drive (Table 58).

Table 58. Respondents reporting awareness of LDW present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	259	50%
No	245	48%
Not sure	10	2%

LDW – Attitudes Regarding the System

Respondents reported how frequently they felt comfortable looking away from the road, making a phone call or sending a text knowing their vehicle had a LDW system. Nearly 8% reported that they are sometimes, frequently or often comfortable engaging in those activities.

Table 59. Reported frequency of feeling comfortable to engage in other activities while LDW is activated

Response	Percent
Often	1%
Frequently	0%
Sometimes	6%
Rarely	17%
Never	75%

Approximately 40% of owners reported that they have deactivated their LDW system. The most common reason given for doing so was that they felt it was annoying. Seventy-seven percent of owners felt that the system was useful and 77% agreed that they could trust the system (Table 60).

Table 60. Percent of respondents who trusted LDW and felt LDW was useful.

Question	Agree	Neutral	Disagree
I trust the Lane Departure Warning system.	77%	12%	9%
I think the Lane Departure Warning system is useful.	77%	12%	8%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

Prior to the purchase of their vehicle, half (50%) of owners reported they did not understand how LDW worked (Table 61). Slightly more than half of respondents (52%) recalled someone at the dealership offering training related to the LDW system. Of those, 92% reported completing the training.

Table 61. Respondents reporting whether they understood how LDW worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	237	46%
No	259	50%
Not sure	18	4%

More than 90% of owners reported that now that they had driven their vehicle for a while, they had a better understanding of LDW (Table 62). However, 13% reported that they had, at some point, been confused about the way their LDW system was behaving (Table 63).

Table 62. Respondents reporting a better understanding of LDW after driving with it for a period of time.

Response	Count	Percent
Yes	467	91%
No	37	7%
Not sure	10	2%

Table 63. Respondents reporting confusion at some point with their LDW system.

Response	Count	Percent
Yes	69	13%
No	426	83%
Not sure	19	4%

Most respondents agreed the LDW system was easy to learn (87%) and they could explain to others how the system worked to others (82%).

Table 64. Percent reporting ease of learning and ability to explain LDW to others.

Question	Agree	Neutral	Disagree
I think the Lane Departure Warning system is easy to learn.	87%	7%	4%
I can explain to others how the Lane Departure Warning system works.	82%	8%	7%

When asked to report all information sources they used to get information about their LDW system (Figure 7), the most common cited by respondents were the owner's manual (46%) and learning by trial and error (24%). Nearly a third of respondents (31%) reported they had not sought information regarding their LDW system.

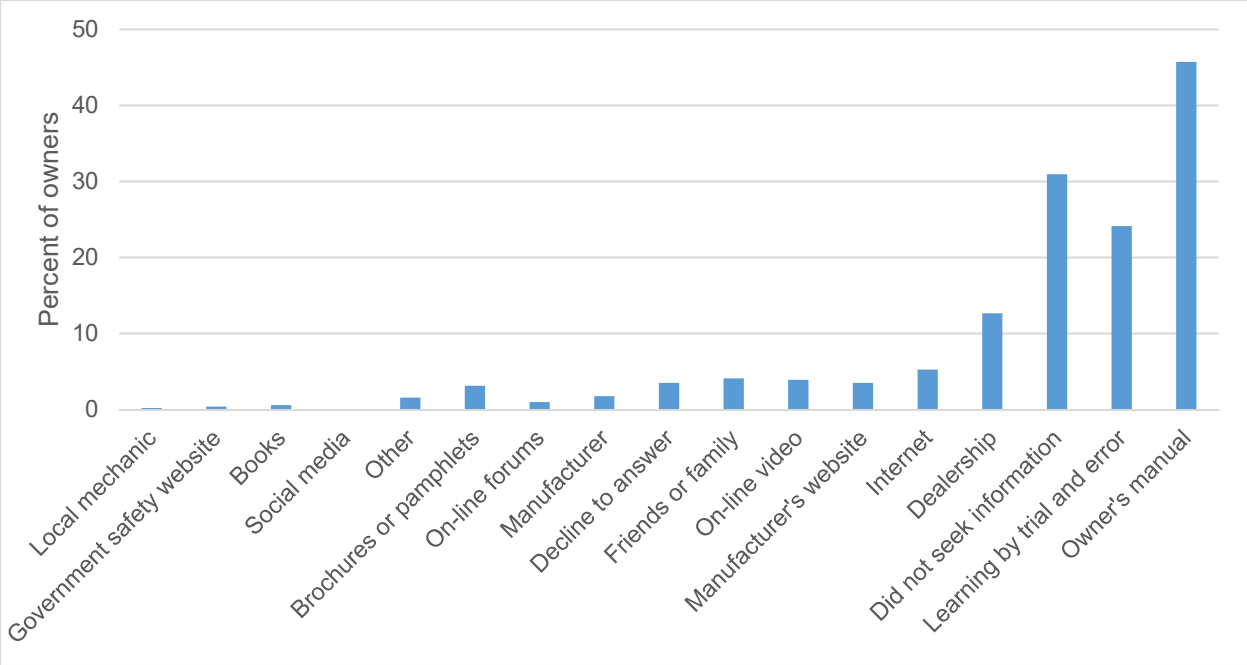

Figure 7. Percent of respondents who reported seeking information from various sources about their vehicle's LDW system.
Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions and Limitations

Respondents were asked conceptual questions regarding their knowledge of the LDW technology. The questions were specifically developed to cover a range of LDW systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 65 measured the owners' knowledge of the basic purpose of LDW. Most respondents (81%) understood that LDW provided a warning or alert when their vehicle was leaving its lane.

Table 65. Knowledge question measuring understanding of the basic purpose of LDW.

Lane Departure Warning systems:	Count	Percent
Can gently steer your vehicle back into the lane if it begins to depart from the lane.	79	15%
Can provide an alert if another vehicle is entering your lane.	6	1%
Can provide an alert if your vehicle is departing its lane.	**415**	**81%**
I am unsure of the correct response.	6	1%
Prefer not to answer	8	2%

The question in Table 66 examines owners' basic knowledge of the LDW system, including its capabilities and limitations. Nearly three-fourths of respondents (73%) correctly responded that

the system did not work when the turn signal was activated in the direction that the vehicle was departing. However, approximately 18% of respondents were unsure of the correct response and 6% believed incorrectly that the system was capable of working in thick fog and heavy rain.

Table 66. Knowledge question measuring understanding of a common limitation of LDW.

Lane Departure Warning systems:	Count	Percent
Are like "cruise control" for steering so the driver does not need to use the steering wheel.	5	1%
Can work well in thick fog or heavy precipitation because they rely on radar.	31	6%
Do not respond if the turn signal is activated and the vehicle is drifting in that direction.	**373**	**73%**
I am unsure of the correct response.	94	18%
Prefer not to answer	11	2%

The question in Table 67 measured an owner's basic knowledge regarding how the LDW system worked. Approximately 81% understood that it used cameras and sensors to detect lane markings, while 15% of respondents were unsure of the correct response.

Table 67. Knowledge question measuring understanding of the basic function of LDW.

Lane Departure Warning systems determine the vehicle's position in the lane by using:	Count	Percent
GPS data.	4	1%
Sensors and cameras to detect lane line markings on each side of the lane.	**418**	**81%**
Sonar to detect the angle between the roadway and the curb.	4	1%
I am unsure of the correct response.	78	15%
Prefer not to answer	10	2%

Lane Keeping Assist (LKA)

A total of 784 respondents (64%) reported that they had an LKA system in their vehicle. Of these respondents, 502 randomly received the LKA technology block.

Purchase Behavior and Intent

Approximately 90% of respondents reported this was their first vehicle equipped with LKA (Table 68).

Table 68. Respondents reporting their current vehicle to be the first they have owned/leased with an LKA system.

Response	Count	Percent
Yes	454	90%
No	48	10%

Only about half (49%) of respondents were aware their vehicle was equipped with LKA before choosing to go for a test drive (Table 69).

Table 69. Respondents reporting awareness of LKA present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	247	49%
No	246	49%
Not sure	9	2%

Attitudes Regarding the System

Respondents reported how frequently they felt comfortable looking away from the road, making a phone call or sending a text knowing that their vehicle was equipped with an LKA system. More than 13% indicated that they were sometimes, frequently or often comfortable doing so.

Table 70. Reported frequency of feeling comfortable engaging in other activities while LKA is activated.

Response	Percent
Often	1%
Frequently	2%
Sometimes	11%
Rarely	19%
Never	67%

More than 42% of owners indicated that they have deactivated their LKA. The most common reason reported for doing so was that it was annoying.

The majority of owners (79%) agreed that the LKA system was useful, with a slightly smaller percentage (73%) agreeing that they trusted the system. All questions offered a "prefer not to answer" option, which is not included in the table below.

Table 71. Percent of respondents who trusted LKA and felt LKA was useful.

Question	Agree	Neutral	Disagree
I trust the Lane Keeping Assistance system.	73%	13%	14%
I think the Lane Keeping Assistance system is useful.	79%	9%	11%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

Prior to the purchase of their vehicle, 56% of respondents reported they did not understand how LKA worked (Table 72). More than half of respondents (56%) recalled someone at the dealership offering training related to the LKA system. Of those respondents, 91% reported completing the training.

Table 72. Respondents reporting whether they understood how LKA worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	203	40%
No	279	56%
Not sure	20	4%

A majority of the respondents (92%) indicated that now that they had driven with LKA for a while, they had a better understanding of how it worked (Table 73). However, 13% of owners said that they had, at one point or another, been confused about the way the LKA system was behaving (Table 74).

Table 73. Respondents reporting a better understanding of LKA after driving with it for a period of time.

Response	Count	Percent
Yes	464	92%
No	25	5%
Not sure	13	3%

Table 74. Respondents reporting confusion at some point with their LKA system.

Response	Count	Percent
Yes	67	13%
No	410	82%
Not sure	25	5%

Most respondents (88%) agreed the LKA system was easy to learn and they (81%) could explain to others how the system worked.

Table 75. Percent reporting ease of learning and ability to explain LKA to others.

Question	Agree	Neutral	Disagree
I think the Lane Keeping Assistance system is easy to learn.	88%	7%	5%
I can explain to others how the Lane Keeping Assistance system works.	81%	8%	10%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

When asked to report all of the information sources they had used to get information about their LKA system (Figure 8), the most common were the owner's manual (49%) and learning by trial and error (31%). A quarter of respondents (25%) reported they had not sought information regarding their LKA system.

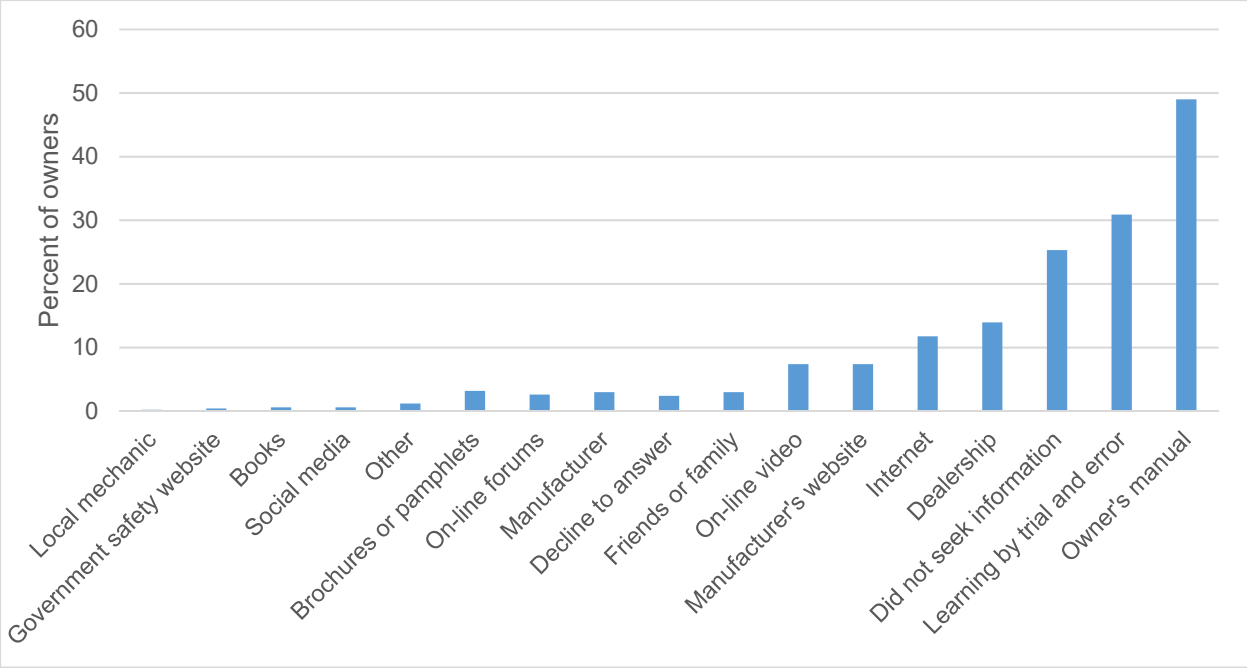

Figure 8. Percent of respondents who reported seeking information from various sources about their vehicle's LKA system.
Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System Purpose, Functions and Limitations

Respondents were asked conceptual questions regarding their knowledge of the LKA technology. The questions were specifically developed to cover a range of LKA systems and focused on the basic concepts of the technology specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 76 measured owners' understanding of the basic purpose of the LKA system. Nearly all respondents (96%) understood that it was intended to prevent crashes caused by a vehicle unintentionally drifting out of its lane.

Table 76. Knowledge question measuring understanding of the basic purpose of LKA.

Lane Keeping Assistance systems:	Count	Percent
Aim to prevent crashes caused by other vehicles crossing the median.	2	0%
Aim to prevent crashes caused by other vehicles that drift out of their lane.	5	1%
Aim to prevent crashes caused by your vehicle unintentionally drifting out of its lane.	**483**	**96%**
I am unsure of the correct response.	7	1%
Prefer not to answer	5	1%

The question in Table 77 examined owners' knowledge of how the LKA system worked. Most respondents (82%) correctly indicated that the system steered their vehicle back into its lane if it

started to depart. However, approximately 13% of respondents were unsure of the correct response.

Table 77. Knowledge question measuring understanding of the basic function of LKA.

Lane Keeping Assistance systems:	Count	Percent
Can abruptly swerve to avoid vehicles moving into your lane.	7	1%
Can bring your vehicle to a slow stop if it begins to depart from the lane.	14	3%
Can steer your vehicle back into the lane if it begins to depart from the lane.	**413**	**82%**
I am unsure of the correct response.	63	13%
Prefer not to answer	5	1%

The question in Table 78 measured the respondents' awareness of the LKA system's capabilities and limitations. Only 78% of respondents understood that the system would not steer them back into their lane if the turn signal was activated and the vehicle was departing the lane in that direction. A small percentage (4%) did not understand that fog and heavy precipitation could negatively impact the system's ability to perform and 13% of respondents were unsure of the correct response.

Table 78. Knowledge question measuring understanding of a common limitation of LKA.

Lane Keeping Assistance systems:	Count	Percent
Are like "cruise control" for steering so the driver does not need to use the steering wheel.	23	5%
Can work well in thick fog or heavy precipitation because they rely on radar.	18	4%
Do not respond if the turn signal is activated and the vehicle is drifting in that direction.	**390**	**78%**
I am unsure of the correct response.	64	13%
Prefer not to answer	7	1%

Rear Cross Traffic Alert (RCTA)

A total of 822 respondents (68%) reported that they had an RCTA system in their vehicle. Of these respondents, 513 were randomly selected to receive questions regarding the RCTA technology.

Purchase Behavior and Intent

Approximately 80% of respondents reported this was their first vehicle equipped with RCTA (Table 79).

Table 79. Respondents reporting their current vehicle to be the first they have owned/leased with an RCTA system.

Response	Count	Percent
Yes	409	80%
No	99	19%
Not sure	5	1%

Less than half of respondents (45%) were aware their vehicle was equipped with RCTA before choosing to go for a test drive (Table 80).

Table 80. Respondents reporting awareness of RCTA present in the vehicle prior to the test drive.

Response	Count	Percent
Yes	231	45%
No	262	51%
Not sure	20	4%

Attitudes Regarding the System

Respondents were asked to report how frequently they relied solely on their RCTA system. Eleven percent reported that they often or frequently relied solely on the system without confirming that the area behind them was clear with a visual check (Table 81).

Table 81. Reported frequency in solely relying on RCTA system.

Count	Percent
Often	8%
Frequently	3%
Sometimes	14%
Rarely	21%
Never	55%

Nearly all respondents (96%) reported they had never deactivated their RCTA system.

A large percentage (92%) of owners agreed that the RCTA system was useful. Fewer (82%) agreed that they trusted the system (Table 82).

Table 82. Percent of respondents who trusted RCTA and felt RCTA was useful.

Question	Agree	Neutral	Disagree
I trust the Rear Cross Traffic Alert system.	82%	11%	6%
I think the Rear Cross Traffic Alert system is useful.	92%	4%	2%

Note: Questions included a 'prefer not to answer' option, not shown in table; thus, some rows do not add up to 100%.

System Learning/Training

Prior to the purchase of their vehicle, 44% of respondents reported they did not understand how RCTA worked (Table 83). Slightly less than half of the respondents (45%) recalled someone at the dealership offering training related to the RCTA system. Of those, 91% reported completing the training.

Table 83. Respondents reporting whether they understood how RCTA worked prior to the purchase of their vehicle.

Response	Count	Percent
Yes	263	51%
No	224	44%
Not sure	26	5%

Ninety percent of owners reported that, after driving with RCTA for a while, they had a better understanding of how it worked (Table 84).

Table 84. Respondents reporting a better understanding of RCTA after driving with it for a period of time.

Response	Count	Percent
Yes	451	90%
No	30	6%
Not sure	22	4%

Additionally, 88% reported that they had never been confused about how their RCTA system behaved (Table 85).

Table 85. Respondents reporting confusion at some point with their RCTA system.

Response	Count	Percent
Yes	43	8%
No	453	88%
Not sure	17	3%

Most respondents agreed the RCTA system was easy to learn (94%) and said they could explain to others how the system worked (84%).

Table 86. Percent reporting ease of learning and ability to explain RCTA to others.

Question	Agree	Neutral	Disagree
I think the Rear Cross Traffic Alert system is easy to learn.	94%	4%	1%
I can explain to others how the Rear Cross Traffic Alert system works.	84%	9%	5%

When asked to report all of the information sources they had used to get information about their RCTA system (Figure 9), owners reported the most common to be the owner's manual (42%)

and learning by trial and error (27%). Nearly a third of respondents (32%) reported they had not sought information regarding their RCTA system.

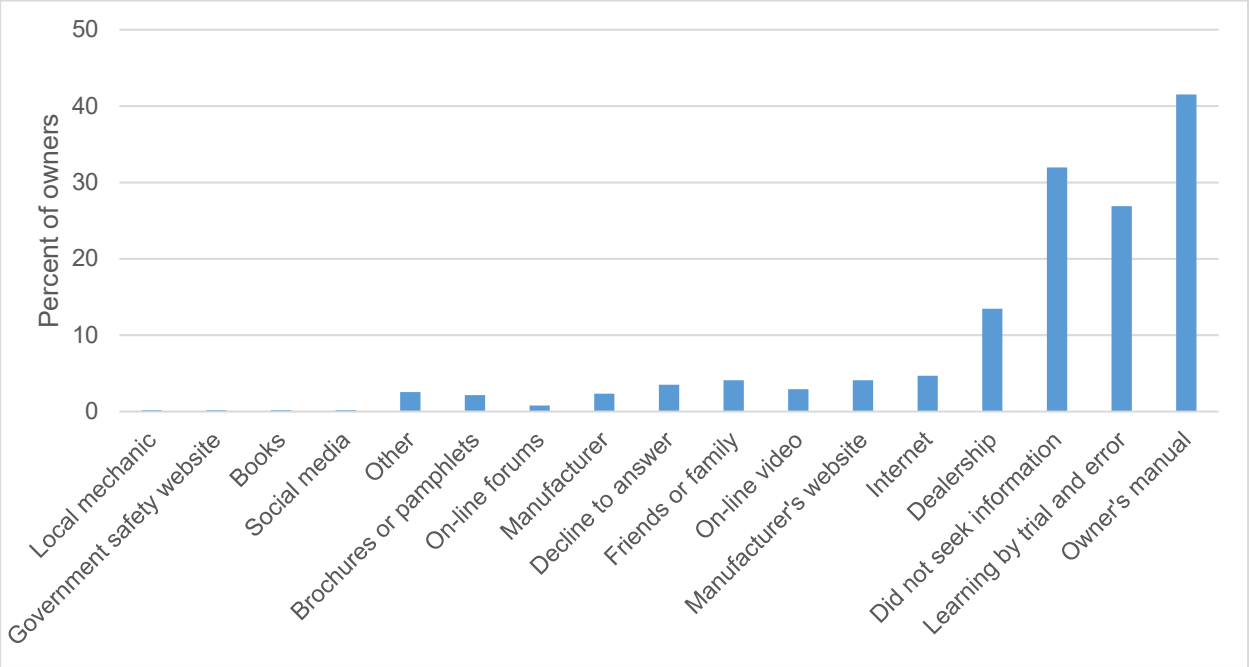

Figure 9. Percent of respondents who reported seeking information from various sources about their vehicle's RCTA system.
Note: Respondents were allowed to select multiple responses; thus, percentages add up to more than 100%.

Knowledge of System, Purpose, Functions and Limitations

Respondents were asked conceptual questions regarding their knowledge of the RCTA technology. The questions were specifically developed to cover a range of RCTA systems and focused on the basic concepts of the technology, specifically related to the purpose, function (how the system works) and limitations. All knowledge questions featured one correct answer, which is highlighted in the tables.

The question in Table 87 measured owners' understanding of the purpose of an RCTA system. Most respondents (82%) understood that the system would provide an alert if another vehicle entered the detection zone while they were backing up. Sixteen percent, however, incorrectly believed that the system would apply the brakes as well.

Table 87. Knowledge question measuring understanding of the basic purpose of RCTA.

Rear Cross Traffic Alert systems:	Count	Percent
Brake your vehicle for you if you fail to notice an object that is located behind your vehicle while you are backing up.	13	3%
Provide an alert if another vehicle enters the detection zone while you are backing up and then applies the brakes for you if you do not.	66	13%
Provide an alert if another vehicle enters the detection zone while you are backing up.	**420**	**82%**
I am unsure of the correct response.	10	2%
Prefer not to answer	4	1%

The question in Table 88 examined whether owners understood the basics regarding how the RCTA system worked. More than half of respondents (61%) knew that the system used sensors located on the rear of the vehicle, while approximately 34% of respondents thought the system used some type of camera.

Table 88. Knowledge question measuring understanding of the basic function of RCTA.

Rear Cross Traffic Alert systems:	Count	Percent
Rely on cameras located in the rear view mirror.	74	14%
Rely on sensors that are located on the rear of the vehicle.	**315**	**61%**
Rely on the rear back-up camera.	102	20%
I am unsure of the correct response.	7	1%
Prefer not to answer	15	3%

The question in Table 89 measured basic knowledge regarding the capabilities and limitations of RCTA systems. Only 60% of respondents understood that the system was not designed to detect objects in front of the vehicle and 14% believed that the system was designed as a parking aid. An additional 19% of respondents were unsure of the correct response.

Table 89. Knowledge question measuring understanding of a common limitation of RCTA.

Rear Cross Traffic Alert systems:	Count	Percent
Are able to detect objects located partially under the vehicle.	28	5%
Are not primarily designed to detect objects in the front of the vehicle.	**308**	**60%**
Are primarily designed to assist with backing into a parallel parking space.	71	14%
I am unsure of the correct response.	96	19%
Prefer not to answer	10	2%

Comparisons and Contrasts across All Technologies

The following section provides a more comprehensive look at the results across all of the technologies. These particular results were selected for their importance and interest to the research team.

Figure 10 shows the percentage of all survey respondents who reported that their vehicle was equipped with each respective technology.

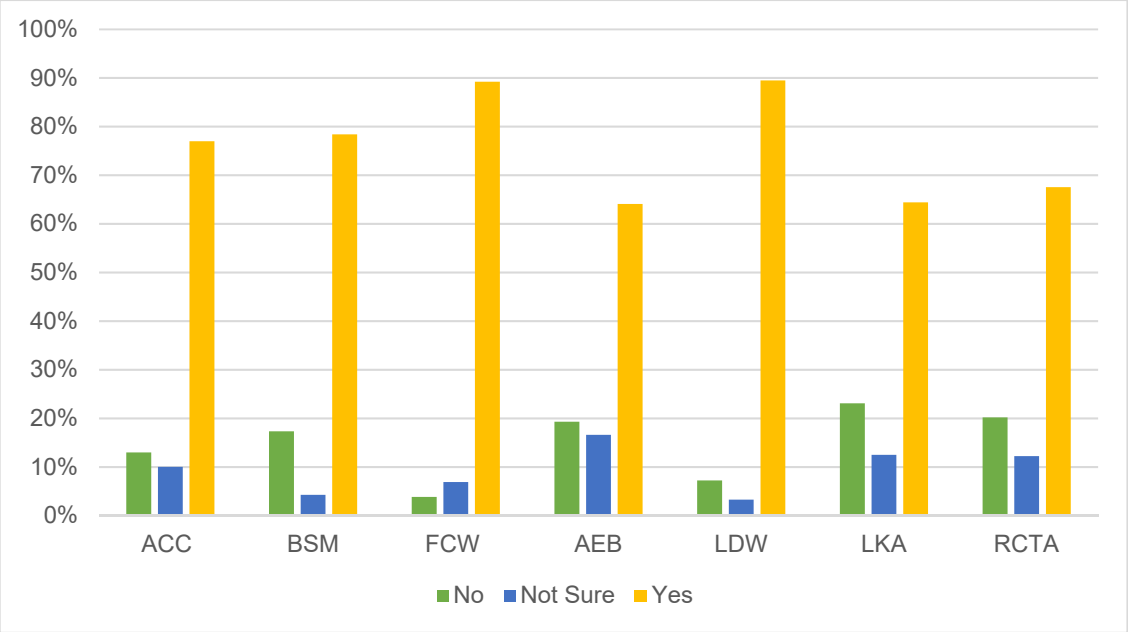

Figure 10. Self-reported technology equipped in respondent vehicle

Awareness Prior to the Test Drive

Figure 11 shows the aggregate responses when asked if owners were aware their vehicle was equipped with a particular technology prior to the test drive. The total range for all technology awareness by respondents fluctuated between 46% and 69%. However, awareness of all technologies, except for BSM, ranged from 45-53%. The BSM system had a markedly higher awareness percentage by respondents of 69%. Reported uncertainty regarding whether their vehicle was equipped with a particular technology was relatively low for all technologies and ranged between 2-4%.

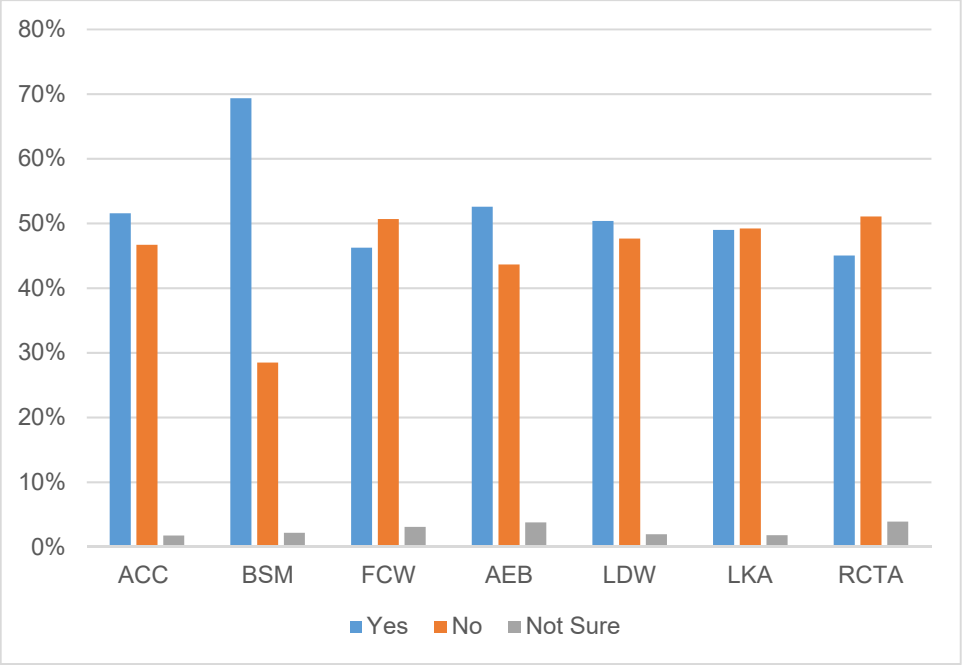

Figure 11. Awareness that vehicle was equipped with each respective technology prior to test driving the vehicle, among owners of vehicles equipped with each respective technology.

Respondents were asked to indicate how important it was to them that the vehicle was equipped with the ADAS technologies at the time they started shopping for a vehicle.

Table 90 displays the percent of respondents who felt it was important that the vehicle was equipped with each ADAS technology among respondents who were aware that the vehicle was equipped with the system prior to their test-driving the vehicle and among respondents who were not aware that the vehicle had the technology prior to test-driving it. Unsurprisingly, those who felt it was important for their car to be equipped with a particular system were much more likely to be aware that the vehicle was equipped with that system before they even test-drove it.

Table 90. Percent of respondents who reported that it was important for their vehicle to be equipped with particular technologies in relation to whether or not they were aware that the vehicle that they ultimately bought or leased was equipped with the technology prior to taking the vehicle for a test drive.

Percent of respondents who indicated that it was important for their vehicle to be equipped with technology shown in column							
Aware the vehicle was equipped with the technology before test drive?	**ACC**	**BSM**	**FCW**	**AEB**	**LDW**	**LKA**	**RCTA**
YES	47%	67%	51%	54%	39%	44%	63%
NO	6%	19%	12%	11%	7%	6%	15%

Prior Ownership of Technology

Table 91 shows how important it was to the owner that the vehicle they were purchasing be equipped with the technology, cross-tabulated with previous ownership of a vehicle equipped with the applicable technology. The percentage totals in Table 91 reflect the cumulative percentage of respondents who agreed that it was important (at the time of shopping) that their vehicle was equipped with the technology, among respondents who ultimately bought or leased a vehicle with that technology. For example, the first row shows that the 70% of respondents with ACC who had previously owned another vehicle with that technology agreed that it was important at the time of shopping their vehicle was equipped with ACC. In contrast, only 37% of respondents with ACC who had not previously owned another vehicle with that technology agreed that it was important for their vehicle to have ACC. As demonstrated in Table 91, higher percentages of respondents who had previously owned a vehicle equipped with each respective ADAS system considered it important for the vehicle for which they were shopping to be equipped with the technology.

Table 91. Percent of respondents who reported that it was important for their vehicle to be equipped with particular technologies in relation to whether or not they had previously had a vehicle with that technology.

Percent of respondents who indicated that it was important for their vehicle to be equipped with technology shown in column							
Had other previous vehicle with the technology?	**ACC**	**BSM**	**FCW**	**AEB**	**LDW**	**LKA**	**RCTA**
YES	70%	84%	67%	71%	49%	73%	76%
NO	37%	58%	43%	48%	36%	37%	46%

Attitudes and Opinions Regarding the Technologies

Table 92 displays the proportion of respondents who agreed with each of several statements about each respective technology. Statements assessed the extent to which respondents trusted the technology, found it useful, found it annoying, found it distracting, believed that it made them safer and found it easy to learn.

The percentage of respondents who agreed they trusted the system was highest for BSM (84%) and RCTA (82%). These technologies also had the highest percentage of respondents who agreed the system made them feel safer and the lowest percentage who felt they were distracting.

The technologies with the highest percentage of owners agreeing they were useful included BSM (94%) and RCTA (92%). Fewer agreed that AEB (85%), LKA (85%), ACC for highway driving (81%) and LDW (77%) were useful. In a major departure from all other technologies examined, only 47% of owners agreed that ACC for in-town driving was useful.

The technologies that the greatest numbers of respondents indicated were annoying were LDW (25%) and ACC in-town (24%). These same technologies were also considered distracting by the largest percentages of respondents.

The vast majority of respondents with RCTA and BSM agreed that these technologies were easy to learn how to use (both 94%). AEB (78%) and in-town ACC (75%) were rated as easy to learn by the fewest respondents.

Table 92. Opinions regarding trust, usefulness, safety and ease of learning of ADAS technologies among owners of vehicles equipped with the technologies.

	I trust the technology	I think the technology is useful	I think the technology is annoying	The technology makes me feel safer	I think the technology is distracting	I think the technology is easy to learn
ACC in-town	59%	47%	24%	48%	21%	75%
ACC highway	78%	81%	13%	61%	11%	80%
BSM	84%	94%	4%	85%	3%	94%
FCW	69%	85%	11%	68%	9%	85%
AEB	66%	85%	11%	69%	8%	78%
LDW	77%	77%	25%	62%	18%	87%
LKA	73%	79%	17%	65%	15%	88%
RCTA	82%	92%	4%	81%	2%	94%

Deactivation of the Technology

Respondents were asked to report how frequently they deactivated or, in the case of ACC, chose not to use the technology (Table 93). LDW and LKA systems were the technologies most frequently deactivated (40% and 42%, respectively). Approximately 11% and 15% for ACC highway and in-town, respectively, reported they never used the technology. Very few respondents with BSM or RCTA reported deactivating these technologies.

Table 93. Percentage reporting deactivation or nonuse of the technology.

ACC highway	ACC in-town	BSM	FCW	AEB	LDW	LKA	RCTA
11%	15%	3%	11%	11%	40%	42%	4%

Owners who reported never using their ACC for highway or in-town use most commonly reported that this was because they did not need/want the system (39% and 52%, respectively) (Figure 12). While a very small percentage of owners reported deactivating their BSM system, nearly a quarter of them (24%) said they did so because it was distracting. The most common reason given for deactivating FCW, AEB, LDW and LKA was that owners felt it was annoying (Figure 13). This was especially true for owners of LDW and AEB, with 41% and 31%, respectively, indicating that this was the reason they deactivated their system. In the case of RCTA, the small number of drivers who deactivated the system indicated that they thought it was annoying (22%) or answered "other" (22%) and provided additional information indicating that they deactivated it because the system provided warnings continuously when they were towing a trailer or a boat.

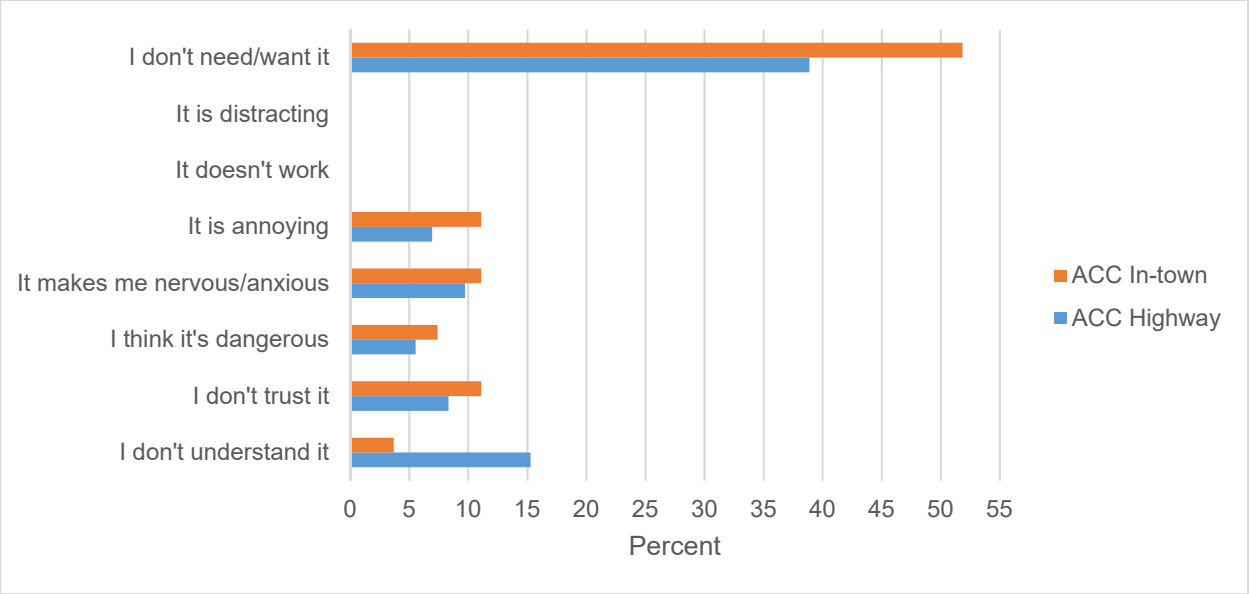

Figure 12. Reported reasons for nonuse of ACC highway and in-town systems among vehicle owners who reported having ACC but not using it.

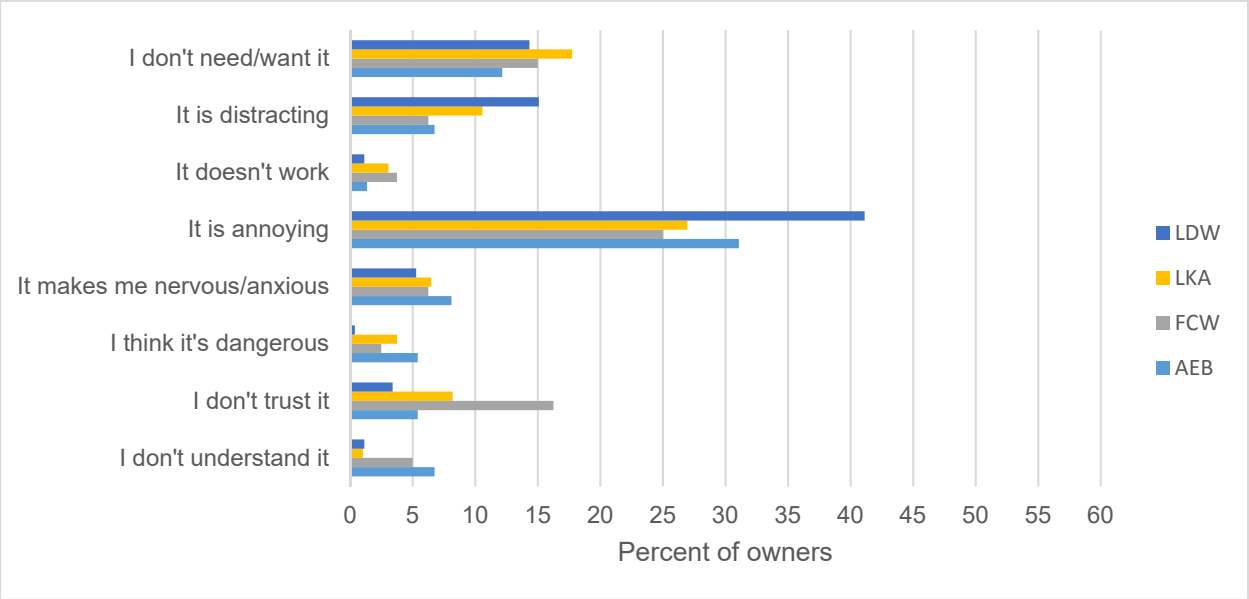

Figure 13. Reported reasons for deactivating LDW, LKA, FCW and AEB among vehicle owners who deactivated the systems.

Unexpected Events

Respondents were asked to report if they had ever experienced a situation or scenario in which the technology behaved unexpectedly or in a manner they did not understand. Results are presented in Table 94. The technologies for which respondents were most likely to report having

experienced unexpected behavior were FCW (18%) and AEB (16%). Respondents were least likely to report having experienced unexpected behavior from RCTA or BSM systems.

Table 94. Percentage reporting they had been confused or did not understand why the technology behaved the way it did.

ACC	BSM	FCW	AEB	LDW	LKA	RCTA
14%	7%	18%	16%	13%	13%	8%

Respondents who indicated they had experienced a time when their ADAS technology behaved in a manner they did not understand were asked to describe the incident(s). Table 95 features a selected qualitative response from a respondent for each technology.

Table 95. Examples of respondents' descriptions of experiences in which their vehicles behaved in a manner they did not understand.

Technology	Selected quote/response
ACC	*"Didn't really know I had it so the first time the vehicle slowed down, I was surprised. I liked it! I only use cruise control on the highway."*
BSM	*"At times, it picks up stationary objects on the side of the road that are not in the possibility of a collision."*
FCW	*"Did not feel that I was too close to the vehicle in front of me. I felt I was in complete control of my vehicle & not in danger of a collision"*
AEB	*"Car pulled out near me, but not completely, I might not have braked quite so soon or so hard - it confused the other driver thought I was yielding to them when I was not.*"
LDW	*"Alert sounded when no apparent lane departure occurred. Approximately 5 times in 13k miles."*
LKA	*"There have been a handful of times where [the LKA system] allowed me to drift out of a lane. This usually happens if I'm in the right lane of the highway and there is an exit, so I attributed it to losing sight of the lines."*
RCTA	*"A school bus was approaching when I was backing out of the garage although I was a bit scared of the sound and the warning indicator. It was the first time."*

Learning Preferences

Respondents were asked to select all of the sources they had used to learn about the different ADAS technologies. As illustrated in Figure 14, the owner's manual was the most commonly reported source used to seek information for all of the technologies, with the second, third and fourth most common answers being the dealership, trial and error, and not seeking any information, with the order varying across technologies. Roughly 12% of respondents reported seeking information about AEB and LKA from the internet; fewer than 10% of respondents reported consulting any of the other sources queried (e.g., vehicle manufacturer, friends and family, government safety websites, and others) for any of the technologies.

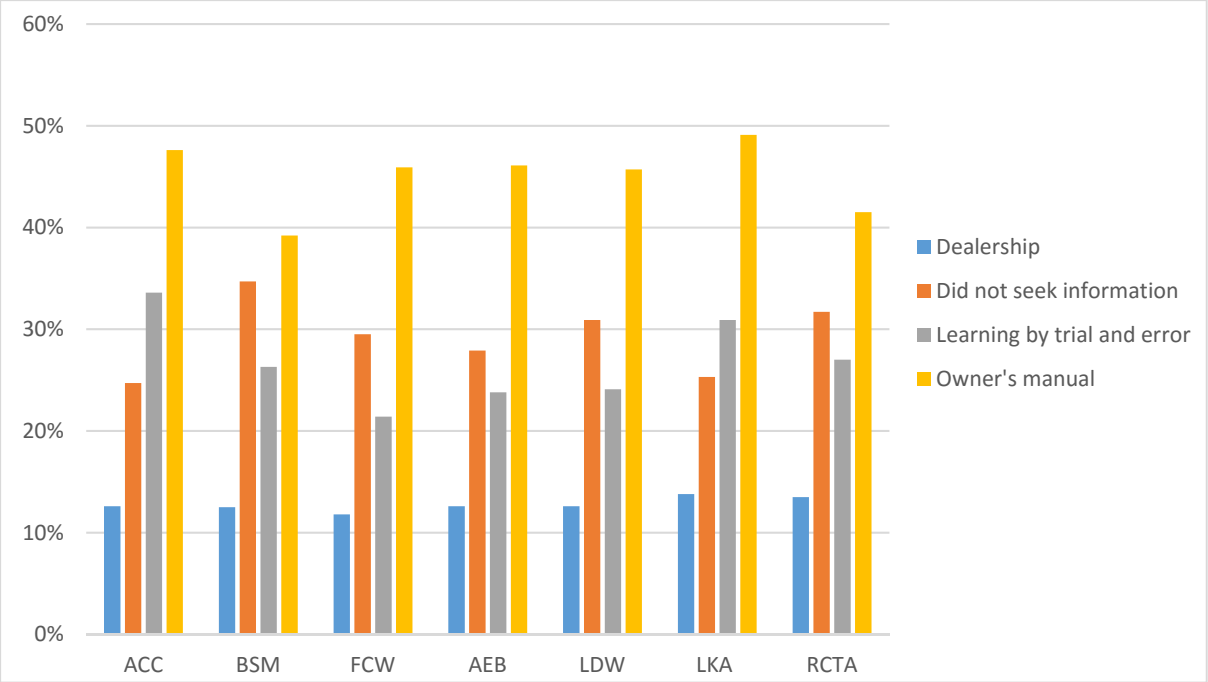

Figure 14. Percentage of vehicle owners who reported learning about each technology from their dealership, trial and error, or the owner's manual, or not seeking any information at all.

Training at the Dealership

Nearly all respondents (97%) in the survey reported purchasing their vehicle from a dealership. Respondents who purchased their vehicle from a dealership were asked additional questions, such as if they were offered training at the dealership and what their satisfaction level was with any training. Approximately 42-56% of respondents recalled training being offered by the dealership for each technology (Table 96).

Table 96. Respondent recall of ADAS technology training offered at dealership.

Technology	Yes	No	Not Sure
ACC	45%	45%	7%
BSM	50%	38%	9%
FCW	43%	49%	7%
AEB	42%	45%	9%
LDW	52%	42%	6%
LKA	56%	39%	6%
RCTA	45%	45%	10%

For respondents who recalled training offered at the dealership, 87% or more took advantage of the opportunity and completed the training.

Table 97. Percentage of respondents who completed the training at the dealership.

Technology	Percent
ACC	87%
BSM	89%
FCW	88%
AEB	93%
LDW	92%
LKA	91%
RCTA	91%

Generally, respondents were satisfied with the training they received at the dealership, giving it an average rating between 7.5 and 8.3 on a 10-point scale on which 10 represented the highest rating for satisfaction (Table 98).

Table 98. Respondent average rating of training at the dealership.

Technology	Average Satisfaction Rating (1 = Very Unsatisfied, 10 = Very Satisfied)
ACC	7.7 (SD = 2.0)
BSM	8.1 (SD = 2.0)
FCW	8.1 (SD = 2.0)
AEB	7.7 (SD = 2.1)
LDW	8.0 (SD = 2.0)
LKA	7.5 (SD = 2.2)
RCTA	8.4 (SD = 1.8)

Respondents were asked whether they still had questions after the training regarding the technology. RCTA, BSM and LDW had the fewest respondents reporting they had remaining questions following the training (13%, 14% and 17%, respectively). All other technologies (AEB, FCW, LKA and ACC) had approximately 20% of respondents or greater with remaining questions following the training. The technology with the greatest number of respondents who had remaining questions following the training was ACC.

Future Technology Interest and Recommendation of Technology to Others

In each technology block, respondents were asked to rate the likelihood that they would want that technology in the next vehicle they buy or lease. Figure 15 presents the percentage of respondents who indicated they would "definitely" or "probably" want to have a particular technology in their next vehicle, as well as the percentage of respondents who would recommend the technology to others.

The technology with the highest percentage of people indicating that they would definitely want it in their next vehicle was BSM (94%). In fact, no respondents indicated they would "definitely not" want a BSM system — the only technology for which this was the case. RCTA was similarly popular, with 90% of respondents indicating that they would definitely want it on their next vehicle, fully 10 percentage points ahead of the next most popular technology. The

percentage of respondents who indicated that they would recommend the technologies to others followed a similar pattern.

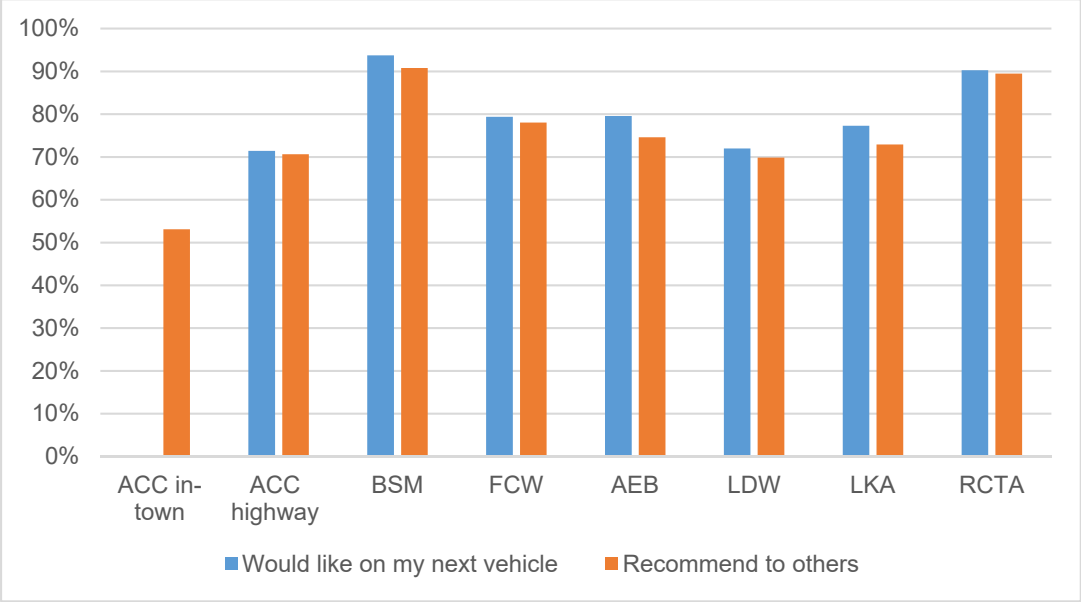

Figure 15. Percentage of owners interested in the technology for their next vehicle and the percentage who would recommend the technology to others.

Discussion

The study sought to provide insight into how drivers' experiences with ADAS technologies relate to their understanding and opinions of the technology. The study also sought to identify educational needs for the driving public regarding ADAS. The research investigated four key areas: purchase behavior and intent, drivers' attitudes regarding the system, system learning and training, and general knowledge of the technologies.

Purchase Behavior and Intent

An examination of drivers' purchase behavior in regard to vehicles equipped with ADAS systems found that, prior to the test drive, only about half of respondents were aware that the vehicle that they ultimately bought was equipped with its particular technologies. This is somewhat surprising, given the fact that many of these technologies are making their way to economy level trims. In addition, some manufacturers have started advertising these technologies, touting their benefits in terms of driver convenience and safety.

The BSM system was the one that the greatest percentage of owners (69%) reported being aware of prior to the test drive. This finding may not be all that surprising, given that prior research indicates high interest in the BSM technology (J.D. Power Ratings, 2015; McDonald et al., 2016). This high interest may be due to the salience of its interface. While implementation of the technology varies across vehicles and manufacturers, generally the system provides an icon on the side-view mirror and may also provide a sound, beep or haptic alert when a vehicle is located in the driver's blind spot. The easy-to-understand nature of the BSM technology could also play a role, as could the fact that its functionality is less likely to be confused with one of the other systems (such as confusion between FCW and AEB, AEB and ACC, or LDW and LKA).

Drivers exhibited low levels of awareness of RCTA, FCW, LKA and LDW prior to the test drive, between 45% and 50%. For example, 51% of respondents were unaware that their vehicle was equipped with FCW at the time of the test drive. However, when respondents were asked if they were aware that their vehicle was equipped with AEB, 53% answered they were. Most AEB systems are coupled with FCW systems and provide a warning prior to engaging automatic braking. As previously noted, the integration of some of these technologies can make it difficult for drivers to understand where one system stops and another takes over.

Similar findings were present for LDW. Approximately 48% reported they were not aware at the time of the test drive if the vehicle was equipped with LDW. However, 49% reported they were aware their vehicle had LKA. It's highly unlikely that a vehicle equipped with LKA would not have a warning (LDW) component to the technology, prior to initiating control of the vehicle. It's possible that owners do not understand that the warning component of each technology (the audible sound, haptic alert or icon presence) is a technology on its own and they believe the warning is part of the technology that takes over control. Typically, the warning component acts seconds or even only a fraction of a second prior to the vehicle taking over control, possibly making it difficult for the driver to perceive the difference between the warning and the control aspect of the technology. While it may not be harmful to the respondent or impact safety on roadways, it is concerning that a respondent is not aware of a warning in general. If a respondent

does not know the technology exists in the vehicle, how will they respond to that alert and will they understand its true nature?

Similar to FCW and LDW, RCTA systems provide the driver with some type of hazard alert (e.g., a tone or beep) when the driver is backing up. Commonly, this system operates alongside or in conjunction with a back-up camera, making it indistinguishable by the driver. It is possible that, prior to the test drive, respondents believed the alerts were coming from the backup camera rather than a standalone system, such as the RCTA. If so, this could explain the low percentage of drivers who reported being aware of that system being present in the vehicle.

Not surprisingly, the data indicates that those respondents who were aware a vehicle was equipped with a particular technology were more likely to feel it was important for their vehicle to have it; it is possible that the drivers who considered it important for their car to have a specific technology sought out the car that they ultimately bought at least in part because of the technology. Currently, there is very little information regarding how aware drivers are of ADAS technologies. The Information Seeking and Adoption Model (ISAM) was developed by leaders of the MyCarDoesWhat campaign to explain what motivates individuals to seek out new information on a new topic (Whitcomb, Askelson, Friberg, Sinelnikov, & Bukowski, 2017). The model was developed specifically for the campaign due to ADAS technology's recent emergence into the market and relative lack of knowledge by the general public. The ISAM is a hybrid of two public health models: Theory of Motivated Information Model (TMIM) and Precaution Adoption Process Model (PAPM) (Afifi & Weiner, 2004; Fowler & Afifi, 2011; Jones & Donovan, 2004). The first model is used to explain what motivates individuals to seek information on a particular topic, while the second model focuses on motivating behavior change. The MyCarDoesWhat ISAM has four critical stages that include various strategies to motivate the individual to move through the model. The first stage of the model relies on the individual perceiving that the issue is important. Data from this survey supports the notion that if drivers do not have awareness of the technology, they may not believe it to be important.

Attitudes Regarding the Systems

Drivers' attitudes regarding the technologies can impact acceptance and effective use of the system. Previous literature has found that acceptance is vital for the successful implementation of these technologies and for them to achieve their full safety potential (Najm, Stearns, Howarth, Koopmann, & Hitz, 2006). Additionally, inappropriate trust and false expectations can lead to misuse of or an overreliance on the technology (Parasuraman & Riley, 1997). This was found to be true for several of the systems in the context of the current study. For example, nearly half of all respondents with BSM reported that they at least "rarely" rely solely on their BSM and do not perform a visual check of their blind spot before changing lanes, including 11% who admitted solely relying on the BSM "often" or "frequently." Similar findings were observed with RCTA, with a substantial minority of respondents indicating that they did not always perform visual checks when backing, and LDW, with some respondents indicating that they were more comfortable looking away from the road because of the LDW system. While many reported that having ACC did not cause them to increase or decrease their following distance, approximately 13% of respondents said that they felt comfortable looking away from the road "sometimes," "frequently" or "often." As drivers become more comfortable with these technologies, the

possibility for overreliance on these systems could grow. Much more research is needed on this topic.

Deactivation or nonuse of the systems examined, and the respondent's reason for doing so, varied from one technology to the next. ACC for both in-town and highway use was the system that the greatest percentage of owners with the system reported not using. When asked to report why, owners said that they did not want or need the technology. While further research is needed to fully understand this, it may be that those who reported not needing ACC for highway driving simply did not drive that often on highways and interstates. For ACC in-town, owners may not have perceived it as being useful. When compared with the other systems, ACC for in-town use received the lowest percentage of owners who felt it was useful. It is also possible that owners might be extrapolating from their prior experience with ordinary cruise control, which typically advised drivers that it was not to be used in stop-and-go traffic, and thus simply not thinking of using a feature that is referred to as a form of "cruise control" for nonhighway driving.

Interestingly, for most of the technologies (FCW, AEB, LDW, LKA and RCTA), the reason that owners gave most frequently for deactivating the system was that they found it annoying. This is not surprising for the LDW technology, as previous research has indicated that drivers find the sound or warning annoying and that they believed they received false or unnecessary warnings (Braitman et al., 2010). Similar patterns have been found for FCW and AEB in that drivers report the system to be annoying and that they receive false or unnecessary warnings (Cicchino & McCartt, 2014). In both cases of AEB and LKA, the technologies work very closely with their alerting counterpart (i.e., FCW and LDW). The alert is provided immediately before the control aspect of the technology takes effect, and it is critical to understand which element the driver finds annoying. For respondents who have both technologies in the set (FCW/AEB and LDW/LKA), further analyses should be completed to understand how much false or unnecessary warnings are contributing to a driver's annoyance.

To further understand driver attitudes regarding the systems, the survey included questions of the respondents' willingness to recommend the technology to other drivers and to have it on their next vehicle. By both measures, BSM and RCTA systems were the most popular by a full 10 percentage points, with 90% or more of owners indicating that they would want the system on their next vehicle and would recommend it to others. The popularity of the BSM system is consistent with previous findings by others (J.D. Power Ratings, 2016; McDonald et al., 2016). Responses to these questions were fairly similar for FCW, AEB, LKA, LDW and ACC for highway driving, with 70-80% of owners providing positive responses for these items. A major exception to this pattern of general enthusiasm for the technologies was found for ACC for in-town driving, which only 53% of owners reported that they would recommend to others.

Notably, 32% of drivers who reported that their vehicle was equipped with ACC indicated that they were unsure as to whether their ACC system included in-town/stop-and-go functionality. When comparing opinion and attitude results of ACC for in-town driving with ACC for highway driving, the ACC for highway driving had higher percentages of trust, usefulness, making the respondent feel safer and ease of learning than ACC for in-town driving. Additionally, ACC for highway driving had fewer owners who reported apprehension, annoyance and distraction compared with ACC for in-town driving. More analysis is required to ensure that individuals

who reported having ACC for in-town driving actually had the technology on their vehicle. It is also possible that those owners who have ACC for in-town driving have an inaccurate mental model of how the system actually works. It can seem very different from ACC for highway driving. This aligns with previous research that found when drivers have misconceptions about ADAS systems and their performance capabilities, their mental models of the systems may not match reality (Llaneras, 2006). In addition, when asked about limitations of the ACC system, 38% of owners failed to identify the correct response, which was that it may not be able to successfully brake in all situations. This is consistent with prior research that found 30% of drivers reported being unaware of ACC system limitations or situations in which the system had difficulty functioning, including curves or roundabouts (Larsson, 2012). If a driver has inaccurate expectations of what the system can do relative to what it can actually do, this can affect their overall opinions and attitudes regarding the system. Further analysis is needed to identify the potential factors that may have influenced owners' attitudes regarding this system.

System Learning and Training

Understanding how drivers seek information regarding their ADAS technologies is critical for the industry to better meet educational needs. Regardless of the technology, the sources drivers reported using most often for gaining information included the vehicle owner's manual, learning by trial and error, and the dealership. These are very conventional, traditional methods. Somewhat surprisingly, for each of the technologies examined, 25-35% of respondents reported that they had not sought any information from any source regarding the technology. At most 12% of respondents indicated that they had sought information about any of the technologies on the internet. Beyond the vehicle owner's manual, the dealership, the internet, and trial and error, fewer than 10% of respondents reported having consulted any of the other sources of information listed in the survey. Of particular note, the percentage of respondents who indicated that they had sought information about the technologies from government websites was very low for all technologies examined and was actually zero for some of them. It is possible that respondents believe they do not need information regarding the system or perhaps these people do not use the system. Relying exclusively on the owner's manual and/or learning by trial and error may have negative consequences on the driver's understanding or mental model development. For example, previous research found that drivers may not understand or remember all of the system limitations when learning the technology by trial and error (Mehlenbacher, Wogalter, & Laughery, 2002). Furthermore, drivers who read the owner's manual may not have actually fully read and understood all important content in it and may have difficulty transferring what they read to their real-world driving situation (Leonard & Karnes, 2000). Given the prevalence of preference for the owner's manual, there may be an opportunity for the industry and manufacturers to re-evaluate owner's manuals and identify ways to improve comprehension of content related to ADAS technologies.

Most respondents reported purchasing their vehicle from a dealership. Those who did were asked to report if they recalled training being offered by someone there. Across all technologies, approximately half of the respondents recalled training being offered. Of these, approximately 90% across all technologies reported having completed the training. The results showed that when drivers were offered training at the dealership, they were likely to take advantage of it. However, approximately 15-30% of respondents still had remaining questions following the

training at the dealership. It is worth noting that the technologies that take over control garnered higher reports of remaining questions after the training. These results may suggest that technologies that take on greater levels of control may require additional and more in-depth training to ensure drivers have a firm understanding of the technology.

It is important to understand the sources owners are using to get information about the technologies in their vehicles in order to identify how and at what point drivers are developing their mental model and where potential breakdowns may occur. Additionally, having the correct knowledge of a system's purpose, functions and limitations is extremely important to the development of these models.

Knowledge of System Purpose, Functions, and Limitations

Owners' knowledge of the technologies varied. The knowledge questions sought to measure the respondents' understanding of the basic purpose, function and common limitations of the technologies — they were not intended to be tricky or difficult. One technology in particular did garner higher percentages on the knowledge questions than the other technologies. The function and the purpose of the BSM generated the two highest percentages of correct responses for the purpose and function of the technology — 95% and 89% respectively. No other technology's knowledge questions related to purpose and function had this high of a correct response rate. The remainder of the technologies had varying results, with some respondents selecting the incorrect response for the question, but also many instances where respondents indicated that they did not know the answer. These technologies rely on cameras, radars and other sensors that have limited capabilities. For example, ACC cannot successfully brake in time to prevent a crash in any and all situations, yet more than one-third of owners with ACC apparently did not know this, either selecting an incorrect response to the relevant question or reporting that they did not know the answer. Similarly, more than half of owners with BSM systems did not identify the possibility that the system might not accurately detect motorcycles, bicycles, pedestrians or vehicles traveling at extremely high speeds as the correct response to a question regarding limitations of BSM. For many LDW and LKA systems, a common limitation of the technology is that it will not operate if the turn signal is activated and the vehicle is being steered in the same direction as the turn signal — a substantial minority of respondents who owned vehicles with these technologies failed to identify this as the correct response to the relevant question regarding the limitations of these technologies. These results indicate that a substantial number of owners of vehicles with these technologies appear to be unaware of significant system limitations. Accurate understanding of the technologies' limitations is vital to overall safety. Prior research indicates poor understanding of system limitations may negatively affect a driver's trust as they begin to experience situations in which their mental model of the technology does not match the technology's actual capability (Jenness et al., 2008). Lack of knowledge of a technology's limitations may indicate insufficient mental model development or general knowledge of the technology. For these systems to positively impact safety, drivers must understand the environments and conditions under which the system will and will not work.

While there are some consistencies across make, model and trim, there are also differences. Therefore, it is important to measure how individual drivers perceive the technology in their particular vehicle and how this influences their opinions, experience and understanding of the

technology. Better understanding of how drivers' perceptions influence their opinions, experience and knowledge will greatly assist the industry. Design and human factors interface improvements can be made that bridge the gap between the human interaction with the technology and managing the driver's expectation of a technology's function and utility. This work can also provide valuable insight into the development of educational resources that can assist in increasing drivers' understanding of the technology and increasing the chance the safety benefits will be translated to our roadways.

Study Limitations

Although respondents appeared to be reasonably representative of the population from which they were sampled — the registered owners of selected model year 2016 or 2017 vehicles — they were not representative of the general driving population with respect to general demographic characteristics. The average respondent of the survey was approximately 57 years old, male, white and with a relatively high income. Two studies from 2014 and 2015 found that the average age of buyers of new cars has steadily increased over the past 15 years (United States Bureau of Labor Statistics, 2015; J.D. Power Ratings, 2015). One of the studies found that new vehicle buyers' average age rose from 43.5 years old in 2000 to more than 49 years old in 2009 (J.D. Power Ratings, 2015). Some of this reflects demographic shifts in age of the U.S. population, such as the aging of the baby boomer generation (Kurz, Geng, & Vine, 2016). Additionally, one study found that the age groups with the highest rates of new vehicle purchases on average per year are 35-49-year-olds and 50-54-year-olds (Kurz, Geng, & Vine, 2016). The median annual household income for drivers in the current study was in the $100,000-$149,000 category, which is much higher than the national average (McDonald et al., 2016). Additionally, one study found that 30% of recently acquired new vehicle purchasers were in the highest income quartile (Paszkiewicz, 2003). A more affluent driver may have greater access to not only newer model vehicles but to information and resources about the technologies.

Similar demographic patterns have resulted in previous studies of ADAS technologies. In a study as recent as 2014 focusing on the experiences of owners of Jeep and Dodge collision avoidance technologies, more than half (56%) of the sample report was male and 53% of the overall sample was age 41-60, with 33% age 61 and older (Cicchino & McCartt, 2014). In a 2012 study of owners of ACC technology (Larsson, 2012), more than 80% of the participants were male. The same study produced a similar but slightly narrower range of ages of respondents (22-66 years old) as compared with the current study (22-77 years old) and noted that, given the premium segment of vehicles examined in that study, this was expected. While the current study included some economy level trims, the survey was targeted to owners of 2016 and 2017 vehicles, which may trend toward buyers with the means to purchase vehicles new rather than used.

In addition, even if the respondents are reasonably representative of the population from which they were drawn — registered owners of selected vehicles with ADAS technologies — they may not be representative of the population that drives these vehicles today (which might include not only registered owners but also their spouses, children, etc.) or those who will drive these and similar vehicles in the future as these vehicles enter the used car market and are purchased and driven at lower price points by different segments of the driving population. As the technologies examined in the current study become more widely available in lower-priced new vehicles and in

used vehicles, and as they become standard rather than optional in more vehicles, the demographic distribution of drivers exposed to these technologies is likely to shift slowly from the older, predominantly male, predominantly higher-socioeconomic status population represented in the current study toward that of the general driving population.
The survey did not measure the length of time for which respondents had owned their vehicle. It is possible that knowledge and opinions regarding the technologies examined might change or evolve over time. However, it is known that all respondents had been the registered owners of their vehicles for at least approximately three months at the time that the research team acquired the sample, and at least an additional month before actually receiving the invitation to participate in the survey; thus, all respondents had at least four months of experience with their vehicles by the time they participated in the survey. It is possible that the responses of owners very new to the technologies (e.g., first week or two of ownership) or with years of experience driving vehicles with these technologies might have differed from those reported here.

It is also important to discuss the technical error that affected approximately 6% of the Wave 3 sample. While only eight respondents completed any of the same blocks of technology-specific questions twice, 195 respondents were asked both times to report what technologies they had in their vehicle. It is possible that, during the time from the initial response to their second response, the experience of taking the survey might have led them to analyze which technologies they had or did not have in their vehicle. It may be worth conducting an in-depth analysis on the data from these 195 individuals to compare which technologies the respondent believed they had or did not have.

Finally, while this survey compiled detailed data from more than 1,200 owners of vehicles equipped with ADAS technologies, the depth of analysis that was possible was limited by sample size. For example, while there were more than 300 owners of Toyota and Honda vehicles represented among the respondents, the only other manufacturer with more than 100 respondents was Volvo. Thus the comparison that can be made across vehicle makes and models regarding the knowledge, opinions and experiences of owners is quite limited.

Conclusion

This study sought to understand the knowledge, attitudes, behaviors and experiences of drivers who own or lease a vehicle equipped with selected ADAS technologies. The survey results indicate that the majority of drivers generally have favorable impressions of these technologies, trust them, find them helpful, would want to have them in the next vehicle that they buy and would recommend the technologies to others. However, many respondents —and in some cases the majority — demonstrated misperceptions or lack of awareness about what the technologies can and cannot do. Additionally, the prevalence of drivers' willingness to engage in other activities, look away from the roadway or rely on the technology to the exclusion of ordinary safe driving practices (e.g., not checking blind spots before changing lanes or backing up) may indicate lack of understanding or appreciation of the fact that these technologies are designed to assist the driver, and that the driver is still required to be attentive and in control of the vehicle at all times to ensure safety. Results also showed that drivers were unsure about how some systems work in combination with others and how they are distinguishable from one another. Uncertainty and confusion may impact a driver's usage, comfort and reliance on the technology. Finally, few respondents reported seeking information about technologies from any sources beyond the dealership, owner's manual, and their own experience via trial and error; only about 1 in 10 reported seeking information on the internet and hardly any reported visiting government safety websites. More research is needed to determine how best to reach drivers with important information about how to safely use these technologies.

To understand how to best inform the general public of the driver's role in using these technologies, it is imperative to understand how drivers develop their mental model of these systems and how their experiences with different implementations of the technologies affect their opinions, attitudes and experiences. Improved driver understanding and effective usage will increase the likelihood that ADAS technologies' safety benefits are translated to American roadways.

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