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NHTSA Light Vehicle Antilock Brake System Research Program Task 2:

National Telephone Survey of Driver Experiences and Expectations Regarding Conventional Brakes versus ABS

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EXECUTIVE SUMMARY

Numerous crash data statistical analyses conducted over the past few years suggest that, for automobiles, the introduction of four-wheel antilock brake systems (ABS) has produced net safety benefits much lower than originally expected. The studies indicate the apparent increase in single-vehicle crashes involving passenger cars equipped with four-wheel ABS almost completely offsets the safety advantage such vehicles have over their conventionally-braked counterparts. For example, Kahane [1] found that, with the introduction of ABS, involvements in fatal multi-vehicle crashes on wet roads were significantly reduced by 24 percent, and nonfatal crashes by 14 percent. Fatal collisions with pedestrians and bicyclists were down a significant 27 percent with ABS. However, these reductions were offset by a statistically significant increase in the frequency of fatal single-vehicle, run-off-road crashes, as compared to cars without ABS. Fatal run-off-road crashes were up by 28 percent and nonfatal crashes by 19 percent.

One possible reason for this minimal safety benefit may be inadequate or incorrect driver knowledge about ABS. For example, they might misinterpret ABS brake pedal feedback or drive faster and take greater risks because they expect ABS to help them stop faster. This report documents the work performed by the National Highway Traffic Safety Administration (NHTSA) to examine this possibility.

In 1998, NHTSA developed a questionnaire concerning driver experiences and expectations regarding ABS versus non-ABS vehicles. Schulman, Ronca & Bucuvalas, Inc. (SRBI) assisted with the refining of the questionnaire document by transforming a list of questions into a structured survey. Dynamic Science, Inc. (DSI), with subcontractor PricewaterhouseCoopers LLP (PwC), assisted in the preparation of the survey for implementation through pre-testing and further refinement. Using the final survey instrument, a representative national survey was conducted of car drivers in the United States. The survey was administered in early 1999 in both English and Spanish via telephone to approximately 3,500 households.

Based on this evaluation, NHTSA now has information regarding how drivers respond to ABS and how drivers' experiences and expectations of brake performance differ based on whether or not their own automobiles were equipped with ABS. These findings further examined where drivers may have incorrectly used ABS and where their expectations of ABS were not realistic.

This survey found that although most drivers had heard of ABS, many did not know what it did or how it affected vehicle performance, when it functioned, or even if their vehicle was equipped with ABS. While only approximately 39 percent of respondents knew what the acronym "ABS" stands for, 87 percent of respondents reported having heard of antilock brake systems when they were specifically asked about the system. Only 31 percent of respondents correctly reported that ABS only activates when the ABS senses the vehicle is beginning to skid (i.e., wheels are locked). Similarly, approximately one-third of respondents felt that brake pedal vibration was normal with ABS activation and did not indicate a problem with the brake system. Results did not show that respondents understood that ABS would allow a vehicle to be stopped in a shorter distance than could be attained with standard brakes on smooth, non-deformable surfaces, but not necessarily on deformable or rough surfaces. Their belief was that ABS creates shorter stopping distances and reduces the chance of skidding on dry and wet pavements, but not on snow or ice covered ones.

Some potential for inappropriate changes in driver behavior (e.g., following other cars more closely) was identified that may serve to counteract the potential crash avoidance benefits of ABS. However, given the limited awareness of ABS and its abilities identified through this survey, it is difficult to say that drivers are adapting to something they know little or nothing about. In addition, the fact that related NHTSA on-road research studies have not found evidence of differences in driving behavior as a function of brake system (i.e., ABS versus standard brakes)(as noted in Section 1.2 of this report) may indicate that the reported increased likelihood of risky behavior is not transferring to detectable differences in actual driving behavior or could be a mere artifact of some aspect of the survey.

Overall, most responses indicated that drivers saw ABS as a beneficial feature that increases safety. Increasing driver awareness of the operational characteristics and capabilities of ABS may improve drivers' understanding of ABS function and how to correctly apply the brakes in an ABS-equipped vehicle and what to expect. Providing ABS information at the time of purchase was the means by which the majority of drivers found out about the brakes on their vehicle. However, approval ratings for lengthy or mandatory information sessions were not well received, though some methods held promise. Enhancing the ABS-related information provided in vehicle owner's manuals or other video or printed information provided at the time of purchase may be the method of information delivery most acceptable to average drivers. Providing specific information regarding ABS functionality should provide some benefit through increased driver knowledge and understanding of this important safety feature.

1.0 INTRODUCTION

1.1 Effects of ABS on Crash Rates

Antilock brake systems (ABS) have been introduced on many passenger car and light truck make/models in recent years. In general, ABS appear to be very promising safety devices when evaluated on a test track. Under many pavement conditions antilock brake systems allow the driver to stop a vehicle more rapidly while maintaining steering control even during situations of extreme, panic braking. Brake experts anticipated that the introduction of ABS on passenger vehicles would reduce both the number and severity of crashes. However, a number of crash data analyses have been performed in recent years by NHTSA, automotive manufacturers, and others that indicate that the introduction of ABS has not reduced the number of crashes where they were expected to be effective. Results of these analyses suggest that, for automobiles, the introduction of ABS has produced net safety benefits much lower than originally expected for ABS-equipped light vehicles [1, 2, 3, 4, 5]. Safety benefits due to ABS were seen in light truck (rear wheel ABS only) crash data studies.

Kahane [1] found that, with the introduction of ABS, involvements in fatal multi-vehicle crashes on wet roads were significantly reduced by 24 percent, and nonfatal crashes by 14 percent. Fatal collisions with pedestrians and bicyclists were down a significant 27 percent with ABS. However, these reductions were offset by a statistically significant increase in the frequency of fatal single-vehicle, run-off-road crashes, as compared to cars without ABS. Fatal run-off-road crashes were up by 28 percent and nonfatal crashes by 19 percent.

A 1995 study by Hertz, Hilton, and Johnson [4] found similar results to Kahane, i.e., reductions in fatal multi-vehicle crashes and pedestrian strikes and increases in fatal single-vehicle crashes. A later, 1998 study [2, 3] by the same authors found similar results except that ABS now appears to be decreasing one particular subtype of single-vehicle road departure crashes, frontal impacts with fixed objects, rather than increasing their numbers.

The most recent NHTSA study of ABS-related crash data was published in 2000 by Hertz et al [5]. This analysis differed from the earlier work by Hertz in that it included vehicles whose owners had selected ABS as an option. The inclusion of the vehicles with optional ABS did not seem to make much difference in the estimation of the effect of all-wheel ABS in crashes of all severities. Results showed that ABS still seemed to have a beneficial effect in preventing each crash type except for side impacts, where it appeared to be associated with a higher crash rate, especially for passenger cars. It still appeared to be beneficial in preventing pedestrian crashes, rollovers, run-off-road crashes and frontal crashes with another moving vehicle. The previous Hertz study indicated several instances where ABS was not beneficial in fatal crashes. The only statistically significant one remaining in the 2000 study was rollovers of LTVs. However, this increase was still large enough to negate most of the benefits of ABS.

1.2 NHTSA's Light Vehicle ABS Research Program

In an effort to investigate possible causes of the crash rate phenomena identified, NHTSA developed its Light Vehicle ABS Research Program. This program contained nine separate tasks which address potential theories as to the cause of the lack of net crash benefits such as driver behavior in a

crash-imminent situation, driver response to ABS activation, ABS hardware performance, and environmental factors (as outlined in [6]). To date, NHTSA research has found no systematic hardware deficiencies in its examination of ABS hardware performance (as documented in [7]). It is unknown, however, to what extent the increase in run-off-road crashes may be due to drivers' incorrect usage of ABS, incorrect response to ABS activation, incorrect instinctive driver response (e.g., oversteering), changes in driver behavior (i.e., behavioral adaptation) as a result of ABS use, and/or some other factor.

Task 1 of NHTSA's Light Vehicle ABS Research Program, performed by Hertz in 2000 [5] as mentioned in the previous section, involved performing a new crash data study of the effect on safety of adding four-wheel ABS to automobiles. This study differed from those previously conducted [1, 2, 3, 4] in that it focused on newer vehicles and antilock brake systems and included some methodological improvements. This study endeavored to address whether whatever problem may have caused the apparent increase in single-vehicle crashes for ABS-equipped automobiles still existed following the introduction of newer generation ABS hardware.

Task 2 of this program involved conducting a national telephone survey to determine drivers' knowledge and expectations about ABS. The purpose of this 1998 survey was to assess whether the apparent increase in single-vehicle crashes for automobiles may be due to drivers' misunderstanding of ABS functionality. Results from this survey are presented in this report.

Task 3 involved the examination of 257 selected single-vehicle 1996 crash reports collected by the National Automotive Sampling System (NASS). The goal of this work was to determine what differences could be identified in the characteristics of single-vehicle crashes incurred by ABS-equipped versus non-ABS-equipped automobiles using NASS Crashworthiness Data System (CDS) cases. Results of this examination of crash cases did not provide conclusive evidence that ABS had a significant effect on crash rates for the time period covered.

Task 4 [7] measured the braking performance of a group of model year 1993-97 production ABS-equipped vehicles over a broad range of surfaces and maneuvers. While ABS stopping performance has been measured by many groups over many years, there is a possibility that poor performance on some unusual surface or during some maneuver may have been overlooked. If such could be found, this might explain the apparent increase in single-vehicle crashes of ABS-equipped automobiles. Results of this 1997-98 study showed that for most maneuvers, on most surfaces, ABS-assisted stops yielded distances shorter than those made with the ABS disabled. The one exception was on loose gravel where stopping distances increased by an average of 27.2 percent overall. Additionally, the vehicular stability observed during testing was almost always superior with ABS. For the cases in which instability was observed, ABS was not deemed responsible for its occurrence.

Task 5 examined the hypothesis that the apparent increase in single-vehicle crashes with ABS-equipped vehicles is due to driver "oversteering" in crash-imminent situations. In a crash imminent situation, a driver's first action is expected to be a very hard application of the brake pedal. Oversteering occurs when the driver, possibly believing that the hard braking input is insufficient to avoid the upcoming obstacle (such as another vehicle), rapidly turns the steering wheel by a large amount. For conventionally braked or rear-wheel ABS only vehicles, this oversteering has little effect, since the initial driver brake pedal activation is likely to lock the vehicle's front wheels. However, for a vehicle equipped with four-wheel ABS (where the ABS minimizes front wheel lockup and allows the driver to maintain steering capability), the oversteering may result in the

vehicle missing the upcoming obstacle, going off of the roadway, and being involved in a single-vehicle crash.

Task 5 was divided into multiple subtasks to examine driver crash avoidance behavior with and without ABS. This task sought to assess the prevalence of driver oversteering and examined the effects of ABS instruction and braking practice on successfully avoiding a crash. Task 5.1 used a driving simulator to address this issue. Task 5.2 examined driver crash avoidance behavior in a test track environment on a dry road surface with a high coefficient of friction. Task 5.3 also studied driver crash avoidance behavior in a test track environment but on a wet road surface with a low coefficient of friction. Results of the 1997-98 test track studies, Tasks 5.2 and 5.3 [8], showed that drivers do tend to brake and steer in realistic crash avoidance situations and that excessive steering can occur. However, a significant number of road departures did not result from this behavior for dry or wet pavement. ABS was found to significantly reduce crashes on wet pavement as compared to conventional brakes. Results of the 1997 simulator study (Task 5.1) [9] also showed that excessive steering can occur during realistic crash avoidance situations. However, this steering was not found to result in a significant number of road departures.

In 2000, Task 6 investigated the effects of ABS during road recovery maneuvers (i.e., when a driver attempts to maneuver an automobile back onto the roadway after a departure). Many road departures occur when the driver maneuvers the vehicle in an essentially straight line that leaves the road. This action may be due to driver inattention, sleepiness, or intoxication. None of these causes are related to the presence or absence of ABS. However, the presence of ABS may or may not influence the ability of the driver to safely maneuver the vehicle back onto the roadway. The Task 6 report was being finalized at the time of publication of this report.

Task 7 involved two separate studies that examined the issue of ABS and behavioral adaptation. Several studies have found that people drive faster or more aggressively on test tracks in ABS-equipped vehicles than with conventionally braked vehicles. The goal of this task was to try to determine if these trends occur during typical driving on actual public roads.

Task 7 was divided into multiple subtasks. Task 7.1 (in press) involved remote, unobtrusive observation methods to collect data about the behavior (e.g., speed) of drivers. Although a consistent trend was seen in mean speed by brake system for each site where higher speeds were observed for drivers of ABS-equipped vehicles, this trend was statistically insignificant. The results of this study showed that type of brake system (ABS or conventional) had no significant effect on driving speed under the conditions examined. Task 7.2, the subject of this report, sought to assess possible ABS-related behavioral adaptation through the collection of more detailed data about the driving behavior of subjects using instrumented vehicles in a naturalistic research setting.

Task 8 involved the integration of data from all of the preceding tasks in an attempt to infer why the crash data studies did not find the anticipated increase in safety for ABS-equipped automobiles.

Task 9 involved the dissemination of task results. NHTSA has shared knowledge gained through the program's research efforts by reporting its findings with interested parties within NHTSA and the public at large. Summaries of current research efforts and results-to-date have been presented for discussion.

NHTSA's Light Vehicle ABS Research Program has only been a first step in assessing the anticipated safety benefits from ABS. This program deals solely with trying to learn why the crash data studies did not find the anticipated increase in safety for ABS-equipped automobiles. The development of countermeasures to resolve any problems discovered is left to future research.

2.0 BACKGROUND AND OBJECTIVES

2.1 Driver Knowledge about Antilock Brake Systems

One of the hypotheses regarding factors that may have contributed to the lack of apparent net crash benefits resulting from ABS implementation is that drivers may be misusing ABS due to a lack of understanding of its operation. Misuse could involve inappropriate driver reactions such as removing their foot from the brake pedal in response to sensing brake pedal feedback or pumping the brake pedal during hard braking. In a crash-imminent situation either of these mistakes could increase the likelihood of a collision. Assessing the extent of drivers' knowledge deficit regarding ABS function and operation could provide insight into the degree to which drivers may be defeating the utility of ABS through improper responses to its activation.

A number of surveys conducted by the government, ABS manufacturers and insurance agencies have supported the hypothesis that driver knowledge of ABS is lacking. Some of these surveys are summarized below.

2.1.1 NHTSA 1996 Survey on Occupant Protection

Results of a 1996 NHTSA Survey on Occupant Protection showed that 57 percent of drivers thought their vehicle was equipped with ABS, 35 percent thought their vehicle did not have ABS, and 7 percent did not know. (In mid-1996, approximately 17 percent of the light vehicle fleet in the U.S. actually was equipped with ABS [10].) A third (34 percent) of respondents thought that brake pedal vibration meant that something was wrong with the brakes and 30 percent report not knowing what it meant. When asked what one should do when using ABS, 40 percent of drivers reported they would make an inappropriate response (e.g., reduce pressure, pump brake pedal) and 11 percent said they didn't know what to do. Nearly 30 percent of 16 to 24 year olds reported that pumping the brake pedal was the appropriate response to ABS activation.

2.1.2 Driver Experience with Antilock Brake Systems (Williams and Wells, 1994)

Williams and Wells (1994) [11] surveyed approximately 1000 owners of cars equipped with ABS from the states of North Carolina and Wisconsin. When asked how important the presence of ABS was in their decision to buy a car 38 percent said it was very important, 34 percent said fairly important, and 25 percent said it was not important. Over 50 percent of respondents stated that no one had spoken to them regarding braking methods and how ABS work prior to purchasing their vehicle. Results showed that approximately one-half of North Carolina respondents and one-third of Wisconsin respondents stated that they would pump the brake pedal in an emergency situation. Sixty-two percent of North Carolina drivers and 36 percent of Wisconsin drivers reported never having activated their ABS. Of the drivers who reported having activated the ABS, 71 percent of North Carolina drivers and 45 percent of Wisconsin drivers reported that the ABS had been helpful to them in avoiding a crash. A majority of drivers in both states reported feeling more secure in snowy and icy conditions with ABS, with 14 percent of North Carolina drivers and 17 percent of Wisconsin drivers stating that they would drive in snowy or icy conditions with ABS that they would have previously avoided when they drove a vehicle with conventional brakes. Ninety-two percent of respondents stated that they wanted ABS on their next vehicle. In a 1995 report to NHTSA [12] COMSIS Corporation summarized the results of this survey to indicate "a general lack of knowledge" regarding ABS.

2.1.3 A Survey of Canadian Drivers' Knowledge About and Experience with Anti-lock Brakes (Collard and Mortimer, 1998)

This paper by Collard and Mortimer [13] presented the results of a telephone survey of 1392 drivers of ABS-equipped vehicles. This study found that 18 percent of respondents thought that pumping the brake pedal was the correct thing to do with ABS. Close to 40 percent of respondents thought that the purpose of ABS was to cause the vehicle to stop faster and/or to prevent all skids. Twenty-seven percent of respondents stated that ABS had helped them to avoid a collision in the previous two years. However, nearly 7 percent of respondents stated that ABS had caused them to have at least one collision in the past two years, with 34 percent of cases involving reports of extended stopping distances. Of the incidents reported by respondents, 96 percent of them were stated to have occurred on the roadway while the remaining 4 percent occurred off road.

2.1.4 A Survey of German Taxicab Drivers' Knowledge About and Experience with Antilock Brakes

An empirical study conducted by Aschenbrenner, Biehl, & Wurm [14] questioned 70 taxicab drivers about their knowledge of, attitudes to, opinions on and experiences with ABS in the exercise of their occupation. Although 70% knew that a pulsating pedal meant that ABS was responding, only 23% knew that the main effect of ABS was that the vehicle remained steerable even under full braking. Twenty-two percent of the drivers thought that one could drive faster with ABS on curves for dry, wet, and glare ice roadways. It was noted that 18% of drivers who rarely drove ABS equipped vehicles felt they activated the ABS system at least once a day. Interestingly enough, 63% of the drivers thought that ABS generally would lead to riskier driving, which has not been proven thus far.

2.2 Objectives of NHTSA's National Telephone Survey on ABS

Based on the accumulated evidence of drivers' lack of knowledge regarding ABS and its operation, NHTSA set out to conduct a more thorough survey to inquire about drivers' knowledge regarding ABS in more detail. The purpose of this additional detail was to determine whether any particular component of ABS operation (e.g., brake pedal feedback) or peoples' beliefs about the benefits of ABS under certain road conditions might provide some explanation of the lack of net crash benefits.

3.0 SURVEY METHODOLOGY

3.1 Support for Survey Development and Administration

Two contractors were employed in developing and conducting this survey. Schulman, Ronca & Bucuvalas, Inc. (SRBI) assisted with the refining of the questionnaire document by transforming a list of questions into a structured survey. SRBI conducted focus group meetings and an initial pre-test. SRBI also developed the sample design based on NHTSA requirements. Dynamic Science, Inc. (DSI), with subcontractor PricewaterhouseCoopers LLP (PwC), assisted in the preparation of the survey for implementation through further pre-testing and refinement. Using the final survey instrument, PwC administered the representative national survey of car drivers in the United States. The survey was administered in both English and Spanish via telephone to approximately 3,500 households.

3.2 Survey Development

Survey questions were developed by NHTSA staff to address issues relating to driver knowledge regarding ABS function, benefits, and ABS presence on their own vehicle. Questions were compiled and then reviewed internally for readability and clarity. Following NHTSA review, SRBI reviewed the draft questionnaire and suggested improvements. Following revision, SRBI led focus group discussions in the Washington, DC area to refine question wording and assess whether questions were useful in addressing the issues of interest. Additional revisions were made based on results of the focus groups and then a pre-test was conducted.

3.3 Sample Design

Households from across the U.S. were selected at random using Random Digit Dialing (RDD) techniques. The results of this survey effort are presented in this report. RDD is a method by which random telephone numbers are selected with known probability from a set of working prefixes throughout the U.S.

The method used for this survey to implement RDD was list-assisted sampling. For this method, RDD samples are matched against databases of phone numbers that are known to be non-residential to eliminate a large portion of potentially unproductive calls. A recent article [15] discusses the relative merits of the major RDD methods (e.g., the Mitofsky-Waksberg method) and concludes that any biases that might be inherent in the list-assisted samples produced by the supplier, GENESYS, are small. Thus, an RDD sample from GENESYS was purchased because of the specialized nature of creating efficient RDD samples (i.e., as free of businesses and other extraneous telephone numbers as possible). The main benefit to the methodology used is that it is the most cost effective RDD methodology that also yields high quality probability samples.

A national area probability sample of the population of the United States was constructed by GENESYS. Since only national estimates were desired, the sample was not stratified by region. However, in order to ensure that the proportion of telephone numbers in each region of the U.S. was equal to the proportion of telephone numbers in each region selected for the sample, GENESYS utilized an implicit stratification approach. Implicit stratification actually results in expected sampling variations that are less than those of an equivalent simple random sample of the same size

by ensuring strict geographic representation. The implicit strata that GENESYS used were the ten census divisions split by metro and non-metro county definitions.

Implicit stratification involves sorting the population by strata, and selecting every k th sampling unit after a random starting point. The sampling interval is defined as $k=N/n$, where N is the population size and n is the desired sample size. However, when using implicit stratification in RDD designs, instead of selecting every k th telephone number, GENESYS actually selected a random telephone number from each interval of size k . This is because the metro stratum is ordered from the largest to the smallest metro area, and therefore, exchanges near the beginning of any interval are associated with larger metro areas than those near the end of the interval. Therefore, selecting every k th telephone number could have resulted in a bias.

During the survey administration process, telephone numbers were selected in "batches." Putting the sampled units (or telephone numbers) in batches allowed the numbers to be used as needed until the target number of interviews had been reached. Releasing the sample in batches, rather than all at once, also helped to maximize the response rate. As each batch was released, it is added to the denominator of the response rate calculation as shown in the equation below:

$$\frac{\text{Number of Completed Interviews}}{\text{Total Number of Eligible Respondents in Sample}} \times 100$$

3.4 Preparation for Data Collection

3.4.1 Programming the Questionnaire into CATI

The survey was administered using Computer Assisted Telephone Interviewing (CATI). With the CATI system, quality control checks were performed on the survey data as it was entered. Specifically, the system was programmed to include the following on-line data verification features:

Range Checking – rejected data that fell outside a specific range.

Contingency Checking - skipped or "branched over" questions that were not applicable, and required responses to questions that were applicable.

Closed-end Checking - allowed interviewers to enter only a limited set of responses (i.e., "Yes", "No", "Don't Know", or "Refused").

Open-end Checking - required at least two keystrokes on all applicable open-end responses. This feature prevented the interviewer from entering a blank response to open-end questions. Instead, if a respondent had no response, the interviewer entered "NA."

When any on-line edit checks failed, a message appeared on the interviewer's screen. The message described the specific error and provided instructions regarding the appropriate corrective action. This on-line verification improved the quality of the data and allowed mistakes to be corrected immediately. Upon completion of each telephone interview, the data were immediately stored in a central database containing the responses from all completed interviews.

3.4.2 Pretest

Several iterations of testing and debugging were performed to ensure that both the English and Spanish versions of the questionnaire functioned properly. A pretest of the questionnaire was conducted in October 1997, prior to the award of the contract to administer the survey. The questionnaire draft was reviewed and modified before conducting the second pretest in December 1998, using a small RDD sample of phone numbers purchased from GENESYS. This pretest resulted in 13 interviews that were conducted during the daytime, evenings, and weekends. The average length of a completed interview was the targeted 20 minutes as tested. The objective of the second pretest was to test the CATI programming of the questionnaire and questions that were modified or added based on the initial pretest. After the second pretest, revisions were made to the instrument and the questionnaire was finalized for use in the study.¹

3.4.3 Interviewer Training

Formal training sessions for all interviewers and supervisors were conducted before data collection. The purpose of the training sessions was to discuss, in detail, the purpose and objectives of the study, familiarize the interviewer with the survey instrument, answer questions, and reduce the potential for interview bias by promoting consistency. All interviewers were provided with a training manual² that contained training notes, a data facts sheet, and the questionnaire.

3.4.4 Administration

A total of 3,584 interviews were completed during the four-month data collection schedule in early 1999. The survey was conducted during the day, evenings, and on the weekends in both English and Spanish. The target respondent with whom to conduct the interview was a driver in the household, age 16 and older, who had driven a passenger car in the last year. In order to identify the correct respondent to interview, respondents were initially asked screener questions to determine how many eligible persons existed within the household. In the case where there was more than one eligible adult, the interviewer asked to speak to the car driver who had the most recent birthday. The average length of a completed interview was approximately 13 minutes.

3.4.5 Call Disposition Statistics

Up to 10 attempts were made to a household in order to complete an interview.³ Call attempts were made at different times of the day in order to maximize the chance of reaching the individual.

A conservative response rate calculation was used based on the *Standard Definitions* produced by The American Association for Public Opinion Research (AAPOR)⁴ and other market research publications. The response rate divided the number of completed interviews by the total number of eligible respondents. The participation rate was calculated as the degree of self-selection by

¹ Please see Appendix A for a copy of the final questionnaire used for the study.

² Please see Appendix B for a copy of the Interviewer Training Manual used for the study.

³ During the first month of data collection 6 attempts were made to complete the interview. The number of call attempts was increased to 10 in order to increase the likelihood of reaching the individual with which to conduct the telephone interview.

⁴ See The American Association for Public Opinion Research. 1998. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for RDD Telephone Surveys and In-Person Household Surveys*. Ann Arbor, Michigan: AAPOR.

potential respondents into or out of the survey. Table 3.1 below provides the administration statistics for the study.

Table 3.1: Survey Administration Statistics

Response Status	Number
Total Sample	15,535
Completed Interviews	3,584
English	3,433
Spanish	75
Partial Interviews ⁵	76
Non-Interviews – Eligible	3,584
Refusals	654
Partial Interviews (not used)	52
Unresolved at end of data collection – verified household	927
10 call attempts – verified household	1,951
Non-Interviews – Ineligible	8,367
Non-working/disconnected/fax number	3,442
No car drivers in household	1,496
Non-residential number	1,613
Cell phone	22
Other non-interview (language barrier, respondent injured, etc.)	125
10 call attempts – unknown eligibility	1,562
Unresolved at end of data collection – unknown eligibility	107
Response Rate (3,584 / 7,168)	50.0%
Participation Rate (3,584+1,496)/(3,584+1,496+52+654)	87.8%

3.5 Data Analysis

3.5.1 Data Cleaning Procedures

Generally, survey data collected via CATI required very little cleaning as most editing was done on-line during the data collection period. Problems or questions that arose during the interview were documented by the telephone interviewers on a "Problem/Comment Sheet." For example, occasionally a respondent wanted to change an answer given earlier in the interview. Rather than taking up the respondent's time by backing up in the CATI system, the interviewer would record the correction on a "Problem/Comment Sheet" and continue the interview promptly. All such sheets were reviewed and the data edited as necessary.

A small number of respondents (45) surveyed at the beginning of data collection answered according to the van, minivan, sport utility vehicle, or pickup truck they had driven in the past year. This was a result of these respondents incorrectly including people who strictly drove these vehicles when

⁵ Partial interviews are defined as cases in which the respondent terminated the interview before reaching the last question in the survey. Cases that were terminated after question 13 are included in the survey results.

answering question B in the questionnaire. Because relevant information was obtained from these respondents, the data were kept and used in the results. However, information collected in the survey that pertained specifically to their vehicle (i.e., driving incidents such as in questions 7-9) were not included so as not to bias the results. Interviewers were retrained to ensure that this did not occur in future interviews.

3.5.2 Coding Open-ended Responses

The seven open-ended questions in the survey were designed to collect candid information from the respondent. Categories were created for each of the open-ended questions based on the verbatim responses collected during the interview. In many cases, respondents offered more than one response to these types of questions. For this reason, these questions were tabulated and reported as multiple response questions. In addition to the open-ended questions, several questions had an "other" category that allowed the respondent to indicate a response choice that was not already listed. In cases where answers could be categorized into an already existing answer choice, they were re-classified. Otherwise, a category was added to include those responses. The question-by-question tabulations include the categorized "other" responses. For this reason, some of the response categories listed include more than the answer choices shown in the questionnaire for some questions.

3.5.3 Survey Weighting

One of the benefits of obtaining an RDD sample from GENESYS is that it was a self-weighting sample of households, i.e., every telephone household will have an equal probability of selection (the treatment of households with multiple phone lines is discussed below). Since the population of interest included persons whose primary motor vehicle was a car, there could be multiple persons within a household who were eligible to complete the survey. In cases where more than one person was eligible, the driver with the most recent birthday was selected to ensure a random selection of eligible respondents within a household. Therefore, even in cases where there were more than one eligible respondent per household, the sample was still self-weighting at the household level.

Although it was not necessary to weight the survey results for the probabilities of selection, there were two weighting adjustments that were applied to the results in order to generalize the results to the number of adults in the U.S. The product of each of the weighting adjustments resulted in a respondent's final weight.

First Weighting Adjustment

The first weighting adjustment accounted for the number of telephone lines in a household and the number of car drivers existing in that household.

Households with more than one telephone number had multiple chances of selection into the sample. A weighting adjustment called the multiple phone number factor (MPNF) was used, to adjust for the higher probability of selection of these households. During the telephone interview, respondents were asked how many phone numbers existed in their household.⁶ The multiple phone number factor adjustment is the reciprocal of the number of phone numbers for the household:

⁶ Please see Appendix A, survey question D10.

$$MPNF_i = \frac{1}{\text{Number of phone numbers for the household}},$$

where i was each respondent. If a respondent did not reveal the number of phone numbers in their household (i.e., DON'T KNOW or REFUSED), then MPNF was set to 1 (MPNF=1). It has been found that if the MPNF < 0.5, the further reduction in bias is usually offset by an increase in variance due to the weighting. When a large number of telephone numbers was reported, it could be measurement error (i.e., the number of extensions being mistakenly reported as the number of telephone numbers). Therefore, the minimum value of the MPNF was set at 0.5.

To adjust for the cluster affect of the number of car drivers in the household, PwC multiplied the MPNF and the number of car drivers, D :

$$W1_i = (MPNF_i) (D_i).$$

Second Weighting Adjustment

The survey data were also weighted to adjust for cases where certain groups had responded at higher rates than others (adjusting for non-response). The first step was to assign each interviewed and non-interviewed household to a group based on the census region and metro/non-metro indicators in the sample frame purchased from GENESYS. Therefore, each case was a member of only one group. The second step was to compute the number of interviewed households or completed interviews, C , and the number of non-interviewed households, NC for each group. The non-response adjustment ($W2$) for each group, k , was calculated to be:

$$W2_k = \frac{(C + NC)_k}{C_k}.$$

Final Weight

The final weight applied to each respondent was the product of $W1$ and $W2$. A constant factor was also applied so that the sum of the weights added to the total number of respondents who completed the survey. Therefore, a respondent's final weight was:

$$\text{Weight}_{ik} = (W1_{ik})(W2_k) \left[\frac{\sum_k C_k}{\sum_k \sum_i (W2_k)(W1_{ik})} \right].$$

where k was the number of groups of Census Regions and metro/non-metro areas, and i is the number of respondents.

3.6 Reliability and Precision of Survey Results

The reliability and precision of survey results was affected by a number of factors including the number of respondents that answered a given question. This section discusses the factors affecting

the precision of the survey findings and offers guidelines for understanding how the survey results included in this report were interpreted.

3.6.1 Statistical Precision of Results

Sampling error (or statistical accuracy) occurs whenever a sample is used to predict statistical estimates for a population. Because a *sample* of car drivers in the U.S. was selected for survey participation, a certain amount of error was generated by the mere fact that not *all* car drivers in the U.S. were surveyed. Thus, when making statements about the population of car drivers in the U.S., it is important to remember their opinions were expected to fall within a range around the actual survey results. Consider the following examples.

Sampling error is a function of two primary factors: 1) the number of respondents answering a given question on a survey and 2) the variability of their responses to that question. Table 3.2 demonstrates this concept using the results of question 3: "About how many miles did you drive a car in the past year?"

Table 3.2: Survey Results for Question 3: How many miles did you drive a car in the past year?

	COUNT	PERCENT
Less than 2,000 miles	439	11.4%
2,000 to less than 8,000 miles	858	24.0%
8,000 to less than 13,000 miles	906	25.5%
13,000 to less than 20,000 miles	642	18.5%
20,000 to less than 30,000 miles	338	9.9%
30,000 or more miles	257	7.2%
Don't know	138	3.3%
Refused	6	0.2%
TOTAL	3,584	100%

Consider the example of estimating the percentage of respondents who have driven between 13,000 and 20,000 miles in the past year (18.5%). Using the table in Figure 3.1, we see that the true percentage lies between 17.2% and 19.8% (18.5% +/- 1.3). Figure 3.1 shows that as the number of respondents increases, the sampling error decreases and statistical accuracy improves.

Figure 3.1 shows the relationship between the number of respondents, the variability of their answers and the statistical precision of an estimate. Figure 3.1 can be used as a *rough* guide to determine the statistical precision for each response to a survey question.

Percentage of Respondents Giving a Specific Answer to a Survey Question

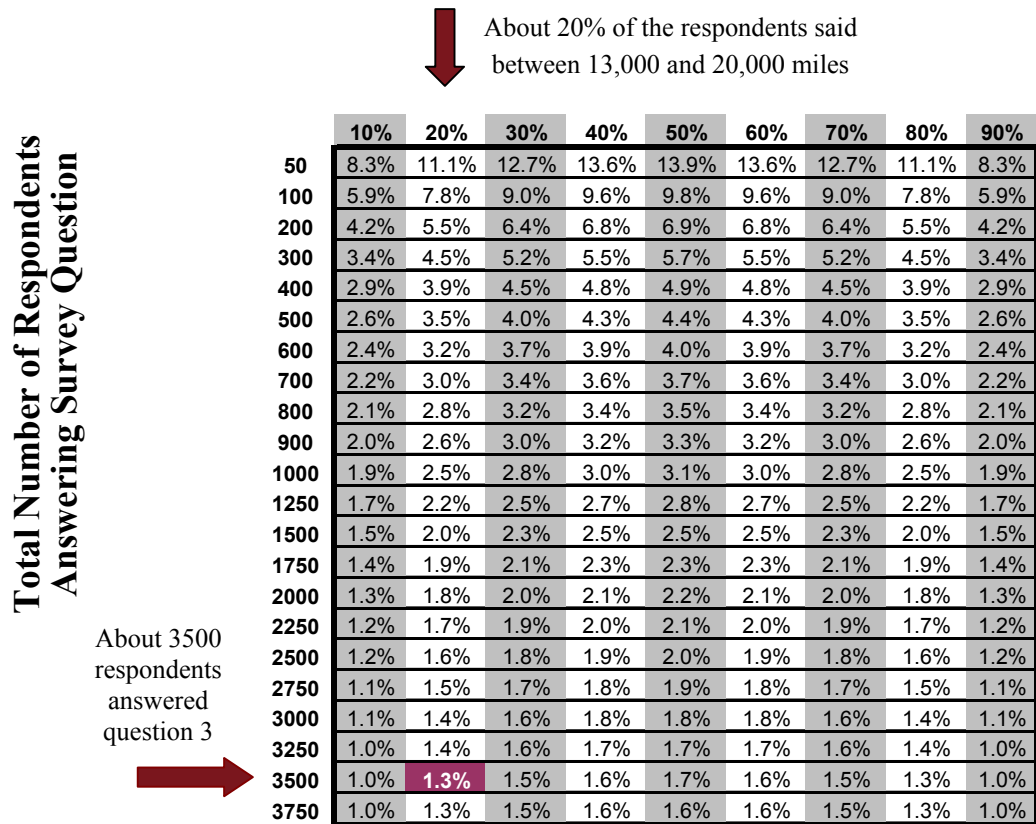


Figure 3.1: Statistical Precision at the 95% Confidence Level

When comparing the percentages of two groups, the number of respondents in *each* group must be considered in the calculation of precision. This is often useful when comparing cells in a cross tabulation table. Figure 3.2 can be used to find the precision of an estimate between two groups. For instance, using this table, comparisons could be made between those respondents who have a car with ABS compared with those who do not. If the difference exceeds the percent shown in the table, the groups can be said to be "significantly different."

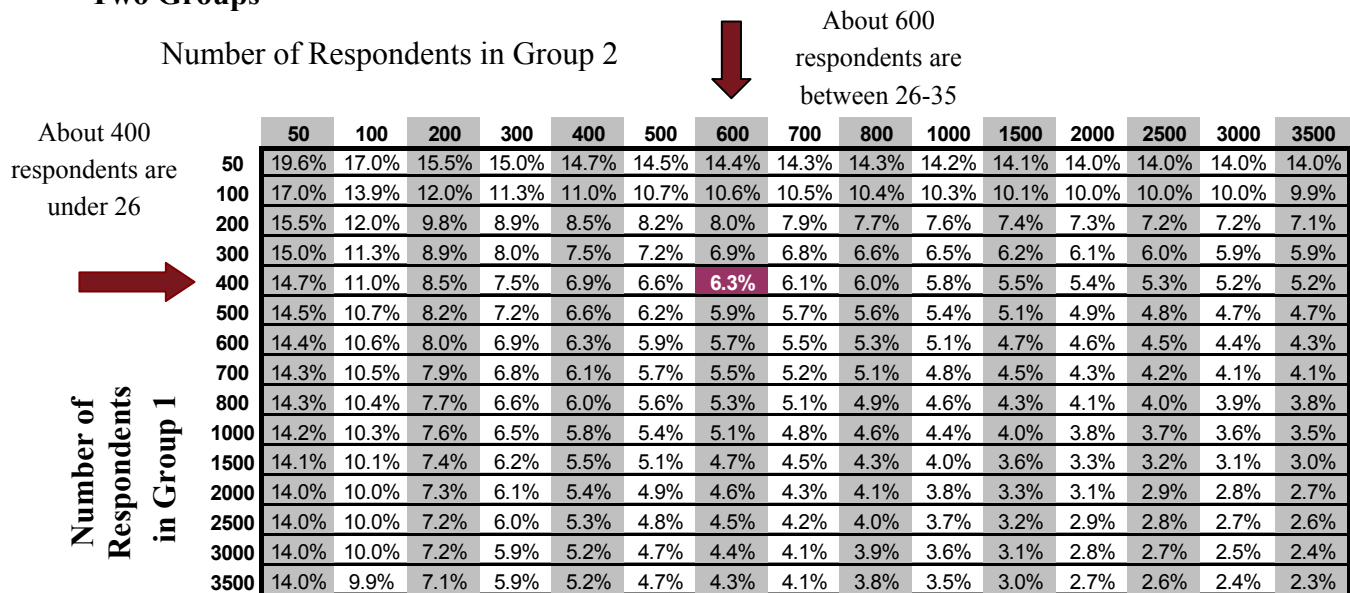
For example, assume that we want to know if the speed at which a person drives depends on whether or not the car has ABS. To do so, we might compare responses to question 5 (how fast one drives) with a respondent's age (question D1). Table 3.3 shows the survey results for questions 5 by the respondent's age. We see that 27.4% of respondents under 26 say that they drive "a little faster than the other traffic on the road," compared to 23.7% of respondents between ages 26-35 who "drive a little faster than other traffic on the road."

Table 3.3: Crosstab Results for Question 5: Do you drive a lot faster than the average speed, a little faster, just at the average speed, a little slower, or a lot slower?

	Under 26	26-35	36-60	Over 60
A lot faster	5.6%	2.8%	1.1%	0.2%
A little faster	27.4%	23.7%	15.2%	7.2%
Just as fast	57.4%	59.6%	64.6%	62.0%
A little slower	8.2%	12.3%	16.8%	24.4%
A lot slower	0.9%	0.7%	0.9%	1.8%
Don't know	0.0%	0.4%	0.4%	0.6%
Refused	0.5%	0.4%	1.1%	3.8%
Total	100%	100%	100%	100%
Sample Size	442	608	1,586	801

To determine if the two percentages (27.4% and 23.7%) differ “significantly”, we refer to the table in Figure 3.2. Using the number of respondents in each category (442 for drivers under 26 and 608 for drivers between 26 and 35 years of age), the table indicates that the percentages must differ by at least 6.3 percentage points in order to be considered "significantly different." So, in the example of respondents who drive a little faster than the average speed, there is no statistically significant difference between those under 26 versus those aged between 26-35.

Figure 3.2: Statistical Precision at the 95% Confidence Level for the Difference Between Two Groups⁷



⁷ Figure 3.2 assumes percentage estimates of 50 percent; this yields the most conservative precision estimates.

4.0 SURVEY RESULTS

This section presents results of the national telephone survey to assess drivers' knowledge of ABS and expectation of ABS performance. Question results are grouped into topics areas of interest as outlined in Table 2.1.

Table 4.1: Questions as Grouped by Topic

Topic (Results Section Heading)	Applicable Questions
4.1 ABS Knowledge	10-16, 18, 19
4.2 ABS Pedal and Other Feedback	20-25
4.3 Activation Experience	26-30
4.4 ABS Behavioral Adaptation	16a2, 17
4.5 Purchase Experience and Preferences	31-38
4.6 Instruction Preferences	39-40
4.7 Demographics	D1-D10

For each question, significant results are presented and any noticeable trends are mentioned. All comparisons made between cross-tabulated results in this report are statistically significant unless otherwise noted. Responses listed in the tables may be abbreviated for space considerations.

4.1 ABS Knowledge

Several questions were developed to assess respondents' knowledge about ABS including their familiarity with the acronym, how to determine whether a vehicle is equipped with ABS, and whether their own primary vehicle has ABS. In addition, questions were used to address whether people had ideas about the advantages and disadvantages of ABS as well as braking performance differences under different pavement conditions. Responses to these questions are summarized in the following subsections of Section 4.1.

4.1.1 Question 10. If you saw the initials "ABS" on a car, what would you think they would stand for?

The purpose of this question was to assess peoples' familiarity with the acronym, "ABS," which stands for Antilock Brake System. Overall results to this survey question indicate that more people did not know the exact meaning of the term "ABS" than did know, as shown in Table 4.2. A small portion of the respondents related the ABS acronym to an airbag system (2.2%). However, nearly 13% of all respondents knew that the term "ABS" related to the brakes and just could not be more specific.

When examined by age, drivers 35 years and younger recognized the term more than 50% of the time. For drivers ages 36-60, recognition was approximately 40%. A sharp drop was visible for drivers over the age of 60, where 64.2% of the respondents were unable to say what the term "ABS" stood for.

Responses were also examined by gender, income level, and education level. When examined by gender, women were more than twice as likely not to know than know, while men were nearly the exact opposite. When examined by income level, recognition doubled from the lowest to highest

grouping, with a corresponding drop in lack of recognition. Similar results were found when the data were examined by education level.

In summary, higher income, well-educated males between the ages of 26-35 would be the most likely individuals to accurately identify the term “ABS”.

Table 4.2: Summary of Selected Responses to Question 10

Question 10. If you saw the initials “ABS” on a car, what would you think they would stand for?								
Response	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Antilock Brake System	38.8%	52.9%	26.4%	50.6%	52.0%	39.1%	18.9%	
Don’t Know	43.6%	28.7%	56.1%	36.0%	32.2%	40.5%	64.2%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Antilock Brake System	27.1%	36.5%	45.3%	55.9%	25.6%	32.8%	39.5%	49.7%
Don’t Know	58.4%	43.9%	33.4%	23.4%	64.4%	50.0%	39.4%	31.6%

4.1.2 Question 11: Have you ever heard of antilock brake systems?

Overall results to this survey question indicated that more people had heard of antilock brakes than had never heard of them by a 7:1 ratio. When examined by age, there was no observable difference in level of awareness for all drivers under the age of 60, where roughly 90% of respondents had heard of antilock brake systems. However, a drop in awareness was again observed for those 60 and older, to just over 79%. When examined by gender, the majority of both males and females had heard of antilock brake systems, with males being slightly higher. By income level, awareness rose as income rose from the lowest to highest bracket. Education level mirrored this trend as can be seen in Table 4.3 below. To summarize, better-educated, higher income males under the age of 60 had heard of antilock brakes more than any other group of respondents.

Table 4.3: Summary of Selected Responses to Question 11

Question 11: Have you ever heard of antilock brake systems?								
Response	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Yes	86.6%	90.6%	83.8%	89.7%	87.2%	89.7%	79.3%	
No	12.2%	8.7%	14.7%	9.8%	12.4%	9.3%	18.5%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Yes	78.4%	89.5%	95.7%	96.3%	73.5%	84.9%	91.5%	91.4%
No	19.7%	9.8%	4.3%	3.5%	24.7%	13.2%	7.9%	8.4%

4.1.3 Question 12. Does your (year, make, model) have an antilock brake system?

If the respondent’s answer to question 10 was anything other than “antilock brake system”, they were told what the term “ABS” stood for prior to the administering of this question. Overall results indicate that 47% of drivers said they thought their car had ABS, 35% said they thought it did not,

and 18% did not know. Based on data from Ward’s Automotive, in mid-1996, approximately 17 percent of light vehicles on the road in the U.S. were equipped with ABS [10]. At the time this survey was taken (early 1999), approximately 60% of newly manufactured vehicles were equipped with ABS. This resulted in roughly half of the vehicles on the road being equipped with ABS.

The only observable difference in age was that fewer individuals in the 26-35 age group were uncertain when compared to the remaining groups. Eleven percent of men and 25% of women were not sure if their car had ABS. When viewing this same uncertainty by income level, it was halved as income level increased. Education level followed a similar trend. The largest variations in response to this question were observed in the “Don’t know” response, as can be seen in Table 4.4 below.

Table 4.4: Summary of Selected Responses to Question 12

Question 12. Does your (year, make, model) have an antilock brake system?								
Response	Overall Results	Gender			Age			
		Male	Female	<26	26-35	36-60	>60	
Yes	47.1%	48.6%	45.5%	43.6%	48.1%	47.8%	47.2%	
No	35.0%	40.7%	29.8%	33.2%	36.9%	35.1%	35.3%	
Don’t Know	17.9%	10.7%	24.7%	23.2%	15.0%	17.1%	17.4%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Yes	40.9%	45.0%	47.0%	59.2%	36.8%	47.1%	46.9%	49.9%
No	38.7%	37.0%	35.8%	30.7%	34.5%	34.4%	34.9%	36.3%
Don’t Know	20.5%	17.9%	17.2%	10.1%	28.8%	18.3%	18.2%	13.8%

4.1.4 Question 13a. Please tell me all the reasons you know your vehicle has ABS?

Based on responses to the previous question, for drivers who responded that they believed their car had ABS, overall results showed that 57% of them reported that they knew they had ABS because of information obtained when purchasing the vehicle. This was the most frequent response of those given, as shown in Table 4.5. The next highest response was that a light on the instrument panel indicated to them that the vehicle was equipped with ABS. Other methods supporting their belief included ABS insignias and familiarity with the car or the vehicle owner’s manual. These responses ranged from 32-46% of all respondents.

Prevalent indications of ABS presence were also examined by demographic variables. When examined by age, drivers under 26 were more likely to report they relied upon a light on the instrument panel as the basis of their belief, while drivers 60 and older reported they relied on information received at the time of purchase. Men were equally likely to respond that they relied on purchase information, vehicle owner’s manual, knowledge of vehicle specifications and instrument lighting, while women tended to report favoring purchase information and instrument lighting. Income level had no appreciable effect on responses to this question, save that drivers making less than \$30K a year reported relying less on information received when purchasing the vehicle than the higher income brackets. Increasing levels of education saw an increased reliance on purchasing information. In summary, women and drivers age 60-older reported relying more heavily on information received at the time of purchase than any other group. It is worth noting that reliance

upon the light on the instrument panel was fairly consistent for all groups, with exceptions previously noted.

Table 4.5: Summary of Selected Responses to Question 13a

Question 13a. Please tell me all the reasons you know your vehicle has ABS?								
Response	Overall Results	Gender			Age			
		Male	Female	<26	26-35	36-60	>60	
Told when bought it.	56.6%	52.3%	61.8%	48.7%	58.3%	57.2%	60.2%	
Know specs. for car	41.1%	49.0%	33.8%	39.4%	39.3%	43.5%	39.7%	
Instrument Panel Light	49.3%	52.9%	46.3%	61.2%	48.3%	49.5%	42.7%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Told when bought it.	51.5%	60.3%	60.4%	57.1%	40.1%	56.6%	57.1%	60.8%
Know specs. for car	35.2%	38.9%	46.3%	44.3%	34.4%	40.5%	43.4%	42.4%
Instrument Panel Light	49.5%	50.0%	55.5%	49.6%	48.6%	48.1%	56.9%	45.8%

4.1.5 Question 13b. Please tell me all the reasons you know your vehicle does not have ABS?

Overall results showed that knowledge about vehicle specifications was clearly the most frequent response to this question, easily doubling the next closest response, as can be seen in Table 4.6 below. Of the drivers who reported that their car did not have ABS, women were 15% less likely than men to base this belief on their knowledge of the cars’ specifications. As income level increased, so did driver reliance on purchasing information and knowledge of vehicle specifications. College graduates were significantly more likely to base their belief on knowledge of vehicle specifications than the less educated groups.

Table 4.6: Summary of Selected Responses to Question 13b

Question 13b. Please tell me all the reasons you know your vehicle does not have ABS?								
Response	Overall Results	Gender			Age			
		Male	Female	<26	26-35	36-60	>60	
Told when bought it.	24.7%	24.2%	25.2%	24.1%	36.0%	21.4%	22.3%	
Read driver’s manual.	28.0%	28.0%	27.8%	34.3%	30.4%	28.5%	18.3%	
Know specs. for car	58.3%	64.8%	49.8%	56.5%	56.3%	60.1%	55.8%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Told when bought it.	17.4%	26.8%	28.3%	31.3%	17.6%	20.9%	25.2%	29.6%
Read driver’s manual.	29.1%	23.3%	28.7%	37.0%	18.8%	24.4%	32.8%	30.2%
Know specs. for car	54.8%	57.3%	59.9%	64.8%	58.1%	54.4%	53.5%	65.4%

4.1.6 Question 14. Based on what you know or have heard, what are the advantages of antilock brake systems, if any, compared to standard brake systems?

Overall results to this survey question indicate that the majority of people (39.2%) reported that the essential advantage of ABS was to prevent the vehicle’s wheels from locking and resulting in tire skidding. However, 22.5% of the respondents reported not knowing any advantage that ABS had when compared to standard brake systems. A smaller portion reported that there were benefits, and

these were categorized into numerous smaller groups. Drivers whose cars had ABS were significantly more likely to report that ABS “Prevents brakes from locking/skidding”, and significantly less likely to answer “Don’t Know”.

When examined by age, those drivers aged 26-35 were more likely to report that ABS “Prevents brakes from locking/skidding” when compared with other age brackets. This group was also least likely to respond with “Don’t know”. Conversely, those drivers over 60 were least likely to report that ABS “Prevents brakes from locking/skidding” than the other groups, and more likely to answer with “Don’t know”.

When examined by gender, women were significantly less likely than men to report that ABS prevents wheels from locking and thus tires from skidding. Women were also more likely to respond, “Don’t know” than men.

Examination of the income and education categories revealed similar trends in both. Increasing levels of income or education saw an increase in the percentage of drivers able to relate the advantage of ABS to the prevention of wheel lockup and resultant skidding, and a corresponding drop in the number of drivers that replied “Don’t know.” In summary, higher income, well-educated males between the ages of 26-35 would be the most likely individuals to report that the advantage ABS has over standard brakes is that it “Prevents brakes from locking and skidding”. A summary of selected responses can be seen in Table 4.7 below.

Table 4.7: Summary of Selected Responses to Question 14

Question 14. Based on what you know or have heard, what are the advantages of antilock brake systems, if any, compared to standard brake systems?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Prevent brake lock/skid	39.2%	45.8%	33.5%	42.2%	38.2%	35.8%	47.2%	40.0%	34.5%
Better control of car	12.8%	17.5%	8.9%	15.1%	12.6%	12.0%	11.2%	14.4%	12.7%
Don’t Know	22.5%	11.8%	31.8%	16.1%	22.6%	22.3%	19.4%	21.1%	26.3%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Prevent brake lock/skid	30.1%	39.8%	46.3%	48.0%	21.6%	34.9%	41.7%	48.0%	
Better control of car	8.5%	10.7%	15.0%	20.9%	8.0%	10.6%	13.5%	16.8%	
Don’t Know	32.2%	21.7%	15.3%	12.9%	32.8%	27.1%	20.3%	15.1%	

4.1.7 Question 15. Based on what you know or have heard, what are the disadvantages of antilock brake systems, if any, compared to standard brake systems?

Overall results to this survey question indicate that half the people (50.9%) did not know any disadvantage of ABS. The second largest response was that there were no disadvantages. A smaller group (approximately 6.4%) replied that ABS did not stop as fast as standard brakes, and that they caused skidding and loss of control in bad road conditions. Responses were consistent when examined by age. Gender analysis revealed that more men reported there were no disadvantages to antilock brakes, while more women answered “Don’t know”. As income level and education level increased, a decreased response of “Don’t know” was found, as can be seen in Table 4.8 below. To

summarize, 67.8% of the respondents stated that ABS either had no disadvantages or did not know of any.

Table 4.8: Summary of Selected Responses to Question 15

Question 15. Based on what you know or have heard, what are the disadvantages of antilock brake systems, if any, compared to standard brake systems?								
Response	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
No disadvantages	16.9%	20.7%	13.6%	16.3%	17.4%	17.4%	17.2%	
Don't Know	50.9%	38.2%	62.1%	53.2%	50.2%	48.0%	54.8%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
No disadvantages	16.1%	17.6%	16.0%	19.4%	15.3%	18.1%	17.0%	16.3%
Don't Know	57.5%	52.0%	45.3%	42.0%	59.9%	51.4%	51.1%	46.2%

4.1.8 Questions 16a1-c5. True and false questions assessing a driver’s knowledge of ABS.

This question was divided into the following three main categories of driver knowledge: driver knowledge of how ABS impacts overall vehicle performance; driver knowledge regarding the ability of ABS to shorten stopping distances on road surfaces with varying degrees of traction; and, driver knowledge regarding the ability of ABS to reduce the likelihood of skidding on road surfaces with varying degrees of traction. For certain types of snow covered surfaces and gravel, ABS can produce stopping distances greater than those from a standard brake system.

Overall results to these survey questions revealed that while many of the responses indicate a basic understanding that ABS had a positive benefit on vehicle performance, they were divided on the issues of stopping distance and the likelihood of skidding as road conditions worsened. When comparing car owners whose car had ABS with those that did not, the ABS group’s knowledge that ABS positively impacted their car’s performance was evident in their greater partiality to answer true to those questions regarding performance. This knowledge regarding the capability of ABS transferred over to their belief that ABS would create shorter stopping distances and reduce the chance of skidding on dry and wet pavements, but not to snow or ice covered ones. Women and drivers over 60 responded “Don’t know” more than the other groups in their respective classes for all questions. The three previously mentioned categories of driver knowledge are examined individually below.

The first set of questions addressed driver knowledge of the ability of ABS to impact overall vehicle performance. The following questions focused on that aspect, and Table 4.9 summarizes the selected responses.

- 16a1. Is it true or false that antilock brakes help you to better avoid crashes than you could with standard brakes?
- 16a2. Is it true or false that antilock brakes allow you to follow other vehicles more closely than you could with standard brakes?
- 16a3. Is it true or false that antilock brakes help keep you from losing control of the vehicle when braking sharply?
- 16a4. Is it true or false that antilock brakes help you maintain steering control while braking?

Table 4.9: Summary of Selected Responses to Questions 16a1-4

Questions 16a1-c5. Is it true or false that antilock brakes help you to...			
Response to Q16a1 Better avoid crashes?	Overall Results	Results by Drivers With/Without ABS, 16a1	
		ABS	No ABS
True	68.3%	73.2%	64.3%
False	25.3%	23.6%	28.9%
Response to Q16a2 Follow more closely?	Overall Results	Results by Drivers With/Without ABS, 16a2	
		ABS	No ABS
True	15.7%	16.9%	12.2%
False	77.9%	79.8%	81.0%
Response to Q16a3 Helps keep from losing control during braking?	Overall Results	Results by Drivers With/Without ABS, 16a3	
		ABS	No ABS
True	76.6%	81.0%	75.3%
False	17.1%	15.8%	17.9%
Response to Q16a4 Helps maintain steering control?	Overall Results	Results by Drivers With/Without ABS, 16a4	
		ABS	No ABS
True	75.6%	81.4%	73.6%
False	18.0%	15.4%	19.6%

The second set of questions addressed driver knowledge of the ability of ABS to shorten stopping distances on road surfaces with varying degrees of traction. These surfaces included pavement that was dry, wet, snow-covered and icy, and “dirt or gravel” roads. The following questions focused on that aspect, and Table 4.10 summarizes the selected responses.

- 16b1. Is it true or false that antilock brakes help you to brake in a shorter distance on...dry pavement?
- 16b2. Is it true or false that antilock brakes help you to brake in a shorter distance on...wet pavement?
- 16b3. Is it true or false that antilock brakes help you to brake in a shorter distance on...snow-covered pavement?
- 16b4. Is it true or false that antilock brakes help you to brake in a shorter distance on...icy pavement?
- 16b5. Is it true or false that antilock brakes help you to brake in a shorter distance on...dirt or gravel roads?

Table 4.10: Summary of Selected Responses to Questions 16b1-5 (braking in shorter distance)

Questions 16a1-c5. Is it true or false that antilock brakes help you to brake in a shorter distance on...			
Response to Q16b1 Dry pavement?	Overall Results	Results by Drivers With/Without ABS, 16b1	
		ABS	No ABS
True	58.2%	63.0%	52.1%
False	30.2%	29.3%	36.2%
Response to Q16b2 Wet pavement?	Overall Results	Results by Drivers With/Without ABS, 16b2	
		ABS	No ABS
True	58.2%	62.6%	55.7%
False	30.3%	29.8%	32.5%
Response to Q16b3 Snow-covered pavement?	Overall Results	Results by Drivers With/Without ABS, 16b3	
		ABS	No ABS
True	41.1%	42.1%	43.3%
False	47.4%	50.2%	44.9%
Response to Q16b4 Icy pavement?	Overall Results	Results by Drivers With/Without ABS, 16b4	
		ABS	No ABS
True	31.6%	32.6%	33.6%
False	56.9%	59.8%	54.6%
Response to Q16b5 Dirt or gravel roads?	Overall Results	Results by Drivers With/Without ABS, 16b5	
		ABS	No ABS
True	43.5%	44.7%	43.9%
False	45.0%	47.6%	44.4%

The final set of questions found in question 16 addressed driver knowledge of the ability of ABS to reduce the likelihood of skidding on road surfaces with varying degrees of traction. These surfaces also included pavement that was dry, wet, snow-covered and icy, and “dirt or gravel” roads. The following questions focused on this aspect of driver knowledge, and Table 4.11 summarizes the selected responses.

- 16c1. Is it true or false that antilock brakes reduce the likelihood of skidding on...dry pavement?
- 16c2. Is it true or false that antilock brakes reduce the likelihood of skidding on...wet pavement?
- 16c3. Is it true or false that antilock brakes reduce the likelihood of skidding on...snow-covered pavement?
- 16c4. Is it true or false that antilock reduce the likelihood of skidding on...icy pavement?
- 16c5. Is it true or false that antilock reduce the likelihood of skidding on...dirt or gravel roads?

Table 4.11: Summary of Selected Responses to Questions 16c1-5 (likelihood of skidding)

Questions 16a1-c5. Is it true or false that antilock brakes reduce the likelihood of skidding on...			
Response to 16c1 Dry pavement?	Overall Results	Results by Drivers With/Without ABS, 16c1	
		ABS	No ABS
True	72.7%	77.2%	71.0%
False	18.4%	16.9%	20.4%
Response to 16c2 Wet pavement?	Overall Results	Results by Drivers With/Without ABS, 16c2	
		ABS	No ABS
True	69.0%	72.6%	70.3%
False	22.0%	21.4%	21.1%
Response to 16c3 Snow-covered pavement?	Overall Results	Results by Drivers With/Without ABS, 16c3	
		ABS	No ABS
True	50.4%	53.4%	52.7%
False	40.7%	40.7%	38.7%
Response to 16c4 Icy pavement?	Overall Results	Results by Drivers With/Without ABS, 16c4	
		ABS	No ABS
True	39.5%	40.0%	42.8%
False	51.5%	54.1%	48.6%
Response to 16c5 Dirt or gravel road?	Overall Results	Results by Drivers With/Without ABS, 16c5	
		ABS	No ABS
True	52.9%	54.8%	55.8%
False	38.1%	39.2%	35.6%

4.1.9 Question 18. Does the antilock brake system activate, or kick in...?

The appropriate response to this question was “Only if the system (ABS) senses the wheels are beginning to (longitudinal) skid”, shortened to “ABS senses skid” below. Overall results to this survey question indicate that the majority of people felt that ABS only activated when the ABS senses a skid. When examined by age, drivers over the age of 60 were the least likely to report that ABS activated when the ABS senses a skid, and most likely to respond “Don’t know”. Drivers in the 36-60 bracket were more likely to answer “Don’t know” than drivers under the age of 35. Men were much more likely to answer “beginning of skid” than women, and correspondingly less likely to reply “Don’t know”. Comparable trends are once again evident by income and education levels. As levels of both increased towards the higher paid, better-educated individuals, there was a drop in the number of “Don’t know” responses, as well as a drop in “As soon as you step on the brake pedal”. As these declined, there was a substantial increase in the number of correct responses, that of “...beginning to skid”, as can be seen in Table 4.12 below. In summary, higher income, well-educated males under the age of 26 would be the most likely individuals to accurately identify when ABS activated.

Table 4.12: Summary of Selected Responses to Question 18

Question 18. Does the antilock brake system activate, or kick in...?								
Response	Overall Results	Gender			Age			
		Male	Female	<26	26-35	36-60	>60	
Soon as brake is used	21.4%	18.4%	24.0%	22.0%	22.9%	20.5%	21.1%	
“Hard” brake pressure	21.9%	22.0%	21.8%	22.5%	20.8%	23.0%	19.4%	
ABS senses skid	31.1%	41.0%	22.0%	37.3%	36.2%	32.0%	20.8%	
Don’t Know	16.3%	9.4%	22.7%	6.5%	9.0%	15.9%	30.9%	

Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Soon as brake is used	25.9%	22.7%	22.3%	15.9%	26.4%	24.4%	21.7%	16.5%
“Hard” brake pressure	19.2%	22.6%	21.1%	24.8%	19.4%	23.0%	20.7%	22.3%
ABS senses skid	26.9%	30.0%	34.4%	40.8%	22.1%	27.4%	30.2%	39.1%
Don’t Know	19.4%	16.3%	11.5%	9.9%	24.0%	16.3%	16.0%	13.5%

4.1.10 Question 19. To brake in the shortest distance possible on a smooth dry road in a car that is equipped with antilock brakes, should drivers...?

The purpose of this question was to determine whether drivers knew that the brake pedal should not be pumped with ABS. Thus, the appropriate response to this question was “Press the brake pedal as hard as you can”.

Overall results to this survey question indicate that the majority of people felt that light pressure was sufficient to stop a car in the shortest distance on a smooth dry road. ABS owners were significantly more likely to respond with light pressure than non-ABS owners. When examined by age, more than half the drivers over the age of 60 thought that light pressure would stop an ABS-equipped vehicle in the shortest possible distance. Drivers over the age of 60 were also more likely to respond with “Don’t know”. Male drivers were significantly more likely to reply “Press the brake pedal as hard as you can” than female drivers were. That same response also gained in significance as both income and education levels rose.

In summary, no group had a majority of individuals that could readily say that pressing the brake pedal hard would bring a vehicle to a stop in the shortest possible distance. Table 4.13 below contains a portion of the overall responses.

Table 4.13: Summary of Selected Responses to Question 19

Question 19. To brake in the shortest distance possible on a smooth dry road in a car that is equipped with antilock brakes, should drivers...?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Apply light pressure	47.7%	45.5%	49.8%	51.1%	43.4%	42.2%	46.8%	47.5%	54.0%
Push hard as possible	27.8%	35.4%	20.6%	31.1%	29.9%	27.0%	27.6%	30.4%	22.3%
Pump brake pedal	15.7%	13.8%	17.7%	14.4%	15.2%	27.3%	19.3%	13.8%	8.3%

Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Apply light pressure	50.4%	51.6%	45.3%	42.6%	49.6%	51.8%	49.6%	41.4%
Push hard as possible	20.9%	24.0%	31.7%	40.0%	19.7%	23.0%	25.9%	36.3%
Pump brake pedal	20.0%	15.8%	16.8%	10.7%	18.7%	16.7%	15.5%	14.6%

4.2 ABS Pedal and Other Feedback

Questions were included to assess drivers’ knowledge regarding ABS brake pedal feedback and whether or not this feedback indicated normal brake system operation. It should be noted that at the time this survey was conducted, prevalent ABS had noticeable brake pedal feedback, while many later systems had reduced levels of feedback.

4.2.1 Question 20. To the best of your knowledge, when the antilock brake system is activated, is it normal for the brake pedal to vibrate, or does vibration mean that there is something wrong with the system?

The purpose of this question was to assess how many people are familiar with ABS related brake pedal feedback. The appropriate response to this question was “Vibration is normal”.

Overall results to this survey question indicate that the majority of people felt that brake pedal vibration meant that something was wrong with the brake system. When examined by age, drivers over age 60 were least likely to report that vibration was normal, and most likely to respond, “Don’t know”. Drivers under age 26 were most likely to respond that something was wrong with the brake system. As age increased, so did the likelihood that the driver would respond to this question with “Don’t know”. By gender, men were much more likely to report that vibration was normal. Increasing levels of income and education saw an increase in awareness that vibration was normal, and a corresponding decline in the response “Something is wrong”, as can be seen in Table 4.14 below. College graduates earning more than \$75K a year would be the drivers most likely to report that pedal vibration is normal during ABS activation.

Table 4.14: Summary of Selected Responses to Question 20

Question 20. To the best of your knowledge, when the antilock brake system is activated, is it normal for the brake pedal to vibrate, or does vibration mean that there is something wrong with the system?								
Response	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Vibration is normal	33.5%	42.1%	25.5%	32.5%	36.4%	35.7%	26.0%	
Something is wrong	45.9%	43.1%	48.7%	55.0%	46.2%	43.9%	44.8%	
Don’t know	20.3%	14.5%	25.7%	12.5%	17.2%	20.1%	29.0%	
Response	Income Level				Education Level			
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Vibration is normal	21.0%	29.7%	39.1%	48.7%	20.8%	29.8%	31.2%	43.1%
Something is wrong	58.3%	50.1%	44.3%	33.1%	61.4%	52.4%	49.1%	32.4%
Don’t know	20.5%	20.2%	16.5%	18.0%	17.8%	17.6%	19.3%	24.1%

4.2.2 Question 21. If you were attempting to stop a vehicle equipped with antilock brakes and the pedal began to vibrate or pulsate, which of the following would you be most likely to do?

The appropriate responses to this question were “Apply the same amount of pressure” (maintain). The response “increase the pressure on the pedal” was also acceptable since this response would have a similar result.

Overall results to this survey question indicated that the majority of people reported they would continue to apply the same amount of pedal pressure in response to brake pedal vibration or

pulsation. An additional 12.2% indicated they would increase the pressure, while 7.2% did not know. ABS owners were more likely to maintain or increase the pressure and less likely to answer, “Don’t know” than non-ABS owners.

When examined by age, drivers over age 60 were least likely to know what they would do if the brake pedal began to vibrate or pulsate during braking. By gender, men were much more likely to report either maintaining or increasing the pressure and less likely to answer “Don’t know”. Increasing levels of income and education saw an increase in the response “Apply the same amount of pressure”, as can be seen in Table 4.15 below. Male college graduates that owned an ABS-equipped vehicle and earned more than \$75K a year would be the drivers most likely to appropriately react to brake pedal vibration.

Table 4.15: Summary of Selected Responses to Question 21

Question 21. If you were attempting to stop a vehicle equipped with antilock brakes and the pedal began to vibrate or pulsate, which of the following would you be most likely to do?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Increase Pressure	12.2%	13.2%	11.4%	13.8%	10.7%	14.8%	11.3%	12.0%	11.6%
Maintain Pressure	29.9%	38.8%	21.6%	35.0%	30.5%	26.2%	31.5%	32.2%	26.2%
Don’t Know	7.2%	3.8%	10.2%	3.2%	9.0%	1.4%	1.8%	6.5%	17.2%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Increase Pressure	11.4%	11.4%	14.0%	14.1%	15.6%	12.1%	10.4%	12.9%	
Maintain Pressure	19.4%	28.0%	35.1%	41.7%	18.1%	26.1%	27.4%	39.5%	
Don’t Know	7.3%	6.6%	5.2%	4.1%	8.9%	7.3%	7.0%	6.0%	

4.2.3 Question 22. If you were attempting to stop a vehicle equipped with antilock brakes and the brake pedal dropped to the floor, which of the following would you be most likely to do?

Overall results to this survey question indicated that the majority of people would pump the brakes if the brake pedal dropped to the floor during use. In certain ABS-equipped vehicles the brake pedal may drop when ABS is activated. The next highest response following “Pump the pedal” was that drivers would take their foot off the brake. There were no observable differences between ABS owners and non-ABS owners.

Younger drivers were significantly more likely to decrease pressure or to take their foot off the brake completely. Men were much more likely to say “pump the pedal” and less likely to say “take foot off the pedal”. One out of two male, high school graduates, and drivers earning between \$30K-50K a year would be the drivers most likely to reply “pump the brake pedal” if their ABS activated and dropped to the floor. A summary of responses can be found in Table 4.16.

Table 4.16: Summary of Selected Responses to Question 22

Question 22. If you were attempting to stop a vehicle equipped with antilock brakes and the brake pedal dropped to the floor, which of the following would you be most likely to do?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Decrease Pressure	5.2%	4.2%	6.2%	5.5%	5.1%	9.5%	5.0%	4.4%	3.7%
Pump Brake Pedal	45.3%	54.4%	36.8%	44.3%	47.8%	39.7%	49.2%	47.9%	40.3%
Take Foot Off Pedal	24.9%	19.6%	30.1%	25.6%	23.5%	32.4%	26.2%	24.1%	20.3%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Decrease Pressure	6.0%	3.6%	6.2%	5.7%	5.0%	3.1%	6.6%	6.2%	
Pump Brake Pedal	44.9%	52.2%	45.8%	41.3%	45.7%	49.4%	48.5%	39.2%	
Take Foot Off Pedal	27.3%	23.8%	23.8%	25.3%	26.3%	24.1%	24.7%	25.8%	

4.2.4 Question 23. What does it mean if the brake pedal pushes up against your foot while you are braking in a vehicle equipped with antilock brakes?

In some vehicles, during normal ABS activation the brake pedal may become firm, giving the driver the feeling that the brake pedal is pushing up against their foot. Thus, the appropriate response to this question was “ABS is activated”.

Overall results to this survey question indicated that there was no single response that drivers favored most. The responses “ABS Activated”, “Brake Malfunction” and “Don’t Know” were equal at approximately 31%. ABS owners were more likely to report that brake pedal “firmness” indicated that active ABS was activated, equally likely to say it was a malfunction, and less likely to respond “Don’t know” than the non-ABS owners.

There were significant increases in “Don’t know” responses as driver age increased from bracket to bracket, culminating at 47% of the drivers over age 60. Only 21% of drivers over 60 responded with the correct answer. A plurality of women (40%) did not know the meaning of this type of pedal feedback, and were significantly more likely not to know than men. When examined by income level, observable trends can be found in the responses “ABS Activated” (increasing) and “Brake Malfunction” (decreasing), with significance between the lower and higher income brackets. Identical significant trends are clear among drivers with a high school education level or less and the more educated drivers. A summary of selected responses can be seen in Table 4.17 below. In summary, drivers over 60, women and non-ABS owners are individuals least likely to report that when the brake pedal applies pressure to their foot that ABS is activated.

Table 4.17: Summary of Selected Responses to Question 23

Question 23. What does it mean if the brake pedal pushes up against your foot while you are braking in a vehicle equipped with antilock brakes?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
ABS Activated	31.2%	35.7%	27.1%	35.1%	30.1%	34.6%	30.3%	34.5%	21.4%
Brake Malfunction	30.1%	33.7%	26.8%	31.5%	28.9%	40.6%	35.5%	26.5%	26.0%
Don't Know	31.9%	23.8%	39.7%	26.0%	35.7%	15.7%	25.4%	33.7%	46.9%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
ABS Activated	27.6%	29.4%	35.3%	39.1%	21.5%	27.5%	32.4%	37.2%	
Brake Malfunction	35.9%	31.2%	28.8%	26.7%	39.0%	35.9%	30.0%	21.9%	
Don't Know	28.1%	32.5%	31.0%	28.1%	27.1%	30.1%	31.6%	35.3%	

4.2.5 Question 24. What does a clicking or ratcheting noise mean during severe braking when driving a vehicle equipped with and antilock braking system?

In certain ABS-equipped vehicles, a clicking or ratcheting noise can be heard when ABS is activated. Therefore the appropriate response to this question was “ABS is activated”.

Overall results to this survey question indicated that the majority of people responded with “brake malfunction” if they heard a clicking or ratcheting noise. Only 20% stated that it meant the ABS was activated, with no significant difference between drivers with and without ABS in the responses “ABS is activated” and “Brake malfunction”. However, drivers without ABS were more likely to answer, “Don’t know”.

There were significant increases in “Don’t know” responses as driver age increased, reaching a high of 42.1% for drivers over age 60. The over 60 group was also the least likely to reply that ABS was active. The majority of women (35.9%) did not recognize this type of auditory feedback, and were significantly less likely than men to answer correctly “ABS activated”. As both income and education levels increase, a gradual increase in correct responses and a gradual decrease in “Brake Malfunction” can be seen. A summary of these selected responses can be seen in Table 4.18 below.

Once again, drivers over 60, women and non-ABS owners are individuals least likely to know that when they hear clicking or ratcheting during severe braking that ABS is activated.

Table 4.18: Summary of Selected Responses to Question 24

Question 24. What does a clicking or ratcheting noise mean during severe braking when driving a vehicle equipped with and antilock braking system?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
ABS Activated	20.4%	26.5%	14.5%	23.8%	20.6%	20.4%	22.6%	21.6%	14.5%
Brake Malfunction	43.3%	46.0%	40.8%	44.8%	40.4%	52.4%	47.0%	41.4%	37.8%
Don't Know	28.5%	20.4%	35.9%	23.7%	30.6%	14.5%	19.9%	30.8%	42.1%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
ABS Activated	11.8%	16.8%	23.4%	32.8%	12.2%	17.7%	19.0%	26.6%	
Brake Malfunction	50.6%	48.9%	43.6%	33.0%	52.8%	45.8%	46.0%	35.9%	
Don't Know	27.1%	27.6%	25.6%	27.3%	20.5%	28.7%	27.8%	31.0%	

4.2.6 Question 25. What does it mean if you feel the steering wheel shake or vibrate during severe braking when driving a vehicle equipped with antilock brakes?

The appropriate response to this question was “Brake rotors are warped or damaged”. Vehicles will experience steering wheel shake under braking when variations in the front brake rotor thickness exceed the run-out specification, more commonly referred to as a “warped” rotor. Vibration during braking can also come from warped rotors. This question was inserted into the survey to see if respondents would relate other brake problems to normal ABS behavior.

Overall results showed that only 14.1% of respondents related vibration or steering wheel shake to ABS activation. The most popular answer, warped rotor, was given by 37.5% of the respondents. The other sizeable responses are listed below in Table 4.19. No noticeable differences in response existed between the ABS and non-ABS drivers. As driver age increased, so did “Don’t know” responses, while correct responses decreased accordingly. This meant that fewer drivers over 60 knew what steering wheel shake or vibration under braking meant than did know. Men were much more likely to answer correctly than women, and less than half as likely to respond “Don’t know”. Oddly enough, as income and education level increased, so did the likelihood that this braking condition would be attributed to ABS. Correct responses fell at the same time. In summary, non-ABS related problems felt during braking are more likely to be correctly identified as a warped rotor than blamed on ABS.

Table 4.19: Summary of Selected Responses to Question 25

Question 25. What does it mean if you feel the steering wheel shake or vibrate during severe braking when driving a vehicle equipped with antilock brakes?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
ABS Activated	14.1%	15.9%	12.5%	15.3%	14.6%	17.9%	15.9%	14.5%	8.2%
Warped Rotors	37.5%	45.8%	29.7%	39.4%	39.0%	42.6%	41.6%	38.9%	26.4%
Brake Malfunction	22.1%	20.8%	23.3%	21.1%	21.4%	22.7%	23.8%	20.8%	24.3%
Don’t Know	20.2%	12.1%	27.7%	16.8%	20.7%	10.2%	14.7%	20.3%	31.9%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
ABS Activated	8.5%	11.1%	15.8%	24.3%	10.4%	10.5%	13.5%	19.4%	
Warped Rotors	39.4%	44.4%	39.2%	32.5%	36.8%	41.5%	39.5%	32.3%	
Brake Malfunction	24.0%	21.7%	21.8%	19.1%	27.3%	22.1%	22.5%	20.1%	
Don’t Know	19.4%	17.5%	17.0%	19.8%	17.2%	19.1%	18.6%	23.0%	

4.3 Activation Experience

4.3.1 Questions 26a-e. Related questions assessing drivers’ perception and subjective responses towards activation of ABS on their vehicle.

- 26a. To the best of your knowledge, has the antilock brake system on your (year, make, model) ever been activated when you braked?
- 26b. Please tell me all the reasons you know that your antilock brakes were activated.
- 26c. Did the antilock brakes perform as you expected on that occasion?
- 26d. Please tell me which ones apply to that occasion.
- 26e. During the past year, about how often would you say that you have activated your antilock brakes?

This question was directed at those respondents who had earlier indicated they thought their vehicles were equipped with ABS (question 12). Overall results to these survey questions revealed that 57.8% of the surveyed drivers felt that their ABS had been activated at least once. Their reasons for this included changes in pedal pressure (49.3%), pedal vibration (46%), and auditory feedback (32.1%). Nearly all of those drivers felt the ABS performed as expected (91.8%). Of the minority that did not, 60% attributed perceived ABS shortcomings to unsatisfactory stopping time. However, this group was so small (only 42 drivers) that the reader is reminded that results based on sample sizes smaller than 50 are not considered to be statistically valid. Responses regarding frequency of activation included a few times a year (37.6%), a few days a month (15.6%), and daily or almost daily (16.4%). Men were significantly more likely to have indicated that their ABS had been activated at least once (64.4% versus 51.1% for women). An examination of the remaining weighted cross tabulations reveals little in the way of significance, though one peculiarity stands out. Drivers over 60 represent the smallest group of respondents who felt their ABS had been activated at least once (49.6%), but a full 30% from this same group felt their ABS activated daily or near daily, twice as likely as the other age brackets. A summary of selected responses can be seen in Table 4.20.

Table 4.20: Summary of Selected Responses to Questions 26a-e

Questions 26a-e. Related questions assessing drivers' perception and subjective responses towards activation of ABS on their vehicle.								
Response to Q.26a	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Yes	57.8%	64.4%	51.1%	58.5%	57.9%	60.7%	49.6%	
No	29.3%	27.2%	31.3%	34.1%	29.0%	26.1%	33.2%	
Response to Q.26a		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	50.3%	50.8%	59.8%	69.1%	44.1%	52.8%	59.3%	64.3%
No	34.6%	35.1%	28.4%	20.6%	42.2%	33.6%	30.0%	21.6%
Response to Q.26b	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Pedal Pressure Change	49.3%	47.6%	51.7%	57.8%	52.3%	50.4%	34.9%	
Pedal Vibration	46.0%	51.6%	39.1%	38.5%	48.3%	49.9%	38.7%	
Heard Noise	32.1%	31.4%	32.5%	29.1%	33.8%	34.8%	23.8%	
Response to Q.26b		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Pedal Pressure Change	52.3%	48.8%	59.0%	50.0%	36.1%	48.7%	57.0%	47.1%
Pedal Vibration	36.9%	40.1%	45.5%	55.9%	30.5%	41.3%	42.2%	55.3%
Heard Noise	26.5%	25.2%	31.3%	43.0%	20.5%	27.7%	30.0%	38.6%
Response to Q.26c	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Yes	91.8%	90.9%	92.9%	90.8%	90.0%	92.8%	91.0%	
No	5.5%	6.2%	4.5%	9.0%	7.9%	4.0%	4.4%	
Response to Q.26c		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	84.8%	89.8%	95.2%	95.8%	89.6%	90.9%	93.0%	91.9%
No	12.9%	6.8%	4.8%	1.1%	6.7%	7.5%	6.2%	3.1%
Response to Q.26d	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Did not Stop Fast Enough	59.8%	61.6%	56.5%	65.1%	75.4%	59.3%	18.6%	
Pedal Did not Feel Right	30.5%	31.9%	28.0%	8.8%	43.1%	39.4%	18.6%	
Brake Sounds Not Right	12.0%	13.7%	9.1%	10.7%	21.8%	6.7%	9.7%	
Response to Q.26d		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Did not Stop Fast Enough	62.5%	53.9%	72.9%	22.0%	40.0%	67.4%	83.8%	21.3%
Pedal Did not Feel Right	17.5%	47.6%	60.2%	22.0%	60.0%	21.1%	46.5%	17.1%
Brake Sounds Not Right	8.4%	0.0%	40.4%	22.0%	0.0%	12.6%	23.0%	0.0%
Response to Q.26e	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Daily/Almost Daily	16.4%	18.7%	13.6%	12.6%	16.2%	13.2%	30.5%	
Few Days a Month	15.6%	18.1%	12.5%	27.8%	18.2%	12.5%	12.0%	
Few Times a Year	37.6%	36.0%	40.0%	39.2%	36.1%	42.4%	23.8%	
Response to Q.26e		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Daily/Almost Daily	22.4%	13.7%	14.8%	16.1%	28.5%	16.3%	15.3%	15.5%
Few Days a Month	11.0%	10.4%	14.1%	4.4%	8.8%	9.4%	12.2%	7.0%
Few Times a Year	18.3%	12.3%	15.7%	18.2%	17.5%	18.3%	14.1%	14.7%

4.3.2 **Question 27. Have you ever activated the antilock brake system on any car you were driving?**

This question was directed at those respondents who had earlier indicated that the ABS on their ABS-equipped vehicle had not been activated (question 26a). Overall results to this survey question indicated that the majority of drivers (63.3%) felt they had not activated ABS on another vehicle either. Non-ABS owners were much more likely to reveal that had activated the ABS in a car other than their own than ABS owners.

Drivers under the age of 35 held comparable positions in that both groups were considerably more likely to have activated ABS than drivers 36 and above. Only 13% of drivers over 60 reported they had activated ABS on another car, with 73% answering that they had not, each representing the extreme low and high of all ages, respectively. The responses of women were comparable to older drivers, with 16.1% answering “Yes” and 68.9% saying “No”; each in noticeable contrast to male responses. Examinations of income and education levels revealed that higher earning better-educated drivers were more likely to answer “Yes” and less likely to answer “No” than the lower brackets. A summary of selected responses can be seen in Table 4.21 below. In summary, drivers over 60 and women are the individuals least likely to report they had activated the ABS in another ABS-equipped car.

Table 4.21: Summary of Selected Responses to Question 27

Question 27. Have you ever activated the antilock brake system on any car you were driving?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	25.6%	36.8%	16.1%	15.3%	14.6%	31.1%	33.9%	26.1%	13.0%
No	63.3%	56.8%	68.9%	39.4%	39.0%	61.4%	58.1%	62.0%	72.9%
Don't Know	10.9%	6.3%	14.9%	16.8%	20.7%	7.3%	7.9%	11.9%	14.0%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	18.3%	24.5%	33.0%	33.9%	22.5%	22.6%	25.7%	30.2%	
No	72.3%	64.9%	56.0%	54.7%	67.7%	66.3%	64.5%	57.4%	
Don't Know	9.2%	10.7%	11.0%	11.5%	9.8%	10.9%	9.9%	12.3%	

4.3.3 **Questions 28a-c. Related questions assessing drivers’ reaction towards activation of ABS on their vehicle.**

- 28a. Have you ever been startled by the way your brake pedal felt when you tried to stop quickly in a car with antilock brakes?
- 28b. How did the pedal react?
- 28c. Did you ever take your foot off the pedal when this happened?

Overall results to these survey questions revealed that 61% of the surveyed drivers said they had never been startled by ABS activation. When asked to describe how the pedal reacted, 51% of the respondents said it vibrated or pumped, another 21.1% reported experiencing a change in pressure, while 11.4% claimed it made a noise. Slightly less than half the drivers reported taking their foot off the pedal (45%). However, the majority did not (52%). Owners of cars without ABS were significantly more likely to report being startled by ABS behavior, more likely to notice and describe its response as pedal vibration or pumping, and more likely to take their foot off the pedal during ABS activation than ABS owners.

Based on their responses, women were more likely to be startled than men, reporting pedal vibration as the prominent indicator of activation, and reacted without bias; 49.1 percent took their foot off the pedal, 49 percent did not. Drivers aged 26-60 years were most likely to report being startled by ABS activation, more than half describing pedal reaction as vibration or pumping, with both age groups more likely to keep their foot on the brake. In response to Q.28a, no single income level was significant when compared to the others. Increasing levels of income saw increased response to reporting pedal vibration, but driver reaction was consistent with overall results; the majority of drivers in all groups kept their foot on the pedal during ABS activation. Increasing levels of education saw an increasing trend in drivers reporting being startled but this did not impact whether they kept their foot on the pedal or not.

In summary, though several groups expressed surprise over how ABS felt when activated, there were no observable patterns in how this effected when drivers took their foot off the pedal. A summary of these and other selected responses can be seen in Table 4.22 below.

Table 4.22: Summary of Selected Responses to Questions 28a-c

Questions 28a-c. Related questions assessing drivers' reaction towards activation of ABS on their vehicle.									
Response to Q.28a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	37.8%	34.6%	42.3%	33.7%	46.5%	30.8%	43.9%	42.7%	19.0%
No	61.0%	64.5%	56.1%	65.6%	51.4%	66.4%	55.7%	56.3%	79.8%
Response to Q.28a	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	36.4%	40.9%	40.0%	38.4%	27.7%	33.6%	40.0%	41.6%	
No	61.3%	57.8%	59.8%	60.9%	70.2%	64.8%	59.5%	57.2%	
Response to Q.28b	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Vibrated/Pumped	51.0%	54.3%	47.4%	47.9%	58.3%	46.9%	56.2%	52.3%	29.6%
Felt Stiff/Hard to Push	21.1%	20.9%	21.2%	20.9%	23.5%	32.0%	15.2%	20.1%	30.7%
Made Noise	11.4%	13.0%	9.6%	12.7%	11.8%	8.8%	11.0%	10.6%	20.2%
Response to Q.28b	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Vibrated/Pumped	38.9%	45.5%	51.2%	57.1%	31.8%	48.5%	45.3%	59.3%	
Felt Stiff/Hard to Push	28.8%	21.8%	21.1%	18.5%	37.2%	16.2%	27.6%	17.5%	
Made Noise	6.4%	8.4%	14.0%	16.2%	10.1%	9.0%	7.4%	16.1%	
Response to Q.28c	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	45.0%	41.4%	49.1%	41.6%	51.1%	44.2%	42.2%	47.9%	32.3%
No	52.0%	54.7%	49.0%	55.1%	46.0%	55.0%	55.5%	48.8%	60.2%
Response to Q.28c	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	48.1%	42.8%	43.2%	46.7%	54.3%	40.9%	49.8%	42.5%	
No	51.0%	56.3%	53.4%	49.4%	45.7%	55.5%	47.3%	54.4%	

4.3.4 Questions 29a-b. Related questions assessing if and how drivers associate ABS performance to crashes.

- 29a. Have you ever had a crash which you feel was caused, at least in part, by your antilock brakes?
- 29b. How did the ABS system contribute to the crash?

Overall results to question 29a revealed that almost none of the drivers blamed ABS (96.6 percent answered “No”) for a crash they had experienced. The cross tabulations failed to produce any significant results due to the extreme imbalance in the responses. The responses to 29b included ABS not stopping the vehicle fast enough, it malfunctioned, locked the wheels, or otherwise caused loss of control. However, the sample size for question 29b was so small (36 drivers) that the results are not considered statistically valid. The majority of these responses can be seen in Table 4.23 below.

Table 4.23: Summary of Selected Responses to Questions 29a-b

Questions 29a-b. Related questions assessing if and how drivers associate ABS performance to crashes.									
Response to Q.29a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	2.3%	2.5%	1.9%	2.2%	2.4%	4.1%	2.6%	1.9%	0.3%
No	96.6%	96.8%	96.3%	96.6%	96.4%	95.5%	96.4%	97.1%	97.2%
Response to Q.29a	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	5.0%	3.7%	0.6%	0.7%	2.5%	4.0%	2.3%	1.0%	
No	94.1%	95.4%	98.4%	98.0%	95.3%	95.3%	96.3%	98.0%	
Response to Q.29b	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Did not stop fast enough	48.1%	46.2%	62.3%	63.2%	25.3%	67.6%	56.3%	40.7%	100.0%
ABS Malfunction	26.3%	34.9%	11.2%	25.7%	43.1%	19.5%	43.7%	29.6%	0.0%
Response to Q.29b	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Did not stop fast enough	71.3%	30.2%	75.0%	77.7%	0.0%	51.9%	55.3%	67.9%	
ABS Malfunction	18.1%	45.8%	25.0%	22.3%	77.8%	24.2%	30.1%	9.4%	

4.3.5 Question 30. Do you feel that your antilock brakes have ever allowed you to avoid a crash that would have been unavoidable with standard brakes?

Overall results to this survey question show that 40.4 percent of surveyed drivers reported that ABS had allowed them to avoid a crash that would have been unavoidable with standard brakes. Owners of cars with ABS were just as likely to answer “Yes” as “No” (45 percent versus 47 percent) and significantly more likely to answer “Yes” than non-ABS owners.

Female respondents showed similar numbers of yes and no responses (44.4 percent “Yes” versus 47.1 percent “No”) and were significantly more likely to answer “Yes” than men. When examined by age bracket, the younger drivers were more likely to answer “Yes” than the older but no other trends existed. Responses by income class followed the overall response average with the exception

of the \$50K-\$75K bracket, which answered “Yes” only 37.5 percent of the time, and “No” 57.5 percent. College graduates held a similar response pattern, with 35 percent “Yes” and 55 percent “No”. Drivers with less than a high school education did not follow the overall average, with more drivers answering “Yes” than “No” (50.7 percent versus 42 percent). In summary, female car owners with ABS and individuals with less than a high school education are the type of drivers most likely to credit ABS with avoiding an otherwise unavoidable crash. A portion of the responses can be seen in Table 4.24 below.

Table 4.24: Summary of Selected Responses to Question 30

Question 30. Do you feel that your antilock brakes have ever allowed you to avoid a crash that would have been unavoidable with standard brakes?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	40.4%	37.7%	44.4%	45.0%	29.3%	45.5%	40.5%	41.0%	33.7%
No	52.4%	55.9%	47.1%	47.8%	63.2%	50.3%	55.8%	51.0%	52.2%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	42.9%	46.4%	37.5%	40.3%	50.7%	42.1%	43.8%	35.0%	
No	47.4%	49.8%	57.5%	51.8%	42.0%	51.8%	51.7%	55.0%	

4.4 ABS Behavioral Adaptation

Behavioral adaptation, relating to automotive safety features, is a theoretical concept that states that as additional safety features are added to vehicles, drivers will alter their behavior in a way that results in decreased safety, e.g., by becoming less cautious or driving more aggressively. (When combined with the effects of the added safety features, this change in driver behavior may result in less of an improvement in safety than might otherwise be expected.) This change in behavior may be attributable to drivers’ beliefs that the added safety features will prevent them from having a crash or being injured. In an attempt to determine whether this phenomenon might be contributing to crashes, questions were included to see whether drivers would provide responses which would suggest that their behavior might be different as a result the presence of ABS on their vehicle.

4.4.1 Question 16a2. Do ABS allow you to follow other vehicles more closely than you could with standard brakes?

Despite the enhancement of braking abilities afforded by ABS in some circumstances, following vehicles closely is considered risky regardless of brake system. However, approximately 16 percent of respondents reported that ABS did allow them to follow other vehicles more closely than they could with standard brakes. This finding was comprised of 17 percent of ABS-equipped vehicle owners and 12 percent of non-ABS-equipped vehicle owners. Responses can be seen in Table 4.25.

Table 4.25: Summary of Selected Responses to Question 16a

Question 16a2. Do ABS allow you to follow other vehicles more closely than you could with standard brakes?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
True	15.7%	16.4%	14.9%	16.9%	12.2%	25.7%	17.1%	13.3%	12.7%
False	77.9%	80.6%	75.9%	79.8%	81.0%	72.9%	80.8%	80.8%	73.5%
Don't Know	6.1%	2.7%	9.0%	2.9%	6.7%	1.3%	2.1%	5.7%	13.1%
Response	Income Level				Education Level				
	<\$30K	▶\$49.9K	▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
True	20.9%	17.3%	11.3%	14.2%	24.2%	17.0%	15.8%	12.0%	
False	71.6%	77.5%	84.6%	82.1%	66.4%	76.3%	78.5%	83.2%	
Don't Know	7.5%	5.2%	3.8%	3.7%	9.4%	6.5%	5.3%	4.8%	

4.4.2 Questions 17a1-c4. Yes and no questions assessing a driver's adaptive tendencies to ABS.

For certain types of loosely packed surfaces (e.g., gravel or snow covered), ABS can produce stopping distances greater than those possible with a standard brake system. Under some severe road conditions, driving is a risky undertaking regardless of brake system. This question attempted to assess drivers' willingness to expose themselves to these less than optimal road conditions (the idea being that under some poor road conditions some drivers may choose to stay home rather than drive under those conditions). Increased exposure to adverse road conditions could then be used to infer increased exposure to crashes.

This question was divided into the following three main categories of driving *tasks*: the increased likelihood that a driver will *drive* on road surfaces with varying degrees of traction; the increased likelihood that a driver will *drive faster* on road surfaces with varying degrees of traction; and, the increased likelihood that a driver will *pass another vehicle* on road surfaces with varying degrees of traction.

Overall results to these survey questions revealed that 52 percent to 37 percent of the surveyed drivers would be more likely to drive as road conditions worsened (reduced traction) given the presence of ABS on their vehicle. These numbers fell to between 19.9 percent to 7.6 percent (inclusive) when asked of the likelihood of driving faster, and between 33.8 percent and 7.9 percent (inclusive) when asked of the likelihood of passing another vehicle. A comparison between drivers whose cars had ABS and those who did not revealed that ABS owners were more likely to drive on any of the given road conditions, more likely to pass in dry and wet conditions, and more likely to pass in dry, wet and snowy conditions. Regardless of conditional traction (dry, wet, snow-covered, or icy), drivers under the age of 26 were consistently above average in likeliness to drive, drive faster, and pass other vehicles, while drivers over the age of 60 were always below average. The three previously mentioned categories of driving tasks are examined individually below.

The first set of questions addressed the increased likelihood that a driver will drive on road surfaces with varying degrees of traction. The following questions focused on that aspect, and Table 4.26 summarizes the overall responses to question 17a.

- 17a1. With antilock brakes, would you be more likely to drive on...wet roads?
- 17a2. With antilock brakes, would you be more likely to drive on...snow-covered roads?

17a3. With antilock brakes, would you be more likely to drive on...icy roads?

Table 4.26: Summary of Selected Responses to Questions 17a1-3

Questions 17a1-c4. Yes and no questions assessing a driver's adaptive tendencies to ABS.								
Response to Q17a1 Wet Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	52.0%	65.7%	54.3%	50.9%	42.1%	57.7%	45.4%	
No	42.5%	33.0%	43.7%	44.2%	45.2%	39.1%	49.4%	
Response to Q17a1 Wet Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	58.0%	54.7%	53.5%	46.4%	58.5%	56.2%	55.9%	43.0%
No	35.0%	40.1%	43.8%	50.5%	33.3%	38.2%	39.0%	52.5%
Response to Q17a2 Snow-Covered Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	44.2%	54.0%	41.7%	45.1%	36.1%	48.9%	40.0%	
No	50.4%	44.7%	56.2%	50.0%	51.1%	47.9%	54.8%	
Response to Q17a2 Snow-Covered Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	48.0%	44.0%	45.6%	42.0%	48.8%	47.2%	46.1%	38.4%
No	45.0%	50.8%	51.8%	54.9%	43.0%	47.2%	48.8%	57.1%
Response to Q17a3 Icy Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	36.7%	46.9%	34.6%	37.0%	30.1%	41.1%	33.4%	
No	57.8%	51.8%	63.4%	58.1%	57.1%	55.7%	61.3%	
Response to Q17a3 Icy Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	39.6%	38.0%	38.1%	34.4%	41.3%	39.0%	38.7%	31.7%
No	53.3%	56.8%	59.2%	62.6%	50.5%	55.4%	56.3%	63.9%

The second set of questions addressed the increased likelihood that a driver will drive faster on road surfaces with varying degrees of traction. These surfaces included pavement that was dry, wet, snow-covered and icy. The following questions focused on that aspect, and Table 4.27 summarizes the overall responses to question 17b.

- 17b1. With antilock brakes, would you be more likely to drive faster on...dry roads?
- 17b2. With antilock brakes, would you be more likely to drive faster on...wet roads?
- 17b3. With antilock brakes, would you be more likely to drive faster on...snow-covered roads?
- 17b4. With antilock brakes, would you be more likely to drive faster on...icy roads?

Table 4.27: Summary of Selected Responses to Questions 17b1-4

Questions 17a1-c4. Yes and no questions assessing a driver's adaptive tendencies to ABS.								
Response to Q17b1 Dry Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	19.9%	33.0%	25.4%	16.3%	12.0%	23.1%	15.1%	
No	76.3%	65.5%	72.9%	80.5%	79.3%	74.7%	81.1%	
Response to Q17b1 Dry Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	26.4%	23.6%	15.6%	14.7%	34.8%	23.0%	20.8%	11.3%
No	68.7%	73.1%	81.9%	83.8%	57.6%	73.7%	75.7%	85.6%
Response to Q17b2 Wet Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	13.1%	22.9%	14.5%	11.3%	8.0%	15.1%	10.1%	
No	83.1%	75.6%	83.7%	85.5%	83.3%	82.7%	86.2%	
Response to Q17b2 Wet Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	16.6%	16.1%	10.1%	10.5%	21.3%	15.2%	13.2%	8.2%
No	78.5%	80.6%	87.4%	88.0%	71.0%	81.5%	83.3%	88.7%
Response to Q17b3 Snow-Covered Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	9.0%	13.1%	9.1%	8.9%	5.2%	10.8%	7.1%	
No	87.2%	85.4%	89.1%	87.8%	86.1%	87.0%	89.2%	
Response to Q17b3 Snow-Covered Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	10.0%	11.2%	8.6%	7.5%	10.4%	10.4%	9.1%	6.9%
No	85.1%	85.5%	89.0%	91.1%	81.9%	86.3%	87.4%	90.0%
Response to Q17b4 Icy Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	7.6%	12.2%	7.3%	7.1%	4.8%	8.9%	5.8%	
No	88.6%	86.4%	90.9%	89.7%	86.5%	88.9%	90.4%	
Response to Q17b4 Icy Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	8.2%	8.6%	7.6%	6.8%	8.2%	9.0%	7.9%	5.5%
No	86.8%	88.1%	89.9%	91.8%	84.1%	87.7%	88.6%	91.3%

The final set of questions addressed the increased likelihood that a driver will pass another vehicle on road surfaces with varying degrees of traction. These surfaces also included pavement that was dry, wet, snow-covered and icy. The following questions focused on this aspect of driver knowledge, and Table 4.28 summarizes the overall responses to question 17c.

- 17c1. With antilock brakes, would you be more likely to pass another vehicle on...dry roads?
- 17c2. With antilock brakes, would you be more likely to pass another vehicle on...wet roads?
- 17c3. With antilock brakes, would you be more likely to pass another vehicle on...snow-covered roads?

17c4. With antilock brakes, would you be more likely to pass another vehicle on...icy roads?

Table 4.28: Summary of Selected Responses to Questions 17c1-4

Questions 17a1-c4. Yes and no questions assessing a driver's adaptive tendencies to ABS.								
Response to Q17c1 Dry Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	33.8%	45.0%	34.6%	31.2%	30.4%	37.8%	25.5%	
No	62.7%	53.0%	64.3%	66.3%	61.3%	60.0%	71.4%	
Response to Q17c1 Dry Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	45.0%	38.1%	29.5%	23.3%	45.8%	40.6%	37.0%	21.0%
No	51.0%	58.8%	69.2%	75.2%	46.5%	56.2%	60.3%	76.3%
Response to Q17c2 Wet Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	19.6%	29.8%	20.8%	18.7%	13.1%	23.5%	13.7%	
No	76.9%	68.1%	78.0%	78.7%	78.6%	74.2%	83.2%	
Response to Q17c2 Wet Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	23.5%	22.4%	19.7%	14.0%	26.0%	23.9%	22.6%	11.5%
No	72.5%	74.4%	79.0%	84.5%	66.3%	72.9%	74.8%	85.8%
Response to Q17c3 Snow-Covered Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	10.0%	15.0%	9.9%	9.4%	7.3%	12.0%	7.1%	
No	86.5%	83.0%	89.0%	88.0%	84.5%	85.8%	89.8%	
Response to Q17c3 Snow-Covered Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	11.9%	11.1%	9.5%	7.6%	10.1%	11.5%	12.4%	6.6%
No	84.1%	85.7%	89.2%	90.8%	82.3%	85.4%	85.0%	90.7%
Response to Q17c4 Icy Roads	Overall Results	Age of Respondents				Driver's Cars With:		
		<26	26-35	36-60	>60	ABS	No ABS	
Yes	7.6%	12.5%	7.5%	7.3%	5.4%	8.9%	5.5%	
No	88.6%	85.5%	91.4%	90.1%	86.3%	88.9%	91.4%	
Response to Q17c4 Icy Roads		Income Level			Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.
Yes	9.9%	7.7%	7.2%	6.7%	7.8%	9.0%	9.6%	5.2%
No	86.1%	89.1%	91.5%	91.8%	84.5%	87.9%	87.8%	92.0%

4.4.3 Cross-Tabulation of Questions 17 and 30

This section focuses on how a driver's willingness to drive, drive faster, and pass other vehicles on road surfaces with varying degrees of traction interacted with the likelihood of them reporting nearly being in a crash. According to the theory of behavioral adaptation, as additional safety features are added to vehicles drivers may alter their behavior by taking additional risks in response to the responses to the presumed added safety afforded by the new equipment. This theory of behavioral adaptation relies on a driver's knowledge of the safety feature, which can come from either direct experience with the safety feature or exposure to information about its benefits. Due to the nature of

this questionnaire, it is impossible to say whether drivers first narrowly avoided an accident, and thus were more willing to drive, drive faster and pass other vehicles on road surfaces with varying degrees or that this willingness is the factor that had placed them into a near accident situation to begin with. Either way, the results showed that drivers who had indicated they were more likely to drive on wet, snow-covered and icy roads as being significantly more likely to report that ABS allowed them to avoid an otherwise unavoidable crash. Additionally, results showed that drivers who had previously indicated they were more likely to drive faster and pass other vehicles in both dry and wet road conditions were also significantly more likely to report that ABS allowed them to avoid and otherwise unavoidable crash. A portion of these results can be seen in Table 4.29 below.

Table 4.29: Summary of Cross-Tabulated Results of Questions 17 and 30

17a1. With antilock brakes, would you be more likely to drive on... wet roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	72.4%	43.0%	52.0%
No	26.9%	55.3%	42.5%
17a2. With antilock brakes, would you be more likely to drive on... snow-covered roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	61.0%	36.8%	44.2%
No	38.0%	61.6%	50.4%
17a3. With antilock brakes, would you be more likely to drive on... icy roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	51.6%	32.2%	36.7%
No	47.6%	66.2%	57.8%
17b1. With antilock brakes, would you be more likely to drive faster on... drv roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	30.3%	13.4%	19.9%
No	69.2%	85.2%	76.3%
17b2. With antilock brakes, would you be more likely to drive faster on... wet roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	20.2%	9.0%	13.1%
No	79.3%	89.6%	83.1%
17b3. With antilock brakes, would you be more likely to drive faster on... snow-covered roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	12.3%	7.6%	9.0%
No	87.2%	91.0%	87.2%
17b4. With antilock brakes, would you be more likely to drive faster on... icy roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	10.3%	6.4%	7.6%
No	89.2%	92.2%	88.6%
17c1. With antilock brakes, would you be more likely to pass another vehicle on... drv roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	45.6%	23.7%	33.8%
No	53.4%	75.2%	62.7%
17c2. With antilock brakes, would you be more likely to pass another vehicle on... wet roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	31.3%	14.8%	19.6%
No	67.7%	84.1%	76.9%
17c3. With antilock brakes, would you be more likely to pass another vehicle on... snow-covered roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	13.8%	8.0%	10.0%
No	85.2%	90.9%	86.5%
17c4. With antilock brakes, would you be more likely to pass another vehicle on... icy roads?			
Response	ABS Has Helped Avoid Crash	ABS Hasn't Helped Avoid Crash	Total
Yes	9.9%	6.1%	7.9%
No	89.1%	92.9%	88.7%

4.5 Purchase Experience and Preferences

4.5.1 Questions 31a-b. Related questions assessing driver history of automotive purchases.

31a. Have you ever purchased a brand new car (not counting vans, minivans, sport utility vehicles)?

31b. In what year was your most recent purchase?

Some questions were included in the survey to determine how information about ABS is transmitted to people shopping for a new vehicle. Overall results to these survey questions reveal that 56 percent of surveyed drivers report that, “Yes,” they had purchased a brand new car, with most of these purchases occurring in the 1995-1999 timeframe. ABS owners were much more likely to have purchased a new vehicle than non-ABS owners, and that car was bought in the 1995-1999 timeframe 62.9 percent of the time.

Though there were no differences in gender, obvious disparities can be seen when the responses are examined by age, education, and income level. With increasing age comes an increasing trend of respondents reporting having purchased new vehicles, with drivers over age 60 answering “Yes” more than 4 times as much as drivers under the age of 26, and nearly all drivers under age 26 buying cars in 1995-1999. Income and age also revealed increasing trends; both categories saw a difference from lowest to highest of nearly a 1:2 margin. Higher income and better-educated drivers were more likely to have purchased a car in 1995-1999. In summary, the higher the age, income and education level was, the more likely that driver had purchased a new car in the 1995-1999 timeframe. A portion of the responses can be seen in Table 4.30 below.

Table 4.30: Summary of Selected Responses to Questions 31a-b

Questions 31a-b. Related questions assessing driver history of automotive purchases.									
Response to Q.31a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	56.0%	54.9%	56.9%	65.5%	48.9%	18.7%	45.6%	64.6%	74.7%
No	43.8%	45.0%	42.7%	34.5%	51.0%	81.3%	54.4%	35.2%	24.3%
Response to Q.31a	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	38.3%	53.7%	59.7%	72.2%	27.5%	50.9%	54.7%	70.2%	
No	61.7%	45.8%	40.1%	27.5%	71.5%	49.0%	45.1%	29.6%	
Response to Q.31b	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
1985-1989	12.1%	11.0%	13.0%	7.3%	18.5%	0.0%	9.0%	13.6%	12.7%
1990-1994	24.8%	22.9%	26.6%	22.5%	29.6%	13.3%	27.3%	26.3%	23.3%
1995-1999	50.4%	54.0%	47.2%	62.9%	33.1%	84.4%	63.2%	45.9%	45.5%
Response to Q.31b	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
1985-1989	12.7%	14.4%	11.6%	9.6%	11.6%	13.2%	11.2%	12.1%	
1990-1994	23.8%	26.1%	26.0%	22.8%	37.4%	25.1%	24.2%	23.6%	
1995-1999	44.2%	43.7%	52.0%	61.6%	30.1%	49.3%	49.0%	54.8%	

4.5.2 Question 32. When you were shopping for that car, did the salesman or anyone else at the dealerships discuss antilock brakes with you?

Overall results to this survey question show that only 37.4 percent of surveyed drivers had discussed ABS with dealership personnel when they were shopping for their new car. ABS owners were twice as likely to have discussed ABS while new-car shopping than non-ABS drivers. Gender made no difference. Increasing age saw a decreased amount of respondents having discussed ABS, with only 30.7 percent of drivers over 60 answering “Yes”. Contrary to that trend, increasing levels of income and education saw gradual increases in dealership involvement regarding ABS discussion, with both categories exceeding the overall average at their highest level as can be seen in Table 4.31 below. In summary, younger, higher earning and better-educated drivers would be the individuals most likely to have discussed ABS with dealership personnel when they were shopping for their new car.

Table 4.31: Summary of Selected Responses to Question 32

Question 32. When you were shopping for that car, did the salesman or anyone else at the dealerships discuss antilock brakes with you?									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	37.4%	37.8%	37.1%	45.0%	27.8%	47.4%	41.1%	38.1%	30.7%
No	50.7%	55.8%	45.8%	44.9%	62.5%	46.2%	52.6%	50.1%	51.8%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	32.0%	29.8%	39.3%	44.0%	30.8%	34.0%	35.3%	42.1%	
No	57.9%	58.1%	49.9%	45.6%	51.2%	54.8%	52.9%	46.4%	

4.5.3 Questions 33a-c. Related questions assessing the manner in which dealership personnel discussed ABS at the time of purchase.

- 33a. Were you shown or given brochures, videos, or other types of information material that explained how antilock brake systems worked?
- 33b. What types of informational material were you given or shown?
- 33c. Did the informational material make you more likely to want a car with antilock brakes, one without ABS, or have no effect on your preference?

This question was directed at those respondents who had earlier indicated they had bought a new car (question 31a) within the 1990-1999 timeframe (question 31b). Overall results to these survey questions revealed that 64.9 percent of the surveyed drivers had not been given any brochures or other informational material when they were shopping for a new vehicle. Of the 27.2 percent who did see material, 58.1 percent read about ABS in the owner’s manual, 45.3 percent saw a brochure specifically on ABS, and another 16.6 percent read about it in a brochure on safety features. Upon reviewing this ABS material, 44.9 percent preferred to have ABS on their vehicle, while 50.9 percent said that it had no effect on their preference of vehicle. Twice as many ABS owners read brochures or were otherwise exposed to ABS information than non-ABS owners during this shopping period. These ABS owners typically read the vehicles owner’s manual or a brochure on ABS, and were significantly more likely to prefer ABS on their vehicle than non-ABS owners (48.4 percent versus 31.7 percent). No other significant differences were apparent in the data. A summary of these and other selected responses can be seen in Table 4.32 below.

Table 4.32: Summary of Selected Responses to Questions 33a-c

Questions 33a-c. Related questions assessing the manner in which dealership personnel discussed ABS at the time of purchase.									
Response to Q.33a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	27.2%	24.5%	29.6%	34.1%	16.7%	26.8%	24.0%	27.3%	29.1%
No	64.9%	70.9%	59.4%	58.1%	78.5%	72.5%	70.9%	64.4%	59.7%
Response to Q.33a	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Yes	26.2%	20.6%	27.0%	30.4%	38.9%	26.3%	27.0%	26.5%	
No	68.2%	75.0%	65.3%	59.0%	54.9%	67.4%	66.5%	63.8%	
Response to Q.33b	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Owners Manual	58.1%	57.3%	58.9%	62.2%	42.5%	65.6%	51.0%	57.9%	63.9%
ABS Brochure	45.3%	48.8%	42.1%	44.6%	58.9%	53.4%	55.0%	42.8%	40.7%
Safety Feature Brochure	16.8%	18.3%	15.7%	14.0%	22.5%	12.8%	20.6%	19.0%	12.2%
Response to Q.33b	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Owners Manual	71.1%	49.1%	53.5%	56.7%	53.6%	66.1%	58.9%	53.6%	
ABS Brochure	50.6%	44.2%	44.6%	51.5%	45.4%	38.2%	39.8%	53.3%	
Safety Feature Brochure	21.3%	12.7%	25.0%	14.5%	3.3%	13.4%	23.4%	17.7%	
Response to Q.33c	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Want One With ABS	44.9%	41.2%	47.7%	48.4%	31.7%	55.2%	43.9%	39.5%	51.5%
Had No Effect	50.9%	54.1%	48.6%	48.8%	62.9%	44.8%	54.3%	55.2%	43.8%
Response to Q.33c	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Want One With ABS	46.4%	51.9%	35.8%	45.4%	49.8%	44.1%	44.9%	43.9%	
Had No Effect	48.0%	45.4%	61.2%	53.1%	33.9%	51.3%	50.4%	54.3%	

4.5.4 Questions 34a-d. Related questions assessing how ABS came to be on the new car at the time of purchase.

- 34a. Did the type of car you purchased offer antilock brakes as standard equipment, as an option, as part of an option package, or not offer antilock brakes?
- 34b. Did you purchase the ABS option?
- 34c. Did you purchase the option package including ABS?
- 34d. Did you get the option package primarily for the ABS or primarily for some other feature in the package?

This question was directed at those respondents who had earlier indicated they had bought a new car (question 31a) within the 1990-1999 timeframe (question 31b). The cross-tabulated results to questions 34b-d are not statistically valid due to insufficient sample size. In addition, the data contained under the “Gender” portion of question 34b reflect an error found in the source table.

Overall results to these survey questions revealed that 49.7 percent of the respondents had purchased cars with ABS as standard equipment. Another 12.1 percent of the respondents had ABS offered as an option on their vehicle, but only 38.4 percent purchased it. A smaller portion of respondents, 7.8

percent, had purchased a car where ABS was available as part of an option package. Sixty-nine percent of that group opted for that package; 24 percent primarily because of ABS, 61.3 percent for some other feature.

Men were more likely than women to get ABS as an option. Drivers under the age of 26 and drivers with income above \$75K were statistically more likely to get ABS as an option than their respective counterparts. In summary, the majority of respondents appear to have gotten ABS primarily through standard factory production or attractive packaging that included it. A summary of these and other selected responses can be seen in Table 4.33 below.

Table 4.33: Summary of Selected Responses to Questions 34a-d

Questions 34a-d. Related questions assessing how ABS came to be on the new car at the time of purchase.									
Response to Q.34a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
ABS Standard	49.7%	52.7%	46.8%	67.0%	21.7%	61.0%	46.2%	49.7%	48.1%
ABS as an Option	12.1%	14.9%	9.5%	7.6%	25.6%	12.3%	15.1%	12.5%	9.4%
Option Package w/ABS	7.8%	7.3%	8.2%	8.4%	7.6%	5.1%	9.2%	8.6%	5.2%
Response to Q.34a	Income Level				Education Level				
	<\$30K	▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
ABS Standard	46.3%	43.5%	47.1%	59.0%	44.5%	50.3%	48.1%	50.6%	
ABS as an Option	11.3%	14.7%	11.3%	12.4%	17.9%	10.5%	12.7%	12.3%	
Option Package w/ABS	4.1%	6.4%	9.9%	8.3%	2.1%	6.8%	7.2%	9.5%	
Response to Q.34b	Overall Results	Response to Q.34c		Overall Results	Response to Q.34d		Overall Results		
Yes	38.4%	Yes		69.2%	Yes		24.0%		
No	60.9%	No		29.6%	No		61.3%		

4.5.5 Questions 35a-c2. Related questions assessing respondents’ decision criteria regarding ABS and the purchase of new vehicles.

- 35a. Did any of the other cars that you were considering buying have antilock brakes as a standard feature?
- 35b1. Why did you decide to buy a car with antilock brakes?
- 35b2. Why did you decide to buy a car without antilock brakes?
- 35c1. Did the presence of antilock brakes have a lot of effect, some effect, a little effect, or no effect on your decision to buy that vehicle?
- 35c2. Did the absence of antilock brakes have a lot of effect, some effect, a little effect, or no effect on your decision to buy that vehicle?

This question was directed at those respondents who had earlier indicated they had bought a new car (question 31a) within the 1990-1999 timeframe (question 31b). Many of cross-tabulated results to questions 35b1-c2 are not statistically valid due to their small sample size. Overall results to these survey questions revealed that a relatively small subset of the respondents, 16.8 percent, appear to have looked at other cars with ABS. When asked why they purchased a car with/without ABS (part b), the majority of respondents in both cases cited that the standard car, or options the car came with, as the reason the vehicle came so equipped. When asked how the presence/absence of ABS influenced their decision to buy the car (part c), the majority in both cases cited “No Effect” as the

their answer, though the presence of ABS was influential to varying degrees. A summary of these and other selected responses can be seen in Table 4.34 below.

Table 4.34: Summary of Selected Responses to Questions 35a-c2

Questions 35a-c2. Related questions assessing respondents' decision criteria regarding ABS and the purchase of new vehicles.									
Response to Q.35a	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Yes	16.8%	19.9%	14.8%	23.1%	15.1%	5.8%	25.6%	18.1%	10.2%
No	27.7%	31.5%	25.2%	14.5%	45.2%	37.7%	28.5%	29.6%	23.6%
One Car Considered	15.2%	14.7%	15.5%	20.7%	13.1%	12.7%	7.2%	12.7%	24.3%
Response to Q.35a	Overall Results	Income Level				Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Yes	16.2%	19.7%	21.4%	12.9%	18.1%	18.2%	20.5%	13.4%	
No	32.2%	34.2%	20.8%	26.2%	44.6%	32.3%	22.6%	26.2%	
One Car Considered	15.4%	8.4%	16.0%	21.4%	18.8%	15.0%	11.4%	17.5%	
Response to Q.35b1		Overall Results		Response to Q.35b2		Overall Results			
Car/Option – Had ABS		56.7%		Car/Option – Did Not have ABS		34.3%			
ABS Better/Safer		27.9%		Not Worth the Cost		29.9%			
Response to Q.35c1		Overall Results		Response to Q.35c2		Overall Results			
Lot of Effect		11.4%		Lot of Effect		3.6%			
Some Effect		20.7%		Some Effect		4.9%			
Little Effect		22.0%		Little Effect		10.6%			
No Effect		44.6%		No Effect		76.8%			

4.5.6 Question 36. At the time you purchased that car, had you heard that it was a good idea to practice braking with ABS in a non-emergency situation?

A fair amount of encouragement to practice braking with ABS has been promoted by ABS advocates and other groups. A survey question was included to assess how many people had heard this advice. This question was directed at those respondents who had earlier indicated they had bought a new car (question 31a) within the 1990-1999 timeframe (question 31b).

Overall results to this survey question revealed that 32.2 percent of the respondents reported having heard about practice braking with ABS while 64.5 percent had not. Men were more likely than women to report having heard they should practice braking with ABS. Similarly, drivers under the age of 26 were significantly more aware of this than drivers age 26-60. A summary of these selected responses can be seen in Table 4.35 below.

Table 4.35: Summary of Selected Responses to Question 36

Question 36. At the time you purchased that car, had you heard that it was a good idea to practice braking with ABS in a non-emergency situation?							
Response	Overall Results	Age of Respondents				Gender	
		<26	26-35	36-60	>60	Male	Female
Yes	32.2%	47.0%	22.0%	31.9%	34.8%	36.8%	27.4%
No	64.5%	53.0%	77.5%	64.5%	59.3%	60.5%	68.6%

4.5.7 Question 37. Did you ever try out the ABS in a non-emergency situation to see how it works (even before this purchase)?

The purpose of this question was to assess how many people had actually considered practicing using their ABS to become familiar with its operation. This question was directed at those respondents who had earlier indicated they had bought a new car (question 31a) within the 1990-1999 timeframe (question 31b).

Overall results to this survey question revealed that 30.6 percent of the respondents reported having practiced braking with ABS. Men were more likely than women to report having tested ABS in a non-emergency situation. When examined by education level, drivers with a college degree were significantly more likely to report having tested ABS. A summary of these selected responses can be seen in Table 4.36 below.

Table 4.36: Summary of Selected Responses to Question 37

Question 37. Did you ever try out the ABS in a non-emergency situation to see how it works (even before this purchase)?							
Response	Overall Results	Education Level				Gender	
		<H.S.	H.S.	<Coll.	Coll.	Male	Female
Yes	30.6%	24.8%	28.0%	25.4%	35.3%	38.9%	22.2%
No	68.1%	73.7%	72.0%	73.1%	62.7%	60.5%	75.9%

4.5.8 Question 38. How would you feel about having antilock brakes on your next car? Would you...

Overall results to this survey question revealed that 56.2 percent of the respondents preferred to have an ABS-equipped vehicle as their next car. One third said it made no difference. Current owners of clearly expressed the preference for another ABS-equipped vehicle as their next car. Men were more likely to prefer ABS than women. Examination by age showed a slight decline in the response “Makes no difference” as age increased. Greater differences are observable in income and education levels, where the highest income and education levels showed the strongest preference for ABS on their next vehicle. In summary, higher income, well-educated males that currently had an ABS-equipped vehicle would be the most likely drivers to prefer ABS on their next vehicle, as can be seen in Table 4.37 below.

Table 4.37: Summary of Selected Responses to Question 38

Question 38. How would you feel about having antilock brakes on your next car? Would you...									
Response	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Prefer a car w/ ABS	56.2%	59.1%	53.4%	71.3%	43.1%	57.3%	59.4%	56.3%	53.6%
Prefer a car w/o ABS	6.1%	7.0%	5.3%	3.4%	10.4%	5.7%	4.8%	6.5%	6.3%
No Difference	32.3%	31.1%	33.5%	23.3%	39.9%	35.2%	33.3%	32.8%	27.7%
Response	Income Level				Education Level				
	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.	
Prefer a car w/ ABS	49.6%	54.1%	56.5%	69.8%	46.3%	53.5%	55.4%	62.9%	
Prefer a car w/o ABS	6.7%	6.2%	7.1%	3.2%	6.7%	6.5%	6.6%	5.0%	
No Difference	36.6%	34.4%	34.0%	24.3%	36.2%	34.4%	33.3%	28.3%	

4.6 Instruction Preferences

In an effort to anticipate what sorts of changes to the ABS information provided at the time of sale of a new vehicle might be beneficial in promoting greater driver awareness of ABS function, operation, and benefits, questions were included to determine what method of instruction customers would be willing to receive. Opinions were obtained regarding a number of different methods of instruction.

4.6.1 Questions 39a1-b. Related questions assessing respondents' ABS instruction preferences.

- 39a1. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... offered 30 minutes of education and practice with ABS before you left?
- 39a2. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... required you to read the instructions for ABS and practice using it?
- 39a3. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... gave you a free 10 minute video on how ABS works?
- 39a4. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... gave you a free 10 minute audiotape on how ABS works?
- 39a5. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... offered 15 minutes of education and practice with ABS before you left?
- 39a6. When buying your next ABS-equipped car, would you approve or disapprove if the dealer ... offered 15 minutes of practice on ABS simulator before you left?
- 39b. Which one of the options you mentioned would you prefer the most?

Overall results to part 39a indicated that a small majority of drivers were amenable to receiving ABS information from the dealership where long portions of time were involved or mandated (questions 39a1 and 39a2 respectively). Receptiveness increased when this information was placed at the drivers' disposal to review at their leisure (questions 39a3 and 39a4), with the "Free 10 minute video" as the favorite of all methods. Practice times half as long received slightly more than 70 percent approval rating (questions 39a5 and 39a6). Non-ABS owners and women consistently expressed more approval for receiving information from the dealership for all questions in part a, most of which are statistically significant. An examination of questions 39a1 and 39a2 by income and education level showed that the highest level in each bracket was the least receptive to receiving instructions on ABS. The responses to 39b reiterate the previous 6 questions, as can be seen in Table 4.38 below.

Table 4.38: Summary of Selected Responses to Questions 39a1-b

Questions 39a1-b. Related questions assessing respondents' ABS instruction preferences.									
Response to Q.39a1	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Approve	52.1%	49.2%	55.1%	46.2%	60.2%	55.7%	55.0%	50.4%	51.7%
Disapprove	47.0%	49.3%	44.5%	52.7%	39.4%	44.3%	44.5%	48.8%	45.3%
Response to Q.39a1	Overall Results	Income Level				Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Approve	60.2%	58.2%	55.3%	40.5%	53.0%	55.3%	55.2%	47.6%	
Disapprove	39.5%	40.8%	44.0%	59.5%	46.6%	43.8%	44.0%	51.2%	
Response to Q.39a2	Overall Results	Gender		Drivers with:		Age			
		Male	Female	ABS	No ABS	<26	26-35	36-60	>60
Approve	59.8%	56.6%	63.2%	56.3%	64.7%	64.9%	61.7%	58.3%	57.5%
Disapprove	39.2%	42.0%	36.3%	42.6%	34.9%	35.1%	37.8%	40.9%	39.4%
Response to Q.39a2	Overall Results	Income Level				Education Level			
		<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Approve	68.9%	67.3%	61.2%	47.6%	66.5%	65.3%	60.9%	53.4%	
Disapprove	30.8%	31.6%	38.1%	52.4%	33.1%	33.7%	38.3%	45.4%	
Response to Q.39a3	Overall Results	Gender		Drivers with:					
		Male	Female	ABS	No ABS				
Approve	80.7%	77.4%	84.2%	79.3%	82.9%				
Disapprove	18.3%	21.1%	15.4%	19.7%	16.7%				
Response to Q.39a4	Overall Results	Gender		Drivers with:					
		Male	Female	ABS	No ABS				
Approve	73.9%	73.3%	74.6%	70.9%	78.2%				
Disapprove	25.1%	25.2%	24.9%	28.0%	21.4%				
Response to Q.39a5	Overall Results	Gender		Drivers with:					
		Male	Female	ABS	No ABS				
Approve	73.7%	69.6%	78.0%	70.8%	76.8%				
Disapprove	25.4%	29.0%	21.5%	28.2%	22.8%				
Response to Q.39a6	Overall Results	Gender		Drivers with:					
		Male	Female	ABS	No ABS				
Approve	71.9%	67.1%	76.8%	66.2%	79.6%				
Disapprove	27.2%	31.4%	22.7%	32.8%	20.0%				
Response to Q.39b	Overall Results	Gender		Drivers with:		Income Level			
		Male	Female	ABS	No ABS	<\$30K	▶▶\$49.9K	▶▶\$74.9K	>\$75K
30 min Education	11.8%	10.5%	13.1%	9.2%	14.0%	18.2%	10.7%	13.9%	5.1%
Free 10 min Video	32.6%	35.6%	29.7%	35.9%	26.8%	26.2%	31.7%	35.0%	37.1%
15 min Education	15.3%	15.0%	15.6%	15.1%	17.0%	13.4%	17.3%	17.9%	13.4%
Simulator Training	29.6%	27.9%	31.2%	27.8%	32.8%	28.7%	29.3%	27.0%	33.2%

4.6.2 Question 40. Have you ever read the brake section of your vehicle owner’s manual?

Overall results to this survey question revealed that 52.1 percent of the respondents reported that they had not read their vehicle owner’s manual about the car’s brakes. Men were much more likely than women to report having reviewed this material. As driver age increased, so did the percent of drivers who had read their owners manual. Increasing levels of income and education saw an increasing trend in the number of drivers who replied “Yes” to this question, as can be seen in Table 4.39 below. In summary, high income, better-educated male drivers over the age of 36 would be the individuals most likely to report having read their owners manual regarding their car’s brake system.

Table 4.39: Summary of Selected Responses to Question 40

Question 40. Have you ever read the brake section of your vehicle owner’s manual?								
Response	Overall Results	Gender		Age				
		Male	Female	<26	26-35	36-60	>60	
Yes	45.9%	56.6%	36.5%	36.2%	42.3%	47.8%	51.7%	
No	52.1%	41.8%	61.1%	62.1%	56.6%	50.7%	44.9%	
Response	Income Level				Education Level			
	<\$30K	▶\$49.9K	▶\$74.9K	>\$75K	<H.S.	H.S.	<Coll.	Coll.
Yes	42.0%	41.3%	49.0%	56.4%	30.7%	43.7%	45.2%	54.3%
No	55.8%	56.8%	50.1%	41.5%	65.8%	54.2%	53.4%	44.3%

4.7 Demographics

Demographic information was gathered at the end of the survey. Each of the tables that follow the demographic questions below states the total number of respondents for that question. Percentages found at the end of each question are calculated based on the original sample size of 3,508.

Table 4.40: D1. In what year were you born? (converted to age, rounded down)

D1. In what year were you born? (converted to age, rounded down)		
Age	Count	Percent
Under 26	442	14.8%
26-35	608	17.3%
36-60	1,586	46.2%
Over 60	801	19.8%
SUB TOTAL	3,437	98%

Table 4.41: D2. Are you currently employed full time, part time, unemployed and looking for work, retired, going to school, homemaker or something else?

D2. Are you currently employed full time, part time, unemployed and looking for work, retired, going to school, homemaker or something else?		
Response	Count	Percent
Employed full time	1,961	55.9%
Employed part time	321	10.4%
Retired	644	15.8%
Going to school	184	6.2%
Homemaker	223	6.7%
SUB TOTAL	3,333	95%

Table 4.42: D3. What is the highest grade or year of regular school you have completed?

D3. What is the highest grade or year of regular school you have completed?		
Response	Count	Percent
Some high school	316	9.0%
High school graduate	1,121	32.1%
Some college	864	25.1%
Four-year college graduate	647	18.6%
Graduate degree	341	9.6%
SUB TOTAL	3,289	93.8%

Table 4.43: D4. Are you currently married, divorced, separated, widowed, or single?

D4. Are you currently married, divorced, separated, widowed, or single?		
Response	Count	Percent
Married	1,942	60.6%
Divorced	349	7.9%
Widowed	267	5.1%
Single	825	23.6%
SUB TOTAL	3,383	96.4%

Table 4.44: D5. Are you of Hispanic origin or descent?

D5. Are you of Hispanic origin or descent?		
Response	Count	Percent
Hispanic	248	7.3%
Not Hispanic	3,184	90.7%
SUB TOTAL	3,432	97.8%

Table 4.45: D6. Which of these categories best describes your racial background?

D6. Which of these categories best describes your racial background?		
Response	Count	Percent
White	2,725	77.3%
Black or African American	317	8.5%
Asian or Pacific Islander	98	3.5%
Mixed	243	7.1%
SUB TOTAL	3,383	96.4%

Table 4.46: D7. How many persons under 16 live in your household?

D7. How many persons under 16 live in your household?			
	Count	Mean	Median
Number Under 16 Years of Age	3,472	0.7	0
Non response	36		
TOTAL	3,508		

Table 4.47: D8. Which of the following categories best describes your total household income before taxes in 1998? Your best estimate is fine.

D8. Which of the following categories best describes your total household income before taxes in 1998?		
Response	Count	Percent
\$15,000 to less than \$30,000	594	15.8%
\$30,000 to less than \$50,000	778	22.1%
\$50,000 to less than \$75,000	616	19.0%
\$75,000 to less than \$100,000	280	8.9%
\$100,000 or more	273	8.8%
SUB TOTAL	2,541	72.4%

Table 0.1: D9. Gender

D9. Gender		
Response	Count	Percent
Male	1,603	46.5%
Female	1,905	53.5%
TOTAL	3,508	100%

Table 4.48: D10. Is the telephone number I reached you at the only number for this household?

D10. Is the telephone number I reached you at the only number for this household?		
Response	Count	Percent
Yes	3,069	91.8%
No	393	6.9%
SUB TOTAL	3,462	98.7%

Table 4.49: D10a. How many telephone numbers exist for this household?

D10a. How many telephone numbers exist for this household?			
Response	Count	Mean	Median
Number of Phone Lines in Household (if more than 1 line)	383	2.2	2
Non-response (Don't Know/Refused)	10		
TOTAL	393		

5.0 SUMMARY

This survey was developed as part of NHTSA's Light Vehicle ABS Research Program to help understand drivers' experiences and expectations with ABS and to determine if these experiences were different based on whether or not their own vehicles were equipped with ABS. The survey itself can be divided into six topics of interest: ABS Knowledge; Brake Pedal and Other Feedback; Activation Experience; Behavioral Adaptation; Purchase Experience and Preferences; and Instructional Preferences, which are summarized below.

5.1 ABS Knowledge

Assessment of the respondents' knowledge of ABS showed that when asked what the initials "ABS" on a car would stand for, 38.8 percent answered correctly "antilock brake system" and 43.6 percent indicated they did not know. However, when asked if they had heard of antilock brake systems, 86.6 percent of the respondents said they had heard of them, with only 12.2 percent saying they had not.

Drivers were then asked if their car had ABS, 47.1 percent of the respondents said "Yes", 35 percent said "No", and 17.9 percent did not know. Of the drivers who said their car had ABS, 56.6 percent of them reported that they obtained that information when purchasing the vehicle. Panel lights, ABS insignias and familiarity with the car or the vehicle owner's manual were other ways they knew. For those drivers who said their car did not have ABS, the predominant reason was their knowledge about vehicle specifications, at 58.3 percent of those respondents.

General awareness of the benefits of ABS was then assessed. Thirty-nine percent of respondents reported that the essential advantage of ABS was to prevent the brakes from locking resulting in skidding. However, 22.5 percent of the respondents reported did not know of any advantage that ABS had when compared to standard brake systems. Conversely, when asked what disadvantages ABS had, 50.9 percent did not know any disadvantage of ABS, while another 16.9 percent said that there were no disadvantages. Sixty-eight percent of respondents stated that ABS would help drivers better avoid crashes. Owners of ABS-equipped vehicles were 9 percent more likely to report that ABS would help drivers better avoid crashes than were owners of vehicles with standard brakes. Approximately 77 percent of respondents felt that ABS would help them keep from losing control of their vehicle during braking.

Driver knowledge of how ABS impacted vehicle performance in traffic and on road surfaces with varying degrees of traction was assessed. Research [7] has shown that ABS generally produces shorter stopping distances on dry, wet, and slippery pavement, but not on loose gravel. However, 44 percent of respondents incorrectly believed that ABS would help them to brake in a shorter distance on dirt or gravel roads. Drivers for the most part indicated that ABS had a positive benefit on vehicle performance but they were divided on the issues of stopping distance and road conditions. Their belief was that ABS creates shorter stopping distances and reduces the chance of skidding on dry and wet pavements, but not on snow or ice covered ones.

From an operational standpoint, when asked at what point ABS activates the most popular response (31.1 percent) was that ABS only activates at the onset of a skid. Other responses included that ABS activates when the driver presses on the brake pedal hard (21.9 percent) or as soon as the driver steps on the brake pedal (21.4 percent). For achieving the shortest stopping distance on a smooth, dry road, most respondents (47.7 percent) felt that light pressure would suffice.

5.2 Brake Pedal and Other Feedback

Questions were asked to determine how drivers might respond to various types of tactile and auditory feedback that might be associated with ABS activation. When asked if it was normal for an active ABS system to cause brake pedal vibration, only 33.5 percent thought it was normal, with the most respondents (45.9 percent) saying it was a brake malfunction. Drivers were asked if they felt the brake pedal begin to vibrate, what would they be most likely do. The appropriate responses of “Apply the same amount of pressure” or “Increase the pressure on the pedal” were given by 29.9 percent and 12.2 percent of the respondents, respectively.

Respondents were asked how they would react if the brake pedal dropped to the floor while they were braking. Certain ABS-equipped vehicles may exhibit this condition when ABS is activated. A loss of hydraulic pressure would also exhibit a similar brake pedal response. Most respondents (45.3 percent) stated that they would pump the brakes, the appropriate response to the condition of hydraulic pressure loss. However, the appropriate response to a properly working ABS was “Apply the same amount of pressure” or “Increase the pressure on the pedal”, chosen by 6.2 percent and 4.7 percent of the respondents, respectively. The second highest response following “Pump the pedal” was “Take your foot off of the pedal”, at 24.9 percent of all respondents.

Drivers were also asked to respond to a question regarding what might be happening if the brake pedal pushed up against their foot during braking. Certain ABS-equipped vehicles exhibit this condition when ABS is activated. Although “ABS is activated” was the correct response (31.2 percent), it was selected in a similar amount as the responses “Brake Malfunction” and “Don’t Know”, at 30.1 percent and 31.9 percent respectively.

Another question asked drivers to interpret what was happening if they heard a clicking or ratcheting noise during severe braking (often associated with ABS brake pedal feedback). The majority of drivers (45.3 percent) reported this meant there was a brake malfunction. Twenty-eight and a half percent of drivers responded, “Don’t know”, while only 20.4 percent answered correctly with “ABS is activated”

Finally, drivers were asked to interpret what would cause the steering wheel to shake or vibrate during severe braking. The correct answer, a warped rotor, was given by 37.5 percent of the respondents. While 28.5 percent of drivers answered “Don’t know” and another 22.1 percent blamed some other brake malfunction, very few drivers attributed steering wheel shake and vibration under heavy braking to normal ABS operation (14.1 percent).

5.3 Activation Experience

Questions were included to provide insight into whether drivers felt they had ever activated ABS, and if so, what was their reaction to that experience. The first question had 5 parts, and was directed at those drivers who had earlier said their vehicle was equipped with ABS. The responses revealed that 57.8 percent of the surveyed drivers felt that their ABS had been activated at least once. The reasons they thought this included changes in pedal pressure (49.3 percent), pedal vibration (46 percent), and auditory feedback (32.1 percent).

Nearly all of those drivers that reported having experience ABS activation felt that the ABS performed as expected (91.8 percent). Of the minority that did not, 60 percent attributed perceived ABS shortcomings to unsatisfactory stopping time. However, this group was too small to be

considered statistically valid. Responses regarding frequency of activation included a few times a year (37.6 percent), a few days a month (15.6 percent), and daily or almost daily (16.4 percent).

Of the drivers who did not think they had activated their ABS equipped car, 25.6 percent said they had activated ABS on another vehicle at some point.

Respondents who had driven a car equipped with ABS were asked whether or not they had been startled by ABS activation. Of these, 37.8 percent of indicated that they had been startled by the performance of ABS. Their descriptions of ABS responses included brake pedal vibration or pumping (51 percent), changes in pedal pressure (21.1 percent), and it made a noise (11.4 percent). Forty-five percent of the drivers reported taking their foot off the pedal but the majority did not (52 percent).

The next question asked drivers if they were ever involved in a crash they felt was caused by ABS in some way. Most of the respondents answered “No” (96.6 percent), but a small number (2.3 percent) did state that ABS contributed to a crash. Alternatively, question 30 asked drivers if they felt ABS had ever helped them avoid an otherwise unavoidable crash. Of these, 40.4 percent said “Yes”.

5.4 Behavioral Adaptation

A portion of questions was directed at all drivers (i.e., those with ABS, those without ABS, and those that did not know) and focused on how the presence of ABS might cause them to alter their driving behavior. The question was separated into 3 parts. For the first part, drivers were asked if the presence of ABS on their vehicle would cause an increased likelihood that they would drive on road surfaces that were wet, snow-covered, or icy. The second part asked if the presence of ABS, would cause an increased likelihood that they would drive faster on road surfaces that were dry, wet, snow-covered, or icy. The last part inquired whether ABS would cause an increased likelihood that drivers would pass another vehicle on road surfaces that were wet, snow-covered, or icy.

Responses suggest that drivers may drive differently in ABS-equipped vehicles. Fifty-two percent of respondents indicated they would be more likely to drive on wet roads if they had ABS, 44.2 percent would be more likely to drive on snow-covered roads, and 36.7 percent more likely to drive on icy roads. The second part revealed that 19.9 percent of drivers indicated they were more likely to drive faster on dry roads if they had ABS, 13.1 percent were more likely to drive faster on wet roads, 9 percent were more likely to drive faster on snow-covered roads, and 7.6 percent were more likely to drive faster on icy roads. For the last part, 33.8 percent of drivers reported that they would be more likely to pass another vehicle on dry roads if they had ABS, 19.6 percent would be more likely to pass another vehicle on wet roads, 10 percent would be more likely to pass another vehicle on snow-covered roads, and 7.9 percent would be more likely to pass another vehicle on icy roads. These indications that drivers may be more likely to engage in some driving behavior because the vehicle they are driving is equipped with ABS implies behavioral adaptation and suggests that drivers may be putting themselves at greater risk for a crash. However, the fact that related NHTSA on-road studies did not find evidence of differences in driving behavior as a function of brake system (i.e., ABS versus standard brakes)(as noted in Section 1.2 of this report) may indicate that the reported increased likelihood of risky behavior could be a mere artifact of some aspect of the survey. The ordering of questions may have influenced responses (i.e., respondents may have developed ideas about the intent of the line of questioning or ideas about ABS as they progressed through the survey). The length of the survey may also have had an impact on responses wherein motivation of

respondents to provide high quality answers may have decreased as the survey progressed. Lastly, it is difficult to draw conclusions about respondents' actual behavior based on their statements about what they believe their behavior to be like.

When individual responses to Questions 17 and 30 were examined and correlated, results showed that drivers who indicated they would be more likely to drive on wet, snow-covered and icy roads were significantly more likely to report being in an incident that would have resulted in a crash if it had not been for ABS. Drivers who had previously indicated they were more likely to drive faster and pass other vehicles in both dry and wet road conditions were also significantly more likely to report being in an incident that would have resulted in a crash if it had not been for ABS. Note that this comparison involves questions that were directed at both ABS owners and non-ABS owners.

Responses to Question 16 indicated that approximately 16 percent of respondents stated that ABS allowed them to follow other vehicles more closely than they could with standard brakes. Following other vehicles more closely in response to the presence of ABS on a vehicle would qualify as behavioral adaptation. Shorter following distances can lead to increased crash exposure, the opposite of the intended effect of ABS.

5.5 Purchase Experience and Preferences

Questions 31 through 38 were directed at individuals who had bought a car in the 1990-1999 timeframe. Fifty-six percent of surveyed drivers had indicated they bought a new car at least once, 75.2 percent of them having purchased it during this time. Older models were not considered because of the limited availability of ABS on pre-1990 models. Questions 31 through 33 established what drivers' ABS-related experiences were when they shopped for and bought a new car. Of the drivers who bought a new car in the years from 1990-1999, 37.4 percent had discussed ABS with dealership personnel when they were shopping for their new car, but 50.7 percent replied they had not.

The majority of these new car buyers (64.9 percent) did not receive brochures or any other informational material at the time they were shopping for their vehicle. Of the 27.2 percent who did see material, 58.1 percent read about ABS in the vehicle owner's manual, 45.3 percent saw a brochure specifically on ABS, and another 16.6 percent read about it in a brochure on safety features. Upon reviewing this ABS material, 44.9 percent preferred to have ABS on their vehicle, while 50.9 percent said that it had no effect on their vehicle selection. A small percentage (2.2 percent) decided against getting ABS on their new car after reviewing material on it. Only 16.8 percent of the new car buyers appear to have looked at other cars with ABS.

Questions 34 and 35 ascertained how ABS was packaged on the new car purchased by the previously mentioned respondents. They revealed that 49.7 percent of the respondents had purchased cars with ABS as standard equipment. Another 12.1 percent of the respondents had ABS offered as an option on their vehicle, but only 38.4 percent of them purchased it. A smaller portion of new car buyers, 7.8 percent, had purchased a car where ABS was available as part of an option package. Sixty-nine percent of that group opted for the package, 24 percent primarily for ABS but 61.3 percent replied it was for some other feature.

Thirty-two point two percent of new car buyers reported having heard that it was a good idea to practice braking with ABS in a non-emergency situation, but 64.5 percent had not. Almost the same

number of respondents (30.6 percent) reported having practiced braking with ABS before they purchased their new car.

When asked how the presence of ABS influenced their decision to buy the car, 44.6 percent said that it had no effect at all. However, the presence of ABS was influential to varying degrees (22 percent said a little, 20.7 percent said some, and 11.4 percent said it had a lot of effect) for most respondents.

When asked how the absence of ABS influenced their decision to buy the car, 76.8 percent said that it had no effect, 10.6 percent said a little, 4.9 percent said some effect, and 3.6 percent said it had a lot of effect. When looking ahead to their next new car purchase, 56.2 percent of the respondents preferred to have their next vehicle equipped with ABS. One third said it made no difference.

5.6 Instructional Preferences

Two survey questions were used to determine how average drivers would prefer to be presented with information regarding ABS on their vehicle at the time of purchase. Combinations of education, practice and informative material, taking varying amounts of time, were among the selections offered. Results indicated that 52.1 percent of drivers approved of ABS information provided from the dealership when 30 minutes was involved. Requiring drivers to read and practice reached a 59.8 percent approval rating. Drivers were more willing to learn about ABS when the information could be reviewed at their leisure, with the “Free 10 minute video” as the favorite of all methods (80.7 percent approved). Practice times of 15 minutes received slightly more than 70 percent approval rating. When asked if they had read the owner’s manual about their vehicle’s brakes, 52.1 percent of the respondents reported that they had not.

6.0 CONCLUSIONS

This report documents the methods and results of a nationwide telephone survey of car drivers to assess their knowledge of and experience with ABS. Useful information regarding driver misperceptions of ABS functionality and benefits was obtained. Some areas where the provision of additional ABS-related information to drivers may be beneficial were identified.

While only approximately 39 percent of respondents knew what the acronym “ABS” stands for, 87 percent of respondents reported having heard of antilock brake systems when they were specifically asked about the system. Only 31 percent of respondents correctly reported that ABS only activates when the ABS senses the vehicle is beginning to skid (i.e., wheels are locked). Similarly, approximately one-third of respondents felt that brake pedal vibration was normal with ABS activation and did not indicate a problem with the brake system. Results did not show that respondents understood that ABS would allow a vehicle to be stopped in a shorter distance than could be attained with standard brakes on smooth, non-deformable surfaces, but not necessarily on deformable or rough surfaces. Their belief was that ABS creates shorter stopping distances and reduces the chance of skidding on dry and wet pavements, but not on snow or ice covered ones.

Some potential for inappropriate changes in driver behavior (e.g., following other cars more closely) was identified that may serve to counteract the potential crash avoidance benefits of ABS. However, given the limited awareness of ABS and its abilities identified through this survey, it is difficult to say that drivers are adapting to something they know little or nothing about. In addition, the fact that related NHTSA on-road research studies have not found evidence of differences in driving behavior as a function of brake system (i.e., ABS versus standard brakes)(as noted in Section 1.2 of this report) may indicate that the reported increased likelihood of risky behavior is not transferring to detectable differences in actual driving behavior or could be a mere artifact of some aspect of the survey.

Overall, most responses indicated that drivers saw ABS as a beneficial feature that increases safety. Increasing driver awareness of the operational characteristics and capabilities of ABS may improve drivers understanding of ABS function and how to correctly apply the brakes in an ABS-equipped vehicle and what to expect. Providing ABS information at the time of purchase was the means by which the majority of drivers found out about the brakes on their vehicle. However, approval ratings for lengthy or mandatory information sessions were not well received, though some methods held promise. Enhancing the ABS-related information provided in vehicle owner’s manuals or other video or printed information provided at the time of purchase may be the method of information delivery most acceptable to average drivers. Providing specific information regarding ABS functionality should provide some benefit through increased driver knowledge and understanding of this important safety feature.

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8.0 APPENDICES

Appendix A NHTSA ANTILOCK BRAKE SYSTEM SURVEY

INTRODUCTION TO BE ADMINISTERED TO ANY ADULT HOUSEHOLD MEMBER:

Hello, my name is _____ and I am calling on behalf of the U.S. Department of Transportation. We are conducting a study about Americans' driving habits and their concerns and attitudes about automobile safety equipment.

PROMPT: I am calling from the PricewaterhouseCoopers Survey Research Center on behalf of the U.S. Department of Transportation. We were contracted to conduct this research.

PROMPT: Your individual responses will be completely confidential.

PROMPT: The survey will take 15-20 minutes to complete.

PROMPT: The OMB approval number for the collection of this information is 2127-0594.

- A. How many persons aged 16 and older live in this household, even if they are not at home right now?

NUMBER OF ADULTS _____ (RANGE 0-10)

IF QA=0, THEN GO TO DECISION

- B. How many of these persons have driven a car at least occasionally in the last year (not counting vans, minivans, sport utility vehicles, pickup trucks, or motorcycles)?

NUMBER OF DRIVERS _____ (RANGE 0-10)

IF QB=0, THEN GO TO DECISION

IF QB=1, THEN SAY: It is important that we speak to the person in this household who has driven a car in the last year. Are you that person?

IF SPEAKING TO THE CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

IF QB>1, THEN SAY: In order to randomly select just one driver to interview, could I speak to the car driver in your household, age 16 and older, who has had the most recent birthday?

PROMPT: This is a common method we use to randomly select one person to interview within a household. This will ensure a good representation of drivers in the United States.

IF SPEAKING TO CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

DECISION IF QA=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY I'm sorry, for this study we are interviewing only adults aged 16 and older. Thank you.

IF QB=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY I'm sorry, for this study we are interviewing only people who have driven a car in the past year. Thank you.

1. Would you say that you usually drive....?

- 1 Almost every day
- 2 A few days a week
- 3 A few days a month
- 4 A few times a year
- 8 DON'T KNOW
- 9 REFUSED

2. How many years have you been driving a car?

YEARS DRIVING _____ (RANGE 0-80)

- DK DON'T KNOW
- RF REFUSED

3. About how many miles did you drive a car in the past year?

PROMPT: THIS INCLUDES EVERY CAR THE RESPONDENT HAS DRIVEN IN THE PAST YEAR.

- 1 Less than 2,000
- 2 2,000 to less than 8,000
- 3 8,000 to less than 13,000
- 4 13,000 to less than 20,000
- 5 20,000 to less than 30,000
- 6 30,000 or more
- 8 DON'T KNOW
- 9 REFUSED

4a. I am going to ask you a few questions about the car that you drive most often. To do so, I need some information about the vehicle. First, what is the make and model of that car?

PRE-LIST

77/777 OTHER (SPECIFY _____)

88/888 DON'T KNOW

99/999 REFUSED

IF Q4a NOT EQUAL TO 88/888 OR 99/999 THEN ASK:

4b. A model of a car is available in different trim levels. Examples include LX, EX, Si, STE, GT, etc. What is the trim level of your (MAKE, MODEL)?

INTERVIEWER: IF "BASIC" TRIM LEVEL OR CAR DOES NOT HAVE A TRIM LEVEL, TYPE "BASIC"

FILL IN TRIM LEVEL _____

- DK DON'T KNOW
- RF REFUSED

- 4c. What is the model year of that vehicle?
 19_____ (RANGE 50-99)
 DK DON'T KNOW
 RF REFUSED

IF 4a=88/888, 99/999 OR 4c=DK, RF ASK:

- 4d. Is the car you drive most often a rental car?
 1 YES
 2 NO
 8 DON'T KNOW
 9 REFUSED

5. On the roads that you usually drive, do you drive a lot faster than other traffic, a little faster, just as fast, a little slower, or a lot slower than other traffic on the road?
 1 A LOT FASTER
 2 A LITTLE FASTER
 3 JUST AS FAST
 4 A LITTLE SLOWER
 5 A LOT SLOWER
 8 DON'T KNOW
 9 REFUSED

- 6a. In some cases when a driver applies the brakes on a car very sharply, the wheels may stop spinning, or 'lock' causing the vehicle to skid. Have you ever had to brake your (YEAR, MAKE, MODEL) so sharply that your brakes locked and you went into a skid?
 1 YES
 2 NO
 8 DON'T KNOW
 9 REFUSED
- GO TO Q7a
 GO TO Q7a
 GO TO Q7a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

- 6b. Was the road surface.....?
 1 Dry
 2 Wet
 3 Icy
 4 Snow-covered
 5 OTHER (SPECIFY _____)
 8 DON'T KNOW
 9 REFUSED

- 6c. Did you stay on the road or go off the road?
 1 STAYED ON
 2 WENT OFF
 8 DON'T KNOW
 9 REFUSED

IF THE MODEL YEAR OF THEIR VEHICLE IS PRIOR TO 1990, Q4a=88/888 OR 99/999, Q4c=DK, RF OR Q4d=1, THEN GO TO Q10

7a. Not counting skids in which your wheels locked, have you ever had to brake your (YEAR, MAKE, MODEL) sharply and found that your brakes were not performing as well as you would expect them to?

- 1 YES
- 2 NO GO TO Q8a
- 8 DON'T KNOW GO TO Q8a
- 9 REFUSED GO TO Q8a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

7b. Was the road surface.....?

- 1 Dry
- 2 Wet
- 3 Icy
- 4 Snow-covered
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

7c. What happened when you applied the brakes? Anything else?

- _____ FILL IN RESPONSE
- DK DON'T KNOW
 - RF REFUSED

7d. Did you take your foot off the pedal when this happened?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

7e. Did you stay on the road or go off the road?

- 1 STAYED ON GO TO Q7g
- 2 WENT OFF
- 8 DON'T KNOW GO TO Q7g
- 9 REFUSED GO TO Q7g

7f. What situation or situations from the following list caused you to drive off the road on that occasion - was it...? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 05)

- 01 Falling asleep at the wheel
- 02 Unexpected curve in the road
- 03 Steering away to avoid hitting something
- 04 Distraction diverted your attention
- 05 Driving too fast for the road conditions
- 06 Or something else (SPECIFY _____)
- 88 DON'T KNOW
- REFUSED

7g. Were you able to stop before you hit anything?

- 1 YES GO TO Q8a
- 2 NO

- 8 DON'T KNOW GO TO Q8a
- 9 REFUSED GO TO Q8a

7h. What did you hit when you drove off the road?

Another vehicle

An object beside the road (rail, sign, post, tree, etc)

- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8a. Aside from any occasions that you have already told me about, have you ever gone off the road, unintentionally, when driving your (CAR)?

- 1 YES
- 2 NO GO TO Q9a
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

8b. What situation or situations from the following list caused you to drive off the road on that occasion - -- was it . . .? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 05)

- 01 Falling asleep at the wheel
- 02 Unexpected curve in the road
- 03 Steering away to avoid hitting something
- 04 Distraction diverted your attention
- 05 Driving too fast for the road conditions
- 06 Or something else (SPECIFY _____)
- 88 DON'T KNOW
- 99 REFUSED

8c. Was the road surface.....?

- 1 Dry
- 2 Wet
- 3 Icy
- 4 Snow-covered
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8d. Were you able to stop before you hit anything?

- 1 YES GO TO Q9a
- 2 NO
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

8e. What did you hit when you drove off the road?

- 1 Another vehicle
- 2 An object beside the road (rail, sign, post, tree, etc)

- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9a. Aside from any occasions that you have already told me about, have you ever intentionally driven off the road to avoid a collision, when driving your (CAR)?

- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO Q10
GO TO Q10
GO TO Q10

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

9b. What were you trying to avoid on that occasion?

- 1 Another moving vehicle
- 2 A stationary vehicle
- 3 An animal
- 4 A bicyclist
- 5 A pedestrian
- 6 Debris in the roadway
- 7 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9c. Did you consciously decide to drive off the road or did you just react instinctively to avoid the collision?

- 1 CONSCIOUSLY DECIDED
- 2 JUST REACTED
- 8 DON'T KNOW
- 9 REFUSED

9d. Were you able to maintain control of your car after you left the road?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

9e. Were you able to stop before you hit anything?

- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO Q10
GO TO Q10
GO TO Q10

9f. What did you hit when you drove off the road?

- 1 Another vehicle
- 2 An object beside the road (rail, sign, post, tree, etc)
- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

Now, I would like to switch to a different subject.

10. If you saw the initials "ABS" on a car, what would you think they stand for?

- 1 ANTILOCK BRAKE SYSTEM GO TO Q12
- 2 AIR BAG SYSTEM
- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

11. Have you ever heard of antilock brake systems?

- 1 YES
- 2 NO GO TO Q40
- 8 DON'T KNOW GO TO Q40
- 9 REFUSED GO TO Q40

IF Q10=2,3,8,9, THEN SAY The initials ABS stand for antilock brake system.

12. Does your (YEAR, MAKE, MODEL) have an antilock brake system?

- 1 YES
- 2 NO
- 8 DON'T KNOW GO TO Q14
- 9 REFUSED GO TO Q14

13. Please tell me all the reasons you know your vehicle (HAS/DOESN'T HAVE) ABS. CHECK ALL THAT APPLY

CATI: ROTATE RESPONSES 1-7

- 1 Told when bought it
- 2 Read drivers manual
- 3 Know specifications for car
- 4 ABS logo on car
- 5 Light on the instrument panel
- 6 Ordered ABS specifically when purchasing car
- 7 Specifically requested a vehicle without ABS
- 8 DON'T KNOW
- 9 REFUSED

14. Based on what you know or have heard, what are the **advantages** of antilock brake systems, if any, compared to standard brake systems? Anything else?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

15. Based on what you know or have heard, what are the **disadvantages** of antilock brake systems, if any, compared to standard brake systems? Anything else?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

To the best of your knowledge, I'd like you to tell me whether you think the following statements are true or false.

CATI: ROTATE QUESTIONS 16a TO 16c

16a. Is it true or false that antilock brakes....

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

CATI: ROTATE RESPONSES

- 1 Help you to better avoid crashes than you could with standard brakes
- 2 Allow you to follow other vehicles more closely than you could with standard brakes
- 3 Help keep you from losing control of the vehicle when braking sharply
- 4 Help you to maintain steering control while braking
- 5 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

16b. Is it true or false that antilock brakes help you to brake in a shorter distance on...

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 dry pavement
- 2 wet pavement
- 3 snow-covered pavement
- 4 icy pavement
- 5 dirt or gravel roads
- 6 ALL FALSE
- 8 DON'T KNOW

REFUSED

16c. Is it true or false that antilock brakes reduce the likelihood of skidding on...

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 dry pavement
- 2 wet pavement
- 3 snow-covered pavement
- 4 icy pavement
- 5 dirt or gravel roads
- 6 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

Now, for the next set of questions, I would like you to respond with a yes or no.

17a. With antilock brakes, would you be more likely to drive on...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Wet roads
- 2 Snow-covered roads
- 3 Icy roads
- 4 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

17b. With antilock brakes, would you be more likely to drive faster on ...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Dry roads
- 2 Wet roads
- 3 Snow-covered roads
- 4 Icy roads
- 5 ALL NO
- 6 DON'T KNOW

7 REFUSED

17c. Would you be more likely to pass another vehicle on ...?
INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Dry roads
- 2 Wet roads
- 3 Snow-covered roads
- 4 Icy roads
- 5 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

For the next set of questions, please select the phrase that you feel best completes the sentence.

18. Does the antilock brake system activate, or kick in.....

- 1 As soon as you step on the brake pedal
- 2 Only if you step on the brake pedal hard
- 3 Only if the brake pedal is depressed to a certain extent
- 4 Only if the system senses the wheels are beginning to skid
- 5 DON'T KNOW
- 9 REFUSED

19. To brake in the shortest possible distance on a **smooth dry road** in a car that **is** equipped with antilock brakes, should drivers.....

- 1 Apply light pressure on the brake pedal
- 2 Press the brake pedal as hard as you can
- 3 Pump the brake pedal
- 8 DON'T KNOW
- 9 REFUSED

20. To the best of your knowledge, when the antilock brake system is activated, is it normal for the brake pedal to vibrate, or does vibration indicate that there is something wrong with the system?

- 1 VIBRATION IS NORMAL
- 2 SOMETHING IS WRONG WITH THE SYSTEM
- 8 DON'T KNOW
- 9 REFUSED

21. If you were attempting to stop a vehicle equipped with antilock brakes and the pedal began to vibrate or pulsate, which of the following would you be most likely to do?

- 1 Decrease the pressure on the pedal
- 2 Increase the pressure on the pedal
- 3 Apply the same amount of pressure
- 4 Pump the brake pedal
- 5 Take your foot off of the pedal
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

22. If you were attempting to stop a vehicle equipped with antilock brakes and the brake pedal dropped to the floor, which of the following would you be most likely to do?

- 1 Decrease the pressure on the pedal

- 2 Increase the pressure on the pedal
- 3 Apply the same amount of pressure
- 4 Pump the brake pedal
- 5 Take your foot off of the pedal
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

23. What does it mean if the brake pedal pushes up against your foot while you are braking in a vehicle equipped with antilock brakes?

- 1 ABS is activated
- 2 ABS is not working
- 3 Brake malfunction
- 4 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

24. What does a clicking or ratcheting noise mean during severe braking when driving a vehicle equipped with an antilock brake system?

- 1 ABS is activated
- 2 ABS is not working
- 3 Brake malfunction
- 4 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

25. What does it mean if you feel the steering wheel shake or vibrate during severe braking when driving a vehicle equipped with an antilock brake system?

- 1 ABS is activated
- 2 ABS is not working
- 3 Brake rotors are warped or damaged
- 4 Other brake malfunction
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

IF Q12=2,8,9, GO TO Q27

26a. To the best of your knowledge, has the antilock brake system on your (YEAR, MODEL, MAKE) ever been activated when you braked?

- 1 YES
- 2 NO GO TO Q27
- 8 DON'T KNOW GO TO Q27
- 9 REFUSED GO TO Q27

26b. Please tell me all the reasons you know that your antilock brakes were activated. CHECK ALL THAT APPLY

- 1 Pedal pressure changed
- 2 Light on dash came on
- 3 Pedal vibration
- 4 Heard noise

- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

- 26c. Did the antilock brakes perform as you expected on that occasion?
- 1 YES GO TO Q26e
 - 2 NO
 - 8 DON'T KNOW GO TO Q26e
 - 9 REFUSED GO TO Q26e

- 26d. Please tell me which ones apply to that occasion. CHECK ALL THAT APPLY
- 1 Did not stop fast enough
 - 2 Lost steering control
 - 3 Pedal did not feel right
 - 4 Braking sounds were not right
 - 5 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED

- 26e. During the past year, about how often would you say that you have activated your antilock brakes?
- 1 Every day/almost every day
 - 2 A few days a week
 - 3 A few days a month
 - 4 A few times a year
 - 5 Once
 - 6 Never
 - 8 DON'T KNOW
 - 9 REFUSED

IF Q26a=1, GO TO Q28a

27. Have you ever activated the antilock brake system on **any** car you were driving?
- 1 YES
 - 2 NO GO TO Q31a
 - 8 DON'T KNOW GO TO Q31a
 - 9 REFUSED GO TO Q31a

- 28a. Have you ever been startled by the way your brake pedal felt when you tried to stop quickly in a car with antilock brakes?
- 1 YES
 - 2 NO GO TO Q29a
 - 8 DON'T KNOW GO TO Q29a
 - 9 REFUSED GO TO Q29a

- 28b. How did the pedal react?
 _____ FILL IN RESPONSE
- DK DON'T KNOW
 - RF REFUSED

- 28c. Did you ever take your foot off the pedal when this happened?
- 1 YES

- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

29a. Have you ever had a crash which you feel was caused, at least in part, by your antilock brake system?

- 1 YES
- 2 NO GO TO Q30
- 8 DON'T KNOW GO TO Q30
- 9 REFUSED GO TO Q30

29b. How did the ABS system contribute to the crash?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

30. Do you feel that your antilock brakes have ever allowed you to avoid a crash that would have been unavoidable with standard brakes?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

31a. Have you ever purchased a brand new car (not counting vans, minivans, sport utility vehicles, pickup trucks, or motorcycles)?

- YES
- NO GO TO Q38
- DON'T KNOW GO TO Q38
- REFUSED GO TO Q38

31b. In what year was your most recent purchase?

19_____ (50-99)

- DK DON'T KNOW
- RF REFUSED

IF Q31b<90, GO TO Q38

32. When you were shopping for that car, did the salesman or anyone else at the dealerships discuss antilock brakes with you?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

33a. Were you shown or given brochures, videos or other types of informational material that explained how antilock brake systems worked?

- 1 YES
- 2 NO GO TO Q34a
- 8 DON'T KNOW GO TO Q34a
- 9 REFUSED GO TO Q34a

33b. What types of informational material were you given or shown? CHECK ALL THAT APPLY

- 1 Owners manual
- 2 Brochure on ABS
- 3 Brochure on safety features
- 4 Video on ABS
- 5 Video on safety features
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

33c. Did the informational material make you more likely to want a car with antilock brakes, one without ABS, or have no effect on your preference?

- 1 WANT ONE WITH ABS
- 2 WANT ONE WITHOUT ABS
- 3 NO EFFECT
- 8 DON'T KNOW
- 9 REFUSED

34a. Did the type of car you purchased offer antilock brakes as standard equipment, as an option, as part of an option package, or not offer antilock brakes?

- 1 ABS STANDARD GO TO Q35b
- 2 ABS AS AN OPTION
- 3 ABS AS PART OF AN OPTION PACKAGE GO TO Q34c
- 4 NO ABS GO TO Q35a
- 8 DON'T KNOW GO TO Q35a
- 9 REFUSED GO TO Q35a

34b. Did you purchase the ABS option?

- 1 YES GO TO Q35b
- 2 NO GO TO Q35b
- 8 DON'T KNOW GO TO Q35b
- 9 REFUSED GO TO Q35b

34c. Did you purchase the option package including ABS?

- 1 YES
- 2 NO GO TO Q35b
- 8 DON'T KNOW GO TO Q35b
- 9 REFUSED GO TO Q35b

34d. Did you get the option package primarily for the ABS or primarily for some other feature in the package?

- 1 PRIMARILY FOR ABS GO TO Q35b
- 2 PRIMARILY FOR SOME OTHER FEATURE GO TO Q35b
- 8 DON'T KNOW GO TO Q35b
- 9 REFUSED GO TO Q35b

35a. Did any of the other cars that you were considering buying have antilock brakes as a standard feature?

- 1 YES
- 2 NO GO TO Q38

- 3 ONLY CONSIDERED ONE CAR GO TO Q38
- 8 DON'T KNOW GO TO Q38
- 9 REFUSED GO TO Q38

35b. Why did you decide to buy a car (with/without) antilock brakes?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

35c. Did the (presence/absence) of antilock brakes have a lot of effect, some effect, a little effect, or no effect on your decision to buy that vehicle?

- 1 LOT OF EFFECT
- 2 SOME EFFECT
- 3 LITTLE EFFECT
- 4 NO EFFECT
- 8 DON'T KNOW
- 9 REFUSED

IF 34a=4, 8, 9, 34b=2, 8, 9 OR 34c=2, 8, 9, GO TO Q38

36. At the time you purchased that car, had you heard that it was a good idea to practice braking with ABS in a non-emergency situation?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

37. Did you ever try out the ABS in a non-emergency situation to see how it works (even before this purchase)?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

38. How would you feel about having antilock brakes on your next car? Would you.....

- 1 Prefer a car with ABS
- 2 Prefer a car without ABS GO TO Q40
- 3 Makes no difference GO TO Q40
- 8 DON'T KNOW GO TO Q40
- 9 REFUSED GO TO Q40

39a. When buying your next ABS equipped car, would you approve or disapprove if the dealer.....

INTERVIEWER: HIGHLIGHT 'APPROVE' RESPONSES

CATI: ROTATE QUESTIONS

- 1 Offered 30 minutes of education and practice with ABS before you left.
- 2 Required you to read the instructions for ABS and practice using it.
- 3 Gave you a free 10 minute video on how ABS works.
- 4 Gave you a free 10 minute audiotape on how ABS works.
- 5 Offered 15 minutes of education and practice with ABS before you left.
- 6 Offered 15 minutes of practice on an ABS simulator before you left.
- 7 ALL DISAPPROVE

- 8 DON'T KNOW
- 9 REFUSED

SHOW/HIDE APPROVES FROM Q39a

IF DISAPPROVED ALL ITEMS OR APPROVED ONLY ONE ITEM IN Q39a, GO TO Q40

39b. Which one of the options you mentioned would you prefer the most?

CATI ROTATE RESPONSES

- 1 Offering you **30 minutes** of education and practice before leaving
- 2 Requiring you to read the instructions for ABS and practice using it
- 3 Giving you a free 10 minute video on how ABS works
- 4 Giving you a free 10 minute audiotape on how ABS works
- 5 Offering you **15 minutes** of education and practice before leaving
- 6 Offering you **15 minutes** of practice on an ABS simulator before leaving
- 8 DON'T KNOW
- 9 REFUSED

40. Have you ever read the section of your owner's manual on your car's braking system?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

Now, a few last questions for statistical purposes...

D1. In what year were you born?
_____ (RANGE 1900-1985)
RF REFUSED

D2. Are you currently employed full time, part time, unemployed and looking for work, retired, going to school, homemaker or something else?

- 1 EMPLOYED FULL TIME
- 2 EMPLOYED PART TIME
- 3 UNEMPLOYED AND LOOKING FOR WORK
- 4 RETIRED
- 5 GOING TO SCHOOL
- 6 HOMEMAKER
- 7 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

D3. What is highest grade or year of regular school you have completed? READ IF NECESSARY

- 1 NO FORMAL SCHOOLING
- 2 FIRST THROUGH 7TH GRADE
- 3 8TH GRADE
- 4 SOME HIGH SCHOOL
- 5 HIGH SCHOOL GRADUATE
- 6 SOME COLLEGE
- 7 FOUR-YEAR COLLEGE GRADUATE
- 8 SOME GRADUATE SCHOOL
- 9 GRADUATE DEGREE

88 DON'T KNOW
REFUSED

D4. Are you currently married, divorced, separated, widowed, or single?

- 1 MARRIED
- 2 DIVORCED
- 3 SEPARATED
- 4 WIDOWED
- 5 SINGLE
- 8 DON'T KNOW
- 9 REFUSED

D5. Are you of Hispanic origin or descent?

- 1 HISPANIC
- 2 NOT HISPANIC
- 8 DON'T KNOW
- 9 REFUSED

D6. Which of these categories best describes your racial background?

- 1 White
- 2 Black or African-American
- 3 Asian or Pacific Islander
- 4 Eskimo, Aleutian or American Indian
- 5 Mixed
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

D7. How many persons under 16 live in your household?
NUMBER UNDER 16 YEARS OF AGE _____ (RANGE 0-12)

- DK DON'T KNOW
- RF REFUSED

D8. Which of the following categories best describes your total household income before taxes in 1998?
Your best estimate is fine.

- 1 Less than \$5,000
- 2 \$5,000 to less than \$15,000
- 3 \$15,000 to less than \$30,000
- 4 \$30,000 to less than \$50,000
- 5 \$50,000 to less than \$75,000
- 6 \$75,000 to less than \$100,000
- 7 \$100,000 or more
- 8 DON'T KNOW
- 9 REFUSED

[FROM OBSERVATION]

- D9. Gender
- 1 MALE
- 2 FEMALE

- D10. Is the telephone number I reached you at the only number for this household?
- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO D10a

- D10a. How many telephone numbers exist for this household?
SPECIFY HOW MANY _____ (RANGE 2-10)
- DK DON'T KNOW
 - RF REFUSED

Thank you for your assistance. That completes our interview.

Appendix B ANTILOCK BRAKE STUDY TRAINING MANUAL

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION ANTILOCK BRAKE STUDY

Training Notes

Primary Objective of the NHTSA Antilock Brake Study

The U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) is conducting a nationwide telephone survey regarding drivers' experiences and expectations with antilock brake systems (ABS).

Sample Frame

A sample of phone numbers in the United States has been drawn from a listing of U.S. households. We do not have any identifying information (name, address, etc.).

The potential universe for this survey includes all persons residing in the United States who are 16 years or older and drive passenger cars. This population is further restricted to persons whose primary motor vehicle is a passenger car and who have driven in the past year. A sample of 3,500 interviews will be taken from this universe of approximately 125 million car drivers.

Procedures

The interview will be conducted in English or Spanish- whichever language the respondent prefers.

If the respondents have any questions about the study, or would like to verify that PricewaterhouseCoopers is conducting this survey for NHTSA, have them call Jan Cooper, NHTSA at 1-800-262-8309 or Pahla Schutte, PricewaterhouseCoopers at 301-897-4217.

The call history screen includes the 12 codes shown below:

Reasons to Call Back	Reasons Not to Call Back
01 No Answer	09 Non-working Number
02 Busy	10 Hard Refusal
03 Call back with reschedule	11 Non-residential Number
04 Call back without reschedule	12 Cell Phone

05 Answering Machine	13 Other Reason for Non-Interview
06 Change Notes	
07 Soft Refusal	
08 Spanish Speaking Respondent	

Note that codes 09, 10, 11, 12 require supervisor approval.

05 Answering Machine- Please do not leave messages on answering machines.

07 Soft Refusal- This code should be used for refusals that you believe have the possibility of being converted. If the respondent is not interested, too busy, hangs up, or is just plain rude, then code the case 07-Soft Refusal.

08 Spanish Speaking Respondent- This code should be used if a non-bilingual interviewer encounters a Spanish speaking respondent who cannot conduct the interview in English. If this occurs, thank the respondent and end the call. At the notes screen, enter “Spanish speaking only”, then code the case 08-Spanish Speaking Respondent. Using this code, the CATI system will release this call only to bilingual interviewers.

09 Non-working Number- If you reach a non-working number (modem, fax, cell phone), please schedule a callback for the next day at an opposite time of day. After two callbacks result in a non-working number, the case should be coded 09-Non-working Number.

10 Hard Refusal- This code should be used for refusals that you believe do not have the possibility of being converted. If the respondent is threatening, uses abusive language or profanity, or threatens to call the telephone company, code the case as 10-Hard Refusal. *Before coding a hard refusal, you must have approval from a supervisor.*

11 Non-residential Number- We are only interviewing households. Therefore, if you reach an extension that is not a household then code the case as 11-Non-residential Number.

12 Cell Phone - We are only interviewing households. Therefore, if you reach an extension that is a cellular phone, then code the case as 12-Cell Phone.

13 Other Reason for Non-Interview- Use this code for respondents that fall into one of the following categories: 1) out of the country/long term travel, 2) deceased, 3) severely ill or injured, or 4) language barrier (the respondent speaks neither English nor Spanish).

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ANTILOCK BRAKE STUDY

Data Facts Sheet

Who is sponsoring the survey?

The survey is sponsored by the U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA).

What is the purpose of the study?

The survey is designed to learn about Americans' driving habits and their concerns and attitudes about automobile safety equipment. NHTSA will use the results to determine the best strategy for increasing the safety benefits of automobile safety equipment and to assess the need for an educational program to teach drivers about the proper use of this equipment.

Who are you surveying?

We are surveying people aged 16 or older who have driven a passenger car at least occasionally in the last year.

Where did you get my telephone number?

Your number was randomly generated through a technique called random digit dialing.

Will my answers be confidential?

Overall results of the study will be reported to NHTSA. However, all of your individual answers will remain strictly confidential, and you will not be required to provide any identifying information (e.g., name, address).

How long will the survey take?

This survey will take about 15-20 minutes to complete.

What kinds of questions will I be asked?

You will be asked about some of your driving experiences as well as your knowledge and opinions about automobile safety equipment.

Will I be able to see the results of the study?

NHTSA will be publishing the results of the study for the general public. The results will be used by NHTSA in order to improve traffic safety.

Why should I participate in this study?

Your input will help NHTSA increase the benefits of automobile safety equipment.

Who can I contact to verify the legitimacy of the study?

You may call Jan Cooper from NHTSA at 1-800-262-8309 or Pahla Schutte from PricewaterhouseCoopers at 301-897-4217.

What is the OMB approval number for this study?

The OMB approval number is 2127-0594.

NHTSA ANTILOCK BRAKE SYSTEM SURVEY
QUESTION BY QUESTION TRAINING NOTES

SCREENING QUESTIONS

If the designated respondent is not available, record their first name. When this person is called back, questions A and B will be skipped. If a first name is not recorded, questions A and B will appear when this household is called back.

NHTSA ANTILOCK BRAKE SYSTEM SURVEY

INTRODUCTION TO BE ADMINISTERED TO ANY ADULT HOUSEHOLD MEMBER:

Hello, my name is ____ and I am calling on behalf of the U.S. Department of Transportation. We are conducting a study about Americans' driving habits and their concerns and attitudes about automobile safety equipment.

PROMPT: I am calling from the PricewaterhouseCoopers Survey Research Center on behalf of the U.S. Department of Transportation. We were contracted to conduct this research.

PROMPT: Your individual responses will be completely confidential.

PROMPT: The survey will take 15-20 minutes to complete.

PROMPT: The OMB approval number for the collection of this information is 2127-0594.

A. How many persons aged 16 and older live in this household, even if they are not at home right now?

NUMBER OF ADULTS _____ (RANGE 0-10)

IF QA=0, THEN GO TO DECISION

B. How many of these persons have driven a car at least occasionally in the last year (not counting vans, minivans, sport utility vehicles, pickup trucks, or motorcycles)?

NUMBER OF DRIVERS _____ (RANGE 0-10)

IF QB=0, THEN GO TO DECISION

IF QB=1, THEN SAY: It is important that we speak to the person in this household who has driven a car in the last year. Are you that person?

IF SPEAKING TO THE CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

IF QB>1, THEN SAY: In order to randomly select just one driver to interview, could I speak to the car driver in your household, age 16 and older, who has had the most recent birthday?

PROMPT: This is a common method we use to randomly select one person to interview within a household. This will ensure a good representation of drivers in the United States.

IF SPEAKING TO CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

DECISION IF QA=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY I'm sorry, for this study we are interviewing only adults aged 16 and older. Thank you.

IF QB=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY I'm sorry, for this study we are interviewing only people who have driven a car in the past year. Thank you.

1. Would you say that you usually drive....?

- 1 Almost every day
- 2 A few days a week
- 3 A few days a month
- 4 A few times a year
- 8 DON'T KNOW
- 9 REFUSED

2. How many years have you been driving a car?

YEARS DRIVING _____ (RANGE 0-80)

- DK DON'T KNOW
- RF REFUSED

3. About how many miles did you drive a car in the past year?

PROMPT: THIS INCLUDES EVERY CAR THE RESPONDENT HAS DRIVEN IN THE PAST YEAR.

- 1 Less than 2,000
- 2 2,000 to less than 8,000
- 3 8,000 to less than 13,000
- 4 13,000 to less than 20,000
- 5 20,000 to less than 30,000
- 6 30,000 or more
- 8 DON'T KNOW
- 9 REFUSED

4a. I am going to ask you a few questions about the car that you drive most often. To do so, I need some information about the vehicle. First, what is the make and model of that car?

PRE-LIST

77/777 OTHER (SPECIFY _____)

88/888 DON'T KNOW

99/999 REFUSED

IF Q4a NOT EQUAL TO 88/888 OR 99/999 THEN ASK:

4b. A model of a car is available in different trim levels. Examples include LX, EX, Si, STE, GT, etc. What is the trim level of your (MAKE, MODEL)?

INTERVIEWER: IF "BASIC" TRIM LEVEL OR CAR DOES NOT HAVE A TRIM LEVEL, TYPE "BASIC"

FILL IN TRIM LEVEL _____

- DK DON'T KNOW
- RF REFUSED

4c. What is the model year of that vehicle?

- 19 _____ (RANGE 50-99)
- DK DON'T KNOW
- RF REFUSED

IF 4a=88/888, 99/999 OR 4c=DK, RF ASK:

4d. Is the car you drive most often a rental car?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

5. On the roads that you usually drive, do you drive a lot faster than other traffic, a little faster, just as fast, a little slower, or a lot slower than other traffic on the road?

- 1 A LOT FASTER
- 2 A LITTLE FASTER
- 3 JUST AS FAST
- 4 A LITTLE SLOWER
- 5 A LOT SLOWER
- 8 DON'T KNOW
- 9 REFUSED

6a. In some cases when a driver applies the brakes on a car very sharply, the wheels may stop spinning, or lock causing the vehicle to skid. Have you ever had to brake your (YEAR, MAKE, MODEL) so sharply that your brakes locked and you went into a skid?

- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO Q7a
GO TO Q7a
GO TO Q7a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

6b. Was the road surface.....?

- 1 Dry
- 2 Wet
- 3 Icy
- 4 Snow-covered
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

6c. Did you stay on the road or go off the road?

- 1 STAYED ON
- 2 WENT OFF
- 8 DON'T KNOW
- 9 REFUSED

IF THE MODEL YEAR OF THEIR VEHICLE IS PRIOR TO 1990, Q4a=88/888 OR 99/999, Q4c=DK, RF OR Q4d=1, THEN GO TO Q10

7a. Not counting skids in which your wheels locked, have you ever had to brake your (YEAR, MAKE, MODEL) sharply and found that your brakes were not performing as well as you would expect them to?

- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO Q8a
GO TO Q8a
GO TO Q8a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

7b. Was the road surface.....?

- 1 Dry
- 2 Wet
- 3 Icy
- 4 Snow-covered
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

7c. What happened when you applied the brakes? Anything else?

- _____ FILL IN RESPONSE
- DK DON'T KNOW
 - RF REFUSED

- 7d. Did you take your foot off the pedal when this happened?
- 1 YES
 - 2 NO
 - 8 DON'T KNOW
 - 9 REFUSED

- 7e. Did you stay on the road or go off the road?
- 1 STAYED ON GO TO Q7g
 - 2 WENT OFF
 - 8 DON'T KNOW GO TO Q7g
 - 9 REFUSED GO TO Q7g

7f. What situation or situations from the following list caused you to drive off the road on that occasion -- was it...? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 05)

- 01 Falling asleep at the wheel
- 02 Unexpected curve in the road
- 03 Steering away to avoid hitting something
- 04 Distraction diverted your attention
- 05 Driving too fast for the road conditions
- 06 Or something else (SPECIFY _____)
- 88 DON'T KNOW
- REFUSED

- 7g. Were you able to stop before you hit anything?
- 1 YES GO TO Q8a
 - 2 NO
 - 8 DON'T KNOW GO TO Q8a
 - 9 REFUSED GO TO Q8a

7h. What did you hit when you drove off the road?

Another vehicle

An object beside the road (rail, sign, post, tree, etc)

- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8a. Aside from any occasions that you have already told me about, have you ever gone off the road, unintentionally, when driving your (CAR)?

- 1 YES
- 2 NO GO TO Q9a
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

8b. What situation or situations from the following list caused you to drive off the road on that occasion --- was it . . . ? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 05)

- 01 Falling asleep at the wheel
- 02 Unexpected curve in the road
- 03 Steering away to avoid hitting something
- 04 Distraction diverted your attention
- 05 Driving too fast for the road conditions
- 06 Or something else (SPECIFY _____)
- 88 DON'T KNOW
- 99 REFUSED

8c. Was the road surface.....?

- 1 Dry
- 2 Wet
- 3 Icy
- 4 Snow-covered
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8d. Were you able to stop before you hit anything?

- 1 YES GO TO Q9a
- 2 NO
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

8e. What did you hit when you drove off the road?

- 1 Another vehicle
- 2 An object beside the road (rail, sign, post, tree, etc)
- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9a. Aside from any occasions that you have already told me about, have you ever intentionally driven off the road to avoid a collision, when driving your (CAR)?

- 1 YES
- 2 NO GO TO Q10
- 8 DON'T KNOW GO TO Q10
- 9 REFUSED GO TO Q10

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

9b. What were you trying to avoid on that occasion?

- 1 Another moving vehicle
- 2 A stationary vehicle
- 3 An animal
- 4 A bicyclist
- 5 A pedestrian
- 6 Debris in the roadway
- 7 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9c. Did you consciously decide to drive off the road or did you just react instinctively to avoid the collision?

- 1 CONSCIOUSLY DECIDED
- 2 JUST REACTED
- 8 DON'T KNOW
- 9 REFUSED

9d. Were you able to maintain control of your car after you left the road?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

9e. Were you able to stop before you hit anything?

- 1 YES GO TO Q10
- 2 NO
- 8 DON'T KNOW GO TO Q10
- 9 REFUSED GO TO Q10

- 9f. What did you hit when you drove off the road?
- 1 Another vehicle
 - 2 An object beside the road (rail, sign, post, tree, etc)
 - 3 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED

Now, I would like to switch to a different subject.

10. If you saw the initials "ABS" on a car, what would you think they stand for?
- 1 ANTILOCK BRAKE SYSTEM GO TO Q12
 - 2 AIR BAG SYSTEM
 - 3 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED

11. Have you ever heard of antilock brake systems?
- 1 YES
 - 2 NO GO TO Q40
 - 8 DON'T KNOW GO TO Q40
 - 9 REFUSED GO TO Q40

IF Q10=2,3,8,9, THEN SAY The initials "ABS" stand for antilock brake system.

12. Does your (YEAR, MAKE, MODEL) have an antilock brake system?
- 1 YES
 - 2 NO
 - 8 DON'T KNOW GO TO Q14
 - 9 REFUSED GO TO Q14

13. Please tell me all the reasons you know your vehicle (HAS/DOESN'T HAVE) ABS. CHECK ALL THAT APPLY

CATI: ROTATE RESPONSES 1-7

- 1 Told when bought it
- 2 Read drivers manual
- 3 Know specifications for car
- 4 ABS logo on car
- 5 Light on the instrument panel
- 6 Ordered ABS specifically when purchasing car
- 7 Specifically requested a vehicle without ABS
- 8 DON'T KNOW
- 9 REFUSED

14. Based on what you know or have heard, what are the **advantages** of antilock brake systems, if any, compared to standard brake systems? Anything else?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

15. Based on what you know or have heard, what are the **disadvantages** of antilock brake systems, if any, compared to standard brake systems? Anything else?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

To the best of your knowledge, I'd like you to tell me whether you think the following statements are true or false.

CATI: ROTATE QUESTIONS 16a TO 16c

16a. Is it true or false that antilock brakes....

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

CATI: ROTATE RESPONSES

- 1 Help you to better avoid crashes than you could with standard brakes
- 2 Allow you to follow other vehicles more closely than you could with standard brakes

- 3 Help keep you from losing control of the vehicle when braking sharply
- 4 Help you to maintain steering control while braking
- 5 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

16b. Is it true or false that antilock brakes help you to brake in a shorter distance on...

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 dry pavement
- 2 wet pavement
- 3 snow-covered pavement
- 4 icy pavement
- 5 dirt or gravel roads
- 6 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

16c. Is it true or false that antilock brakes reduce the likelihood of skidding on...

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 dry pavement
- 2 wet pavement
- 3 snow-covered pavement
- 4 icy pavement
- 5 dirt or gravel roads
- 6 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

Now, for the next set of questions, I would like you to respond with a yes or no.

17a. With antilock brakes, would you be more likely to drive on...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Wet roads
- 2 Snow-covered roads
- 3 Icy roads
- 4 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

17b. With antilock brakes, would you be more likely to drive faster on ...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Dry roads
- 2 Wet roads
- 3 Snow-covered roads
- 4 Icy roads
- 5 ALL NO
- 6 DON'T KNOW
- 7 REFUSED

17c. Would you be more likely to pass another vehicle on ...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Dry roads
- 2 Wet roads
- 3 Snow-covered roads
- 4 Icy roads
- 5 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

For the next set of questions, please select the phrase that you feel best completes the sentence.

18. Does the antilock brake system activate, or kick in.....
- 1 As soon as you step on the brake pedal
 - 2 Only if you step on the brake pedal hard
 - 3 Only if the brake pedal is depressed to a certain extent
 - 4 Only if the system senses the wheels are beginning to skid
 - 5 DON'T KNOW
 - 9 REFUSED
19. To brake in the shortest possible distance on a **smooth dry road** in a car that **is** equipped with antilock brakes, should drivers.....
- 1 Apply light pressure on the brake pedal
 - 2 Press the brake pedal as hard as you can
 - 3 Pump the brake pedal
 - 8 DON'T KNOW
 - 9 REFUSED
20. To the best of your knowledge, when the antilock brake system is activated, is it normal for the brake pedal to vibrate, or does vibration indicate that there is something wrong with the system?
- 1 VIBRATION IS NORMAL
 - 2 SOMETHING IS WRONG WITH THE SYSTEM
 - 8 DON'T KNOW
 - 9 REFUSED
21. If you were attempting to stop a vehicle equipped with antilock brakes and the pedal began to vibrate or pulsate, which of the following would you be most likely to do?
- 1 Decrease the pressure on the pedal
 - 2 Increase the pressure on the pedal
 - 3 Apply the same amount of pressure
 - 4 Pump the brake pedal
 - 5 Take your foot off of the pedal
 - 6 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED
22. If you were attempting to stop a vehicle equipped with antilock brakes and the brake pedal dropped to the floor, which of the following would you be most likely to do?
- 1 Decrease the pressure on the pedal
 - 2 Increase the pressure on the pedal
 - 3 Apply the same amount of pressure
 - 4 Pump the brake pedal
 - 5 Take your foot off of the pedal
 - 6 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED
23. What does it mean if the brake pedal pushes up against your foot while you are braking in a vehicle equipped with antilock brakes?
- 1 ABS is activated
 - 2 ABS is not working
 - 3 Brake malfunction
 - 4 OTHER (SPECIFY _____)
 - 8 DON'T KNOW
 - 9 REFUSED
24. What does a clicking or ratcheting noise mean during severe braking when driving a vehicle equipped with an antilock brake system?
- 1 ABS is activated
 - 2 ABS is not working
 - 3 Brake malfunction

- 4 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

25. What does it mean if you feel the steering wheel shake or vibrate during severe braking when driving a vehicle equipped with an antilock brake system?

- 1 ABS is activated
- 2 ABS is not working
- 3 Brake rotors are warped or damaged
- 4 Other brake malfunction
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

IF Q12=2,8,9, GO TO Q27

26a. To the best of your knowledge, has the antilock brake system on your (YEAR, MODEL, MAKE) ever been activated when you braked?

- 1 YES
- 2 NO GO TO Q27
- 8 DON'T KNOW GO TO Q27
- 9 REFUSED GO TO Q27

26b. Please tell me all the reasons you know that your antilock brakes were activated. CHECK ALL THAT APPLY

- 1 Pedal pressure changed
- 2 Light on dash came on
- 3 Pedal vibration
- 4 Heard noise
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

26c. Did the antilock brakes perform as you expected on that occasion?

- 1 YES GO TO Q26e
- 2 NO
- 8 DON'T KNOW GO TO Q26e
- 9 REFUSED GO TO Q26e

26d. Please tell me which ones apply to that occasion. CHECK ALL THAT APPLY

- 1 Did not stop fast enough
- 2 Lost steering control
- 3 Pedal did not feel right
- 4 Braking sounds were not right
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

26e. During the past year, about how often would you say that you have activated your antilock brakes?

- 1 Every day/almost every day
- 2 A few days a week
- 3 A few days a month
- 4 A few times a year
- 5 Once
- 6 Never
- 8 DON'T KNOW
- 9 REFUSED

IF Q26a=1, GO TO Q28a

27. Have you ever activated the antilock brake system on **any** car you were driving?

- 1 YES

- 2 NO GO TO Q31a
8 DON'T KNOW GO TO Q31a
9 REFUSED GO TO Q31a
- 28a. Have you ever been startled by the way your brake pedal felt when you tried to stop quickly in a car with antilock brakes?
1 YES
2 NO GO TO Q29a
8 DON'T KNOW GO TO Q29a
9 REFUSED GO TO Q29a
- 28b. How did the pedal react?
_____ FILL IN RESPONSE
DK DON'T KNOW
RF REFUSED
- 28c. Did you ever take your foot off the pedal when this happened?
1 YES
2 NO
8 DON'T KNOW
9 REFUSED
- 29a. Have you ever had a crash which you feel was caused, at least in part, by your antilock brake system?
1 YES
2 NO GO TO Q30
8 DON'T KNOW GO TO Q30
9 REFUSED GO TO Q30
- 29b. How did the ABS system contribute to the crash?
_____ FILL IN RESPONSE
DK DON'T KNOW
RF REFUSED
30. Do you feel that your antilock brakes have ever allowed you to avoid a crash that would have been unavoidable with standard brakes?
1 YES
2 NO
8 DON'T KNOW
9 REFUSED
- 31a. Have you ever purchased a brand new car (not counting vans, minivans, sport utility vehicles, pickup trucks, or motorcycles)?
YES
NO GO TO Q38
DON'T KNOW GO TO Q38
REFUSED GO TO Q38
- 31b. In what year was your most recent purchase?
19_____ (50-99)
DK DON'T KNOW
RF REFUSED
- IF Q31b<90, GO TO Q38
32. When you were shopping for that car, did the salesman or anyone else at the dealerships discuss antilock brakes with you?
1 YES
2 NO
8 DON'T KNOW
9 REFUSED

- 33a. Were you shown or given brochures, videos or other types of informational material that explained how antilock brake systems worked?
- | | | |
|---|------------|------------|
| 1 | YES | |
| 2 | NO | GO TO Q34a |
| 8 | DON'T KNOW | GO TO Q34a |
| 9 | REFUSED | GO TO Q34a |
- 33b. What types of informational material were you given or shown? CHECK ALL THAT APPLY
- | | | |
|---|-----------------------------|--|
| 1 | Owners manual | |
| 2 | Brochure on ABS | |
| 3 | Brochure on safety features | |
| 4 | Video on ABS | |
| 5 | Video on safety features | |
| 6 | OTHER (SPECIFY _____) | |
| 8 | DON'T KNOW | |
| 9 | REFUSED | |
- 33c. Did the informational material make you more likely to want a car with antilock brakes, one without ABS, or have no effect on your preference?
- | | | |
|---|----------------------|--|
| 1 | WANT ONE WITH ABS | |
| 2 | WANT ONE WITHOUT ABS | |
| 3 | NO EFFECT | |
| 8 | DON'T KNOW | |
| 9 | REFUSED | |
- 34a. Did the type of car you purchased offer antilock brakes as standard equipment, as an option, as part of an option package, or not offer antilock brakes?
- | | | |
|---|----------------------------------|------------|
| 1 | ABS STANDARD | GO TO Q35b |
| 2 | ABS AS AN OPTION | |
| 3 | ABS AS PART OF AN OPTION PACKAGE | GO TO Q34c |
| 4 | NO ABS | GO TO Q35a |
| 8 | DON'T KNOW | GO TO Q35a |
| 9 | REFUSED | GO TO Q35a |
- 34b. Did you purchase the ABS option?
- | | | |
|---|------------|------------|
| 1 | YES | GO TO Q35b |
| 2 | NO | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 34c. Did you purchase the option package including ABS?
- | | | |
|---|------------|------------|
| 1 | YES | |
| 2 | NO | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 34d. Did you get the option package primarily for the ABS or primarily for some other feature in the package?
- | | | |
|---|----------------------------------|------------|
| 1 | PRIMARILY FOR ABS | GO TO Q35b |
| 2 | PRIMARILY FOR SOME OTHER FEATURE | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 35a. Did any of the other cars that you were considering buying have antilock brakes as a standard feature?
- | | | |
|---|-------------------------|-----------|
| 1 | YES | |
| 2 | NO | GO TO Q38 |
| 3 | ONLY CONSIDERED ONE CAR | GO TO Q38 |
| 8 | DON'T KNOW | GO TO Q38 |
| 9 | REFUSED | GO TO Q38 |
- 35b. Why did you decide to buy a car (with/without) antilock brakes?

FILL IN RESPONSE

DK DON'T KNOW
RF REFUSED

35c. Did the (presence/absence) of antilock brakes have a lot of effect, some effect, a little effect, or no effect on your decision to buy that vehicle?

- 1 LOT OF EFFECT
- 2 SOME EFFECT
- 3 LITTLE EFFECT
- 4 NO EFFECT
- 8 DON'T KNOW
- 9 REFUSED

IF 34a=4, 8, 9, 34b=2, 8, 9 OR 34c=2, 8, 9, GO TO Q38

36. At the time you purchased that car, had you heard that it was a good idea to practice braking with ABS in a non-emergency situation?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

37. Did you ever try out the ABS in a non-emergency situation to see how it works (even before this purchase)?

- 1 YES
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

38. How would you feel about having antilock brakes on your next car? Would you.....

- 1 Prefer a car with ABS
 - 2 Prefer a car without ABS
 - 3 Makes no difference
 - 8 DON'T KNOW
 - 9 REFUSED
- GO TO Q40
GO TO Q40
GO TO Q40
GO TO Q40

39a. When buying your next ABS equipped car, would you approve or disapprove if the dealer.....

INTERVIEWER: HIGHLIGHT 'APPROVE' RESPONSES

CATI: ROTATE QUESTIONS

- 1 Offered 30 minutes of education and practice with ABS before you left.
- 2 Required you to read the instructions for ABS and practice using it.
- 3 Gave you a free 10 minute video on how ABS works.
- 4 Gave you a free 10 minute audiotape on how ABS works.
- 5 Offered 15 minutes of education and practice with ABS before you left.
- 6 Offered 15 minutes of practice on an ABS simulator before you left.
- 7 ALL DISAPPROVE
- 8 DON'T KNOW
- 9 REFUSED

SHOW/HIDE APPROVES FROM Q39a

IF DISAPPROVED ALL ITEMS OR APPROVED ONLY ONE ITEM IN Q39a, GO TO Q40

39b. Which one of the options you mentioned would you prefer the most?

CATI ROTATE RESPONSES

- 1 Offering you **30 minutes** of education and practice before leaving
- 2 Requiring you to read the instructions for ABS and practice using it
- 3 Giving you a free 10 minute video on how ABS works
- 4 Giving you a free 10 minute audiotape on how ABS works
- 5 Offering you **15 minutes** of education and practice before leaving
- 6 Offering you **15 minutes** of practice on an ABS simulator before leaving
- 8 DON'T KNOW

9 REFUSED

40. Have you ever read the section of your owner's manual on your car's braking system?

1 YES

2 NO

8 DON'T KNOW

9 REFUSED

Now, a few last questions for statistical purposes...

D1. In what year were you born?

_____ (RANGE 1900-1985)

RF REFUSED

D2. Are you currently employed full time, part time, unemployed and looking for work, retired, going to school, homemaker or something else?

1 EMPLOYED FULL TIME

2 EMPLOYED PART TIME

3 UNEMPLOYED AND LOOKING FOR WORK

4 RETIRED

5 GOING TO SCHOOL

6 HOMEMAKER

7 OTHER (SPECIFY _____)

8 DON'T KNOW

9 REFUSED

D3. What is highest grade or year of regular school you have completed? READ IF NECESSARY

1 NO FORMAL SCHOOLING

2 FIRST THROUGH 7TH GRADE

3 8TH GRADE

4 SOME HIGH SCHOOL

5 HIGH SCHOOL GRADUATE

6 SOME COLLEGE

7 FOUR-YEAR COLLEGE GRADUATE

8 SOME GRADUATE SCHOOL

9 GRADUATE DEGREE

88 DON'T KNOW

REFUSED

D4. Are you currently married, divorced, separated, widowed, or single?

1 MARRIED

2 DIVORCED

3 SEPARATED

4 WIDOWED

5 SINGLE

8 DON'T KNOW

9 REFUSED

D5. Are you of Hispanic origin or descent?

1 HISPANIC

2 NOT HISPANIC

8 DON'T KNOW

9 REFUSED

D6. Which of these categories best describes your racial background?

1 White

2 Black or African-American

3 Asian or Pacific Islander

4 Eskimo, Aleutian or American Indian

5 Mixed

- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

D7. How many persons under 16 live in your household?
NUMBER UNDER 16 YEARS OF AGE _____ (RANGE 0-12)

- DK DON'T KNOW
- RF REFUSED

D8. Which of the following categories best describes your total household income before taxes in 1998? Your best estimate is fine.

- 1 Less than \$5,000
- 2 \$5,000 to less than \$15,000
- 3 \$15,000 to less than \$30,000
- 4 \$30,000 to less than \$50,000
- 5 \$50,000 to less than \$75,000
- 6 \$75,000 to less than \$100,000
- 7 \$100,000 or more
- 8 DON'T KNOW
- 9 REFUSED

[FROM OBSERVATION]

- D9. Gender
- 1 MALE
 - 2 FEMALE

D10. Is the telephone number I reached you at the only number for this household?

- 1 YES
- 2 NO GO TO D10a
- 8 DON'T KNOW
- 9 REFUSED

D10a. How many telephone numbers exist for this household?
SPECIFY HOW MANY _____ (RANGE 2-10)

- DK DON'T KNOW
- RF REFUSED

Thank you for your assistance. That completes our interview.

NHTSA ANTILOCK BRAKE SYSTEM SURVEY (Spanish Version)

NHTSA ANTILOCK BRAKE SYSTEM SURVEY

INTRODUCTION TO BE ADMINISTERED TO ANY ADULT HOUSEHOLD MEMBER:

Hola, mi nombre es _____, y estoy llamando de parte del Departamento de Transporte de los Estados Unidos. Estamos haciendo un estudio acerca de los hábitos de manejo de los americanos y sus inquietudes y actitudes respecto al equipo de seguridad de los automóviles.

PROMPT: Estoy llamando del PricewaterhouseCoopers Survey Research Center de parte del Departamento de Transporte de los Estados Unidos. Estamos contratados para llevar a cabo esta encuesta.

PROMPT: Sus respuestas serán completamente confidenciales.

PROMPT: La encuesta tardará de 15 a 20 minutos para completar.

PROMPT: El número de aprobación del OMB para la recopilación de esta información es 2127-0594.

A. ¿Cuántas personas de 16 años de edad y mayores viven en esta casa aunque no estén en casa ahora mismo?

NUMBER OF ADULTS _____ (RANGE 0-10)

IF QA=0, THEN GO TO DECISION

B. ¿Cuántas de estas personas han manejado un auto al menos ocasionalmente en el último año (sin contar vans, minivans, vehículos de 4 x 4, camionetas o motos)?

NUMBER OF DRIVERS _____ (RANGE 0-10)

IF QB=0, THEN GO TO DECISION

IF QB=1, THEN SAY: Es importante que hablemos con la persona de esta casa que haya manejado un auto en el último año. ¿Es usted esa persona?

IF SPEAKING TO THE CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

IF QB>1, THEN SAY: Con el fin de seleccionar un conductor al azar para la entrevista, ¿podría yo hablar con la persona en su casa, de 16 años de edad o mayor, que haya cumplido años más recientemente?

PROMPT: Esto es un metodo muy común que usamos para seleccionar una persona para entrevistarla. Esto es para asegurar una buena representación de conductores en los Estados Unidos.

IF SPEAKING TO CORRECT PERSON, GO TO Q1

IF GETTING TRANSFERRED TO CONTACT, REPEAT INTRODUCTION AND GO TO Q1

IF CONTACT NOT AVAILABLE, RECORD CALL BACK DATE, TIME, AND DESIGNATED RESPONDENT

DECISION IF QA=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY Lo siento, pero para este estudio sólo estamos entrevistando a personas de 16 años de edad y mayores. Gracias.

IF QB=0, THEN TERMINATE

INTERVIEWER- IF TERMINATE, SAY Lo siento, pero para este estudio sólo estamos entrevistando a personas que hayan manejado un auto en el último año. Gracias.

1. Usted diría que normalmente maneja....
- 1 Casi todos los días
- 2 Unos días a la semana
- 3 Unos días al mes
- 4 Algunas veces al año
- 8 DON'T KNOW
- 9 REFUSED

2. ¿Cuántos años hace que está manejando un auto?
YEARS DRIVING _____ (RANGE 0-80)
- DK DON'T KNOW
- RF REFUSED

3. ¿Aproximadamente cuántas millas manejó el año pasado?
PROMPT: THIS INCLUDES EVERY CAR THE RESPONDENT HAS DRIVEN IN THE PAST YEAR.

- 1 Menos de 2,000
- 2 2,000 menos que 8,000
- 3 8,000 menos que 13,000
- 4 13,000 menos que 20,000
- 5 20,000 menos que 30,000
- 6 30,000 o más
- 8 DON'T KNOW
- 9 REFUSED

- 4a. Le voy a hacer algunas preguntas acerca del auto que usted maneja con mayor frecuencia. Para hacerlo, necesito alguna información acerca de su vehículo. Primero, ¿cuál es el modelo y la marca de ese auto?

- 1 PRE-LIST _____
- 2 77/777 OTHER (SPECIFY _____)
- 3 88/888 DON'T KNOW
- 4 99/999 REFUSED

IF Q4a NOT EQUAL TO 88/888 OR 99/999 THEN ASK:

- 4b. El modelo de auto esta disponible en diferentes tipos o estilos. Por ejemplo, estos tipos o estilos incluyen LX, EX, SI, STE, GT, etc. ¿Cuál es el tipo o estilo de su (MAKE, MODEL)?

INTERVIEWER: IF "BASIC" TRIM LEVEL OR CAR DOES NOT HAVE A TRIM LEVEL, TYPE "BASIC"

- 1 FILL IN TRIM LEVEL _____
- 2 DK DON'T KNOW
- 3 RF REFUSED

- 4c. ¿De qué año es ese vehículo?

- 1 19 _____ (RANGE 50-99)
- 2 DK DON'T KNOW
- 3 RF REFUSED

IF 4a=88/888, 99/999 OR 4c=DK, RF ASK:

- 4d. ¿Es alquilado el auto que usted maneja con mayor frecuencia?

- 1 SÍ
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

En los caminos que usted comunmente maneja, ¿usted maneja mucho más rápido que los demas, un poco más rápido, a la misma velocidad, un poco más despacio, o mucho más despacio que los demas?

- 1 MUCHO MÁS RÁPIDO
- 2 UN POCO MÁS RÁPIDO
- 3 A LA MISMA VELOCIDAD
- 4 UN POCO MÁS DESPACIO
- 5 MUCHO MÁS DESPACIO
- 8 DON'T KNOW

9 REFUSED

6a. A veces cuando uno frena un auto muy de golpe, las ruedas pueden dejar de girar, o trabarse, causando que el vehículo patine. ¿Ha tenido alguna vez que frenar su (YEAR, MAKE, MODEL) tan de golpe que sus frenos se trabaron y el vehículo empezó a patinar?

- 1 SÍ
- 2 NO GO TO Q7a
- 8 DON'T KNOW GO TO Q7a
- 9 REFUSED GO TO Q7a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

6b. ¿Estaba la superficie del camino...?

- 1 Seco
- 2 Mojado
- 3 Congelado
- 4 Cubierto de nieve
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

6c. ¿Se quedó en el camino o se salió?

- 1 QUEDÓ
- 2 SALIÓ
- 8 DON'T KNOW
- 9 REFUSED

IF THE MODEL YEAR OF THEIR VEHICLE IS PRIOR TO 1990, Q4a=88/888 OR 99/999, Q4c=DK, RF OR Q4d=1, THEN GO TO Q10

7a. Sin contar las patinadas en que sus ruedas se trabaron, ¿ha tenido alguna vez que frenar su (YEAR, MAKE, MODEL) de golpe y encontró que sus frenos no respondían cómo esperaba?

- 1 SÍ
- 2 NO GO TO Q8a
- 8 DON'T KNOW GO TO Q8a
- 9 REFUSED GO TO Q8a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

7b. ¿Estaba la superficie del camino.....?

- 1 Seco
- 2 Mojado
- 3 Congelado
- 4 Cubierto de nieve
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

7c. ¿Qué pasó cuándo frenó? ¿Algo más?

- _____ FILL IN RESPONSE
- DK DON'T KNOW
- RF REFUSED

7d. ¿Sacó su pie del pedal cuándo esto ocurrió?

- 1 SÍ
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

7e. ¿Se quedó en el camino o se salió?

- 1 QUEDÓ GO TO Q7g
- 2 SALIÓ
- 8 DON'T KNOW GO TO Q7g
- 9 REFUSED GO TO Q7g

7f. ¿Cuál situación o situaciones de la siguiente lista causó que se saliera del camino en esa ocasión? ¿Fue....? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 06)

- 01 Que se quedó dormido al volante
- 02 Una curva inesperada en el camino
- 03 Que viró para evitar chocar con algo
- 04 Que una distracción desvió su atención
- 05 Que estaba manejando demasiado rápido para las condiciones del camino
- 06 U otra cosa (SPECIFY _____)
- 88 DON'T KNOW
- 99 REFUSED

7g. ¿Pudo parar antes de chocar con algo?

- 1 SÍ GO TO Q8a
- 2 NO
- 8 DON'T KNOW GO TO Q8a
- 9 REFUSED GO TO Q8a

7h. ¿Con qué chocó cuándo se salió del camino?

Otro vehículo

Un objeto al borde del camino (riel, cartel, poste, árbol, etc)

- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8a. Aparte de las ocasiones que ya me ha contado, ¿se ha salido alguna vez del camino, sin querer, cuándo manejaba su (AUTO)?

- 1 SÍ
- 2 NO GO TO Q9a
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

8b. ¿Cuál situación o situaciones de la siguiente lista causó que se saliera del camino en esa ocasión? ¿Fue....? CHECK ALL THAT APPLY

CATI: ROTATE QUESTIONS (01 THROUGH 06)

- 01 Que se quedó dormido al volante
- 02 Una curva inesperada en el camino
- 03 Que viró para evitar chocar con algo
- 04 Que una distracción desvió su atención
- 05 Que estaba manejando demasiado rápido para las condiciones del camino
- 06 U otra cosa (SPECIFY _____)
- 88 DON'T KNOW
- 99 REFUSED

8c. ¿Estaba la superficie del camino...?

- 1 Seco
- 2 Mojado
- 3 Congelado
- 4 Cubierto de nieve

- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

8d. ¿Pudo parar antes de chocar con algo?

- 1 SÍ GO TO Q9a
- 2 NO
- 8 DON'T KNOW GO TO Q9a
- 9 REFUSED GO TO Q9a

8e. ¿Con qué chocó cuando se salió del camino?

Otro vehículo

Un objeto al borde del camino (riel, cartel, poste, árbol, etc)

- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9a. Aparte de la ocasión que ya ha contado, ¿se ha salido alguna vez del camino intencionalmente para evitar un choque, cuando está manejando su carro?

- 1 SÍ
- 2 NO GO TO Q10
- 8 DON'T KNOW GO TO Q10
- 9 REFUSED GO TO Q10

PROMPT: IF RESPONDENT DESCRIBES TWO OR MORE INCIDENTS, ASK THEM TO DESCRIBE THEIR MOST RECENT INCIDENT.

9b. ¿Qué estaba tratando de evitar en esa ocasión?

- 1 Otro vehículo en movimiento
- 2 Un vehículo estacionado
- 3 Un animal
- 4 Un ciclista
- 5 Un peatón
- 6 Desperdicios en el camino
- 7 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

9c. ¿Decidió conscientemente salirse del camino o reaccionó instintivamente para evitar el choque?

- 1 DECIDIÓ CONCIENTEMENTE
- 2 SIMPLEMENTE REACCIONÓ
- 8 DON'T KNOW
- 9 REFUSED

9d. ¿Pudo mantener el control de su auto después de salirse del camino?

- 1 SÍ
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

9e. ¿Pudo parar antes de chocar con algo?

- 1 SÍ GO TO Q10
- 2 NO
- 8 DON'T KNOW GO TO Q10
- 9 REFUSED GO TO Q10

9f. ¿Con qué chocó cuando se salió del camino?

- 1 Otro vehículo

- 2 Un objeto al borde del camino (riel, cartel, poste, árbol, etc)
- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

Ahora, quisiera cambiar de tema.

- 10. Si viera las iniciales "ABS" en un auto, ¿qué pensaría que significan?
- 1 SISTEMA DE FRENOS DE ANTIBLOQUEO (ANTILOCK) GO TO Q12
- 2 SISTEMA DE BOLSAS DE AIRE
- 3 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

- 11. ¿Ha oído hablar alguna vez de sistemas de frenos de antibloqueo?
- 1 SÍ
- 2 NO GO TO Q40
- 8 DON'T KNOW GO TO Q40
- 9 REFUSED GO TO Q40

IF Q10=2,3,8,9, THEN SAY Las iniciales "ABS" significan sistema de frenos de antibloqueo.

- 12. ¿Tiene su (YEAR, MAKE, MODEL) un sistema de frenos de antibloqueo?
- 1 SÍ
- 2 NO
- 8 DON'T KNOW GO TO Q14
- 9 REFUSED GO TO Q14

- 13. Me podría decir las razones por las cuales usted sabe que su vehículo (tiene/no tiene) frenos con sistema de antibloqueo.
- CHECK ALL THAT APPLY

CATI: ROTATE RESPONSES 1 TO 7

- 1 Le dijeron cuando lo compró
- 2 Leyó el manual del conductor
- 3 Conoce las especificaciones para el auto
- 4 Logotipo del ABS en el auto
- 5 Tablero de instrumentos
- 6 Pidió específicamente el sistema de frenos de antibloqueo cuando compró el auto
- 7 Pidió específicamente un vehículo sin sistema de frenos de antibloqueo
- 8 DON'T KNOW
- 9 REFUSED

- 14. En base a lo que sabe o ha oído, ¿cuáles son las ventajas de los sistemas de frenos de antibloqueo, si las hay, en comparación a sistemas de frenos comunes? Algo más?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

- 15. En base a lo que sabe o ha oído, ¿cuáles son las desventajas de los sistemas de frenos de antibloqueo, si las hay, en comparación a sistemas de frenos comunes? Algo más?

_____ FILL IN RESPONSE

- DK DON'T KNOW
- RF REFUSED

De acuerdo a lo que usted sabe, me gustaría que me dijera si las siguientes afirmaciones son verdaderas o falsas.

CATI: ROTATE QUESTIONS 16a TO 16c

- 16a. ¿Es cierto o falso que los frenos de antibloqueo....?
- INTERVIEWER: HIGHLIGHT TRUE RESPONSES
- CATI: ROTATE RESPONSES
- 1 Ayudan a que usted evite choques mejor que con frenos comunes
- 2 Permiten que usted siga a otros vehículos más de cerca que con frenos comunes
- 3 Ayudan a que usted no pierda control del vehículo cuando frena de golpe

- 4 Ayudan a que usted mantenga control del volante cuando frena
- 5 ALL FALSE
- 6 DON'T KNOW
- 9 REFUSED

16b. ¿Es cierto o falso que los frenos de antibloqueo ayudan a que usted frene en una distancia más corta en...?

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 Pavimento seco
- 2 Pavimento mojado
- 3 Pavimento cubierto de nieve
- 4 Pavimento congelado
- 5 Caminos de tierra o grava
- 6 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

16c. ¿Es cierto o falso que los frenos de antibloqueo reducen la probabilidad de una patinada en...?

INTERVIEWER: HIGHLIGHT TRUE RESPONSES

- 1 Pavimento seco
- 2 Pavimento mojado
- 3 Pavimento cubierto de nieve
- 4 Pavimento congelado
- 5 Caminos de tierra o grava
- 6 ALL FALSE
- 8 DON'T KNOW
- 9 REFUSED

Ahora, para el proximo grupo de preguntas, por favor responda sí o no.

17a. ¿Con los frenos de antibloqueo, es más probable que usted maneje en ...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Caminos mojados
- 2 Caminos cubiertos de nieve
- 3 Caminos congelados
- 4 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

17b. ¿Es más probable que usted maneje más rápido en...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Caminos secos
- 2 Caminos mojados
- 3 Caminos cubiertos de nieve
- 4 Caminos congelados
- 5 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

17c. ¿Es más probable que usted pase a otro vehículo en...?

INTERVIEWER: HIGHLIGHT 'YES' RESPONSES

- 1 Caminos secos
- 2 Caminos mojados
- 3 Caminos cubiertos de nieve
- 4 Caminos congelados
- 5 ALL NO
- 8 DON'T KNOW
- 9 REFUSED

En el proximo grupo de preguntas, por favor seleccione la frase que a usted le parece que mejor completa la oracion.

18. El sistema de frenos de antibloqueo, ¿se activa o se acciona.....?

- 1 En cuanto pone el pie en pedal del freno
- 2 Sólo cuando pisa fuerte el pedal del freno
- 3 Sólo si se oprime el pedal del freno hasta cierto punto
- 4 Sólo si el sistema siente que las ruedas están empezando a patinar
- 5 DON'T KNOW
- 6 REFUSED

19. Para frenar en la distancia más corta posible en un camino liso y seco en un auto que está equipado con frenos de antibloqueo, ¿deberían los conductores.....?

- 1 Frenar suavemente
- 2 Frenar lo más fuerte posible
- 3 Bombear el freno
- 8 DON'T KNOW
- 9 REFUSED

20. A su mejor conocimiento, cuando se activa el sistema de frenos de antibloqueo, ¿es normal que vibre el pedal del freno, o significa la vibración que algo anda mal en el sistema?

- 1 LA VIBRACIÓN ES NORMAL
- 2 ALGO ANDA MAL CON EL SISTEMA
- 8 DON'T KNOW
- 9 REFUSED

21. Si usted estuviera intentando parar un vehículo equipado con frenos de antibloqueo y empieza a vibrar o pulsar, ¿qué es lo más probable que haría de lo siguiente?

- 1 Disminuir la presión en el freno
- 2 Aumentar la presión en el freno
- 3 Aplicar la misma presión
- 4 Bombear el freno
- 5 Quitar el pie del freno
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

22. Si usted estuviera intentando parar un vehículo equipado con frenos de antibloqueo y el pedal se va hasta el piso, ¿qué es lo más probable que haría de lo siguiente?

- 1 Disminuir la presión en el freno
- 2 Aumentar la presión en el freno
- 3 Aplicar la misma presión
- 4 Bombear el freno
- 5 Quitar el pie del freno
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

23. ¿Qué significa cuando el pedal del freno empuja hacia arriba contra su pie mientras está frenando en un vehículo equipado con frenos de antibloqueo?

- 1 Está activado el sistema de frenos de antibloqueo
- 2 No está funcionando el sistema de frenos de antibloqueo
- 3 Falla de los frenos
- 4 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

24. ¿Qué significa un ruido de cliqueo durante una frenada fuerte en un vehículo equipado con un sistema de frenos de antibloqueo?

- 1 Está activado el sistema de frenos de antibloqueo
- 2 No está funcionando el sistema de frenos de antibloqueo
- 3 Falla de los frenos
- 4 OTHER (SPECIFY _____)

- 8 DON'T KNOW
- 9 REFUSED

25. ¿Qué significa si siente que el volante se sacude o vibra durante una frenada fuerte en un vehículo equipado con un sistema de frenos de antibloqueo?

- 1 Está activado el sistema de frenos de antibloqueo
- 2 No está funcionando el sistema de frenos de antibloqueo
- 3 Rotores de los frenos estan combados o danados
- 4 Otro mal funcionamiento de los frenos
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

IF Q12=2,8,9, GO TO Q27

26a. A su mejor saber, ¿ha sido activado alguna vez el sistema de frenos de antibloqueo en su (YEAR, MODEL, MAKE) al frenar?

- 1 SÍ
- 2 NO GO TO Q27
- 8 DON'T KNOW GO TO Q27
- 9 REFUSED GO TO Q27

26b. Me podria decir las razones por las cuales usted sabe que el sistema de antibloqueo de sus frenos fue activado. CHECK ALL THAT APPLY

- 1 Cambió la presión del pedal
- 2 Se encendió una luz en el tablero de instrumentos
- 3 Vibración del pedal
- 4 Escuchó un ruido
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

26c. En esa ocasión, ¿respondieron los frenos de antibloqueo cómo esperaba?

- 1 SÍ GO TO Q26e
- 2 NO
- 8 DON'T KNOW GO TO Q26e
- 9 REFUSED GO TO Q26e

26d. Me podria decir cuales de los siguientes problemas ocurrieron en esa ocacion. CHECK ALL THAT APPLY

- 1 No paró lo suficientemente rápido
- 2 Perdió control del volante
- 3 El pedal no se sentía normal
- 4 Los ruidos de los frenos no eran normales
- 5 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

26e. Durante el año pasado, ¿aproximadamente cuán a menudo diría usted que activó sus frenos de antibloqueo?

- 1 Todos los días/Casi todos los días
- 2 Unos días a la semana
- 3 Unos días al mes
- 4 Unas veces al año
- 5 Una vez
- 6 Nunca
- 8 DON'T KNOW
- 9 REFUSED

IF Q26a=1, GO TO Q28a

27. ¿Ha activado alguna vez el sistema de frenos de antibloqueo en cualquier auto que estaba manejando?

- 1 SÍ

- 2 NO GO TO Q31a
8 DON'T KNOW GO TO Q31a
9 REFUSED GO TO Q31a
- 28a. ¿Se ha sorprendido alguna vez de cómo se sentía su pedal de freno cuándo intentó parar rápidamente en un auto con frenos de antibloqueo?
1 SÍ
2 NO GO TO Q29a
8 DON'T KNOW GO TO Q29a
9 REFUSED GO TO Q29a
- 28b. ¿Cómo reaccionó el pedal?
_____ FILL IN RESPONSE
DK DON'T KNOW
RF REFUSED
- 28c. ¿Sacó en algún momento su pie del pedal cuándo esto ocurrió?
1 SÍ
2 NO
8 DON'T KNOW
9 REFUSED
- 29a. ¿Ha tenido alguna vez un choque qué cree fue causado, al menos en parte, por su sistema de frenos de antibloqueo?
1 SÍ
2 NO GO TO Q30
8 DON'T KNOW GO TO Q30
9 REFUSED GO TO Q30
- 29b. ¿Cómo contribuyó el sistema de frenos de antibloqueo al choque?
_____ FILL IN RESPONSE
DK DON'T KNOW
RF REFUSED
30. ¿Cree usted que sus frenos de antibloqueo le hayan permitido alguna vez evitar un choque que hubiese sido inevitable con frenos comunes?
1 SÍ
2 NO
8 DON'T KNOW
9 REFUSED
- 31a. ¿Ha usted comprado alguna vez un auto nuevo (sin contar vans, minivans, vehículos de 4 x 4, camionetas o motos)?
1 SÍ
2 NO GO TO Q38
8 DON'T KNOW GO TO Q38
9 REFUSED GO TO Q38
- 31b. ¿En que año compró usted su ultimo auto nuevo?
19 _____ (RANGE 50-99)
DK DON'T KNOW
RF REFUSED
- IF Q31b<90, GO TO Q38
32. Cuando estaba comprando ese auto, ¿le habló el vendedor u otra persona en la concesionaria acerca de frenos de antibloqueo?
1 SÍ
2 NO
8 DON'T KNOW
9 REFUSED

- 33a. ¿Le mostraron o le dieron libretas, videos u otros tipos de materiales informativos explicando cómo funcionan los sistemas de frenos de antibloqueo?
- | | | |
|---|------------|------------|
| 1 | SÍ | |
| 2 | NO | GO TO Q34a |
| 8 | DON'T KNOW | GO TO Q34a |
| 9 | REFUSED | GO TO Q34a |
- 33b. ¿Qué tipos de material informativo le dieron o le mostraron? CHECK ALL THAT APPLY
- | | | |
|---|---|--|
| 1 | Manual del dueño | |
| 2 | Libreta sobre sistemas de frenos de antibloqueo | |
| 3 | Libreta sobre características de seguridad | |
| 4 | Video sobre sistemas de frenos de antibloqueo | |
| 5 | Video sobre características de seguridad | |
| 6 | OTHER (SPECIFY _____) | |
| 8 | DON'T KNOW | |
| 9 | REFUSED | |
- 33c. ¿Acaso el material informativo hizo que fuera más probable que quisiera un auto con frenos de antibloqueo, uno sin frenos de antibloqueo o no tuvo efecto alguno sobre su preferencia?
- | | | |
|---|--------------------------------------|--|
| 1 | QUIERE UNO CON FRENOS DE ANTIBLOQUEO | |
| 2 | QUIERE UNO SIN FRENOS DE ANTIBLOQUEO | |
| 3 | NINGÚN EFECTO | |
| 8 | DON'T KNOW | |
| 9 | REFUSED | |
- 34a. ¿Acaso el tipo de auto que compró ofreció frenos de antibloqueo como equipo estándar, como opción, como parte de un paquete de opciones o no ofreció frenos de antibloqueo?
- | | | |
|---|--|------------|
| 1 | FRENOS DE ANTIBLOQUEO COMO ESTÁNDAR | GO TO Q35b |
| 2 | FRENOS DE ANTIBLOQUEO COMO OPCIÓN | |
| 3 | FRENOS DE ANTIBLOQUEO COMO PARTE DE UN PAQUETE DE OPCIONES | GO TO Q34c |
| 4 | SIN FRENOS DE ANTIBLOQUEO | GO TO Q35a |
| 8 | DON'T KNOW | GO TO Q35a |
| 9 | REFUSED | GO TO Q35a |
- 34b. ¿Compró usted la opción frenos de antibloqueo?
- | | | |
|---|------------|------------|
| 1 | SÍ | GO TO Q35b |
| 2 | NO | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 34c. ¿Compró usted el paquete de opciones incluyendo frenos de antibloqueo?
- | | | |
|---|------------|------------|
| 1 | SÍ | |
| 2 | NO | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 34d. ¿Compró usted el paquete de opciones principalmente por el sistema de frenos de antibloqueo o principalmente por alguna otra característica en el paquete?
- | | | |
|---|--|------------|
| 1 | PRINCIPALMENTE POR EL SISTEMA DE FRENOS DE ANTIBLOQUEO | GO TO Q35b |
| 2 | PRINCIPALMENTE POR ALGUNA OTRA CARACTERÍSTICA | GO TO Q35b |
| 8 | DON'T KNOW | GO TO Q35b |
| 9 | REFUSED | GO TO Q35b |
- 35a. ¿Acaso alguno de los otros autos que consideró comprar tenía frenos de antibloqueo como característica estándar?
- | | | |
|---|------------------------|-----------|
| 1 | SÍ | |
| 2 | NO | GO TO Q38 |
| 3 | SÓLO CONSIDERÓ UN AUTO | GO TO Q38 |
| 8 | DON'T KNOW | GO TO Q38 |

9 REFUSED

GO TO Q38

35b. ¿Por qué decidió comprar un auto (con/sin) frenos de antibloqueo?

FILL IN RESPONSE

DK DON'T KNOW

RF REFUSED

35c. ¿Acaso la (presencia/ausencia) de frenos de antibloqueo tuvo mucho efecto, algún efecto, un poco de efecto o ningún efecto en su decisión de comprar ese vehículo?

- 1 MUCHO EFECTO
- 2 ALGÚN EFECTO
- 3 POCO EFECTO
- 4 NINGÚN EFECTO
- 8 DON'T KNOW
- 9 REFUSED

IF 34a=4, 8, 9, 34b=2, 8, 9 OR 34c=2, 8, 9, GO TO Q38

36. En el momento de comprar ese auto, ¿había oído qué era una buena idea practicar frenar con frenos de antibloqueo en una situación no de emergencia?

- 1 SÍ
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

37. ¿Probó alguna vez los frenos de antibloqueo en una situación no de emergencia par ver cómo funcionaban (aún antes de esta compra)?

- 1 SÍ
- 2 NO
- 8 DON'T KNOW
- 9 REFUSED

38. ¿Qué siente respecto a tener frenos de antibloqueo en su próximo auto? Usted.....

- 1 Preferiría un auto con frenos de antibloqueo
- 2 Preferiría un auto sin frenos de antibloqueo GO TO Q40
- 3 No hace ninguna diferencia GO TO Q40
- 8 DON'T KNOW GO TO Q40
- 9 REFUSED GO TO Q40

39a. Cuando esté comprando su próximo auto equipado con frenos de antibloqueo, ¿estaría de acuerdo o en desacuerdo si el concesionario.....?

INTERVIEWER: HIGHLIGHT 'APPROVE' RESPONSES

CATI: ROTATE RESPONSES

- 1 Ofreciera 30 minutos de educación y práctica con frenos de antibloqueo antes de que usted se fuera.
- 2 Requeriera que usted leyera las instrucciones del sistema de frenos con antibloqueo y practicara su uso.
- 3 Le diera un vídeo gratis de 10 minutos sobre cómo funciona el sistema de frenos de antibloqueo.
- 4 Le diera un cassette gratis de 10 minutos sobre cómo funciona el sistema de frenos de antibloqueo.
- 5 Ofreciera 15 minutos de educación y práctica con los frenos de antibloqueo antes de que usted se fuera.
- 6 Ofreciera 15 minutos de práctica en un simulador del sistema de frenos de antibloqueo antes de que usted se fuera.
- 7 ALL DISAPPROVE
- 8 DON'T KNOW
- 9 REFUSED

SHOW/HIDE APPROVES FROM Q39a

IF DISAPPROVED ALL ITEMS OR APPROVED ONLY ONE ITEM IN Q39a, GO TO Q40

39b. ¿Cuáles de las opciones que mencionó preferiría más?

- 1 Ofrecerle 30 minutos de educación y práctica antes de irse
- 2 Que requiera que usted lea las instrucciones del sistema de frenos con antibloqueo y practique su uso.
- 3 Darle un vídeo gratis de 10 minutos sobre cómo funciona el sistema de frenos de antibloqueo.

- 4 Darle un cassette gratis de 10 minutos sobre cómo funciona el sistema de frenos de antibloqueo.
 5 Ofrecerle 15 minutos de educación y práctica con los frenos de antibloqueo antes de que usted se fuera.
 6 Ofrecerle 15 minutos de práctica en un simulador del sistema de frenos de antibloqueo antes de irse.
 8 DON'T KNOW
 9 REFUSED

40. ¿Ha leído alguna vez la sección en su manual del dueño acerca del sistema de frenos de su auto?
 1 SÍ
 2 NO
 8 DON'T KNOW
 9 REFUSED

Ahora, unas últimas preguntas para fines estadísticos...

- D1. ¿En qué año nació usted?
 _____ age (RANGE 1900-1985)
 RF REFUSED

- D2. ¿Está usted actualmente empleado a tiempo completo, tiempo parcial, sin empleo y buscando empleo, jubilado, yendo a la escuela, ama de casa u otra cosa?
 1 EMPLEADO A TIEMPO COMPLETO
 2 EMPLEADO A TIEMPO PARCIAL
 3 SIN EMPLEO Y BUSCANDO EMPLEO
 4 JUBILADO
 5 YENDO A LA ESCUELA
 6 AMA DE CASA
 7 OTHER (SPECIFY _____)
 8 DON'T KNOW
 9 REFUSED

- D3. ¿Cuál es el grado o año más alto de escolaridad regular que ha completado? READ IF NECESSARY
 1 NINGUNA ESCOLARIDAD FORMAL
 2 PRIMERO A SÉPTIMO GRADO
 3 OCTAVO GRADO
 4 ALGO DE ESCUELA SECUNDARIA
 5 BACHILLER
 6 ALGO DE UNIVERSIDAD
 7 TÍTULO UNIVERSITARIO
 8 ALGO DE ESCUELA POSTGRADO
 9 TÍTULO POSTGRADO
 88 DON'T KNOW
 99 REFUSED

- D4. Actualmente, ¿está casado, divorciado, separado, viudo o soltero?
 1 CASADO
 2 DIVORCIADO
 3 SEPARADO
 4 VIUDO
 5 SOLTERO
 8 DON'T KNOW
 9 REFUSED

- D5. ¿Es usted de origen o descendencia hispana?
 1 HISPANO
 2 NO HISPANO
 8 DON'T KNOW
 9 REFUSED

- D6. ¿Cuál de estas categorías mejor describe su raza?
 1 Blanco

- 2 Negro o afroamericano
- 3 Asiático o isleño del pacífico
- 4 Esquimal, aleutiano or indio americano
- 5 Raza mixta
- 6 OTHER (SPECIFY _____)
- 8 DON'T KNOW
- 9 REFUSED

- D7. ¿Cuántas personas menores de 16 años de edad viven en su casa?
 NUMBER UNDER 16 YEARS OF AGE _____ (RANGE 0-12)
- DK DON'T KNOW
 - RF REFUSED

- D8. ¿Cuál de las siguientes categoría mejor describe el ingreso total de su hogar, antes de impuestos, en 1997? Su mejor estimación está bien.
- 1 Menos de \$5,000
 - 2 \$5,000 menos que \$15,000
 - 3 \$15,000 menos que \$30,000
 - 4 \$30,000 menos que \$50,000
 - 5 \$50,000 menos que \$75,000
 - 6 \$75,000 menos que \$100,000
 - 7 \$100,000 o más
 - 8 DON'T KNOW
 - 9 REFUSED

[FROM OBSERVATION]

- D9. Gender
- 1 MALE
 - 2 FEMALE

- D10. ¿El número de teléfono que llamé es el único número de teléfono para esta casa?
- 1 SÍ
 - 2 NO GO TO D10a
 - 8 DON'T KNOW
 - 9 REFUSED

- D10a. ¿Cuántos números de teléfono hay para esta casa?
 SPECIFY HOW MANY _____ (RANGE 2-10)
- DK DON'T KNOW
 - RF REFUSED

Gracias por su ayuda. Eso concluye nuestra entrevista.