

2023 ADAS Driver Education Pilot Study



THE EASTERN TRANSPORTATION COALITION
STUDY FINDINGS | JULY 2023

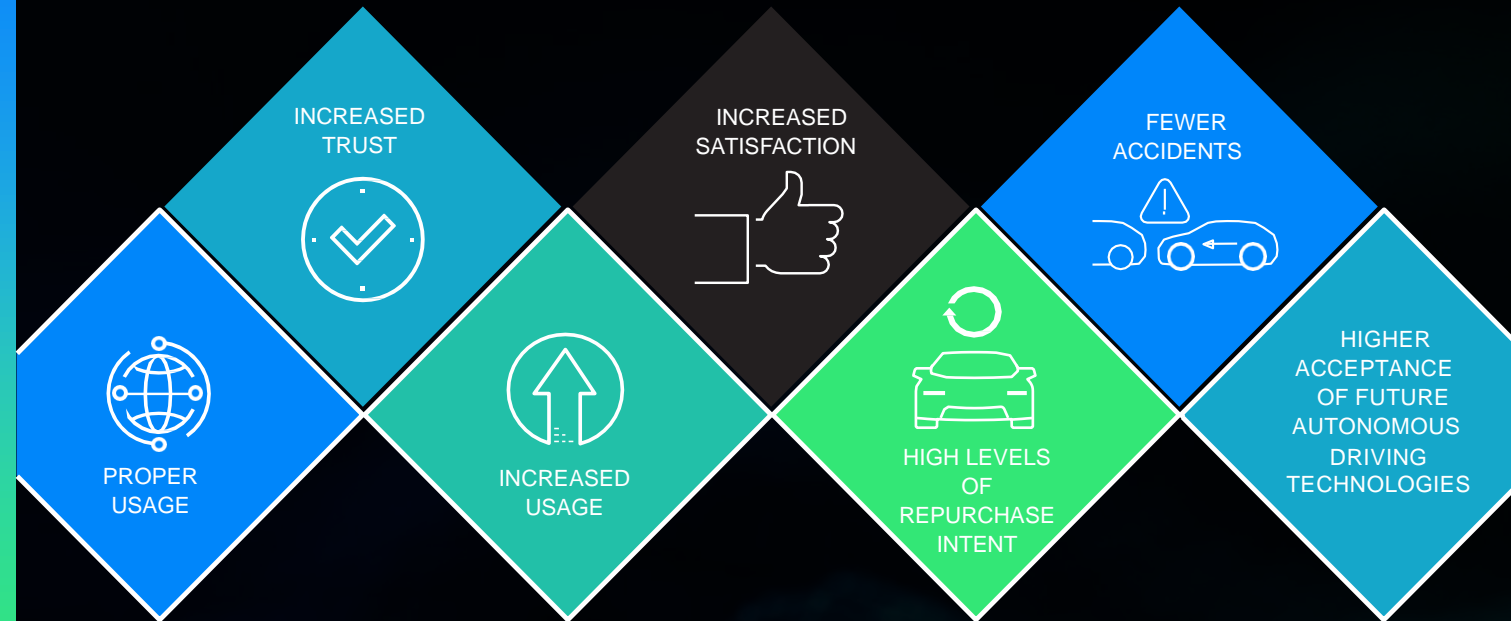


J.D. POWER

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Benefits of Consumer Education on ADAS Technologies





INTRODUCTION

Introduction (1 of 2)

Background

The Eastern Transportation Coalition (TETC), which is comprised of associated State Departments of Transportations (DOTs), is trying to determine how best to ensure that drivers who have more complex ADAS technologies on their vehicle, such as Active Driving Assistance, have been properly trained on how to use the technologies including their limitations. This level of knowledge is critical for road safety.

J.D. Power represents the Voice of the Customer (VoC) and with its vast databases is able to determine which ADAS technologies and brands are particularly problematic for users and, what specifically about those technologies makes them difficult to use/understand. J.D. Power can use this knowledge to create a proper training video to ensure that it covers areas where users have difficulties in understanding.

With that in mind, TETC commissioned J.D. Power to conduct the 2023 ADAS Driver Education Pilot Study.

Introduction (2 of 2)

Objectives

The primary objective of the study is to determine if dedicated training on a ADAS technology that is considered complex could elevate user knowledge, and thus, increase proper usage and improve road safety. Secondary objectives include:

- Understand consumers' perception regarding perceived ease of use of the technology and any items that they considered to be difficult to use/understand
- Measure consumers' baseline knowledge about a technology before completing the training among those with the feature on their vehicle
- Utilize J.D. Power's knowledge of the VoC from its extensive databases to build a 7-minute training video that takes into consideration factors where owners struggle (e.g., limitations, feature reaction, understanding status images in the cluster) as the basis for the training
- Measure consumers' knowledge about the technology after completing the training to determine the effectiveness of proper training
- Conduct a review of the training process, as well as determine where training content needs to be enhanced to further address gaps in user knowledge
- Identify how best to train consumers on ADAS technologies (e.g., in-person, self-administered) based on their learning preferences



METHODOLOGY

Methodology

WHO

- 402 completes
- Age 18 and older
- 2020-2023 MY Vehicles
- Must own a qualifying Toyota vehicle with Active Driving Assistant



WHAT

- Understand owner baseline knowledge of their Active Driving Assistant feature and impact on knowledge with proper training



WHEN

- Fieldwork period:
• June 2 – June 24, 2023



WHERE

- United States



HOW

- Online survey with instructional video



Why Toyota's Active Driving Assistance Technology was Selected

Technology and Brand Selection Consideration Factors

ADAS Technology Consideration Factors:

- Level of user interaction: active vs. passive engagement
- Technology penetration
- J.D. Power quality metrics (Problems Per 100)
- Feature complexity

Brand Consideration Factors:

- Mass Market vs. Premium brand
- Diverse product portfolio across vehicle segments
- J.D. Power quality metrics (Problems Per 100)
- Brand demographics

Toyota

Active Driving Assistance

- Active feature
- Higher-level technology requiring multiple features to be active. This feature is the simultaneous use of lane centering assistance and adaptive cruise control. The driver must supervise and support the feature and maintain responsibility for driving.
- Toyota is one of the most problematic brands*
- Toyota is a Mass Market brand with a diverse product portfolio

* 2022 TXI data based on ACC and LKA; 2023 TXI based on ACC and Lane Centering

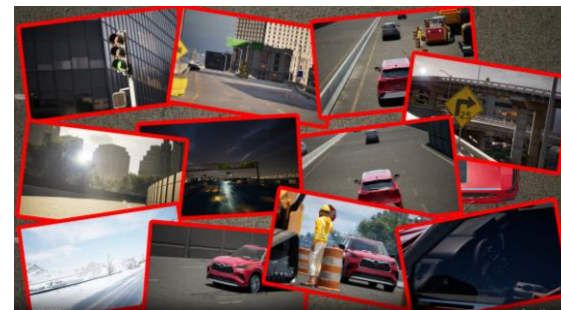
Toyota Active Driving Assistance Training Video Content

J.D. Power developed a seven-minute video that provided a high-level overview of the technology as well as the specifics of the feature for the Toyota brand.

The video content was highly driven by J.D. Power quality metrics and VoC expertise to highlight the areas customers need to know to improve their experience with the feature.

Video content includes:

- Explanation of the feature settings
- How to engage/disengage the feature, including when the system is in a “ready” state vs. an “active” state
- The requirements to operate the feature (e.g., minimum speed)
- The feature’s reaction under various conditions (e.g., lane markings no longer visible)
- The feature’s limitations (i.e., on curves)
- The meaning of the feature’s display images, icons, warnings and alerts messaging



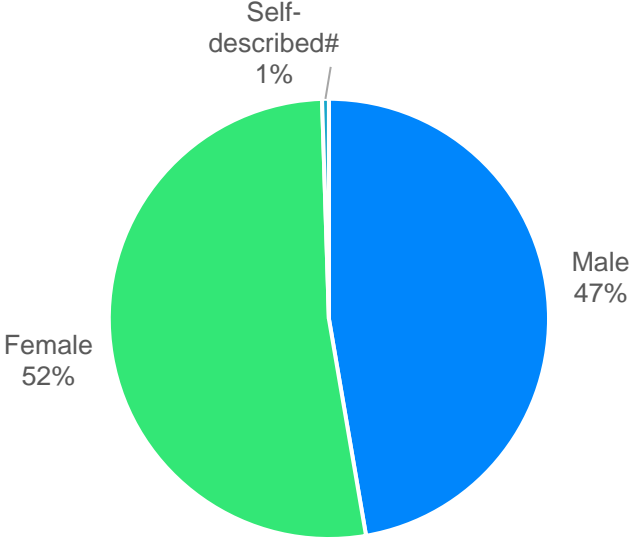
https://txi3danimations.s3.amazonaws.com/FULL_Version07.mp4

Note: The questions in this study were not designed to mislead the respondent but rather focused on critical information needed to use the feature properly and safely.

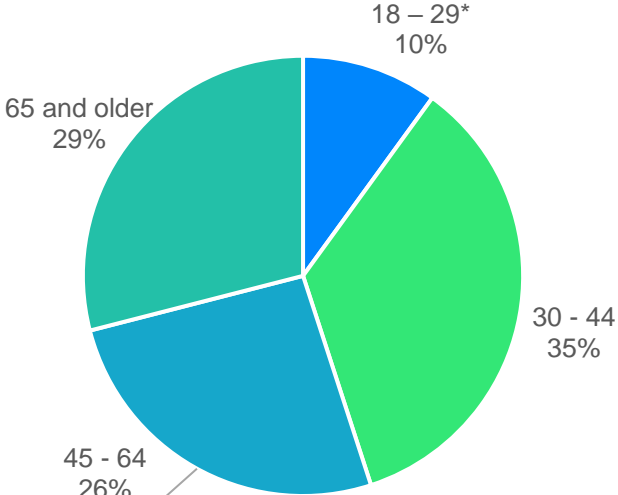
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Sample Composition: N = 402 (1 of 2)

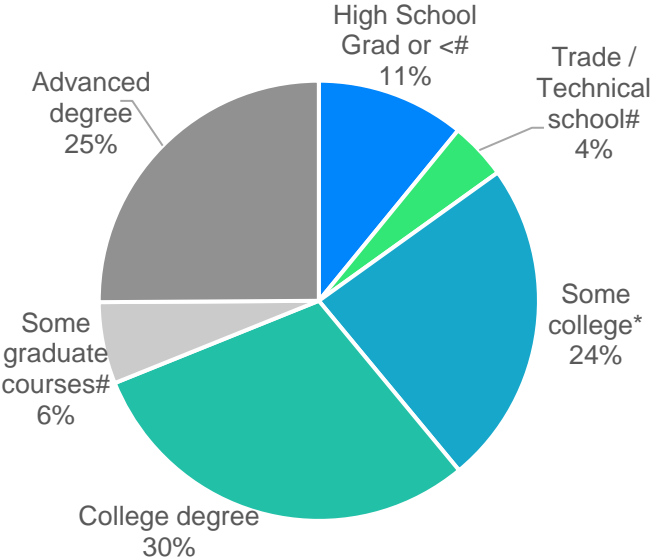
Gender



Age Group



Education



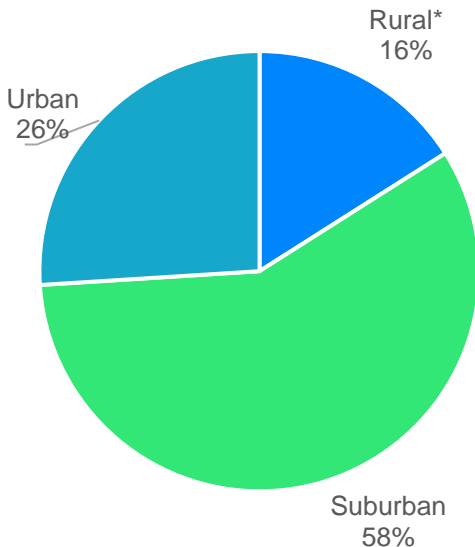
Median Income Range = \$80,000 – 89,999

Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.
 Sample Size: Total Sample: N = 402, 18 – 29: N = 41, 30 – 44: N = 139, 45 – 64: N = 105, and 65 and Older: N = 117.
 Sample Size: Total Sample N = 402, High School Grad or <: N = 44, Trade / Technical school: N = 17, Some college: N = 96, College degree: N = 120, Some graduate courses: N = 24, Advanced degree: N = 101.
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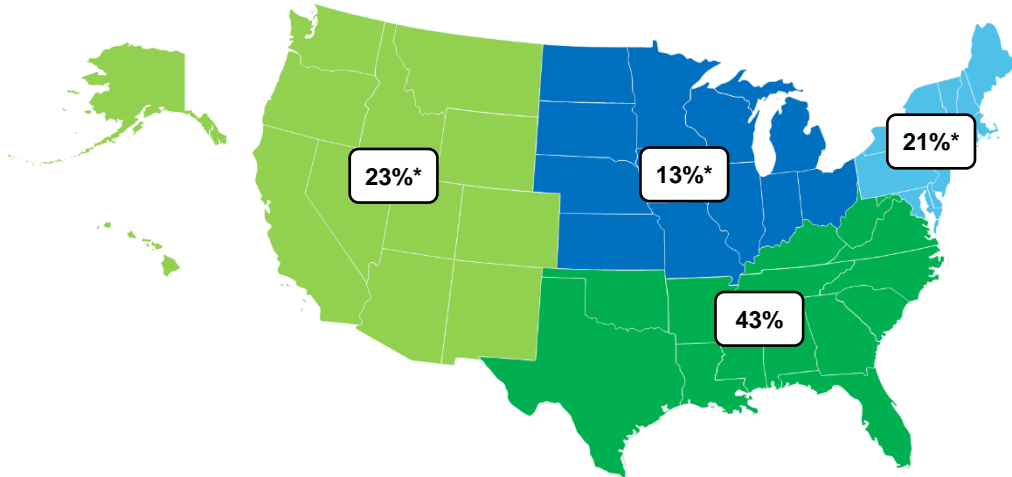
*Small Sample
 #Insufficient Sample

Sample Composition: N = 402 (2 of 2)

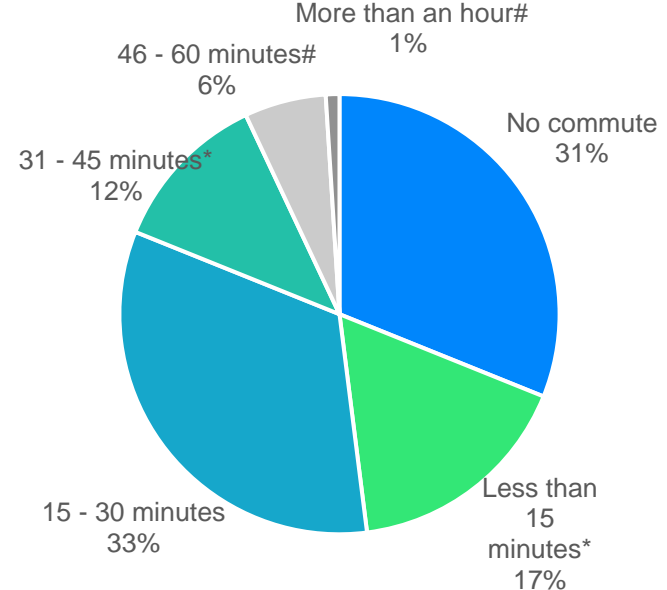
Area Reside



Region



Average Daily Commute



Average Annual Mileage Driven = 11,153

Sample Size: Total Sample: N = 402, Rural: N = 64, Suburban: N = 235, and Urban: N = 103.
 Sample Size: Total Sample: N = 402, Northeast: N = 83, Midwest: N = 53, West: N = 93, and South: N = 173.
 Sample Size: Total Sample N = 402, No commute: N = 125, Less than 15 minutes: N = 68, 15 - 30 minutes: N = 133, 31 - 45 minutes: N = 48, 46 - 60 minutes: N = 24, More than an hour: N = 4.
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*Small Sample
 #Insufficient Sample



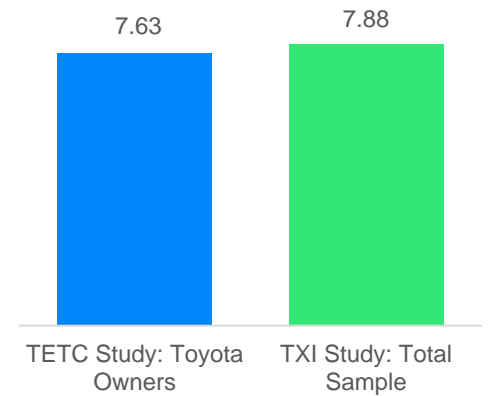
KEY FINDINGS

1. While the TETC study focused on Toyota owners of the Active Driving Assistance, most of the findings can be applied across the automotive industry, regardless of brand, and are not only specific to Toyota

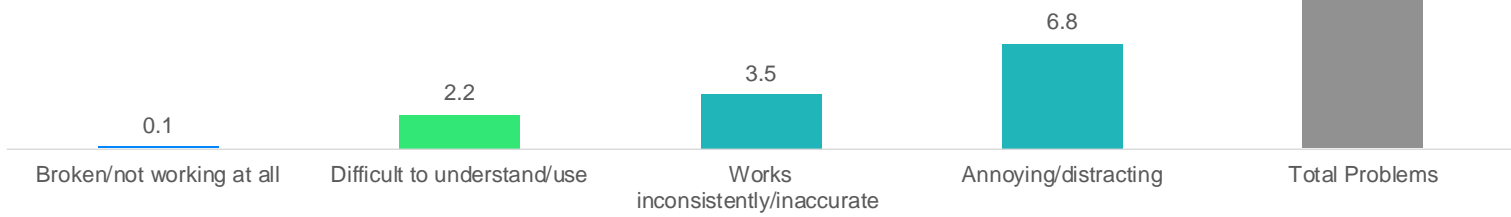
The findings for the Active Driving Assistance feature, in J.D. Power’s 2022 Tech Experience Index Study (TXI), which is a syndicated study that measures the User Experience (UX) with advance technology, are similar to the findings in the TETC Pilot Study that focuses on Toyota’s system.

All brands have various issues with their execution of this technology as seen when comparing the findings from the TETC study to the TXI study. For example, owners of Toyota vehicles indicate the feature is easy to use (94% Top 2 Box), as do all owners of the technology in TXI. However, Overall Satisfaction for the feature is low (7.63 and 7.88, respectively). In particular, owners have issues with not trusting the technology, not finding it useful, and finding it annoying and distracting, among other concerns.

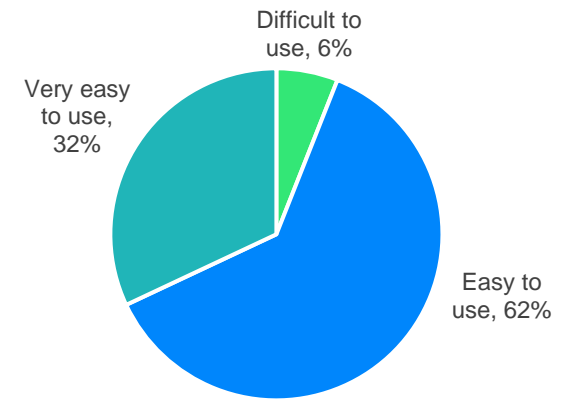
Overall Satisfaction with Active Driving Assistance Feature – Total Sample



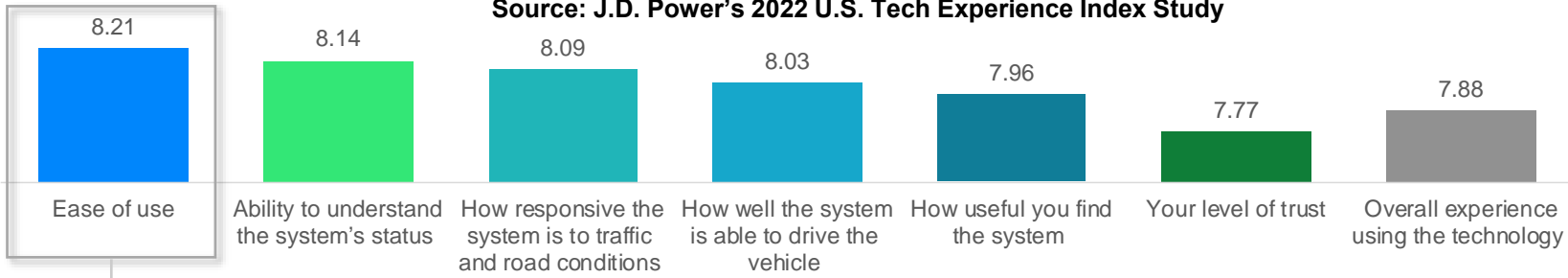
Problems (PP100) with Active Driving Assistance Feature – Industry
Source: J.D. Power’s 2022 U.S. Tech Experience Index Study



Active Driving Assistance – Ease of Use
2022 TETC Study – Total Sample



Satisfaction with Active Driving Assistance Feature – Industry
Source: J.D. Power’s 2022 U.S. Tech Experience Index Study



2. Like other OEMs, Toyota's naming conventions impacted consumer understanding of Active Driving Assistance

Standardized naming conventions and definitions for Active Driving Assistance features is needed to improve consumer understanding, as the terminology to describe Active Driving Assistance varies widely, and often seems to prioritize marketing over clarity.

Automakers have developed their own proprietary branded technology names which has resulted in many unique names for each ADAS feature. The ADAS feature packages offered by many manufacturers introduce further complication with additional terminology and variation of the ADAS package content across manufacturers.

For example, Toyota uses complex naming conventions for their Active Driving Assistance technology:

- Adaptive Cruise Control (ACC) is called Full-Speed Range Dynamic Radar Cruise Control, which is a tongue-twister
- Lane Centering is called Lane Tracing Assist, and comprised of three levels of lane support (i.e., Lane Departure Warning, Lane Keeping Assist, and Lane Centering)
- To further complicate, the Active Driving Assistance feature is packaged with other ADAS features in what Toyota markets as Safety Sense™

Despite ADAS features becoming more prevalent, the lack of standardized terminology creates a threat to consumer comprehension of ADAS features and could lead to their misuse.

ADAS FEATURE	# OF UNIQUE NAMES
Automatic Emergency Braking	40
Adaptive Cruise Control	20
Surround-View Camera	20
Lane Keeping Assistance	19
Blind Spot Warning	19
Automatic High Beams	18
Rear Cross Traffic Warning	15
Driver Monitoring	13
Semi-Automated Parking Assist	12
Dynamic Driving Assistance	10
Forward Collision Warning	8
Night Vision and Pedestrian Detection	5

Source: AAA 2019 Advanced Driver Assistance Technology Names

3. Lack of critical knowledge regarding the Active Driving Assistance feature introduces risk

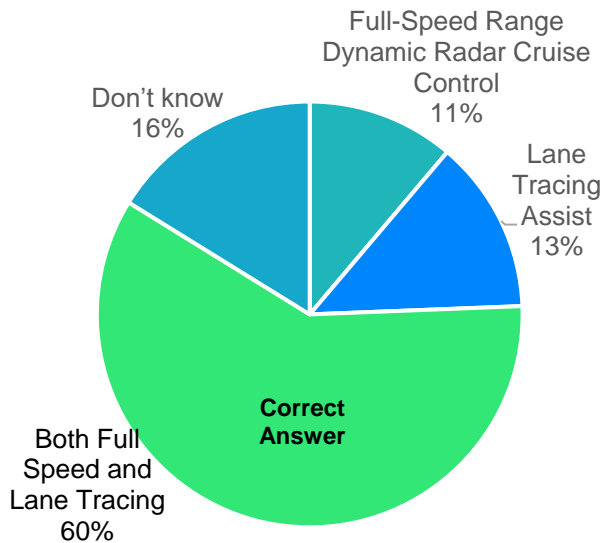
Even fundamental questions about Active Driving Assistance are not known by many of the owners, which is very concerning. For example:

- Before watching the video, only 60% knew which features are needed to use Active Driving Assistance (both Full-Speed Dynamic Radar Cruise Control and Lane Tracing Assist)
- Only one-third knew what type of road the feature can be used on (Interstate/Highways/Freeways without traffic lights) before watching the video
- Only 44% of owners are aware of the speed requirements to activate driving assistance (32 MPH or above) and 24% incorrectly think it can be activated at any speed

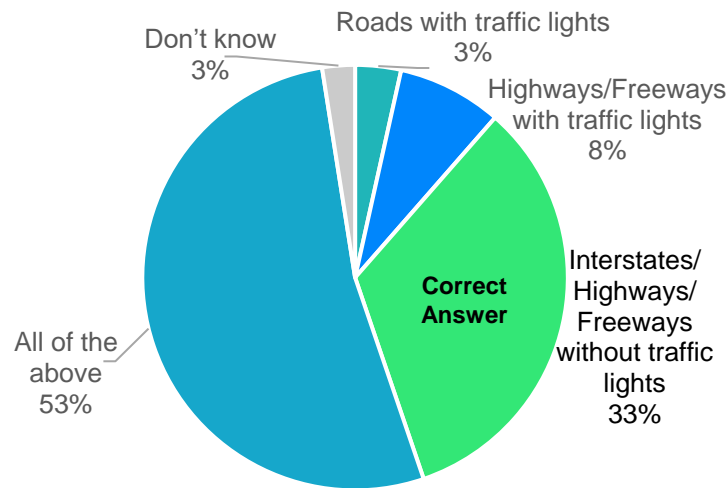
The lack of understanding about the Active Driving Assistance feature is clear as not one of the 402 respondents got all of the 11 category questions correct before watching the video.

In fact, no one got more than five correct and the average was two. This equates to a score of 33% across all of the questions regardless of category (i.e., respondents got some of the multi-part questions correct).

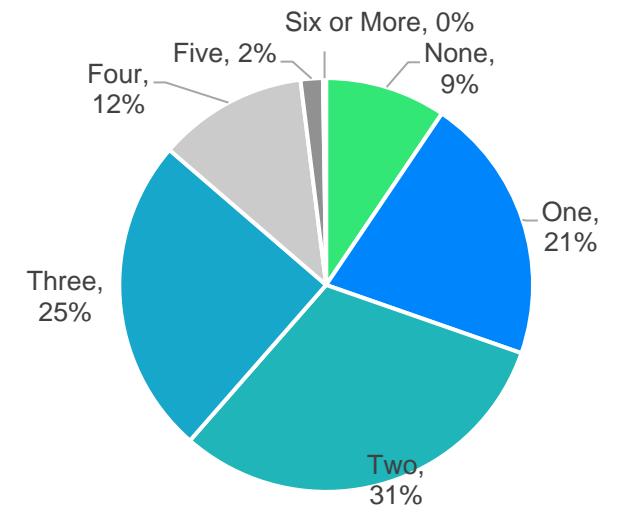
Features Required to Use Active Driving Assistance
Total Sample



Type of Road Where Feature Works Properly
Total Sample



Number of 11 Category Questions Correct:
Pre-Video Total Sample



4. Pre-assessment reveals consumer knowledge about the Active Driving Assistance feature is almost non-existent

The average accuracy rate across the tested metrics was 34% before the training, which is very concerning.

Respondents were most knowledgeable (79%) that the Adaptive Cruise Control feature follows the vehicle in front by a preset distance.

Owners were not familiar with most of the feature reactions, limitations, and how to read the status images in the cluster. The most egregious metric was understanding that the Active Driving Assistance feature does not operate reliably at night (8% accuracy).

Pre-Video Scorecard



		Total Sample
Limitations	Follows the vehicle in front by a preset distance	79%
Instrument Cluster Image 1 (ADA)	Active Driving Assistance is Activated (Image 2)	61%
Settings	I can set the distance in which my vehicle follows the vehicle in front of me	61%
Limitations	Is able to bring my vehicle to a complete stop	61%
Equipment Needed	Both Full Speed and Lane Tracing	59%
Limitations	Cannot change lanes automatically without driver assistance	59%
Limitations	Isn't able to navigate around potholes	55%
Feature Reaction: No Turn Signal	Resists the lane change	54%
Settings	Full-Speed Range Dynamic Radar Cruise Control can be set when traveling at any speed	53%
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is inadvertently exiting the lane on the right	49%
Instrument Cluster Image 3 (LKA on right only)	Full-Speed Range Dynamic Radar Cruise Control is active	45%
Speed Requirement	At 32 MPH or above	44%
Instrument Cluster Image 2 (Departing Lane on Right)	Full-Speed Range Dynamic Radar Cruise Control is active	43%
Settings	The Lane Tracing Assist stays on after an engine restart	43%
Settings	The distance setting will not be maintained after an engine restart	41%
Feature Reaction: Hands Off Wheel	Provides a visual warning "Hold Steering Wheel" in Driver Support Screen	39%
Road Type	Interstates/Highways/Freeways without traffic lights	33%
Instrument Cluster Image 3 (LKA on right only)	Vehicle is receiving steering support for the right side of the lane	32%
Feature Reaction: Resume Driving	Driver can press the "Res" button on the steering wheel	27%
Limitations	Cannot detect pedestrians	24%
Instrument Cluster Image 3 (LKA on right only)	Active Driving Assistance is in standby mode	24%
Feature Reaction: Hands Off Wheel	Beeps	24%
Feature Reaction: No Lane Markings	One or both blue lines no longer appear in the Driver Support screen	23%
Feature Reaction: No Lane Markings	Beeps	23%
Feature Reaction: Resume Driving	Feature will resume automatically if the vehicle has been stopped for less than 3 seconds	21%
Feature Reaction: No Lane Markings	All options (One or both blue lines no longer appear in the Driver Support screen, Beeps, Will no longer keep the vehicle centered in the lane, Goes into standby mode)	21%
Limitations	Does not operate reliably when lane paint is faded	21%
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is receiving steering support for the left side of the lane	20%
Feature Reaction: Resume Driving	Driver can depress the accelerator pedal	20%
Limitations	Does not operate reliably in sharp curves	19%
Limitations	Does not operate reliably when there is snow	19%
Limitations	Does not operate reliably when there are gaps in the lane markings for freeway exits/entrances	17%
Feature Reaction: Hands Off Wheel	After issuing one or multiple warnings, the feature will go into standby mode	16%
Feature Reaction: No Lane Markings	Will no longer keep the vehicle centered in the lane	15%
Settings	I can't change the volume of the audible warnings	14%
Feature Reaction: No Lane Markings	Goes into standby mode	12%
Limitations	Does not operate reliably at night	8%
Average Score 12 Questions		35%
Average Score 11 Questions		34%

5. There is a better understanding of the Adaptive Cruise Control component of the Active Driving Assistance feature than Lane Centering before the training

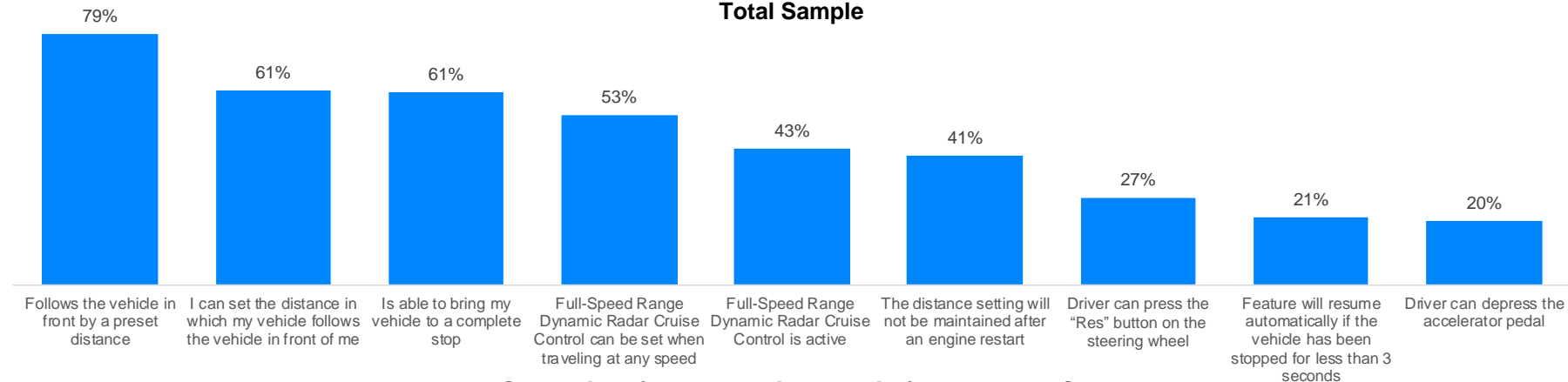
The Adaptive Cruise Control (Toyota’s Full-Speed Range Dynamic Radar Cruise Control) portion of the Active Driving Assistance feature is both less complex to operate and has been around for many years so numerous owners have prior experience with it. Even so, their knowledge is deficient in terms of knowing the details but is stronger than the Lane Centering (Toyota’s Lane Tracing Assist) feature.

Knowledge further declines when the user needs to understand how the two features operate together to get Active Driving Assistance. For example:

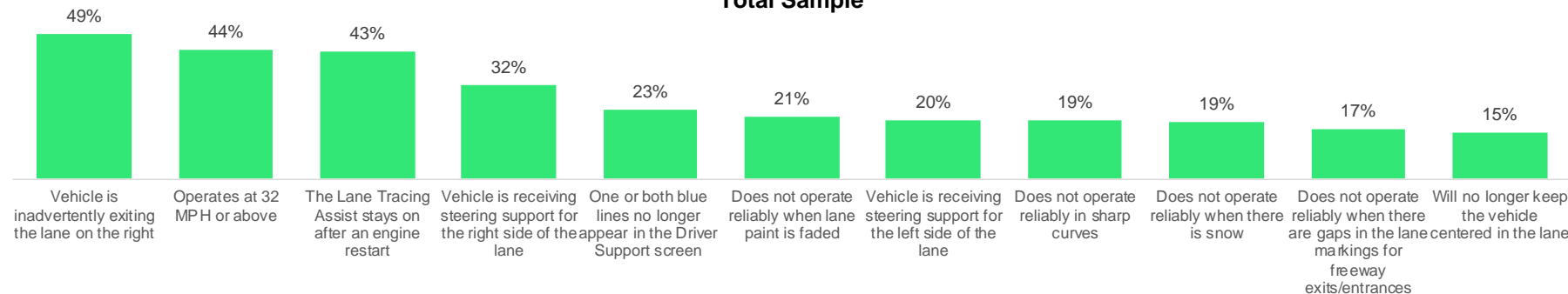
- Provides a visual warning “Hold Steering Wheel” in Driver Support Screen – 39% correct
- Works on Interstates/Highways/Freeways without traffic lights – 33% correct
- After issuing one or multiple warnings, the feature will go into standby mode – 16% correct

How can the industry elevate owner knowledge, especially as it relates to Lane Centering and how the two features work together to get Active Driving Assistance?

Adaptive Cruise Control (Full-Speed Range Dynamic Radar Cruise Control) – Percent Correct Total Sample



Lane Centering (Lane Tracing Assist) – Percent Correct Total Sample



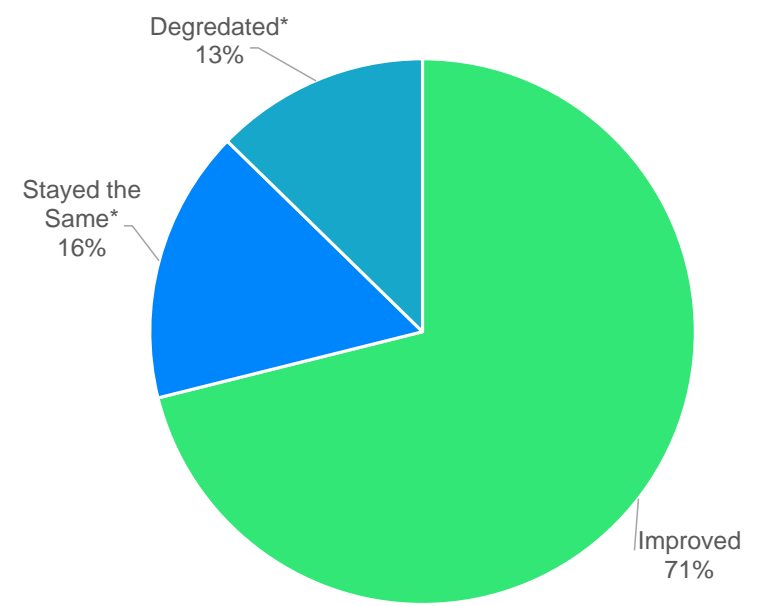
6. Participants positively benefited from the video training with the majority of respondents making learning improvements

The training video benefitted most respondents, but the impact of the training was highest among older respondents. The respondents' education, income, and location were not differentiators of learning improvements.

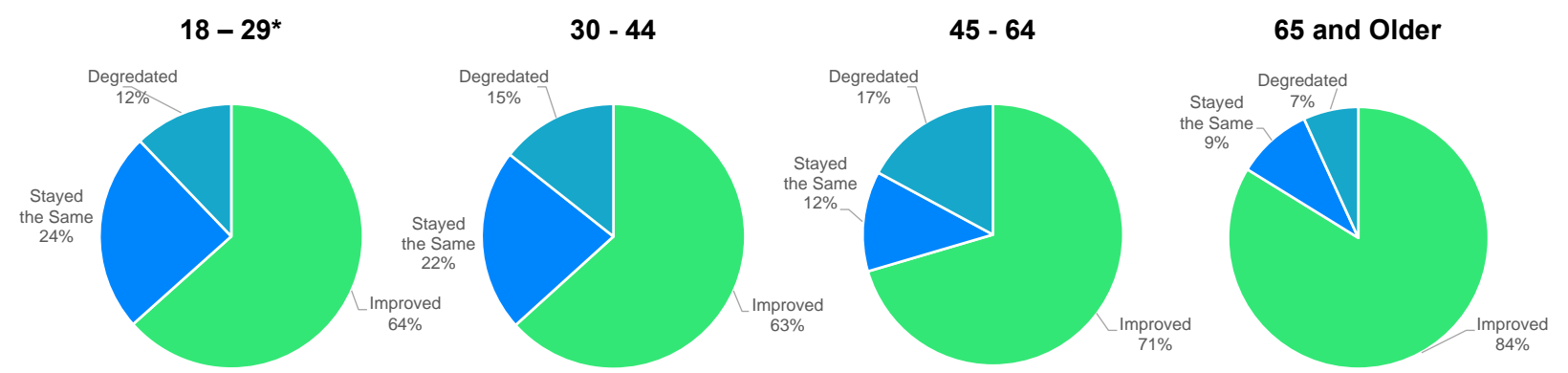
Those who don't use Active Driving Assistance and those who responded "Don't know" prior to watching the video training showed higher levels of learning achievement. However, this group still had difficulty after the video training.

The 7-minute training video provides a foundation for continued learning; learning is not simply one moment of time. There is still much work to be done knowing that the video training focused on key metrics of the feature and did not incorporate all aspects of the Active Driving Assistance feature.

Impact of Video Training - Total Sample



Impact of Video Training - By Age Group



7. Almost every metric showed improvement from the training video, but the status images and feature reaction to missing lane markings are still difficult for owners to understand

The largest gains are primarily in understanding the limitations such as it not working in all weather conditions or at night.

It is positive to note that almost everyone found the training to be beneficial despite most owners initially specifying that they found the technology easy to use (i.e., indicating that they thought they knew enough about it to use it).

Their knowledge base grew extensively after watching the 7-minute video. Imagine what they could learn if they had participated in a more formal training on the feature.

It should be noted that there is a 23-point improvement in owners getting 11 category questions correct.

Post Video Scorecard



		Total Sample: Pre-Training	Total Sample: Post-Training	Better/(Worse)
Equipment Needed	Both Full Speed and Lane Tracing	59%	N/A	N/A
Limitations	Follows the vehicle in front by a preset distance	79%	93%	14
Settings	I can set the distance in which my vehicle follows the vehicle in front of me	61%	87%	26
Limitations	Is able to bring my vehicle to a complete stop	61%	85%	24
Instrument Cluster Image 1 (ADA)	Active Driving Assistance is Activated (Image 2)	61%	81%	20
Limitations	Cannot change lanes automatically without driver assistance	59%	79%	20
Limitations	Does not operate reliably when lane paint is faded	21%	78%	57
Limitations	Isn't able to navigate around potholes	55%	77%	22
Speed Requirement	At 32 MPH or above	44%	73%	29
Feature Reaction: Hands Off Wheel	Provides a visual warning "Hold Steering Wheel" in Driver Support Screen	39%	73%	34
Limitations	Does not operate reliably when there is snow	19%	71%	52
Feature Reaction: No Turn Signal	Resists the lane change	54%	70%	16
Road Type	Interstates/Highways/Freeways without traffic lights	33%	69%	36
Limitations	Does not operate reliably when there are gaps in the lane markings for freeway exits/entrances	17%	69%	52
Limitations	Does not operate reliably in sharp curves	19%	66%	47
Limitations	Cannot detect pedestrians	24%	65%	41
Feature Reaction: Resume Driving	Feature will resume automatically if the vehicle has been stopped for less than 3 seconds	21%	61%	40
Settings	I can't change the volume of the audible warnings	14%	60%	46
Settings	Full-Speed Range Dynamic Radar Cruise Control can be set when traveling at any speed	53%	58%	5
Limitations	Does not operate reliably at night	8%	57%	49
Feature Reaction: Resume Driving	Driver can press the "Res" button on the steering wheel	27%	56%	29
Settings	The Lane Tracing Assist stays on after an engine restart	43%	53%	10
Settings	The distance setting will not be maintained after an engine restart	41%	53%	12
Instrument Cluster Image 3 (LKA on right only)	Full-Speed Range Dynamic Radar Cruise Control is active	45%	50%	5
Feature Reaction: Hands Off Wheel	Beeps	24%	50%	26
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is inadvertently exiting the lane on the right	49%	47%	(2)
Instrument Cluster Image 2 (Departing Lane on Right)	Full-Speed Range Dynamic Radar Cruise Control is active	43%	46%	3
Instrument Cluster Image 3 (LKA on right only)	Active Driving Assistance is in standby mode	24%	46%	22
Instrument Cluster Image 3 (LKA on right only)	Vehicle is receiving steering support for the right side of the lane	32%	45%	13
Feature Reaction: Hands Off Wheel	After issuing one or multiple warnings, the feature will go into standby mode	16%	44%	28
Feature Reaction: Resume Driving	Driver can depress the accelerator pedal	20%	38%	18
Feature Reaction: No Lane Markings	All of the above (One or both blue lines no longer appear in the Driver Support screen, Beeps, Will no longer keep the vehicle centered in the lane, Goes into standby mode)	21%	34%	13
Feature Reaction: No Lane Markings	One or both blue lines no longer appear in the Driver Support screen	23%	32%	9
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is receiving steering support for the left side of the lane	20%	32%	12
Feature Reaction: No Lane Markings	Goes into standby mode	12%	30%	18
Feature Reaction: No Lane Markings	Will no longer keep the vehicle centered in the lane	15%	24%	9
Feature Reaction: No Lane Markings	Beeps	23%	17%	(6)
	Average Score 12 Questions	35%	N/A	N/A
	Average Score 11 Questions	34%	57%	23

8. Active Driving Assistance status images displayed in the cluster are not understood, which is concerning

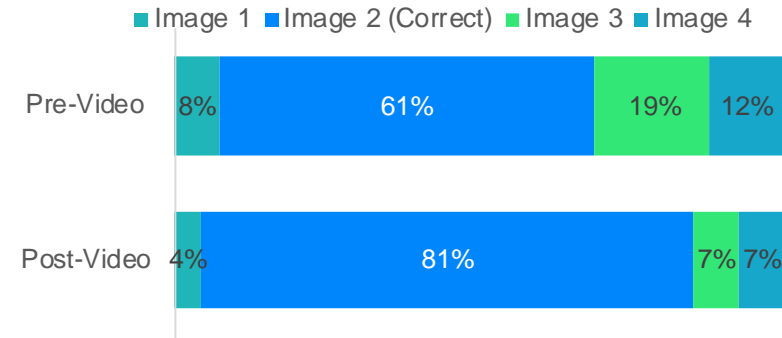
Active Driving Assistance status images are not understood, creating a situation where drivers may think they have support when the feature is not actually active. In fact, the percent of owners who think the feature is operating in these images, both pre- and post-training, is troublesome.

Almost 40% of owners don't know the basic meaning of the image (View 1- Image 2) being displayed in the cluster showing the status of Active Driving Assistance. It is alarming that this large share of the user base cannot identify the status of the feature from the image provided. Furthermore, users do not understand the specific details (e.g., icons, colors) nor the meaning of the various levels of support (e.g., Lane Departure Warning vs. Lane Keeping Assist vs. Lane Centering) being displayed in the cluster. Understanding the nuances of these images is

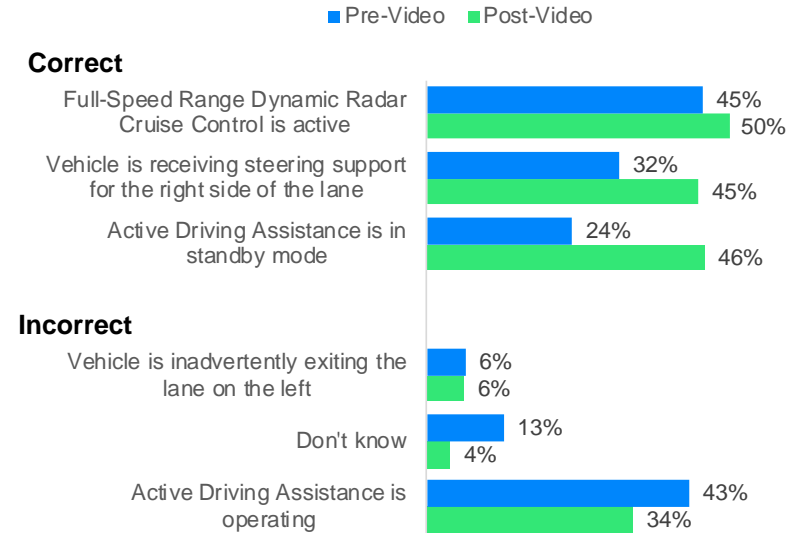
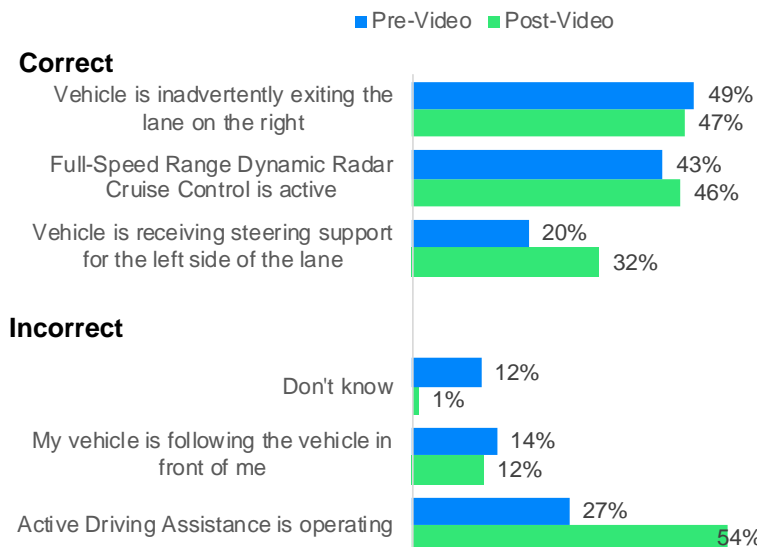
critical for proper and safe use of the feature so that drivers know exactly what level of support is being provided. These findings indicate that not only is more training needed, but that the vehicle manufacturers need to do a better job in designing the screens to ensure the message being communicated is more self-explanatory, especially when looking at a glance while driving.



Instrument Cluster View 1 Indicating Active Driving Assistance is Activated
Total Sample



Instrument Cluster Active Driving Assistance Status: Total Sample
View 2 View 3



9. Feature reactions and limitations are not known by the majority of owners, which has the potential to create risky situations on the road

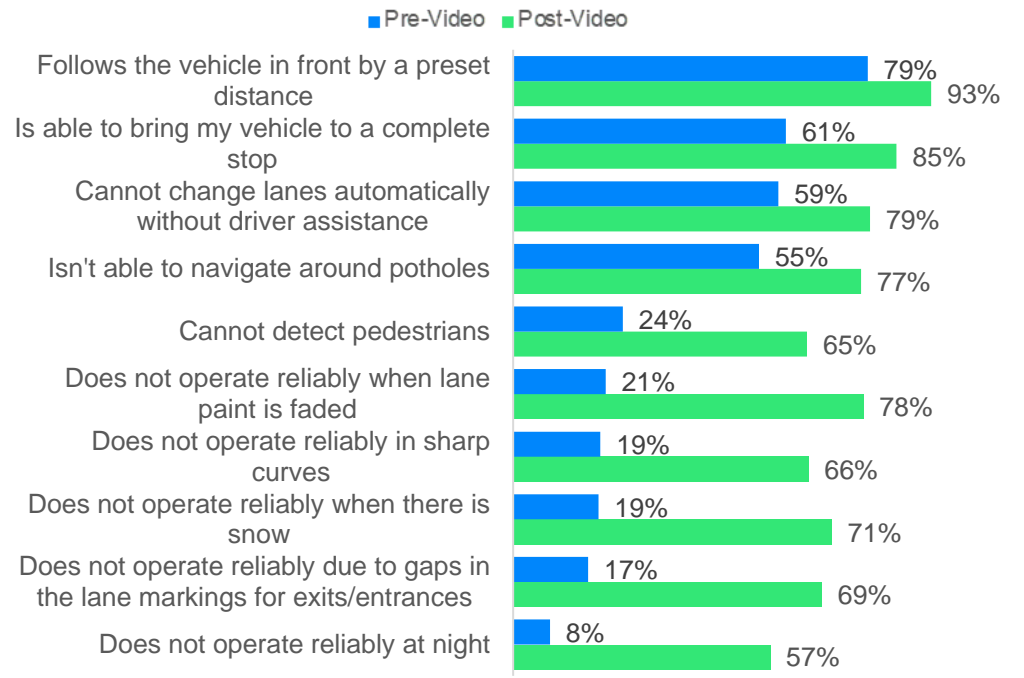
Adding to the urgency of needing to be educated on this technology is the clear lack of understanding of the feature’s reactions and limitations. Even after watching the video, feature reaction deficiencies persist among those who use the feature.

Most drivers do not understand the basic principle that if the lane markings are no longer visible, then the feature is no longer active and won’t keep the vehicle centered in the lane. This means that people are driving their vehicle thinking they have support when the Active Driving Assistance feature is actually in standby mode, creating a situation of overconfidence in a capability that is not functioning 100% of the time. The feature reaction accuracy remains among the worst performing metrics post-training.

Features Reaction – Percent Correct: Total Sample

Feature Reaction	Correct Answer	Total Sample: Pre-Training	Total Sample: Post-Training
No Turn Signal	Resists the lane change	54%	70%
	All of the above (See "memo" list below)	21%	34%
No Lane Markings	Memo: One or both blue lines no longer appear in the Driver Support screen	23%	32%
	Memo: Beeps	23%	17%
	Memo: Will no longer keep the vehicle centered in the lane	15%	24%
	Memo: Goes into standby mode	12%	30%
Hands Off Wheel	Provides a visual warning "Hold Steering Wheel" in Driver Support Screen	39%	73%
	Beeps	24%	50%
	After issuing one or multiple warnings, the feature will go into standby mode	16%	44%
Resume Driving	Driver can press the "Res" button on the steering wheel	27%	56%
	Feature will resume automatically if the vehicle has been stopped for less than 3 seconds	21%	61%
	Driver can depress the accelerator pedal	20%	38%

Active Driving Assistance Technology Limitations – Percent Correct Total Sample



Adding to this concern is the fact that owners don’t understand the limitations of the feature including some that could introduce risk such as:

- Not operating reliably at night
- Not working when there are gaps in the lane markings
- Not working in sharp curves
- Not detecting pedestrians, among other limitations
- Etc.

10. Toyota owners found the video training to be helpful and are more likely to use the Active Driving Assistance feature more often and hopefully, use it properly

Upon completion of the research exercise, respondents were asked to assess the training video. Almost all of Toyota owners found the training helpful.

- Training has encouraged those that don't currently use the feature to use it and want it on their next vehicle.
- The training video increases the likelihood for more frequent, and hopefully, more proper, use of the Active Driving Assistance feature, as 59% of respondents state they are likely to use the feature more frequently after watching the training video.

It is important to keep in mind that positive and diverse learning experiences build consumer confidence and their trust of ADAS features, but no singular learning method or learning source can do it alone.

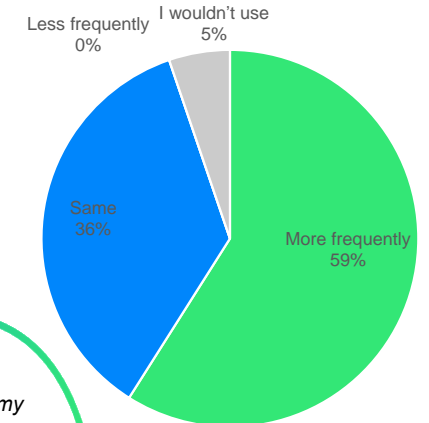
HOW HELPFUL WAS THE VIDEO

98% of people found the training helpful

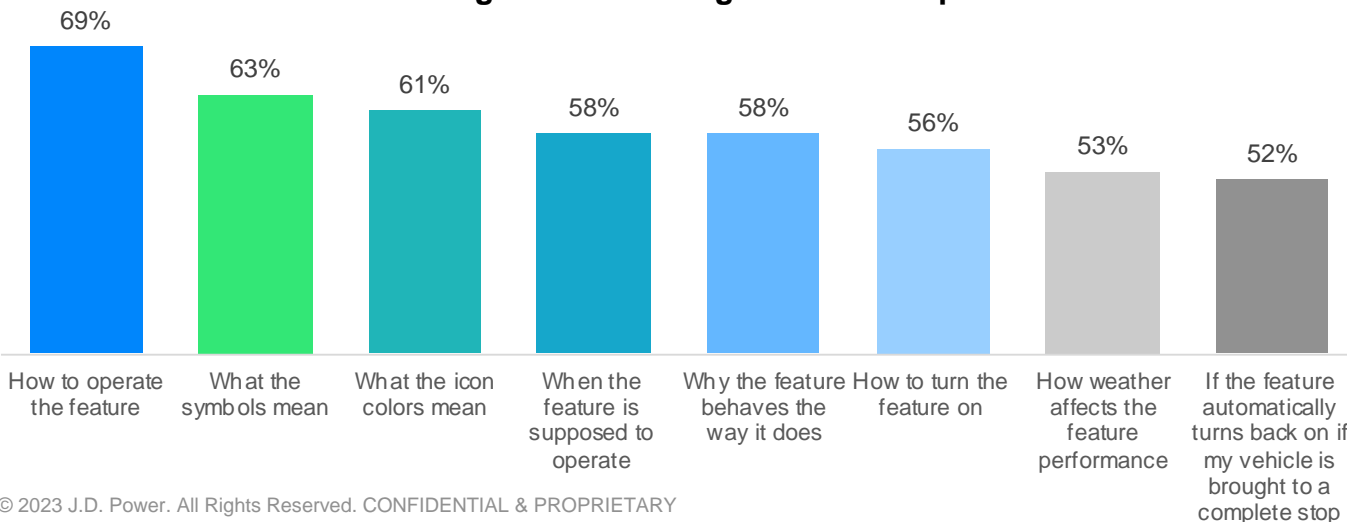


Likelihood to use Active Drive Assistance after Training Video

Total Sample



Training Video Learnings – Total Sample



“Did not understand all the different icons on my car screen until I saw this video clip.”

“I couldn't figure out some things earlier but now I have a better understanding.”

“I did not know that this feature had all of these capabilities before watching the video.”

“I honestly never paid attention to this feature and now I'm going to check it out and use it when necessary!”

“I feel more confident about using the feature now.”

11. Content and depth play a critical role in effectively educating consumers and dealers on the Active Driving Assistance feature

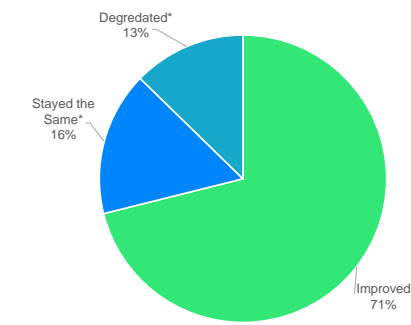
Minimal differences appear in the comparison of the degree of knowledge about the feature by how the owner learned about it, indicating that the educational content being provided is not sufficient for complete user understanding.

The lack of content being absorbed by owners can be impacted by several factors including:

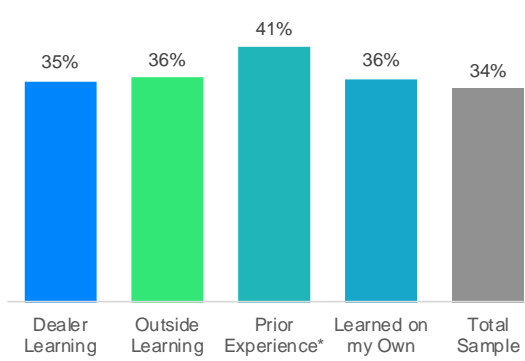
- Content provided by OEMs is not detailed enough (i.e., too high-level) to fully educate consumers on the technology, and the owner’s manual is often difficult to navigate.
- Dealer sales staff are not being properly trained on the Active Driver Assistance feature, and therefore, cannot communicate detailed operating information to new vehicle owners.
- Previous experience with Active Driving Assistance does not aid accuracy of understanding.

As shown in the findings, there is a significant improvement in a variety of knowledge about the feature when owners are properly trained. The impact from this short video is notable with 71% of participants elevating their knowledge base. Collaboration across the auto industry, dealers, insurance, and state DOTs would transform the industry and consumer education.

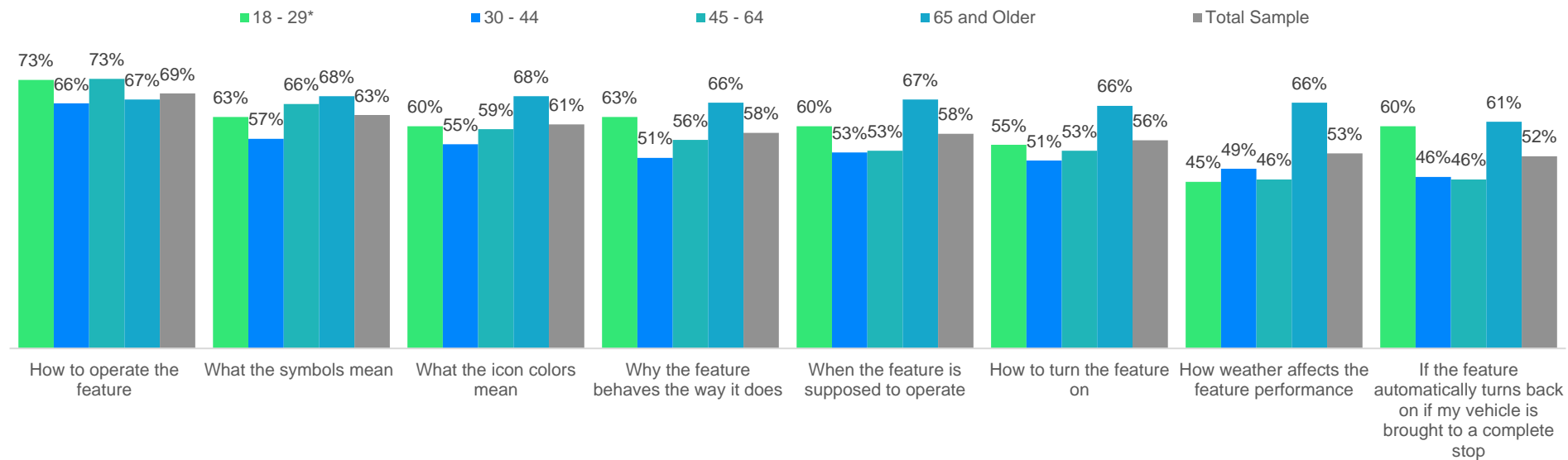
Impact of Video Training
Total Sample



Average % Correct: Pre-Video
Total Sample By How Learned



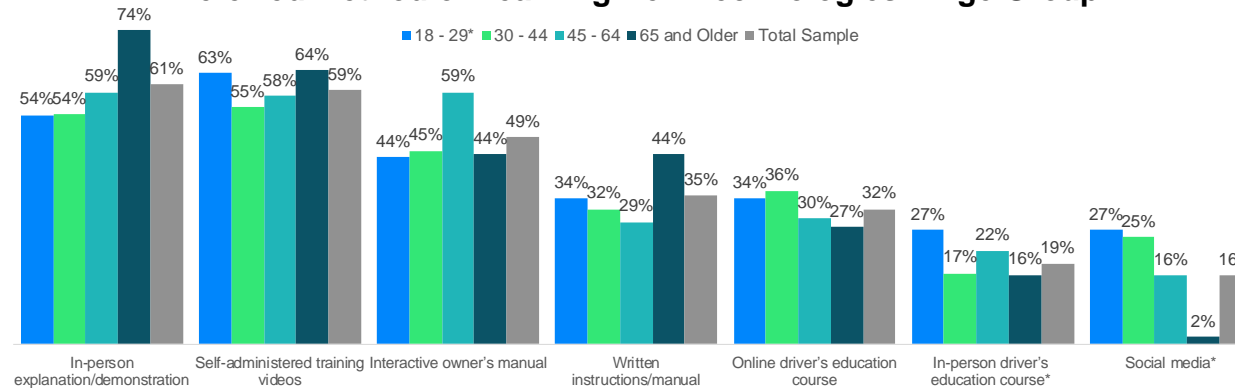
Key Learning from the Video
Total Sample



12. An opportunity exists for in-person training or self-administered training videos

Owners expect to be educated about new technologies through their dealer or vehicle manufacturer. However, these methods have not been effective. Regardless of which stakeholder provides the education program, consumers prefer in-person explanations/demonstrations or self-administered training videos.

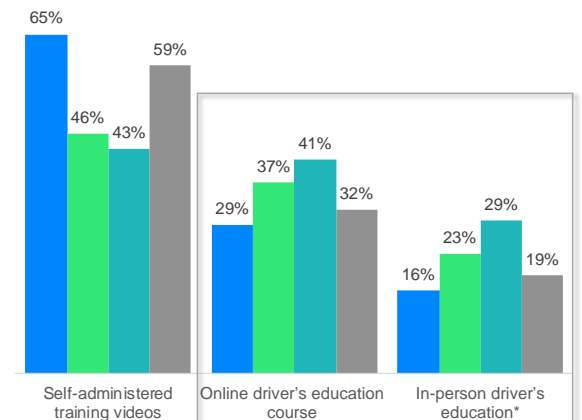
Preferred Method of Learning New Technologies – Age Group



Those who had difficulty learning from the video training are more likely to look to the DOT or an Insurance Provider to educate them and are more open to formal education learning methods.

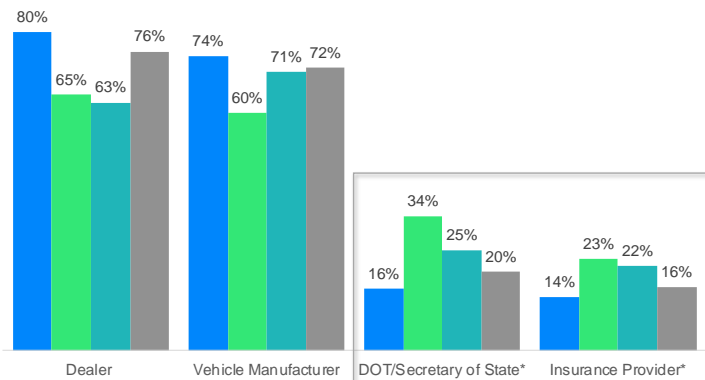
Preferred Method of Learning By Impact of Video Training on Preferences for Learning

Improved Stayed the Same Degradated Total Sample



Preferred Training Provider By Impact of Video Training on Preferences for Learning

Improved Stayed the Same Degradated Total Sample



DOTs and Insurance Providers could offer online driver's education courses.

- Younger owners are more open to receiving training from the DOT/Secretary of State, creating the opportunity for ongoing education for newer drivers.
- Consumers expect insurance providers to play a lesser role in educating them on new technologies in their vehicle.

13. Mandatory educational training may be necessary to elevate the knowledge-base of the Active Driving Assistance feature, which is clearly needed to reduce risk

With almost 90% of owners wanting this feature again and prior experience having a limited impact on knowledge, requiring training may be the best path forward to ensure proper use of the Active Driving Assistance technology.

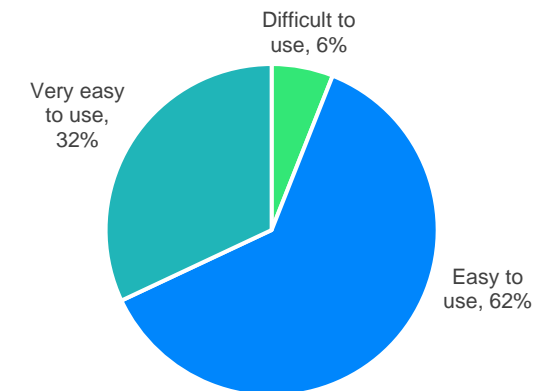
Furthermore, it may be difficult to get consumers to willingly agree to be educated as they think the technology is easy to use and they don't realize the degree of their lack of knowledge and how much help they really need to truly know how to operate the feature.

Despite clear misconceptions about the feature's capability, reaction and limitations, many think the feature is easy to use which could make them less likely to become educated on the feature.

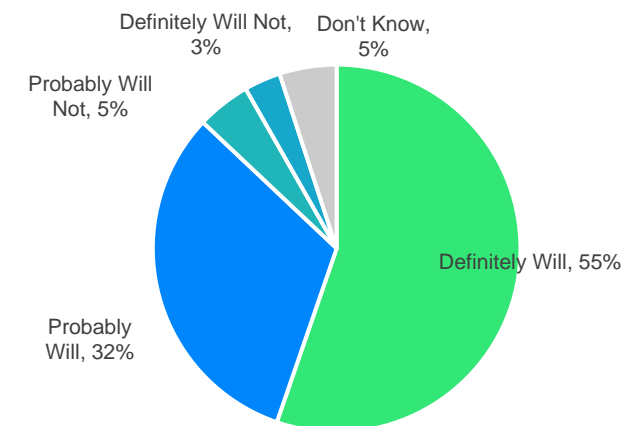
Even though the preference is to learn from the dealer or vehicle manufacturer, required training may be the best path forward, as most owners will make minimal effort to be properly trained despite expressing their desire for training.

If not mandatory, then a variety of training methods need to be offered to meet varying needs of consumers by age and gender. Perhaps, some reward-type system (e.g., insurance discount, subscription service discount) could also be used to encourage training.

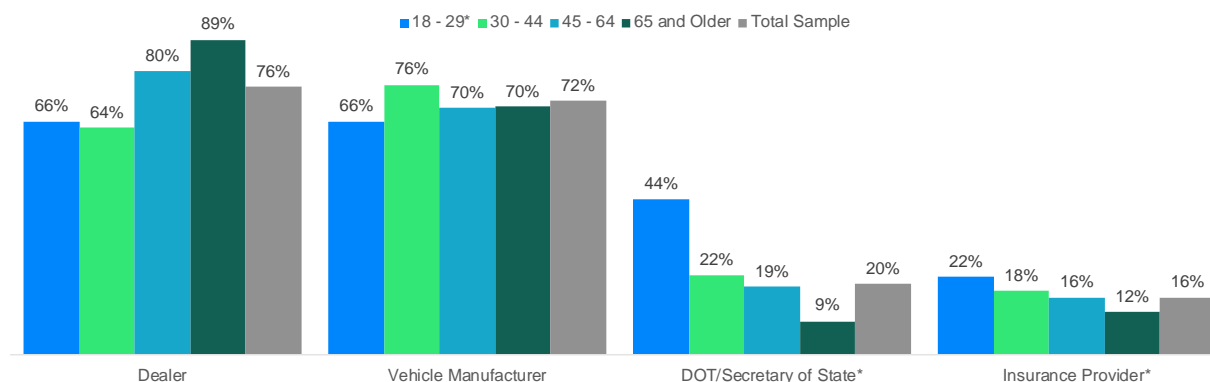
Active Driving Assistance – Ease of Use
Total Sample



Future Intent: Want Active Driving Assistance Again on Next Vehicle
Total Sample



Preferences for New Technology Training
By Age Group





RECOMMENDATIONS

Recommendations

1

Collaborative Training Content

OEMs must provide critical content to operate their ADAS technologies and elevate driver knowledge of activation, current state, understanding status images, feature reactions, limitations, and settings

2

Increase Training for Dealer Staff

Must ensure dealers are properly trained on complex ADAS features. Leverage the existing dealer relationship to serve as qualified sources for critical information and conduits for proven learning sources

3

Increase Variety of Training Methods

There is an opportunity for industry and government stakeholders to create learning methods that leverage consumer preferences for in-person and self-administered learning experiences

4

DOT Mandated Education

Initial efforts can focus on new and more complex ADAS features. Mandating training ensures all consumers are trained – especially those who overestimate their knowledge. Prior feature experience does not remove the need for training



STUDY FINDINGS

Experience with Active Driving Assistance

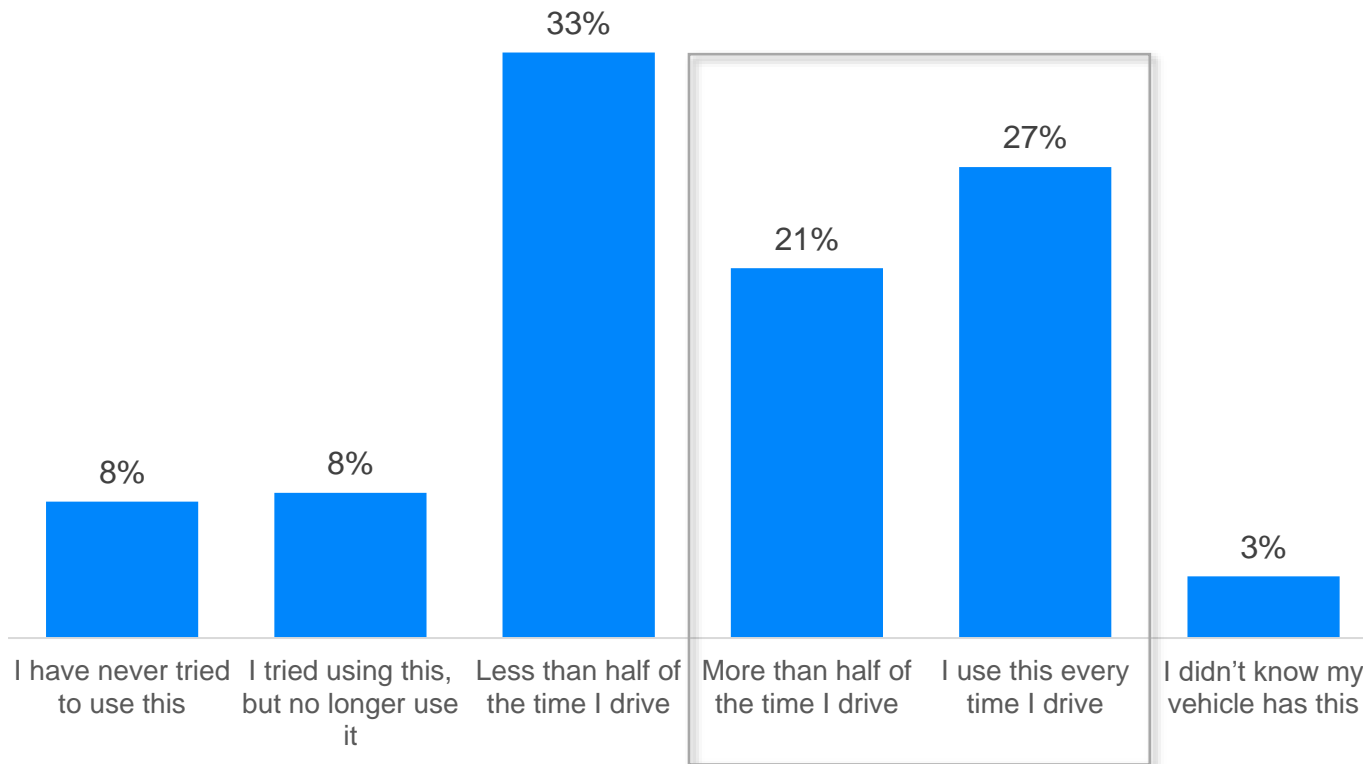
Experience with Active Driving Assistance Summary

- Forty-eight percent of respondents use the technology regularly, and 94% of those using it to some degree find it an easy tech to use
- Satisfaction with the Active Driving Assistance feature increases with frequency of use
- Total lack of engagement with the tech is seen most in those with no commute although this is a small sample, while those using it more than half of the time commute between 15-30 minutes
- Abandonment of the tech is low, only 33 people out of the 402 respondents indicated they no longer use the technology mainly due to need, trust, and usefulness
- While only a small number of people never used the tech (31 out of 402), lack of a need and not knowing how to use it are the main reasons

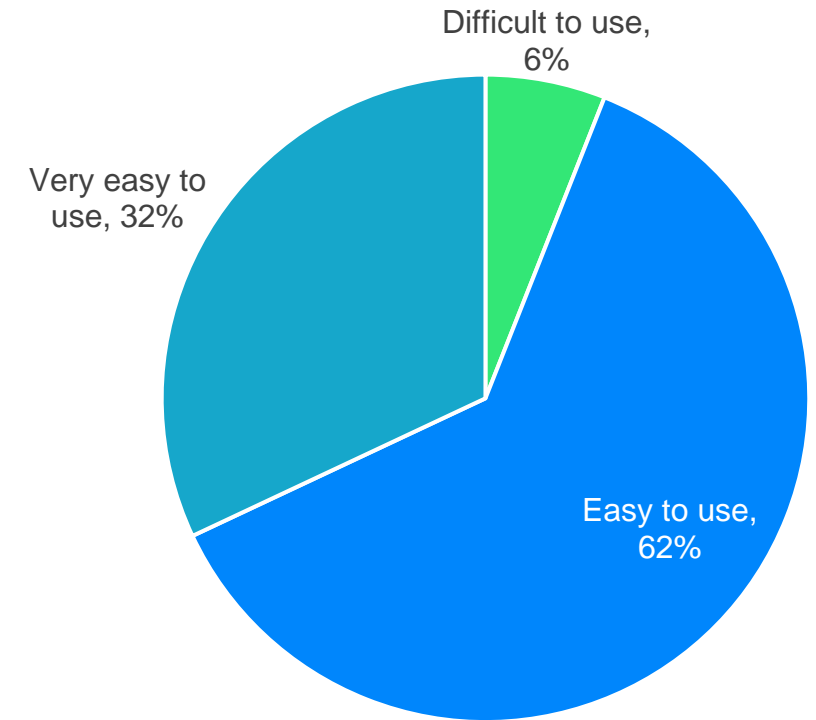
Roughly half of respondents use the technology regularly, and almost all found it easy to use

Active Driving Assistance Technology

Frequency of Use



Ease of Use



U1: How frequently do you use the Active Driving Assistance technology on your vehicle?

Sample Size: Total Sample: N = 402.

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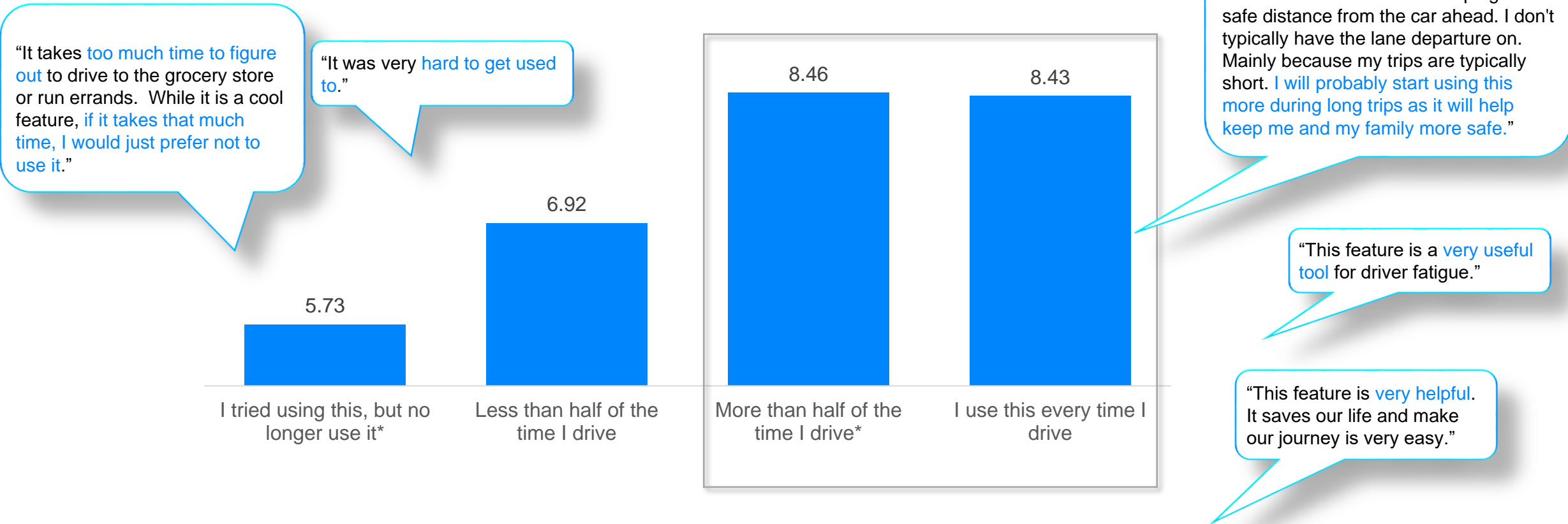
U4: Which of the following best describes your experience using the Active Driving Assistance technology on your vehicle?

Sample Size: Total Sample: N = 402.

Satisfaction with the Active Driving Assistance feature increases with frequency of use

Overall Satisfaction with Active Driving Assistance Technology

By Frequency of Use



U7: Using a 1 to 10 scale, how would you rate the Active Driving Assistance technology on your vehicle?
U1: How frequently do you use the technology on your vehicle?
Sample Size: Total: N = 357, No Longer use: N = 33, Less than half of the time: N = 133, More than half of the time: N = 84, Every time: N = 107.

Total lack of engagement with the tech is seen most in those with no commute, while those using it more than half of the time commute between 15-30 minutes

Frequency of Use of Active Driving Assistance Feature – Length of Commute

	I have never tried to use this*	I tried using this, but no longer use it*	Less than half of the time I drive	More than half of the time I drive*	I use this every time I drive
No commute	48%	33%	32%	21%	29%
Less than 15 minutes	10%	27%	17%	17%	15%
15-30 minutes	23%	30%	33%	42%	33%
31-45 minutes	19%	6%	9%	12%	17%
46-60 minutes or more	0%	3%	7%	8%	6%
More than an hour	0%	0%	2%	0%	1%
	100%	100%	100%	100%	100%

U1: How frequently do you use the Active Driving Assistance technology on your vehicle?

D3: What is the length of your typical daily commute one way to work or school?

Sample Size: Total: N = 402, Never used: N = 31, No longer use: N = 33, Less than half the time: N = 133, More than half the time: N = 84, Every time: N = 107, Didn't know my vehicle had this = 14.

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*Small Sample

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Abandonment of the tech is low...

Only 33 people out of the 402 respondents indicated they no longer use the technology; mainly due to need, trust, and usefulness.



“I think it is irritating when it slows down too soon.”

“Keeps telling you that you are over the line when you are not.”

“It slows you down when it doesn’t need to. It is irritating.”

“Sometimes the vehicle does lane assist and sometimes not. I’m assuming it’s the road lane striping.”

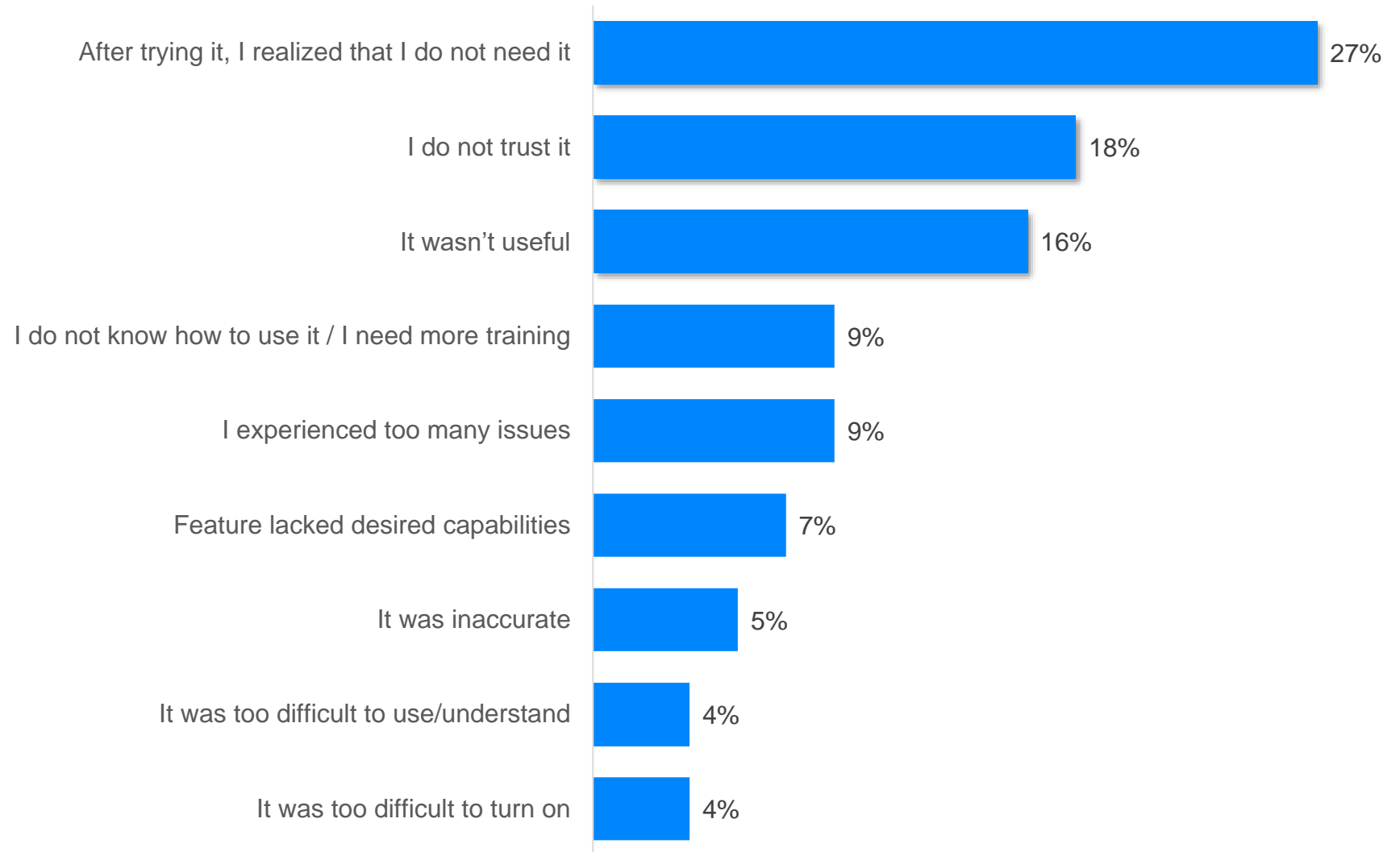
“I feel it sometimes works and sometimes not.”

“It never works in heavy rain.”

“It was very hard to get used to.”



Reasons No Longer Use*



Level of Knowledge Before the Training

Level of Knowledge Before the Training Summary (1 of 3)

- Toyota owners are deficient in terms of their level of knowledge regarding the Active Driving Assistance feature
 - *On average, respondents get two of the 11 category questions correct equating to a score of 35% across all of the questions regardless of category (i.e., respondents got some of the multi-part questions correct)*
- There is a lack of understanding of the Active Driving Assistance limitations as well as the feature's reaction to various changing conditions (e.g., lane markings, hands off the wheel)
- Technology status images are not understood creating the situation where drivers may think they have support when it is actually not active
- There is a stronger understanding of the Adaptive Cruise Control component of the Active Driving Assistance feature, which has been around longer than Lane Centering
 - *More owners are aware of the how Adaptive Cruise Control works in terms of the ability to adjust the following distance, ability to bring the vehicle to a complete stop, etc.*

Level of Knowledge Before the Training Summary (2 of 3)

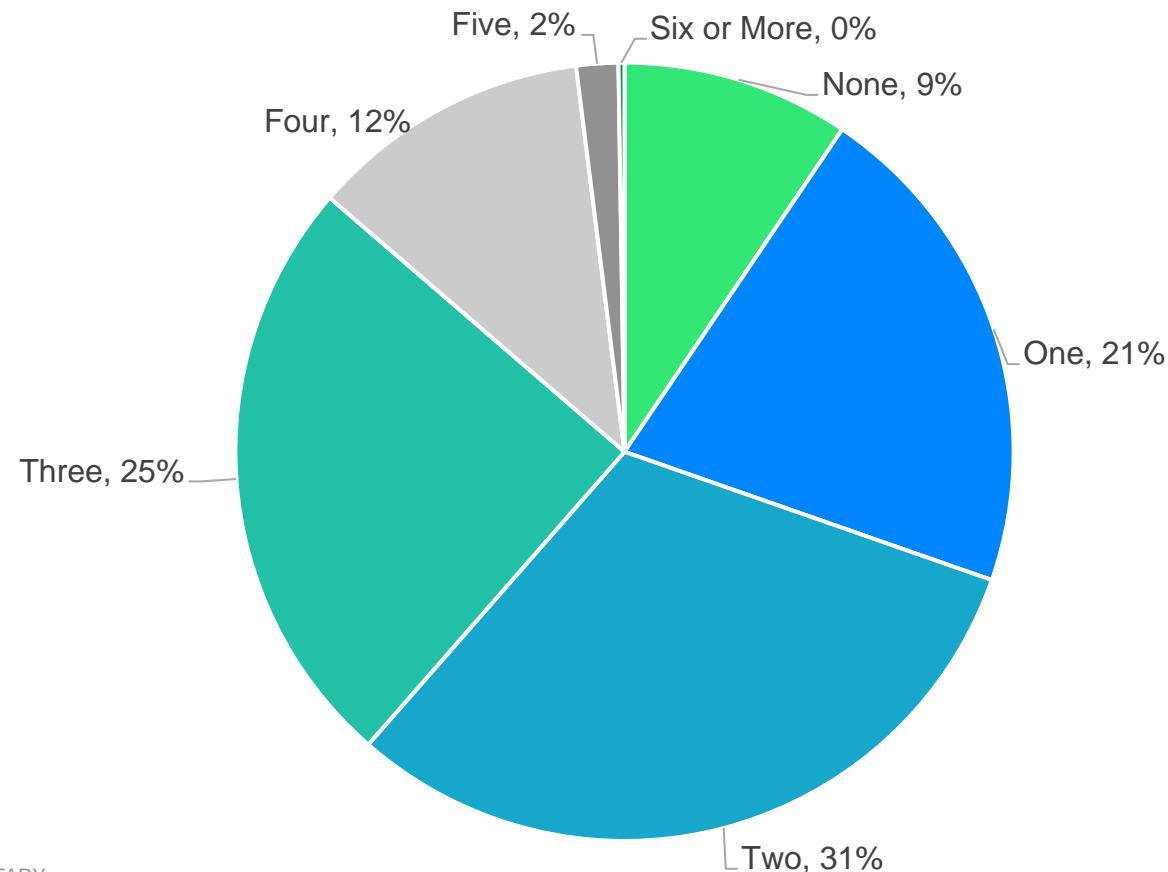
- How the respondent learned (e.g., dealer, outside sources) about the Active Driving Assistance feature does not play a role in the accuracy and depth of their knowledge
 - *There are a few exceptions where prior experience with the feature makes a difference including more owners knowing that the feature cannot be used on roads with traffic lights*
- With the exception of a few aspects (e.g., which technologies are required to use the feature), age does not play a strong role in the degree of understanding the technology
 - *It is often thought that younger people have an easier time learning advanced technologies, but that is not the case with the Active Driving Assistance feature*
- Males tend to be slightly more accurate about the true statements tested about the technology. However, males also show overconfidence as they select answers that are incorrect at a higher rate than females
- While still lagging in total, owners who use the feature tend to have more accurate knowledge about it than those that don't use or have stopped using it
- Respondents don't know that the volume for the audible alert can't be adjusted

Level of Knowledge Before the Training Summary (3 of 3)

- The lack of knowing the feature's limitations is concerning as it can create risk. The least known limitations include:
 - *Impact of weather (e.g., snow, sun glare)*
 - *Inability to work reliably at night*
 - *Gaps in lane markings and faded lane markings*
 - *Inability to detect pedestrians*
 - *Lack of reliability in sharp curves*
- Outside of roughly half of the respondents knowing that having the feature active will cause it to resist lane changes without using the turn signal, most don't understand how the feature will react when:
 - *They take their hands off the steering wheel*
 - *The lane markings are no longer visible*
 - *Resuming after the vehicle is brought to a complete stop*

The lack of understanding about the Active Driving Assistance feature is clear as not one of the 402 respondents got all of the 11 category questions correct; in fact, no one got more than five correct and the average was two

Number of Questions Correct: Pre-Video
Total Sample



The questions were not designed to mislead but rather focused on basic information needed to use the feature properly and safely.

Question areas included:

- Road type where the feature can be used
- How to activate
- Speed requirement to activate
- Meaning of the display images, icons and warning
- Feature Reaction
- Limitations
- Settings

On average, respondents received accuracy score of 20% based on the 11 category questions

Pre-Video Scorecard

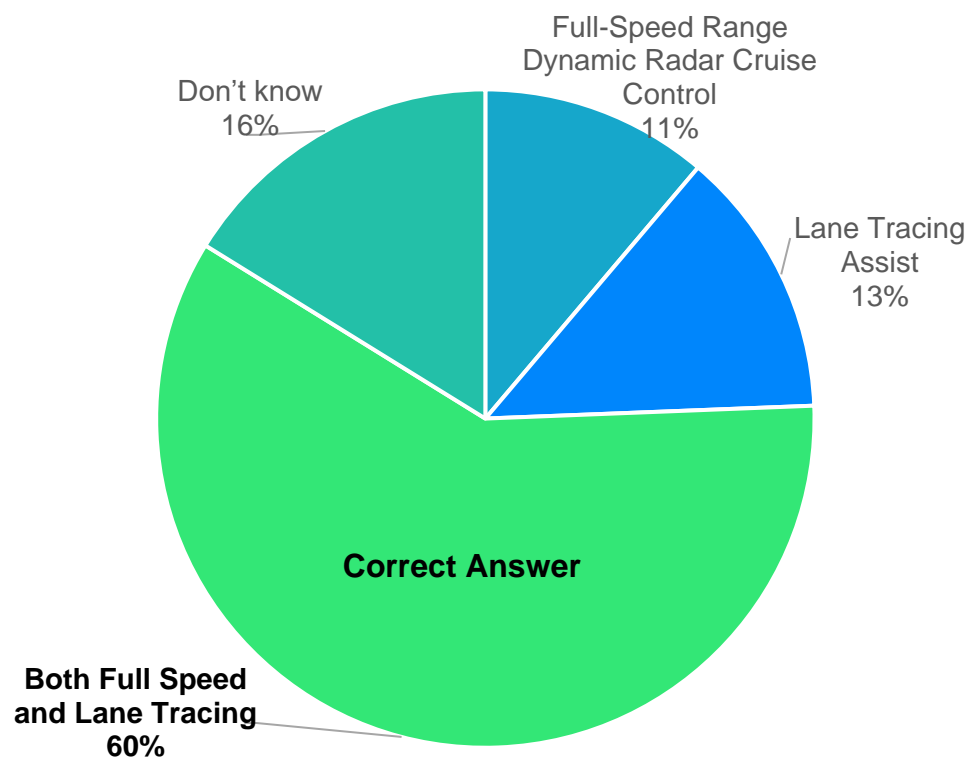


		Total Sample
Limitations	Follows the vehicle in front by a preset distance	79%
Instrument Cluster Image 1 (ADA)	Active Driving Assistance is Activated (Image 2)	61%
Settings	I can set the distance in which my vehicle follows the vehicle in front of me	61%
Limitations	Is able to bring my vehicle to a complete stop	61%
Equipment Needed	Both Full Speed and Lane Tracing	59%
Limitations	Cannot change lanes automatically without driver assistance	59%
Limitations	Isn't able to navigate around potholes	55%
Feature Reaction: No Turn Signal	Resists the lane change	54%
Settings	Full-Speed Range Dynamic Radar Cruise Control can be set when traveling at any speed	53%
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is inadvertently exiting the lane on the right	49%
Instrument Cluster Image 3 (LKA on right only)	Full-Speed Range Dynamic Radar Cruise Control is active	45%
Speed Requirement	At 32 MPH or above	44%
Instrument Cluster Image 2 (Departing Lane on Right)	Full-Speed Range Dynamic Radar Cruise Control is active	43%
Settings	The Lane Tracing Assist stays on after an engine restart	43%
Settings	The distance setting will not be maintained after an engine restart	41%
Feature Reaction: Hands Off Wheel	Provides a visual warning "Hold Steering Wheel" in Driver Support Screen	39%
Road Type	Interstates/Highways/Freeways without traffic lights	33%
Instrument Cluster Image 3 (LKA on right only)	Vehicle is receiving steering support for the right side of the lane	32%
Feature Reaction: Resume Driving	Driver can press the "Res" button on the steering wheel	27%
Limitations	Cannot detect pedestrians	24%
Instrument Cluster Image 3 (LKA on right only)	Active Driving Assistance is in standby mode	24%
Feature Reaction: Hands Off Wheel	Beeps	24%
Feature Reaction: No Lane Markings	One or both blue lines no longer appear in the Driver Support screen	23%
Feature Reaction: No Lane Markings	Beeps	23%
Feature Reaction: Resume Driving	Feature will resume automatically if the vehicle has been stopped for less than 3 seconds	21%
Feature Reaction: No Lane Markings	All options (One or both blue lines no longer appear in the Driver Support screen, Beeps, Will no longer keep the vehicle centered in the lane, Goes into standby mode)	21%
Limitations	Does not operate reliably when lane paint is faded	21%
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is receiving steering support for the left side of the lane	20%
Feature Reaction: Resume Driving	Driver can depress the accelerator pedal	20%
Limitations	Does not operate reliably in sharp curves	19%
Limitations	Does not operate reliably when there is snow	19%
Limitations	Does not operate reliably when there are gaps in the lane markings for freeway exits/entrances	17%
Feature Reaction: Hands Off Wheel	After issuing one or multiple warnings, the feature will go into standby mode	16%
Feature Reaction: No Lane Markings	Will no longer keep the vehicle centered in the lane	15%
Settings	I can't change the volume of the audible warnings	14%
Feature Reaction: No Lane Markings	Goes into standby mode	12%
Limitations	Does not operate reliably at night	8%
Average Score 12 Questions		35%
Average Score 11 Questions		34%

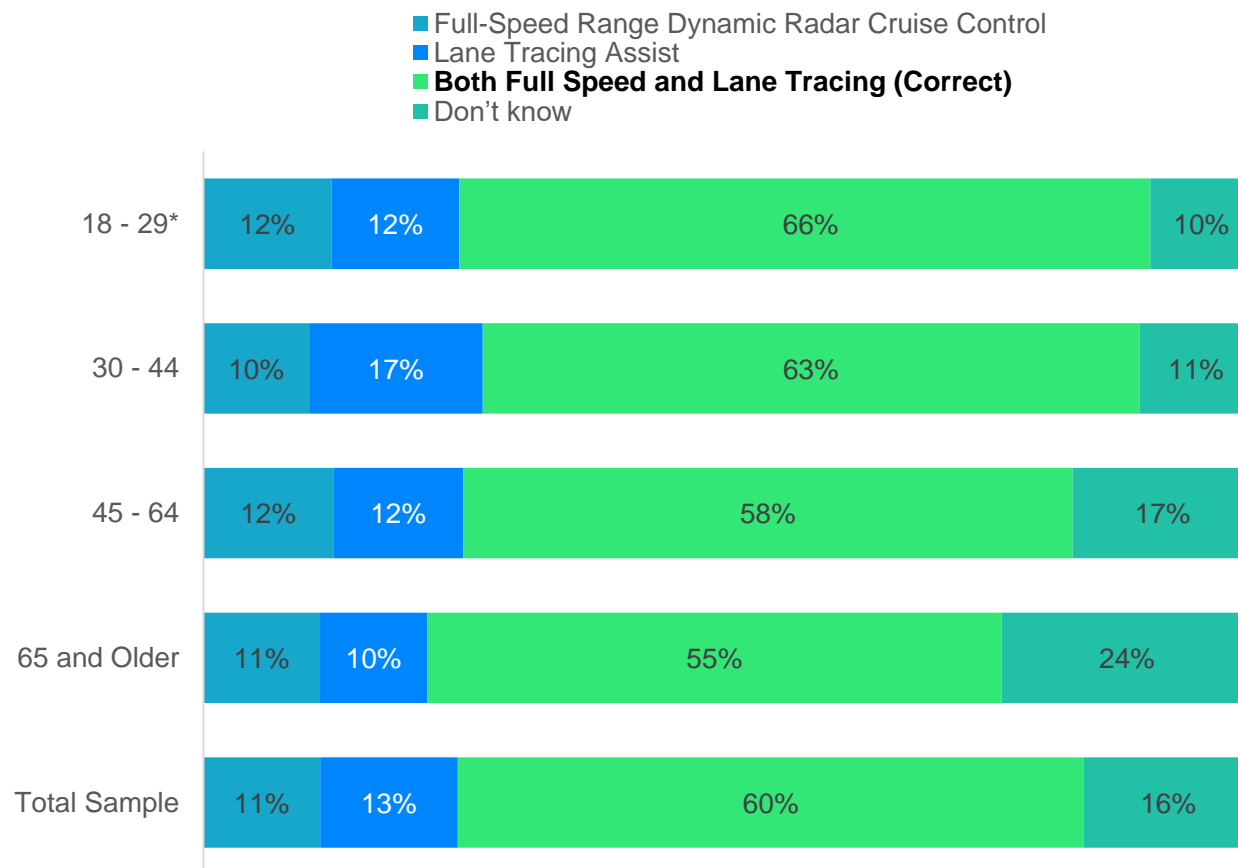
Many respondents (40%) don't know that both Full Speed Range Dynamic Radar Cruise Control and Lane Tracing Assist are needed to have Active Driving Assistance capability; knowledge declines with age

Features Required to Use Active Driving Assistance

Total Sample



By Age Group



11: Which of the following features are required to use the Active Driving Assistance technology on your Toyota vehicle?
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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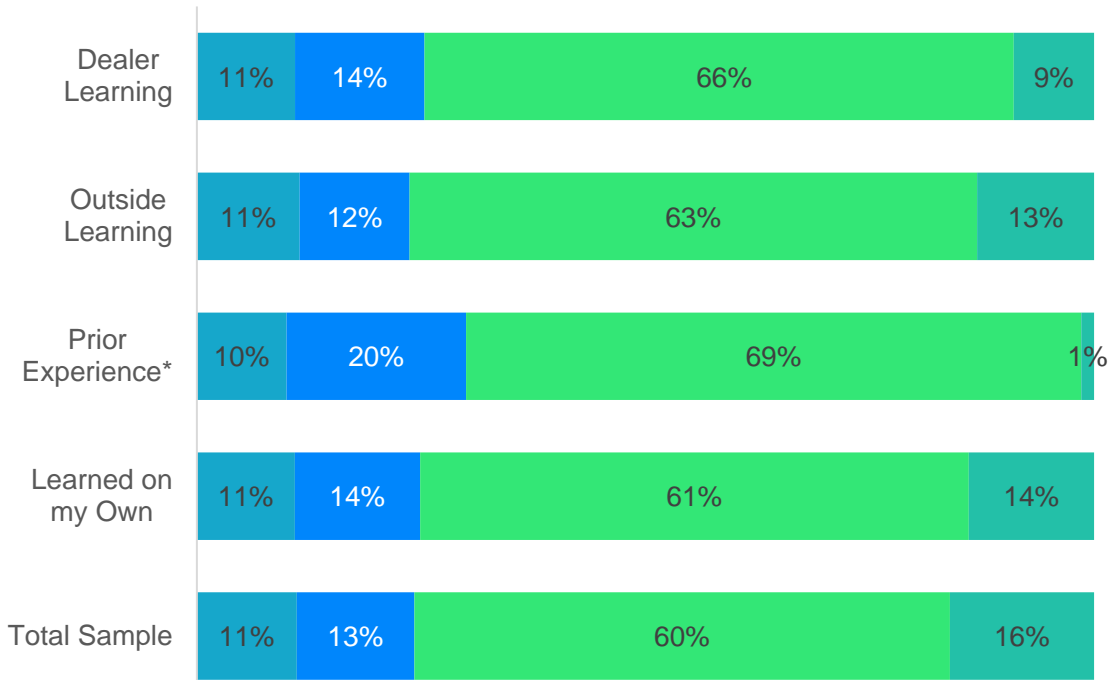
*Small Sample

Those with prior experience have more knowledge as to the required features than those who learned on their own; those that use the feature possess a more accurate knowledge of which features are required for Active Driving Assistance

Features Required to Use Active Driving Assistance

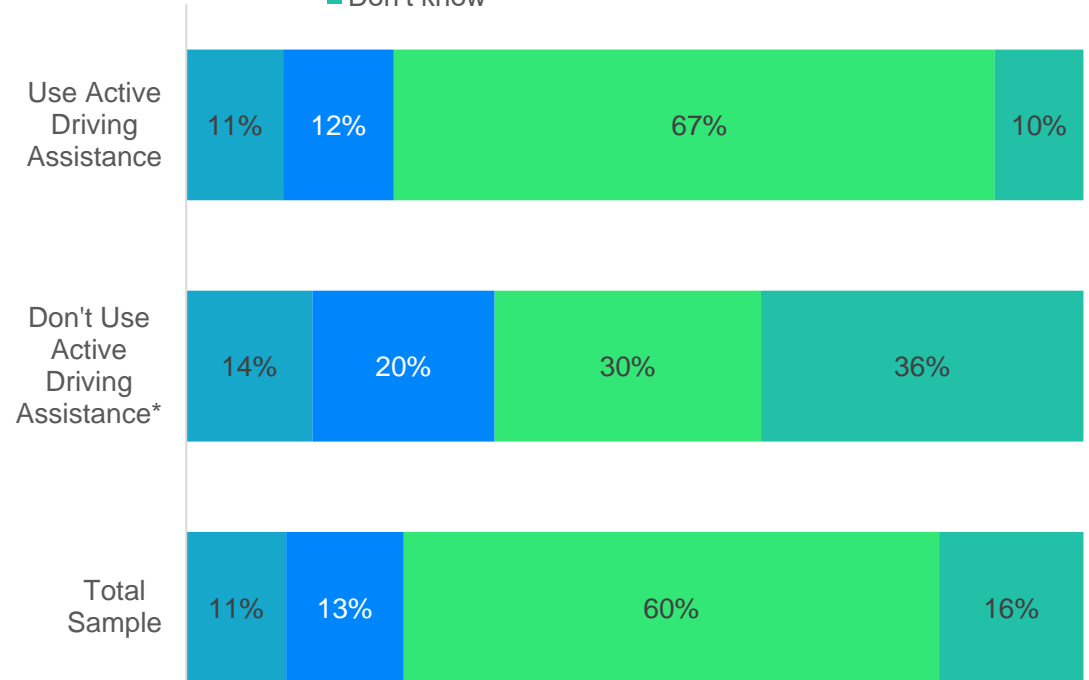
By How Learned

- Full-Speed Range Dynamic Radar Cruise Control
- Lane Tracing Assist
- Both Full Speed and Lane Tracing (Correct)
- Don't know



By Frequency of Use

- Full-Speed Range Dynamic Radar Cruise Control
- Lane Tracing Assist
- Both Full Speed and Lane Tracing (Correct)
- Don't know

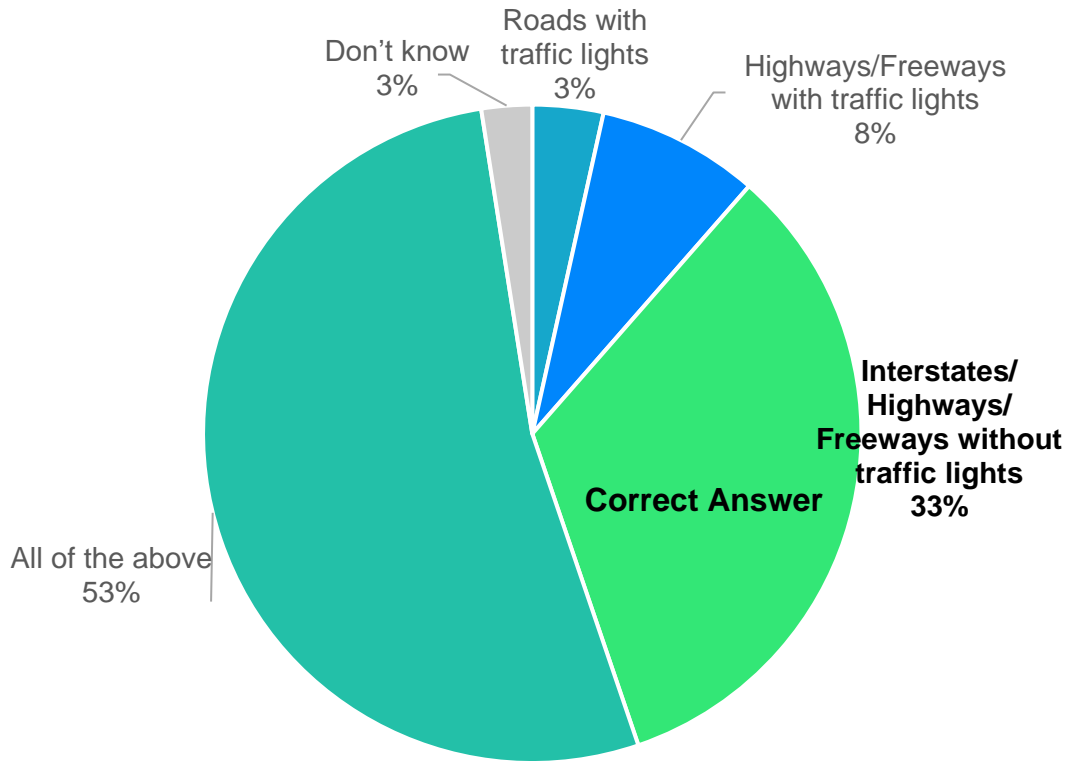


I1: Which of the following features are required to use the Active Driving Assistance technology on your Toyota vehicle?
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

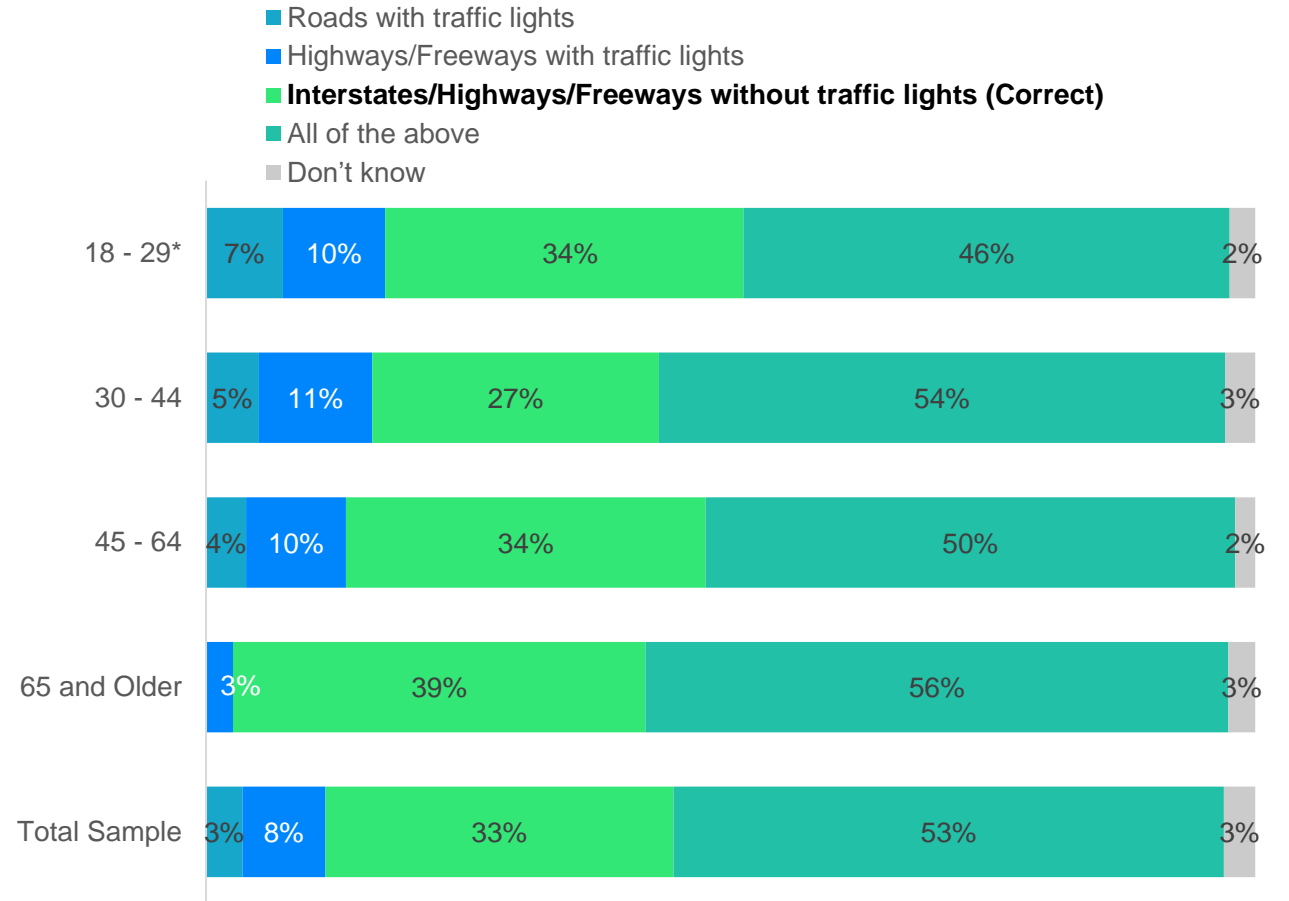
Prior to the video training, only one third of owners understand that the feature cannot be used on roads/highways with traffic lights, which is concerning

Type of Roads Where Feature Works Properly

Total Sample



By Age Group



C1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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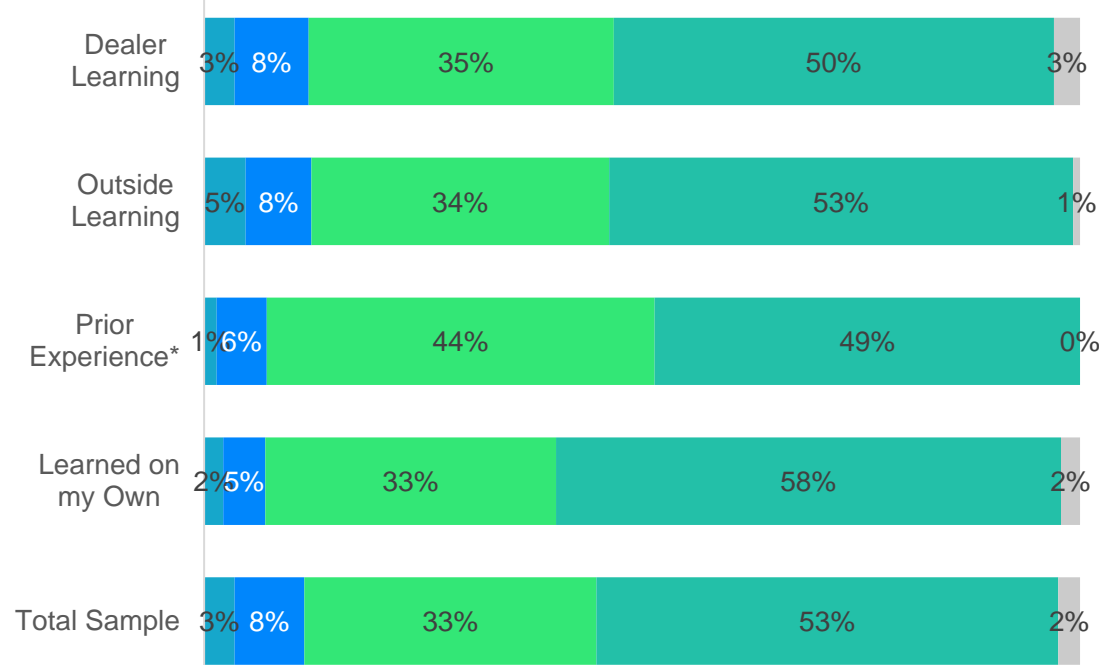
*Small Sample

Usage plays no distinct role in understanding the feature cannot be used on roads with traffic lights; however, prior experience increases user understanding that the feature cannot be used on roads with traffic lights

Type of Roads Where Feature Works Properly

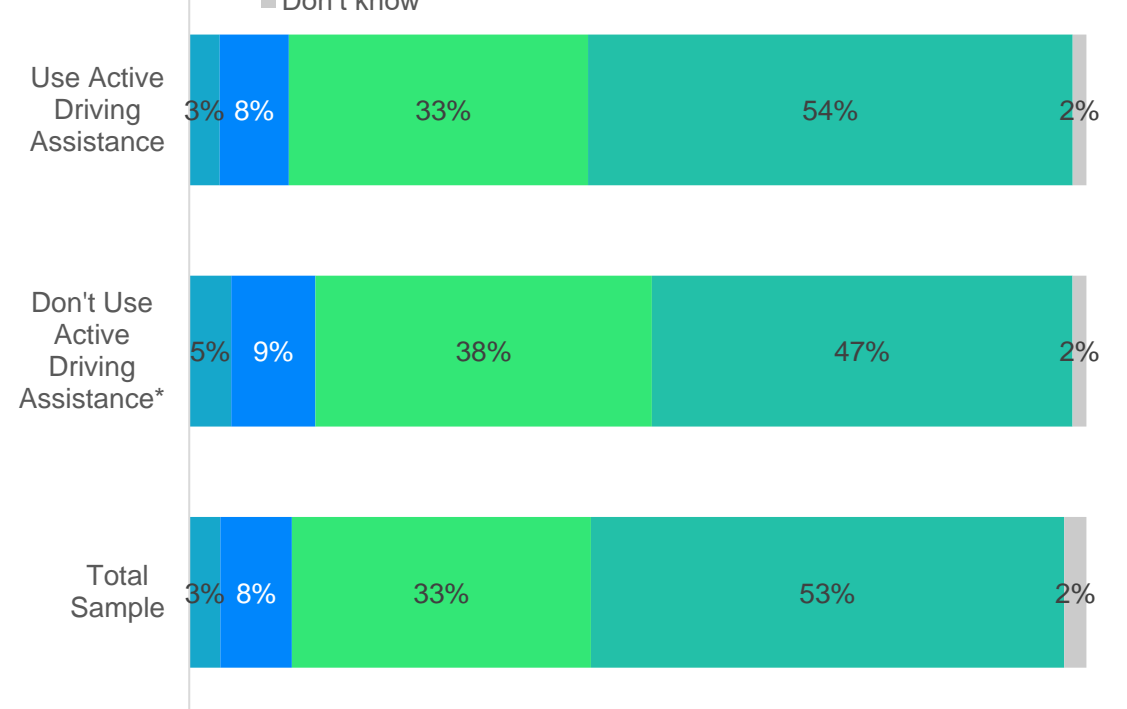
By How Learned

- Roads with traffic lights
- Highways/Freeways with traffic lights
- Interstates/Highways/Freeways without traffic lights (Correct)
- All of the above
- Don't know



By Frequency of Use

- Roads with traffic lights
- Highways/Freeways with traffic lights
- Interstates/Highways/Freeways without traffic lights (Correct)
- All of the above
- Don't know

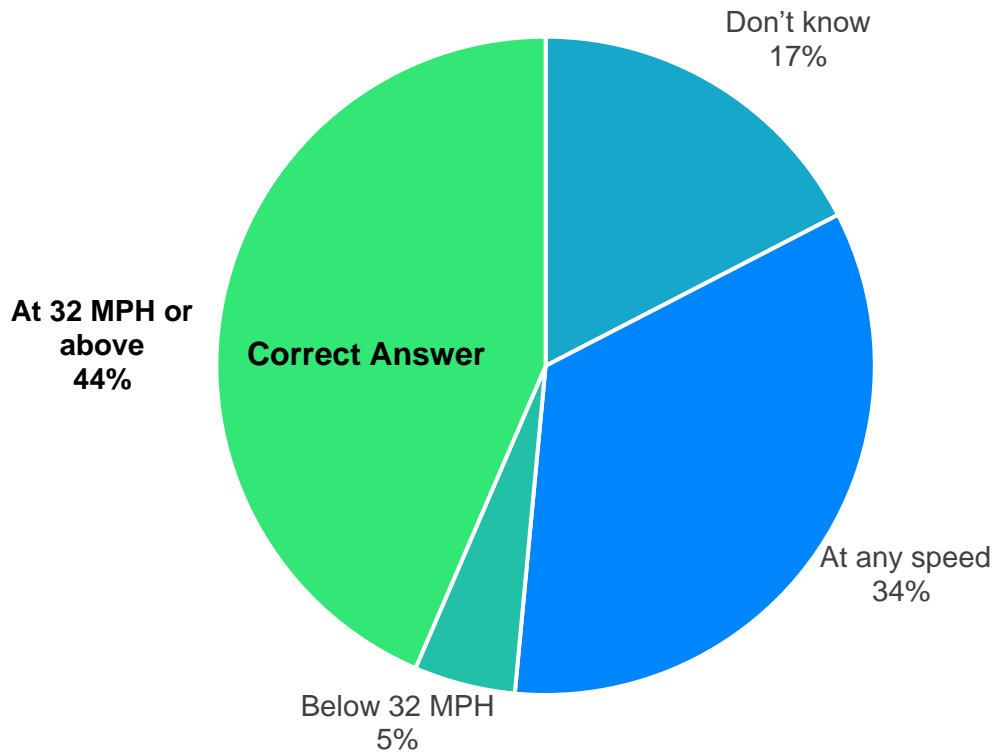


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 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

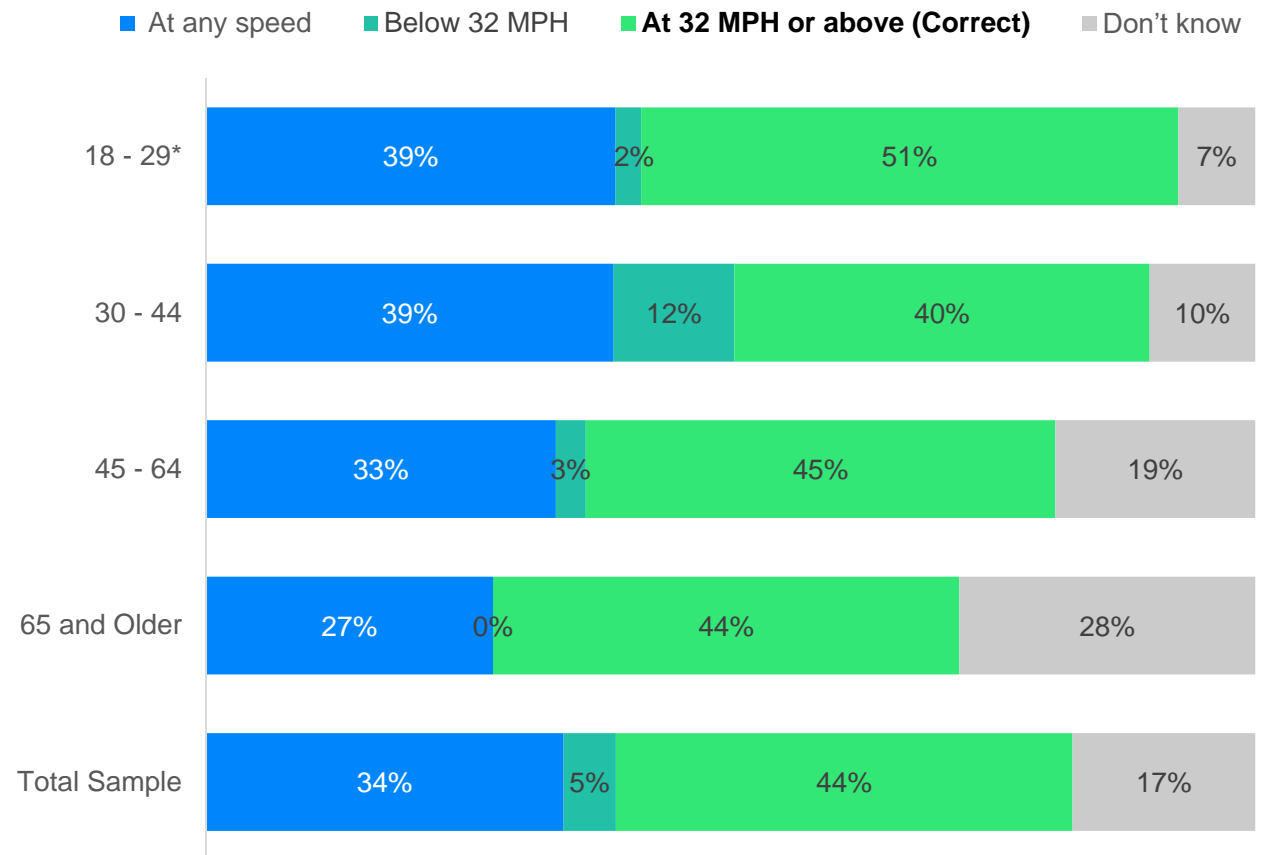
Less than half of the respondents know that the vehicle must be traveling at a minimum of 32 MPH for Active Driving Assistance to activate and it is troublesome that they incorrectly think they have support

Minimum Speed Require to Activate

Total Sample



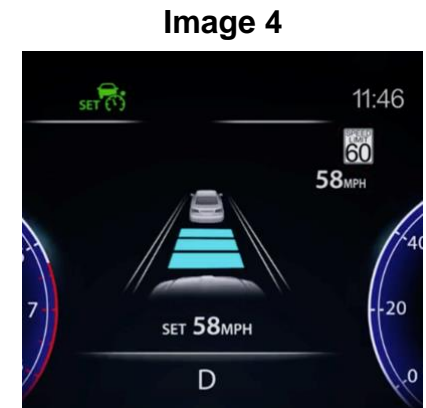
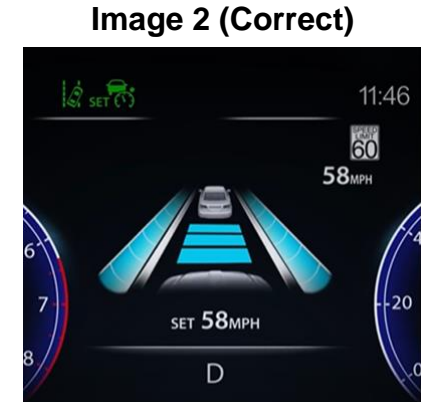
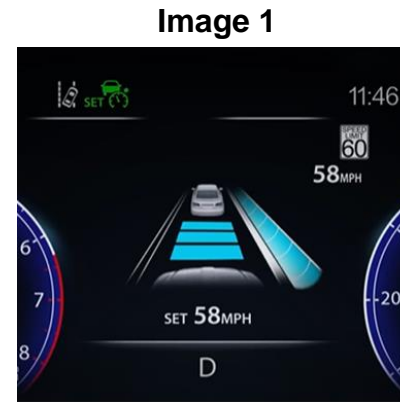
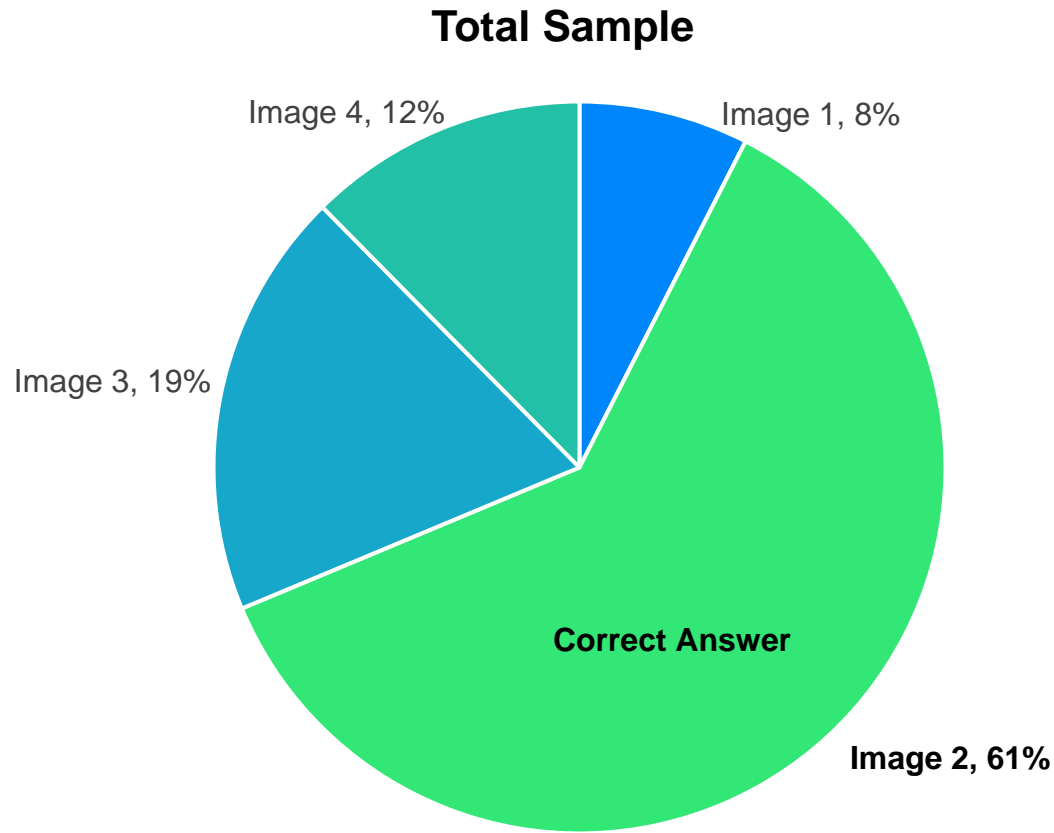
By Age Group



C2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Roughly 40% of owners of the technology do not know how to tell if the feature is active in the instrument cluster, which is alarming

Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1



IS1: Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?

Sample Size: Total Sample: N = 402.

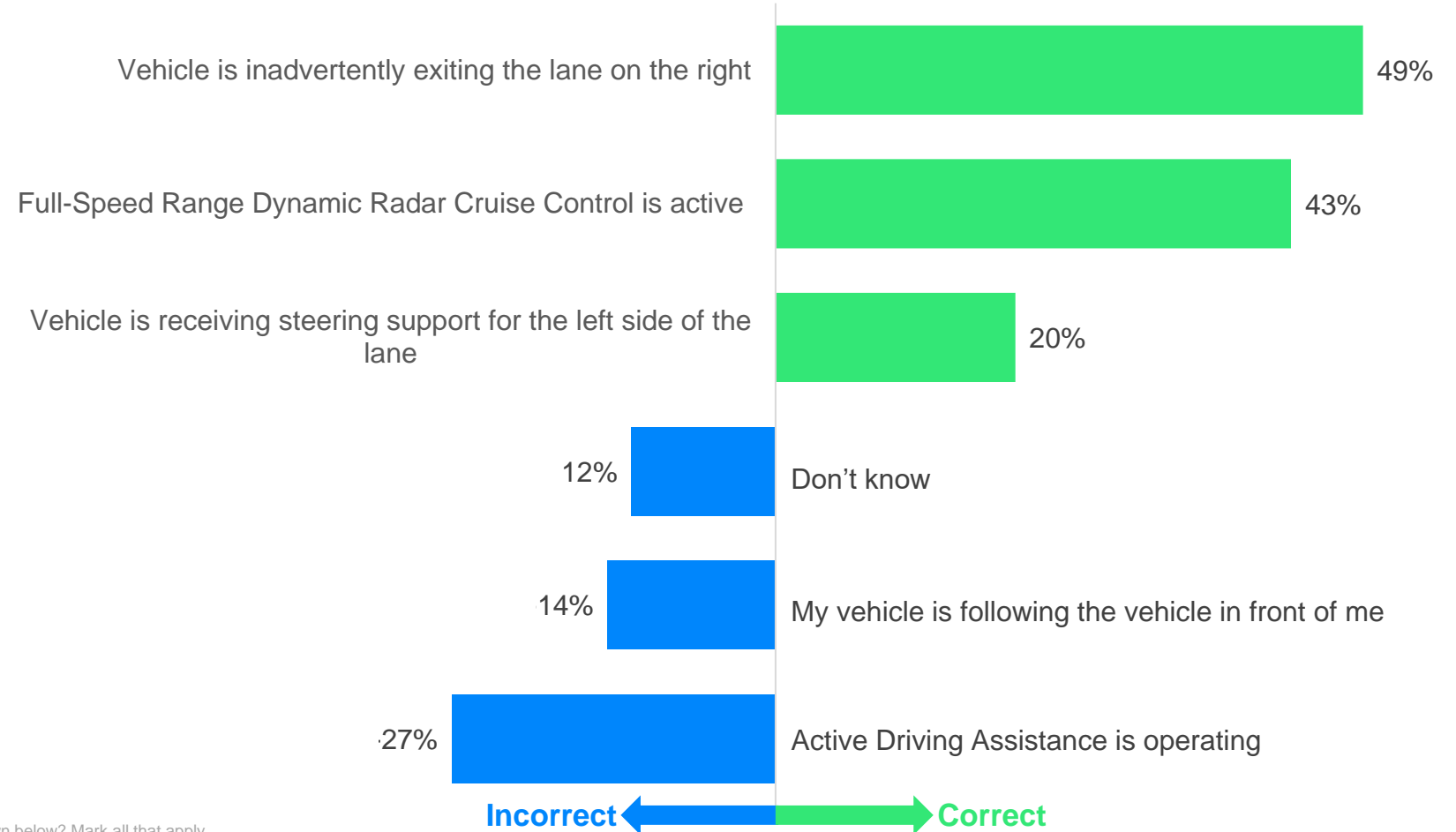
99% of respondents answered this question incorrectly



There is a lack of understanding of what the Active Driving Assistance images in the cluster are trying to communicate to drivers

Instrument Cluster Active Driving Assistance Status Image Indication: View 2 – Total Sample

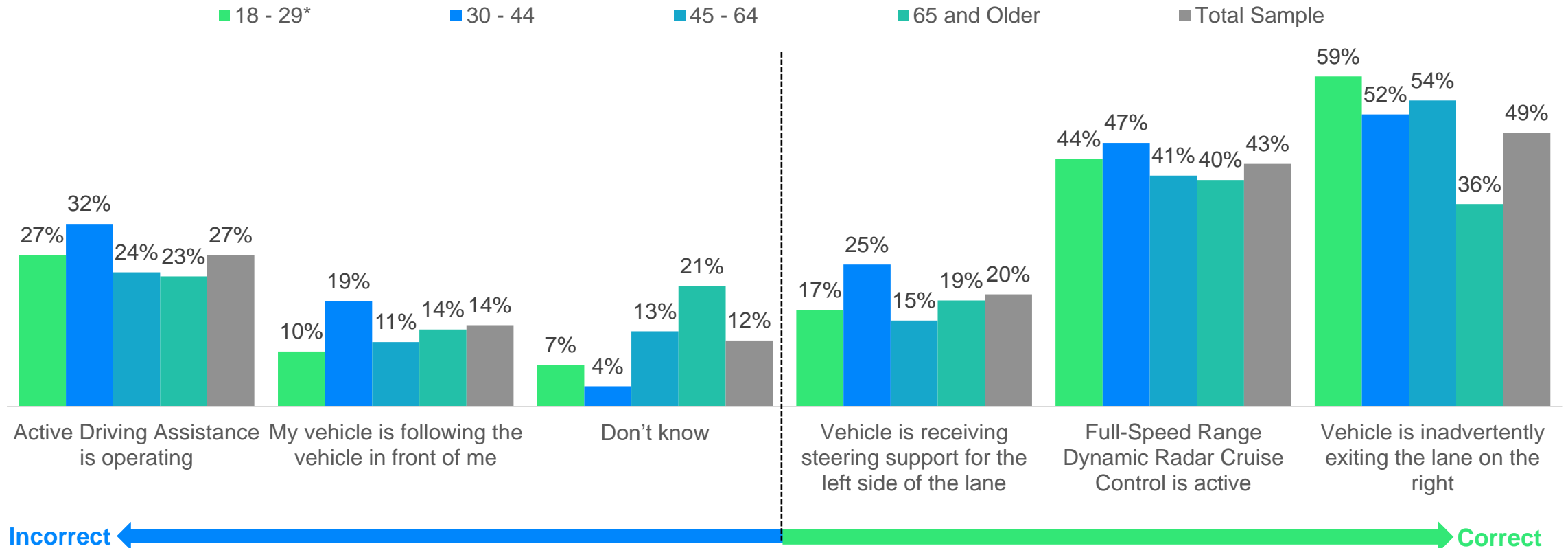
- Even the activation of the more simplistic functionality, Adaptive Cruise Control, is not clear to most owners
- Understanding if the vehicle is providing Lane Keeping Assist and which side(s) of the vehicle is receiving support adds a layer of complexity beyond most users understanding, especially when looking at the image at a glance while driving



IS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402.

Fewer people ages 65 and Older correctly interpret the cluster image in terms of the vehicle exiting the lane on the right

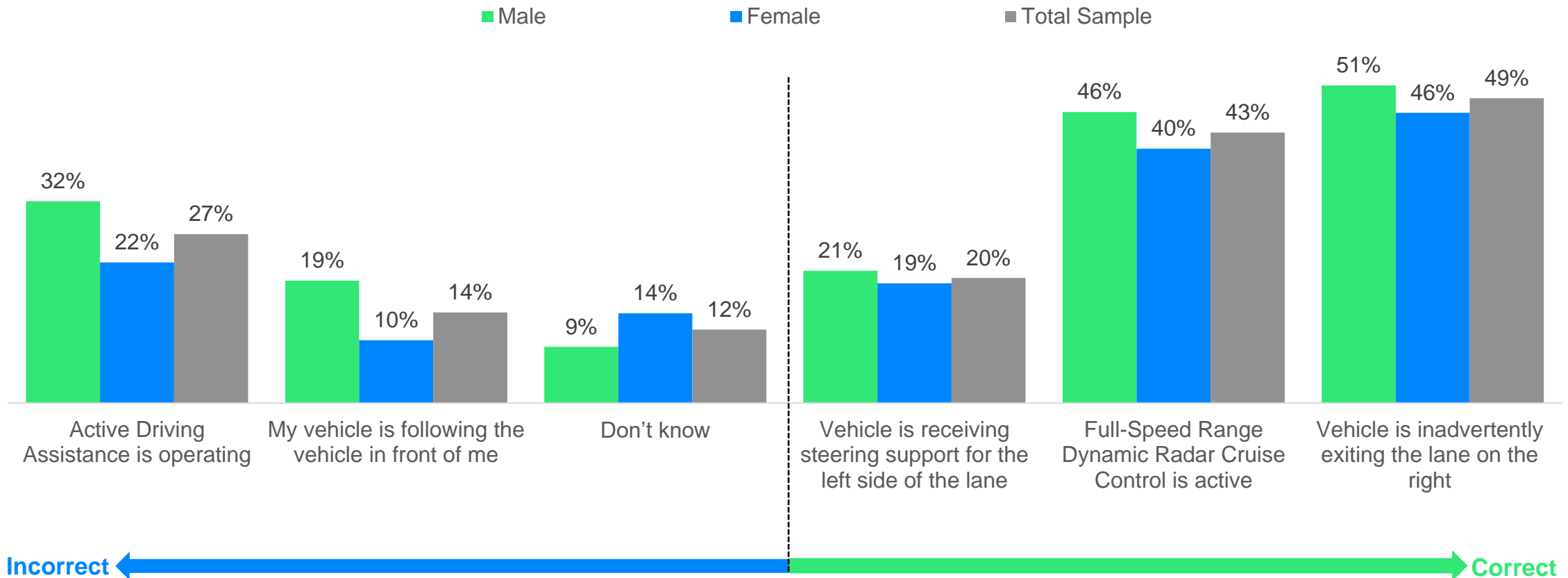
Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By Age Group



IS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Males correctly interpret the cluster image in terms of the vehicle exiting the lane on the right more than females, but incorrectly think that the Active Driving Assistance is operating

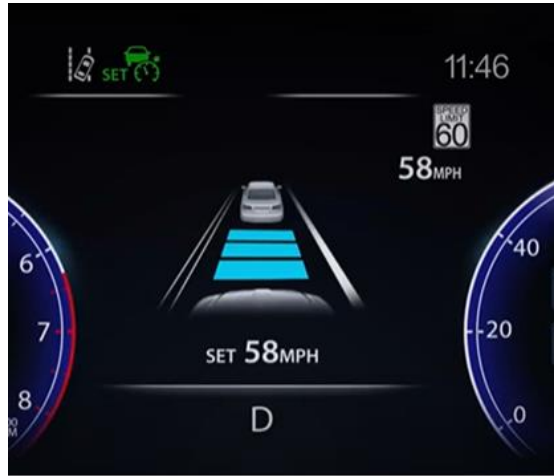
Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By Gender



IS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.
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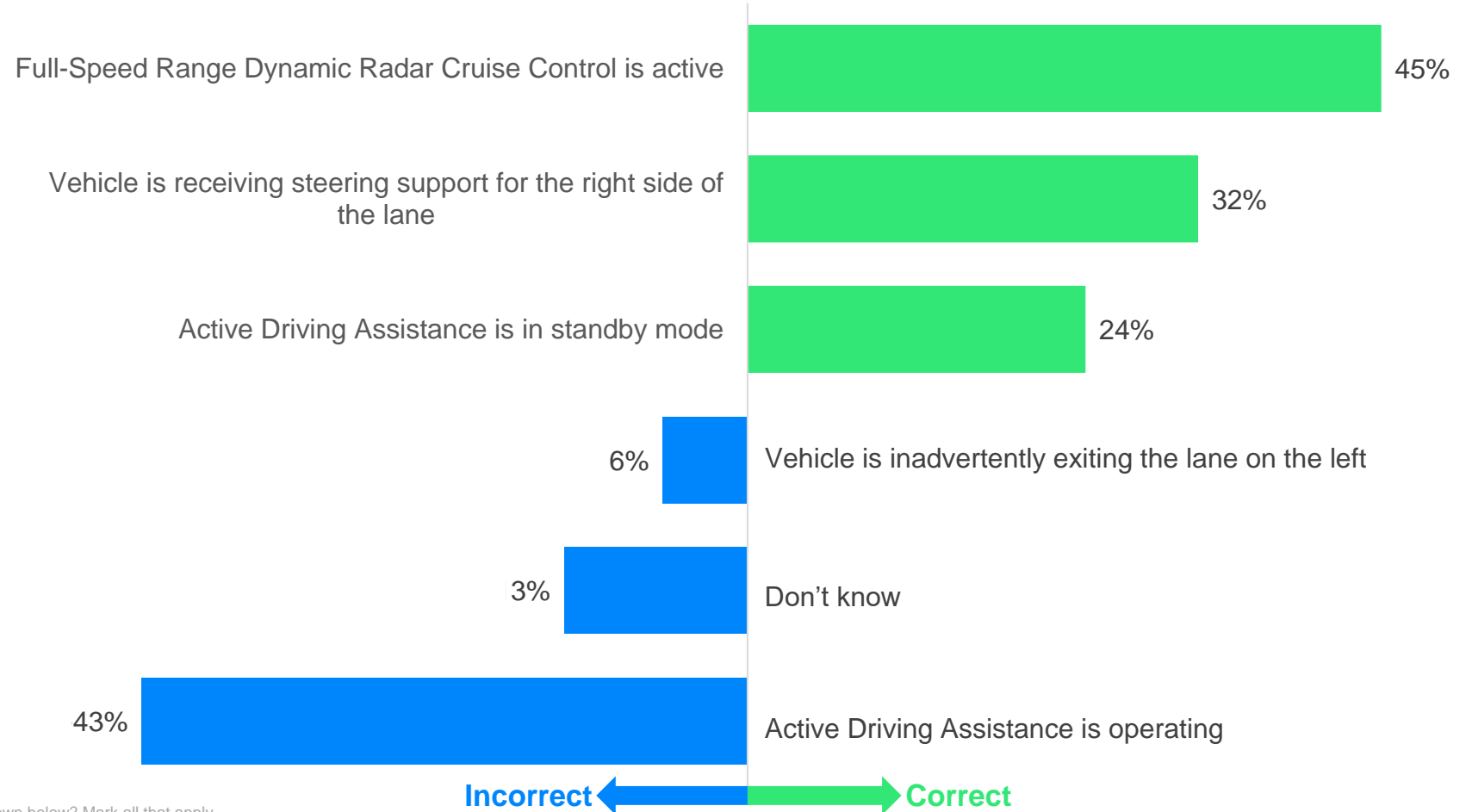
99% of respondents answered this question incorrectly

Respondents are not clear how to interpret the Active Driving Assistance status image in the cluster, which is concerning



- Many (43%) think Active Driving Assistance is operating despite all of the images (e.g., LTA icon, blue lines) indicating otherwise
- Over fifty percent (55%) don't realize the Adaptive Cruise Control is functioning
- Sixty eight percent don't understand that a solid white line means the vehicle is receiving Lane Keeping Assist support

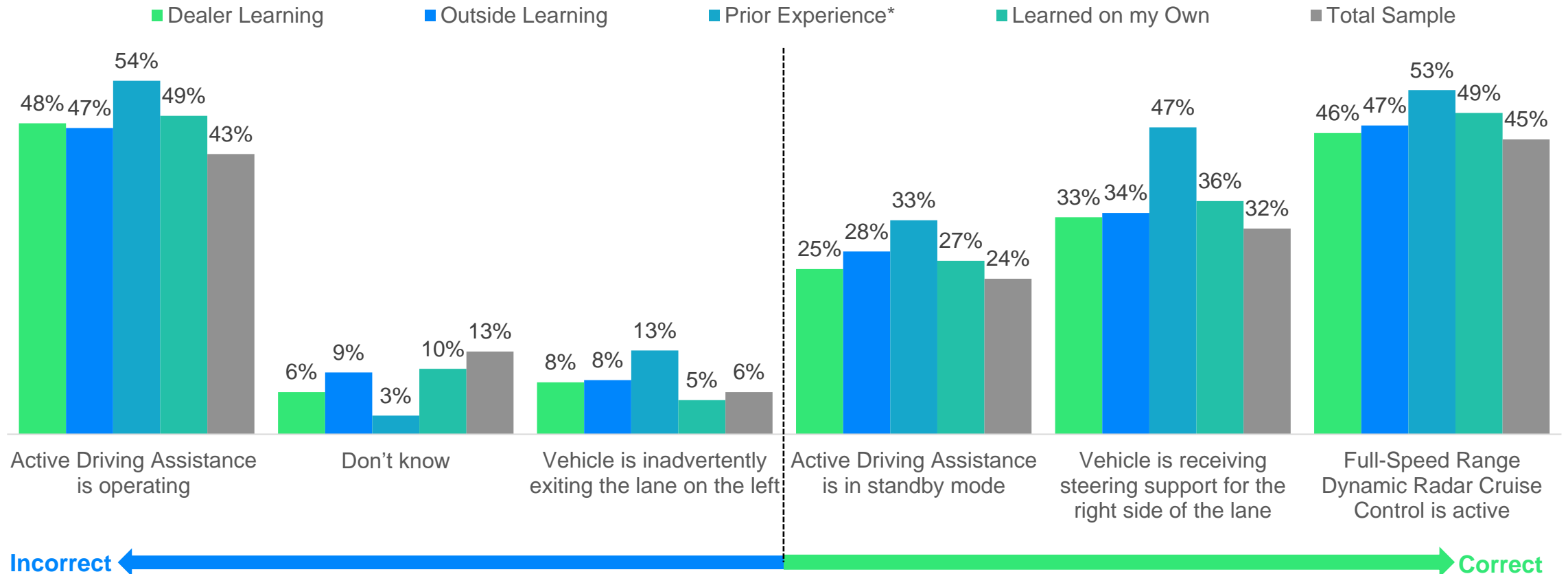
Instrument Cluster Active Driving Assistance Status Image Indication: View 3 – Total Sample



IS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402.

Those with prior experience incorrectly think the feature is active

Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By How Learned



IS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

98% of respondents answered the Setting category questions incorrectly

Most owners incorrectly think that they can change the volume for the audible warnings in their Toyota vehicle; Toyota does not have a volume setting for warnings

Settings Options for Active Driving Assistance – Total Sample Percent Correct

I can set the distance in which my vehicle follows the vehicle in front of me

61%

Full-Speed Range Dynamic Radar Cruise Control can be set when traveling at any speed

54%

The Lane Tracing Assist stays on after an engine restart

43%

The distance setting will not be maintained after an engine restart

41%

I can't change the volume of the audible warnings

14%

S1: Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle.

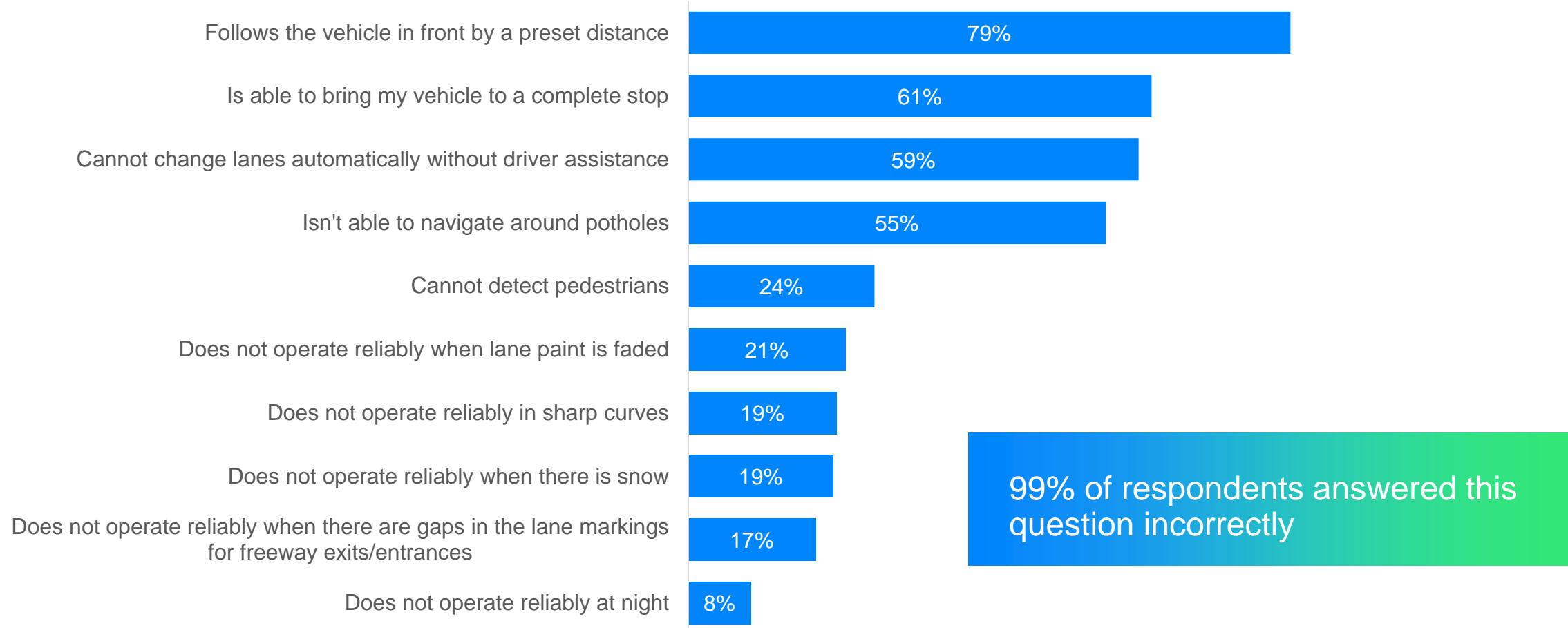
Sample Size: Total Sample: N = 402.

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- Almost 40% of respondents do not know that they can set the distance in which their vehicle follows the one in front of it when Adaptive Cruise Control is active
- The majority (59%) don't realize that the distance setting for Adaptive Cruise Control will not be maintained after an engine restart
- Fifty-seven percent lack the knowledge that Lane Tracing Assist does stay on after an engine restart

There is a lack of understanding the technology's limitations, especially for items such as working reliably at night, when there are gaps in lane markings, and in a sharp curve

Active Driving Assistance Technology Limitations – Total Sample Percent Correct



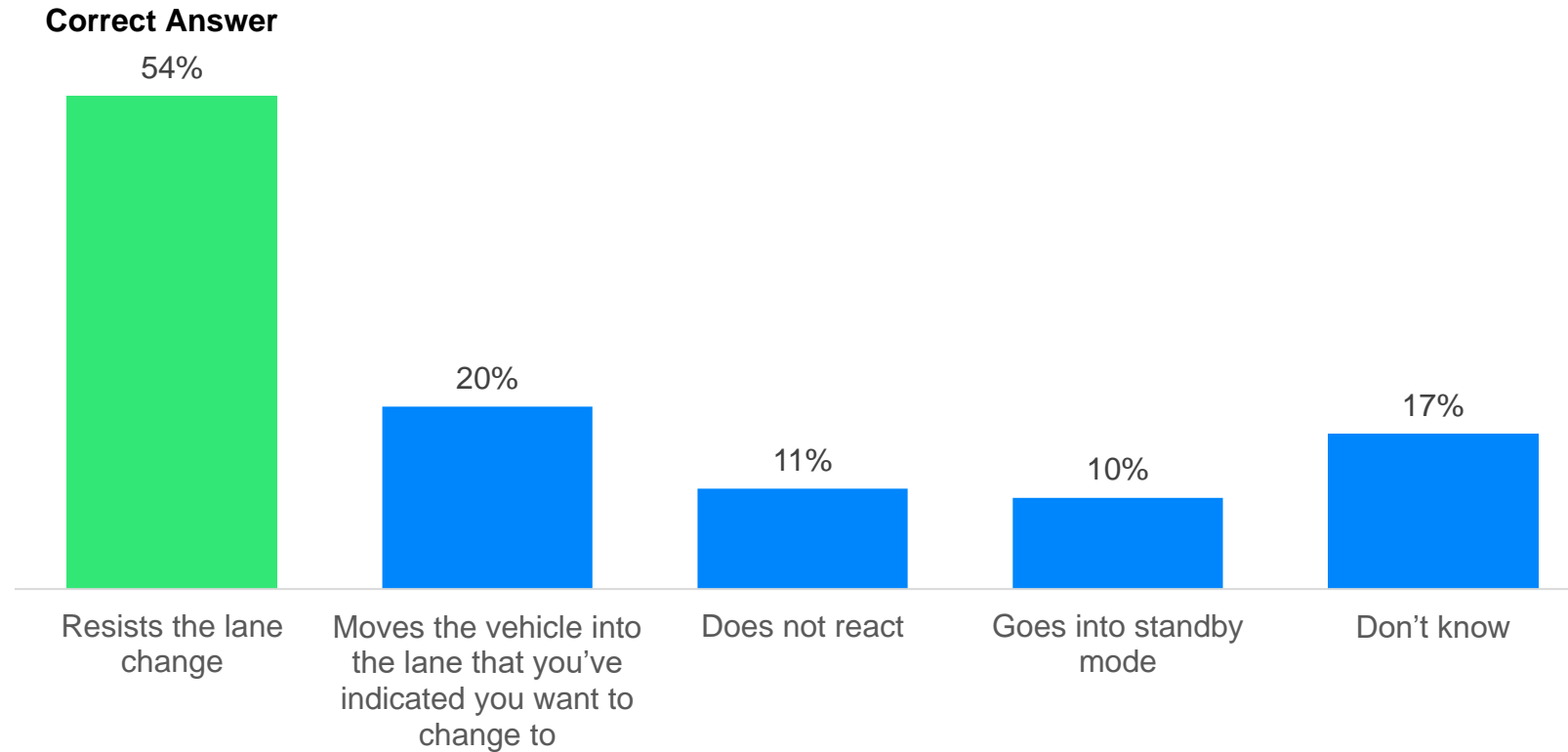
FC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.

Sample Size: Total Sample: N = 402.

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Roughly half of respondents understood that the vehicle will resist a lane change when the feature is active if the turn signal is off

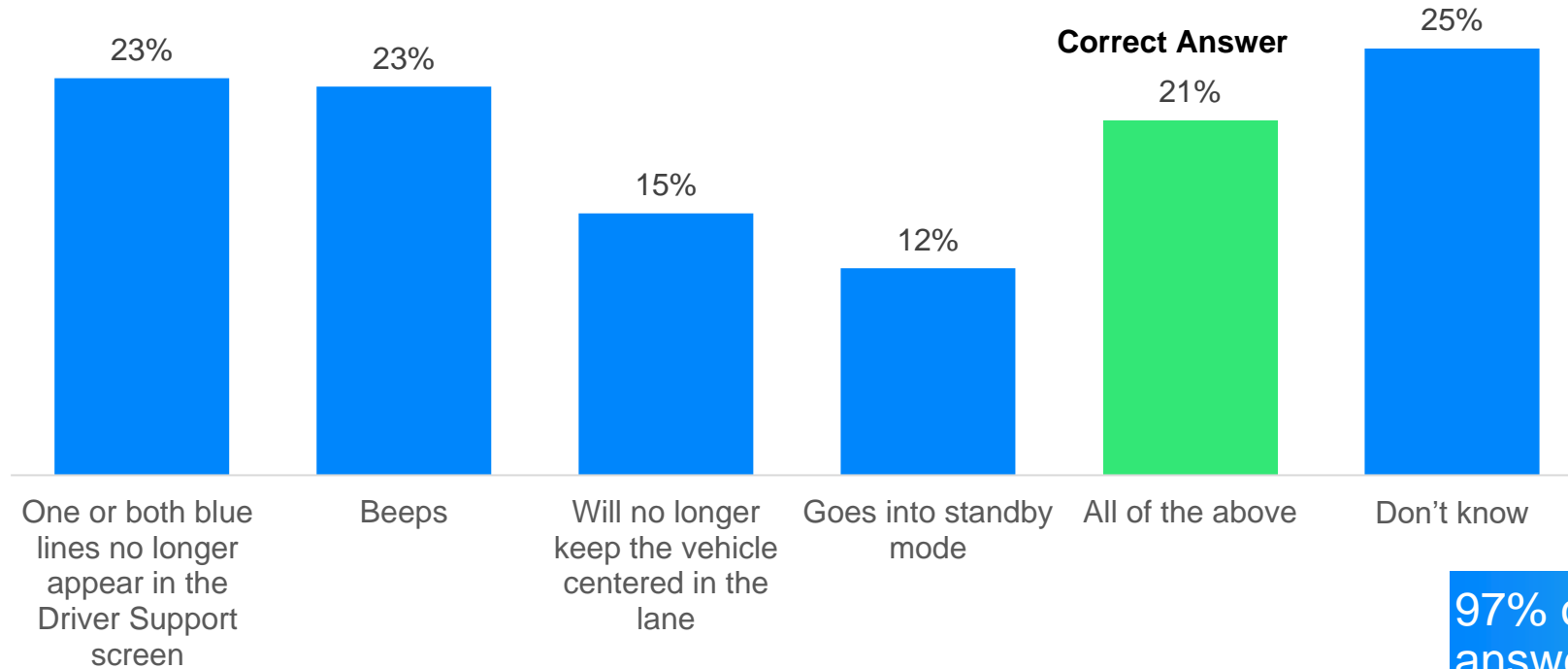
Feature Reaction: When Attempting to Change Lanes Without Turn Signal Total Sample



FR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

Only 21% of respondents understand the feature reaction when lane markings are no longer visible

Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible
Total Sample

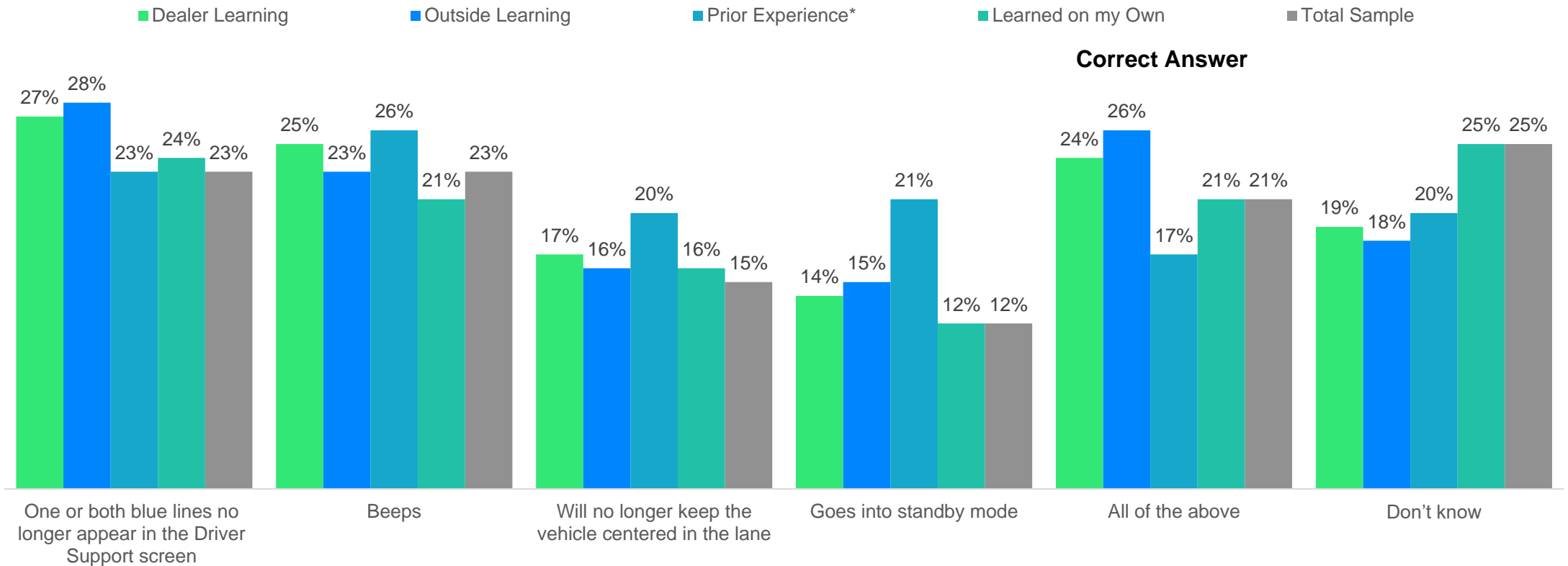


97% of respondents answered this question incorrectly

FR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

Prior experience does not aid in understanding the feature's reaction

Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible By How Learned



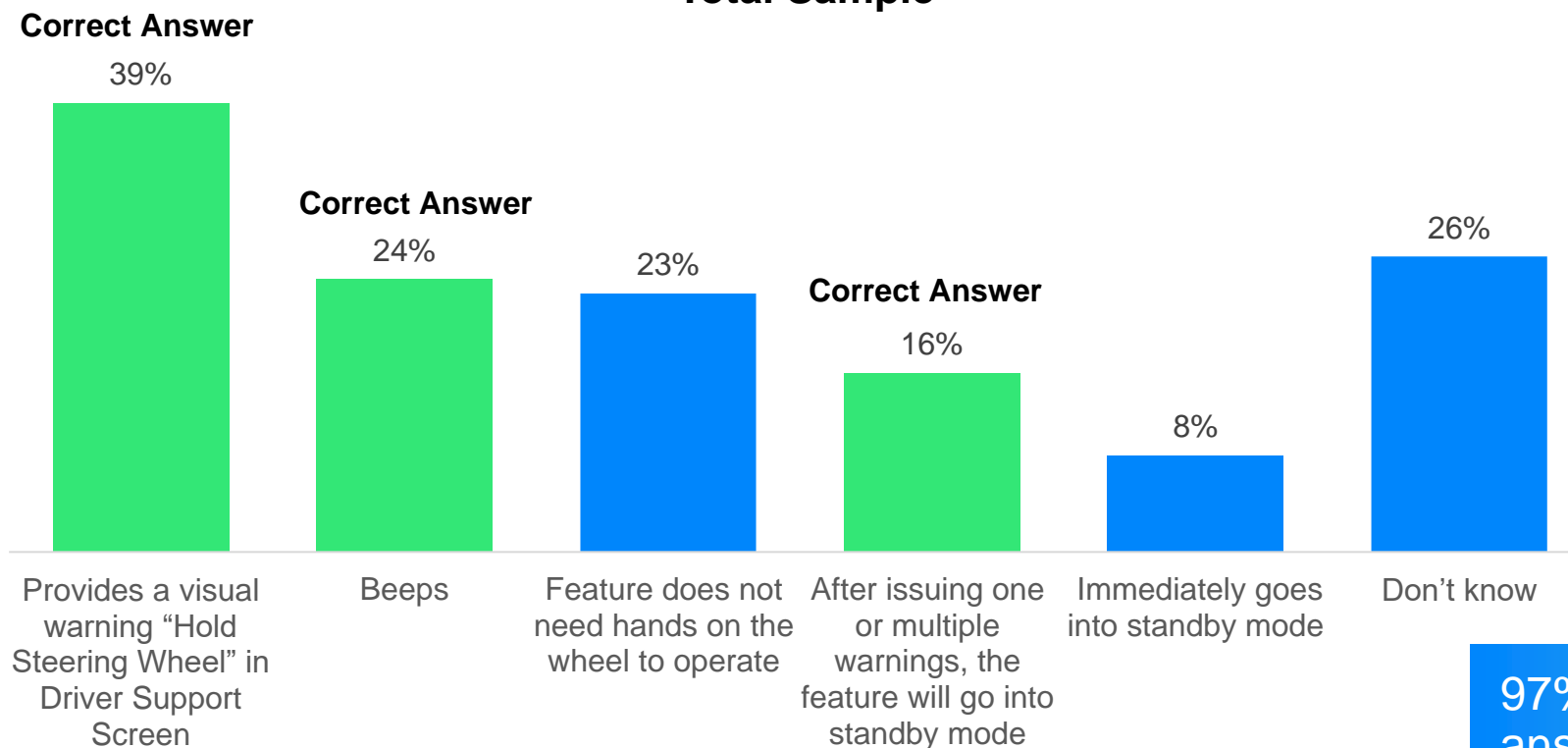
FR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

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*Small Sample

While roughly 40% knew that a visual warning is provided when the user's hands are off the wheel, most did not know that the system also provides a beep and will eventually go into standby mode

Feature Reaction: If You Take Your Hands Off the Steering Wheel Total Sample

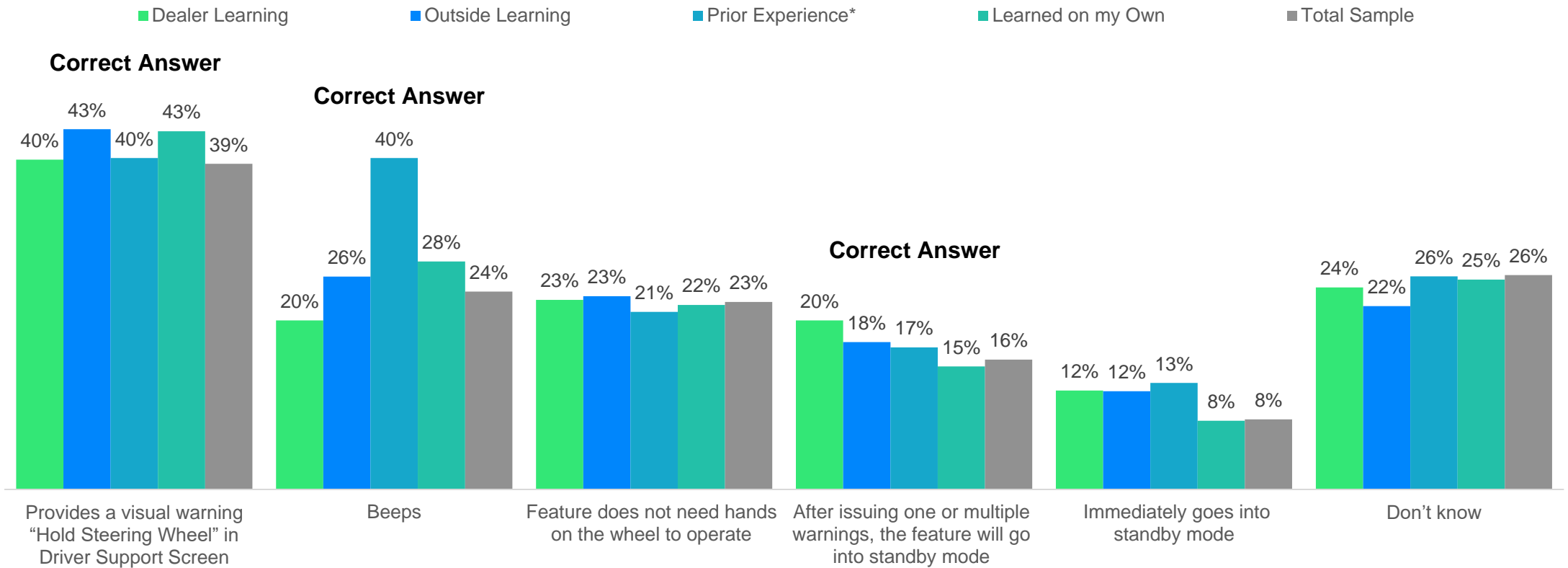


97% of respondents answered this question incorrectly

FR3: If you take your hands off the steering wheel while driving with the Active Driving Assistance feature on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

Prior experience helps users recognize that an audible warning will be provided when they take their hands off the wheel

Feature Reaction: If You Take Your Hands Off the Steering Wheel By How Learned



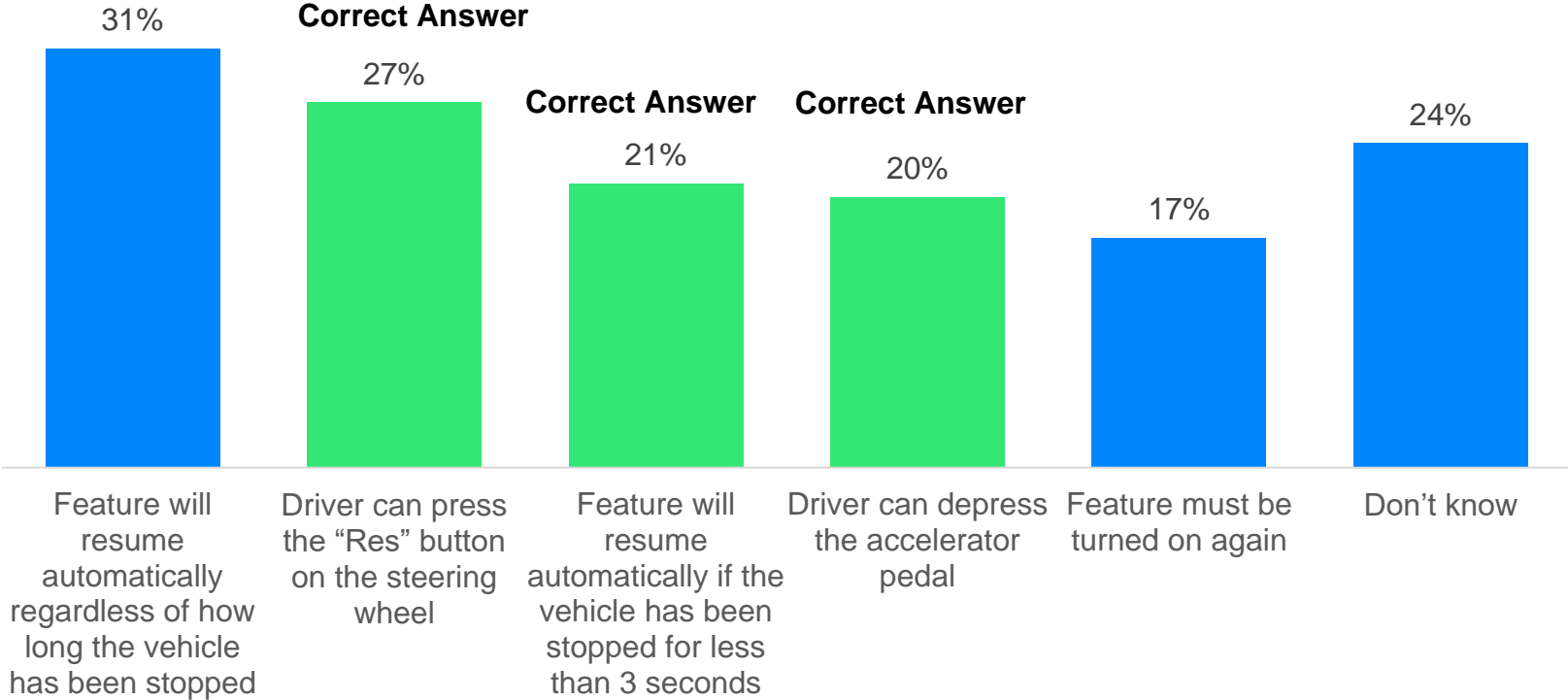
FR3: If you take your hands off the steering wheel while driving with the Active Driving Assistance feature on, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
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*Small Sample

Twenty-seven percent of owners know that they can depress the “Res” button on the steering wheel to resume driving

Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop Total Sample

98% of respondents answered this question incorrectly



FR4: If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply. Sample Size: Total Sample: N = 402.

Level of Knowledge After the Training

Level of Knowledge After the Training (1 of 2)

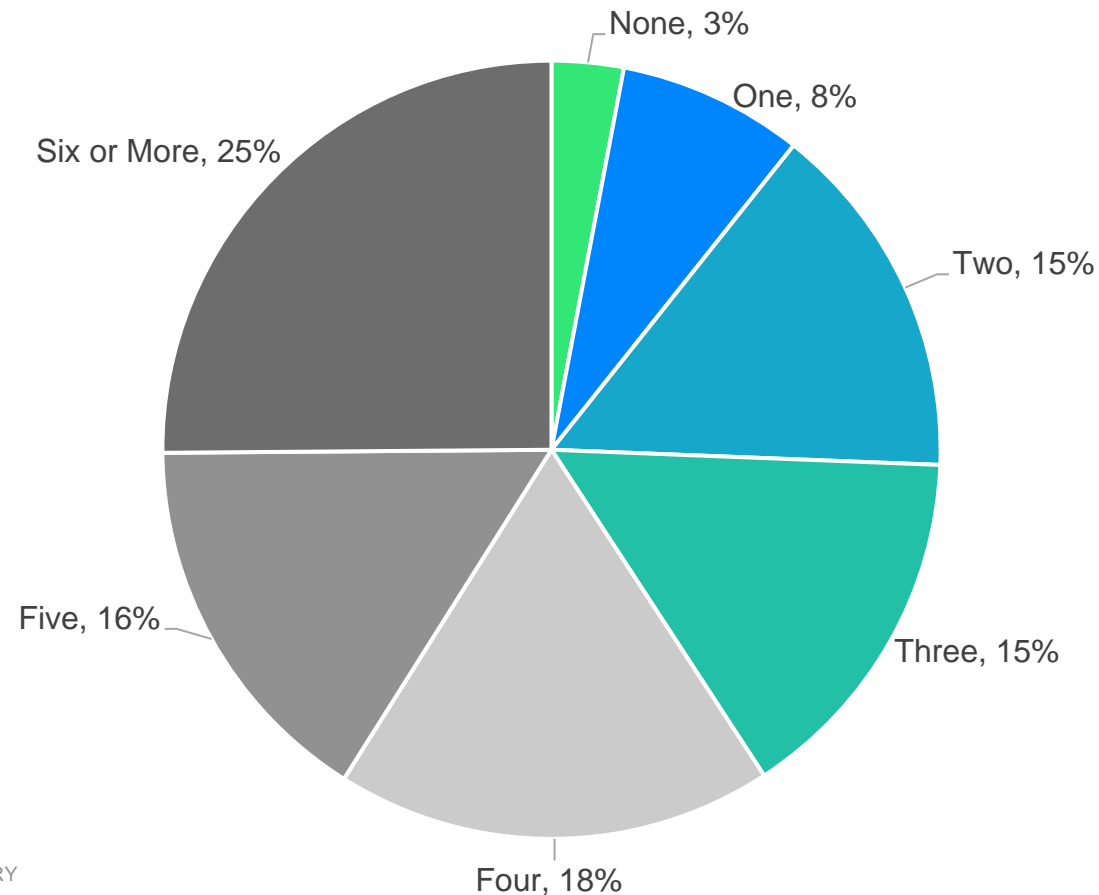
- Overall, Toyota owners benefited from the video training with 71% of respondents making learning improvements in the post-video assessment
 - *34 of 37 training metrics showed improved learning. The number of training metrics with more than 70% accuracy improves from one metric to 10 metrics post-video training. The number of training metrics with accuracy below 20% decreases from eight metrics to only one*
 - *The impact of training increased positively with age with older owners making the most notable improvements. 63% of respondents ages 30 - 44 had improved learning, 71% of owners ages 45 – 64 had improved learning and 84% of owners ages 65 and older had improved learning*
- Owners with prior Active Driving Assistance experience and users of the feature show higher levels of improved learning post-video
- Video training improved owners' understanding of each of the Active Driving Assistance limitations included in the video. The greatest learning improvement in this area was a 67-point increase in owners understanding that the feature does not operate reliably when lane paint is faded
- Owners improved their understanding of the feature's reaction to changing conditions (e.g., lane markings, vehicle brought to a complete stop)
 - *Fewer selected "Don't know" post training and were able to select at least one of the correct responses, if not all*

Level of Knowledge After the Training (2 of 2)

- Knowledge levels have increased, but there is still work to be done
 - *The percentage of owners understanding the types of roads where Active Driving Assistance works properly increases from 33% to 69%; however, 25% of owners continue to believe the feature operates on all roads*
 - *The percentage of owners understanding the speed requirements to activate Active Driving Assistance improved from 44% to 73%; however, 23% incorrectly believe the feature can be activated at any speed post-training*
- Post-video results show a greater understanding of the Active Driving Assistance limitations; however, owners continue to have difficulty understanding feature reactions post-training. In fact, the feature reaction metrics remain among the worst performing metrics post-training
- Although the percentage understanding the instrument cluster images improved and the percentage of incorrect responses decreased overall post-video training, challenges remain
 - *The number of correct and incorrect responses for Image 2 increased post-training with more respondents incorrectly believing Active Driving Assistance is operating*
 - *Owners have difficulty deciphering between Active Driving Assistance and Adaptive Cruise Control cluster images and despite some improvement one third of owners still think the feature is operating post-training*
- While most understand the feature requires hands on the wheel to operate, 7% of owners still believe the feature does not need hands on the wheel

The training video improved Toyota owners' understanding of the Active Driving Assistance feature with more respondents getting a greater number of questions correct and the accuracy score increasing from 20% to 37%

Number of Questions Correct: Post-Video
Total Sample



On average, respondents received accuracy score of 37% based on the 11 category questions

The number of questions correct after watching the training video.
Sample Size: Total Sample: N = 402.

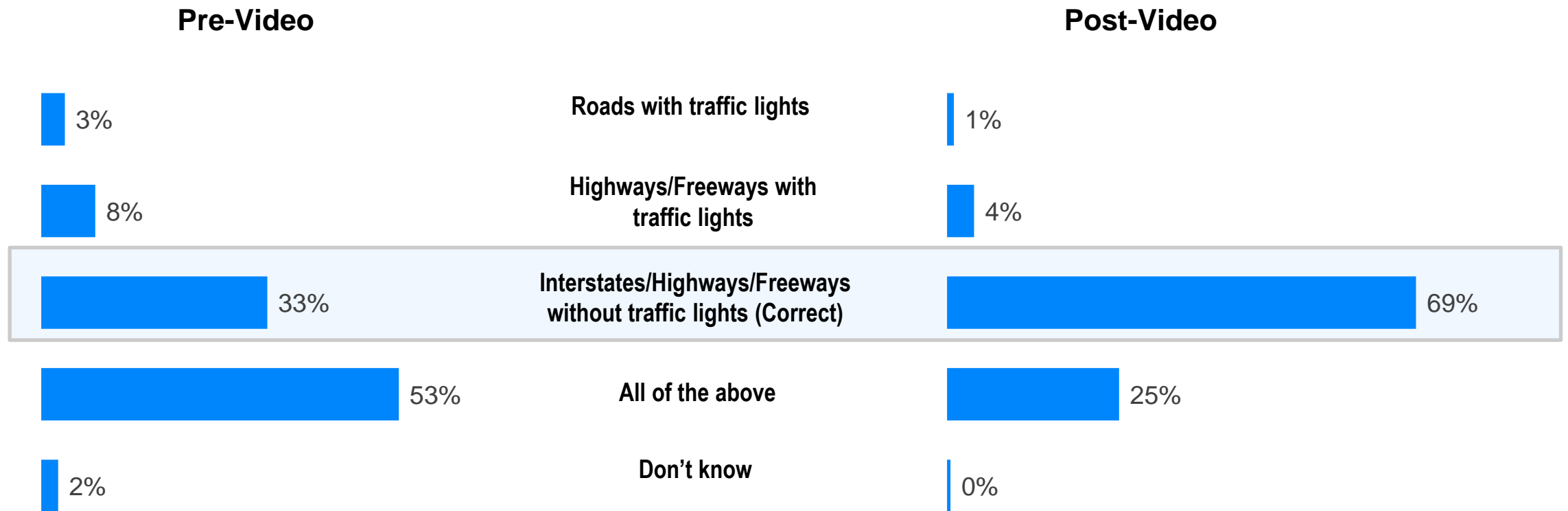
Post-Video Scorecard



		Total Sample: Pre-Training	Total Sample: Post-Training	Better/(Worse)
Equipment Needed	Both Full Speed and Lane Tracing	59%	N/A	N/A
Limitations	Follows the vehicle in front by a preset distance	79%	93%	14
Settings	I can set the distance in which my vehicle follows the vehicle in front of me	61%	87%	26
Limitations	Is able to bring my vehicle to a complete stop	61%	85%	24
Instrument Cluster Image 1 (ADA)	Active Driving Assistance is Activated (Image 2)	61%	81%	20
Limitations	Cannot change lanes automatically without driver assistance	59%	79%	20
Limitations	Does not operate reliably when lane paint is faded	21%	78%	57
Limitations	Isn't able to navigate around potholes	55%	77%	22
Speed Requirement	At 32 MPH or above	44%	73%	29
Feature Reaction: Hands Off Wheel	Provides a visual warning "Hold Steering Wheel" in Driver Support Screen	39%	73%	34
Limitations	Does not operate reliably when there is snow	19%	71%	52
Feature Reaction: No Turn Signal	Resists the lane change	54%	70%	16
Road Type	Interstates/Highways/Freeways without traffic lights	33%	69%	36
Limitations	Does not operate reliably when there are gaps in the lane markings for freeway exits/entrances	17%	69%	52
Limitations	Does not operate reliably in sharp curves	19%	66%	47
Limitations	Cannot detect pedestrians	24%	65%	41
Feature Reaction: Resume Driving	Feature will resume automatically if the vehicle has been stopped for less than 3 seconds	21%	61%	40
Settings	I can't change the volume of the audible warnings	14%	60%	46
Settings	Full-Speed Range Dynamic Radar Cruise Control can be set when traveling at any speed	53%	58%	5
Limitations	Does not operate reliably at night	8%	57%	49
Feature Reaction: Resume Driving	Driver can press the "Res" button on the steering wheel	27%	56%	29
Settings	The Lane Tracing Assist stays on after an engine restart	43%	53%	10
Settings	The distance setting will not be maintained after an engine restart	41%	53%	12
Instrument Cluster Image 3 (LKA on right only)	Full-Speed Range Dynamic Radar Cruise Control is active	45%	50%	5
Feature Reaction: Hands Off Wheel	Beeps	24%	50%	26
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is inadvertently exiting the lane on the right	49%	47%	(2)
Instrument Cluster Image 2 (Departing Lane on Right)	Full-Speed Range Dynamic Radar Cruise Control is active	43%	46%	3
Instrument Cluster Image 3 (LKA on right only)	Active Driving Assistance is in standby mode	24%	46%	22
Instrument Cluster Image 3 (LKA on right only)	Vehicle is receiving steering support for the right side of the lane	32%	45%	13
Feature Reaction: Hands Off Wheel	After issuing one or multiple warnings, the feature will go into standby mode	16%	44%	28
Feature Reaction: Resume Driving	Driver can depress the accelerator pedal	20%	38%	18
Feature Reaction: No Lane Markings	All of the above (One or both blue lines no longer appear in the Driver Support screen, Beeps, Will no longer keep the vehicle centered in the lane, Goes into standby mode)	21%	34%	13
Feature Reaction: No Lane Markings	One or both blue lines no longer appear in the Driver Support screen	23%	32%	9
Instrument Cluster Image 2 (Departing Lane on Right)	Vehicle is receiving steering support for the left side of the lane	20%	32%	12
Feature Reaction: No Lane Markings	Goes into standby mode	12%	30%	18
Feature Reaction: No Lane Markings	Will no longer keep the vehicle centered in the lane	15%	24%	9
Feature Reaction: No Lane Markings	Beeps	23%	17%	(6)
	Average Score 12 Questions	35%	N/A	N/A
	Average Score 11 Questions	34%	57%	23

The percentage of owners understanding the types of roads where the feature works properly doubles after the training, yet 25% continue to believe the feature operates on all roads

Type of Roads Where Feature Works Properly – Total Sample



C1 and PVC1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?

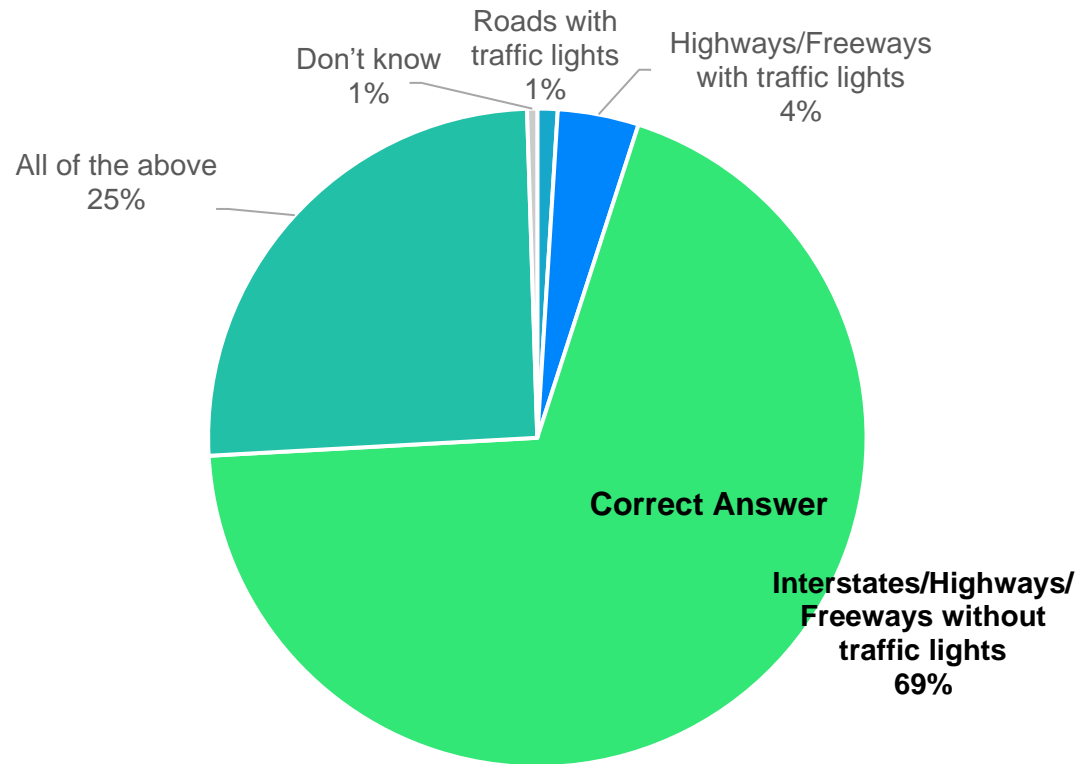
Sample Size: Total Sample: N = 402.

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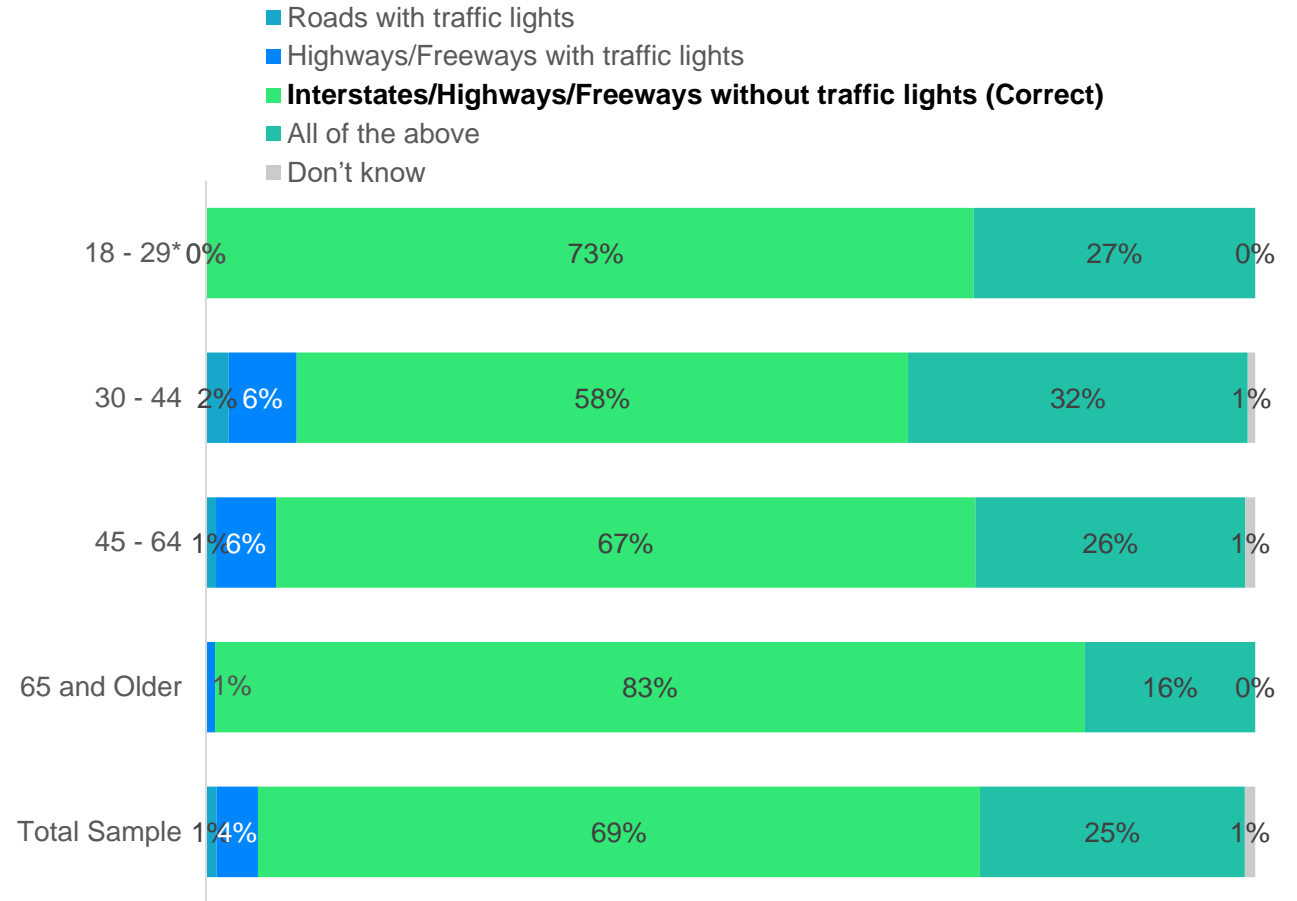
After the video training, the majority of owners understood the types of roads where the feature works, with the greatest improvement among the youngest and oldest respondents

Type of Roads Where Feature Works Properly – Post-Video

Total Sample



By Age Group

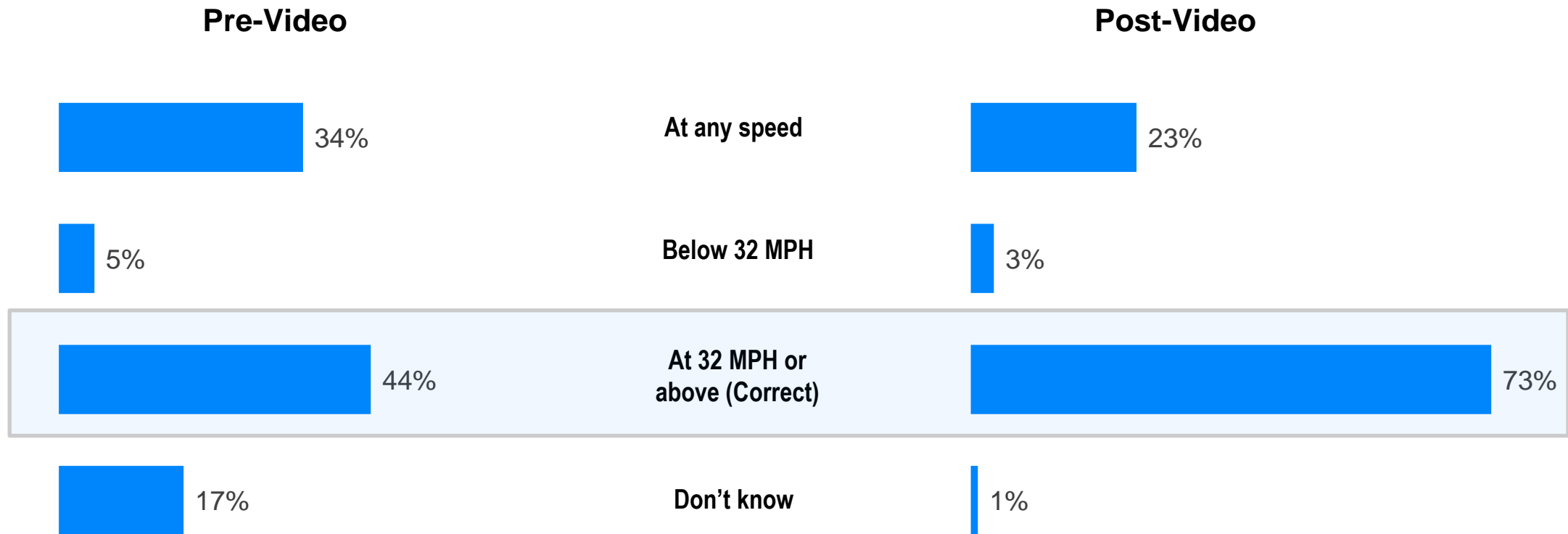


PVC1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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*Small Sample

Understanding the speed requirements to activate Active Driving Assistance improves by 29 points after training, but there is still opportunity for those who incorrectly think it can be activated at any speed

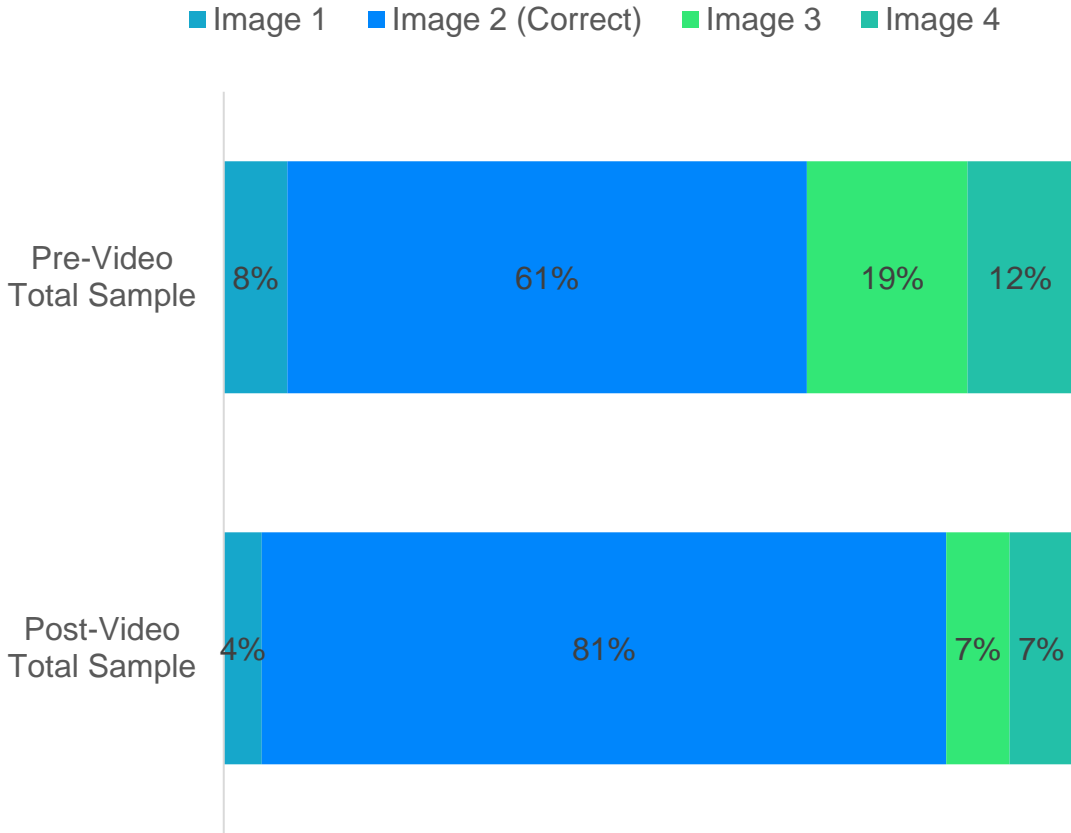
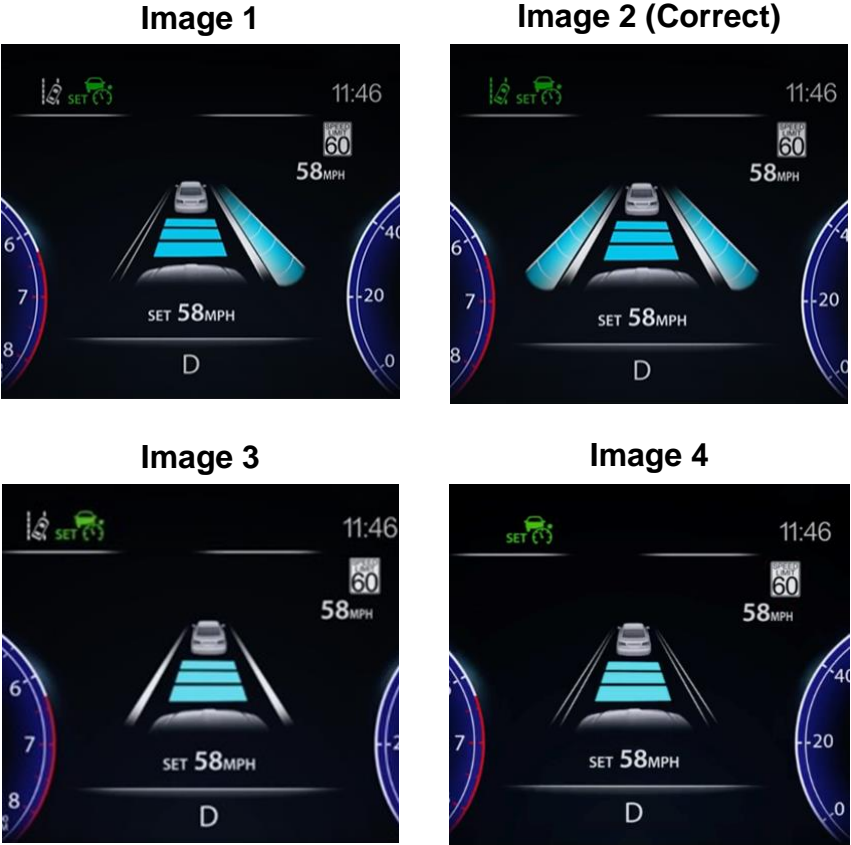
Minimum Speed Required to Activate – Total Sample



C2 and PVC2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
Sample Size: Total Sample: N = 402.

The video training provided owners with a better understanding of the instrument cluster images of when the feature is active

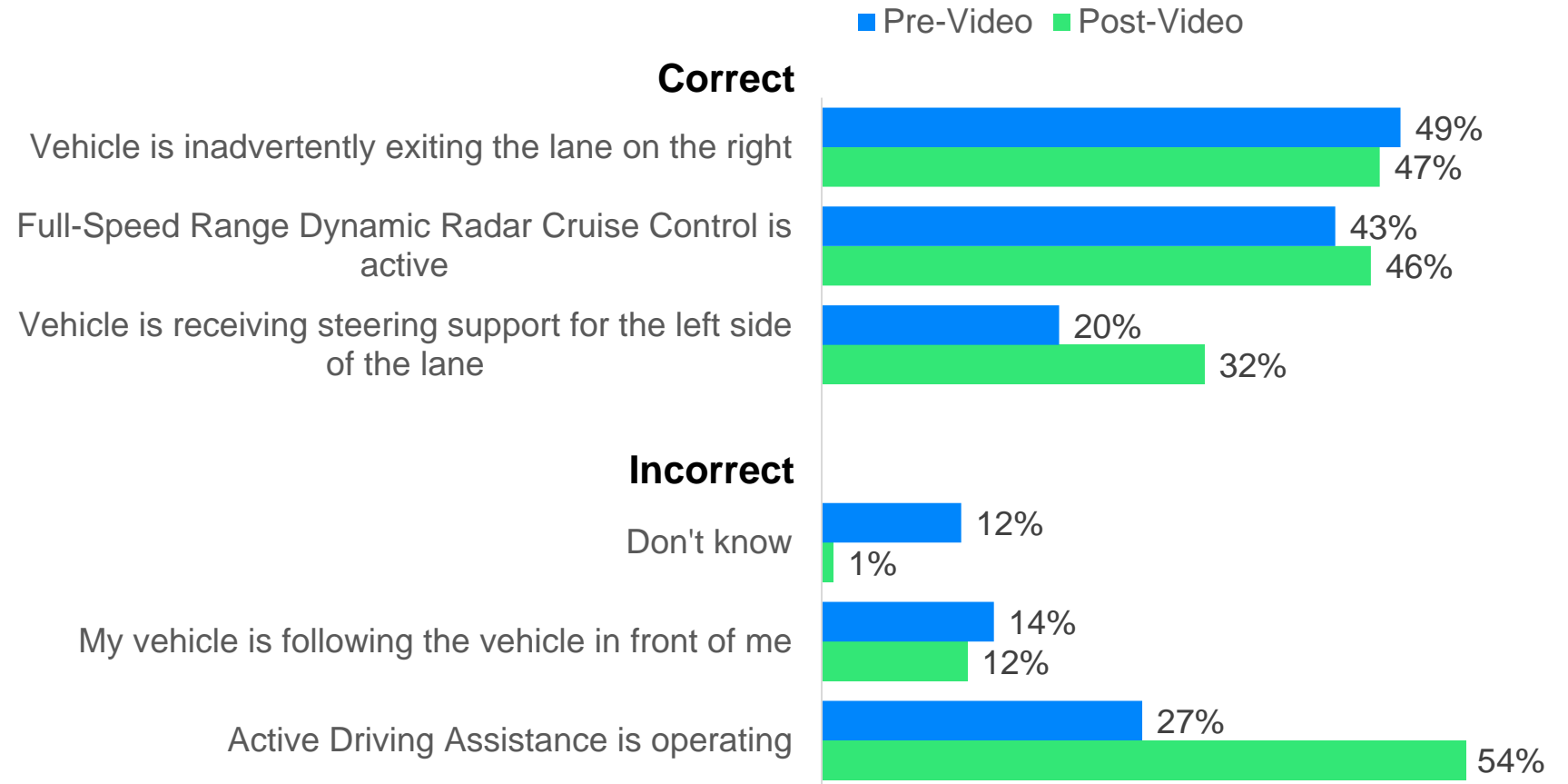
Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1 Total Sample



IS1 and PVIS1. Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?
Sample Size: Total Sample: N = 402.

Understanding the cluster images remains a challenge with more respondents making incorrect selections post-video

Instrument Cluster Active Driving Assistance Status Image Indication: View 2 Total Sample



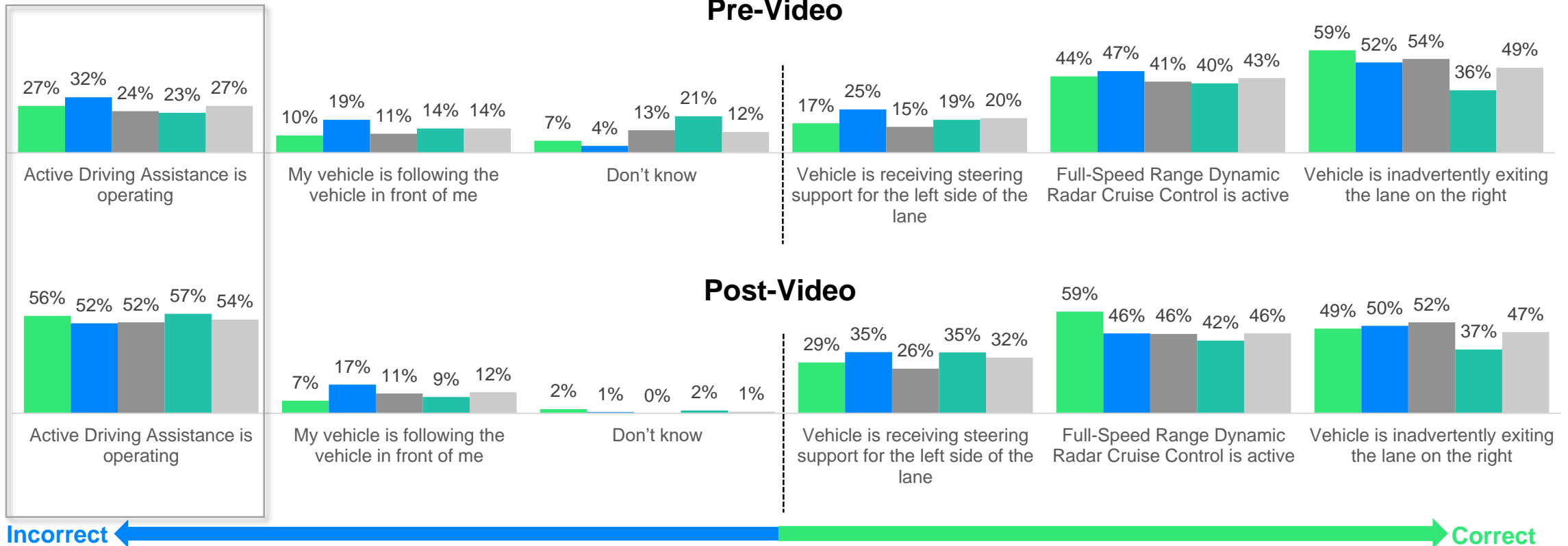
IS2 and PVIS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.

Sample Size: Total Sample: N = 402.

Owners of all ages continue to incorrectly interpret the cluster image and think Active Driving Assistance is operating

Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By Age Group

■ 18 - 29* ■ 30 - 44 ■ 45 - 64 ■ 65 and Older ■ Total Sample

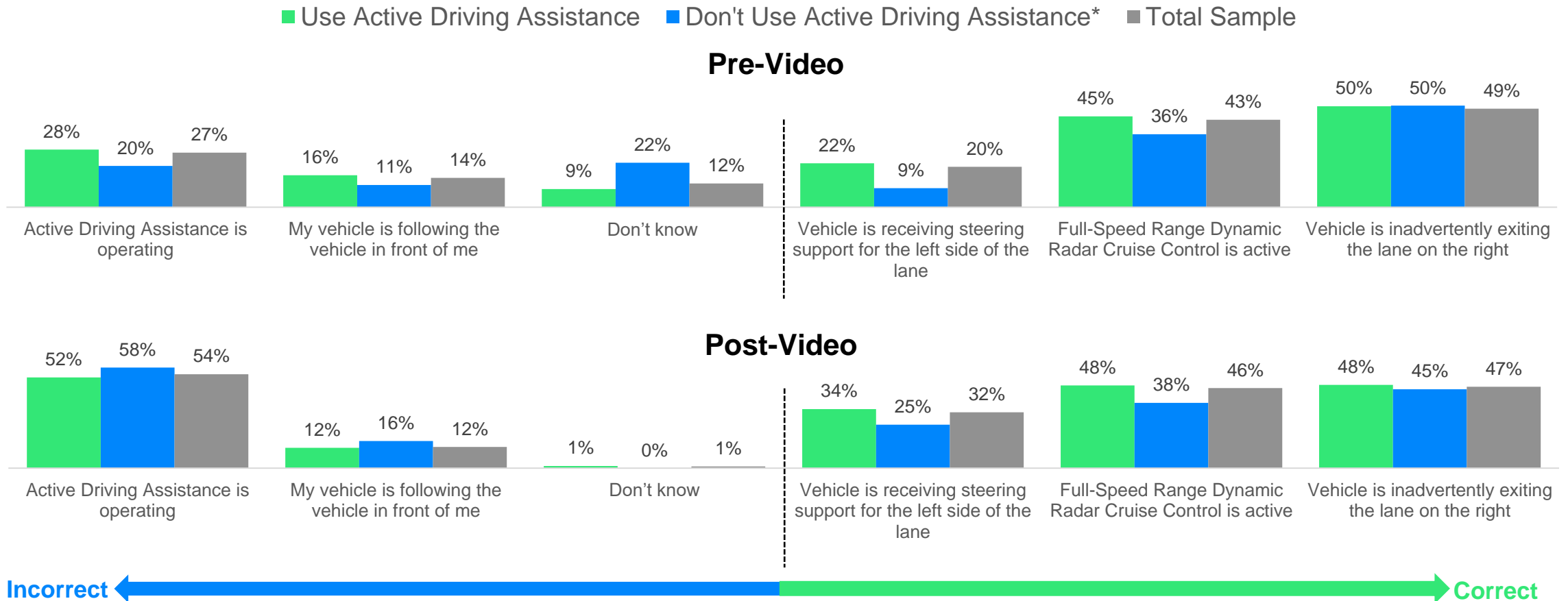


IS2 and PVIS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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*Small Sample

Both users and non-users interpreted the cluster image incorrectly post-video

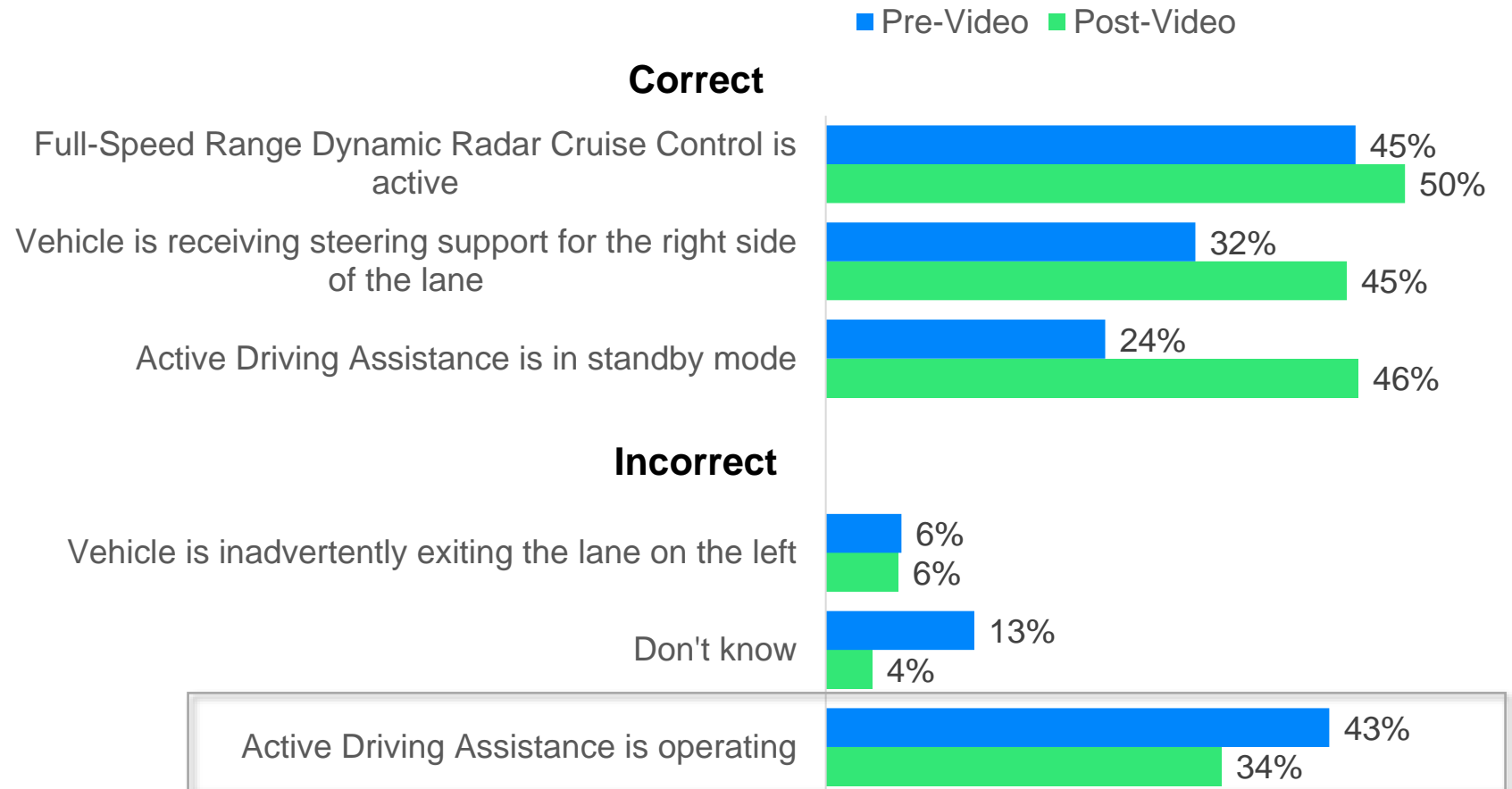
Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By Frequency of Use



IS2 and PVIS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Difficulty deciphering between the Active Driving Assistance and the Adaptive Cruise Control cluster images remain and result with one-third of owners incorrectly thinking the feature is active post-training

Instrument Cluster Active Driving Assistance Status Image Indication: View 3 – Total Sample



IS3 and PVIS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.

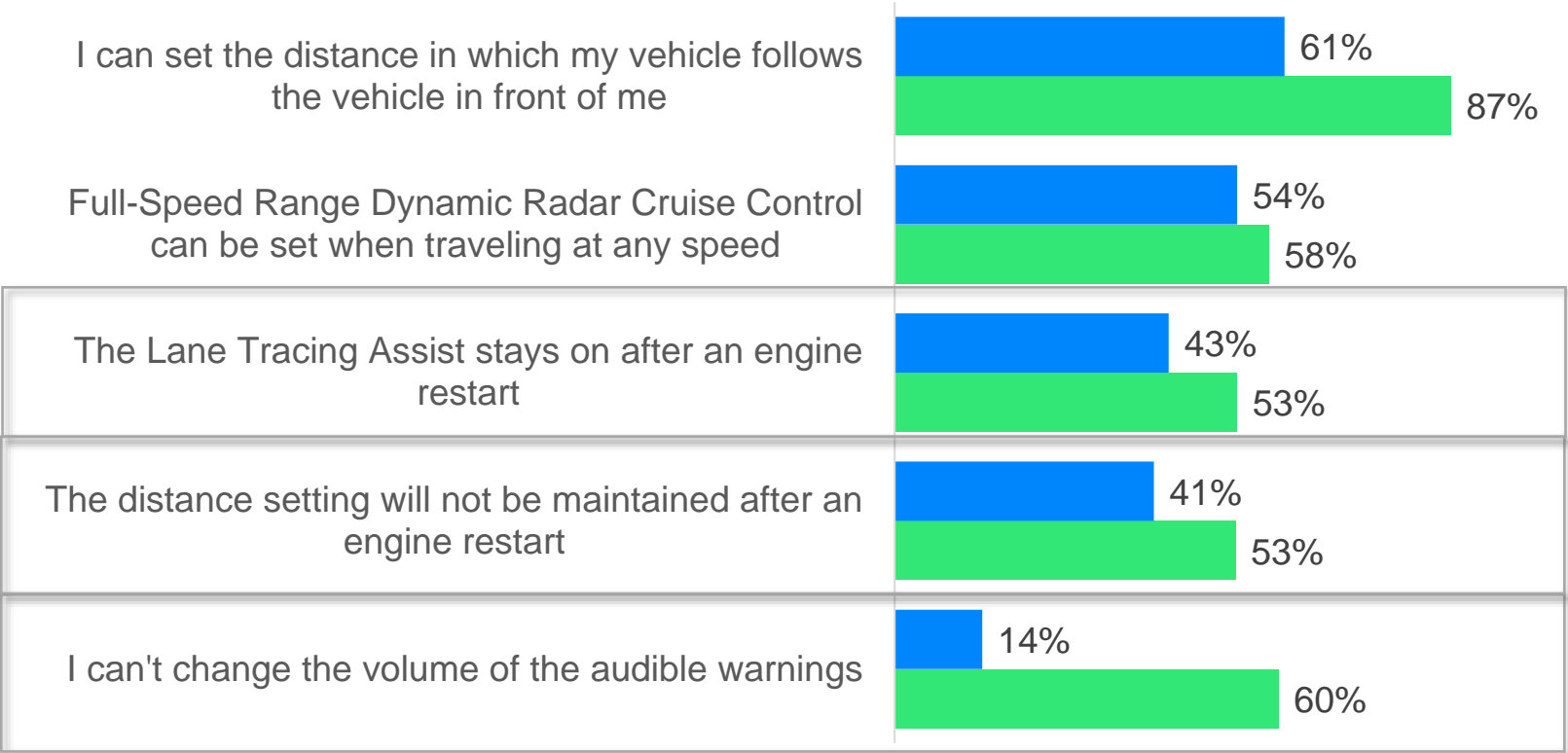
Sample Size: Total Sample: N = 402.

While there is improved learning of the feature's setting options post-video training, owners continue to lack knowledge, especially of the impact from an engine restart and the inability to change the volume

Settings Options for Active Driving Assistance – Total Sample

Percent Correct

■ Pre-Video ■ Post-Video



S1 and PVS1: Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle.

Sample Size: Total Sample: N = 402.

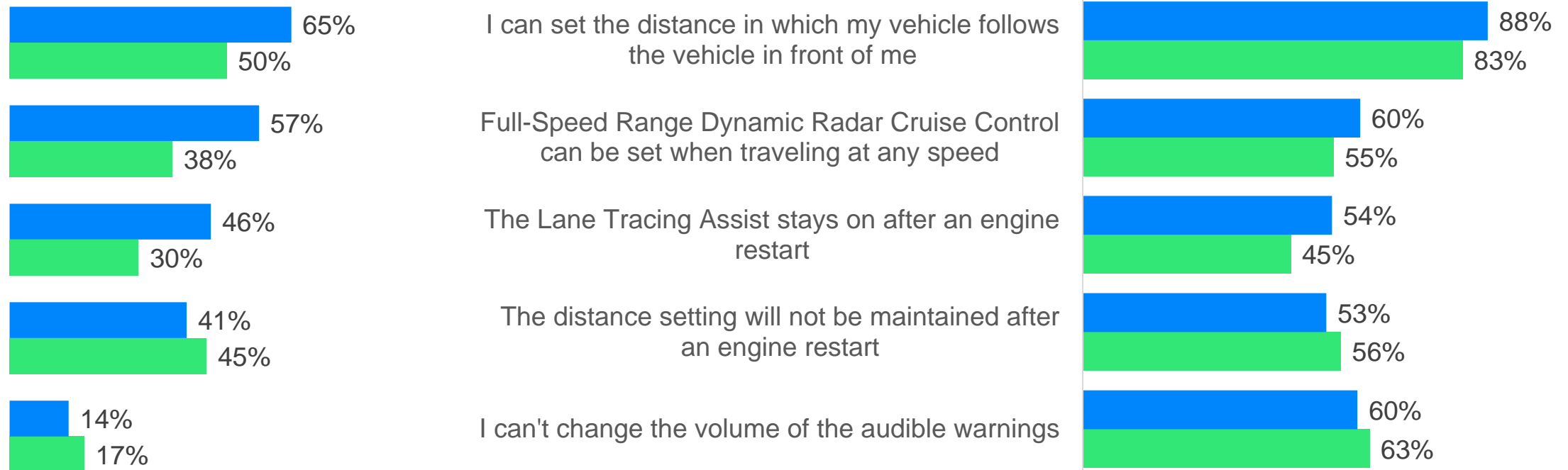
Non-users learned about the settings options from the video training at a higher rate than feature users

Settings Options for Active Driving Assistance – Total Sample Percent Correct

Pre-Video

Post-Video

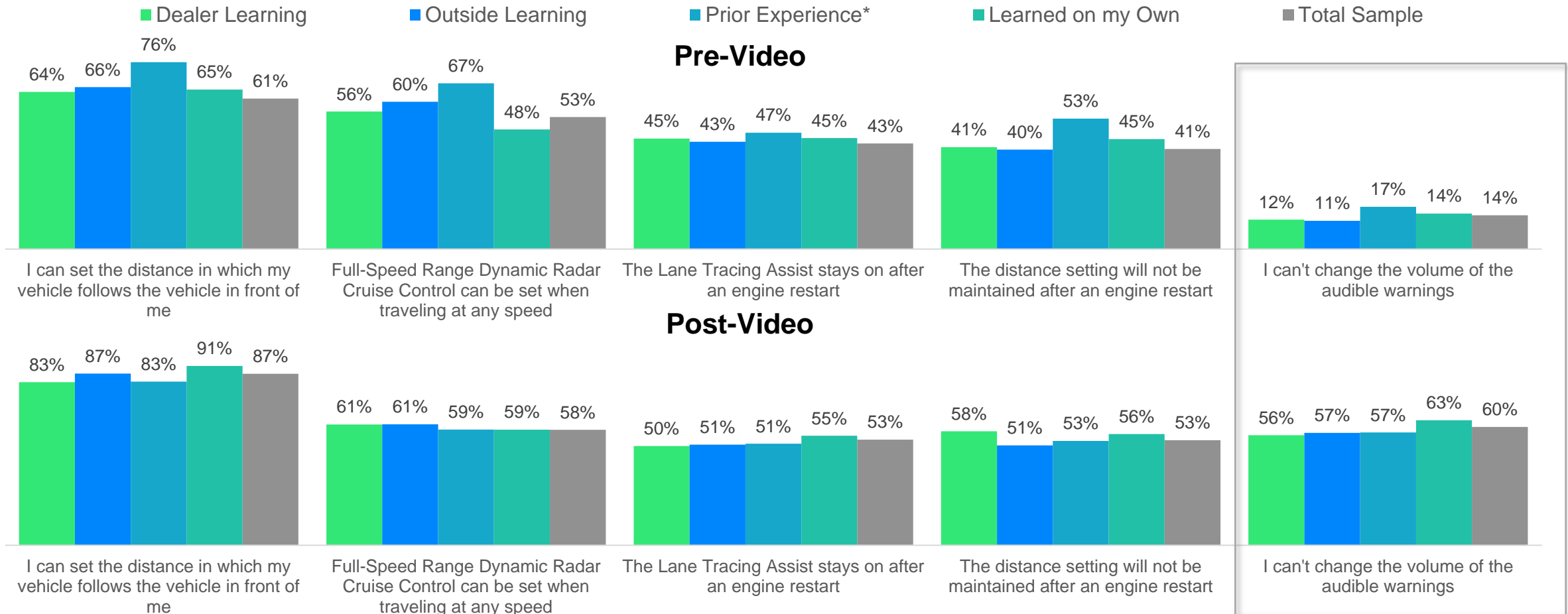
■ Use Active Driving Assistance ■ Don't Use Active Driving Assistance*



S1 and PVS1. Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle:
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

More than half of all owners learned about the volume setting for warnings from the video training

Settings Options for Active Driving Assistance By How Learned



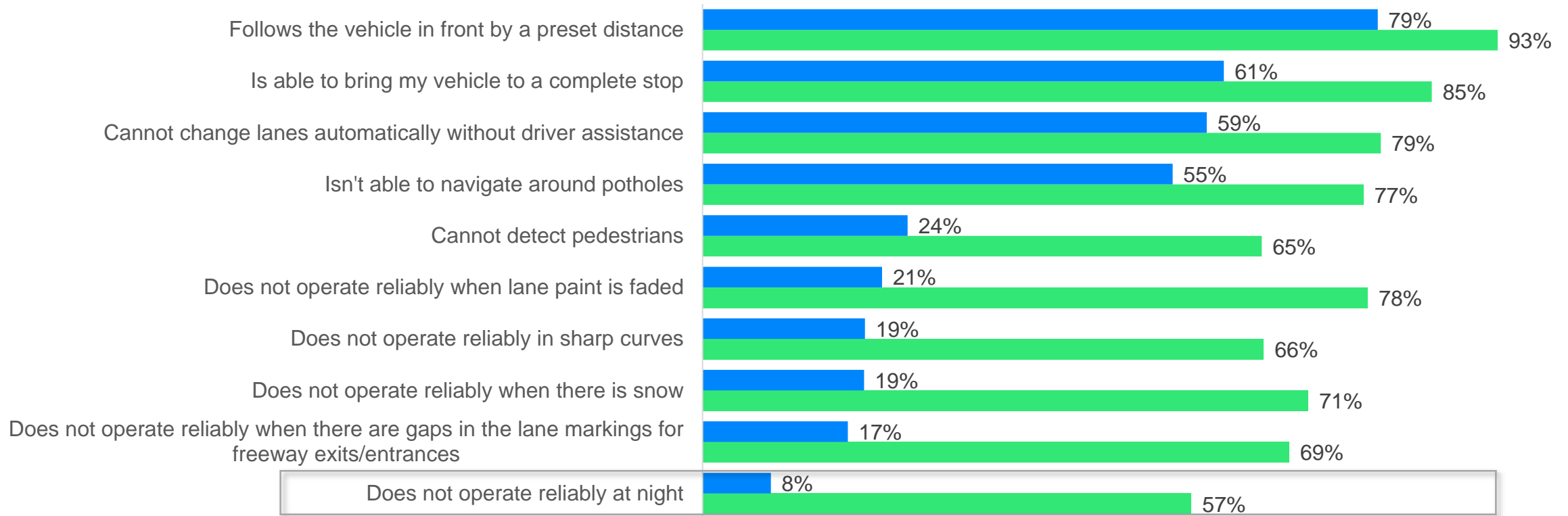
S1 and PVS1: Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
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*Small Sample

While there is an improved understanding of all feature limitations and the gap is reduced across each of the items, it is concerning that the knowledge is not stronger for metrics such as not operating reliably at night

Active Driving Assistance Technology Limitations – Total Sample Percent Correct

■ Pre-Video ■ Post-Video



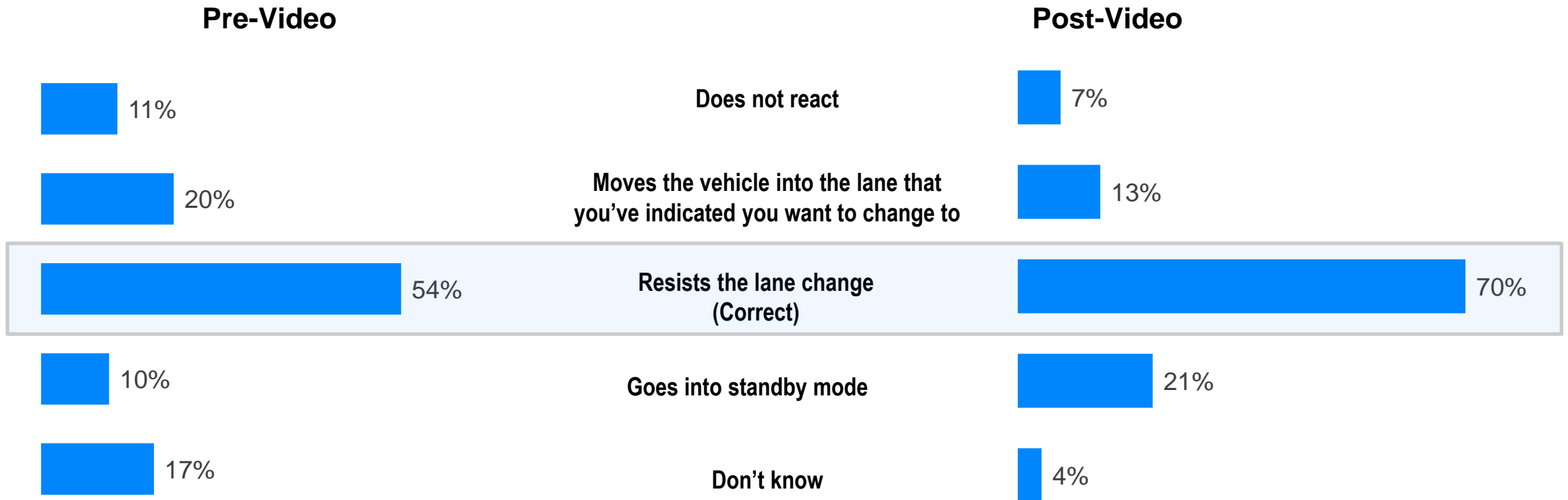
FC1 and PVFC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.:

Sample Size: Total Sample: N = 402.

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There is a net gain of 16 points for knowledge of the feature's reaction to attempting to change lanes without a turn signal

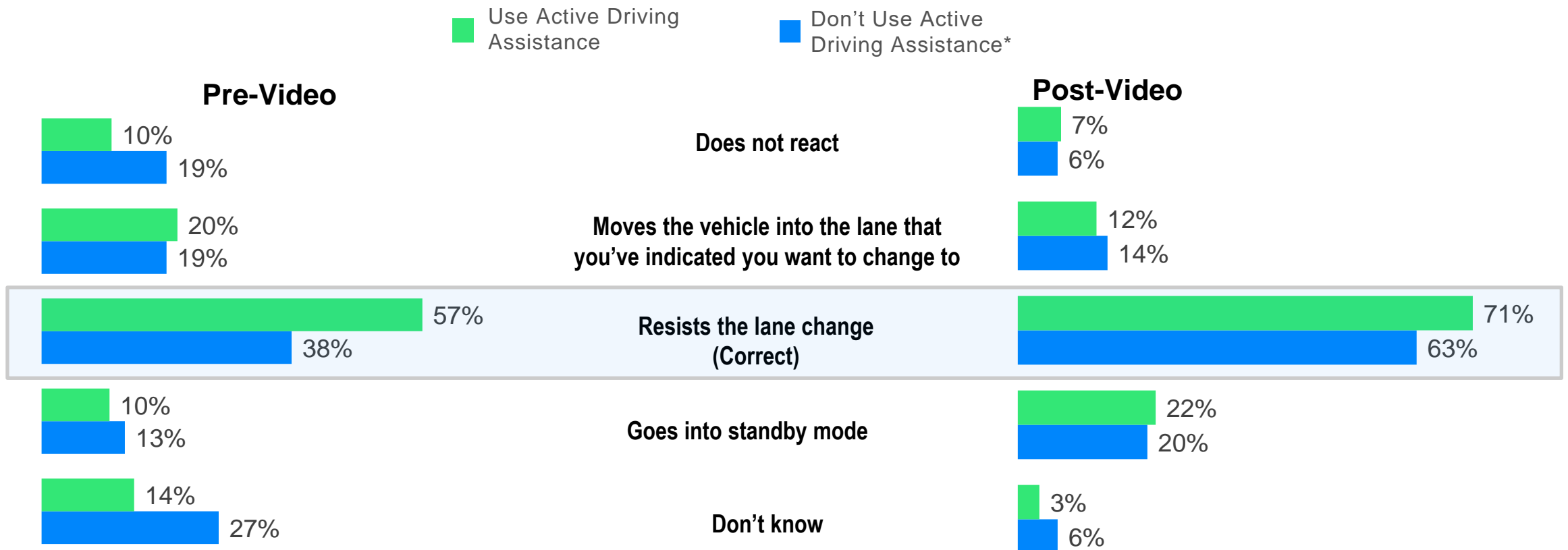
Feature Reaction: When Attempting to Change Lanes Without Turn Signal Total Sample



FR1 and PVFR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

While owners who have not used the feature benefited the most, there is an increase in incorrect knowledge after the training that the feature goes into standby mode

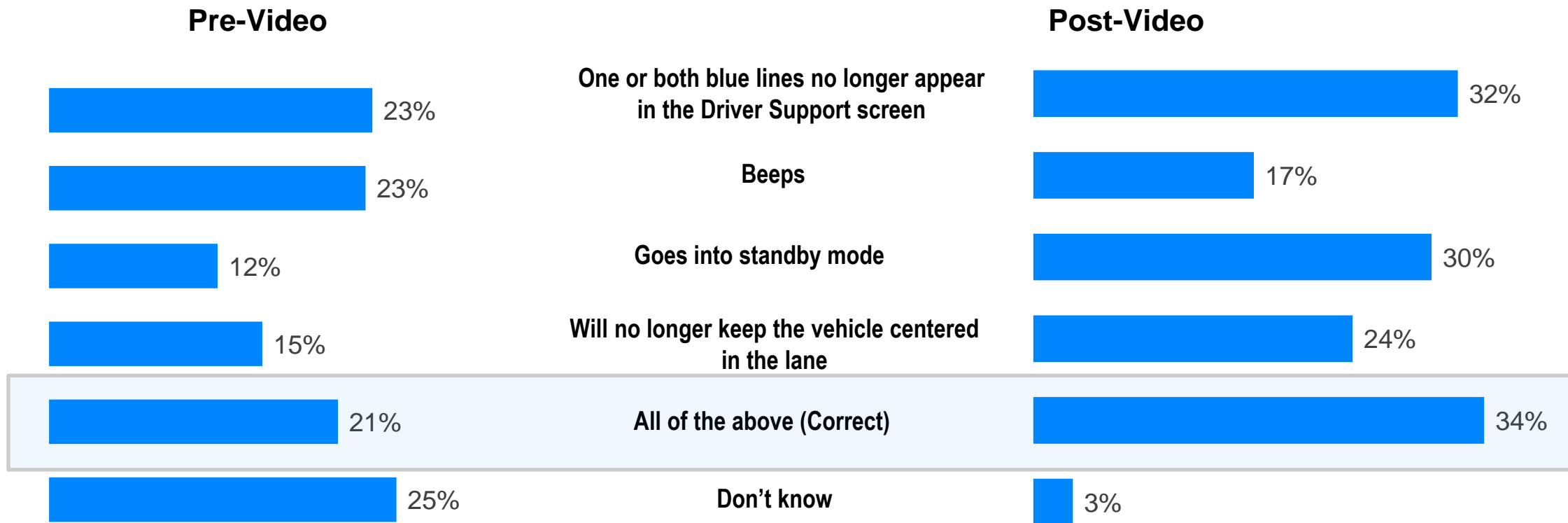
Feature Reaction: When Attempting to Change Lanes Without Turn Signal By Frequency of Use



FR1 and PVFR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Post-video learnings show improvement yet only one-third of respondents understand the feature reaction when lane markings are no longer visible

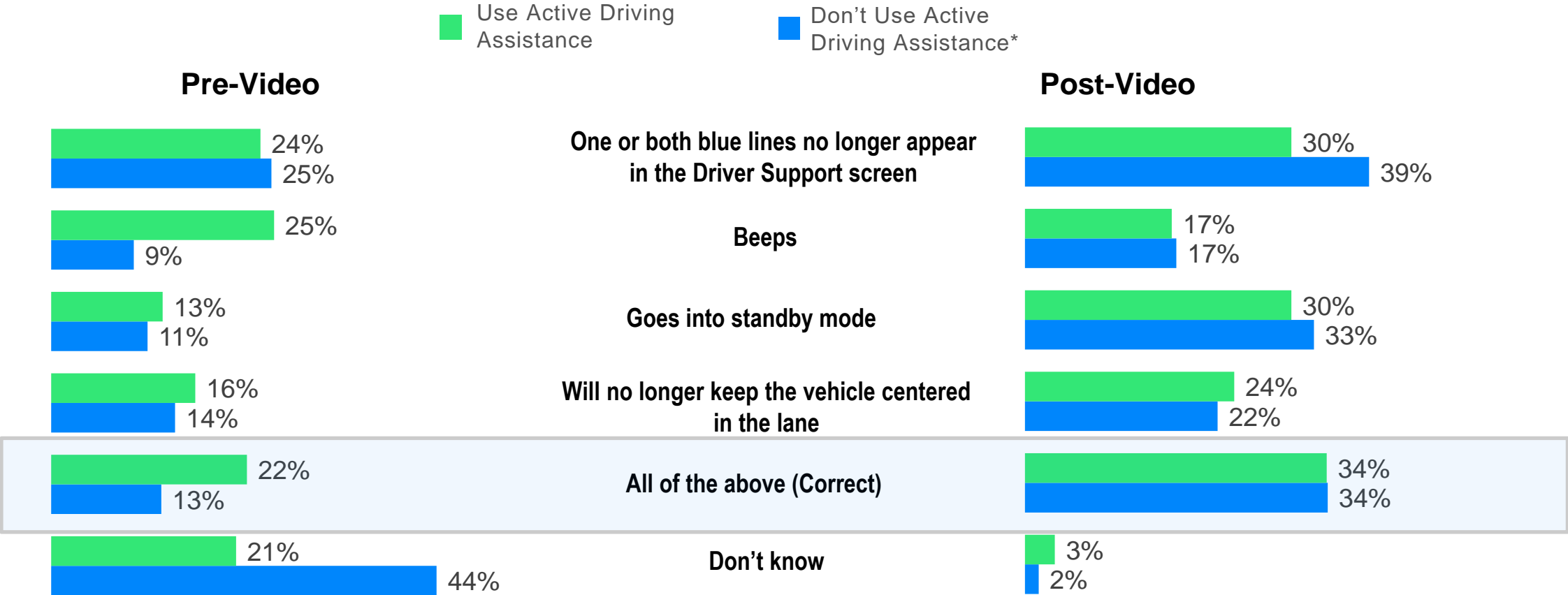
Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible Total Sample



FR2 and PVFR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

Video training helped those who "didn't know" select the correct reaction

Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible By Frequency of Use

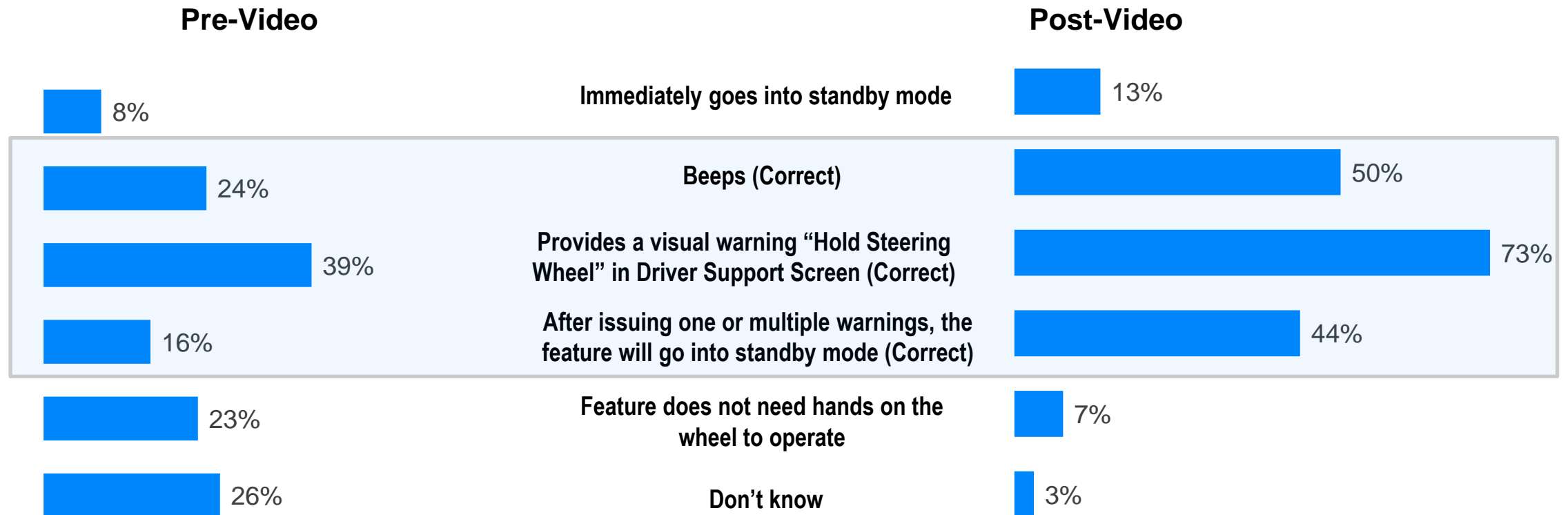


FR2 and PVFR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.
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*Small Sample

Participants are helped by the training video in that they better understand the reaction to taking their hands off the steering wheel

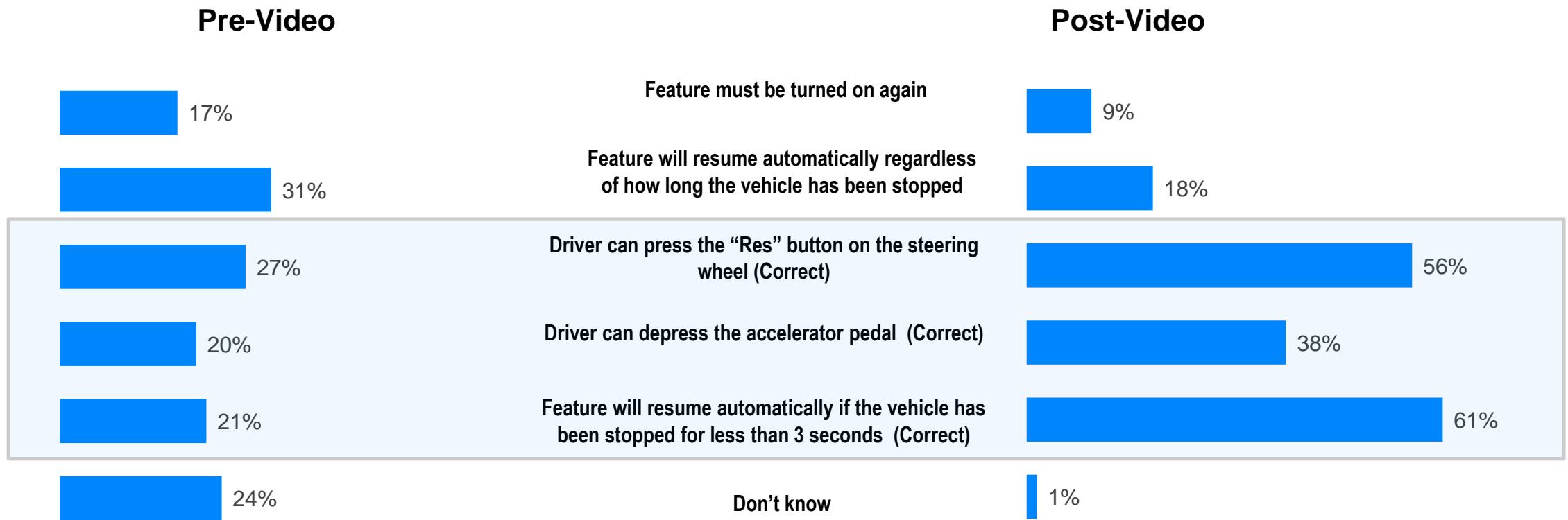
Feature Reaction: If You Take Your Hands Off the Steering Wheel Total Sample



FR3 and PVFR3: If you take your hands off the steering wheel while driving with the Active Driving Assistance feature on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402.

Knowing that the feature will resume automatically if the vehicle has been stopped for less than 3 seconds received the largest increase in understanding among participants

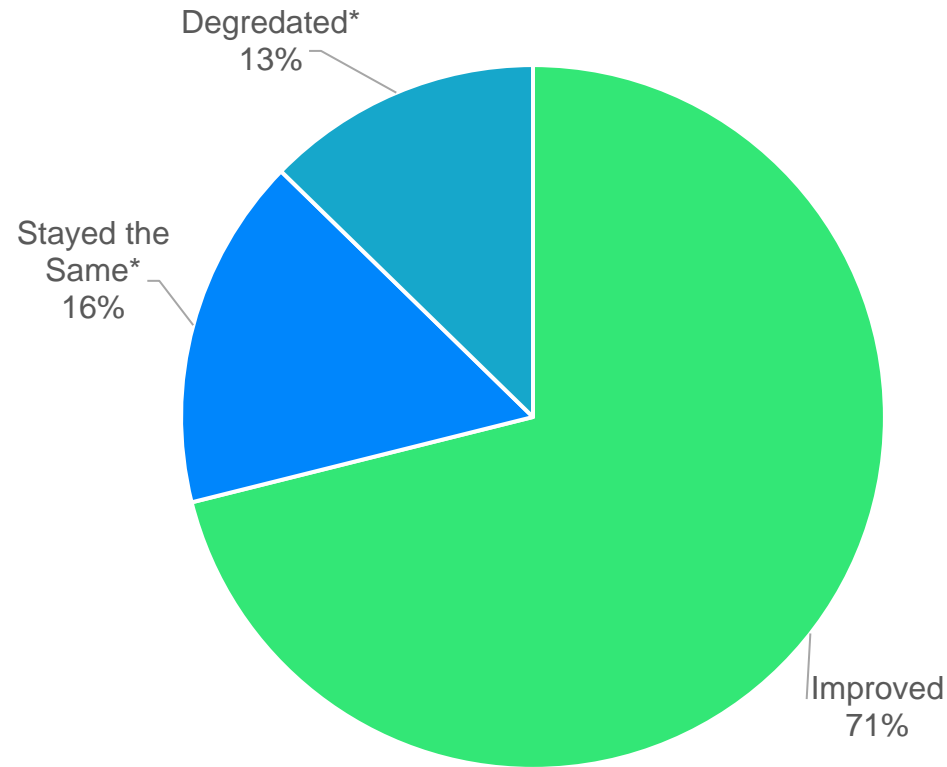
Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop Total Sample



FR4 and PVFR4: If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply.
Sample Size: Total Sample: N = 402.

The majority of participants benefited from the video training

Impact of Video Training
Total Sample



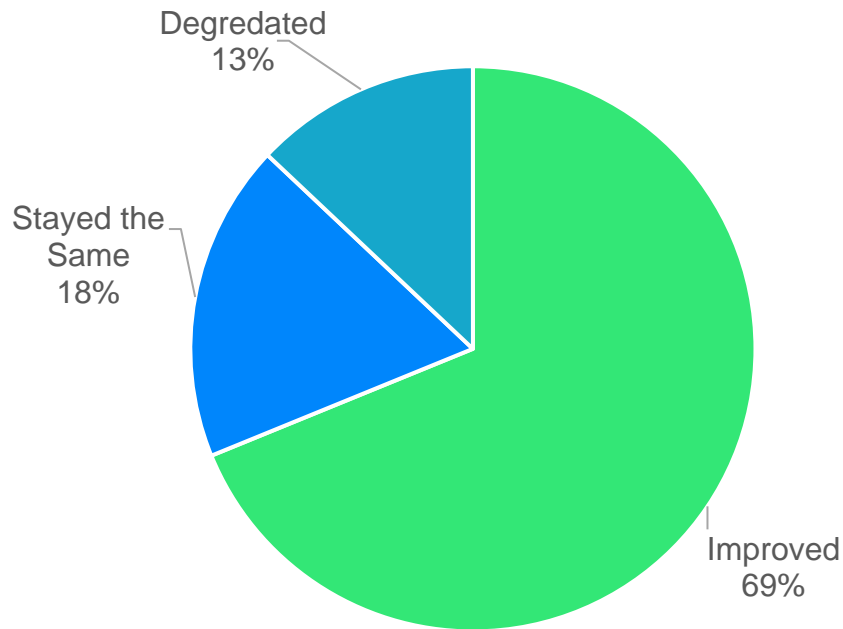
Percent difference in the number of questions correct after the video training versus before.
Sample Size: Total Sample: N = 402. Improved: N = 286, Stayed the Same: N = 65, Degradated: N = 51.
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*Small Sample

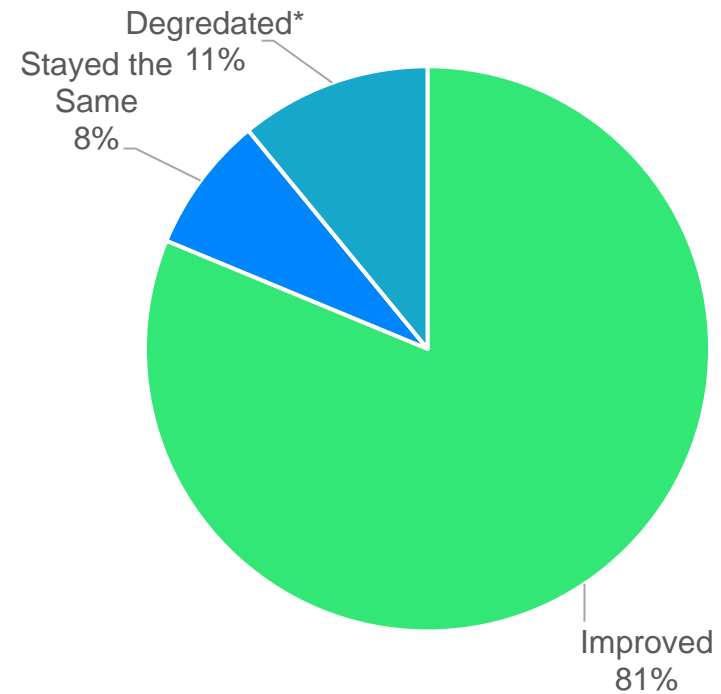
While the video training benefited most, those who don't use the feature showed higher levels of learning achievement

Impact of Video Training By Frequency of Use

Use Active Driving Assistance



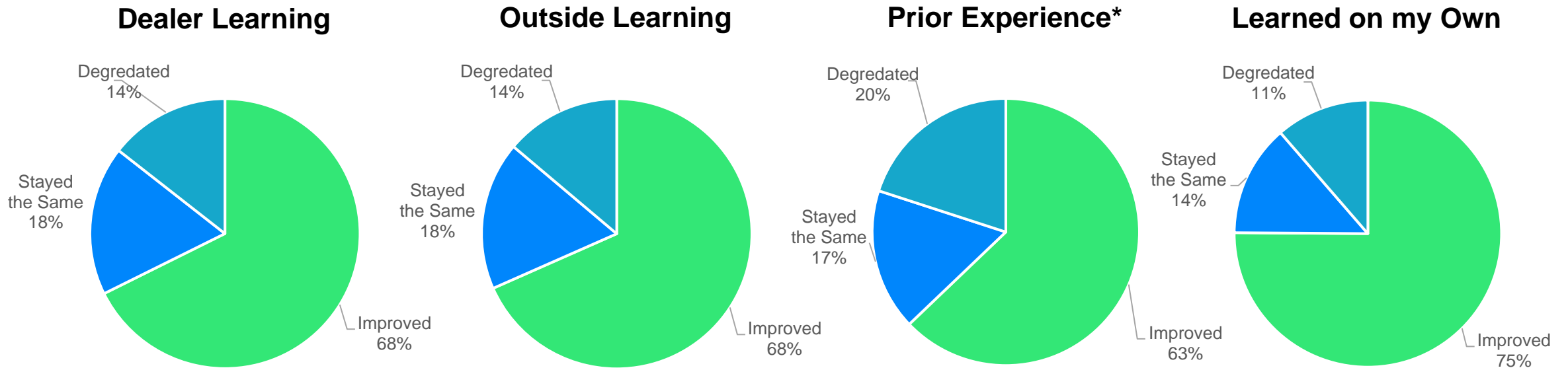
Don't Use Active Driving Assistance*



Percent difference in the number of questions correct after the video training versus before.
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Learning improvements are consistent across previous learning methods; however, those who initially learned on their own show the most improvement

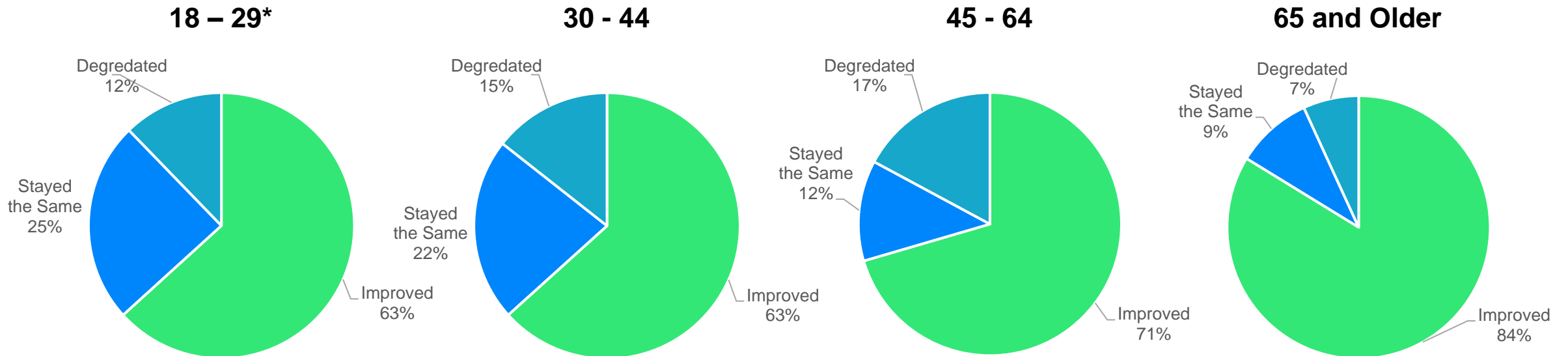
Impact of Video Training By How Learned



Percent difference in the number of questions correct after the video training versus before.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

The impact of training was highest among older respondents with higher levels of improved learning

Impact of Video Training By Age Group



Percent difference in the number of questions correct after the video training versus before.
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Implications of Proper Training

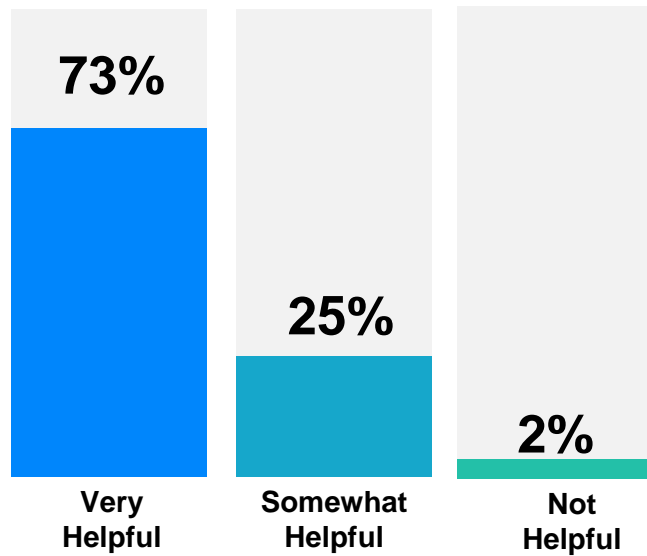
Implications of Proper Training

- The majority of participants found the video training to be very helpful, with some commenting that they didn't understand the feature and didn't know its capabilities until they took the training
- Respondents' knowledge about the Active Driving Assistance is elevated across a variety of metrics after watching the training video. They indicate learning most about:
 - *How to operate the feature*
 - *What the symbols mean*
 - *What the icon colors mean*
- The training video increases the likelihood for more frequent use of the Active Driving Assistance among owners
- After watching the Active Driving Assistance training video, the majority of respondents see the largest advantage to using the feature is improved traffic safety (i.e., fewer crashes)
- The majority of respondents indicate they want the Active Driving Assistance feature on their next vehicle
 - *With the exception of younger people (Ages 18-29), future interest (i.e., Definitely will) declines with age.*
- Those that don't currently use Active Driving Assistance are more likely to use it after watching the video training and also express future desire for the feature on their next vehicle

HOW HELPFUL WAS THE VIDEO

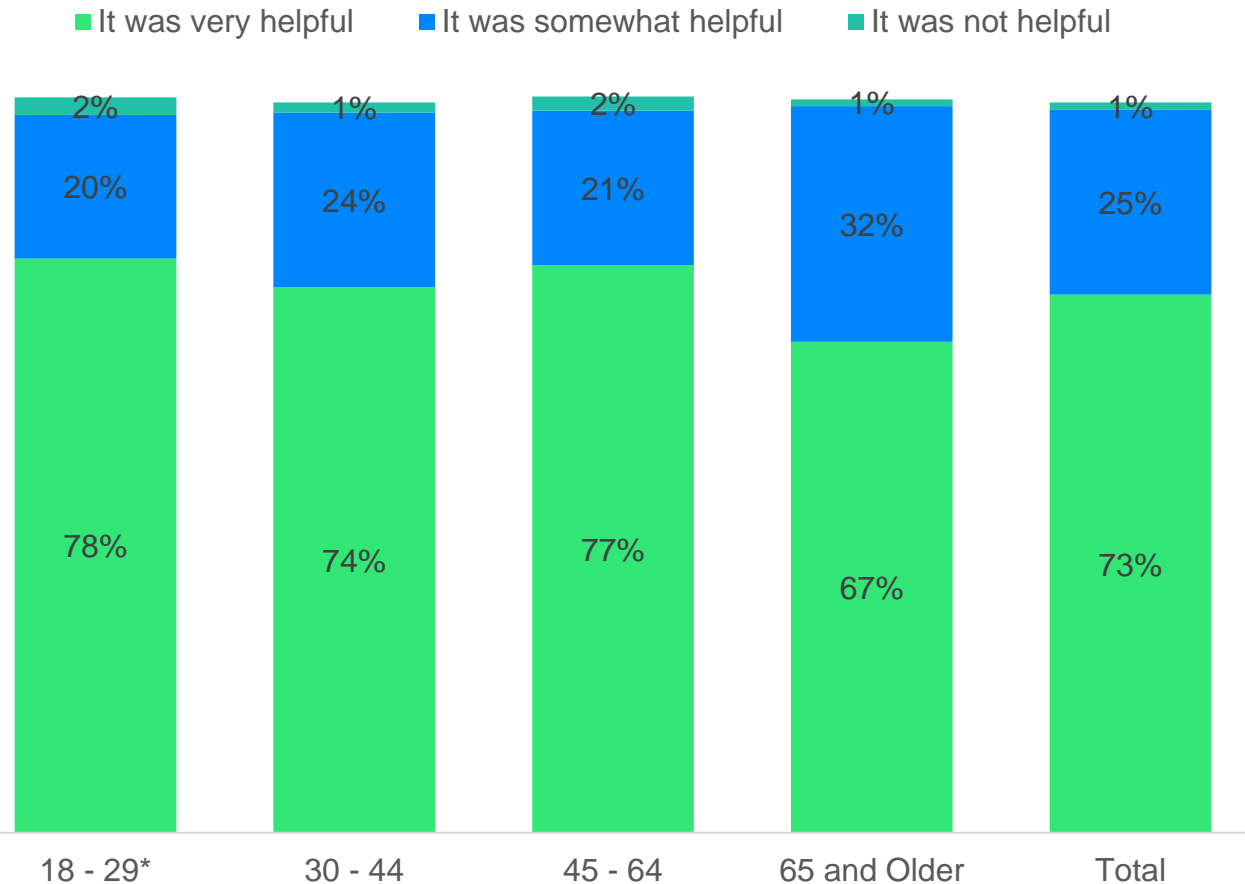
98% of people found the training helpful

Assessment of the training



The majority of owners found the video to be very helpful, regardless of age group; both people who use and don't use found it to be very helpful (75% and 69%*, respectively)

Training Video Assessment By Age Group



“After watching the video, I came to learn more about this feature, and I will use it more often on freeways rather than highways with signals and stop signs.”

“Did not understand all the different icons on my car screen until I saw this video clip.”

“Didn't really understand until watching the video!”

“I couldn't figure out some things earlier but now I have a better understanding.”

“I did not know that this feature had all of these capabilities before watching the video.”

“I honestly never paid attention to this feature and now I'm going to check it out and use it when necessary!”

“I feel more confident about using the feature now.”

“I learned some new things that I will love to try.”

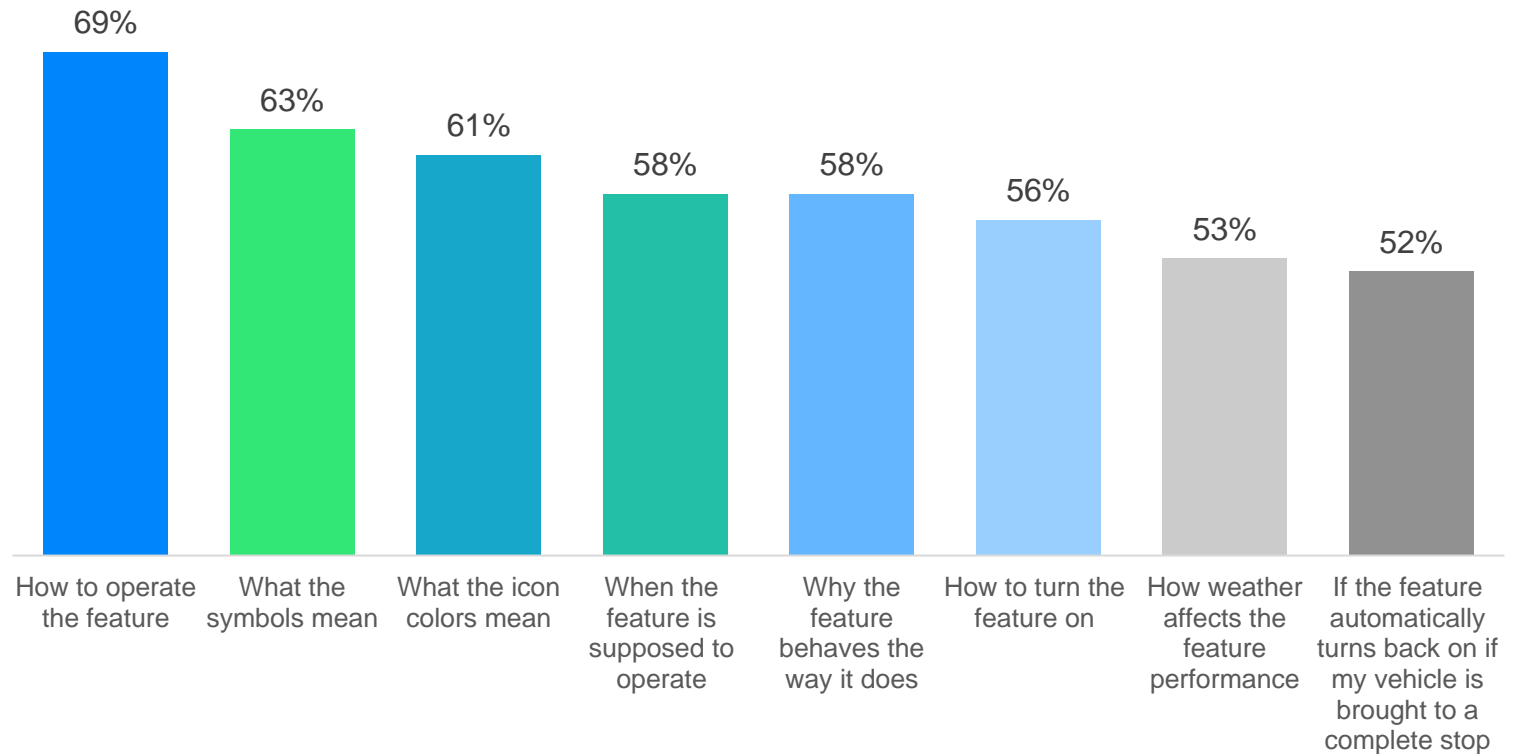


VA1: How helpful was the video in furthering your understanding of the Active Driving Assistance feature on your vehicle?
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

The training elevated the user's understanding across a variety of metrics



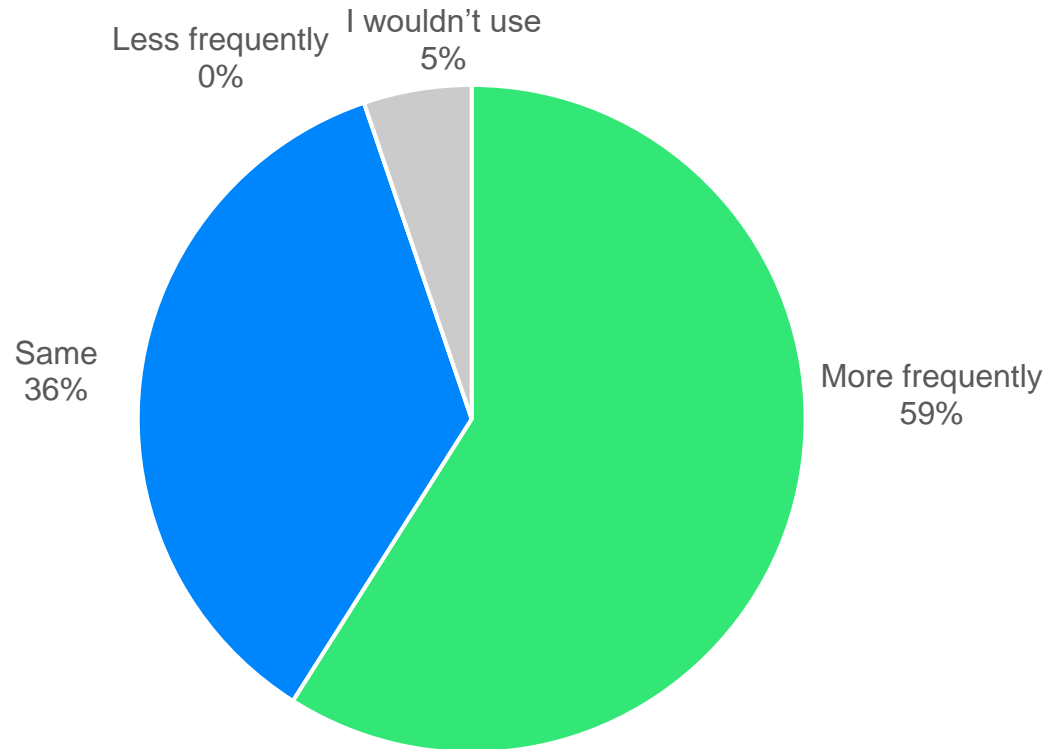
Training Video: Perception of Learning



VA2: What specifically did the training video teach you? (Multiple choice).
Sample Size: Total: N = 402.

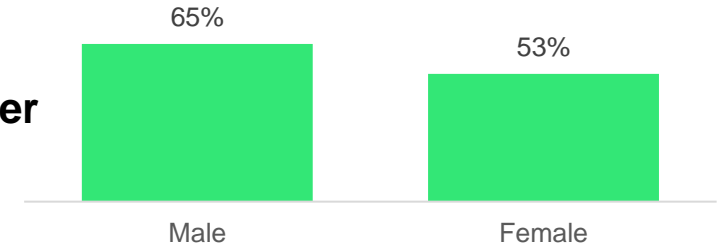
The training video increases likelihood for more frequent use; over forty percent of those that don't use it currently indicate they will use it frequently after the training

Likelihood to use Active Drive Assistance after Training Video

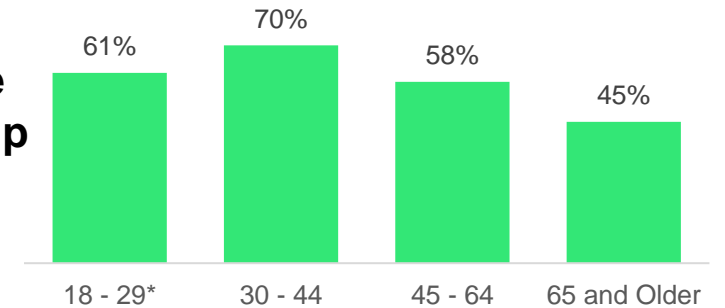


More Frequently:

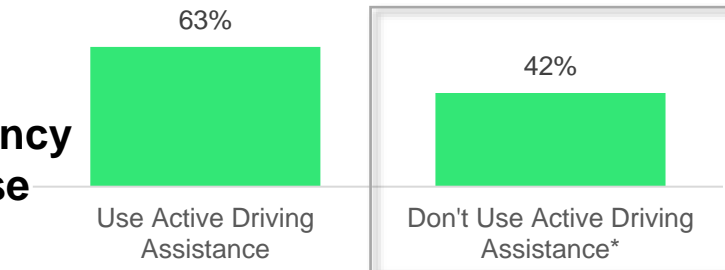
Gender



Age Group



Frequency of Use

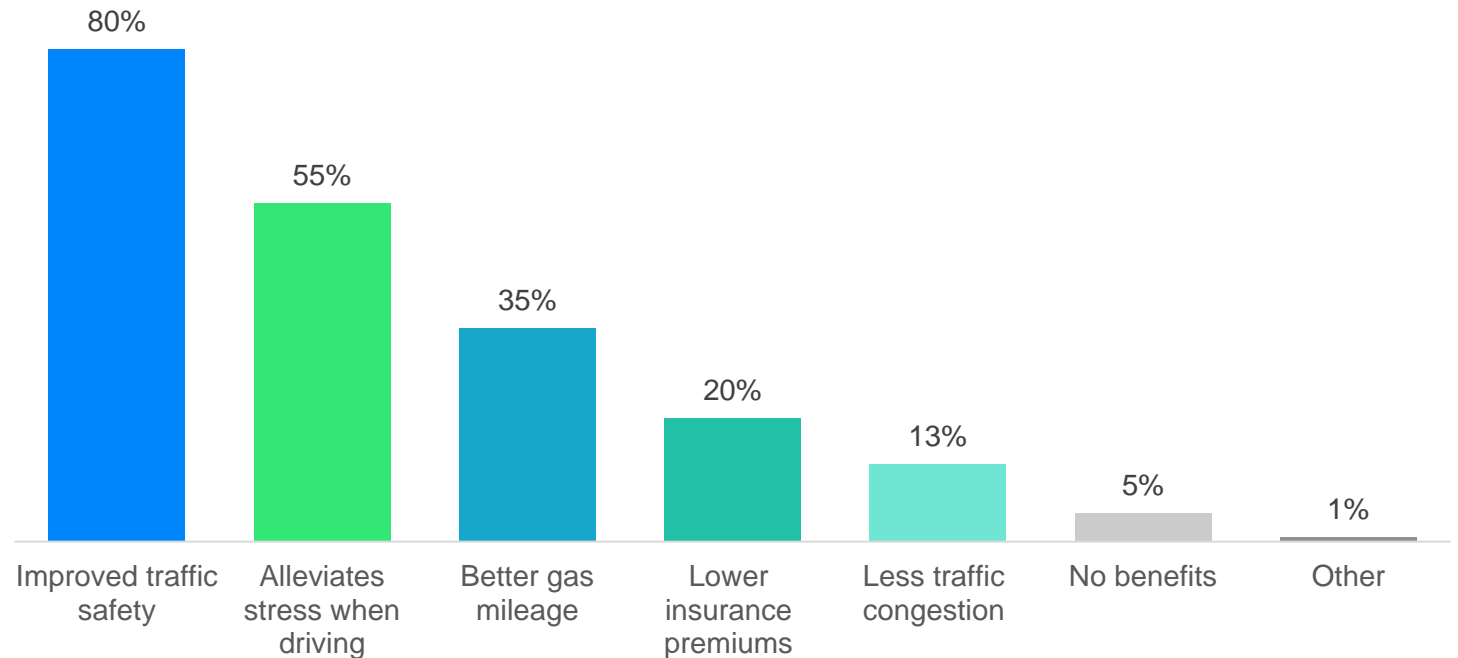


VA4: Frequency of usage of the Active Driving Assistance feature on your vehicle after training video.
 Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
 Sample Size: Total Sample: N = 402, Don't use feature: N = 64, Use feature: N = 324, and Didn't know had feature: N =

*Small Sample

Most feel the Active Driving Assistance technology will help improve traffic safety

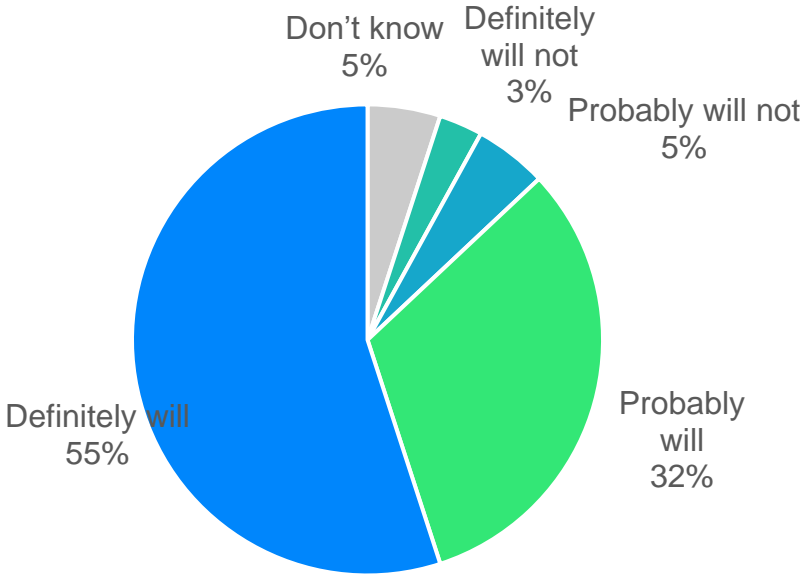
Advantages of the Active Driving Assistance Feature



FUTURE DESIRE

More than half of the owners state they **definitely will** want the Active Driving Assistance feature on their next vehicle

Future Desire for Active Driving Assistance

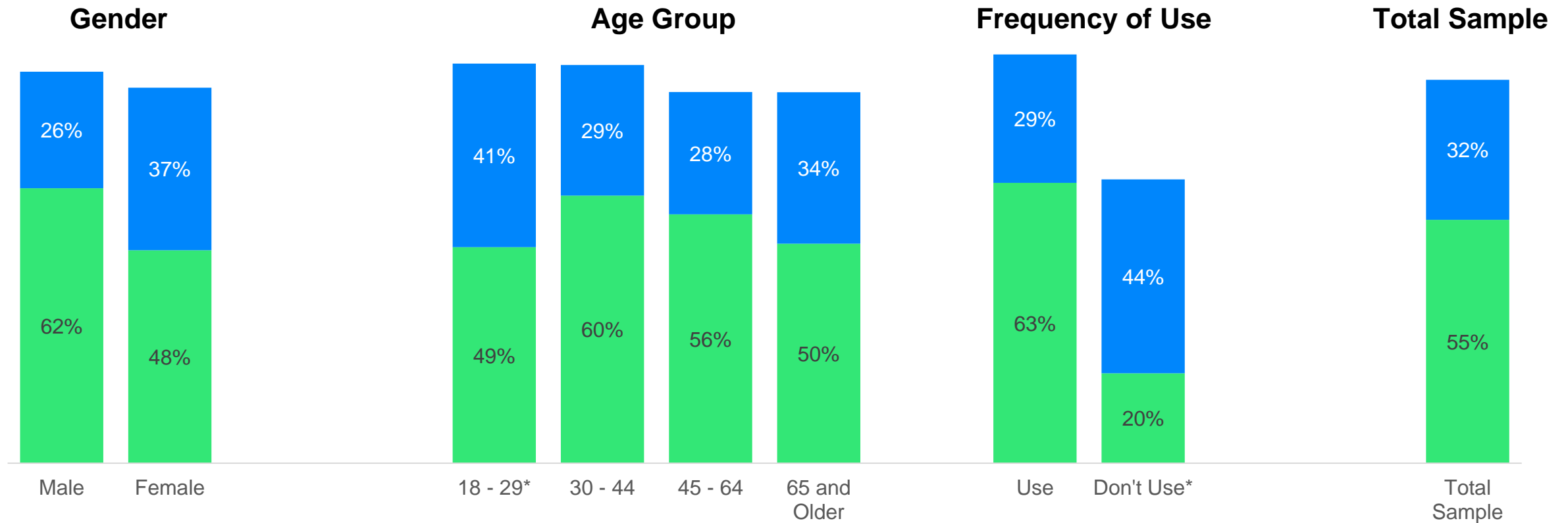


VA7: How likely are you to want Active Driving Assistance on your next vehicle?
Sample Size: Total Sample: N = 402.

Training has encouraged those that don't currently use the feature to be interested in having it on their next vehicle

Future Desire for Active Driving Assistance on Next Vehicle: Top 2 Box

■ Definitely Will ■ Probably Will



VA7: How likely are you to want Active Driving Assistance on your next vehicle?

Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.

Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Sample Size: Total Sample: N = 402, Don't use feature: N = 64, Use feature: N = 324, and Didn't know had feature: N = 14.

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*Small Sample

Future Learning Preferences

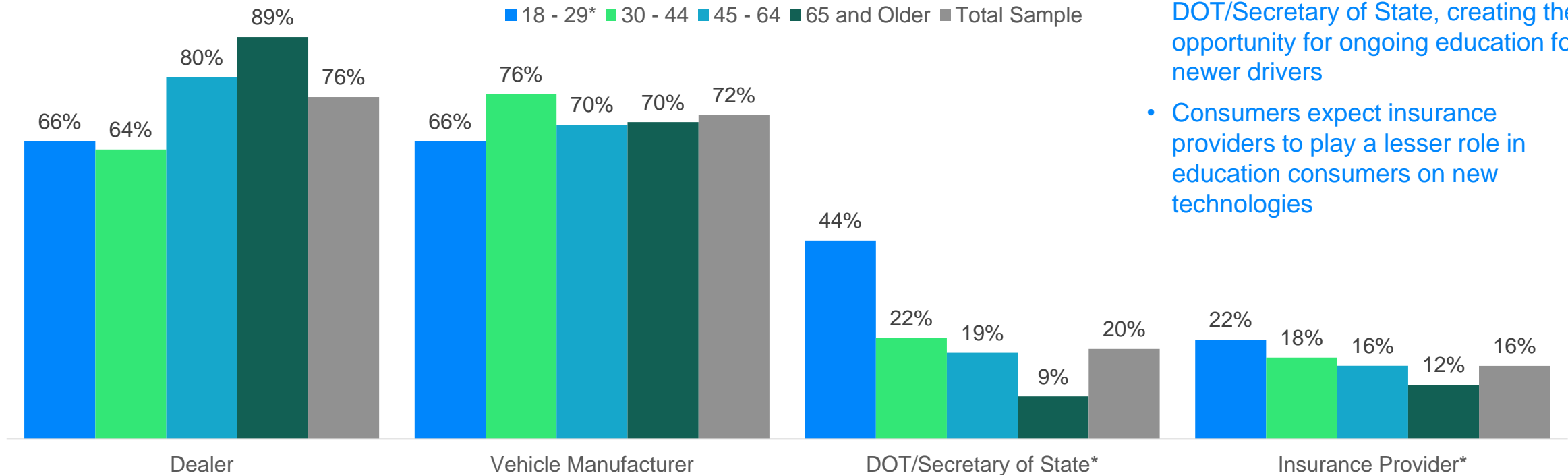
Future Learning Preferences Summary

- Owners expect to be educated about new technologies through their dealer or vehicle manufacturer
 - DOTs and Insurance Providers could offer online driver's education courses
 - Younger people are more open to receiving training from the DOT/Secretary of State, creating the opportunity for ongoing education for newer drivers
 - Consumers expect insurance providers to play a lesser role in educating them on new technologies
- Regardless of which stakeholder provides the education program, consumers prefer in-person explanations/demonstrations and self-administered training videos
- Despite preference for the two aforementioned methods, offering a variety of training methods will help meet varying needs of consumers by age and gender
 - Older (Ages 65 and older) people are more willing to participate in an in-person training or use written instructions
 - More middle-aged (Ages 45-64) people prefer an interactive owner's manual
 - Younger (Ages 18 – 44) people and males are more open to learning through an online driver's education course or through social media
- Those who had difficulty learning from the video training are more likely to look to the DOT or an Insurance Provider to educate them and are more open to a formal education learning methods

HOW TO EFFECTIVELY EDUCATE DRIVERS

Dealers and OEMs Should Provide Training

Preferred Training Provider



- Younger people are more open to receiving training from the DOT/Secretary of State, creating the opportunity for ongoing education for newer drivers
- Consumers expect insurance providers to play a lesser role in education consumers on new technologies

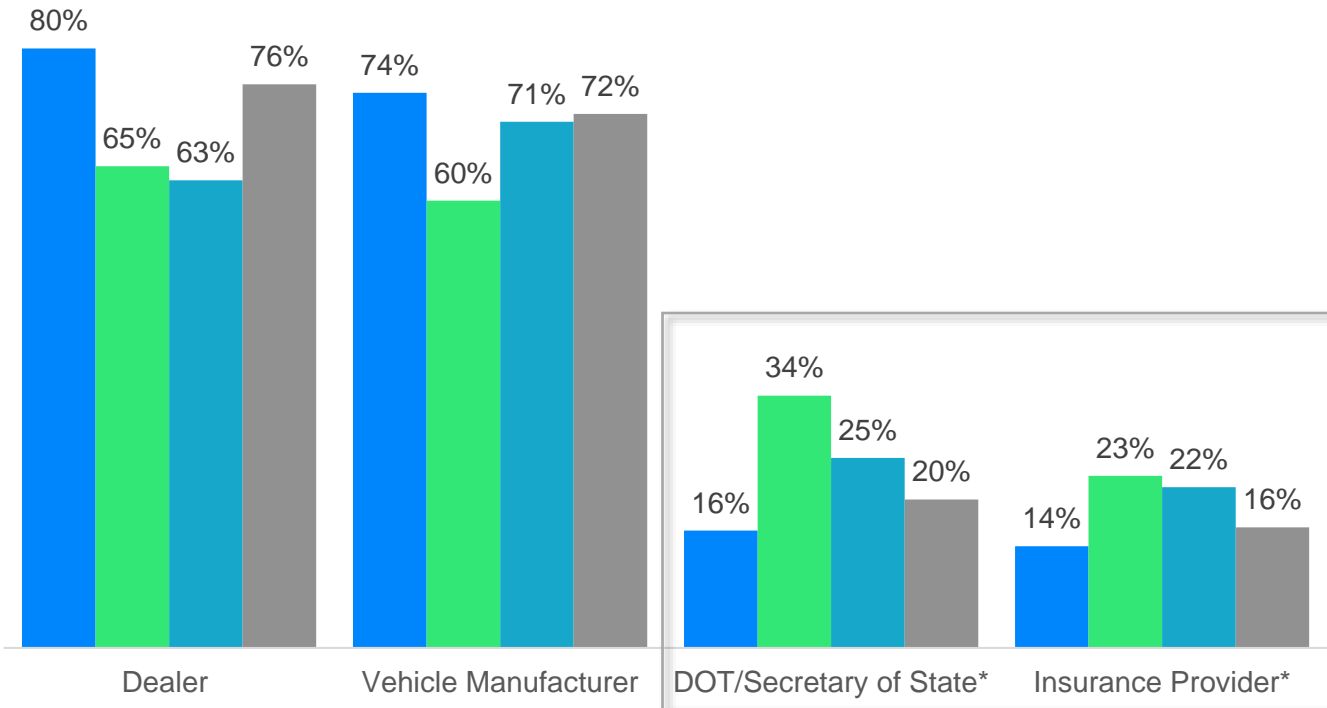
AT1: As vehicles become more automated, users will likely need to learn more about what new technologies can and cannot do. With that in mind, in your opinion, who should provide training how to use the features safely and responsibly? Mark all that apply.
 Sample Size: Total: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Those who had difficulty learning from the video training are more likely to look to the DOT or an Insurance Provider to educate them and are more open to formal education

Impact of Video Training on Preferences for Learning

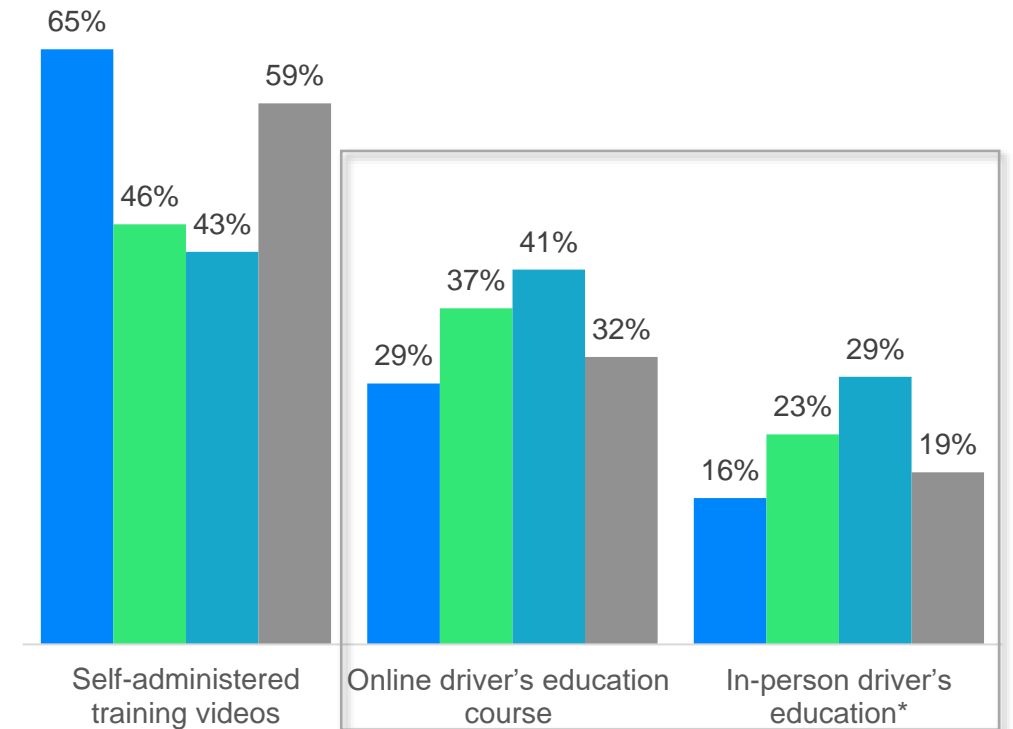
Preferred Training Provider

■ Improved ■ Stayed the Same ■ Degradated ■ Total Sample



Preferred Method of Learning for New Technologies

■ Improved ■ Stayed the Same ■ Degradated ■ Total Sample



AT1: As vehicles become more automated, users will likely need to learn more about what new technologies can and cannot do. With that in mind, in your opinion, who should provide training how to use the features safely and responsibly? Mark all that apply.

AT2: How would you prefer to learn more about these technologies in order to operate your vehicle safely and responsibly? Mark all that apply.

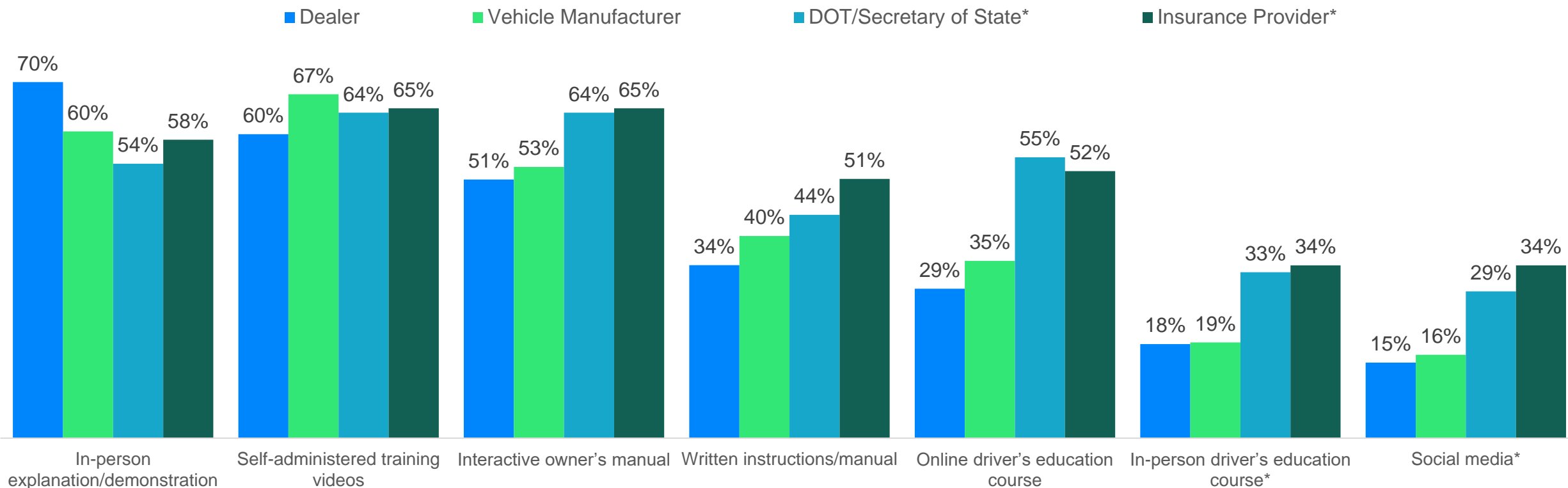
Sample Size: Total Sample: N = 402, Improved: N = 286, Stayed the same: N = 65, and Depredated: N = 51.

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*Small Sample

Training provided by the dealer or vehicle manufacturer should be conducted in-person or through self-administered training videos; DOTs and Insurance Providers could offer online driver's education courses

Preferred Method of Learning New Technologies By Preferred Training Provider



AT1: As vehicles become more automated, users will likely need to learn more about what new technologies can and cannot do. With that in mind, in your opinion, who should provide training how to use the features safely and responsibly? Mark all that apply.
 AT2: How would you prefer to learn more about these technologies in order to operate your vehicle safely and responsibly? Mark all that apply.

Sample Size: Total Sample: N = 402, Dealer: N = 304, Vehicle manufacturer/developer: N = 288, Department of Transportation/Secretary of State: N = 80, Insurance provider: N = 65, and Other: N = 8.

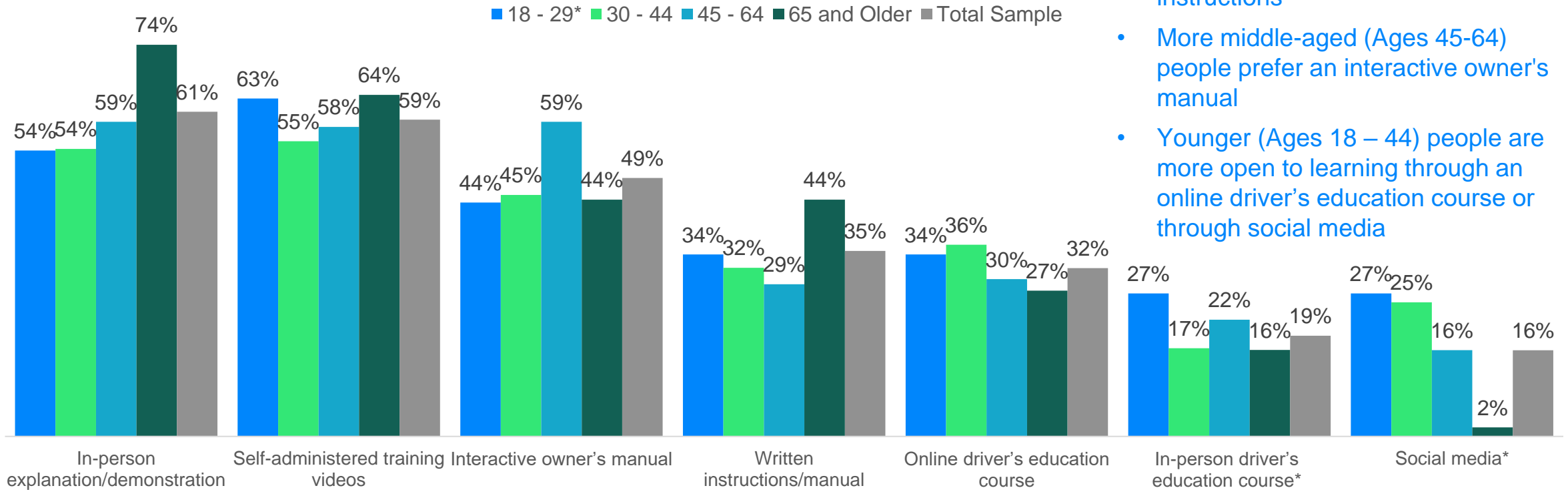
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*Small Sample

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In-person and self-administered training are appealing across all age groups; however, multiple training methods will be needed to target preferences by age group

Preferred Method of Learning New Technologies Age Group



- Older (Ages 65 and older) people are more willing to participate in an in-person training or use written instructions
- More middle-aged (Ages 45-64) people prefer an interactive owner's manual
- Younger (Ages 18 – 44) people are more open to learning through an online driver's education course or through social media

AT2: How would you prefer to learn more about these technologies in order to operate your vehicle safely and responsibly? Mark all that apply.
 Sample Size: Total Sample: N = 402, 18 – 29: N = 41, 30 – 44: N = 139, 45 – 64: N = 105, and 65 and Older: N = 117.
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*Small Sample

Thank You

For further information, please contact:

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and Technology

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Lisa Boor

Senior Manager, Auto Benchmarking

Lisa.Boor@jdpa.com





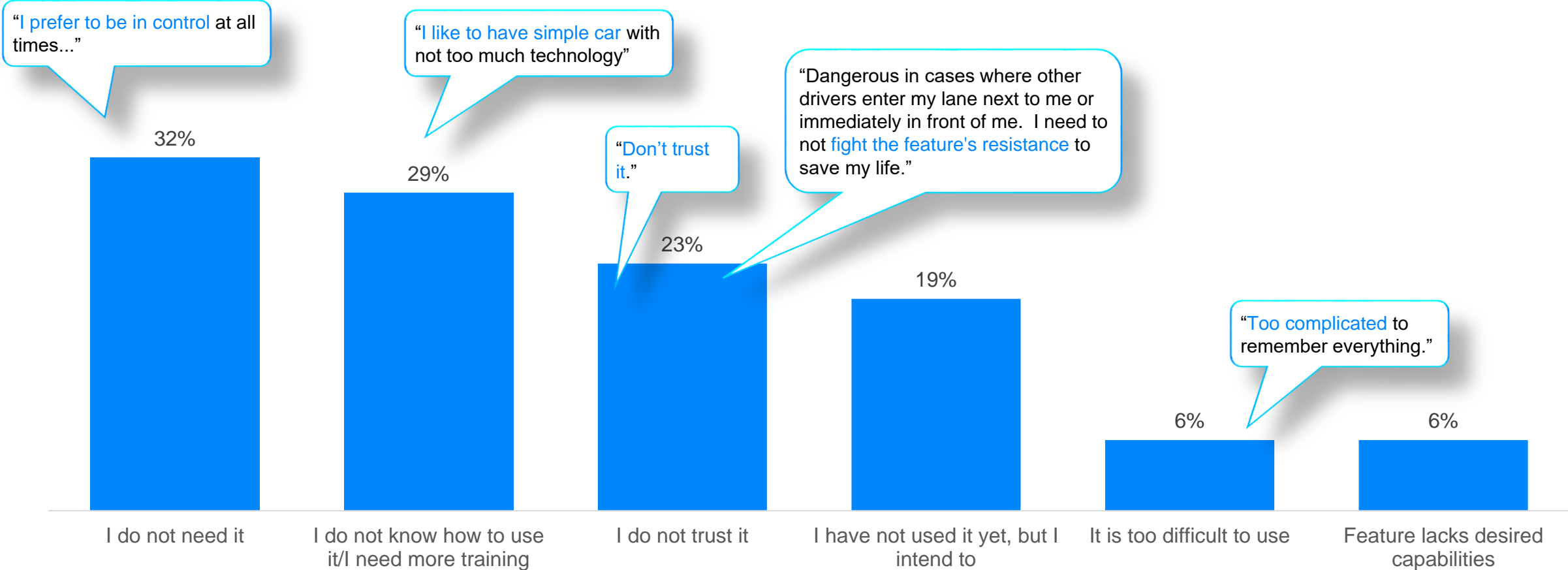
APPENDIX

APPENDIX

Experience with Active Driving Assistance

While only a small number of people never used the tech (31 out of 402), need and not knowing how to use it are the main reasons

Reasons Never Use Active Driving Assistance Technology*



U3: Please tell us why you never use the Active Driving Assistance technology on your vehicle (multiple choice).
Sample Size: Total Sample: N = 31.
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*Small Sample

APPENDIX

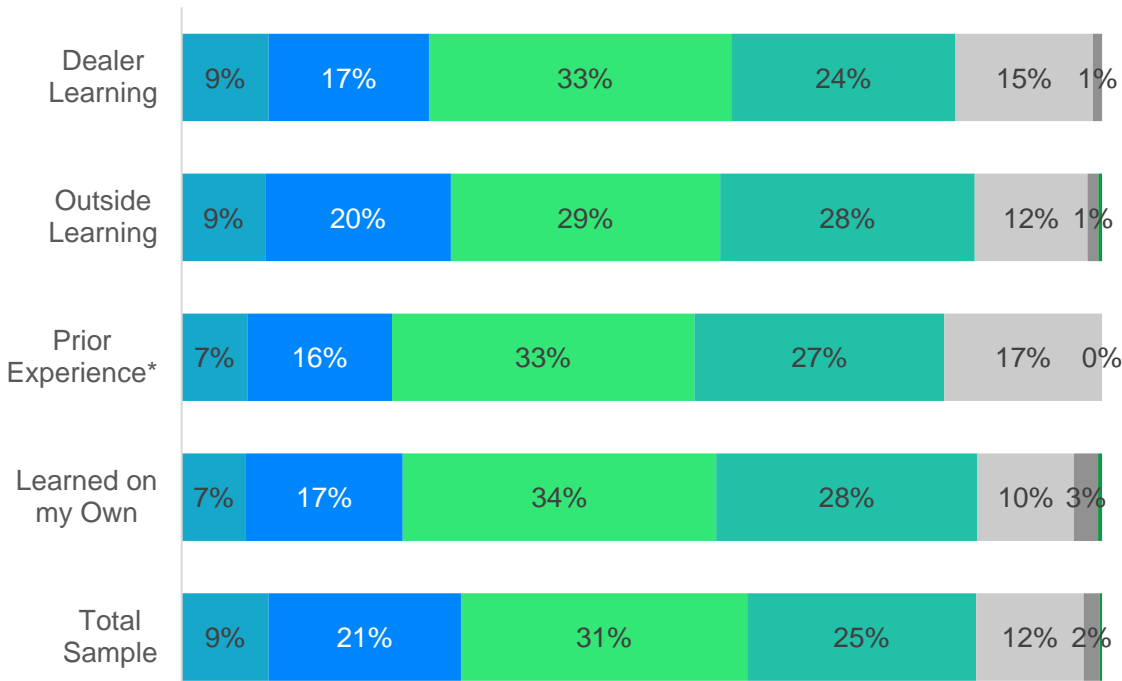
Level of Knowledge Before the Training

There is little difference by method of learning as to the number of questions respondents got correct

Number of Questions Correct: Pre-Video

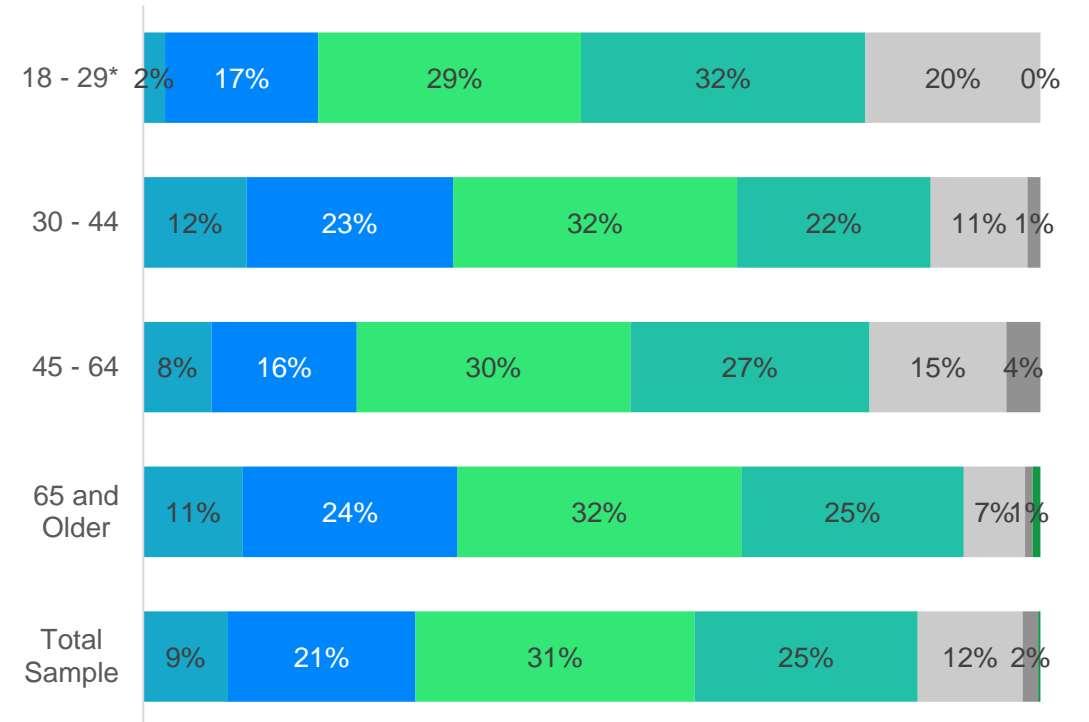
By How Learned

■ None ■ One ■ Two ■ Three ■ Four ■ Five ■ Six or More



By Age Group

■ None ■ One ■ Two ■ Three ■ Four ■ Five ■ Six or More



The number of questions correct prior to watching the training video.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

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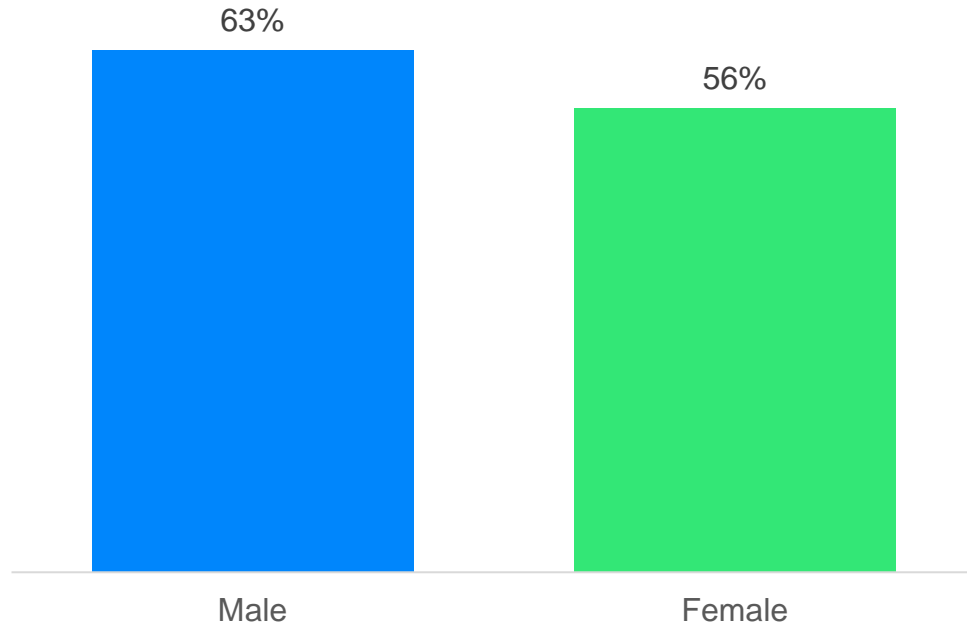
*Small Sample

Males are more knowledgeable about the feature requirements than females, as are those with longer daily commutes, creating more opportunities to use it

Features Required to Use Active Driving Assistance

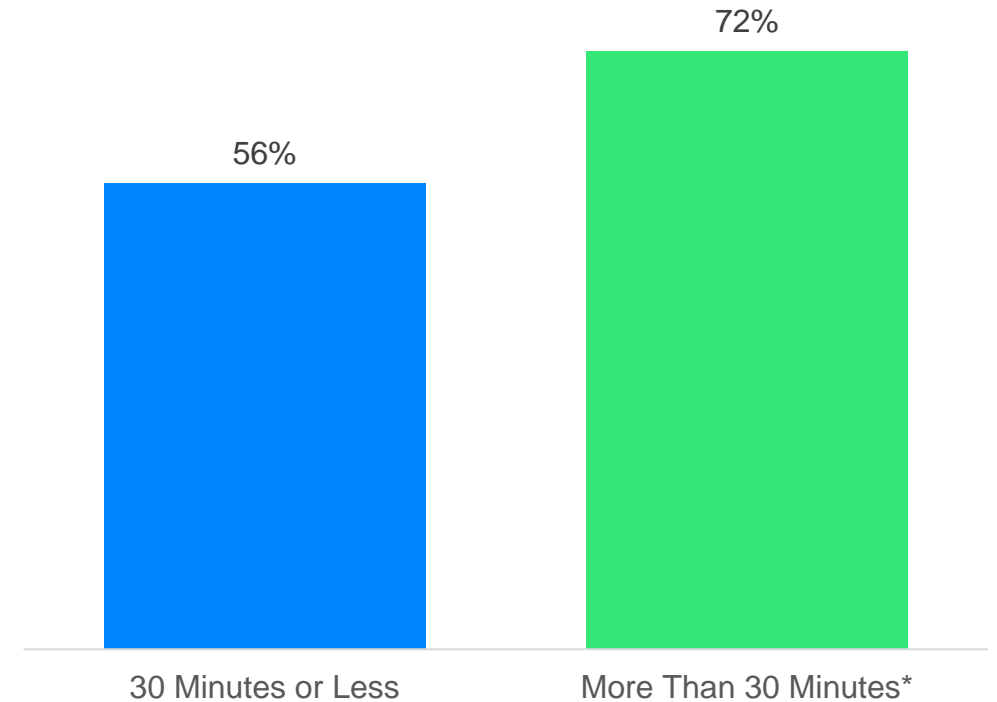
By Gender

Both Full Speed and Lane Tracing (Correct)



By Average Daily Commute

Both Full Speed and Lane Tracing (Correct)



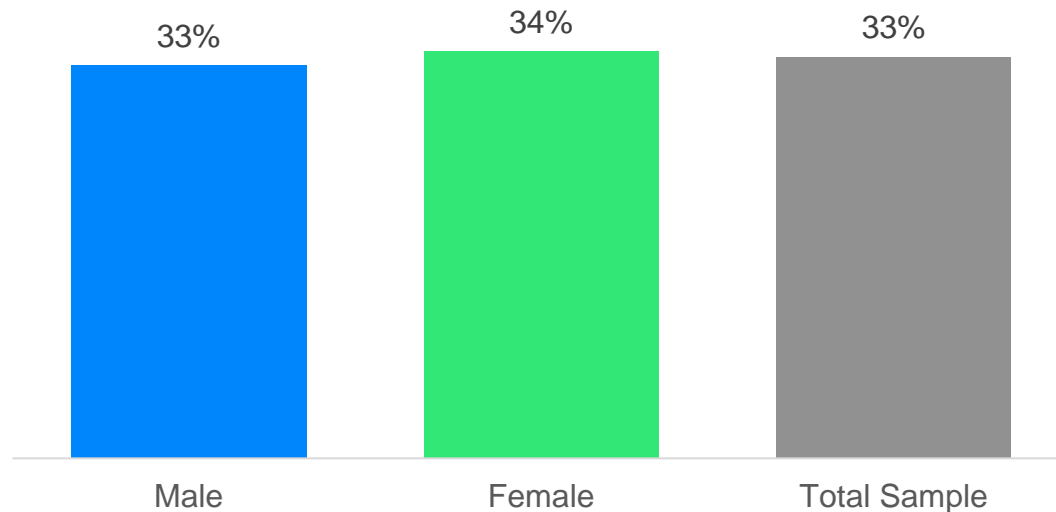
I1: Which of the following features are required to use the Active Driving Assistance technology on your Toyota vehicle?
Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.
Sample Size: Total Sample: N = 402, 30 Miles or Less: N = 326, More Than 30 Minutes: N = 76.
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*Small Sample

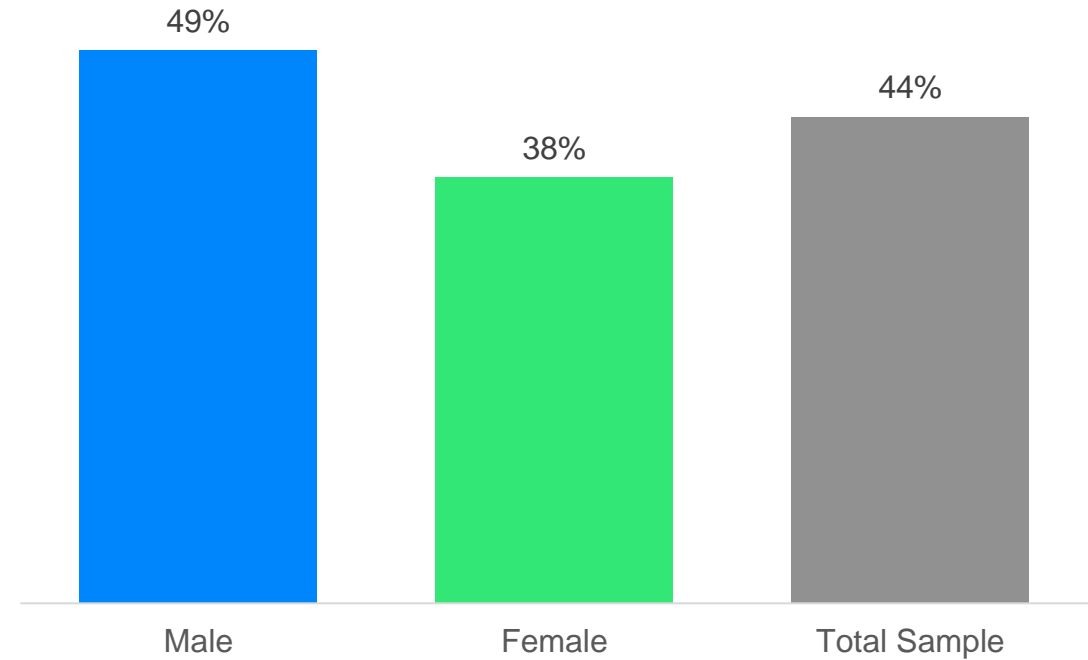
While there was no notable difference between males and females for understanding that the feature does not work properly on roads with traffic lights, more males know that the feature will not work at speeds under 32 MPH

Gender Differences in Active Driving Assistance Technology Requirements to Operate

Type of Road Where Feature Works Properly:
Interstates/Highways/Freeways without traffic lights (Correct)



Minimum Speed Required to Activate:
At 32 MPH or above (Correct)

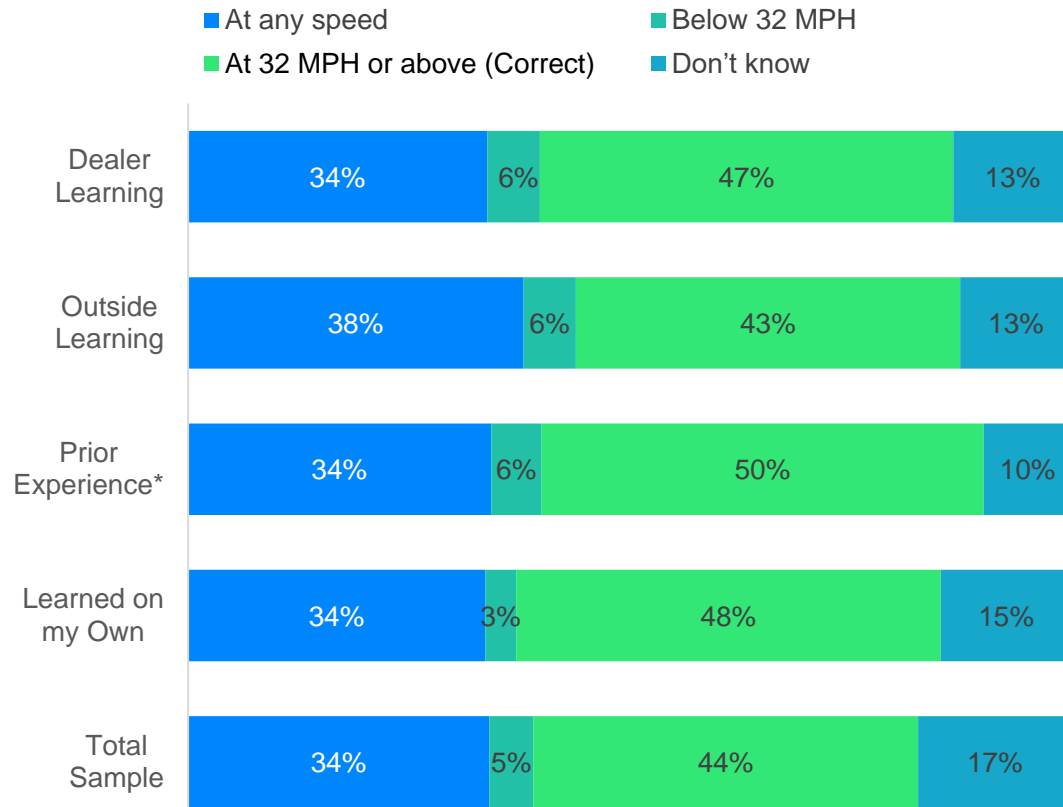


C1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?
C2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.

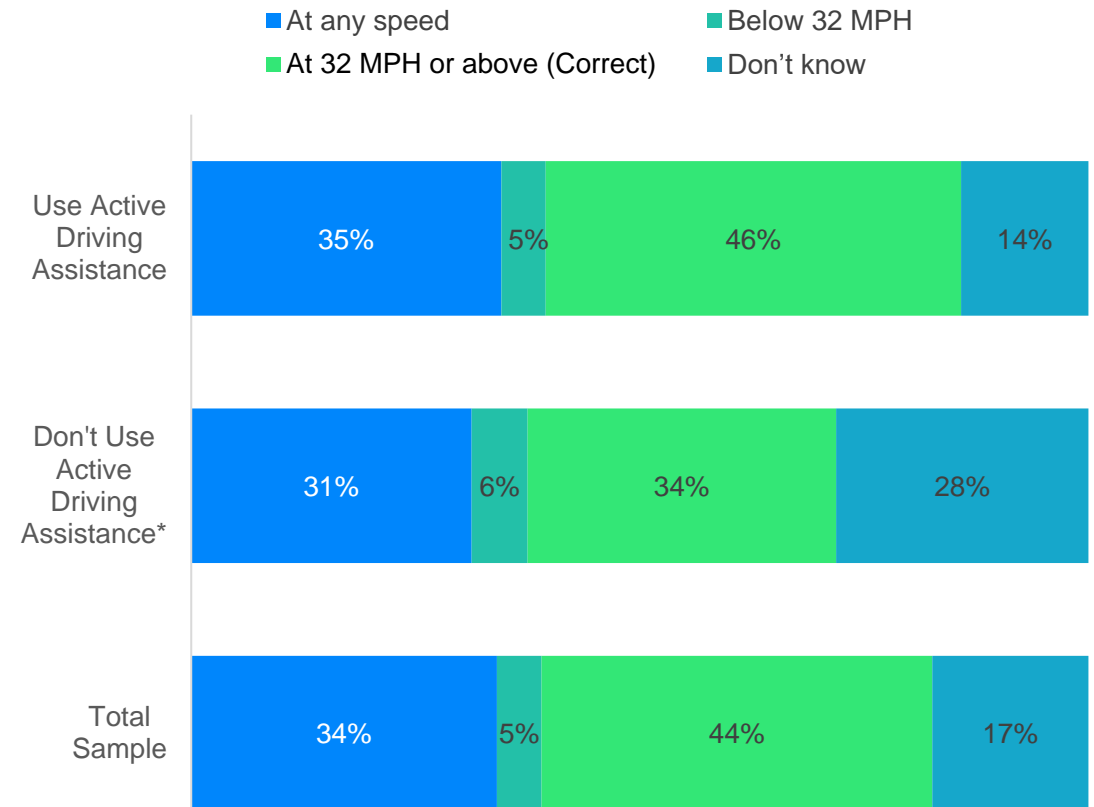
Usage positively impacts understanding that the feature will not activate until the vehicle is traveling at a minimum of 32 MPH

Minimum Speed Require to Activate

By How Learned



By Frequency of Use



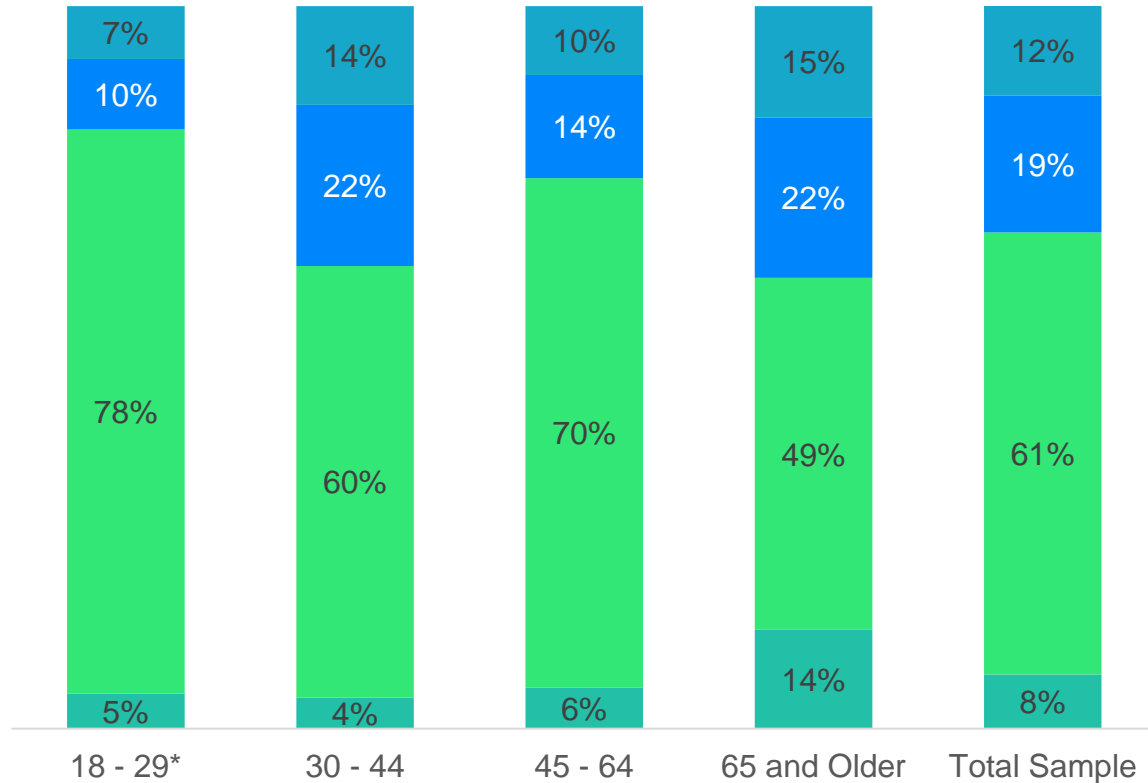
C2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Younger owners (Ages 18 – 29) are more likely to understand the correct image in the cluster of when Active Driving Assistance is active

Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1

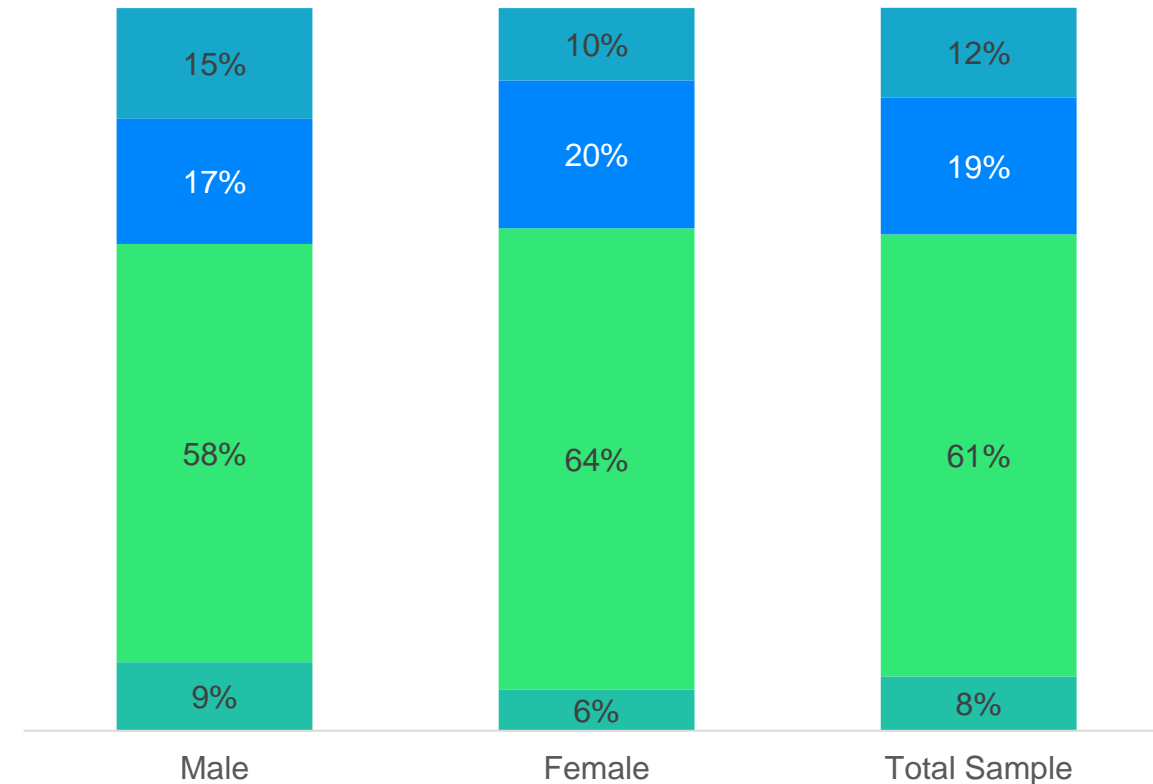
By Age Group

■ Image 1 ■ Image 2 (Correct) ■ Image 3 ■ Image 4



By Gender

■ Image 1 ■ Image 2 (Correct) ■ Image 3 ■ Image 4

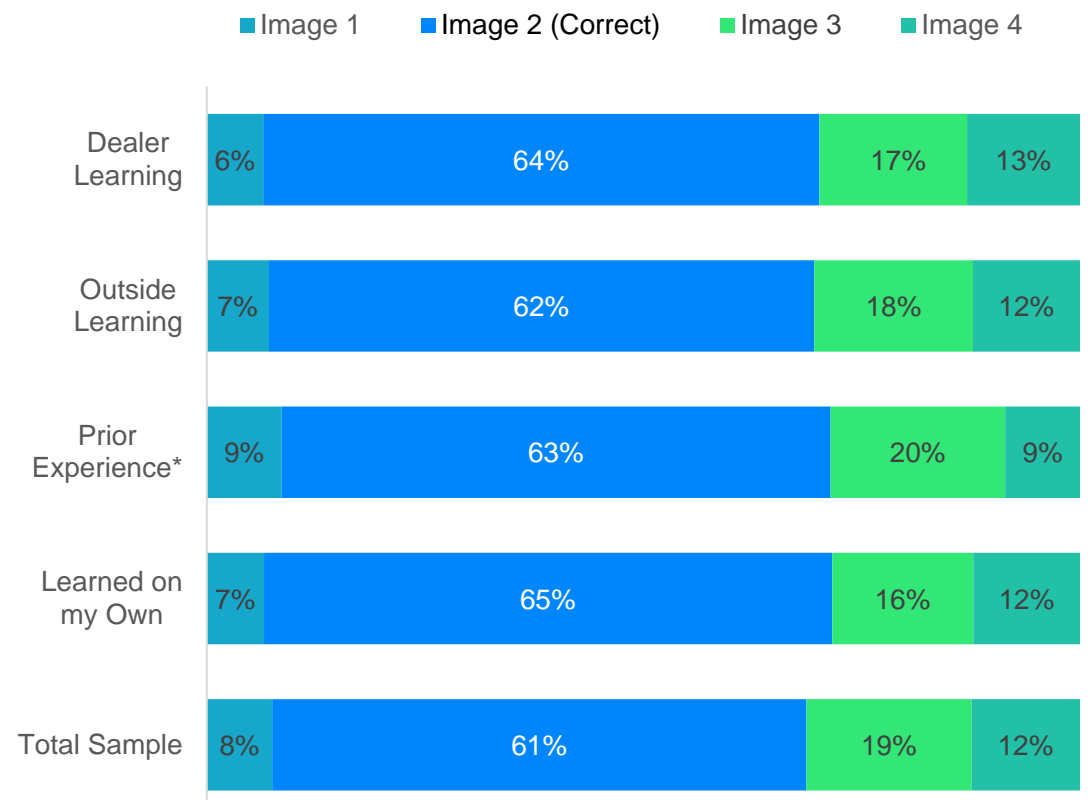


IS1: Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?
 Sample Size: Total Sample: N = 402, 18 – 29: N = 41, 30 – 44: N = 139, 45 – 64: N = 105, and 65 and Older: N = 117.
 Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.

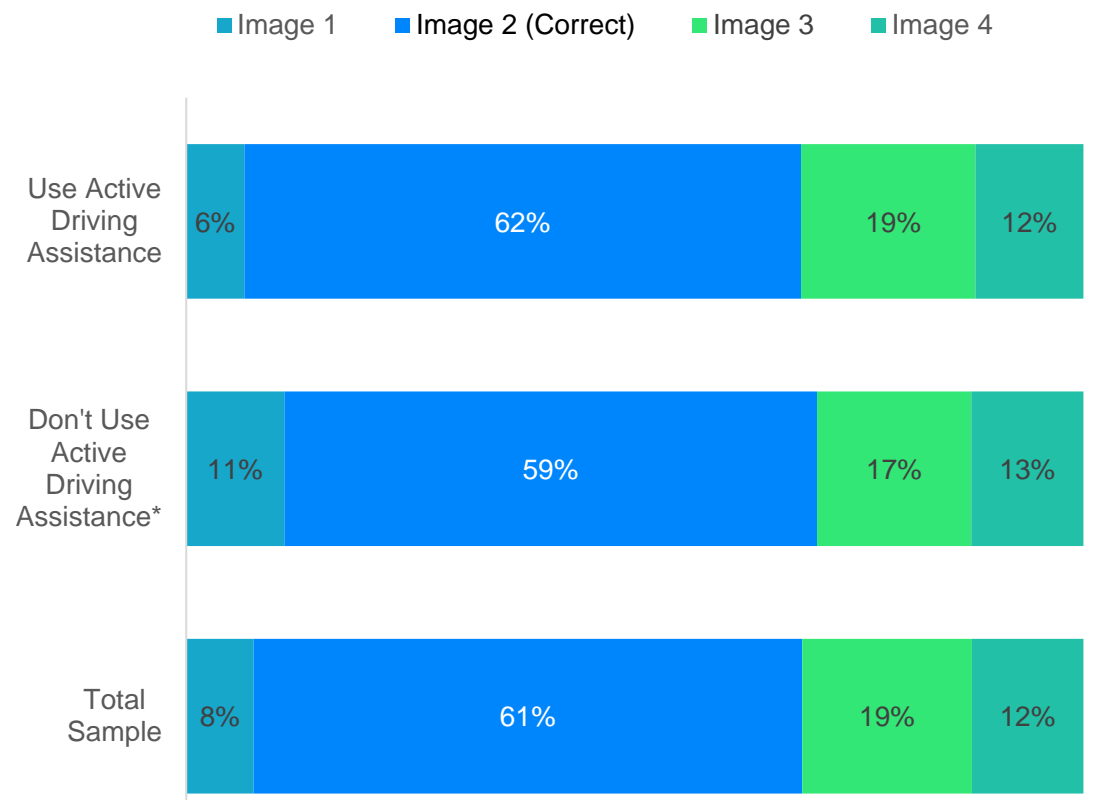
Providing learning as to how to interpret the images shown in the cluster is critical as a large percentage of owners misinterpret it, regardless of how they learned or if they use the feature

Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1

By How Learned



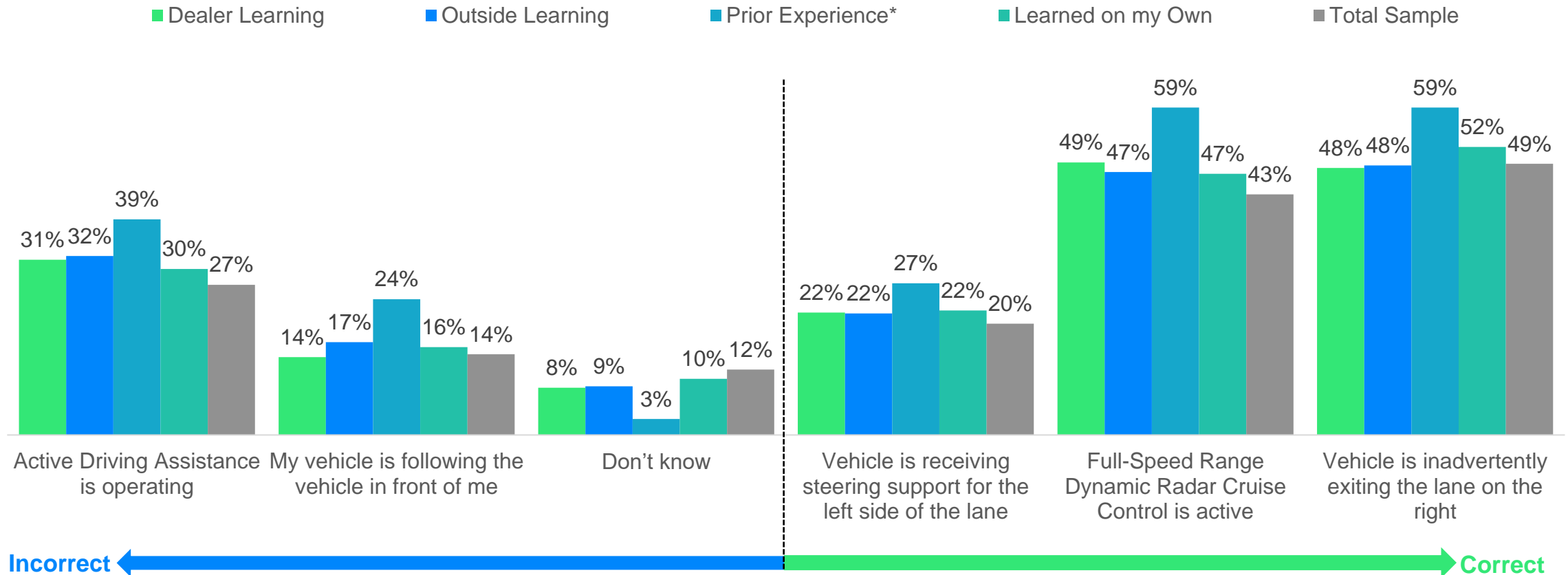
By Frequency of Use



IS1: Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

More owners with prior experience incorrectly think the image shows that the Active Driving Assistance feature is operating

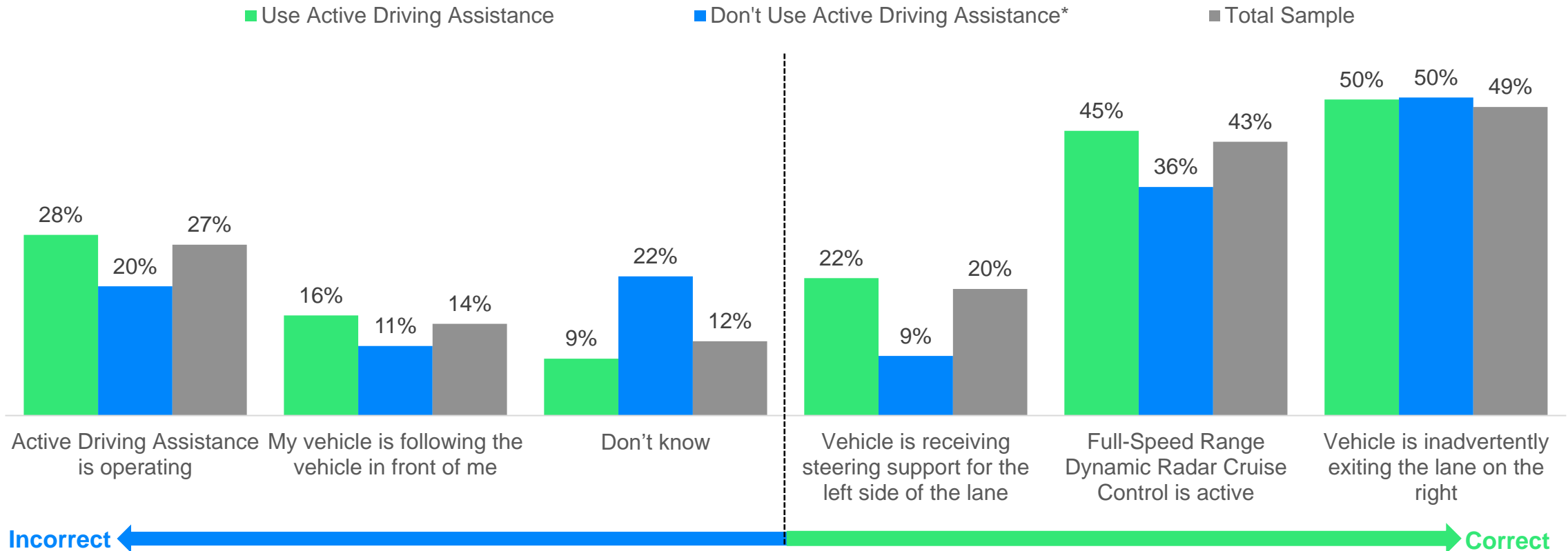
Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By How Learned



IS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Knowledge among those that currently use the feature is not much stronger than those that don't use the feature, in terms of the vehicle exiting the lane on the right

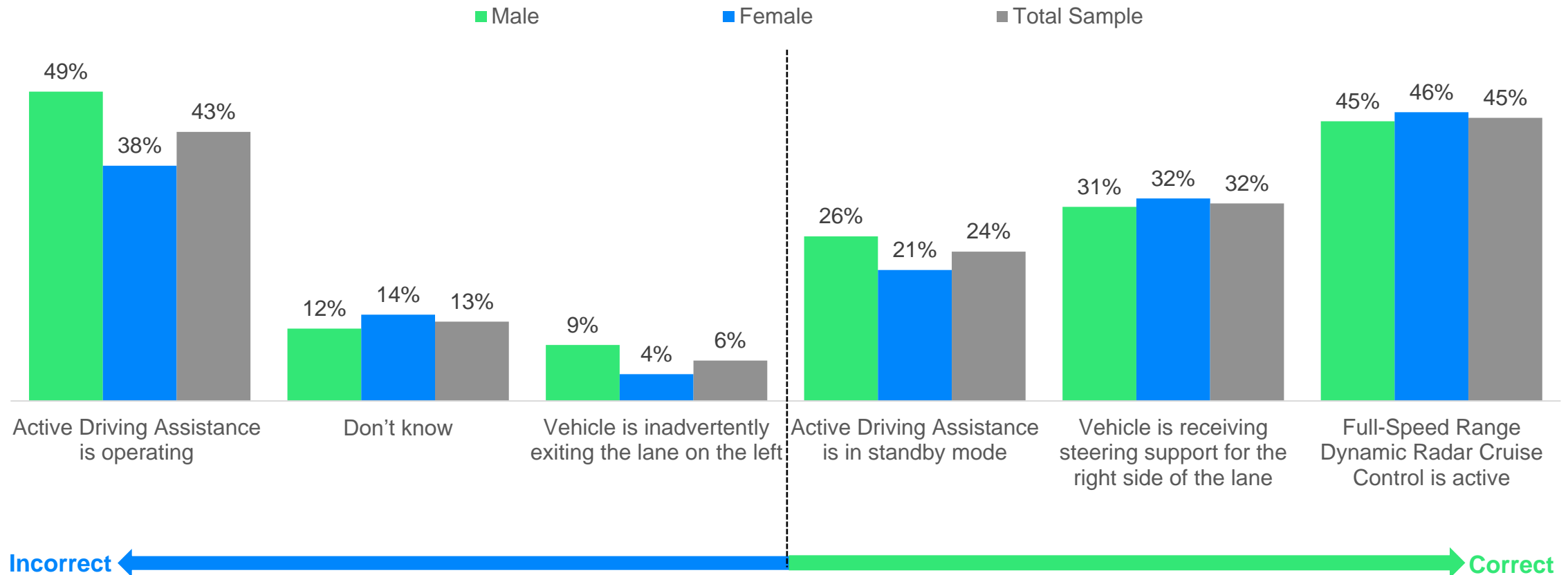
Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By Frequency of Use



IS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

More males misinterpret the image in the cluster to mean the Active Driving Assistance is operating when it is not functioning

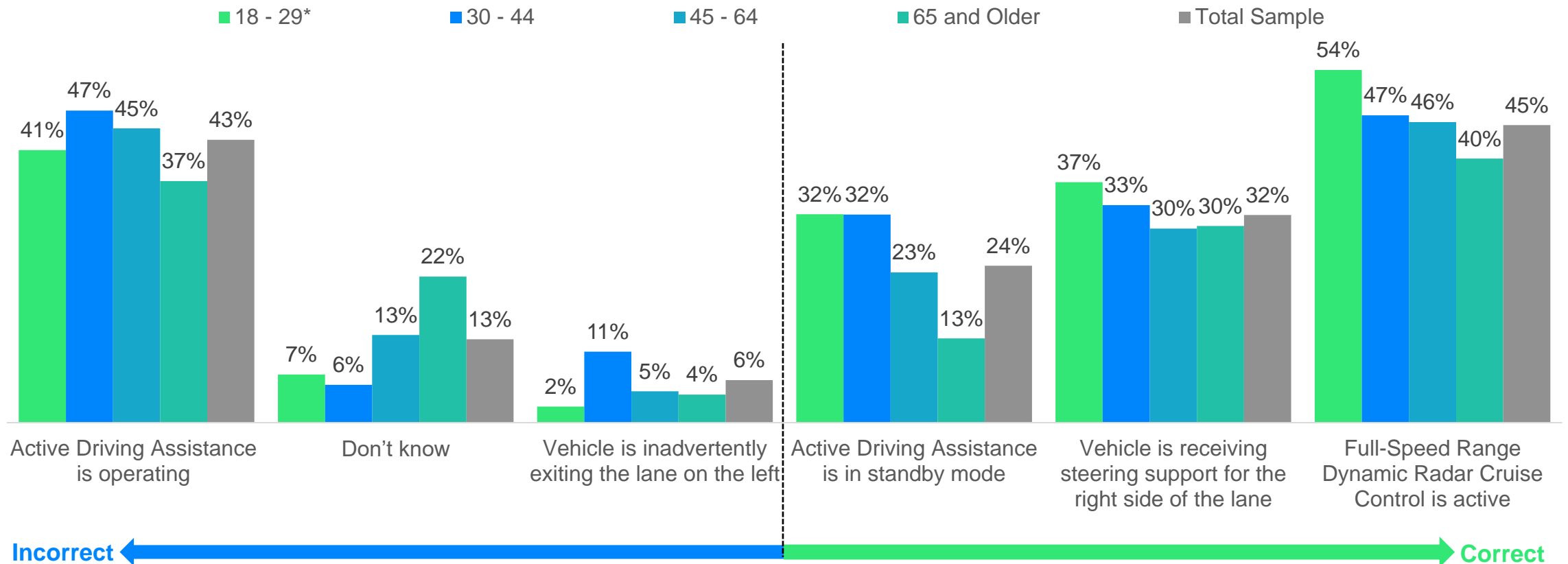
Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By Gender



IS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.
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While room for improvement, younger owners (Ages 18 – 29) are more accurate in their interpretation of the Active Driving Assistance image in the cluster

Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By Age Group

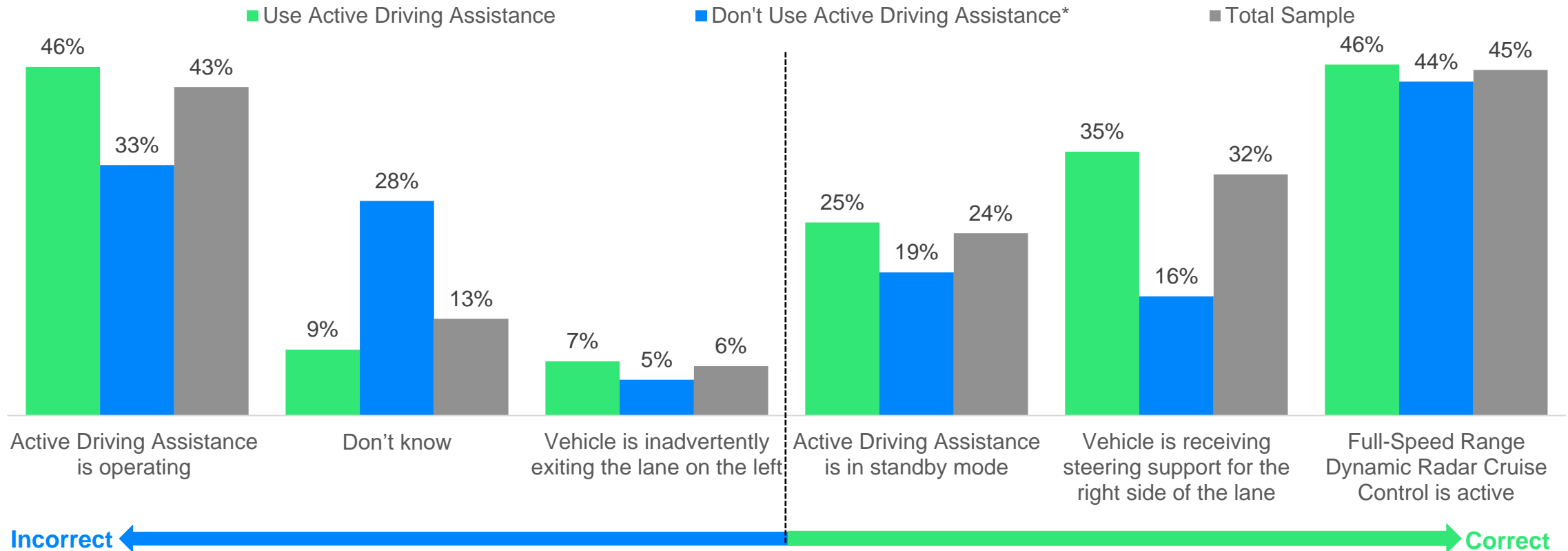


IS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, 18 – 29: N = 41, 30 – 44: N = 139, 45 – 64: N = 105, and 65 and Older: N = 117.

*Small Sample

Those who use the feature are more incorrect in their belief that Active Driving Assistance is operating than those who have never use it

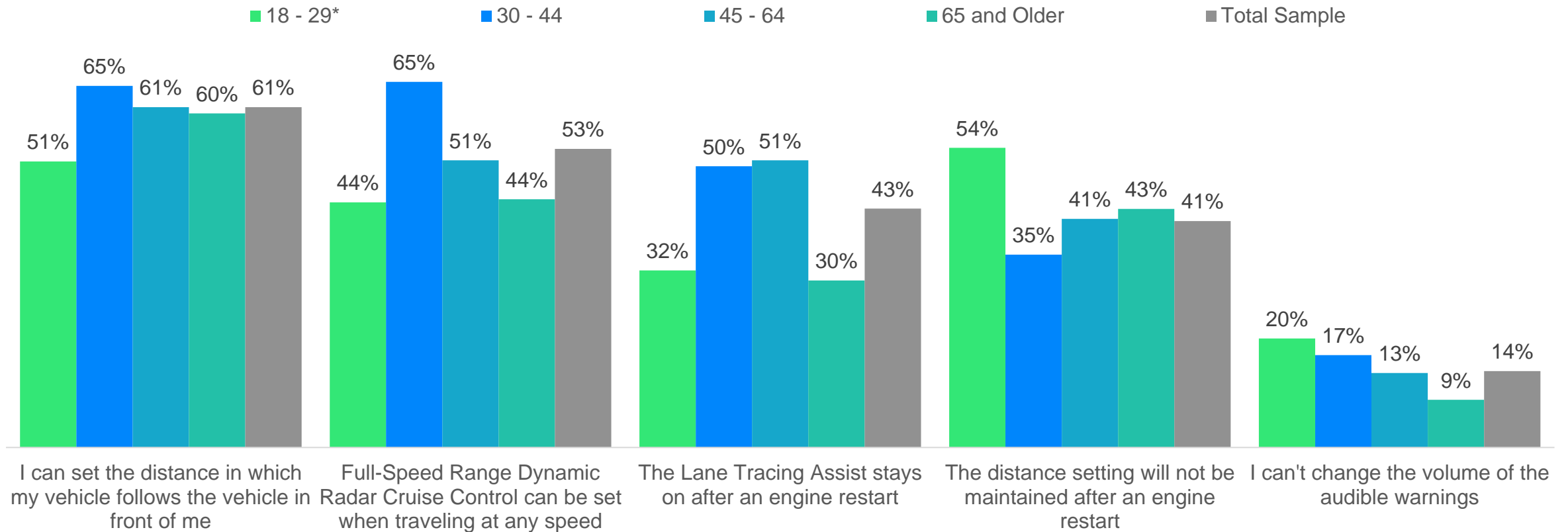
Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By Frequency of Use



IS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Regardless of age, most owners don't realize that they cannot change the volume of the audible warnings

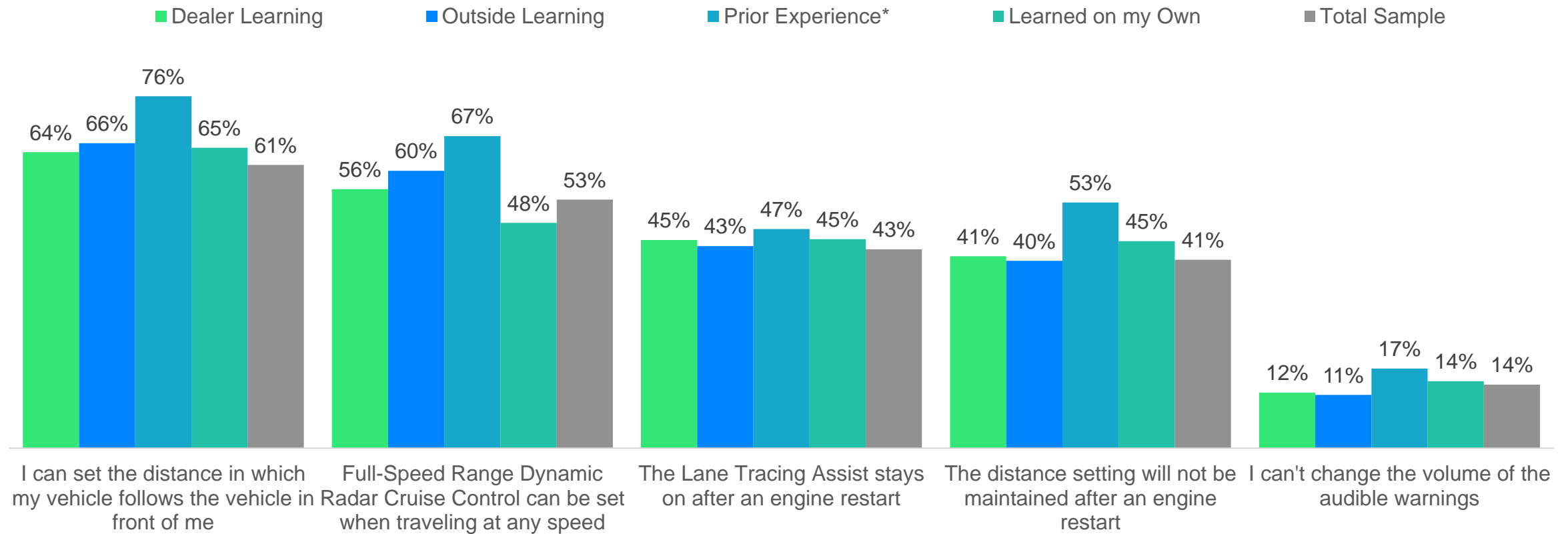
Settings Options for Active Driving Assistance – By Age Group Percent Correct



S1: Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle.
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Prior experience aids in user understanding for the Adaptive Cruise Control feature, but not for the Lane Centering aspects of Active Driving Assistance

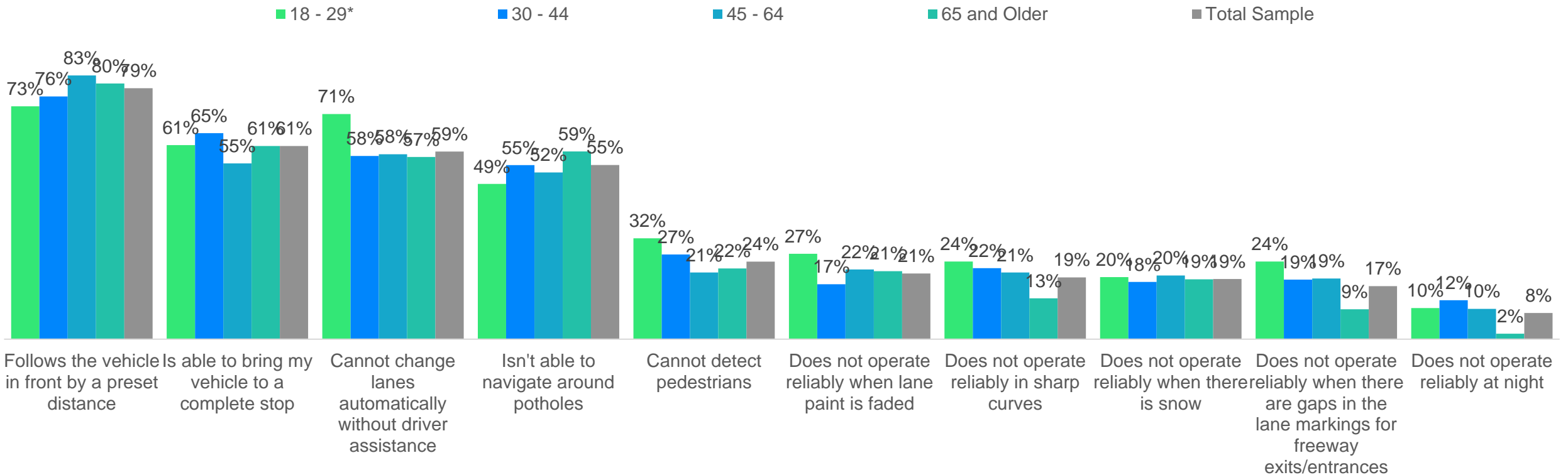
Settings Options for Active Driving Assistance – By How Learned Percent Correct



S1: Are the following statements true or false regarding the settings options for the Active Driving Assistance feature on in your Toyota vehicle.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Age is not a differentiator in terms of understanding the limitations of the Active Driving Assistance technology

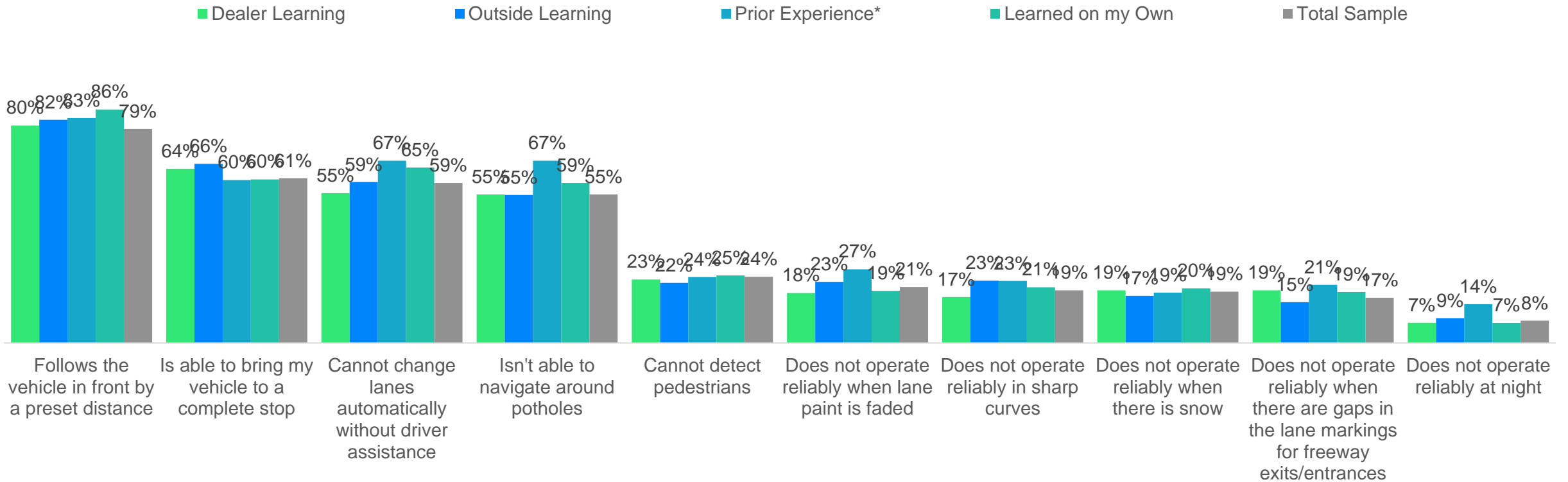
Active Driving Assistance Technology Limitations – By Age Group Percent Correct



FC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.
Sample Size: Total Sample: N = 402, 18 – 29: N = 41, 30 – 44: N = 139, 45 – 64: N = 105, and 65 and Older: N = 117.

With the exception of navigating around potholes, there is very little difference in how owners learned about their Active Driving Assistance feature in regards to understanding the limitations

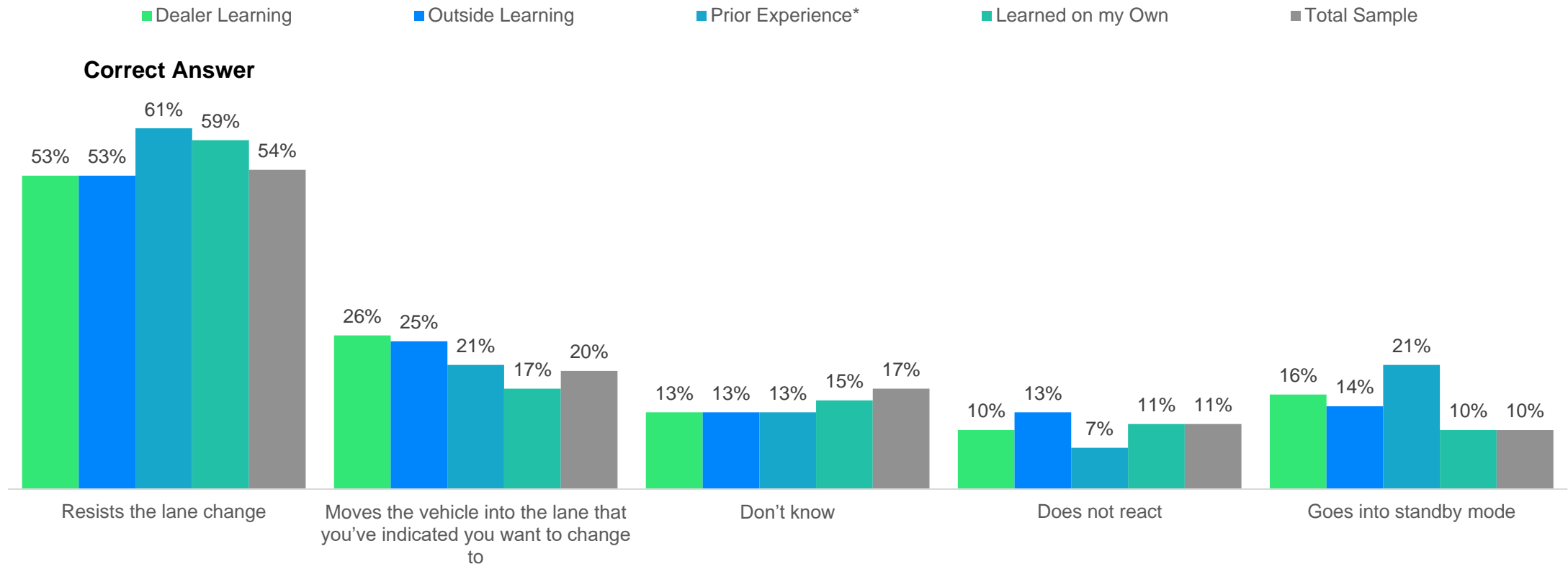
Active Driving Assistance Technology Limitations – By How Learned Percent Correct



FC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Owners who learned through Prior Experience and Learning on their Own are slightly more likely to understand that the feature will resist a lane change if a turn signal is not used

Feature Reaction: When Attempting to Change Lanes Without Turn Signal By How Learned

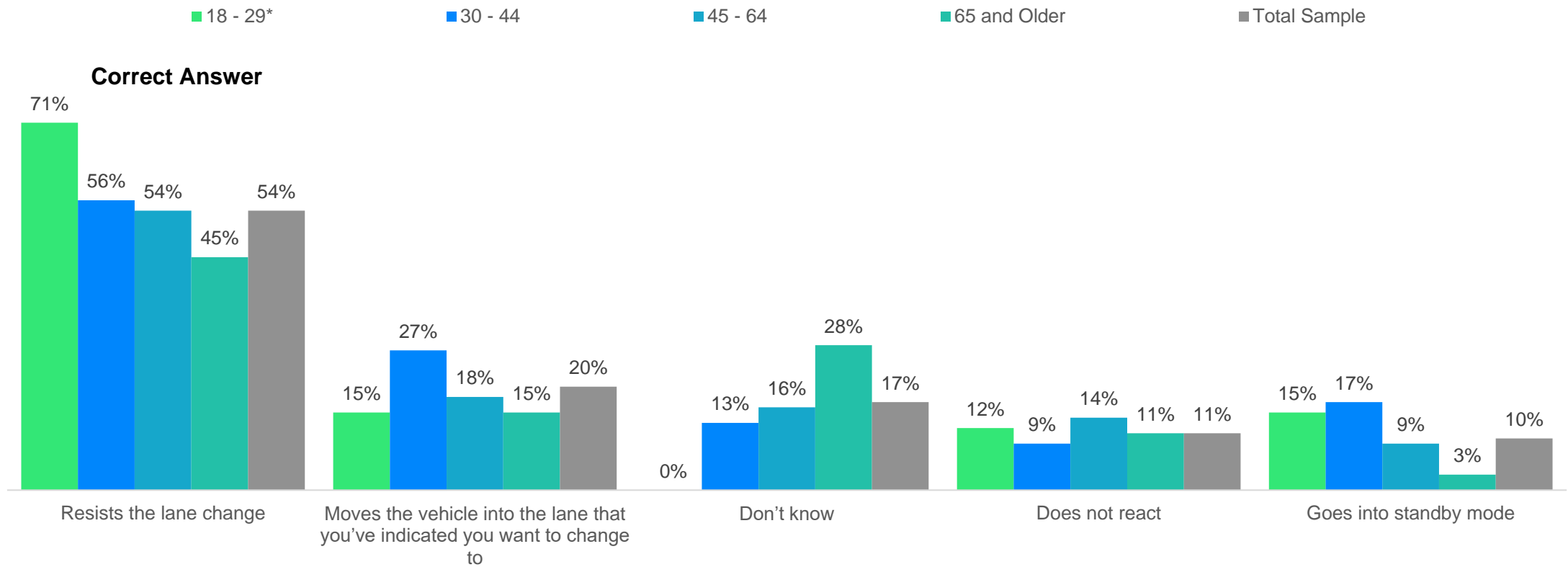


FR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
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*Small Sample

Knowledge of the feature reaction by resisting a lane change declines with age

Feature Reaction: When Attempting to Change Lanes Without Turn Signal By Age Group



FR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.

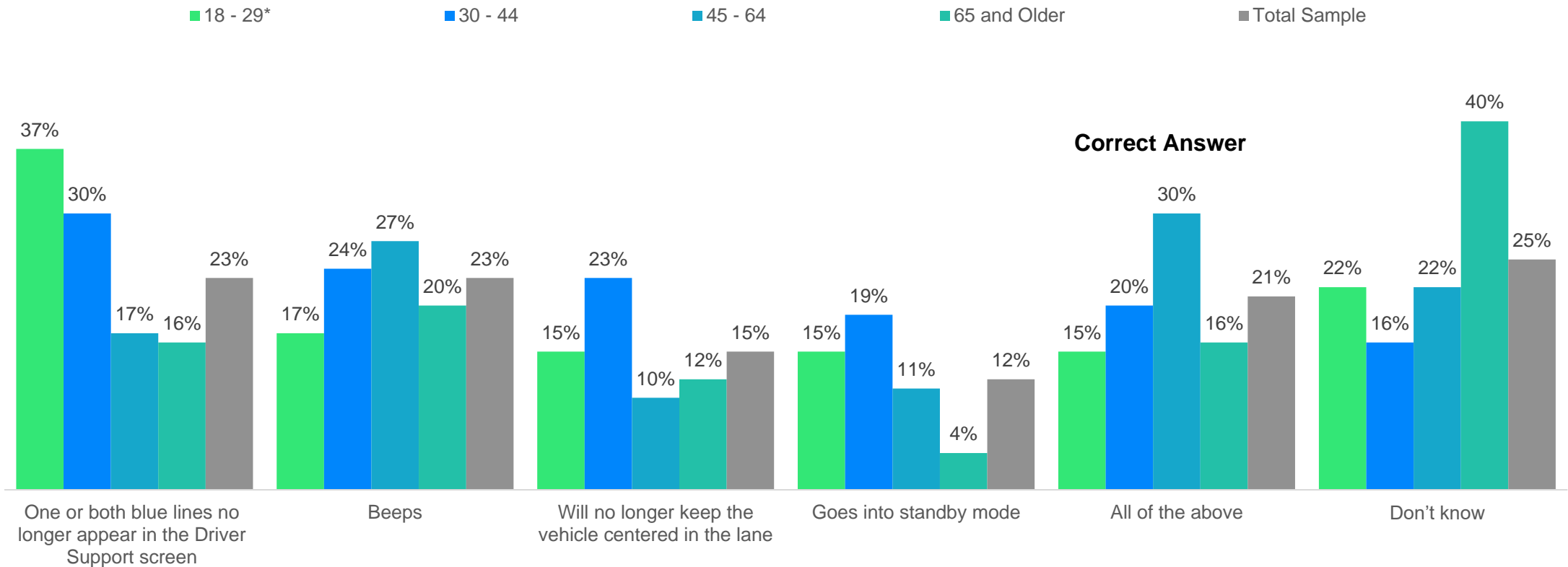
Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

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*Small Sample

Middle-aged people (Ages 45– 64) are more likely to understand the reaction when the lane markings are no longer visible

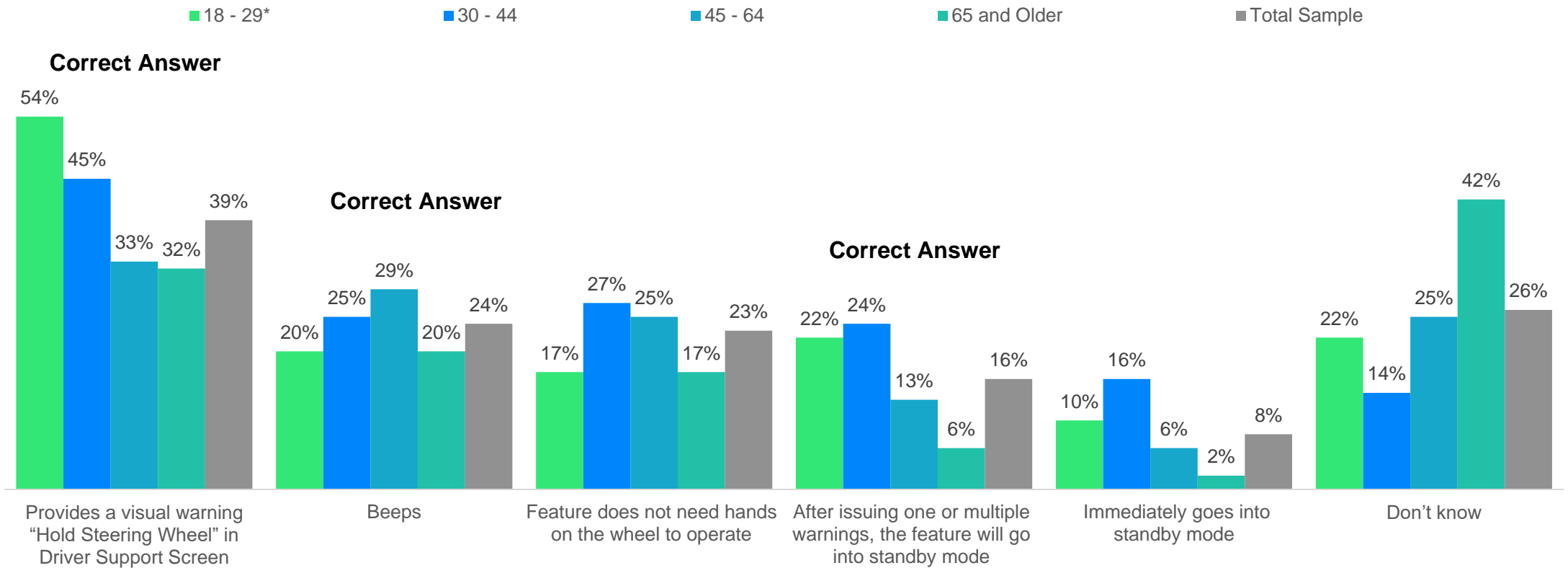
Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible By Age Group



FR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

Older owners (Ages 65 and Older) don't know what to expect if they take their hands off the wheel

Feature Reaction: If You Take Your Hands Off the Steering Wheel By Age Group



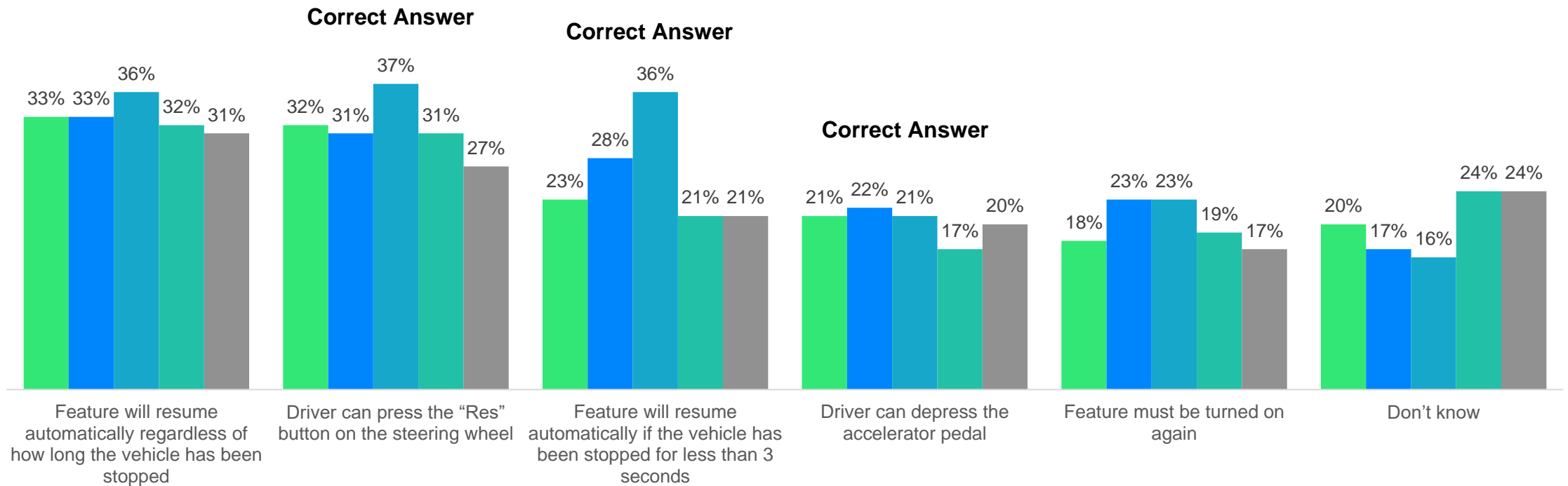
FR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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*Small Sample

There is little difference in the level of knowledge of how to resume driving after being stopped, by how they learned about the feature

Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop By How Learned

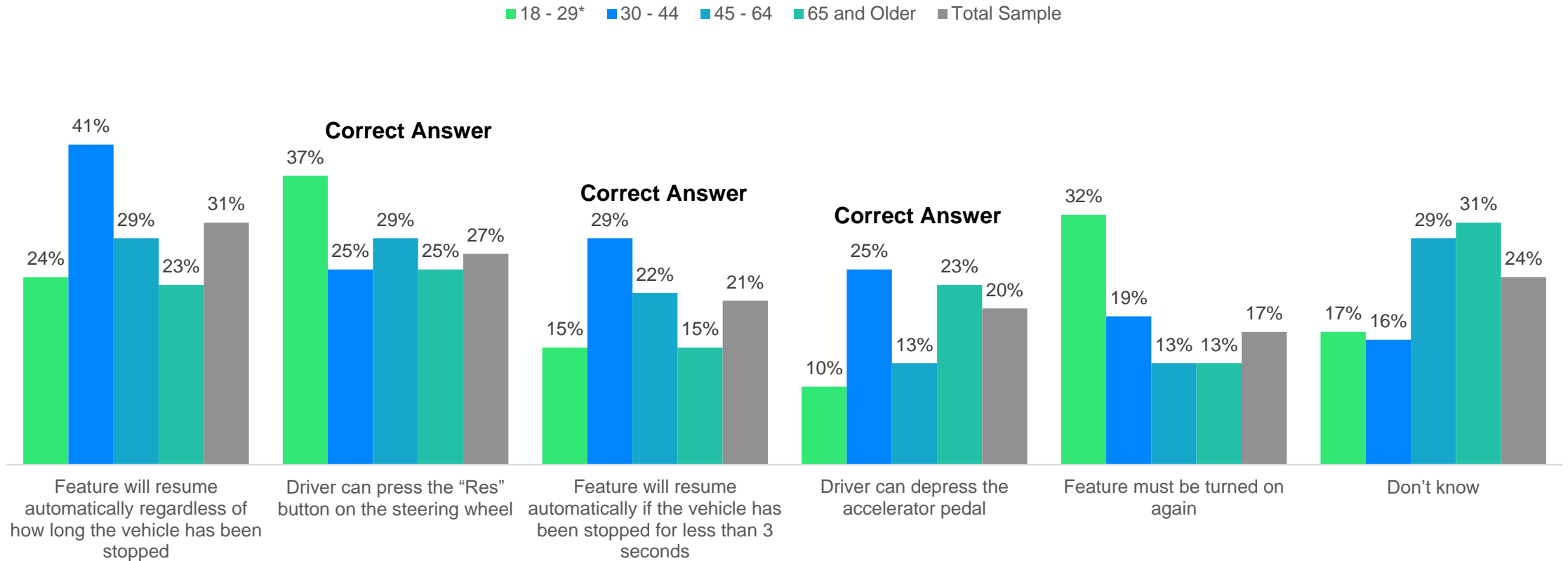
■ Dealer Learning
 ■ Outside Learning
 ■ Prior Experience*
 ■ Learned on my Own
 ■ Total Sample



FR4: If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

There is diversity in knowledge among age groups specific to the ability to use the accelerator pedal

Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop By Age Group



FR4: If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply.
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

APPENDIX

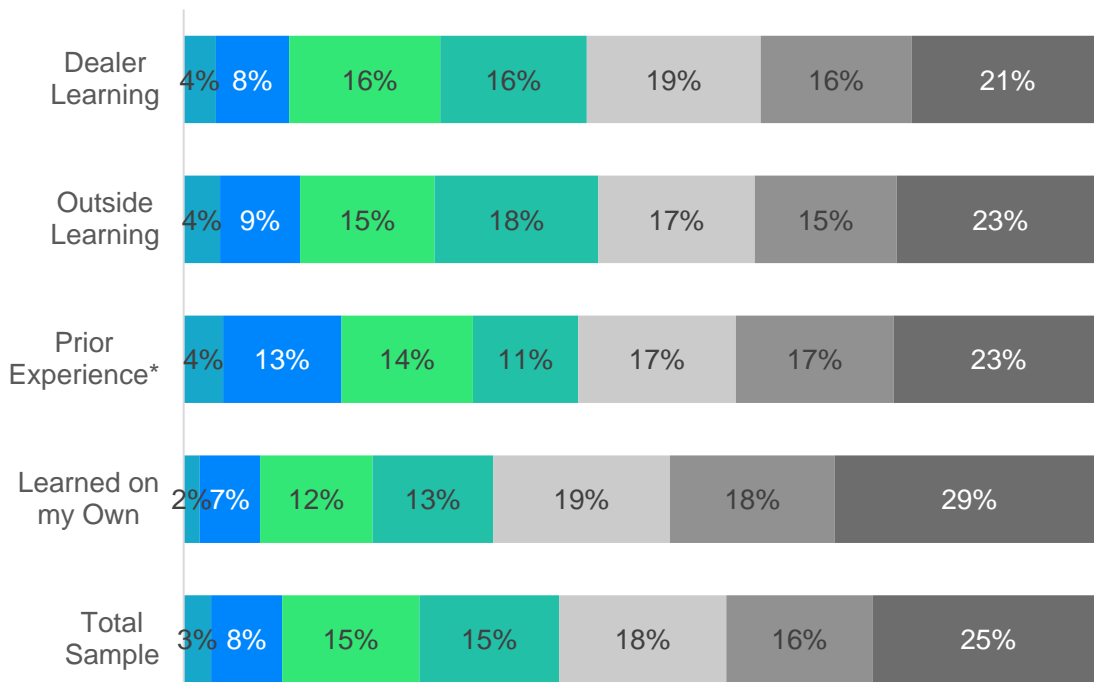
Level of Knowledge After the Training

In contrast to the pre-video assessment, age is a strong differentiator as older owners had higher levels of improvement. There is little difference by method of learning as to the number of questions respondents got correct

Number of Questions Correct: Post-Video

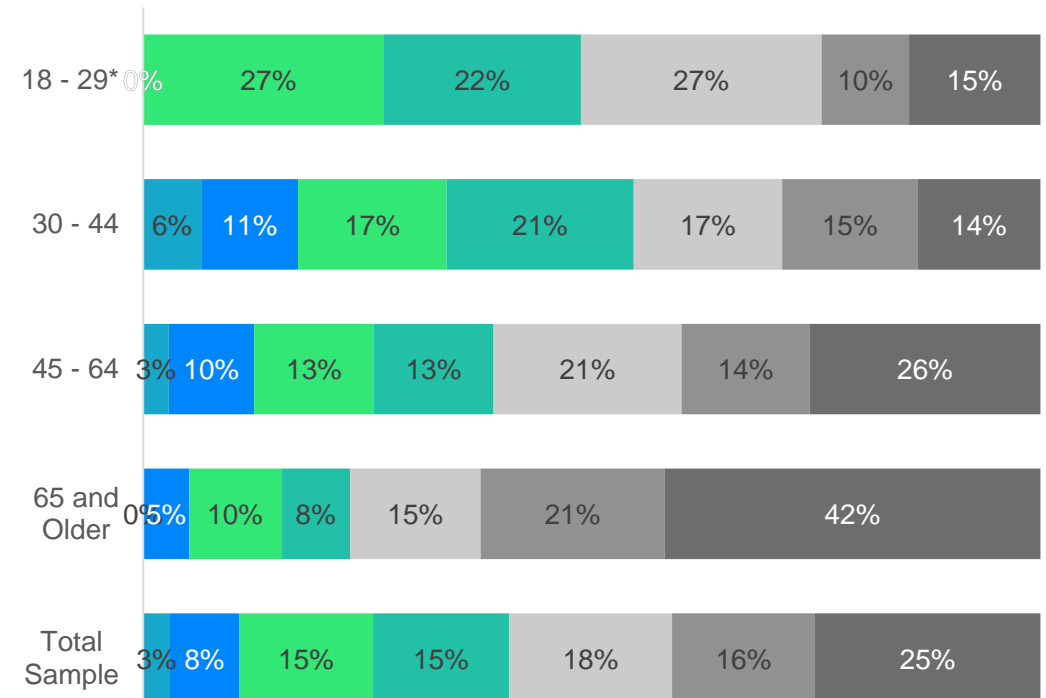
By How Learned

■ None ■ One ■ Two ■ Three ■ Four ■ Five ■ Six or More



By Age Group

■ None ■ One ■ Two ■ Three ■ Four ■ Five ■ Six or More



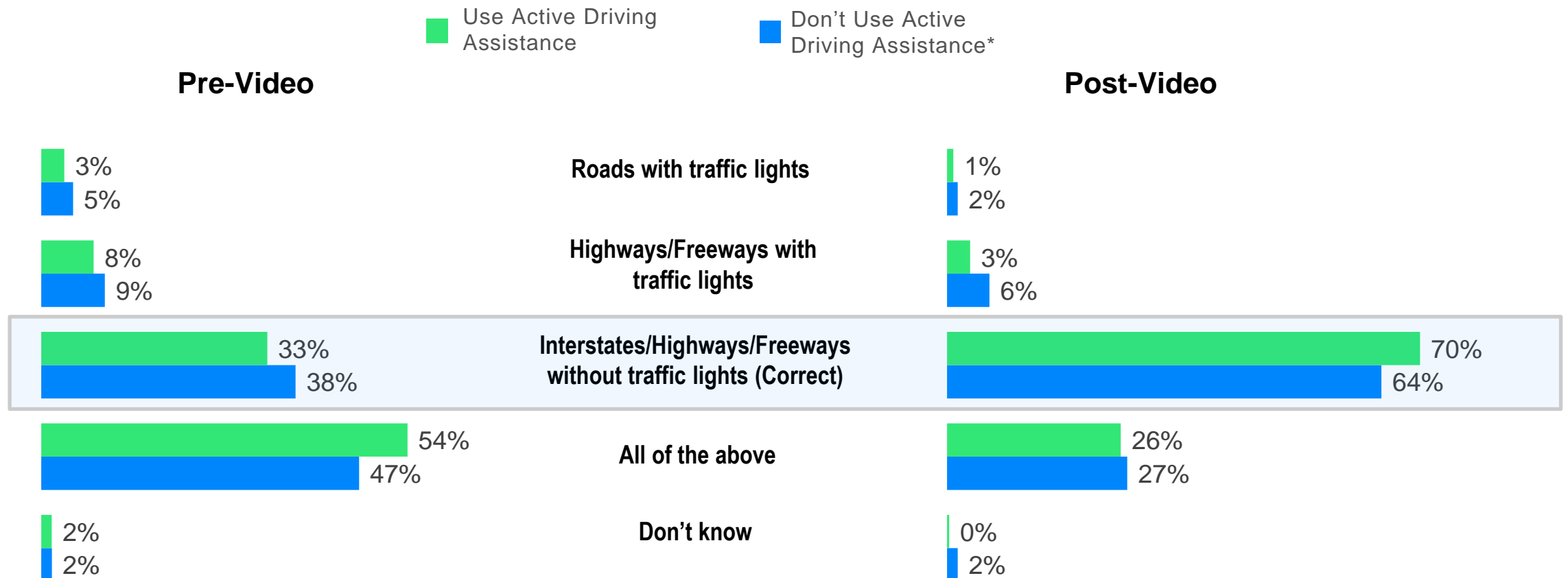
The number of questions correct after watching the training video.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.

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*Small Sample

While the majority of owners understand the types of roads where the feature can be used, those using the feature showed higher levels of learning improvements

Type of Roads Where Feature Works Properly By Frequency of Use

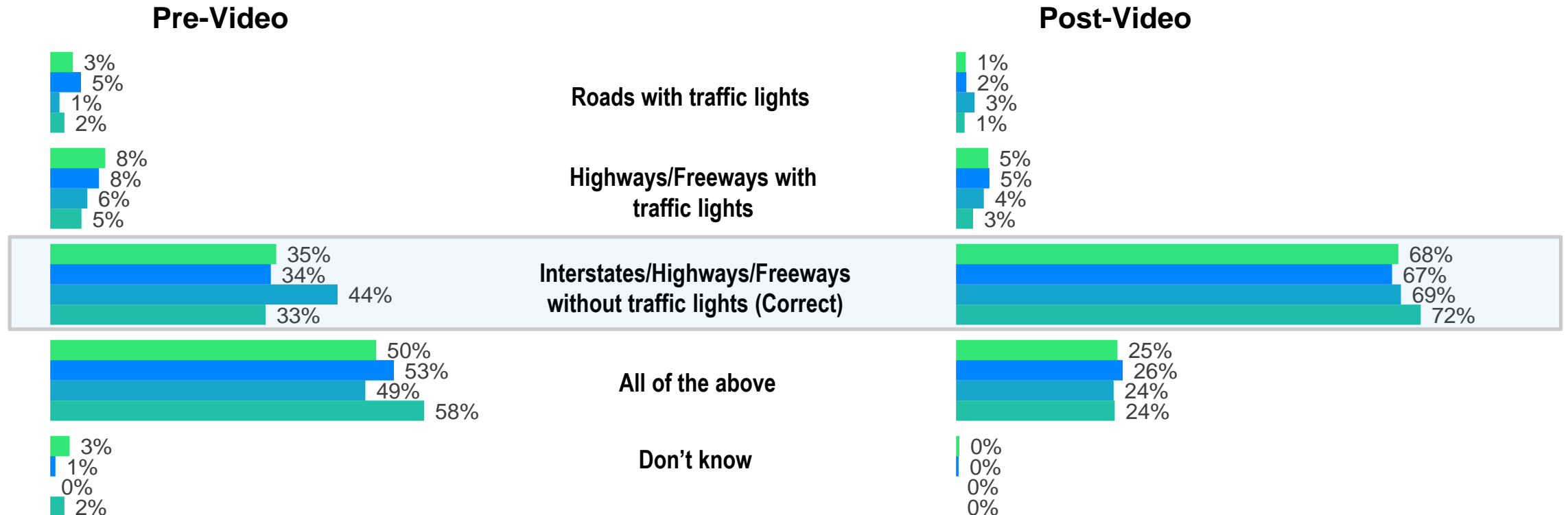


C1 and PVC1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

Prior to the video training, owners with prior experience had a better understanding that the feature cannot be used on roads with traffic lights; however, the levels of understanding are similar for all owners post-training

Type of Roads Where Feature Works Properly By How Learned

■ Dealer Learning
 ■ Outside Learning
 ■ Prior Experience*
 ■ Learned on my Own

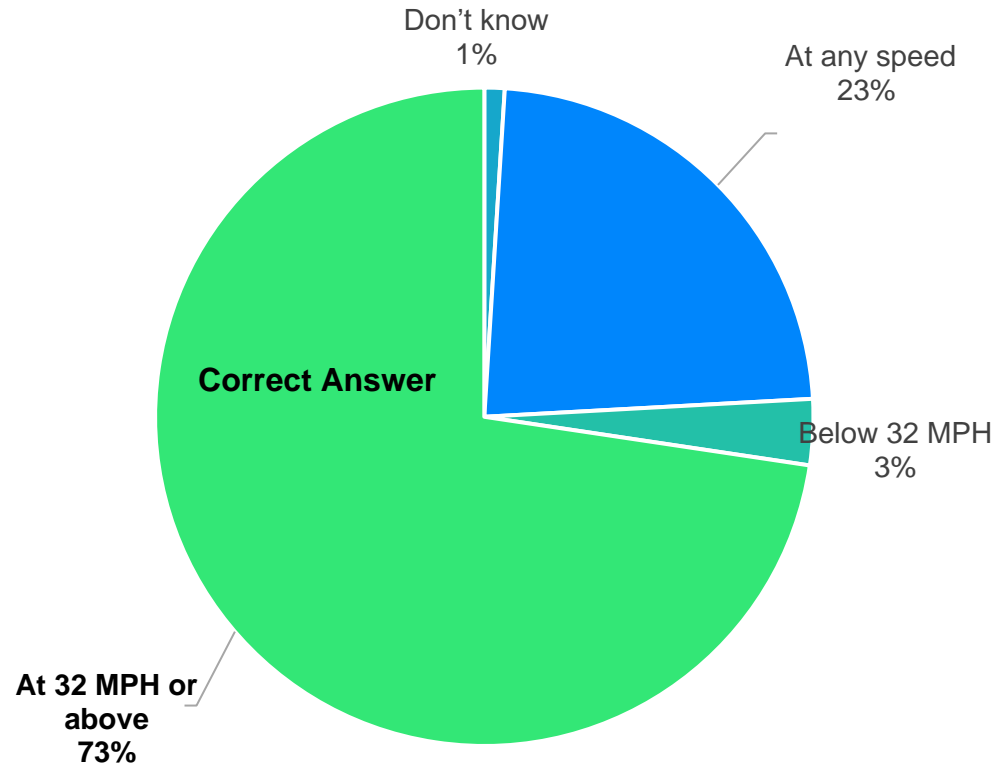


C1 and PVC1: Which of the following best describes which type of roads you can use the Active Driving Assistance feature?
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

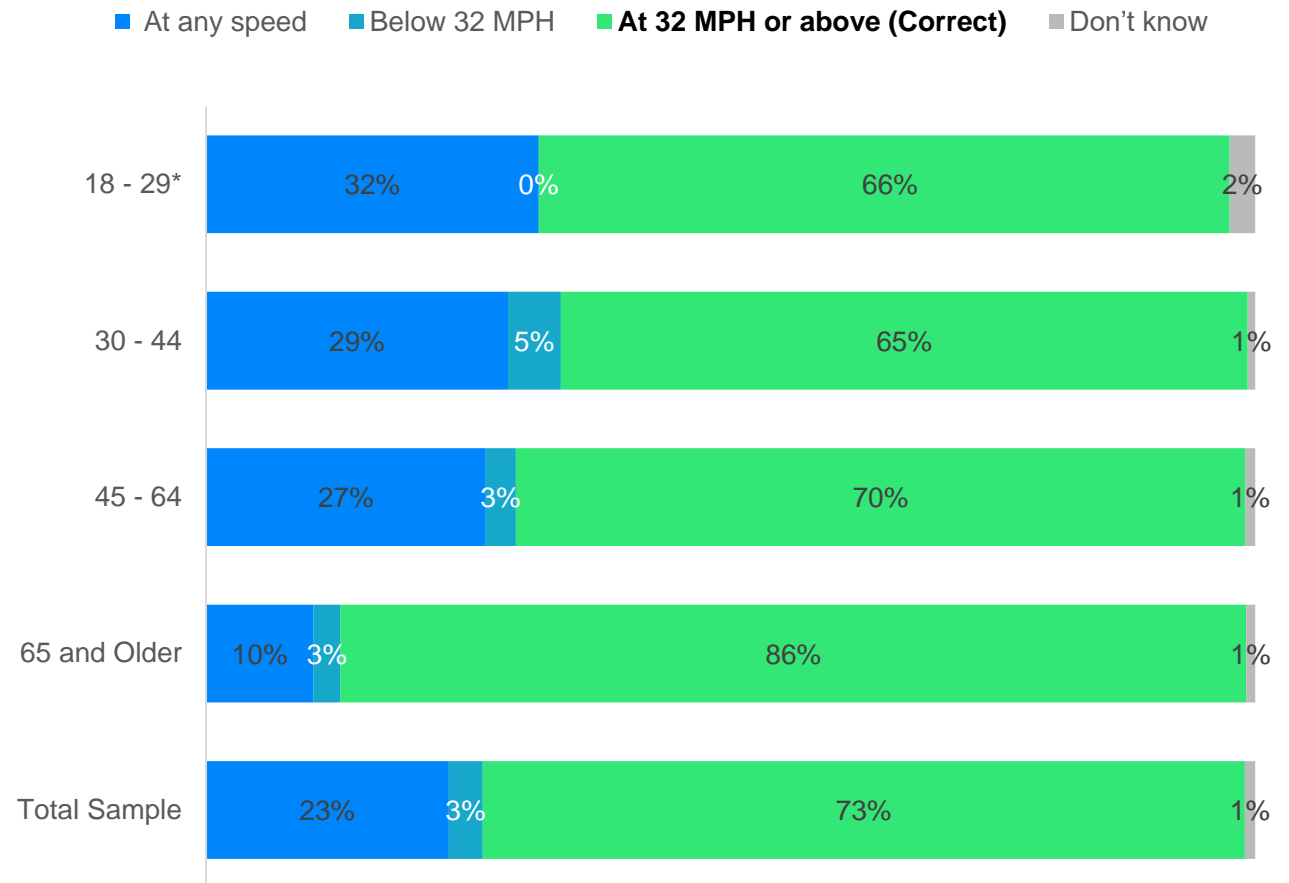
Training increased the number of respondents knowing that the vehicle must be traveling at a minimum of 32 MPH for Active Driving Assistance to activate and older owners show the most improvement

Minimum Speed Require to Activate – Post-Video

Total Sample



By Age Group

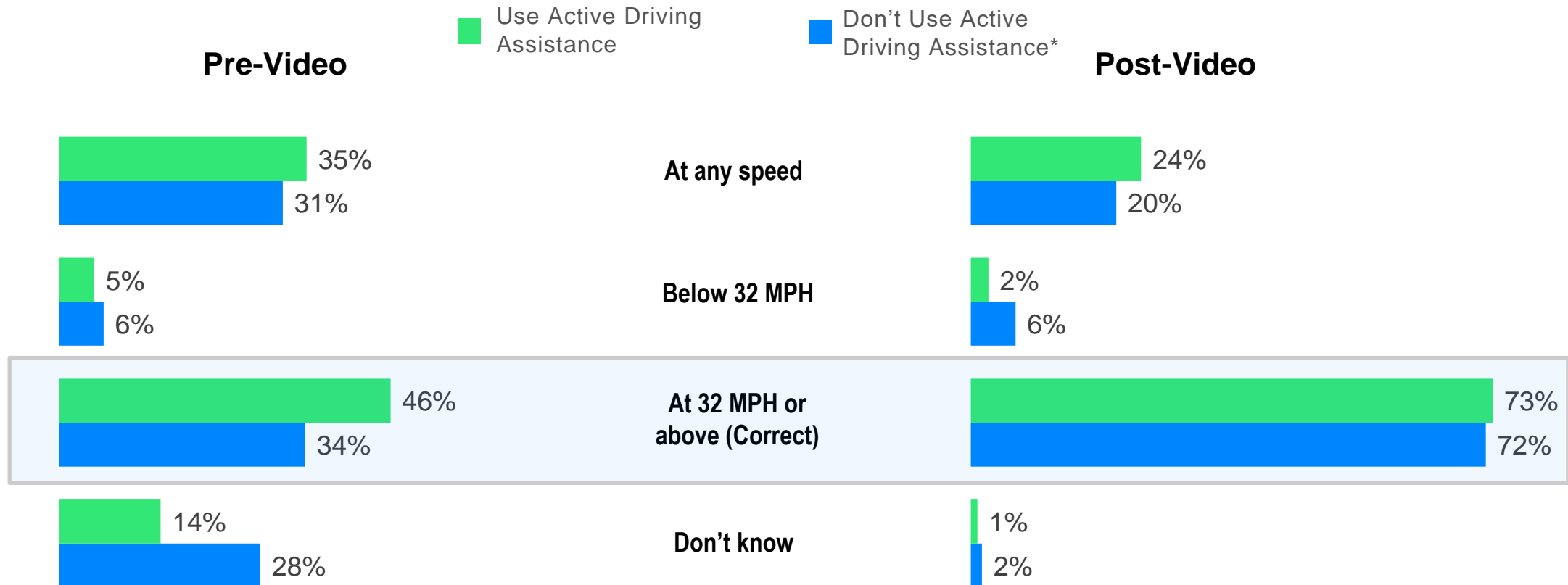


PVC2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
 Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 139, 45 - 64: N = 105, and 65 and Older: N = 117.
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*Small Sample

Post-video results indicate greater understanding of the feature's speed limitations for all participants with non-users closing the gap

Minimum Speed Required to Activate By Frequency of Use



C2 and PVC2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
Sample Size: Total: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

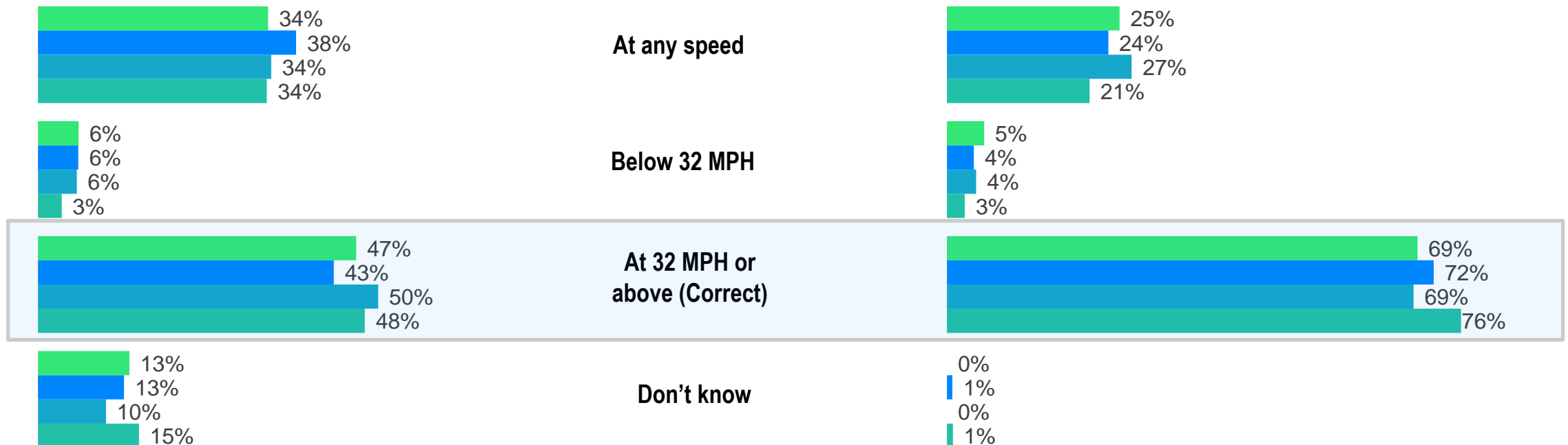
The video training improved knowledge of speed required to activate the feature regardless of how owners were initially trained and those who learned on their own benefitted the most

Minimum Speed Required to Activate By How Learned

■ Dealer Learning ■ Outside Learning ■ Prior Experience* ■ Learned on my Own

Pre-Video

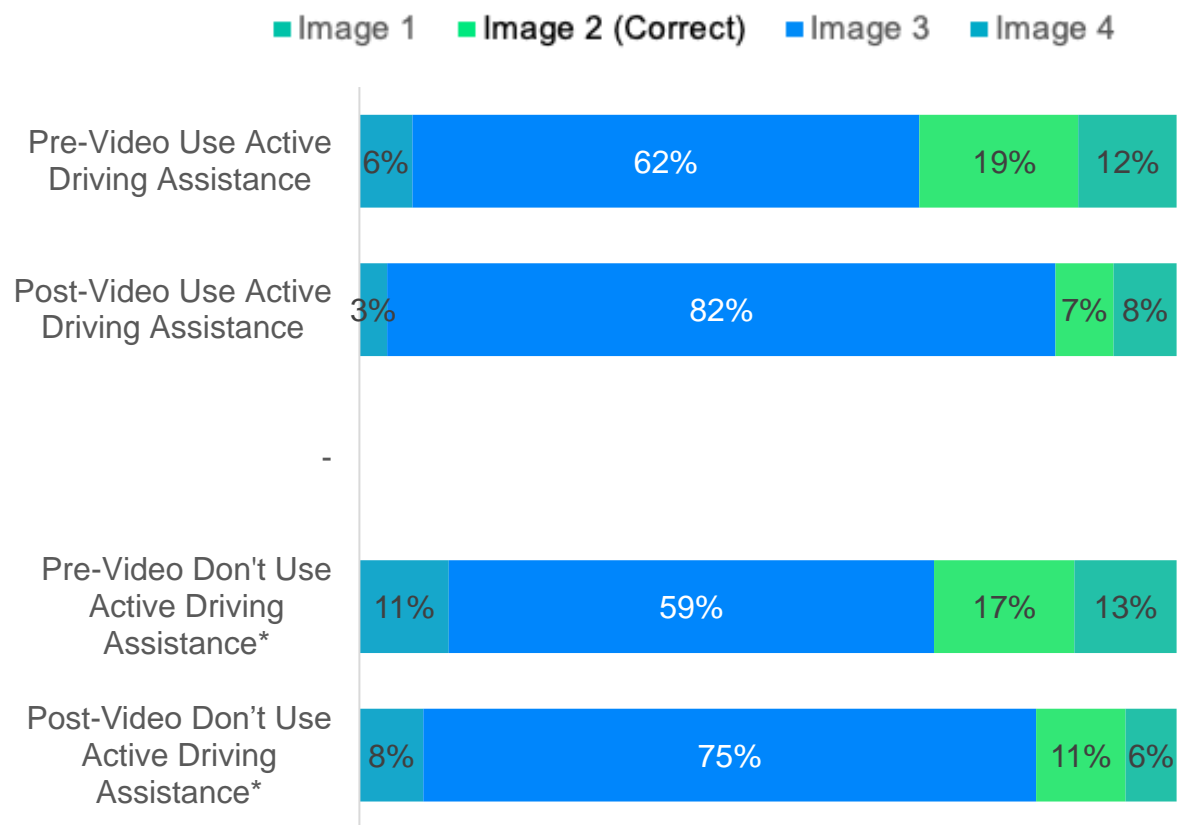
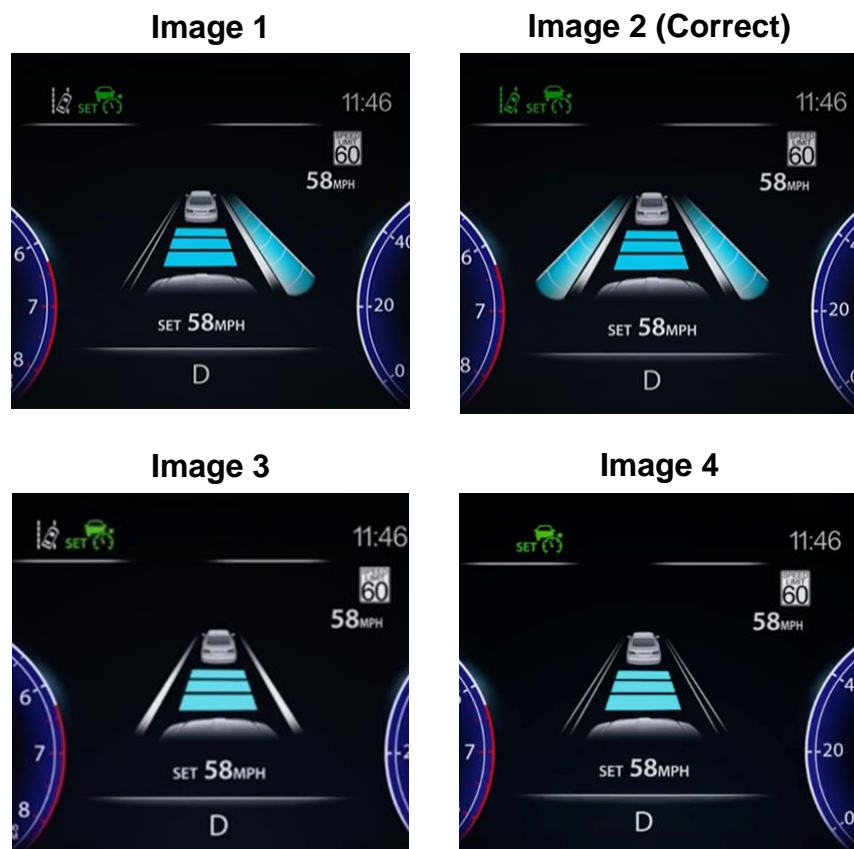
Post-Video



C2 and PVC2: Please select the option that best describes the speed when your vehicle's Active Driving Assistance feature will operate.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Regardless of feature usage, users show higher levels of learning post-video

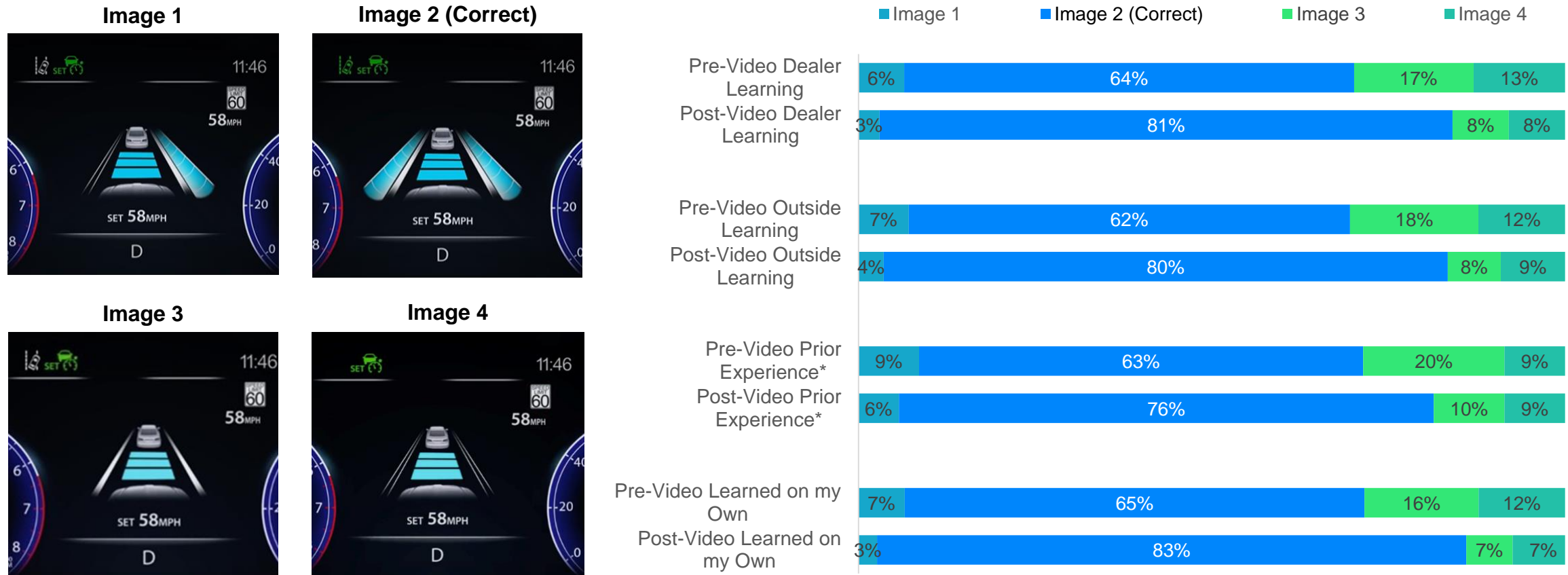
Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1 By Frequency of Use



IS1 and PVIS: Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?
Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

How users initially learned about the feature does not appear to be a factor in their understanding of the instrument cluster images

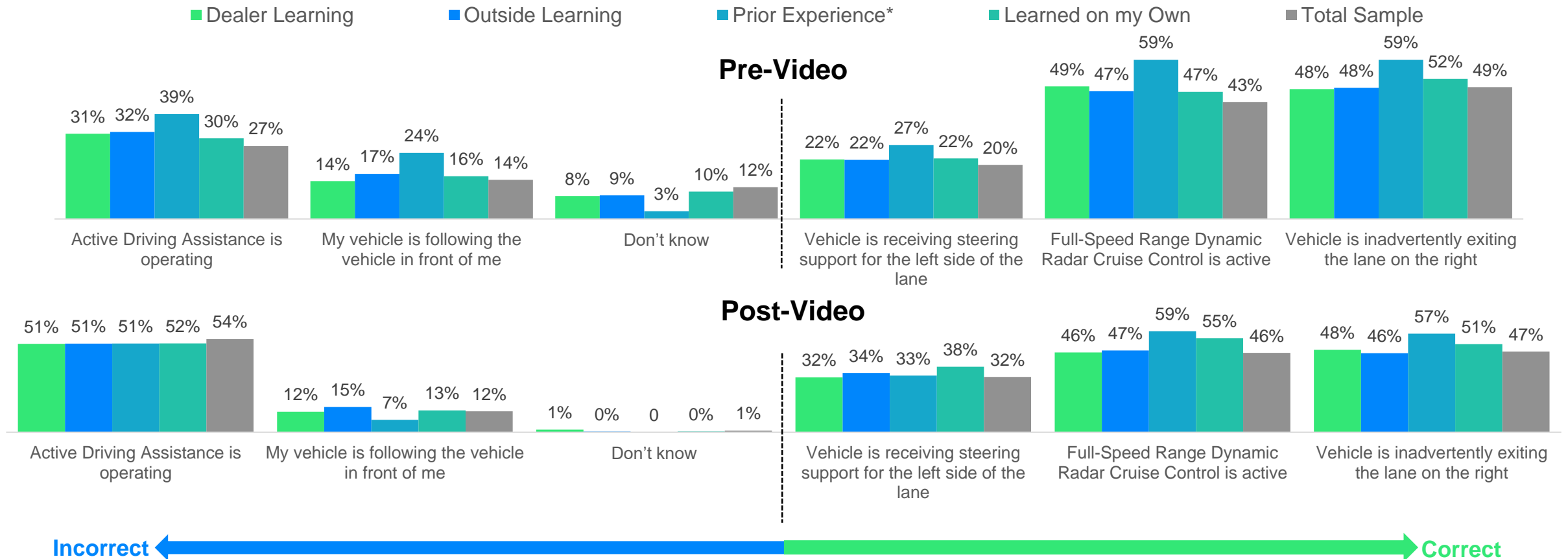
Instrument Cluster Image Indicating Active Driving Assistance is Activated – View 1 By How Learned



IS1 and PVIS1: Which image from the four below indicates that the Active Driving Assistance feature is engaged and operating?
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Correct interpretation of the cluster images remained challenging for all owners regardless of how they initially learned about the feature

Instrument Cluster Active Driving Assistance Status Image Indication: View 2 By How Learned

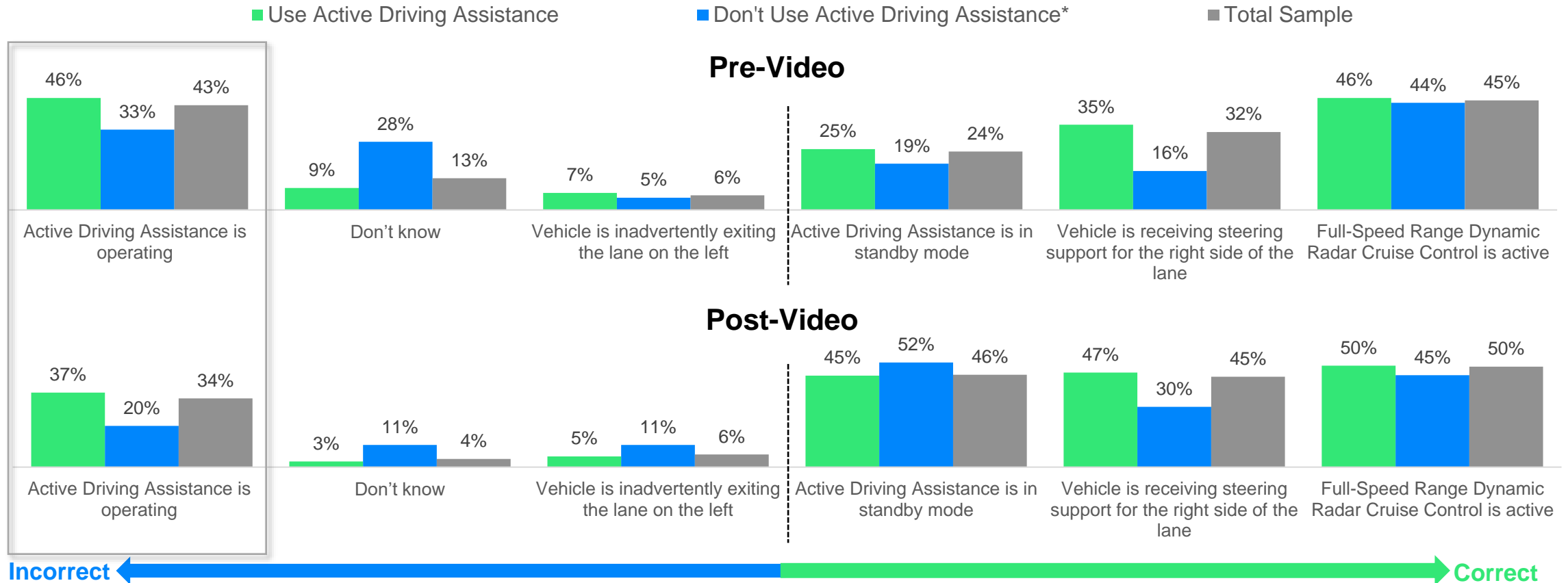


IS2 and PVIS2: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
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*Small Sample

While non-users improved their learning at higher levels than feature users, it is concerning that users still misinterpret the cluster image to mean the feature is operating when it is not

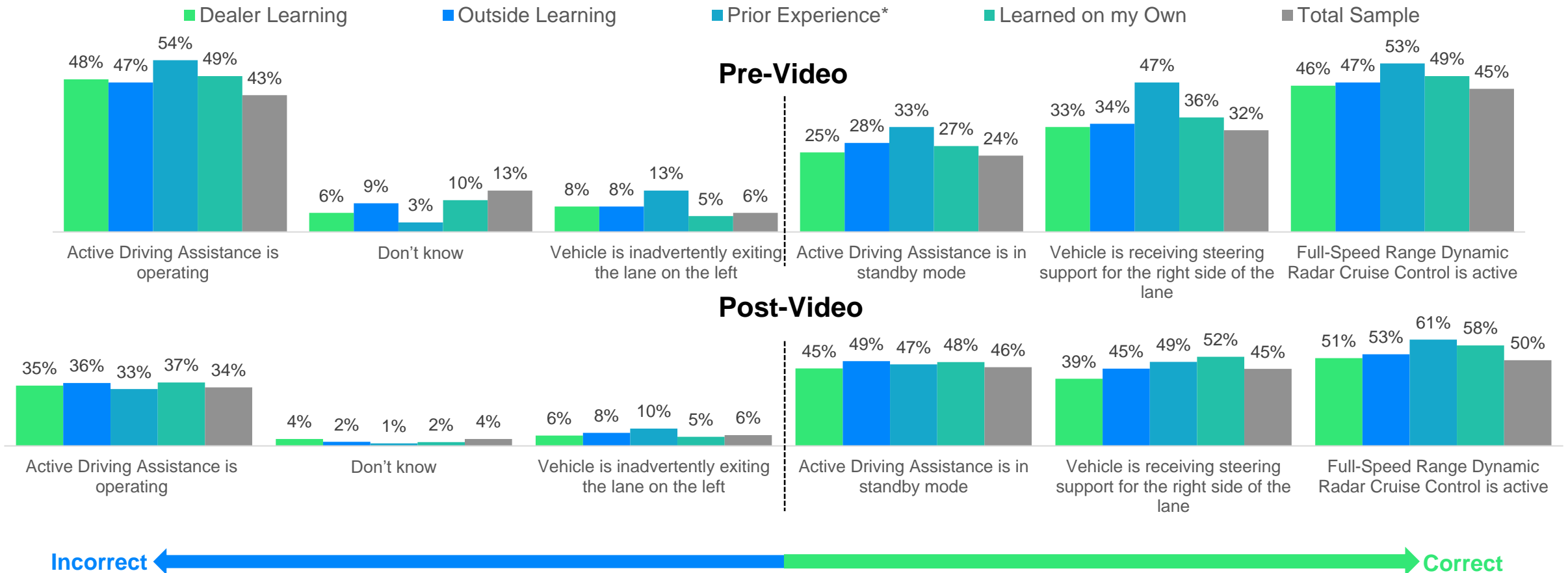
Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By Frequency of Use



IS3 and PVIS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.

How the user initially learned about the feature does not impact the respondent's ability to correctly interpret the cluster image

Instrument Cluster Active Driving Assistance Status Image Indication: View 3 By How Learned

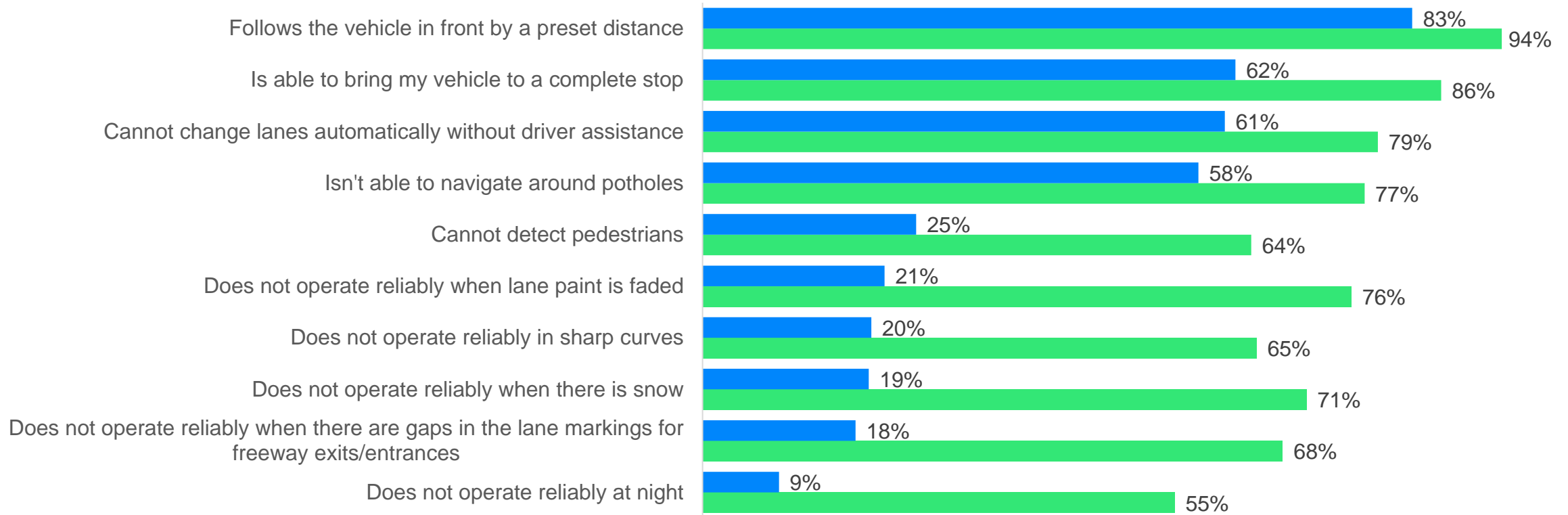


IS3 and PVIS3: What is the status of the Active Driving Assistance feature based on the image shown below? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

While there was improvement after the training, users' lack of understanding for some feature limitations remains concerning

Active Driving Assistance Technology Limitations – Use Active Driving Assistance Percent Correct

■ Pre-Video ■ Post-Video

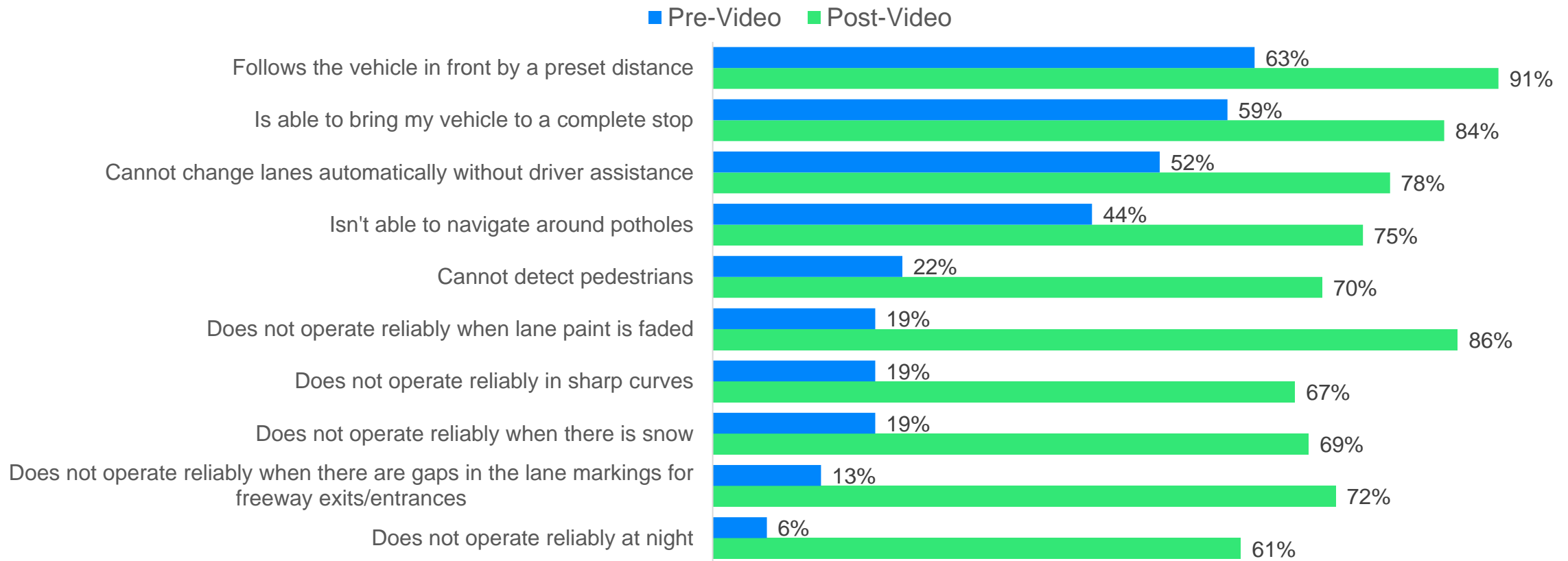


FC1 and PVFC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.
Sample Size: Use Feature: N = 324.

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Those that have not used the Active Driving Assistance feature yet, learned the most about the fact that it will not work reliably when the lane paint is faded

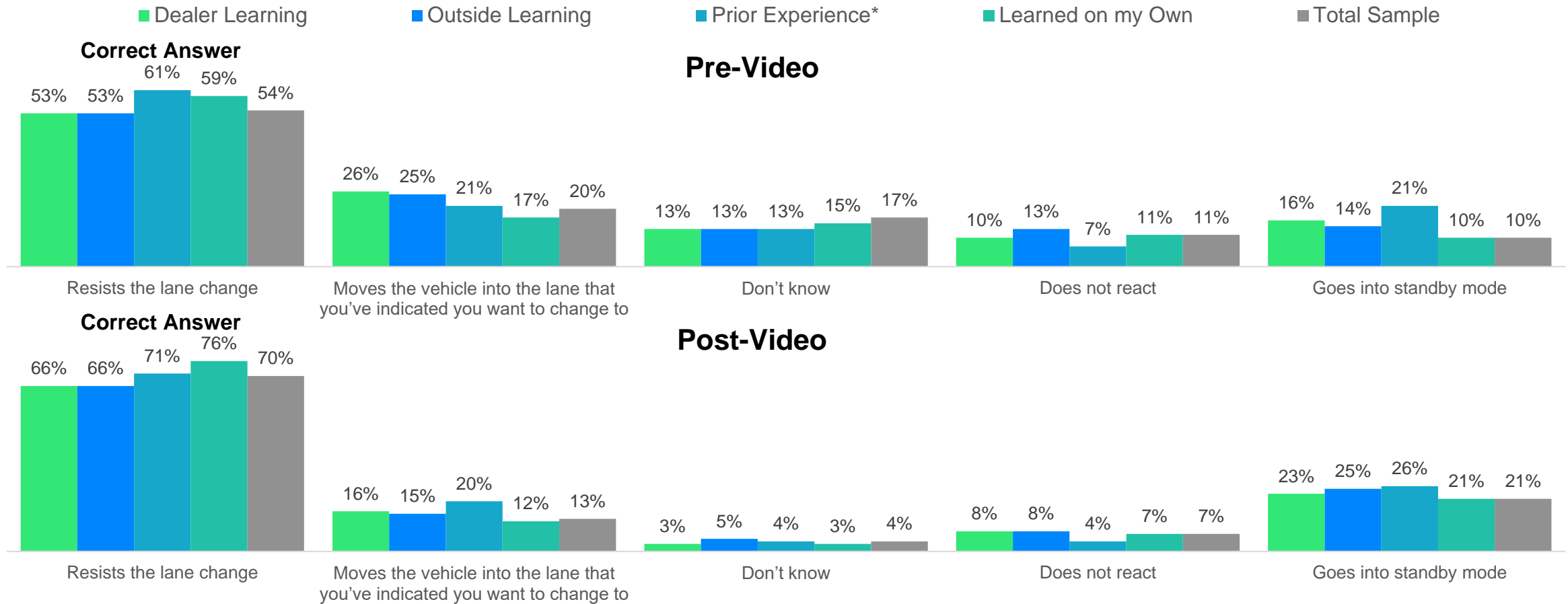
Active Driving Assistance Technology Limitations – Don't Use* Active Driving Assistance Percent Correct



FC1 and PVFC1: Are the following statements true or false regarding the capability of the Active Driving Assistance on your Toyota vehicle.
Sample Size: Don't Use Feature: N = 64.

Those who learned on their own benefited the most from the video about the feature's reaction to an attempted lane change without a turn signal; however, there is a deterioration regarding it going into standby mode

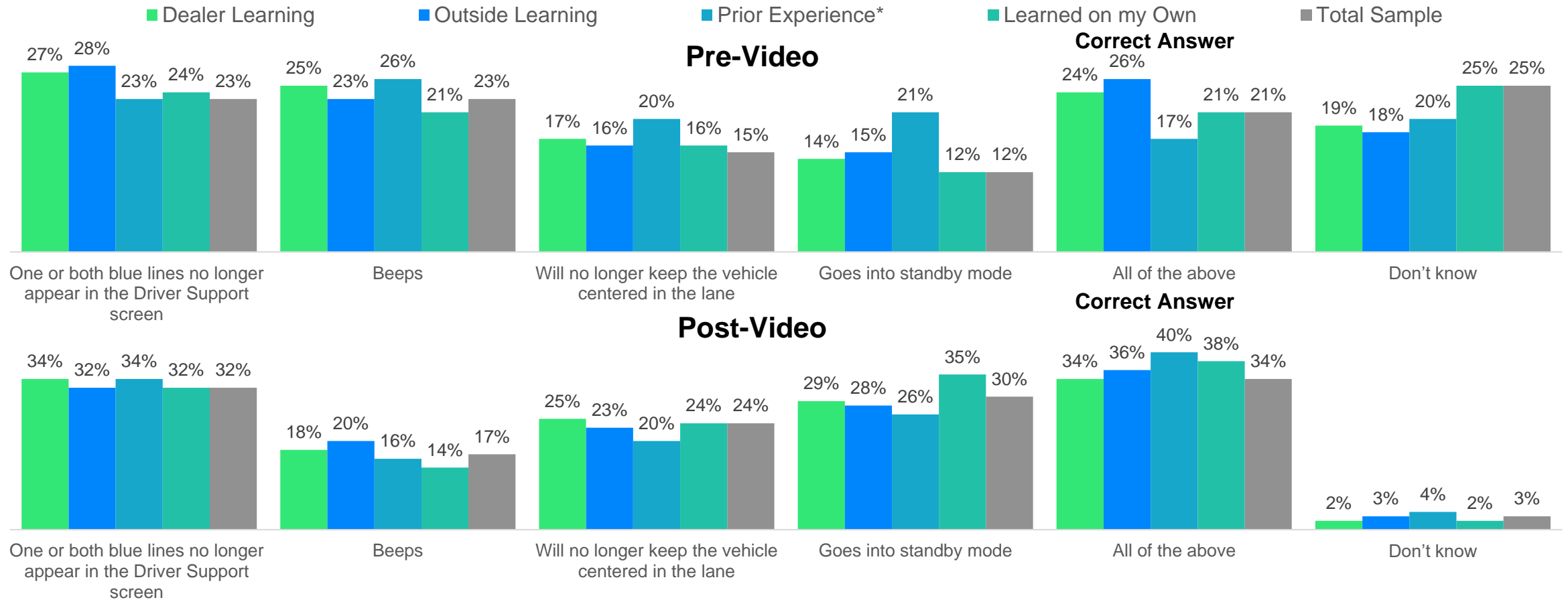
Feature Reaction: When Attempting to Change Lanes Without Turn Signal By How Learned



FR1 and PVFR1: If you attempt to change lanes without using your turn signal while the Active Driving Assistance feature is on, how does the feature react? Mark all that apply.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

Owners who have prior experience or learned on their own benefited the most from the training on the feature's reaction

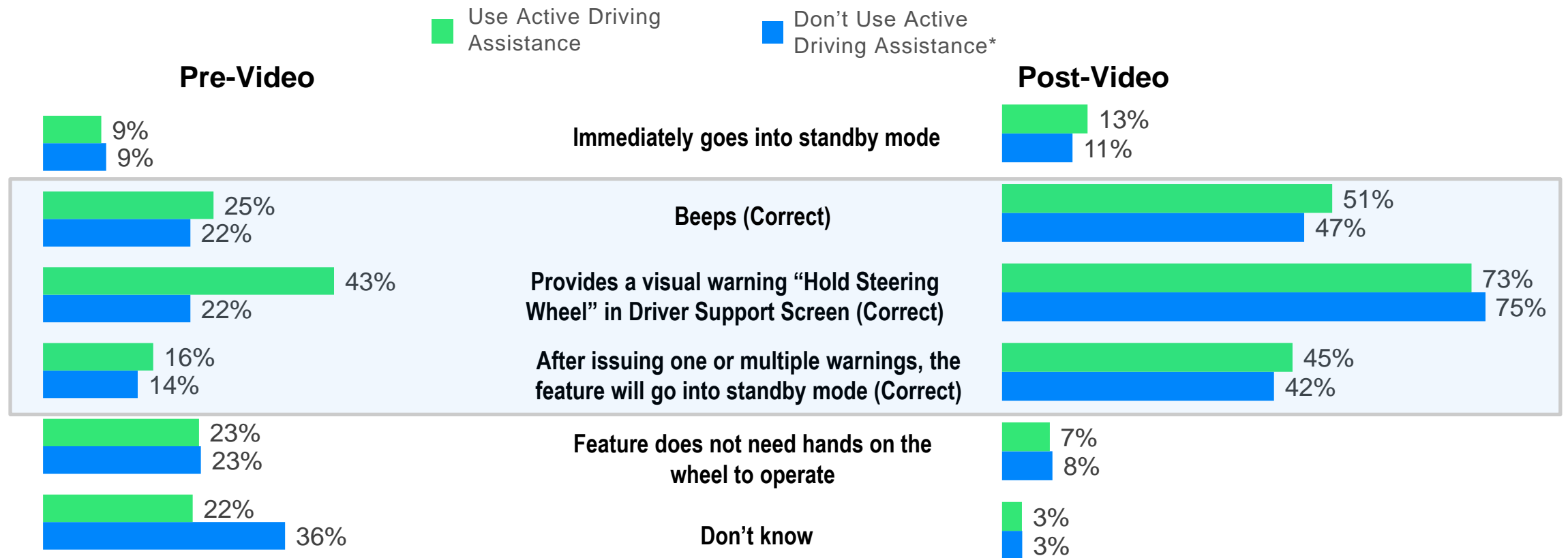
Feature Reaction: When Road Type Changes and/or the Lane Markings are no Longer Visible By How Learned



FR2 and PVFR2: You are driving in a clearly marked lane with Active Driving Assistance on. If the road type changes and/or the lane markings are no longer visible, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.
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The training regarding the reaction if the driver takes their hands off the wheel while using the feature leveled out the differences in knowledge between those that use the feature and those that don't

Feature Reaction: If You Take Your Hands Off the Steering Wheel By Frequency of Use



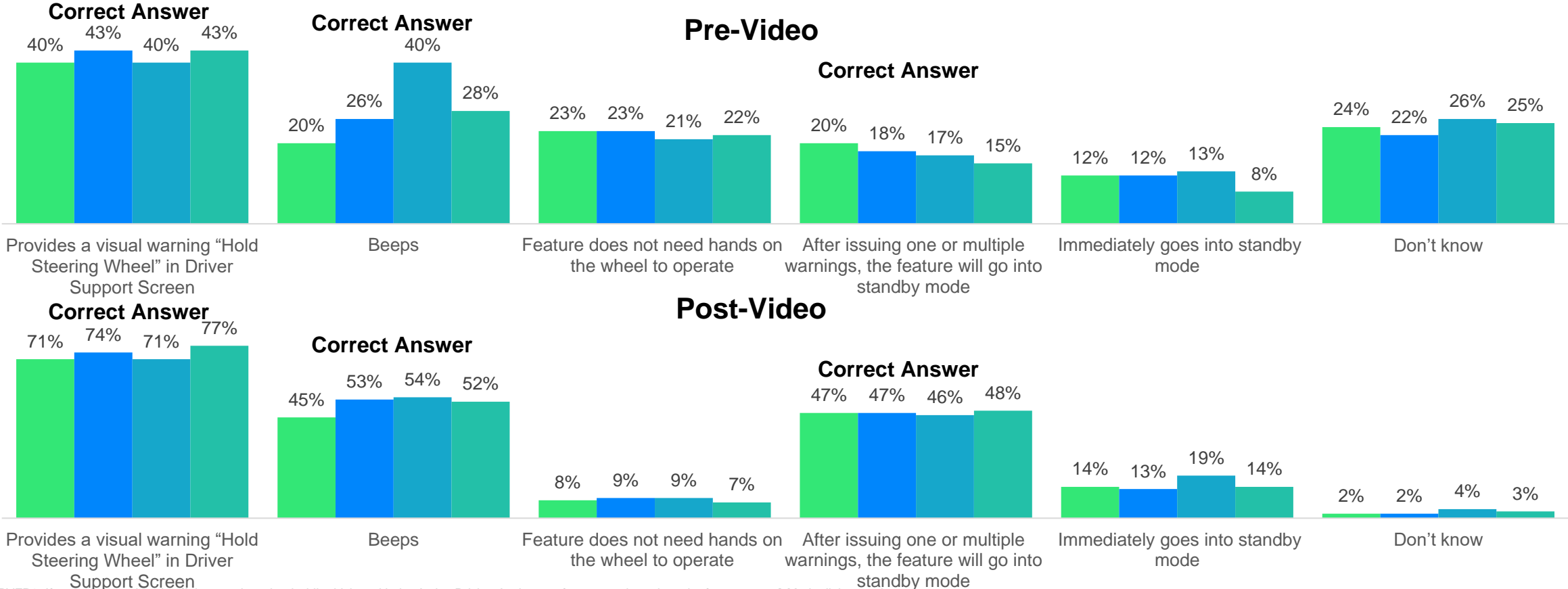
FR3 and PVFR3: If you take your hands off the steering wheel while driving with the Active Driving Assistance feature on, how does the feature react? Mark all that apply.
 Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14.
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*Small Sample

Regardless of how participants initially learned about the feature, all benefited from the video in terms of understanding the feature reaction if they take their hands off the wheel

Feature Reaction: If You Take Your Hands Off the Steering Wheel By How Learned

Dealer Learning Outside Learning Prior Experience* Learned on my Own



FR3 and PVFR3: If you take your hands off the steering wheel while driving with the Active Driving Assistance feature on, how does the feature react? Mark all that apply.

Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

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*Small Sample

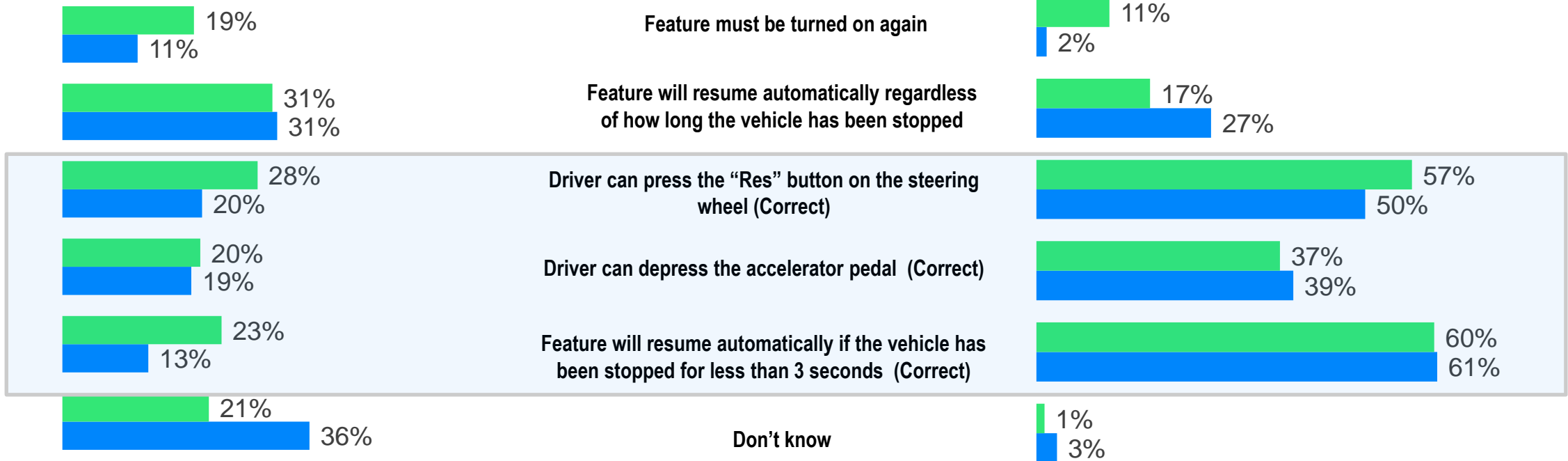
The knowledge about the vehicle's reaction after being brought to a complete stop increases after the video

Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop By Frequency of Use

■ Use Active Driving Assistance
 ■ Don't Use Active Driving Assistance*

Pre-Video

Post-Video

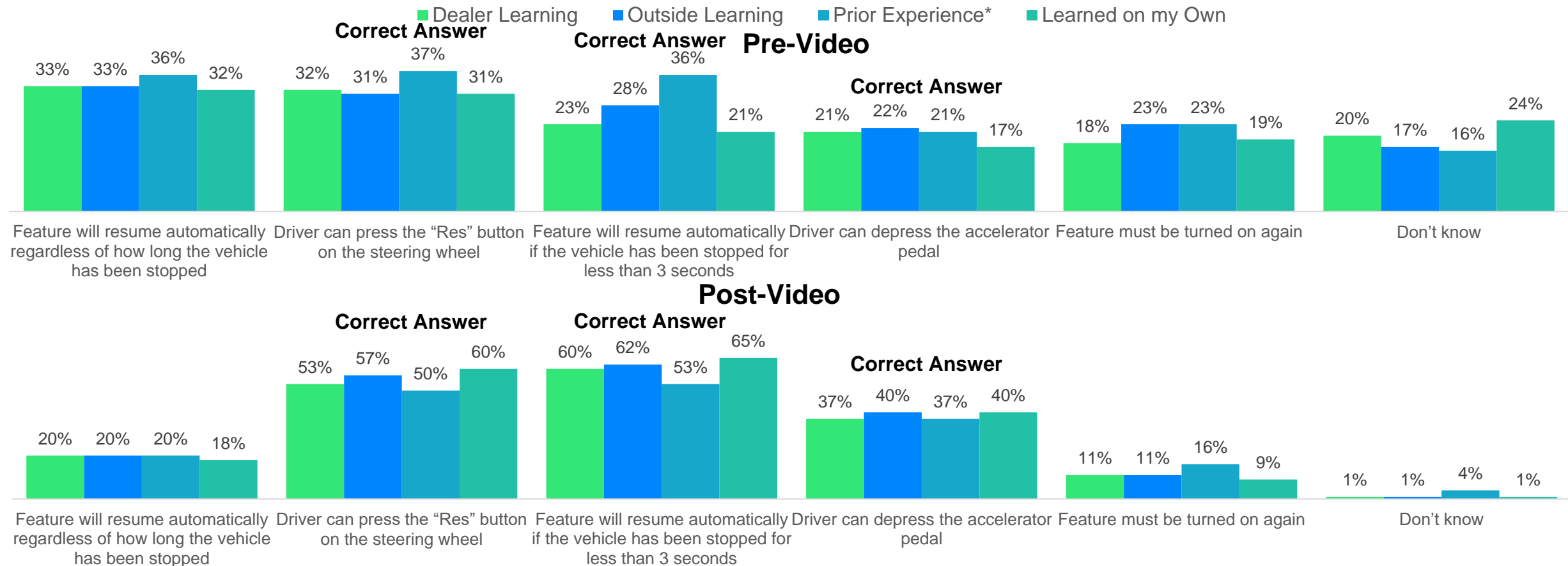


FR4 and PVFR4: If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply. Sample Size: Total Sample: N = 402, Don't Use Feature: N = 64, Use Feature: N = 324, and Didn't Know Had Feature: N = 14. © 2023 J.D. Power. All Rights Reserved. CONFIDENTIAL & PROPRIETARY

*Small Sample

Those owners that initially learned on their own benefited the most from the video training regarding the feature reaction of how the vehicle resumes after being brought to a complete stop

Feature Reaction: How Vehicle Resumes After Being Brought to a Complete Stop By How Learned



FR4 and PVFR4. If your vehicle is brought to a complete stop, how does the Active Driving Assistance feature resume when the vehicle ahead begins moving? Mark all that apply.
Sample Size: Total Sample: N = 402, Dealer Learning: N = 201, Outside Learning: N = 253, Prior Experience: N = 70, Learned on my Own: N = 229.

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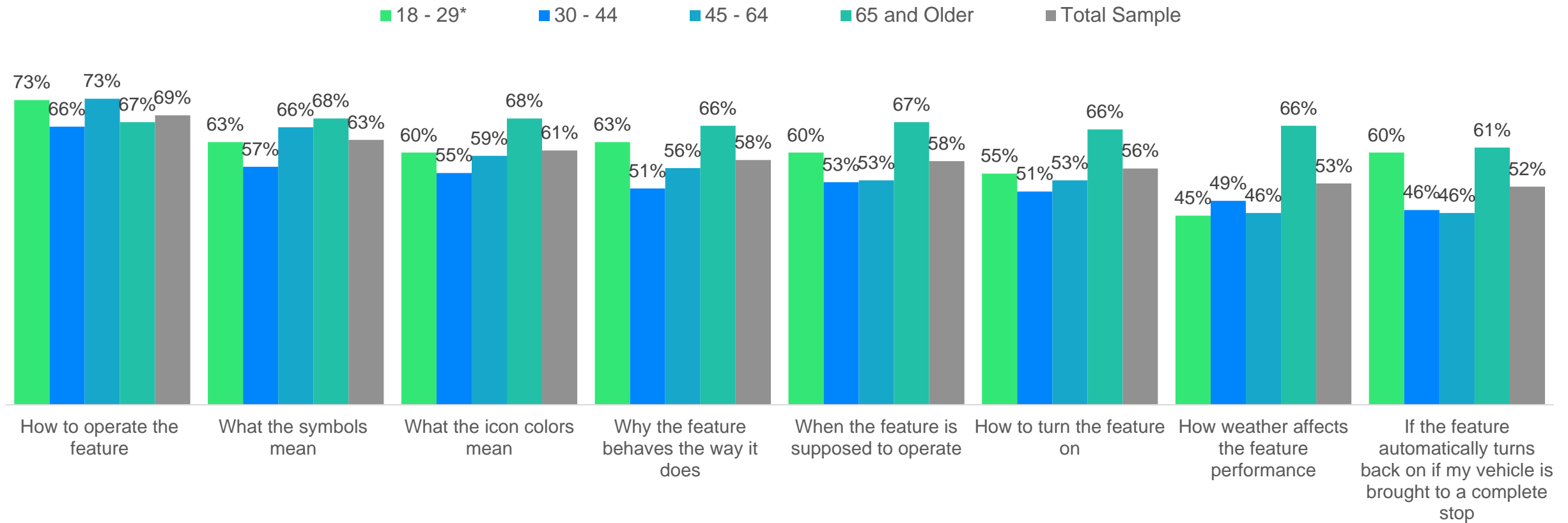
*Small Sample

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APPENDIX
***Implications of Proper
Training***

Older owners (Ages 65 and Older) benefited the most from the training

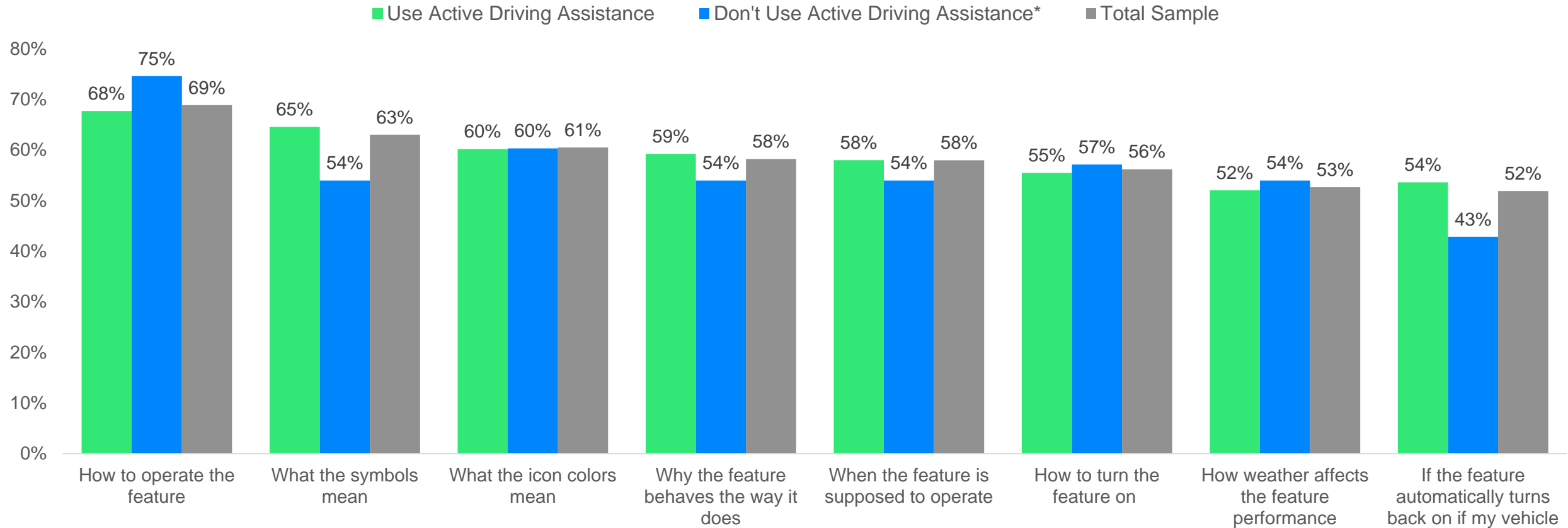
Specific Learning from the Video Training By Age Group



VA2: What specifically did the training video teach you? Mark all that apply.
 Sample Size: Total Sample: N = 395, 18 - 29: N = 40, 30 - 44: N = 139, 45 - 64: N = 103, and 65 and Older: N = 117.

The training taught those who don't currently use the feature how to operate it, but they still need to learn more about what the symbols mean and what to do after coming to a complete stop

Specific Learning from the Video Training By Frequency of Use



VA2: What specifically did the training video teach you? Mark all that apply.

Sample Size: Total Sample: N = 402, Don't use feature: N = 64, Use feature: N = 324, and Didn't know had feature: N = 14.

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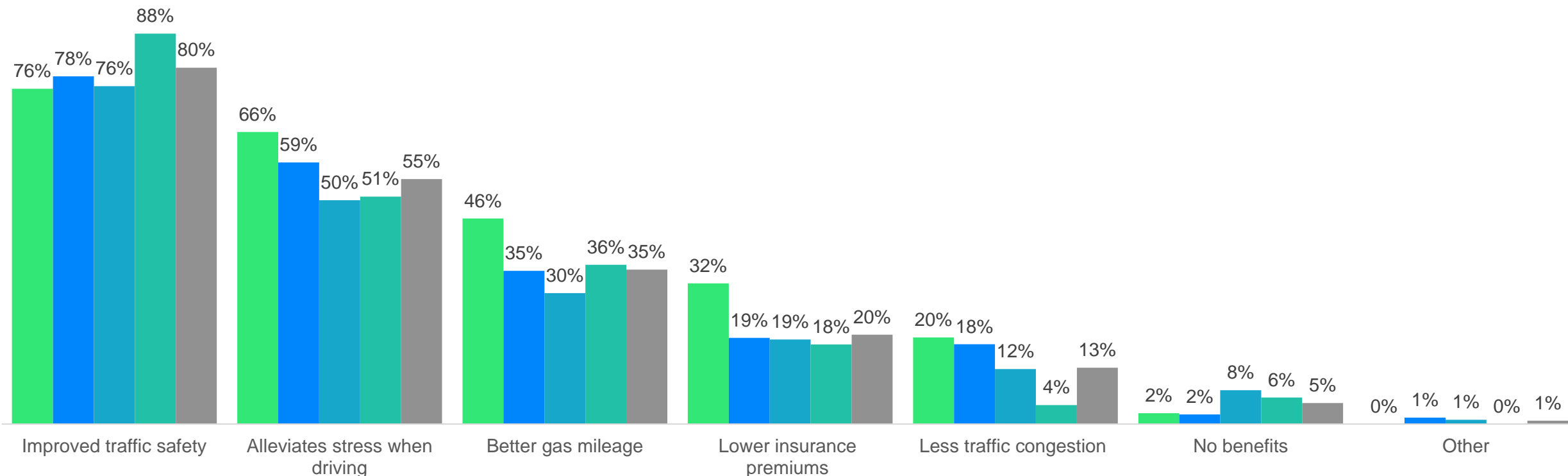
*Small Sample

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Older owners (Ages 65 and Older) perceive the benefit of improved traffic safety from the Active Driving Assistance feature more than younger people

Advantages of the Active Driving Assistance Feature By Age Group

■ 18 - 29* ■ 30 - 44 ■ 45 - 64 ■ 65 and Older ■ Total Sample



VA6: What do you see as the possible advantages of the Active Driving Assistance feature, regardless of whether you currently use or plan to use the Active driving assistance feature? Mark all that apply.
Sample Size: Total Sample: N = 402, 18 - 29: N = 41, 30 - 44: N = 136, 45 - 64: N = 105, and 65 and Older: N = 117.

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*Small Sample

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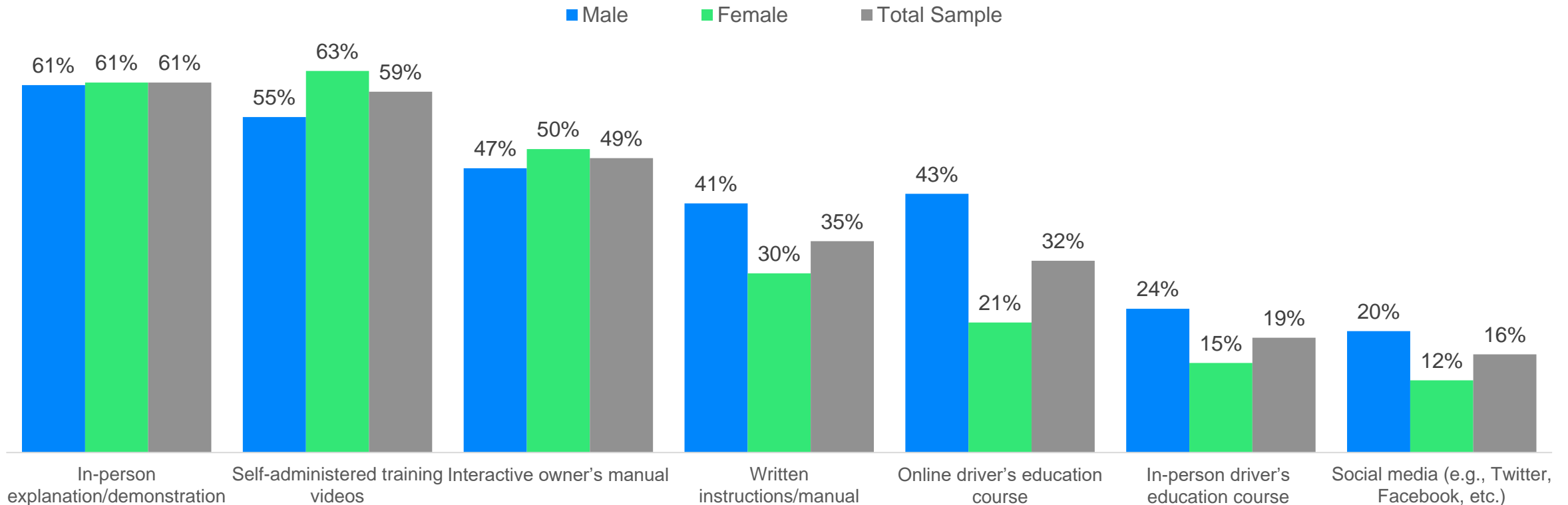
151

APPENDIX

Future Learning Preferences

In-person and self-administered training videos are the preferred method of learning; males are more open to an online driver's education course

Preferred Method of Learning New Technologies



AT2: How would you prefer to learn more about these technologies in order to operate your vehicle safely and responsibly? Mark all that apply.

Sample Size: Total Sample: N = 402, Male: N = 190, Female: N = 210, and Self-described: N = 2.

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