

DRIVER BEHAVIOR & PERFORMANCE
TECHNICAL REPORT



2022 Traffic Safety Culture Index

NOV 2023

607 14th Street, NW, Suite 701
Washington, DC 20005
202-638-5944
AAAFoundation.org

© 2023 AAA Foundation for Traffic Safety

Title

2022 Traffic Safety Culture Index

Authors

AAA Foundation for Traffic Safety

Foreword

The AAA Foundation for Traffic Safety has consistently demonstrated its commitment to improve traffic safety through work such as the one presented in this report, the 15th annual *Traffic Safety Culture Index*. Results presented in this report are based on a nationally representative survey conducted in 2022 of 2,500 licensed U.S. motorists.

As the United States continues to recover from the COVID-19 pandemic, traffic fatalities remain unacceptably high. Risky driving behaviors such as speeding and impaired driving play a critical role in road traffic crashes and contribute to an unsafe transportation environment for Americans travelling both inside and outside vehicles. There is an urgent need for research and public education efforts to understand and develop strategies to curtail these dangerous behaviors. Similar to previous *Traffic Safety Culture Index* reports, the 2022 version should be a useful reference for researchers, practitioners, and traffic safety advocates to gain better understanding of people's perceptions and attitudes towards risky driving behaviors, to identify relevant issues, and to develop corresponding countermeasures.

C. Y. David Yang, Ph.D.

President and Executive Director
AAA Foundation for Traffic Safety

About the Sponsor

AAA Foundation for Traffic Safety
607 14th Street, NW, Suite 701
Washington, D.C. 20005
202-638-5944
www.aaafoundation.org

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

This publication is distributed by the AAA Foundation for Traffic Safety at no charge, as a public service. It may not be resold or used for commercial purposes without the explicit permission of the Foundation. It may, however, be copied in whole or in part and distributed for free via any medium, provided the Foundation is given appropriate credit as the source of the material. The AAA Foundation for Traffic Safety assumes no liability for the use or misuse of any information, opinions, findings, conclusions, or recommendations contained in this report.

If trade or manufacturers' names are mentioned, it is only because they are considered essential to the object of this report and their mention should not be construed as an endorsement. The AAA Foundation for Traffic Safety does not endorse products or manufacturers.

Table of Contents

Introduction	5
Summary of Major Findings.....	6
Results from 2022 Traffic Safety Culture Index.....	6
Distracted Driving Behaviors.....	6
Aggressive Driving Behaviors.....	6
Drowsy Driving Behaviors	6
Impaired Driving Behaviors	7
Identifying Profiles of Risky Driving Behavior Engagement	7
Data Collection Methodology and Limitations.....	8
Survey Instrument.....	8
Sampling.....	8
Weighting.....	8
Limitations.....	9
Results	10
Overall Results	10
Perceived Danger of Driving Behaviors.....	10
Perceived Risk of Apprehension.....	12
Social Disapproval	14
Driving Behaviors in Past 30 Days.....	16
Support for Safety Countermeasures	18
Identifying Profiles of Risky Driving Behavior Engagement	20
Discussion	24
References.....	25
Appendix A: Drivers’ attitudes, perceptions, and behaviors in relation to age and sex.....	26
Distracted Driving Behaviors.....	26
Aggressive Driving Behaviors.....	28
Drowsy and Impaired Driving Behaviors	30
Appendix B: Latent Class Analysis.....	32

Introduction

Two years after the COVID-19 pandemic dramatically altered American lifestyles, patterns of daily life are continuing to recover. Compared to 2020, both American's daily driving patterns and the traffic volumes on major corridors increased in 2021 and remained at a similar level in 2022 (Steinbach and Tefft, 2023; Federal Highway Administration, 2023). However, there has been a corresponding trend in traffic fatalities. In 2021, traffic fatalities reached their highest number since 2005, and the National Highway Traffic Safety Administration (NHTSA) projects only a small decrease (0.3%) in 2022 (National Center for Statistics and Analysis, 2023). A Governor's Highway Safety Association report (2023) highlights that pedestrian fatalities in particular have skyrocketed in recent years with 2022 estimates, 1% higher compared to 2021 and 77% higher than in 2010. Unsafe driving behaviors such as speeding, alcohol involvement, and non-use of a seatbelt, play a crucial role in traffic fatalities. As what the U.S. Secretary of Transportation has called the "national crises of traffic deaths" (NHTSA 2023) continues to affect an unacceptable number of Americans, it is imperative to develop efficient and effective countermeasures to prevent sudden and violent deaths both inside and outside the vehicle and create an environment where all road users can move around safely.

For more than a decade, the AAA Foundation for Traffic Safety has been committed to deepening our understanding of America's traffic safety culture through the annual *Traffic Safety Culture Index* (TSCI) survey. As the impacts of traffic safety on public health have worsened, responses from the 2022 *Traffic Safety Culture Index* can provide insights into understanding public perceptions, attitudes toward, and engagement in unsafe driving behaviors and aspects that should be considered when developing countermeasures.

As in previous years, this report details the data collection methodology and summarizes major national-level results of the 15th annual *Traffic Safety Culture Index*. In addition, this report includes an in-depth analysis to identify and describe profiles of risky driving behavior.

Summary of Major Findings

Results from 2022 Traffic Safety Culture Index

Distracted Driving Behaviors

- Roughly 93% of drivers identify both texting/emailing and reading on a hand-held cell phone as very or extremely dangerous. Fewer drivers perceived holding and talking on a hand-held cell phone (76%) or using a technology that allows hands-free use of their phones (19%) as being very or extremely dangerous.
- A minority of respondents believed that drivers would be apprehended for texting/emailing on a cell phone (37%), holding and talking on a cell phone while driving (37%), or reading a text/email on a cell phone (35%).
- Drivers predominantly agreed that people important to them would disapprove of them engaging in distracted driving behaviors (87%–95% depending on the behavior).
- Nevertheless, more than a quarter of drivers (27%) reported having sent a text/email while driving. More drivers reported they drove while holding and talking on a phone (38%) or drove while reading a text/email (37%). The majority of drivers (59%) indicated they used a hands-free technology to talk/text/email while driving.
- Almost 80% supported a law against holding and talking on a phone while driving, while only 42% supported a law against using hands-free technologies to read/text/email while driving.

Aggressive Driving Behaviors

- Most respondents believed driving through a red light (83%) or aggressive driving including switching lanes quickly and driving closely behind other vehicles (89%) was very or extremely dangerous.
- Fewer drivers perceived speeding as a dangerous activity and the speeding behaviors had the least social disapproval of all the examined unsafe driving behaviors.
- About 63% of drivers believed police would apprehend them for traveling 15mph over the speed limit on a freeway, yet approximately half reported having engaged in the behavior in the past 30 days before the survey.
- Fewer than half (43%) of the respondents supported a policy using cameras to automatically ticket drivers who drive more than 10mph over the speed limit on residential streets.

Drowsy Driving Behaviors

- Drivers predominantly perceived drowsy driving to be very or extremely dangerous (95%); however, 18% of drivers reported having engaged in the behavior in the past 30 days.
- Just over a quarter of respondents (27%) believed the police would apprehend them for drowsy driving.

Impaired Driving Behaviors

- Drivers overwhelmingly perceived driving after drinking (94%) as very or extremely dangerous and 68% believed such a driver would be likely to be apprehended by police. Only 7% of respondents reported having engaged in this behavior in the past 30 days.
- By comparison, only 70% of drivers felt driving (within an hour) of using marijuana to be very or extremely dangerous and 26% believe such a driver would be likely to be apprehended by police. Only 6% of respondents reported having engaged in this behavior in the past 30 days.
- Most respondents (85%) considered driving when using potentially impairing prescription drugs to be very or extremely dangerous. Very few respondents reported driving when using potentially impairing prescription drugs (3%).

Identifying Profiles of Risky Driving Behavior Engagement

- Based on the patterns of reported risky driving behavior engagement, the following six unique groups were identified using a latent class analysis (LCA) and interpreted:
 - Safe Drivers (41.2%): Few engaged in any risky driving behavior.
 - Distracted Drivers (15.0%): Predominantly engaged in all distracted driving behaviors.
 - Speeding Drivers (22.7%): Predominantly engaged in speeding behaviors.
 - Distracted and Aggressive Drivers (17.3%): Predominantly engaged in both distracted driving and aggressive driving behaviors.
 - Impaired Drivers (1.3%): Predominantly engaged in impaired driving (e.g., drunk driving).
 - Most Dangerous Drivers (2.4%): Engaged in all risky driving behaviors.
- On average, Distracted Drivers, Distracted and Aggressive Drivers, and Most Dangerous Drivers were approximately 40 years of age (~13 years younger than members of the other groups).
- Approximately 60% of both the Speeding Drivers and Most Dangerous Drivers were males, whereas 57% of the Safe Drivers were females.
- The Impaired Drivers appeared to have less education than the other groups.
- Approximately 44% of both the Impaired Drivers and the Most Dangerous Drivers had never been married. In contrast, the majority of the other groups were married.
- 14% of respondents were from non-metropolitan locations; however, 37% of Impaired Drivers resided in non-metropolitan settings.

Data Collection Methodology and Limitations

Survey Instrument

The 2022 TSCI instrument was identical to the instrument used in previous years (2019, 2020, and 2021). This year's TSCI continued to survey the five core questions pertaining to people's perceived danger, perceived risk of apprehension, social disapproval, self-reported behaviors, and support for safety countermeasures.

Sampling

The study used a sample from KnowledgePanel®, a probability-based web panel maintained by Ipsos, to collect data. The panel was designed to be representative of households in the United States by using standard probability-based random digit dial (RDD) and address-based sampling (ABS) methods. The sampling frame includes all U.S. households reachable by telephone or regular mail regardless of telephone or internet access or use. If a sampled household did not have an internet connection or an internet-capable computer, a web-enabled device and/or free internet service were provided. To achieve the representation of the U.S. adult population, a broad set of geodemographic indicators as well as hard-to-reach adult subgroups were used for the panel recruitment process. Individuals not sampled could not volunteer to join the panel.

For respondents ages 19 and older, eligible adults across the nine Census geographical divisions were sampled to ensure a minimum of 200 completed interviews per division. The questionnaire was sent to 4,474 panelists ages 19 and older, with 2,354 qualified respondents completing the questionnaire. For the 16- to 18-year-old sample, random households were sampled with at least one 15- to 18-year-old present from KnowledgePanel®. The survey was also sent to parents who had at least one age-eligible teen in their household. If there was more than one teen in this age range, one of the eligible teens was randomly selected. Parents were asked to provide consent for the selected teen and ask their teen to complete the remainder of the survey. Invitations were sent to 4,656 parents of teens ages 15 to 18, and 918 qualified teens completed the questionnaire. A total of 3,272 respondents ages 16 and older completed the survey. Among them, 2,499 were active licensed drivers (who drove in the past 30 days before the survey with valid driver's license). The survey was administered in English and Spanish between July 28 and August 29, 2022.

Weighting

The data were weighted to account for probability of selection for recruitment into KnowledgePanel®, probability of selection for the survey, and non-response at both stages. Further, they were weighted to align the characteristics of respondents to those of the population of residents aged 16 years or older, from which the sample was drawn with respect to gender, age, race/Hispanic ethnicity, education, census region, metropolitan/non-metro status, number of people aged 16 and older in the household, and household income using data from the U.S. Census Bureau's Current Population Survey (2022). All analyses included in this report have been conducted using weighted data.

Limitations

This survey aims to estimate the prevalence of specific attitudes and behaviors among all *drivers* in the United States. However, the results of this survey may differ from true population values due to sampling error and possible sources of bias.

Sampling error measures the extent to which estimates from a sample may reflect the population from which the sample is drawn. In this survey, the sampling error reflects the range in which estimates from the sample of 2,499 drivers might be expected to differ from the results that would be obtained if the same data were collected from all drivers in the United States. In this particular survey, a 95% confidence level is set for the margin of error. This means that the range of estimates is expected to include the actual population values 95 times out of 100 when estimated from a sample of the same size and with the same survey design. Additionally, the margin of error varies depending on the number of responses for a survey question and the distribution of responses. The table below shows the approximate margin of error derived from the entire sample. The margin of error is larger for items asked of fewer respondents.

Table 1. Approximate margin of error (in percentage points) for selected percentages, at the 95% confidence level

Percentages near	Approx. margin of error
90 or 10	± 1.4
80 or 20	± 1.9
70 or 30	± 2.2
60 or 40	± 2.4
50	± 2.4

This survey has a larger margin of error than a simple random sample of the same size because of the design of the panel and the stratification by census division and oversampling of respondents aged 16–18. The margin of error reflects only the statistical variability associated with using the survey sample to draw inferences about the entire population. It does not reflect errors due to bias. For instance, potential sources of bias in surveys include systematic non-coverage of certain segments of the population (e.g., people who cannot read in English or Spanish), non-response (i.e., eligible respondents who either cannot be contacted or refuse to participate), differences in respondents' understanding of survey questions or response options, or deliberate misreporting of information (e.g., underreporting of behaviors that may be perceived as undesirable).

Results

Results of the 2022 TSCI are presented in two sections. The first section includes the overall results regarding perceived danger, perceived risk of apprehension, social disapproval, self-reporting of behaviors, and support of safety laws related to various risky driving behaviors. The second section uses a latent class approach to characterize respondents into driver profiles according to their reported risky driving behaviors. The analysis then considers associations between different driver profiles and demographic characteristics.

Overall Results

Perceived Danger of Driving Behaviors

The survey asks drivers about their perceived level of danger for various driving behaviors. Results are reported in Table 2. The majority of drivers perceived the examined unsafe driving behaviors as very or extremely dangerous with two exceptions—driving using a technology allowing hands-free use of their phone and driving 15 miles per hour [mph] over the speed limit on freeways.

Respondents predominantly agreed that most distracted driving behaviors were very or extremely dangerous: 93% of respondents indicated that both driving while manually texting or emailing on a cell phone and driving while reading on a cell phone are extremely or very dangerous, and 76% of drivers perceived that driving while holding and talking on cell phones was extremely or very dangerous. However, responses on perceptions of hands-free technology followed a different pattern: only 20% of respondents perceived using a technology that allows for hands-free use of their phones as being very or extremely dangerous and 11% perceived this behavior was not dangerous at all.

With regard to aggressive driving behaviors, approximately 89% of drivers believed aggressive driving, including switching lanes quickly and driving closely behind other vehicles was very or extremely dangerous. Driving through a red light was reported as being very or extremely dangerous by 83% of drivers. Fewer drivers perceived speeding as a dangerous activity: 61% of respondents perceived driving 10mph over the speed limit on residential streets as very or extremely dangerous and 47% of respondents reported speeding 15mph over the speed limit on freeways as very or extremely dangerous.

In terms of drowsy or impaired driving, 95% of respondents perceived both driving tired/drowsy and driving after drinking enough alcohol that one may be over the legal limit to be very or extremely dangerous activities. Additionally, 85% of respondents reported driving after using potentially impairing prescription drugs as very or extremely dangerous. However, a smaller proportion of respondents perceived driving within an hour after using marijuana as extremely or very dangerous (70%).

Table 2. How dangerous do you feel the following driving behaviors are?

Driving Behaviors		Extremely dangerous (%)	Very dangerous (%)	Moderately dangerous (%)	Slightly dangerous (%)	Not dangerous at all (%)
Distractions	Drivers holding and talking on cell phones	45.3	30.7	17.5	5.5	1.0
	Drivers reading on cell phones	67.2	25.7	5.7	0.7	0.6
	Drivers manually texting or emailing on cell phones	71.9	21.1	6.4	0.5	0.0
	Drivers using technology that allows hands-free use of their phone (Bluetooth, CarPlay, Android Auto, etc.)*	9.6	9.9	29.5	39.9	11.2
Aggressive	Drivers speeding 15 mph over the speed limit on freeways	20.2	26.4	31.5	18.7	3.3
	Drivers speeding 10 mph over the speed limit on residential streets (neighborhood)	28.0	32.5	29.2	8.7	1.6
	Driving through a light that had just turned red when they could have stopped safely	56.3	27.1	12.3	4.3	0.0
	Driving aggressively (switching lanes quickly, driving very closely behind another car)	56.1	32.7	8.4	2.2	0.6
Drowsy & Impaired	Driving when they were so tired that they had a hard time keeping your eyes open	72.9	22.1	3.4	1.0	0.6
	Driving after drinking enough alcohol that they may be over the legal limit	74.7	19.7	4.3	0.9	0.3
	Driving shortly (within an hour) after using marijuana	46.1	23.8	18.5	8.0	3.6
	Driving after using potentially impairing prescription drugs	56.2	29.1	12.5	1.8	0.5
Other	Driving without wearing a seatbelt	45.9	30.2	16.4	5.9	1.6

* The survey did not specify talking or typing using hands-free technology to ask how dangerous people feel distracted driving is.

Perceived Risk of Apprehension

Table 3 presents the results of respondents' perceptions on how likely a driver is to be caught by the police for certain behaviors. Less than half of drivers reported that a driver engaging in the risky distracted driving behaviors examined in the survey would be somewhat or very likely to be caught by police. Specifically, 37% of drivers believed a driver manually typing or sending a text message/email on a phone or holding and talking on a cell phone would be somewhat or very likely to be apprehended, while 35% believed a driver reading a text/email on a phone would be apprehended by the police.

Compared to perceptions of the risk of apprehension of distracted driving behaviors, a larger proportion of respondents believed drivers engaging in aggressive driving behaviors would be caught by police. For instance, 63% of respondents thought that driving 15 mph over the posted speed limit on a freeway would likely result in apprehension. Similarly, 52% of drivers believed that driving aggressively would likely result in the same.

In terms of driver impairment behaviors, the perceived risk of apprehension varied by the source of impairment. The perceived risk of apprehension was highest for driving after drinking enough alcohol to be over the legal limit, where 68% of respondents perceived a driver was somewhat or very likely to be caught by the police. A much smaller proportion of respondents believed that someone driving within an hour after using marijuana (26%) or driving while being so tired that they had a hard time keeping their eyes open (27%) would be apprehended by the police.

Table 3. How likely is a driver to be caught by the police for the following behaviors?

Driving Behaviors		Very likely (%)	Somewhat likely (%)	Somewhat unlikely (%)	Very unlikely (%)
Distracted	Driving while holding and talking on a cell phone	7.7	29.3	36.1	26.9
	Driving while reading a text or an email on a cell phone	7.2	27.3	41.9	23.6
	Driving while manually typing or sending a text message or email on a cell phone	8.8	27.8	39.5	23.9
Aggressive	Driving 15 mph over the speed limit on a freeway	17.2	45.7	25.4	11.7
	Driving 10 mph over the speed limit on a residential street (neighborhood)	12.1	36.9	32.5	18.5
	Driving through a light that had just turned red when they could have stopped safely	14.6	34.4	33.4	17.6
	Driving aggressively (switching lanes quickly, driving very closely behind another car)	18.1	33.4	32.9	15.7
Drowsy & Impaired	Driving while being so tired that they had a hard time keeping their eyes open	6.8	20.4	43.2	29.6
	Driving after drinking enough alcohol that they may be over the legal limit	21.0	47.5	22.2	9.4
	Driving shortly (within an hour) after using marijuana	6.3	19.3	40.0	34.4
	Driving after using potentially impairing prescription drugs	7.4	32.7	41.1	18.8
Other	Driving without wearing a seatbelt	11.7	29.2	33.7	25.4

Social Disapproval

Table 4 presents results from questions related to social disapproval. Respondents were asked: "How much do you believe people who are important to you would approve of each of the following behaviors?" Drivers overwhelmingly reported that the people important to them would somewhat or completely disapprove of all examined driving behaviors.

Among the distracted driving behaviors, 95% of respondents felt people important to them would somewhat or completely disapprove of driving while manually sending a text/email on a phone. Most drivers also reported that people important to them would disapprove of driving while reading a text/email on a phone (91%) and driving while holding and talking on a phone (87%).

The speeding behaviors had the lowest social disapproval of all the examined unsafe driving behaviors. Specifically, 80% of respondents believed people important to them would disapprove of driving 15mph over the speed limit on a freeway and 87% thought people would disapprove of driving 10mph over the speed limit on a residential street. Respondents reported higher levels of social disapproval for aggressive driving: 95% of respondents indicated that driving through a red light and driving aggressively would be disapproved by people important to them.

There were very high levels of social disapproval for impaired driving behaviors. Nearly all respondents believed riding in a car driven by someone who has had too much alcohol (98%) or driving a car after drinking enough alcohol to be over the legal limit (97%) would be socially disapproved. Slightly fewer respondents (93%) felt that the people important to them would disapprove of driving within an hour after using marijuana.

Table 4. How much do you believe people who are important to you would approve of each of the following behaviors?

Driving Behaviors		Completely approve (%)	Somewhat approve (%)	Somewhat disapprove (%)	Completely disapprove (%)
Distracted	Driving while holding and talking on a cell phone	1.1	11.6	42.5	44.8
	Driving while reading a text or an email on a cell phone	1.4	7.4	33.5	57.7
	Driving while manually typing or sending a text message or email on a cell phone	0.5	4.1	29.3	66.0
Aggressive	Drivers speeding 15 mph over the speed limit on freeways	3.1	16.7	44.0	36.2
	Drivers speeding 10 mph over the speed limit on residential streets (neighborhood)	2.5	10.9	39.6	47.0
	Driving through a light that had just turned red when they could have stopped safely	0.8	3.9	34.3	61.1
	Driving aggressively (switching lanes quickly, driving very closely behind another car)	0.5	4.3	29.7	65.6
Drowsy & Impaired	Driving while being so tired that they had a hard time keeping their eyes open	0.3	2.1	22.8	74.9
	Driving after drinking enough alcohol to be over the legal limit	1.2	1.4	14.4	83.0
	Riding in a car driven by someone who has had too much alcohol	0.3	1.4	6.6	91.7
	Driving shortly (within an hour) after using marijuana	1.2	5.6	17.8	75.4
	Driving after using potentially impairing prescription drugs	1.5	2.5	21.0	75.1
Other	Driving without wearing a seatbelt	0.8	4.2	22.4	72.6

Driving Behaviors in Past 30 Days

Respondents were asked, “In the past 30 days, how often have you done any of the following behaviors?” Table 5 shows that many respondents reported having engaged in each of the behaviors to varying degrees.

For the distracted driving behaviors, nearly 40% of drivers reported they drove while holding and talking on a phone at least once in the past 30 days before the survey, and 37% drove while reading a text/email on a phone. Additionally, more than a quarter of drivers manually typed or sent a text/email on a phone while driving. On the other hand, more drivers indicated they had used a hands-free technology to talk/text/email while driving at least once in the past 30 days (59%).

With respect to speeding, about half of respondents indicated having driven 15mph over the speed limit on a freeway at least once in the past 30 days before the survey. Additionally, 35% of drivers reported having driven 10mph over the speed limit on a residential street. In contrast, fewer reported having driven through a red light (25%) or driven aggressively by switching lanes quickly and/or following very closely behind another vehicle (22%) in the past 30 days.

Compared to distracted or aggressive driving, the prevalence of reported impaired driving was less frequent and varied by the source of impairment. For example, 7% of drivers admitted to having driven when they had enough alcohol that they may have been over the legal limit. Similarly, 6% admitted to having driven shortly (within an hour) after using marijuana at least once in the past 30 days, whereas fewer reported having driven when using potentially impairing prescription drugs (3%). Meanwhile, 18% of drivers reported having driven when they were so tired that they had a hard time keeping their eyes open.

Table 5. In the past 30 days, how often have you...?

Driving Behaviors		Regularly (%)	Fairly often (%)	A few times (%)	Just once (%)	Never (%)
Distracted	Driven while holding and talking on a cell phone	2.2	3.1	23.4	9.3	62.0
	Driven while reading a text or an email on a cell phone	1.9	3.0	22.2	9.7	63.3
	Driven while manually typing or sending a text message or an email	1.6	1.7	16.5	7.6	72.6
	Talked/texted/emailed on a cell phone using hands-free technology (Bluetooth, CarPlay etc.)	9.6	12.0	31.5	6.0	41.0
Aggressive	Driven 15 mph over the speed limit on a freeway	4.6	8.9	27.1	7.4	51.9
	Driven 10 mph over the speed limit on a residential street	2.6	5.3	19.8	7.2	65.2
	Driven through a light that had just turned red when you could have stopped safely	0.4	0.5	10.8	13.0	75.2
	Driven aggressively by switching lanes quickly and/or very close behind another car	0.7	1.4	11.5	8.2	78.3
Drowsy & Impaired	Driven when you were so tired that you had a hard time keeping your eyes open	0.2	0.6	8.0	9.2	82.1
	Driven when you had enough alcohol that you thought you might be over the legal limit	0.1	0.5	2.8	3.5	93.1
	Ridden in a car driven by someone who has had too much alcohol	0.0	0.4	3.6	3.4	92.5
	Driven shortly (within an hour) after using marijuana	1.2	1.0	3.1	1.1	93.7
	Driven when using potentially impairing prescription drugs	0.4	0.4	1.5	0.9	96.8
Other	Driven without wearing a seatbelt	1.6	2.3	8.0	2.6	85.5

Support for Safety Countermeasures

Respondents were asked how strongly they support or oppose various traffic safety countermeasures. As shown in Table 6, many drivers were in favor of most examined countermeasures. Over 90% of the respondents were in support of requiring autonomous vehicle developers to share safety information and testing results with the public before these vehicles are allowed on public roads. Nearly 80% of drivers were supportive of a law against holding and talking on a phone while driving, regardless of the driver's age. Additionally, three quarters of drivers were supportive of a law requiring all new drivers under the age of 21 years to go through training, practice time, and a restriction period. In contrast, fewer were in support of a law against using hands-free technologies for reading, typing, and sending a text message/email (42%). Likewise, about four in ten respondents (43%) were in favor of using cameras to automatically ticket drivers who drive more than 10 mph over the speed limit on residential streets.

With respect to impaired driving, respondents' support for countermeasures varied by the type of countermeasure and source of impairment involved. About half of drivers supported lowering the legal limit for a driver's blood alcohol concentration from 0.08 to 0.05, while 68% of drivers supported lowering the legal limit for a driver's blood alcohol concentration to 0.05 for people transporting young children. More drivers were supportive of making it illegal to drive with more than a certain amount of marijuana in one's system (75%). Similarly, 72% of drivers supported making it illegal to drive with any drug (not legally prescribed) in one's system.

Table 6. How strongly do you support or oppose...?

Driving Behaviors		Support strongly (%)	Support somewhat (%)	Oppose somewhat (%)	Oppose strongly (%)
Distracted	Having a law against holding and talking on a cell phone while driving, for all drivers regardless of their age	47.8	30.6	16.3	5.3
	Having a law against using hands-free technology to read, type, or send a text message/email while driving	19.3	23.1	32.1	25.5
Aggressive	Using cameras to automatically ticket drivers who drive more than 10 mph over speed limit on residential streets	15.7	27.5	24.8	32.1
Impaired	Requiring all new cars to have a built-in technology that won't let the car start if the driver's alcohol level is over the legal limit	38.4	30.4	15.9	15.4
	Having a law lowering the legal limit for a driver's blood alcohol concentration from 0.08 to 0.05	23.3	28.0	28.1	20.6
	Lowering the legal limit for a driver's blood alcohol concentration to 0.05 for people transporting young children	39.9	28.4	13.5	18.2
	Making it illegal to drive with more than a certain amount of marijuana in your system	43.3	31.3	15.0	10.4
	Making it illegal to drive with any drug (not legally prescribed) in your system	40.2	31.8	17.2	10.8
Other	Requiring all new drivers under the age of 21 years to go through training, practice time, and a restriction period	36.7	38.8	16.9	7.6
	Require developers of self-driving car technologies to share safety information and testing results with the public before the vehicles are allowed on public roads	65.4	25.5	5.8	3.3

Identifying Profiles of Risky Driving Behavior Engagement

This section provides further statistical assessment to describe driving profiles in our sample of drivers. A latent class analysis (LCA) uses patterns of responses to uncover hidden subgroups in the data, called classes, based on a predetermined set of variables (Sinha et al., 2021). After classes are determined, the analysis then calculates the probability that an individual respondent will belong to each class. Finally, each individual is assigned to their most-probable class. See Appendix B for a general overview of the LCA approach. The current analysis applied a survey-weighted LCA using each of the 14 risky driving-related behavior engagement questions. These driving-related behavior engagement questions were dichotomized (0 – Never; 1 – Just Once to Regularly) for this analysis.

Based on several model fit indices, six unique groups (i.e., risky driving profiles) were identified in the data. Each respondent was then assigned to their most-likely group. Based on patterns of risky driving-related behavior engagement (see Table 7), these groups are interpreted as representing the following:

1. Safe Drivers (41.2%)
2. Distracted Drivers (15.0%)
3. Speeding Drivers (22.7%)
4. Impaired Drivers (1.3%)
5. Distracted and Aggressive Drivers (17.3%)
6. Most Dangerous Drivers (2.4%).

The largest proportion of respondents were assigned to the Safe Drivers group (41.2% of the weighted sample) and very few in this group reported engaging in any of the risky driving-related behaviors. The majority of the Distracted Drivers group (15% of the weighted sample) were engaging in distracted driving behaviors, such as reading text messages and texting while driving. Those interpreted as Speeding Drivers (22.7% of the weighted sample) composed the second largest group. These drivers were inclined to report driving 15mph over the speed limit on freeways and 10mph over on residential streets. The fewest proportion of respondents were interpreted as belonging to the Impaired Drivers group (1.3% of the weighted sample) as these respondents tended to engage in impairing behaviors (namely drinking and driving). Approximately 17.3% of the respondents were assigned to the Distracted and Aggressive Drivers group. These respondents engaged in both distracted driving behaviors (texting while driving) and aggressive behaviors, such as speeding and switching lanes quickly. Persons included in the Most Dangerous Drivers group (2.4% of the weighted sample) tended to engage in nearly every risky driving-related behavior.

These groups were further characterized based on the composition of their age, sex, education (for adults 19+ years of age), marital status (for adults 19+ years of age), and whether they lived in metropolitan areas (i.e., an urban area inhabited by 50,000 or more persons). An adjustment (the Bolck, Croon, and Hagenaars [BCH] correction) was applied to account for any potential misclassification bias due to using probabilities to assign individuals to their most-likely group (Bolck et al., 2004). Notable group differences were found on each examined characteristic (see Table 8):

- On average, the Distracted Drivers, Distracted and Aggressive Drivers, and Most Dangerous Drivers were approximately 40 years of age. The average age of respondents classified as

Safe Drivers, Speeding Drivers, and Impaired Drivers was nearly 13 years older (approximately 53 years of age on average).

- A larger proportion of men (approximately 60%) were classified into the Speeding Drivers and Most Dangerous Drivers group. A larger proportion of women (57%) composed the Safe Drivers group.
- The Impaired Drivers appeared to have less education than the other groups. For instance, only 5% of the Impaired Drivers had a Bachelor's degree or higher where other groups had representation of 27% to 43%.
- A higher proportion (approximately 44%) of both the Impaired Drivers and the Most Dangerous Drivers had never been married compared to those classified in other groups, where proportions of non-married respondents ranged between 19% and 37%.
- A larger proportion of Impaired Drivers lived in a non-metropolitan area (37%), compared to the overall average (14%).

Table 7. Proportion of Risky Driving Profiles Engaging in Risky Driving Behaviors

Driving Behaviors		Safe Drivers n _w %=41.2 (%)	Distracted Drivers n _w %=15.0 (%)	Speeding Drivers n _w %=22.7 (%)	Impaired Drivers n _w %=1.3 (%)	Distracted and Aggressive Drivers n _w %=17.3 (%)	Most Dangerous Drivers n _w %=2.4 (%)	Total n _w =2,668 (%)
Distracted	Drivers holding and talking on cell phones	12.9	59.1	34.3	61.1	74.2	100.0	38.0
	Drivers reading on cell phones	0.0	94.5	15.7	1.9	96.0	96.6	36.8
	Drivers manually texting or emailing on cell phones	0.0	55.5	1.2	0.0	95.4	91.9	27.4
	Drivers using technology that allows hands-free use of their phone (Bluetooth, CarPlay, Android Auto, etc.)*	41.1	72.8	58.3	28.0	88.8	89.8	59.0
Aggressive	Drivers speeding 15 mph over the speed limit on freeways	15.2	16.8	91.9	0.0	92.4	97.6	48.1
	Drivers speeding 10 mph over the speed limit on residential streets (neighborhood)	10.0	12.3	64.1	14.1	69.5	85.8	34.8
	Driving through a light that had just turned red when they could have stopped safely	6.0	11.0	39.4	22.4	54.1	83.4	24.8
	Driving aggressively (switching lanes quickly, driving very closely behind another car)	3.8	9.0	34.9	0.0	50.8	84.0	21.7
Drowsy & Impaired	Driving when they were so tired that they had a hard time keeping your eyes open	4.8	19.8	17.8	47.9	36.2	83.9	17.9
	Driving after drinking enough alcohol that they may be over the legal limit	0.0	1.6	5.0	61.7	13.2	100.0	6.9
	Ridden in a car driven by someone who has had too much alcohol	2.2	2.4	3.6	49.8	13.5	100.0	7.8
	Driving shortly (within an hour) after using marijuana	0.0	2.7	6.9	37.7	11.5	76.8	6.3
	Driving after using potentially impairing prescription drugs	0.5	1.0	2.8	33.6	2.7	54.4	3.2
Other	Driving without wearing a seatbelt	5.2	16.2	10.9	38.7	29.8	72.2	14.5

Note: n_w=weighted sample size. n_w%=weighted sample size proportion. *=The survey did not specify talking or typing using hands-free technology to ask how dangerous people feel distracted. Frequencies above 50% were bolded to indicate the majority of a given group engaged in a given behavior.

Table 8. Characteristics of Risky Driving Profiles with BCH Corrections

Characteristics		Safe Drivers n _w %=41.2	Distracted Drivers n _w %=15.0	Speeding Drivers n _w %=22.7	Impaired Drivers n _w %=1.3	Distracted and Aggressive Drivers n _w %=17.3	Most Dangerous Drivers n _w %=2.4	Total ^a n _w =2,668
	Age (M) ^{***}	53.5	42.7	52.3	53.2	39.7	39.9	48.8
		(%)	(%)	(%)	(%)	(%)	(%)	(%)
Sex ^{**}	Male	42.7	48.1	60.1	51.9	50.1	59.0	49.3
	Female	57.3	51.9	39.9	48.1	49.9	41.0	50.7
Education of Adult [*]	No High School or GED	8.8	7.8	4.9	11.7	6.1	9.4	7.3
	High School or GED	25.5	27.7	19.8	28.1	20.4	35.3	23.9
	Some College/Associate	31.9	27.15	34.7	55.1	26.6	24.9	31.0
	Bachelor's Degree or Higher	30.5	34.7	39.0	5.0	43.4	27.1	34.9
	Teen Group ^b	3.4	2.7	1.6	0.2	3.5	3.3	2.9
Marital Status of Adult ^{***}	Never Married	19.9	22.0	18.9	44.3	37.3	43.7	24.0
	Married	57.9	67.6	65.8	38.3	46.4	28.1	58.1
	Widowed/Divorced/Separated	18.8	7.7	13.7	17.2	12.9	25.0	15.1
	Teen Group ^b	3.4	2.7	1.6	0.2	3.5	3.3	2.9
Metropolitan Area ^{**}	Yes	85.8	79.5	90.0	63.2	90.6	90.7	86.4
	No	14.2	20.5	10.0	36.8	9.4	9.3	13.6

Note: n_w=weighted sample size. n_w%=weighted sample size proportion. ^a=values in the "Total" column did not require BCH corrections. ^b=The "teen group" in this category denotes participants who are 16-17 years old. *=*p*<.05. **=*p*<.01. ***=*p*<.001. It is possible that frequencies in a given cell do not add up to 100% due to rounding.

Discussion

Findings from the 2022 TSCI survey contribute to our understanding of public perceptions and attitudes towards unsafe driving behaviors and can help identify fruitful areas for countermeasure development. Relating TSCI findings on the perceptions of the relative dangerousness of examined driving behaviors to NHTSA estimates on fatalities reveals some disconcerting trends. NHTSA estimates that in 2021, 1.6% of fatalities were related to drowsy driving, 8.2% of fatalities were related to distracted driving, 29% of fatalities were related to speeding, and 31% of fatalities were related to alcohol-impaired driving (National Center for Statistics and Analysis 2023). Findings from the 2022 TSCI indicate that the American public overwhelmingly view drowsy driving, many distracted driving behaviors, and alcohol impaired driving as very or extremely dangerous. However, a minority of respondents view speeding on the freeway as very or extremely dangerous and only 61% of respondents view speeding on residential streets as dangerous.

In terms of reported behavior, despite noting the riskiness of the behavior, roughly a third of respondents admit to distracted driving behaviors such as reading or sending text messages and emails in the past 30 days, and 18% admit to drowsy driving. Consistent with trends in previous TSCI reports, speeding remains a relatively common behavior with 48% reporting speeding on the freeway and 35% on residential roads.

In examining patterns of risky driving behaviors, six unique groups were identified and characterized as: 1) Safe Drivers, 2) Distracted Drivers, 3) Speeding Drivers, 4) Distracted and Aggressive Drivers, 5) Impaired Drivers, and 6) Most Dangerous Drivers. Most drivers were classified as Safe Drivers due to their engaging in very few risky driving-related behaviors in the past 30 days. The second most-common driving profile was interpreted as drivers whose only risky driving behavior was speeding, suggesting countermeasures targeting attitudes towards speeding behaviors may be particularly fruitful. While the Most Dangerous Drivers consisted of only a small percentage of the drivers, they pose a serious risk to themselves and other road users as they reported engaging in all the risky driving-related behaviors.

These findings are critical to our understanding of the different types of drivers currently on U.S. roads and point to a need to understand how these different patterns of driving behavior manifest. For example, why do some drivers predominantly engage in distracted driving behaviors while others tend to engage in speeding behaviors only? An initial examination of demographic characteristics revealed that these groups differed on their average age, sex, education, marital status, and whether they live in a metropolitan area. These additional findings may be particularly informative for targeted education programs, countermeasures, and public awareness of risky driving behaviors. The AAA Foundation for Traffic Safety continues to devote research efforts to promote safe driving behaviors and to establish a healthy traffic safety culture and encourage safe mobility for all.

References

- Bolck, A., Croon, M., & Hagenaars, J. (2004). Estimating Latent Structure Models with Categorical Variables: One-Step Versus Three-Step Estimators. *Political Analysis*, 12(1), 3–27. <https://doi.org/10.1093/pan/mp001>
- Federal Highway Administration (2023) Traffic Volume Trends: December 2022. U.S. Department of Transport https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
- Governors Highway Safety Association. (2023). *Pedestrian Traffic Fatalities by State: 2022 Preliminary Data (January-December)* <https://www.ghsa.org/resources/Pedestrians23>
- National Center for Statistics and Analysis. (2023). *Early Estimate of Motor Vehicle Traffic Fatalities in 2022 (Crash*Stats Brief Statistical Summary. Report No. DOT HS 813 428)*. National Highway Traffic Safety Administration.
- NHTSA. (2023). *NHTSA Estimates for 2022 show roadway fatalities remain flat after two years of dramatic increases*. <https://www.nhtsa.gov/press-releases/traffic-crash-death-estimates-2022>
- Sinha, P., Calfee, C. S., & Delucchi, K. L. (2021). Practitioner's Guide to Latent Class Analysis: Methodological Considerations and Common Pitfalls. *Critical care medicine*, 49(1), e63–e79. <https://doi.org/10.1097/CCM.0000000000004710>
- Steinbach, R. & Tefft, B.C. (2023). *American Driving Survey: 2022* (Research Brief). Washington, D.C.: AAA Foundation for Traffic Safety.
- U.S. Census Bureau (2022). *Current Population Survey*. Washington, D.C. <http://www.bls.gov/cps/>.
- Weller, B. E., Bowen, N. K., & Faubert, S. J. (2020). Latent Class Analysis: A Guide to Best Practice. *Journal of Black Psychology*, 46(4), 287–311. <https://doi.org/10.1177/0095798420930932>

Appendix A: Drivers' attitudes, perceptions, and behaviors in relation to age and sex

Distracted Driving Behaviors

Table A1. Proportion of drivers who perceived distracted driving as very or extremely dangerous.

		Holding and talking on cell phone (%)	Reading on cell phone (%)	Texting or emailing on cell phone (%)	Using technology that allows hands-free use of their phone (Bluetooth, CarPlay) (%)
All drivers		76.0	92.9	93.0	19.4
Age group	16-18	82.4	87.4	88.1	21.2
	19-24	52.8	91.6	87.3	9.7
	25-39	70.4	90.4	83.2	9.3
	40-59	77.4	3.0	95.1	17.6
	60-74	82.7	94.9	98.7	28.6
	75+	93.5	97.4	98.7	35.7
Sex	Male	78.8	91.5	91.2	20.2
	Female	73.3	94.3	94.8	18.7

Table A2. Proportion of drivers who perceived distracted driving somewhat or very likely to be caught by the police.

		Holding and talking on cell phone (%)	Reading a text or an email on cell phone (%)	Typing or sending a text message or email on cell phone (%)
All drivers		37.0	34.5	36.7
Age group	16-18	34.8	42.6	39.4
	19-24	61.8	43.4	31.4
	25-39	41.6	39.2	43.6
	40-59	30.2	31.6	37.6
	60-74	32.1	31.3	31.5
	75+	40.8	36.4	30.4
Sex	Male	34.1	34.6	36.0
	Female	39.8	34.4	37.4

Table A3. Proportion of drivers who believed people who were important to them would somewhat or completely approve of distracted driving.

		Holding and talking on cell phone (%)	Reading a text or an email on cell phone (%)	Typing or sending a text message or email on cell phone (%)
All drivers		12.8	8.8	4.7
Age group	16-18	7.4	3.3	2.2
	19-24	15.7	0.0	2.5
	25-39	14.7	12.3	6.5
	40-59	13.4	10.2	5.2
	60-74	10.9	7.6	3.7
	75+	7.6	3.4	2.1
Sex	Male	11.5	7.3	4.4
	Female	14.0	10.2	5.0

Table A4. Proportion of drivers who reported engaging in distracted driving at least once in the past 30 days.

		Holding and talking on cell phone (%)	Reading a text or an email on cell phone (%)	Manually texting or sending a text message or email (%)	Using technology that allows hands-free use of their phone (Bluetooth, Carplay) (%)
All drivers		38.0	36.8	27.4	59.0
Age group	16-18	39.0	37.8	30.3	53.3
	19-24	48.8	55.7	41.3	65.6
	25-39	43.5	54.3	47.8	71.3
	40-59	40.2	38.2	27.6	63.6
	60-74	31.8	20.5	9.9	45.6
	75+	17.6	6.7	4.0	36.0
Sex	Male	37.8	37.4	28.1	59.7
	Female	38.3	36.2	26.7	58.3

Aggressive Driving Behaviors

Table A5. Proportion of drivers who perceived aggressive driving as very or extremely dangerous.

		Driving 15 mph over the speed limit on freeway (%)	Driving 10 mph over the speed limit on a residential street (neighborhood) (%)	Driving through a red light (%)	Aggressive driving (%)	Driving without wearing a seatbelt (%)
All drivers		46.5	60.5	83.4	88.9	76.1
Age group	16-18	54.1	62.5	73.6	83.3	78.8
	19-24	31.4	59.9	97.0	84.5	86.0
	25-39	43.9	54.9	68.5	86.8	70.2
	40-59	39.1	58.3	86.4	88.4	77.4
	60-74	56.7	67.4	88.8	91.2	75.7
	75+	74.0	65.9	90.4	100.0	81.2
Sex	Male	39.0	54.1	80.1	86.8	68.9
	Female	53.7	66.8	86.7	90.8	83.2

Table A6. Proportion of drivers who perceived aggressive driving as somewhat or very likely to be caught by the police.

		Driving 15 mph over the speed limit on freeway (%)	Driving 10 mph over the speed limit on a residential street (neighborhood) (%)	Driving through a red light (%)	Aggressive driving (%)	Driving without wearing a seatbelt (%)
All drivers		63.0	48.9	49.0	51.5	40.9
Age group	16-18	64.7	46.3	58.4	58.6	39.9
	19-24	80.2	56.3	49.2	68.1	36.7
	25-39	66.4	53.3	56.2	56.9	40.5
	40-59	64.8	50.4	48.5	47.1	44.1
	60-74	53.2	44.7	44.3	45.6	41.9
	75+	51.9	33.4	41.1	48.2	25.3
Sex	Male	59.4	49.9	47.7	50.5	41.4
	Female	66.4	48.0	50.3	52.4	40.4

Table A7. Proportion of drivers who believed people who were important to them would somewhat or completely approve of aggressive driving.

		Driving 15 mph over the speed limit on freeway (%)	Driving 10 mph over the speed limit on a residential street (neighborhood) (%)	Driving through a red light (%)	Aggressive driving (%)	Driving without wearing a seatbelt (%)
All drivers		19.8	13.3	4.6	4.7	5.0
Age group	16-18	12.2	9.6	2.6	3.2	4.6
	19-24	21.0	15.7	10.2	7.4	6.4
	25-39	22.5	17.0	5.8	5.1	4.9
	40-59	23.0	13.1	6.1	5.8	5.1
	60-74	15.7	11.9	1.8	2.5	6.1
	75+	10.9	4.4	0.0	3.2	0.6
Sex	Male	20.0	14.0	3.7	4.5	4.4
	Female	19.7	12.6	5.5	4.9	5.7

Table A8. Proportion of drivers who reported engaging in aggressive driving at least once in the past 30 days.

		Driving 15 mph over the speed limit on freeway (%)	Driving 10 mph over the speed limit on a residential street (neighborhood) (%)	Driving through a red light (%)	Aggressive driving (%)	Driving without wearing a seatbelt (%)
All drivers		48.1	34.8	24.8	21.7	14.5
Age group	16-18	38.5	41.3	28.2	22.3	13.2
	19-24	53.5	48.1	22.1	30.3	15.8
	25-39	54.0	35.3	30.2	27.8	20.3
	40-59	53.2	35.0	26.3	25.1	15.1
	60-74	39.0	31.6	20.6	11.5	10.5
	75+	30.9	27.0	14.7	10.3	4.1
Sex	Male	51.2	38.0	25.4	25.4	16.1
	Female	45.0	31.8	24.2	18.1	12.9

Drowsy and Impaired Driving Behaviors

Table A9. Proportion of drivers who reported drowsy, alcohol-impaired, or drug-impaired driving as very or extremely dangerous.

		Driving while being so tired that they had had a hard time keeping their eyes open (%)	Drinking enough alcohol that they may be over the legal limit (%)	Driving shortly (within an hour) after using marijuana (%)	Driving after using potentially impairing prescription drugs (%)
All drivers		95.0	94.4	69.9	85.3
Age Group	16-18	93.5	98.6	76.5	92.3
	19-24	86.3	97.2	69.1	89.4
	25-39	97.4	95.0	56.6	84.2
	40-59	95.8	92.5	75.2	83.4
	60-74	94.1	95.1	70.3	86.9
	75+	97.3	96.2	79.9	86.6
Sex	Male	94.8	92.3	66.3	80.2
	Female	95.1	96.4	73.4	90.3

Table A10. Proportion of drivers who perceived drowsy, alcohol-impaired, or drug-impaired driving somewhat or very likely to be caught by the police.

		Driving while being so tired that they had had a hard time keeping their eyes open (%)	Drinking enough alcohol that they may be over the legal limit (%)	Driving shortly (within an hour) after using marijuana (%)	Driving after using potentially impairing prescription drugs (%)
All drivers		27.2	68.4	25.6	40.1
Age Group	16-18	36.5	69.9	37.8	50.6
	19-24	38.5	80.1	36.4	62.3
	25-39	29.3	74.7	26.8	39.5
	40-59	23.4	65.5	24.6	37.6
	60-74	23.4	63.5	24.8	38.5
	75+	32.5	71.0	17.8	35.4
Sex	Male	26.5	64.8	24.1	40.0
	Female	27.9	72.0	27.2	40.2

Table A11. Proportion of drivers who believed people who were important to them would somewhat or completely approve of engaging in drowsy, alcohol-impaired, or drug-impaired driving.

		Driving while being so tired that they had had a hard time keeping their eyes open (%)	Drinking enough alcohol that they may be over the legal limit (%)	Ridden in a car driven by someone who has had too much alcohol (%)	Driving shortly (within an hour) after using marijuana (%)	Driving after using potentially impairing prescription drugs (%)
All drivers		2.3	2.6	1.7	6.8	4.0
Age Group	16-18	2.7	1.8	1.5	2.7	4.0
	19-24	12.0	0.0	5.4	0.0	0.0
	25-39	2.2	4.6	1.6	10.2	3.8
	40-59	0.9	2.3	0.9	7.8	5.5
	60-74	0.9	2.7	1.4	5.3	3.8
	75+	1.9	0.0	1.9	2.1	0.0
Sex	Male	1.6	1.8	0.7	3.2	3.4
	Female	3.0	3.4	2.6	10.3	4.6

Table A12. Proportion of drivers who reported engaging in drowsy, alcohol-impaired, or drug-impaired driving at least once in the past 30 days.

		Driving while being so tired that they had had a hard time keeping their eyes open (%)	Drinking enough alcohol that they may be over the legal limit (%)	Ridden in a car driven by someone who has had too much alcohol (%)	Driving shortly (within an hour) after using marijuana (%)	Driving after using potentially impairing prescription drugs (%)
All drivers		17.9	6.9	7.5	6.3	3.2
Age Group	16-18	18.5	3.2	6.9	5.0	2.6
	19-24	25.9	11.9	8.5	12.5	4.0
	25-39	24.5	10.7	10.5	12.1	5.5
	40-59	16.8	5.3	5.4	4.1	2.5
	60-74	13.4	5.6	7.6	4.0	2.4
	75+	8.9	3.3	6.6	1.3	1.9
Sex	Male	19.3	8.8	6.7	8.1	3.4
	Female	16.6	5.0	8.2	4.7	3.1

Appendix B: Latent Class Analysis

In survey research, there are often important constructs that are not directly measurable with a questionnaire. For instance, the Traffic Safety Culture Index is not able to directly measure a respondent's driving style or whether a particular respondent is a good driver. However, the questionnaire is able to include some indicators of different facets of driving style and ability such as engagement in particular driving behaviors. Responses to questions on engagement in driving behaviors are called observed variables because they are directly measured.

Latent class analysis is an approach that uses patterns of responses to observed variables in the data to investigate whether there are hidden constructs that are not directly measurable in a questionnaire. This technical report examined whether there were any patterns of association in the responses to the observed variables on engagement in driving behaviors that could group the sample into classes characterizing risky driving behavior.

LCA employs a person-oriented statistical procedure to identify individuals who can be grouped together based on their responses to survey questions. The underlying assumption of LCAs is that membership in an unobserved class or subgroup can explain the patterns of responses across the survey questions considered in the analysis. The ideal number of subgroups is not known beforehand. A large technical literature discusses how to select which survey questions to include in an LCA, how to select the final model, how to include covariates, and the appropriate statistics to report.

Briefly, to use an LCA, there are two main pieces of information a researcher needs to input in their statistical program: 1) the survey responses of interest and 2) the number of subgroups (i.e. classes) they want to assess. The researcher wants to ensure the survey responses they are using are dichotomized (e.g., yes–no or 0–1). In any study, an LCA will be run on multiple models with an increasing number of subgroups (e.g., a researcher will run an LCA with 1 group, 2 groups, 3 groups, 4 groups, etc.). This iterative step will help the researcher to choose which model and corresponding number of subgroups best represents the data and should be explored further. Each LCA model run will output model fit indices. Looking at these model fit indices within a single model is not very informative. However, when a researcher compares the model fit indices across several models of varying subgroup numbers they can then decide how many subgroups are appropriate to interpret and inspect further.

It is important to understand that an LCA will not be able to definitively assign a given participant to any one class. Rather, the LCA will create probabilities for each participant for each subgroup in the analysis. There are several ways to use these probabilities, but a common approach (which is used in this technical report) is to assign a participant to their most likely subgroup (i.e., the subgroup for which the participant had the highest probability). There are a variety of approaches that can account for the uncertainty in class assignment and the potential for individuals to be misclassified. The analyses presented in this technical report use the Bolck, Croon, and Hagenars [BCH] correction (Bolck et al., 2004).

This appendix provides a very general overview of an LCA. LCAs can be complex and many details require careful consideration. Weller et al. (2020) presents a more thorough review of LCA approaches.