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Aggressive Driving and Road Rage

SEP 2025

Title

Aggressive Driving and Road Rage

(September 2025)

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AAA Foundation for Traffic Safety

Foreword

Aggressive driving and road rage jeopardize the safe mobility of all road users, both inside and outside vehicles. Finding ways to reduce these risky behaviors is vital and will have a positive influence on traffic safety. However, combating aggressive driving and road rage requires a multi-faceted approach because these are evolving social behaviors motivated by a variety of dynamics.

Building on previous work conducted by the AAA Foundation for Traffic Safety, the work presented in this report used a three-pronged approach, including a literature review, focus group discussions with drivers and a national survey to gain a better understanding of the etiology and correlates of aggressive driving behaviors and related attitudes. Findings identify critical individual, vehicle and situational factors that influence the propensity to engage in aggressive driving and/or road rage. Findings presented in this document should be a useful resource for traffic safety researchers and practitioners. Additionally, the public can benefit from the study results to improve the safety of their commute.

C. Y. David Yang, Ph.D.

President and Executive Director
AAA Foundation for Traffic Safety

About the Sponsor

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List of Acronyms

AAAFTS	AAA Foundation for Traffic Safety
MPH	Miles per hour
NHTSA	National Highway Traffic Safety Administration
SSRS	Social Science Research Solutions
SEM	Socio-Ecological Model
STM	Structural Topic Modeling
TSCI	Traffic Safety Culture Index

Executive Summary

Aggressive driving and road rage are perceived to be serious threats to public safety and contribute to a substantial number of road traffic crashes each year. Previous work by the AAA Foundation for Traffic Safety (AAAFTS) found that more than 78% of drivers reported engaging in at least one aggressive driving behavior in the past year in 2014, underscoring the high prevalence of such risky behaviors. Changes in driving patterns, lifestyles, and technology (both inside and outside the vehicle) in the past decade may have changed the types of behaviors that road users perceive as aggressive as well as the causes and contributing factors of aggressive driving behaviors. This study updated previous AAAFTS research on aggressive driving, further explored the etiology of aggressive driving behaviors and related attitudes, and examined how the concepts of aggressive driving and road rage have evolved over time.

This study took a three-part approach. Part 1 consisted of a comprehensive literature review and discussions with academic experts. Part 2 involved eight focus group discussions with a total of 53 drivers who admitted to engaging in aggressive driving or road rage behaviors, and subsequent thematic analysis of the qualitative data. Part 3 designed a bespoke questionnaire to measure attitudes towards and engagement in aggressive driving and road rage, which was administered to a nationally representative sample of 3,020 drivers, aged 16 and older, recruited from a probability-based panel. Quantitative analyses examined the prevalence and correlates of aggressive driving and road rage attitudes and behaviors.

Key Findings

- The literature review identified many individual, vehicle, and situational factors associated with aggressive driving and road rage. These factors operate at different levels of influence, including the individual level (knowledge, skills, attitudes); relational (family, friends, social networks); and community level (the built and social environment).

- Qualitative analyses of focus group data identified seven key themes in behaviors that drivers consider to be aggressive: *putting others at risk*, *getting ahead*, *stealing space*, *controlling other driver behavior*, *expressions of displeasure*, *provoking reactions*, and *violence*.

- While anger and frustration were the emotions most commonly associated with aggressive driving and road rage in the literature, in focus group discussions drivers also spoke of anxiety, fear, and pleasure in their experiences of aggressive driving and road rage.

- Drivers perceived that they were generally able to cope with feelings of anger while driving unless "triggered," which could lead to more violent behaviors, including those that have been traditionally considered road rage in the literature.

- Drivers reported many different motivations for driving aggressively including getting to destinations more quickly, perceived threats to safety, claiming control over sometimes chaotic driving environments, educating other drivers on the correct way to behave, retaliating against perceived slights, and punishing other drivers for bad behavior.

- Quantitative analyses of survey data revealed extremely high levels of self-reported engagement in aggressive behaviors among American drivers. The survey measured 21 behaviors identified from the literature review, expert panel discussion, and focus groups with drivers. Across all behaviors, 96% of drivers reported engaging in aggressive driving or road rage behaviors at least once in the previous year.

- Analyses investigated the prevalence of aggressive driving by themes identified in the focus group discussions. The most prevalent behaviors were those categorized as either *trying to get ahead* (92%) and *putting others at risk* (92%). In the previous year, 11% of drivers engaged in *violent* behaviors.

- Associations between individual factors and high levels of engagement in aggressive driving mirror findings from the literature review, with higher prevalence rates among younger and male drivers.

- There was evidence of many associations between indicators of how drivers feel about their vehicle and high levels of engagement in aggressive driving.

- Road etiquette and manners appear to be a protective factor against aggressive driving. Drivers who indicated that good manners were important to them were less likely to have high levels of engagement in aggressive driving.

- The most salient predictor of high engagement in aggressive driving was aggressive driving culture, i.e. the extent to which other drivers in your area engage in aggressive driving behaviors.

Introduction

Aggressive driving and road rage are perceived to be serious threats to public safety and contribute to a substantial number of road traffic crashes each year.

In 2016, the AAA Foundation for Traffic Safety (AAAFTS) completed an aggressive driving study that provided estimates of the prevalence of aggressive driving behaviors. Data was collected as part of the AAAFTS's 2014 Traffic Safety Culture Index (TSCI) (AAAFTS, 2015). The survey of over 2,700 licensed drivers aged 16 and older in the United States found approximately 78% of drivers reported engaging in at least one aggressive driving behavior in the past year (AAAFTS, 2016).

Changes in driving patterns, lifestyles, and technology (both inside and outside of the vehicle) over the previous decade may have changed the types of behaviors that road users perceive as aggressive and contributing factors and consequences of said behaviors. This project updates previous AAAFTS research on aggressive driving, further explores the causes and origins of aggressive driving behaviors and related attitudes, and considers how the concepts of aggressive driving and road rage have evolved over time.

To achieve these objectives, this study employed a three-pronged approach:

- **Part 1:** In tandem with a literature review to capture the current state of knowledge on aggressive driving, this study convened an expert panel of accomplished researchers from various disciplines to help conceptualize a working framework for this research.

- **Part 2:** Focus groups with drivers were conducted to identify what signifies aggressive driving at present-day and explore the social meaning and causal factors of these behaviors.

- **Part 3:** Using results from the qualitative analysis of focus group data, the study designed a fit-for-purpose questionnaire that was administered to a nationally representative sample. Survey data was analyzed to estimate the prevalence and correlates of aggressive driving and road rage behaviors among the American public.

Figure 1. Study Sequence
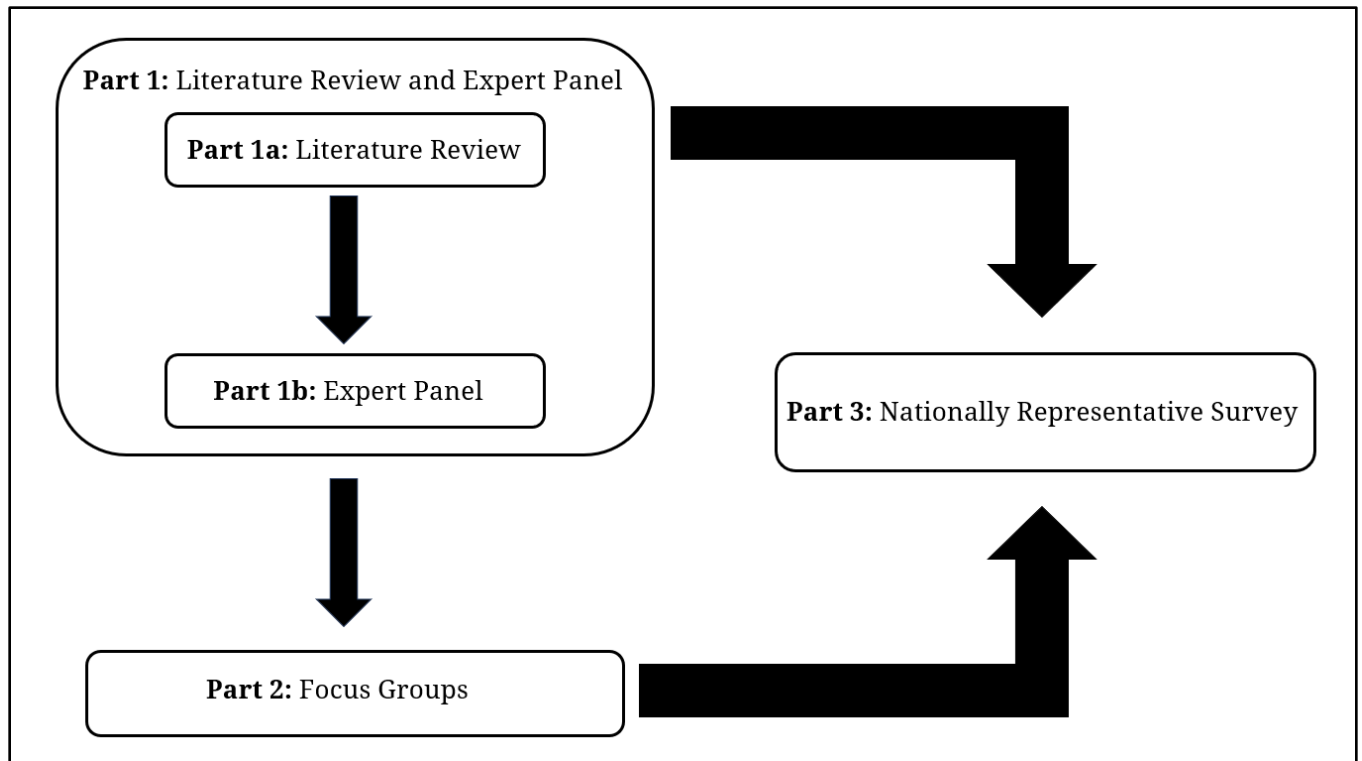
Each part of the study is described comprehensively in the sections below, followed by a general discussion that synthesizes key outcomes.

Part 1: Literature Review and Expert Panel

A comprehensive and interdisciplinary literature review was conducted to compile and synthesize the most recent information available on aggressive driving and road rage. To capture the state of knowledge on this topic, keyword searches included but were not limited to "aggressive driving," "road rage," "driving hostility," and "driving anger." Only literature from 2013 through 2023 were sourced for consideration, but other supplemental literature was included when appropriate. The initial search produced a total of 1,504 records—591 from the Transportation Research International Documentation, 449 from PubMed, and 464 from APA PsycNet. Articles were assessed for relevance, duplicates were removed, and articles were excluded if they were not written in English, resulting in 620 articles for initial review.

To compliment the literature review, AAAFTS researchers put together an interdisciplinary expert panel to help conceptualize definitions and theoretical frameworks for examining aggressive driving and road rage. Five panelists were invited to participate in this panel:

- Dr. Kenneth H. Beck, *University of Maryland, U.S.*
- Dr. Brad J. Bushman, *Ohio State University, U.S.*
- Dr. Bridget Hanson, *Montana State University, U.S.*
- Dr. Amanda S. Stephens, *Monash University, Australia*
- Dr. Christine Wickens, *Centre for Addiction and Mental Health (CAMH), Canada*

Four of the expert panelists were engaged in a one-time 3-hour panel discussion; the final panelist was interviewed independently. Discussion topics included definition and etiology of aggressive driving and road rage behaviors, and feedback on the proposed methodology of this project.

To help organize the findings from the literature review and expert panel, results have been grouped into three broad themes. First, common definitions of aggressive driving and road rage were reviewed and assessed for use in this project. Next, the theoretical approaches and frameworks used by other studies to explain aggressive driving were discussed. Finally, the guiding theoretical framework chosen for this project was explained, and literature review results were presented within the framework.

Definition of Aggressive Driving and Road Rage

The literature review revealed many proposed definitions of aggressive driving. The National Highway Traffic Safety Administration (NHTSA), for instance, has presented at least two definitions over time, the first of which is "an individual commits a combination of moving traffic offenses so as to endanger other persons or property" (Burch et al., 2023; Craciun et al., 2017; Finley et al., 2023; Su et al., 2023). The second NHTSA definition is "driving actions that markedly exceed the norms of safe driving behavior and that directly affect other road users by placing them in unnecessary danger" (Kerwin & Bushman, 2020). While no singular definition has been adopted by researchers and practitioners alike, a common theme of unsafe driving behaviors that put others' safety at risk is widely accepted (Duany & Mouloua, 2022; Edwards et al., 2013; Harris et al., 2014; Lee, 2020; Suhr, 2016; Suhr & Dula, 2017; Zhang et al., 2016).

Some definitions have made distinctions between different types of aggressive behavior. Vallières and colleagues (2014) highlight differences between proactive aggressive driving, where aggressive driving serves a means to an end, and reactive aggressive driving, when a driver reacts aggressively to another driver after a perceived hostile act. Further refinements include characterizations of retaliatory aggressive driving as behavior performed with the intent to cause physical or psychological harm, directed towards another motorist or vehicle that has been perceived to have committed an injustice (Roseborough et al., 2021). Others have proposed definitions with exclusion criteria of aggressive driving, such as aggressive driving does not encompass ordinary highway code violations (Beanland et al., 2014)

Finley and colleagues (2023) systematically reviewed definitions of aggressive driving over time and across various professions including the AAAFTS's definition of aggressive driving as "any unsafe driving behavior, performed deliberately and with ill intention or disregard for safety" (AAAFTS, 2022). In an effort to move towards a common definition of aggressive driving, and building off AAAFTS's 2022 definition, Finley and colleagues propose the following: ***Any unsafe driving behavior that is performed deliberately, with ill intention or disregard for safety, and impacts others.*** Discussions with the expert panel highlighted the utility of the phrase "and impacts others." For instance, panelists debated whether speeding should be characterized as aggressive behavior. They concluded that speeding on an empty open road did not seem like aggressive behavior; however, when a driver deliberately speeds around others with perceived disregard for safety, the behavior becomes aggressive. In light of these discussions, AAAFTS adopted this amended definition for use in the current project.

Like aggressive driving, consensus is lacking on an agreed upon definition of road rage. Much of the literature agrees that road rage represents behaviors that are intended to cause physical, psychological, or emotional harm to another driver or vulnerable road user, and can include using the vehicle as a means for intimidation (Cavacuiti et al., 2013; Goodwin et al., 2013; Jeon et al., 2015; Kerwin & Bushman, 2020; Xu et al., 2021). Some studies highlight that while road rage is often classified as aggressive in nature, the antisocial behavior transcends typical aggressiveness when it results in violence, an increased risk of collision, or the intent to physically injury or kill another road user (Cavacuiti et al., 2013; Craciun et al., 2017; Goodwin et al., 2013; Jeon et al., 2015; Roseborough et al., 2021; Xu et al., 2021). Other studies argue that while road rage is highly influenced by human behavior, the structural environment, such as traffic, road design, or construction, may also contribute to the actions that result in a potential criminal offense of the perpetrator (Craciun et al., 2017; Jeon et al., 2015).

Expert panel discussions echoed difficulties in defining road rage, with no singular definition able to capture the complexities, but panelists agreed that it was useful to distinguish between aggressive driving and road rage. While aggressive driving and road rage were behaviors that panelists felt were on the same continuum, road rage was a confrontational road event that went beyond aggression, differentiated by the hostility road users felt in these combative circumstances with the intention to cause harm, whether physical, mental, or emotional. The panelists highlighted difficulties with the terminology "road rage," with perceptions that key road safety stakeholders and the general public did not discriminate between aggressive driving and these more hostile behaviors. Expert panelists supported coining a new phrase "violent driving" to better encapsulate the dangerous behaviors associated with hostile and confrontational driving, including using a car to physically damage another vehicle, forcing other drivers off the road, and shooting a gun while on the road.

Theoretical Approaches to Studying Aggressive Driving

Theoretical frameworks are ways of thinking about a particular subject of interest—for the purposes of this study, aggressive driving and road rage—and provide useful structures for organizing complex ideas—in this case to review contributing factors and correlates. In order to inform the choice of framework for this study, Table 1 presents some of the most commonly applied frameworks from the literature review results. Broadly, frameworks fall into three themes: those that focus on aggression; emotions; and goal attainment, control, or validation.

Table 1. Identified Aggressive Driving Frameworks

Theme	Frameworks	Description in Relation to Aggressive Driving	Reference(s)
Aggression	General Aggression Model	"Developed to integrate a variety of existing theory of aggressive expression" and surmises there is an increased likelihood of aggressive behavior expression if an individual is "primed to experience hostile thoughts and experiences"	(Suhr, 2016)
	Social Cognitive Model of Driver Aggression (SCAD)	Describes how state and trait anger, other personality traits, affect, and cognitive factors may increase the risk of aggressive driving	(Suhr, 2016)
	Frustration-Aggression Hypothesis	A situation that interferes with one's goal-directed behavior may elicit an intention or desire to harm a person or object perceived to be responsible for the interference	(Su et al., 2023; Zinzow & Jeffirs, 2018)
Emotions	Affective Events Theory	Emotions are both dynamic and change over time and changes in emotions lead to behavioral outcomes	(Burch et al., 2023)
	State-Trait Theory of Anger	Driving anger represents the present occurrence of anger in any specific traffic encounter, and trait driving anger characterizes the tendency to experience state anger more often and more vividly because of frustrating and annoying stimuli in the driving environment	(Edwards et al., 2013; Vallières et al., 2014)
Goal attainment, control, or validation	Regulatory Focus Theory	Distinguishes between eager strategies that fit promotion and vigilant strategies that fit prevention	(Craciun et al., 2017; Tory Higgins, 2015)
	Rotter's Theory of Locus Control	Describes to what extent an individual believes they can control events that affect them	(Peplińska et al., 2015)
	Self-validation Hypothesis	The greater the perceived validity (i.e., confidence) in a given thought, the more likely the thought is to influence judgement and action	(Blankenship et al., 2013; Petty et al., 2002)

These frameworks have successfully been used to examine the etiology of aggressive driving and road rage. However, an initial scan of the literature and discussions with expert panelists highlighted additional factors, outside those captured by these frameworks, which contribute to aggressive driving and road rage: in particular, vehicle factors and factors related to the social and physical environment.

Some studies have adapted and extended frameworks to incorporate some of these factors. For instance, recent work by Finley and colleagues (2023) usefully extends the General Aggression Model to incorporate the role of traffic safety culture in aggressive driving (Finley et al., 2023). The current study chose a theoretical framework—the Socio-Ecological Model—that explicitly allows for these additional factors. While the Socio-Ecological Model, according to the literature review, has not been previously used to study aggressive driving and road rage, examining contributing factors and correlates in a new way aims to avoid duplication of previous efforts and may help lead to novel insights.

Guiding Framework: The Socio-Ecological Model (SEM)

In its original conception, the Ecological Systems Theory (later Bioecological Model) developed by Urie Bronfenbrenner explained human development is shaped by an interconnected environmental system with multiple layers (Bronfenbrenner, 1977, 1995). Over time, this model has been widely adapted and used to conceptualize health promotion, particularly in the field of public health (Kilanowski, 2017) and is now commonly referred to as the Socio-Ecological Model (SEM). While examples are few, the SEM has successfully been applied to the field of transportation to study the influences on driving behavior (Walker et al., 2023).

An SEM framework is attractive for studying aggressive driving and road rage because it allows for multiple levels of reciprocal influence. Under an SEM framework, aggressive driving is a product of various factors and influences acting together to produce this undesired driving behavior (Figure 2). The literature review identified many different contributing factors of aggressive driving (Shinar & Compton, 2004), which this study summarizes as individual factors (such personality characteristics), vehicle factors (such as vehicle size), and situational factors (such as weather or the presence of traffic). These factors occur at different levels of influence: the individual (knowledge, skills, attitudes); relational (family, friends, social networks); and community level (the built and social environment). Critically, in an SEM framework these relationships can be reciprocal: for instance, not only do social norms about aggressive driving influence an individual's behavior, but an individual's behavior also influences social norms around aggressive driving.

Figure 2. Adapted SEM for Aggressive Driving
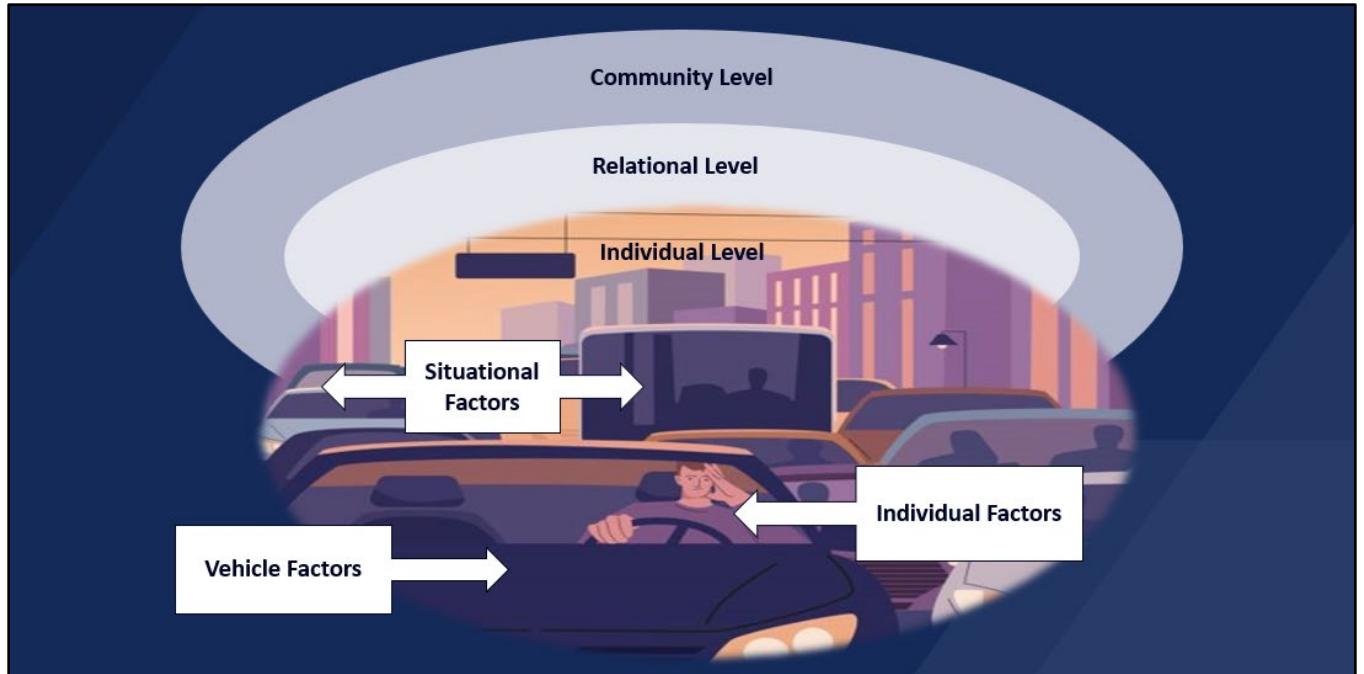
Informed by discussions with the expert panel, the hypothesized individual, vehicle, and situational factors that contribute to aggressive driving at the individual, relational, and societal levels are summarized in Table 2. This adapted framework was then used to synthesize findings from the literature review on contributing factors to aggressive driving and road rage. Factors can appear in more than one box; for instance, it was hypothesized that road design and infrastructure was a community-level influence on individuals, vehicles, and situations.

Table 2. Hypothesized Contributors to Aggressive Driving using the SEM Framework

Factors	Levels of Influence		
	Individual	*Relational*	*Community/Societal*
Individual	• Biology • Demographics • Personality • Mental health • Ability to cope • Attitudes • Personal values • Perceived norms • Reasons for driving • Employment type • Driving history • Training and knowledge of driving	• Family • Friends/peers	• Built environment • Road design and infrastructure • Traffic safety culture • How others around you drive • Police enforcement • Norms about enforcement • Perceptions of enforcement • Cameras • Fines
Vehicle	• Vehicle ownership or rental • Make/model of vehicle • Age of vehicle • Anonymity • Condition or maintenance • Size of vehicle • Marketing	• What vehicles your family & peers drive • Bias • Bumper stickers • Vanity plates	• Built environment • Road design and infrastructure • Consumerism • Brand recognition and reputation
Situational	• Emotional state • Stress • Ability to cope • Drowsiness/alertness • Expectation • Time pressure/urgency • Music • Scents in vehicle	• Other road user behavior • Traffic congestion • Time of day • Weather • Presence of others in vehicle • Presence of guns in vehicle	• Built environment • Road design and infrastructure • Norms around commuting times and modes • Climate • Cultural expectations of driving • How others around you drive • Enforcement measures

Individual Factors

Individual factors like biology, demographics, personality, mental health, and driving history and training influence the relationship an individual has to aggressive driving. Studies have shown male drivers are more aggressive than female drivers, especially on behavioral aggressiveness and when their masculinity is threatened (Braly et al., 2018; Öztürk et al., 2021; Yang et al., 2022), and aggressive driving tendencies tend to decrease with age (Craciun et al., 2017). Personality traits like trait anger, impulsiveness, and narcissism play into individual influences of aggressive driving (Love & Nicolls, 2025). State driving anger is an emotional state marked by subjective feelings

in response to factors or situations encountered while operating a motor vehicle (Roseborough & Wiesenthal, 2018). Studies have found that drivers with a higher propensity for driving anger and those who exhibit poor self-control and impulsivity were associated with risky driving behaviors including aggressive driving (Hassan et al., 2023; Mirón-Juárez et al., 2020).

Similarly, drivers who score higher on individual components of narcissism are more likely to experience state driving anger, with one study confirming that narcissism was positively related to aggressive driving (Bushman et al., 2018; Hennessy, 2016). Mental health disorders like ADHD, anxiety, depression, and PTSD have also been linked to aggressive driving behaviors compared to individual without disorders (Clapp et al., 2019; Duany & Mouloua, 2022).

Aggressive driving is also influenced by personal driving history and training. Crash and citation history, including number of crashes, penalty points, errors or lapses, and moving violations, have been a known predictor of driving aggression (Edwards et al., 2013; Wickens et al., 2016; Yang et al., 2022), and gender, age, and the duration of having a driving license were significant predictors of dangerous driving behaviors on the road (Peplińska et al., 2015). Arguments for the need to incorporate discussions on the impact of personality on negative driving outcomes into driving training have been discussed (Hennessy, 2016), particularly focusing on roadway aggression with teens who present symptoms of conduct disorder as a potential measure to reduce aggressive driving (Wickens et al., 2015).

Research on the role that relationships play on individual factors and aggressive driving has also been studied. Familial relationships, particularly parental relationships, have been shown to influence aggressive driving. Burns et al. (2022) studied the effect of ADHD and dangerous driving in emerging adults to better understand the family climate when considering road safety and found higher levels of parental feedback weakened the relation between ADHD symptoms and aggressive driving. Taubman–Ben-Ari et al. (2015) examined parental contribution to young male drivers' driving behavior and found family cohesion and adaptability mitigate parents' model for risky driving. Taubman–Ben-Ari and Katz–Ben-Ami (2012) also found in a study that examined the "family climate for road safety," that positive aspects of the parent–child relationship were related to greater endorsement of a careful driving style compared to a risky driving style. The influence peers have on aggressive driving has also been examined. The effect of peer pressure on risky driving has been shown to potentially contribute to vehicle crashes (Shepherd et al., 2011), influence risky teen driving (Taubman–Ben-Ari et al., 2015), and encourage aggressive driving in young males (Padilla et al., 2023).

At the community level of influence, individual factors largely center around traffic safety culture and law enforcement. AAAFTS's Traffic Safety Culture Index (TSCI) is an annual survey that describes Americans' perceptions of, attitudes towards, and engagement in dangerous driving behaviors, and identifies profiles of risky driving. The

2023 iteration of this flagship survey found most drivers believed running through a red light (81%) or switching lanes quickly and driving closely behind other vehicles (89%) was very or extremely dangerous. However, a smaller but still majority proportion of drivers believed a driver would be likely to be caught by the police for running a red light (51%) or switching lanes quickly or driving very closely behind another car (52%). Despite these attitudes, 27% of drivers reported running a red light at least once in the previous 30 days, and 22% of drivers reported switching lanes quickly or driving very closely behind another car (AAAFTS, 2024). One study using naturalistic driving data concluded that drivers' awareness of high-visibility enforcement program implementation has the potential to decrease aggressive driving behavior patterns, especially unsafe lane changes and "other" aggressive driving behaviors (Pantangi et al., 2020). Another analysis of safety messages on highway safety signs found that messages about general aggressive driving are significantly misunderstood compared to messages about distracted driving, impaired driving, and wearing a seatbelt, underscoring the need for more targeted messaging on this unsafe driving behavior (Shealy et al., 2020).

Vehicle Factors

The literature about vehicle factors at the individual level of influence mostly considers the anonymity a vehicle can offer. Scott-Parker and colleagues (2018) noted that vehicle features such as tinted windows were often a source of stress because the reactions of the drivers in those vehicles were unable to be seen. Notably, some work has argued that vehicles have been "invisibilized" in popular discourses on road rage (Michael, 2001), which characterizes vehicles as a setting where driver anger takes place, rather than having any contributory role in risky driving behavior.

At the relational level, the literature discusses the anthropomorphization of vehicles: the idea that people attribute human characteristics to vehicles, such as when we name them and give them a personalized license plate (Lupton, 1999). Hoback (2019) examines visual pareidolia, or recognizing an object as a face, to understand if vehicle designs could be influencing aggressive driving and whether it has an equal effect on genders. It was found to predict aggression in men, and Hoback argues that changing vehicle design to appear less aggressive in pareidolia could reduce aggressive driving.

Expert panel discussions helped hypothesize the vehicles factors listed in Table 2 at the community or societal level of influence. There is a dearth of research on how the vehicle interacts with the built environment, road design and infrastructure, consumerism, and brand recognition and reputation to produce aggressive driving behaviors.

Situational Factors

Situational factors that influence aggressive driving at the individual level include stress, drowsiness, and time pressure or urgency. Burch and colleagues (2023) found that experiencing workplace incivility leads to both aggressive driving and negative emotions during the driving commute. The effect of negative emotions on the propensity to engage in aggressive driving behaviors is exacerbated by psychological contract violations (i.e., when another driver is perceived to violate the traffic rules or disrespects the individual through actions such as tailgating). Another study found that participants who self-reported fatigue were less likely to act aggressively (Fountas et al., 2019), but another found that drivers who report being in a hurry when they drive also tend to report engaging in aggressive driving (Beck et al., 2013).

Situational factors, like traffic congestion, time of day, weather, and the presence of guns in the vehicle, can also be attributed to aggressive driving. It is well documented that traffic congestion acts as a contributing factor towards aggressive driving, with drivers being more aggressive in heavily congested traffic and less aggressive when traffic is lighter (Deng & Zhang, 2015; Fountas et al., 2019). Trip-specific conditions may also affect behavioral patterns through the induction of internal or external sources of aggressive driving (Fountas et al., 2019) as one review of online complaints of aggressive behaviors were most frequent on weekdays during the morning and in afternoon rush hour (Wickens et al., 2015), and another simulator study finding that aggressive driving occurs most often at night and in clear conditions (Pulugurtha, & Gouribhatla, 2022).

The presence of a gun in the vehicle also impacts driver aggression. Bushman et al. (2017) conducted a driving simulator study to test the "weapons effect," or the fact that merely seeing a gun can increase aggression (Berkowitz & Lepage, 1967). Bushman and colleagues found results consistent with Benjamin and colleagues (2018) that individuals were more aggressive in the presence of a gun in the vehicle, even when they were not responsible for bringing the weapon into the car.

While there is not a lot of literature that investigates how situational factors are influenced at the community level, a small number of studies have found connections between infrastructure, enforcement, and emotional states. Findings from qualitative work by Scott-Parker et al. (2018) suggest that infrastructure, like traffic lights and posted speed limits, was a source of driver stress, especially when drivers felt it was not fit for purpose. The concept of road justice applied by police to offending drivers was found to reduce anger in other drivers witnessing the event (Roseborough & Wiesenthal, 2018).

To summarize, there is a large literature on how individual factors at the individual level of influence relate to aggressive driving and road rage, while less is known, however, about relationships at the relational and community levels and across vehicle and situational factors. Findings from the literature review reviewed in the SEM

framework and expert panel discussions helped refine the research questions and methodological approach of this study.

Part 2: Focus Groups

Methodology

Qualitative data was derived from in-depth focus groups. Recruitment of participants was handled by Focus Forward, a market research organization. To select participants for the focus groups, Focus Forward administered a screener questionnaire to their list of contacts asking questions about key demographic information and experience with aggressive driving or road rage behaviors (Appendix A). Based on the answers to this screener questionnaire, eligible participants were then determined to be either *"Drivers who occasionally engage in aggressive driving," "Drivers who habitually engage in aggressive driving," or "Drivers who have engaged in road rage."* Two focus groups were conducted for occasional aggressive drivers, three groups were conducted for habitual aggressive drivers, two groups were conducted for a mix of occasional and habitual drivers, and one group was conducted for drivers who engaged in road rage behavior.

A purposive mix of participants was selected to ensure good representation according to key population groups (see Table 3). Participants were terminated from consideration if they did not drive at least once per week, did not have access to a high-speed or broadband internet connection, or did not agree to keep their camera on for the duration of the focus group. A total of 53 participants from 27 U.S. states across 8 focus groups were interviewed online via Zoom. All focus groups were conducted by AAAFTS staff during July 2024 and lasted approximately 45 minutes each.

Participants signed an Informed Consent Form before the focus group and received a $120.00 gift card as token of thanks for participation after its conclusion. Focus groups were taped and transcribed. Participants were assured that all data would be kept confidential, and identifying information would not be disclosed in reports or publications derived from this study. It was determined that this research was exempt from Institutional Review Board (IRB) oversight by Advarra.

Table 3. Focus Group Participant Demographics (N=53)

Demographic categories	n (%)
Gender	
Female	27 *(51%)*
Male	25 *(47%)*
Non-binary	1 *(2%)*
Age	
19–24	7 *(13%)*
25–34	16 *(30%)*
35–34	11 *(21%)*
45–54	12 *(23%)*
55–64	7 *(13%)*
65+	–
Ethnicity	
White	19 *(36%)*
Black	14 *(26%)*
American Indian	2 *(4%)*
Asian	3 *(6%)*
Other non-Hispanic	4 *(7%)*
Hispanic	11 *(21%)*
Education	
Less than high school graduate	–
High school graduate	5 *(9%)*
Some college	12 *(23%)*
College graduate	23 *(43%)*
Graduate school or more	12 *(23%)*
Technical school/other	1 *(2%)*
Employment Status	
Employed full-time/self-employed	36 *(67%)*
Employed part-time	5 *(9%)*
Retired	3 *(6%)*
Homemaker/Do not work	3 *(6%)*
Student	1 *(2%)*
Temporarily unemployed	3 *(6%)*
Disabled/Handicapped and not working	2 *(4%)*
Location	
Urban	21 *(40%)*
Suburban	24 *(45%)*
Rural	8 *(15%)*

Participants were asked to discuss various experiences related to aggressive driving, including describing aggressive behaviors witnessed on the road, situations that

encouraged participants to drive aggressively, what emotions were felt in aggressive driving situations, coping strategies, and road rage experiences. A comprehensive list of topic guide questions used in the focus groups can be found in Appendix B.

Limitations

This qualitative study has several limitations that should be noted. While focus groups recruited drivers from a range of different backgrounds, there were no participants over the age of 65, or with less than a high school degree. To the extent that drivers in these population groups have different attitudes towards aggressive driving, their views may not have been captured in the qualitative part of this study. Further, moderators from the focus groups were identified as AAAFTS staff. While participants were instructed that conversations would be confidential and could not influence insurance premiums, it is possible that this association may have influenced respondents' answers.

Analysis

Data were analyzed qualitatively, using a thematic analysis drawing on principles of the constant comparative method (Strauss, 1987). This involved identifying themes inductively and using initial analysis to shape further data collection. To preserve confidentiality, pseudonyms for participants' names are used when discussing the results of the focus groups below.

Results

Aggressive Driving and Road Rage Behaviors

Focus group discussions provided valuable insight into behaviors that participants deemed aggressive. Figure 3 represents the most prevalent behaviors; the size of dots indicates the frequency with which behaviors came up in conversations.

Figure 3. Aggressive Driving Behaviors
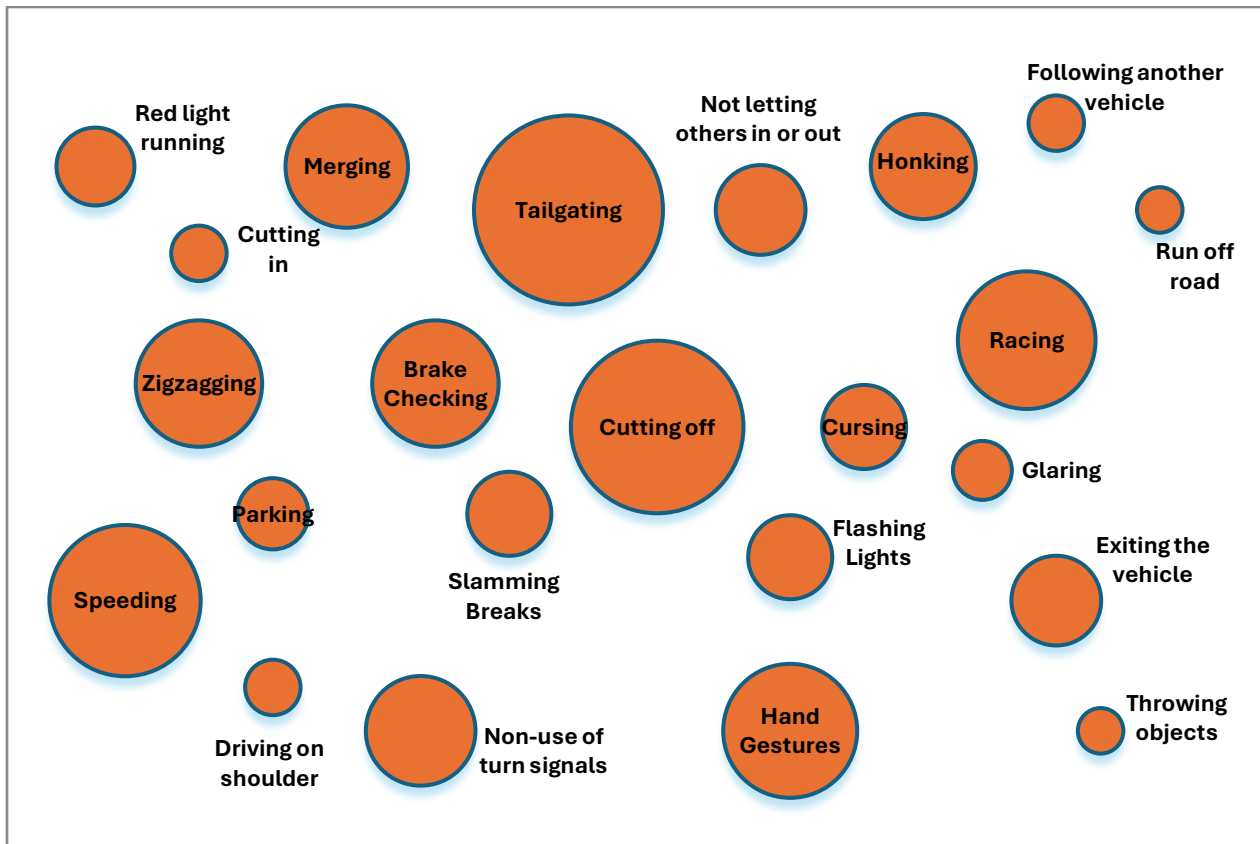
A closer examination of discussions around these behaviors revealed many common characteristics of aggressive driving behaviors, categorized into themes (Strauss, 1987) in the following sections. Themes included ***putting others at risk***, ***getting ahead***, ***stealing space***, ***controlling other driver behavior***, ***expressions of displeasure***, ***provoking reactions***, and ***violence***. Individual behaviors, such as tailgating, often contributed to multiple themes. The following sections describe the identified themes in more detail, supported by quotations from focus group participants.

Identified Themes

Putting Others at Risk. A key theme in driver's descriptions of aggressive behaviors was ***putting others at risk***. Behaviors were often perceived as aggressive because of their potential to cause crashes and injury. Creating risk came up specifically in descriptions of cutting drivers off and "slamming on brakes."

> *Phil (53, rural): "But when I have somebody cutting me off and short stopping me thinking like, 'Oh you can stop as fast as I am' and if [I] have to lay on*

those brakes... then I lose my mind. That's when I lose my mind because there's a potential for a major accident."

Behaviors that involved visual cues, or lack thereof, like flashing high beams or failing to use a turn signal, were also described as aggressive because of their capacity to create road danger.

Michael (42, urban): "When someone like beams their brights behind me, especially like if I'm on like a highway that is not well lit, I hate it and it's dangerous for me because I have [a vision] issue."

Joe (32, urban): "[Aggressive driving is] any vehicle with no signal [that] cuts into my lane. That brings me to freak out. I'm almost going to hit them ... And I also confess, I also do that... late signal when I already cut into somebody's lane. But I don't like that."

While acknowledging the dangerousness of aggressive behaviors, like Joe, many drivers admitted to engaging in aggressive behaviors themselves. Interestingly, drivers often described behaviors as inexcusable when performed by the driver of another vehicle but acceptable when done by themselves, a term often called "cognitive dissonance" in psychology literature. Jake (47, rural) provides an example:

"Yeah, the last brake check I was the perpetrator. I was the one doing it. Just last week, somebody was right on my bumper, way too close. I didn't slam on the brakes, but I pumped him a few times to say 'Hey, give me a few car lengths here.' And it didn't help."

In Jake's story of brake checking, he was justified in engaging in an aggressive act in reaction to another behavior, tailgating, which he goes on to describe as "dangerous."

A key influence on whether behaviors were perceived as aggressive was the context in which they occur. The presence of other drivers and vehicles in particular situation could influence perceptions of whether behaviors put others at risk, turning a usually "safe" driving behavior into an aggressive one.

Vikram (37, suburban): "[It feels aggressive] when people clearly could keep going through the yellow light but decide to like slam on their brakes and stop and then I just slam on my brakes."

In this driving scenario, a driving behavior typically considered safe (stopping at a yellow light) becomes aggressive when it affects others in the driving environment and increases the perception of risk.

Getting Ahead. Many of the behaviors participants deemed aggressive involved trying to get ahead of other vehicles on the road or going faster than they "should."

Weaving in and out of traffic lanes, also called "zigzagging" by participants, was described as a particularly aggressive behavior.

> Rodrigo (57, suburban): "I think [aggressive driving is] weaving in and out of lanes when trying to get around people or you're going, there's only one speed, there's traffic, [where are they] gonna go?"

As Rodrigo's comment suggests, participants felt these types of behaviors were particularly aggressive when they perceived them as futile, when there was traffic or road infrastructure that threw up barriers to successfully getting ahead of other traffic.

> Phil (53, rural): "Anytime a light is green, they have to put the gas as far down as it will go…. they're constantly weaving in and out of traffic to get to the next red light first."

Other behaviors participants discussed in the *getting ahead* theme included running red lights, other drivers cutting in, and driving on the shoulder in order to pass.

Speed itself was not necessarily considered aggressive by respondents. Speed significantly higher than posted speed limits on freeways, particularly in free-flow traffic was condoned by many respondents and generally not interpreted as aggressive. However, speeding was considered aggressive when respondents deemed it was too fast for the conditions, which could include road type, weather, or presence of other traffic.

> Frank (56, urban): "Aggressive is driving fast on like residential streets. You know, I have a residential street goes literally right through our town, right at the end of our road, and it's 35 [MPH] and people are going like 50 [MPH], and I'm like, anyway, to me, that's aggressive. They're heading toward town and going way too fast."

Perceptions of what level of maneuvering and/or speed was acceptable in a given circumstance varied by respondent and local driving etiquette and culture (see section on Motivations for Aggressive Driving), but universally a violation of these unwritten expectations was considered aggressive by respondents.

"Stealing" Space. Another common theme of aggressive driving behavior involved encroaching on perceptions of appropriate space. Driving on the shoulder was perceived as aggressive not only because it was a way of getting ahead of other traffic but also because respondents viewed this behavior as a way of claiming space that drivers were not entitled to:

> Rodrigo (57, urban): "It's going around on the shoulder and it's just like, 'What are you doing?'"

Parking featured heavily in these discussions around space: for instance, taking up more than one parking space was considered aggressive, as was "stealing" someone's parking space. Throughout conversations, drivers recounted situations where they had staked a claim over road space while driving. When this claimed space was threatened by other drivers, this behavior was deemed aggressive. For instance, cutting in, was considered an aggressive behavior because the vehicle cutting in was stealing road space that another driver has already laid claim to. As Alexis (32, suburban) describes:

> *"You leave enough space between you and the car in front of you in case you need a break on ice or anything, and then another car merges in between that space... I'm just trying to be more of a cautious driver at that point and then they're stopping me from doing that."*

Here, not only does Alexis complain about stolen space but also highlights another key theme of aggressive driving behavior: control of other driver behavior.

Controlling Other Driver Behavior. Participants deemed behaviors aggressive that they perceived were trying to alter their own behavior on the road, or as Alexis (32, suburban) says, preventing them from driving the way they want to. Often participants described behaviors that they perceived were designed to get them to move out of the way, such as tailgating and flashing lights.

> *Nicole (47, suburban): "[It's aggressive because], I feel like they're trying to run the show. And so, I'm like, OK, I'm already going. I'm not going to go any faster... So, for me it's like they're trying to drive the narrative. They're trying to control me from their vehicle. So, that's what ticks me off about them when they're tailgating me, because I feel like they're trying to control what I'm doing in my own vehicle."*

> *Cody (23, urban): "It's the fact that they're trying to do things from their car that affect the way you're driving."*

This theme resonated in descriptions around many other aggressive driving behaviors including those that revolved around regulating other drivers' speed such as brake-checking and slowing down on purpose when it was clear another driver wanted you to speed up, and dominating road space such as blocking lane changing, preventing other drivers from passing, and cutting off other vehicles.

Often drivers perceived controlling behavior as unjust critiques of their driving, contributing to the perceptions of aggression.

> *Ruby (33, rural): "To me is like riding my tail or just on me ... Especially if I think they're like, you don't deserve this lead. Like, why are you doing all this? Like, I'm driving perfectly, like you—whatever."*

Jennifer (58, suburban): "Yeah, that they're criticizing you. It can make you feel like that."

Expressions of Displeasure. Another theme of aggressive driving behavior involved expressing disapproval of another driver's actions on the road. Expressions took both auditory forms such as honking, yelling, or cursing, and visual forms such as glaring or angry gestures. These expressions were often described as a reaction to what drivers deemed other aggressive behaviors, but were also in and of themselves interpreted as aggressive acts.

Lucy (28, suburban): "[It's aggressive] when people like blare their horn at other people. Like it's one thing to just like honk it real quick, but like full on blasting for like 10 seconds, I think can be a bit obnoxious."

Sometimes these expressions were cathartic, a way for drivers to release frustration before returning to their journey. As Jennifer (58, suburban) describes:

"Sometimes if you're having like aggressive feelings or feeling angry or it'll release those feelings."

But other times these expressions could be an invitation to interact with other drivers, as Nora (60, suburban) puts it:

"Somebody hanging out their window and screaming at you, it's almost like they want to pick a fight with you."

Provoking Reactions. Nora's comment leads into another theme of behaviors respondents considered aggressive: those that provoked unwanted roadway interactions. These were behaviors that respondents perceived as attempting to start an unspoken conversation or dialogue with another driver through vehicle movements or body language.

Luke (55, urban): "Sometimes they look at in front of you and then they start tapping on the brakes. They start tapping on the brakes and they're in front of you and it's almost like daring you to hit them."

Brake-checking was often mentioned as a behavior that respondents perceived other drivers used to "start a conversation." Other behaviors were racing, following a car, glaring, or angry gestures.

These attempts to provoke a reaction from respondents were often unrequited. Participants outlined many strategies they used to avoid conflict on the road such as slowing down, pulling over, and avoiding eye contact—even after committing some behaviors they know other drivers will interpret as aggressive acts.

Alexis (32, suburban): "I won't make eye contact if I cut someone off and if I curse at them, I won't again, make eye contact. But I say it to myself so there in my car can hear, but other than that I don't try to interact with the other car."

The central motivation for avoiding interaction when provoked was a fear that aggression would escalate into violence, leading to the final theme.

Violence. Respondents largely believed violent behavior was the extreme end of the aggressive driving scale. As Jeff (37, urban) notes:

"It's the same continuum. It's like if someone cuts you off you're gonna catch their attitude and it's like one problem is gonna become another problem."

Violence was often described as an "overreaction" to or "escalation" of aggressive driving. Violent behaviors that came up in focus group discussions included following other vehicles with the intention of confronting the driver, running vehicles off the road, physically threatening other drivers, and throwing objects at vehicles. Many of these behaviors represented what participants thought of as "road rage," however the term road rage was also used to describe driving while angry (see section on Emotions below).

Emotions

Focus group participants discussed a wide array of emotions in their experiences of driving including annoyance, anger, anxiety, and fear or feeling scared (Figure 4). These emotions, plus less frequently mentioned emotions like frustration or irritation, chaos, nervousness, and stress, were felt largely in reaction to other drivers' behavior.

Figure 4. Emotions Word Cloud

Anger was a universal emotion felt by drivers. *Every focus group participant had stories of feeling angry behind the wheel.* Descriptions of anger were personal and took on the tone of airing out grievances.

> *Amber (28, urban): "[I feel] anger because it pisses me off. Don't get too close to my car. Sometimes I have my baby in the car... don't you dare hit my vehicle."*

> *Natalie (37, urban): "I mean, I think in general, you get angry and you obviously say not nice things under your breath."*

Interestingly, many participants deemed the emotion of driving while angry as "road rage." For these participants, road rage was a feeling but not something you would necessarily act on. For instance, Alexis (32, suburban) confesses:

> *"I have a little bit of road rage, but I'm also scared to take it to the extreme."*

Similarly, Rosa (38, urban) feels what she describes as "road rage," but is able to control her behavior:

> *"You know I do have road rage. Like I do. Because there's people that oh my God, like for reals, I'm like, who gave them a driver license? I'm like, who did that for reals? But yeah. But I try to control myself."*

Anxiety was a palpable emotion throughout the focus group discussions. Anxiety, or "feeling anxious," was almost always related to a lack of control behind the wheel.

Vikram (37, suburban): "For me, it like induces a lot of anxiety, I guess, when someone comes up real close to me and flashes their headlights. And like the whole thing is, you know, like you want to be at peace throughout the day and it kind of ruins that for me."

Irritation was reported throughout focus group discussions. Participants expressed feeling irritated, annoyed, and frustrated when reflecting on aggressive driving experiences. These emotions were used interchangeably, though there are small nuances to take into consideration. Irritation and annoyance were felt when discussing behaviors participants identified as aggressive.

Jasmine (23, urban): "Something that annoys me would be when someone cuts me off and then they start going super slow for no reason."

Frustration, however, was commonly used to describe situational factors, like traffic or running late.

Rosa (38, urban): "I can't lose my time. People cannot make me lose time. And whenever there's an accident on the freeway or something happens, I do get really frustrated."

Fear and feeling scared were discussed when participants felt unaware of what other drivers may do. These emotions were oftentimes connected to the perception of being in an unsafe situation. There were concerns for the safety of participants' children, bodily harm, and being involved in a motor vehicle crash because of the unpredictability of other drivers.

Simone (37, suburban): "It's scary just because you never know on the highway, it's so unpredictable."

Participants also often recounted many **positive emotions** related to driving experiences, in particular the thrill and the fun of driving. Sometimes these were related to driving dangerously or aggressively.

Steve (53, suburban): "Honestly, occasionally I get—sorry for the bad choice of word, but intoxicated, when I see just open highway, all three lanes, no one there in front of me. I'm sure my foot goes down a little harder than usual."

Charles (28, rural): "I've raced with my friends on highways a lot... for a few yards just [to see] who can get to 100 [MPH] first... Yeah, it's kind of fun..."

Other times, however, participants enjoyed positive interactions with other drivers. As Aria (32, suburban) states:

"I do get a sense of satisfaction some days when I'm like, I let everybody in who's trying to get over. You're trying to merge, come on over. You got, you need to get over in traffic, come on over."

Acceptability of Aggressive Driving

As part of the recruitment strategy, this study only interviewed participants who at least occasionally engaged in aggressive driving, so it is not surprising that all participants spoke openly about engaging in aggressive driving behaviors. Discussions indicated that aggressive driving was not exactly acceptable, but it was not always unacceptable either. Drivers felt like occasionally engaging in aggressive behaviors were a part of safe driving but drew a line between aggressive and reckless driving.

Javier (47, suburban): "I feel that there are times where I have to be somewhat aggressive just because of being cautious of those other drivers around me. But there is a difference between being aggressive and being an ass."

Amber (28, urban): "But I think there's a difference to be said about that because if there's an aggressive driver who's trying to maneuver a little bit, that's one thing. But if somebody's reckless or they seem are all over the place, I definitely hang back. I get another lane. I don't want to be around you at all. Driving is too dangerous."

Motivations for Aggressive Driving

Participants were explicit on some of their motivations for driving aggressively, and similar to behavioral themes, motivations for aggressive driving were not mutually exclusive—participants reported multiple concurrent motivations for driving aggressively.

A common motivation for driving aggressively was to get to a driver's destination more quickly. Lola (31, suburban) describes this as a sense of urgency:

"I feel like I tend to feel a sense of urgency pushing me when I'm driving aggressively. I can recall times where I'm like driving just like a far distance, and I just want the drive to get done. So I'd like you feel that foot get heavy because you're like, ugh, just need to get there to my destination."

Commutes to work came up often in discussions getting places more quickly, where timeliness was particularly important to professional identities. Luke (55, urban) described frustrations of trying to get to work on time.

"I'm definitely the most aggressive when I'm trying to get to work on time every day. I'm always like afraid I'm going to be late and stuff like that. Then traffic is really, really bad. That's why I'm definitely the most aggressive. I'm trying to get to work because I want to be there on time... I don't want to have a string of being late. That's unprofessional... I've done some crazy things to try to get to work on time. Driving the side of the road if I have to."

As Luke flags, the unpredictability of traffic played a large role in motivations for aggressive driving (for a fuller discussion, see Situational Factors section below). In addition to traffic, the unpredictability of the driving environment more generally was important in motivating aggressive driving behavior. For some participants, driving aggressively was a way of claiming control in a precarious driving environment that could, at times, be chaotic or scary.

Amber (28, urban): "I think that when you're driving there's a kind of automatic anxiety of you are moving with the anticipation of what other people are going to do because you want to be safe. But I think that when you're aggressive and when you feel confident in the moves that you're making, I think having some control over what you're doing and getting from point A to point B might be one of the things."

Claiming control over the driving environment by driving aggressively was closely related to another key motivation: perceived threats to safety. As Amber described above, drivers reported cautiously engaging in aggressive driving behaviors to avoid anticipated road danger.

Ajay (26, suburban) gives another example:

"Like you also have to drive aggressively to get out of dangerous situations in my opinion. If I see a truck next to me, I will go up to 90 miles an hour if I need to get out of that way."

Indeed, respondents noted that driving aggressively sometimes felt like careful, vigilant driving. Considering one time when she drove aggressively, Miley (23, suburban) observed she felt like she was "really driving and way more alert." These associations between aggressive driving, control, and safety were reflected in ways respondents characterized aggressive drivers: as alert, "in control," and more competent.

Ajay (26, suburban) expressed: "They're more competent as drivers, because if you're aggressive, that means you're maneuvering around the road properly. You're not just being mindless about it. In order to be aggressive, you have to pay attention to the road."

Some respondents used this characterization as an explicit motivation to display competent driving styles to themselves, others in the vehicle, or other drivers on the road. Reflecting back to a time when he often drove aggressively, James (52, urban) told us:

> *"I was flying down those highways and changing lanes and had friends in the car from high school and whatever. I don't know, I just think back, I felt like I guess I was a badass and I knew what was going on and these other people were like dumb and just behind."*

While respondents did largely see aggressive driving as behaviors that required high levels of alertness and skill, generally perceptions of aggressive drivers were not positive. Most respondents described aggressive drivers as selfish, dangerous, and disrespectful.

Respect and courtesy came up often in discussions, and respondents were explicit on the importance of driving etiquette: Displaying good manners was a way of signaling to other drivers that you are a safe driver. Conversely, respondents reported feelings of frustration and aggression when they encountered bad manners on the road (see section on Emotions).

> *Adriana (30, suburban): "No, I 100% agree. Actually like, [lack of etiquette is] sometimes what caused my aggression. It's like when there's, I don't know, you let someone in and there's like no sort of like thanks or even like the merging where people don't follow like a basic like merging structure. Like it's not that hard. So yes, definitely. I feel like there's a need for etiquette."*

Behaviors that respondents described as bad manners (like a failure to use turn signals or a thank you wave) were not necessarily deemed aggressive, but respondents sometimes reported correcting bad manners using aggressive acts. In this way, educating other drivers was also mentioned as a motivation for aggressive driving.

> *Frank (56, urban): "Like you're really trying to educate them. Hey, you know, you're going to too fast. And I hear myself saying that hey, man. You're really going—I'm not yelling at them. I mean, I'm not—But I'm like, I'm really trying."*

Like bad manners, drivers also reported engaging in aggressive behaviors to educate other drivers about breaking traffic laws.

> *Joe (32, urban): "One time on the four-way stop...one person tried to turn left and he stopped, like, not even near the sign, not even near the intersection. He just want to go first to turn left and now I'm behind him and driving*

straight, and I go around him, I cut him off and give him middle finger and I drive off.”

As is clear in Joe's story, sometimes motivations for aggressive driving were also about retaliation. Participants were motivated to engage in aggressive behavior as a response to another driver's actions—either breaking the rules of the road or being on the receiving end of an aggressive act.

Vanessa (27, urban) describes the urge as instinctual:

“You want to react the same way, and I have to be honest that sometimes I am the one that has honked obnoxiously or cut someone off. I've done it before. And yes when it's done to you it makes you want to react right back.”

Beyond instinct, respondents also discussed being motivated to “punish” other drivers for their aggressive actions, as Carmen (36, urban) described giving other drivers a taste of their own medicine:

“I did stalk somebody one time, that's so embarrassing. But it's because they were very rude to me … the person kept honking and then they speed around me. So then stupid that I was, …I started driving after them just to like intimidate them… and I stalked them for about like two or three miles, like very aggressively. Then I just went on my own way. I just wanted to scare them, to be sincere. I just wanted to be like, take a taste of your own medicine type of situation.”

In their stories of doling out punishment, drivers were reflective that these actions were not a good idea (indeed, Carmen describes her actions as “stupid”). Charles (28, rural) recounts a time he engaged in retaliatory brake checking, noting the dangers associated with this type of aggressive behavior:

“I think break checking is like being petty. You can't physically attack this person, but you're like I can just put them off. And I think it's extremely dangerous because at that point it's like utter stupidity because you completely disregard every other road user and you could cause something really fatal or serious, but you just want to have that pettiness of payback.”

Behind Carmen's (36, urban) and Charles's (28, rural) stories of retaliation are feelings of anger and frustration. Feeling angry and frustrated while driving was a universal experience and was named as “road rage” by many respondents (see section on Emotions).

Participants reported many coping strategies to deal with their anger on the road including focusing on breathing, calling a family member or friend, repeating a personal mantra, or listening to music, or even riding in silence. Participants perceived that they

were generally able to cope with feelings of driving anger unless "triggered," which could lead to more violent behaviors, including those that have been traditionally considered road rage, like following, stepping outside the vehicle, or even forcing cars off the road. These behaviors were often described as "over-reactions" by participants. Importantly, respondents perceived the trigger to over-react to a situation is different for everyone.

> Rodrigo (57, suburban): "I think when you're aggressive by nature access like a fuse that's ready to be lit by the smallest little altercation that you got your blinker on and you see people blink on and don't make the move. It triggers someone instead get so frustrated and go by and then the road rage starts. And a lot can happen for that."

> Nicole (47, suburban): "There's definitely been times where... you're tailgating me, tailgating me. You fly around. Oh, you're going the same direction as me. OK, now I'm going to follow you to see where you're going. Oh, you're going to pull up to the 7-Eleven. I'm going to pull up beside you and see what were you in a hurry for? Just so I can give you the look and keep it moving. So, things like that, that I should be able to just let it go, but there are days, like [name] said. You have those days where it's just like, whatever, it's whatever. I have those days too."

Other drivers cannot predict what triggers will be, and therefore fear of road rage was a key motivator for drivers to de-escalate potential conflict on the road. In particular, drivers were fearful of gun violence and spoke often about the uncertainty of whether fellow drivers were carrying.

> Miranda (55, suburban): "I think it's just the fear of some[one having a gun]. If you engage in that rhetoric of them being mad, then what's gonna happen? Are you gonna end your life because they don't like you and they have a gun or whatever. It's just a lot of stuff that's going through your mind when this happens and it's just you try to make better choices with it, but sometimes it's hard."

> Jennifer (58, suburban): "You never know how somebody else, what's their frame of mind. It could be really dangerous to be aggressive with a driver you don't know their frame of mind. They could have a gun, they could anything."

Interestingly, drivers also did not always know their own triggers to incite violence. Nicole (47, suburban), above, discussed having "those days" where it is harder to let feelings go. Conversely, Miley (23, suburban)—who admitted to verbally threatening multiple other drivers throughout the discussion—considered a time when she did not give into violent thoughts:

"A time where I should have threatened someone was the other day when someone took my parking spot, but I was already really happy because I got food. But she did it on purpose. She was perfect on timing, and it really made me mad, but I was just happy. So, I just shook it off."

Two additional interrelated motivations for aggressive driving and road rage came up in focus group discussions: local culture and habit. Participants reflected that they were motivated to drive more aggressively in areas where other drivers drove aggressively.

James (52, urban): "I don't know if it's necessarily for me that I need to drive more aggressively. I think I just naturally drive in the way the neighborhood drives. You know, I live in [area of a major city] and people are fairly aggressive. And I noticed like on the [area], it's very aggressive. But then when you get into like beach communities and stuff like that, it's just more chill. That's just what I find."

Danny (23, urban): "Aggressive driving is most the norm in my city, so if you drive, if you actually drive normal, you're supposed to be driving, you're like the outsider. So it's like if you actually follow the law, follow the speed limit or whatever, people get mad at you for doing that."

Other participants indicated that aggressive driving was how they were taught to drive (by family or by driving instructors), and that this style has become a habit over time, particularly in areas with local cultures that include a lot of aggressive driving.

Madison (37, urban): "I think I've learned mine from my father which is, he has pretty aggressive driving skills, and I had to travel with him over the weekend and it reminded me what his aggressive driving skills were, so I definitely think a lot of the, I don't want to say rage, because it hasn't escalated to rage but a lot of the aggression with driving, I think it's because that's how my dad drove when I was a kid, and even still now."

A final motivation for aggressive driving recounted by participants was related to feelings of fun and pleasure (see section on Emotions).

Joanna (39, urban): "I would say my pleasure, [driving aggressively] feels good definitely, one of those early summer mornings when it's hardly no traffic .., like when the birds start chirping and I'm close by the lake. I like those rides. I love driving for that reason."

Miley (23, suburban): "I like the thrill that it gives me sometimes, not to like make things seem evil, but like if someone thinks that they're going to be

more sassier than me, then I enjoy showing them how much I can get there.
Like, don't. I warn them, don't. I look over side eye."

Situational Factors

Focus group participants noted that they drove differently in distinct situations and that key factors such as the presence of others in their vehicles, weather conditions, road environment, and time of day could influence their motivations to drive aggressively.

The presence of other people in the vehicle largely influenced the way participants drove. When children were in the vehicle, participants overwhelmingly reported driving less aggressively and with more caution.

Vanessa (27, urban), a mother, remarked on her willingness to take more risks when she is not driving with her children.

"When I have my kids in the car, I do [drive differently]. There are certain
things that I would probably do when they're not in a car that I wouldn't do
when they are, like making certain turns. Doing things that I'm not supposed
to do that won't hurt anybody else but probably get me pulled over. But when
I'm with the kids I won't do that."

Javier (47, suburban), a father, reflected on restraining from confrontation with other drivers:

"These guys want to start messing with me on the road when I'm with my
kid? Maybe I would've reacted differently if I was not with my child."

Participants' parents influenced the way they drove, too, with many drivers indicating that they drove slower with their mom or dad in the vehicle. Frank (56, urban) avoided confrontation because he was driving with his mother:

"I've had my dear mother with me occasionally and the [other driver] is
[close to] my bumper and I'm thinking to myself, 'I should stop the car and
get out and tell the lady, stop driving so close,' but I don't because my mother
is with me."

Friends and significant others also influence driving behavior. Michael (42, urban) recalled a time he was driving with a friend he deemed aggressive behind the wheel:

"I have a friend, she's a very aggressive driver. She's a weaver. She's always
like, 'Get in the other lane.' So I probably drive a little faster when she's in the
car just because otherwise she's going to comment about it."

Lola (31, suburban), however, had a different response when she had passengers in her vehicle:

"I just feel like in general, whenever there's another person in the car, I just taper my like, I don't drive crazy, but I fudge it a bit. So I try to follow the rules when people are with me just to make them feel safe and secure and just comfortable."

Weather conditions impacted the how focus group participants reported driving and how they perceived other drivers. When asked about the weather, almost all participants reflected on driving in inclement weather, like rainy or icy conditions. Many reported driving less aggressively or more defensively in these conditions and particularly remarked on traveling at slower speeds.

Lucy (28, suburban): "I am the opposite of aggressive when it comes to bad weather."

While many drivers described their own strategies for coping with bad weather, such as calling a rideshare service, leaving more time for daily commutes, and pulling over to wait out bad weather, drivers were very critical of how others drove in these situations. Participants noted that other drivers "lose their mind" (Frank, 56, urban), "are just not performing" (Ajay, 26, suburban), and "go into a different mode and it is just crazy... they go crazy" (Rodrigo, 57, suburban).

Interestingly, Kayla (31, suburban) spoke about how good weather might affect someone's driving.

"And sometimes when it's nicer out, you drive a little fast... If it's not raining or the sun is shining, you might feel happier. You might go a little faster."

According to participants, certain driving expectations map on to various **road types** like freeways, local streets or highways, and back roads. While these observations do not hold true in all scenarios, a couple of patterns emerged.

First, there is an expectation of being able to drive fast on freeways, especially in the left fast lane. Aria (32, suburban) reflected on her experience that there is "always somebody holding up that left fast lane," while Phil (53, rural) had a piece of advice for slow drivers: "Go on and get out of the way if they're holding people up."

Other drivers remarked on their expectation to exceed the speed limit on freeways, especially when there are fewer cars on the road.

Tim (19, urban): "For me it'd be when I'm alone [on] the highway and it's really late at night, and I kind of have fun with it. You know, that's where I decided to be a little aggressive with my car."

Participants shifted their expectations on local streets. While people acknowledged seeing aggressive behaviors occurring on these types of roads, they themselves drove with more caution, sometimes questioning the behaviors of others.

Adriana (30, suburban): "I see it on all local streets. It happens everywhere."

Lola (31, suburban): "I feel like I try to be more cautious whenever I'm on the streets. Whenever people are proximity from me to the people, I just try to just be patient."

Certain road design features came up in discussions where mismatches between road design and different road user needs and expectations added to tensions on the road. Carmen (36, urban) flags one conflict between the needs of tourists and locals:

"I live in a very high touristy area. There's loads of bridges that I cross on the regular basis ... people actually stop their cars on those bridges, get out and take selfies. While the rest of us has to wait. That is, I'm not going to lie, I honked, and I did the move because that's just not right. Like, you cannot do that. This happens, I see it at least two or three times a year where people actually legit-ly park the cars on the top of a bridge to take a picture. You know, and that's nuts."

Road designs featuring merging was another source of tensions. Drivers had different expectations around merging etiquette, which could lead to feelings of frustration and even aggression if expectations were not met—in particular, when drivers would wait until the last moment to merge.

Carlos (39, suburban) complained "A lot of people like to just nose their way into traffic or just bulldoze themselves into your lane" and was met with unanimous agreement. However, later, in the same focus group Natalie (37, urban) shared:

"I think also when you're merging, I feel like you have to be aggressive because people don't want to let you go through."

Her sentiment was also met with unanimous agreement, underscoring that while merging is a familiar road design feature, it can contribute to situations where aggressive driving behavior is more common,

Traffic conditions at different times during the day proved to be a major situational factor that influenced aggressive driving. A few drivers noted different approaches to driving late at night. More commonly, drivers mentioned rush hour and traffic congestion, often reporting more aggressive driving during these times or just before in order to "beat" the traffic. Eve (23, rural) noted that evening rush hour, in particular, tended to make her drive more aggressively:

"I'm trying to hurry up and get home because I know at a certain time it's rush hour traffic, so usually I feel like that's when I drive more aggressive."

Carmen (36, urban) hypothesized about contributing circumstances that may influence aggressive behaviors in the evenings:

"Everybody's already tired, frustrated, hungry, and has to go to the bathroom."

Vehicle Factors

Vehicle factors played a substantial role in drivers' perceptions of aggression. Drivers easily stereotyped vehicles that they considered more aggressive including trucks, motorcycles, and luxury and sports cars. Size was an important factor in perceptions of aggression—the "bigness" of trucks contributed to perceptions of aggression as did the "smallness" of motorcycles.

Kwame (25, suburban): "I've noticed the bigger trucks... the really big ones... when they want to get in the lane they will try to intimidate you to get in that lane."

Aria (32, suburban): "I guess [motorcycles] dodging in and out of the vehicles on the interstate just because they're small enough too."

Noise was another important vehicle element with louder engines associated with more aggression. Other vehicle elements participants highlighted included tinted windows, missing or paper license plates, and "tricked out" features.

Interestingly, associations between vehicle characteristics and aggression could lead to judgments of other drivers' personality characteristics. In particular, participants associated driving a more aggressive vehicle with a sense of entitlement. Vanessa (27, urban) noted:

"I realized when people feel like their car looks and is expensive, that they can do whatever they like. They have the way of the road sometimes."

Ruby (33, rural) described a similar association:

"I'm in the country, so a lot of guys have like these super, super trucks and I'm like, again, no need to be all that aggressive. It just seems unnecessary, but they like to own the road and prove that they own the road."

Crucially, these interpretations of vehicle aggressiveness and driver personalities could influence reactions on the road, and lead to aggressive behavior. For example, Mila

(55, urban) recounted her first encounter with a particular luxury car brand and how it led her to speed up to prevent another driver from changing lanes:

> *"The first time I was next to a [luxury car], he was trying to jump in front of me and I'm like, "No, you're not."... I can't stand a lot of [luxury car] drivers because they just show out too much. They do too much."*

In stories of engaging in aggressive driving, participants occasionally mentioned vehicle elements. Keisha (43, urban) attributes her "fast" driving style to her sports car, and the way vehicle elements could influence the way you feel was a crucial part of Carmen's (36, urban) story about following another vehicle:

> *"I started driving after them just to like intimidate them. At that point, I was in a truck... I just felt like the big boss, I guess, and they were in a tiny little car."*

Vehicles also came up in discussions around motivations to drive safely and motivations to de-escalate potential conflict on the road. Eve (23, rural) noted:

> *"Well, me personally, I don't never feel like I want to react to them or like do what they did to me. I'm not that type because you're not about to mess my car up."*

Liam (50, urban) echoed a similar sentiment:

> *"I [drive] even more defensive... It's just, I've had an accident maybe 10 years ago and I remember even though it was a fender bender on them, to me just going through the insurance and about two, three months before the car got fixed and all that ... it just wasn't a great experience going through the whole process with the insurance. So then why even get an accident? It's just to me too much of a headache."*

Cars were precious, not only because of the expense and hassle of getting them fixed but also because participants saw them as "safe" spaces, where they felt protected from the outside world:

> *Eve (23, rural): "I'm like, the least confrontational person, but I'm like, I'm in my car, I'm safe. So like, what are you going to do to me? So that's sometimes where I can see myself being more the aggressor. Then after a while, I just usually give up because I don't want to like get a ticket or crash or lose control. It's just like not worth it at the end of the day."*

The focus group discussions and subsequent qualitative analysis in Part 2 of this study were useful in gathering a range of opinions around which behaviors constitute aggressive driving and road rage, emotions, motivations, common causes, and triggers.

Qualitative data, however, cannot reveal how widespread certain attitudes and behaviors are among the American public. The next stage of this study takes a quantitative approach to measure the prevalence of attitudes and behaviors though a National Survey, using the qualitative results to inform the questionnaire design.

Part 3: National Survey

Questionnaire Development

To measure the prevalence of, attitudes towards, and correlates of aggressive driving, road rage, and associated behaviors, this study developed a fit-for-purpose questionnaire using previous measures where appropriate and devising new measures when necessary. This bespoke questionnaire was developed using knowledge gained through the comprehensive literature review, expert panel discussion, gaps identified in the modified SEM framework for aggressive driving, qualitative findings from the focus groups, and already existing questionnaires pertaining to aggressive driving.

Findings from the literature review, expert panel discussions, and qualitative analysis were used to devise a list of aggressive behaviors drivers may have experienced and/or engaged in. Next, the gaps identified in the SEM framework and qualitative analysis results were used to develop key topic areas for the questionnaire, including emotions, motivations, vehicle factors, and culture, among others. Existing questionnaires were then assessed to determine the feasibility of implementation of specific items on desired topics in the current study. Those questionnaires include but are not limited to the following:

- The Aggressive Driving Behavior Scale (Houston & Harris, 2003)
- Dula Dangerous Driving Index (Dula & Ballard, 2003)
- Driving Anger Scale–Short Form (Deffenbacher et al., 1994)
- Manchester Driver Behaviour Questionnaire (Beanland et al., 2014; Reason et al., 1990)
- Driving Behavior Survey (Clapp et al., 2011)
- The Prosocial and Aggressive Driving Inventory (Harris et al., 2014)
- The AAAFTS TSCI (AAAFTS, 2024)

In instances where appropriate questions could not be sourced from a previous questionnaire, this study used qualitative results to draft additional questions. Best practices were used in drafting response options for survey items, including recent guidance calling for the need to include "Never" response option for behavioral frequency questions (Stephens et al., 2025).

After the initial development of this survey, a small number of cognitive interviews were deployed. Cognitive interviewing is a method for evaluating survey

questions to determine whether the intended meaning of the question is adequately conveyed to respondents, and more generally whether questions function as designed. Through in-depth interviews, respondents are first asked to answer survey questions and are then asked to describe how and why they answered the way they did to ensure that the questionnaire items were interpreted appropriately. The draft survey was amended based on the feedback received from these interviews.

The newly developed questionnaire was further reviewed by Social Science Research Solutions (SSRS), the market research company engaged to administer the survey for clarity and consistency. Finally, the survey was translated into Spanish and reviewed for comprehension and readability. The English version of the questionnaire is available in Appendix C.

Methodology

The sample for this study came from SSRS's Opinion Panel, a probability-based panel designed to be nationally representative of U.S. households. The Opinion Panel uses standard probability-based random digit dial and address-based sampling methods to recruit panel members. The sampling frame includes all U.S. households reachable by telephone or regular mail regardless of telephone or internet access or use. The sample design for this study targeted U.S. drivers aged 16 and older. To recruit drivers aged 18 and over, a sample of SSRS Opinion Panelists ages 18 or older were invited to participate in the survey and screened to determine if they had driven in the past 30 days. Respondents who had not driven in the past 30 days or refused to answer that question were asked to not continue with the survey.

Drivers aged 16- and 17-years old were targeted through their parents in a separate "teen" sample of SSRS Opinion Panelists who have teenage children. If these respondents indicated they were in fact the parent of a teen driver, their teen was then invited to participate in the study and screened to determine if they had driven in the past 30 days. The sample was stratified by age, gender, race and ethnicity, education, Census region, party identification, and preferred survey language to ensure adequate representation of each demographic group.

Invitations to participate were sent to 6,450 panelists aged 18 and older, with 2,933 qualified respondents completing the questionnaire. For the 16- to 17-year-old sample, invitations were sent to 1,357 parents on the Opinion Panel, and 835 qualified teens completed the questionnaire. A total of 3,020 drivers aged 16 and older completed the survey. The survey was administered in English and Spanish between May 7 and May 19, 2025. After collection, data underwent a rigorous cleaning and quality assurance process.

Weighting

The data were weighted to account for probability of selection for recruitment into the SSRS Opinion Panel, 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 the following:

- Gender
- Age
- Race/Hispanic ethnicity
- Education
- Home tenure
- Number of people aged 16 and older in the household
- Census region
- Population density
- Religious affiliation
- Internet frequency
- Political party identification
- Civic engagement

These characteristics were defined using data from the IPUMS CPS data set (Flood et al., 2024), Claritas Pop-Facts® Premier (Environics Analytics, n.d.), Pew Research Center's National Public Opinion Reference Survey (Pew Research Center, n.d.), and the September 2023 CPS Volunteering and Civic Life Supplement (U.S. Census Bureau, 2023).

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 3,020 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 4. Approximate Margin of Error (in Percentage Points) for Selected Percentages, at the 95% Confidence Level

Percentages Near	Approximate Margin of Error
90 or 10	± 1.2
80 or 20	± 1.6
70 or 30	± 1.9
60 or 40	± 2.0
50	± 2.0

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).

Statistical Analysis

The questionnaire collected information on respondent engagement in 25 aggressive driving and road rage behaviors in the past year. Behaviors were coded into eight themes identified in the qualitative work (Table 5). Themes were not mutually exclusive; behaviors could be categorized into multiple themes. A sensitivity analysis summarized dimensions of aggressive driving using an exploratory factor analysis (Appendix D). Sensitivity analysis results indicate four dimensions of aggressive driving, which largely map on the ***trying to get ahead***, ***controlling other driver behavior***, ***expressions of displeasure***, and **violence** themes from the qualitative work, providing some support for the thematic characterizations of behaviors used in this study.

Analyses explore the prevalence of engagement in aggressive driving and road rage behaviors (overall and by theme), motivations for aggressive driving, situational factors, emotions, and coping strategies.

Table 5. Coding of Self-reported Engagement of Behaviors by Themes

Theme	Behaviors
Putting others at risk	• Have you driven 15 miles per hour faster than the normal flow of traffic? • Have you tried to block another driver from changing lanes? • Have you prevented another vehicle from merging into traffic in front of you? • Have you cut off another vehicle on purpose? • Have you overtaken traffic by weaving in and out of lanes? • Have you driven very close to another vehicle to get that driver to speed up or move over? • Have you tapped your brakes on purpose when another car was following too closely? • Have you sped up on purpose to prevent another driver from passing you? • Have you sped up when the traffic light was changing from yellow to red? • Have you merged into traffic even when another driver tried to close the gap between cars? • Have you spontaneously "raced" other vehicles while driving?
Trying to get ahead	• Have you driven 15 miles per hour faster than the normal flow of traffic? • Have you overtaken traffic by weaving in and out of lanes? • Have you driven very close to another vehicle to get that driver to speed up or move over? • Have you sped up when the traffic light was changing from yellow to red? • Have you flashed your high beams at a slower vehicle so that it would get out of your way? • Have you passed other vehicles using the right (slow) lane? • Have you driven in the shoulder lane or median to get around traffic? • Have you merged into traffic even when another driver tried to close the gap between cars?
Stealing space	• Have you driven in the shoulder lane or median to get around traffic? • Have you intentionally parked in more than one parking space? • Have you merged into traffic even when another driver tried to close the gap between cars?
Controlling other driver behavior	• Have you tried to block another driver from changing lanes? • Have you prevented another vehicle from merging into traffic in front of you? • Have you cut off another vehicle on purpose? • Have you driven very close to another vehicle to get that driver to speed up or move over? • Have you tapped your brakes on purpose when another car was following too closely? • Have you flashed your high beams at a slower vehicle so that it would get out of your way? • Have you sped up on purpose to prevent another driver from passing you? • Have you slowed down on purpose when another driver clearly wanted you to speed up?
Expressions of displeasure	• Have you yelled at another driver? • Have you made an angry gesture (for example: middle finger) at another driver? • Have you glared at another driver in response to something they did on the road? • Have you honked your horn when another driver did something inappropriate (not to avoid an accident)?

Theme	Behaviors
Provoking reactions	• Have you tapped your brakes on purpose when another car was following too closely? • Have you spontaneously "raced" other vehicles while driving? • Have you slowed down on purpose when another driver clearly wanted you to speed up? • Have you yelled at another driver? • Have you made an angry gesture (for example: middle finger) at another driver? • Have you glared at another driver in response to something they did on the road? • Have you recorded another driver's behavior using a phone, dashcam, or other recording device in response to something they did on the road? • Have you followed another vehicle with the intention of confronting a driver (whether you actually confronted them or not)?
Violence	• Have you bumped another vehicle on purpose? • Have you forced another vehicle to drive off the road? • Have you followed another vehicle with the intention of confronting a driver (whether you actually confronted them or not)? • Have you gotten out of your vehicle to confront another driver?

To explore associations between aggressive driving and human, vehicle, and situational factors, respondents were categorized by their level of engagement in measured behaviors (both overall and by theme). Defining levels of engagement was not straightforward as themes contained various numbers of behaviors with differing distributions. This analysis defined high levels of engagement in a theme so that approximately one quarter of respondents were coded as having high levels of engagement. In practice, this meant definitions differed across themes, according to how many behaviors were included in a theme and the distribution of responses (Table 6). A sensitivity analysis explored a weighted approach to defining high levels of engagement. In this sensitivity analysis, frequency of engagement was weighted such that a never response received a weight of 0, just once received a weight of 1, rarely received a weight of 3, fairly often received a weight of 10, and regularly received a weight of 18. Weighted responses to behaviors questions were summed overall and across themes, and those in the highest quartile of weighted responses were considered to have high levels of engagement.

Table 6. Definitions of High Levels of Engagement

Theme	Definition of high level of engagement*	Weighted proportion of respondents
Overall	3 or more	25%
Putting others at risk	2 or more	22%
Trying to get ahead	2 or more	23%
Stealing space	1 or more	11%
Controlling other driver behavior	1 or more	26%
Expressions of displeasure	1 or more	30%
Provoking reactions	1 or more	37%
Violence	Reported any engagement in measured behaviors	11%

Reported number of engagements in measured behaviors fairly often or regularly in the past year.

To define the "culture" of aggressive driving in a respondent's local area, questions on witnessing or being on the receiving end of aggressive behaviors were analyzed (for a list of behaviors see Table 6). All behaviors were weighted in a similar way as the sensitivity analysis described above: a never response received a weight of 0, just once received a weight of 1, rarely received a weight of 3, fairly often received a weight of 10, and regularly received a weight of 18. Weighted responses to behaviors questions were summed and divided into quartiles of aggressive driving culture.

Bivariate associations between individual, vehicle, and situational factors and higher levels of engagement in aggressive driving overall and by theme were examined using chi-squared tests. Poisson regression models were used to quantify associations between individual, vehicle, and situational factors and higher levels of engagement, controlling for other factors using robust standard errors. Results are presented as prevalence rate ratios, which compare the prevalence of high engagement in aggressive driving across population groups.

Finally, further analyses examine responses to an open-ended question: What does the term "road rage" mean to you? Using Structural Topic Modeling (STM), responses to this question were analyzed to identify what drivers think "road rage" is. By applying STM and interpreting its output, this analysis uncovers the general topics, concepts, and associations that respondents tend to relate to road rage. Prior to analysis, all empty and Spanish responses were removed. For the remaining responses, the text was processed and cleaned by removing all stopwords (e.g., and, a, it, the) and punctuation. After this, an additional five responses were removed, due to there being no content after processing. This left a total of 2,877 responses. An STM model was run using eight topics and the covariates included in the model are income, education, region, and state of residence.

All analyses included in this report have been conducted using weighted data.

Results

Aggressive Driving and Road Rage Behaviors

Drivers were asked about their experiences witnessing and being on the receiving end of particular aggressive driving behaviors (Table 7), as a way of assessing aggressive driving "culture." Virtually all drivers reported seeing other drivers run red lights at least once in the past year (99%), with 46% of drivers witnessing the behavior regularly. Other commonly witnessed or experienced behaviors included other drivers weaving in and out of lanes (98%), being tailgated (92%), and getting passed in the right (slow) lane (91%). A smaller but still worryingly large proportion of drivers reported experiences of more violent "road rage" behaviors at least once in the past year: being bumped on purpose (7%), being run off the road (15%), or experiencing another driver get out of the vehicle for a confrontation (14%). More than half of drivers (53%) wondered whether another driver had a weapon in their vehicle in the past year.

Table 7. Frequency of Witnessing Other Drivers Commit Aggressive Driving and Road Rage Behaviors in the Past Year, United States, 2025

	Behavior	Regularly	Fairly Often	Rarely	Just Once	Never	At Least Once
		Row %, Weighted					
Aggressive Driving Behaviors	Has another driver driven very close to you to get you to speed up or move over?	22	38	28	5	8	92
	Has another driver yelled at you?	3	8	35	14	40	60
	Has another driver honked their horn at you for doing something inappropriate (not to avoid an accident)?	5	11	37	15	31	69
	Has another driver made an angry gesture (for example: middle finger) at you?	6	13	38	17	26	74
	Has another driver tried to block you from changing lanes?	9	21	35	7	28	72
	Has another driver cut you off on purpose?	10	23	35	10	22	78
	Has another driver glared at you in response to something you did on the road?	6	15	43	12	24	76
	Has another driver flashed their high beams at you so that you would get out of the way?	6	13	35	11	35	65
	Has another driver passed you using the right (slow) lane?	19	33	33	6	9	91
	Have you seen other drivers overtake traffic by weaving in and out of lanes?	39	43	13	2	2	98
	Has another driver tapped their brakes on purpose in front of you for following them too closely?	5	10	32	9	44	56
	Has another driver sped up on purpose to prevent you from passing them?	18	31	32	6	13	87
	Have you seen other drivers use the shoulder lane or median to get around traffic?	14	29	36	9	12	88
	Have you seen other drivers speed up when the traffic light was changing from yellow to red?	46	41	10	2	1	99
Road Rage Behaviors	Has another driver bumped your vehicle on purpose?	1	1	2	3	93	7
	Has another driver forced your vehicle off the road?	0	1	4	9	85	15
	Has another driver followed you because of something you did on the road?	0	1	6	14	79	21
	Has another driver gotten out of their vehicle to confront you?	0	1	3	9	86	14
	Have you wondered if another driver had a weapon in the vehicle?	10	15	21	8	47	53

Drivers were also asked about the frequency in which they themselves engaged in aggressive driving and road rage behaviors. The most prevalent aggressive behavior was red light running with over four-fifths of the driving population (82%) admitting to participating in this particular behavior at least once in the previous year. Of all behaviors surveyed, accelerating when the traffic light was changing from yellow to red was reported at the highest rate (6%) for those who reported doing this behavior "regularly." Other commonly self-reported aggressive behaviors include passing another vehicle in the right (slow) lane (68%), honking the horn when another driver did something inappropriate (not to avoid an accident) (66%), and glaring at another driver in response to something they did on the road (65%). Engagement in road rage behaviors were self-reported at much lower rates, though any engagement in these behaviors is worrisome. Following another vehicle with the intention of confronting a driver (whether they actually confronted them or not) at least once was the most prevalent road rage behavior (8%), followed by getting out of the vehicle to confront another driver (6%), forcing another vehicle to drive off the road (4%), and bumping another vehicle on purpose (3%). See Table 8.

Table 8. Self-reported Frequency of Aggressive Driving and Road Rage Behaviors in the Past Year, United States, 2025

	Behavior	Regularly	Fairly Often	Rarely	Just Once	Never	At Least Once
				Row %, Weighted			
Aggressive Driving Behaviors	Have you driven very close to another vehicle to get that driver to speed up or move over?	1	6	24	8	61	39
	Have you yelled at another driver?	1	7	21	10	61	39
	Have you honked your horn when another driver did something inappropriate (not to avoid an accident)?	3	12	37	14	34	66
	Have you made an angry gesture (for example: middle finger) at another driver?	2	5	19	12	63	37
	Have you tried to block another driver from changing lanes?	1	3	16	9	72	28
	Have you cut off another vehicle on purpose?	1	1	11	6	81	20
	Have you glared at another driver in response to something they did on the road?	5	15	34	11	35	65
	Have you flashed your high beams at a slower vehicle so that it would get out of your way?	1	3	14	7	74	26
	Have you passed other vehicles using the right (slow) lane?	4	15	40	9	32	68
	Have you recorded another driver's behavior using a phone, dashcam or other recording device in response to something they did on the road?	3	3	7	6	81	19
	Have you intentionally parked in more than one parking space?	1	2	7	3	87	13
	Have you driven 15 miles per hour faster than the normal flow of traffic?	4	12	34	7	42	58
	Have you prevented another vehicle from merging into traffic in front of you?	1	5	26	9	59	41
	Have you overtaken traffic by weaving in and out of lanes?	1	4	19	6	70	30
	Have you tapped your brakes on purpose when another car was following too closely?	2	7	23	11	58	42
	Have you sped up on purpose to prevent another driver from passing you?	1	6	24	11	58	42
	Have you driven in the shoulder lane or median to get around traffic?	1	2	10	6	82	18
	Have you sped up when the traffic light was changing from yellow to red?	6	21	46	9	18	82
	Have you merged into traffic even when another driver tried to close the gap between cars?	2	8	32	11	48	52
	Have you slowed down on purpose when another driver clearly wanted you to speed up?	2	7	26	10	56	45
	Have you spontaneously "raced" other vehicles while driving?	1	2	10	5	83	17

	Behavior	Regularly	Fairly Often	Rarely	Just Once	Never	At Least Once
					Row %, Weighted		
Road Rage Behaviors	Have you gotten out of your vehicle to confront another driver?	0	1	2	3	94	6
	Have you bumped another vehicle on purpose?	0	0	2	1	97	3
	Have you forced another vehicle to drive off the road?	0	1	2	1	97	4
	Have you followed another vehicle with the intention of confronting a driver (whether you actually confronted them or not)?	0	1	3	4	92	8

The first six aggressive driving behaviors and first two road rage behaviors in Table 8 (highlighted) are those that were asked during the 2016 AAAFTS aggressive driving study. Comparisons between 2016 and the current study should be made with caution due to differences in survey methodology between the two studies (i.e., it is possible that identified differences are due to the way behaviors were measured across studies and who was asked to complete the survey, rather than a real change in prevalence).

All self-reported aggressive behaviors increased in frequency in 2025 except for drove very close to another vehicle to get that driver to speed up or move over (tailgated another vehicle) (down 12% since 2016) and yelled at another driver (down 8% since 2016). The highest increase in a single self-reported aggressive behavior at least once in the previous year was honking a horn when another driver did something inappropriate (not to avoid an accident) (22% increase since 2016). Self-reported road rage behaviors increased slightly, with getting out of the vehicle to confront another driver increasing 3% and bumping another vehicle on purpose remaining unchanged. Readers can further compare the results of the two surveys using Table 9 and Appendix E.

Table 9. Comparison of Self-Reported Frequency of Aggressive Driving Behaviors in the Past Year, United States, 2016 and 2025

	At Least Once	
	Row %, Weighted	
Behavior	2016[a]	2025[b]
Tailgated another vehicle	51	39
Yelled at another driver	47	39
Honked to show annoyance or anger	45	66
Made an angry gesture	33	37
Tried to block from changing lanes	24	28
Cut off another vehicle on purpose	12	20
Exited vehicle to confront another driver	4	6
Bumped/rammed another vehicle on purpose	3	3

[a] *2016 Base: 2,705 drivers age 16+ who reported driving in the past 30 days, weighted to reflect the U.S. population. Drivers with missing values were excluded where relevant.*

[b] *2025 Base: 3,020 drivers at 16+ who reported driving in the past 30 days, weighted to reflect the U.S. population. Drivers with missing values were excluded where relevant.*

Table 10 displays the self-reported engagement in aggressive driving by theme and according to definitions of aggressive driving and road rage in the 2016 study. Results indicate that 96% of drivers engaged in at least one of the aggressive driving behaviors at least once in the past 30 days. The most prevalent themes were ***putting others at risk*** and ***trying to get ahead***, with 92% of respondents reporting engagement in those behaviors at least once in the past 30 days. ***Violence*** was the least prevalent theme, with 11% of drivers reporting engagement in violent behaviors in the past 30 days.

To facilitate comparisons with the 2016, Table 10 includes the estimated prevalence of aggressive driving and road rage in the current survey using the common items measured in 2016. Compared to aggressive driving behaviors measured in the 2016 study, this study estimates 3% point increases in both aggressive driving (81% compared to 78% in 2016) and road rage (7% compared to 4% in 2016).

Table 10. Self-reported Engagement in Behavior by Theme and 2016 Definitions

Behavior	At Least Once
	Row %, Weighted
Any measured behavior	96
Putting others at risk	92
Trying to get ahead	92
Stealing space	60
Controlling other driver behavior	80
Expressions of displeasure	82
Provoking reactions	84
Violence	11
Common aggressive driving items measured in 2016 study	81
Common road rage items measured in 2016 study	7

Without defining the term "aggressively," the questionnaire asked drivers their perceptions of how often they drove aggressively, and how often they stopped themselves from driving aggressively. In all, 25% of drivers reported that they never drive aggressively, 44% of drivers rarely, 26% of drivers report sometimes driving aggressively, and 5% of drivers reported driving aggressively often or always. Many drivers report stopping themselves from driving aggressively when tempted: 14% always, 26% often, 27% sometimes, 19% rarely, and 14% not at all.

Respondents were also asked about experiences of being threatened on the road, and temptations to threaten other drivers. In all, 82% of drivers reported experiences where they felt threatened on the road; 21% of drivers report being tempted to threaten another driver, but only 3% of drivers report actually threatening another driver.

Emotions. All drivers that perceived they drove aggressively rarely or more often were asked to reflect on the emotions they felt last time they drove aggressively (n=2,312) (Figure 5). A large proportion of drivers reported feeling annoyed or frustrated (72%), anxious (49%), and angry (48%), but there were also reports of more positive emotions such as calm (37%) and empowered (17%).

Figure 5. Proportion of Drivers Reporting Emotions during Aggressive Driving
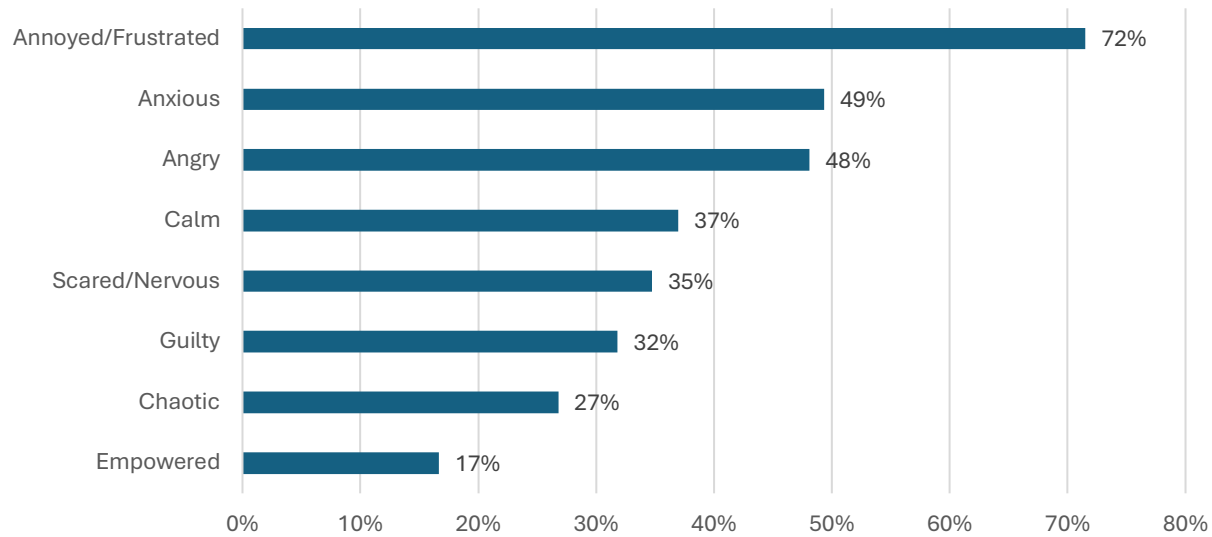
Attitudes Towards Driving Behaviors

Drivers overwhelmingly perceived aggressive driving (99%) and road rage (99%) as problematic. Compared to previous years, 36% of drivers think aggressive driving is a much bigger problem today, and a further 36% of drivers think it is a somewhat bigger problem today. Only 4% of drivers perceive aggressive driving as a smaller problem today. Proportions for road rage were similar: 33% of drivers perceive road rage as a much bigger problem today, 37% as a somewhat bigger problem, while only 5% perceive road rage as a smaller problem.

The majority of drivers (53%) felt there was not enough police enforcement of aggressive driving, 43% of drivers felt the level of police enforcement was about right, and 4% of drivers felt there was too much police enforcement of aggressive driving.

Drivers highlighted the importance of good manners while driving: 77% of drivers reported it was very or extremely important for other drivers to have good manners, while only 1% felt manners were not important.

Motivations

Drivers who reported driving aggressively (n=2,312) were asked to reflect on how often particular motivations were true for them (Figure 6). The most common motivations were to avoid dangerous situations on the road with 65% of self-identified aggressive drivers reporting that motivation was true for them sometimes or more,

followed by the motivation to get to destinations more quickly (55% sometimes or more), and in response to something that happened on the road (42% sometimes or more).

Figure 6. Proportion of Drivers by Different Motivations to Drive Aggressively
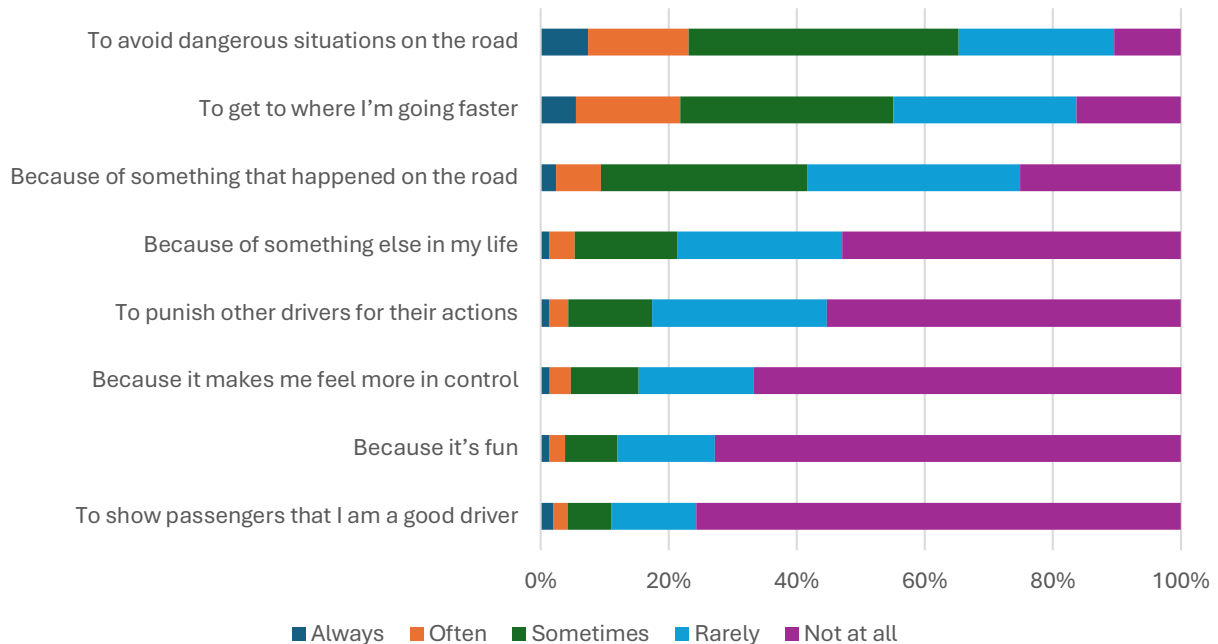
Drivers were also asked about their motivations to refrain from both aggressive driving and threatening other drivers when tempted (Figure 7). The two most common motivations were (a) because driving aggressively (77%) and threatening other drivers (72%) is not the right thing to do and (b) concerns over getting into an accident (78% and 46%, respectively).

Figure 7. Proportion of Drivers Reporting Motivations to Refrain from Aggressive Driving and Threatening Other Drivers When Tempted
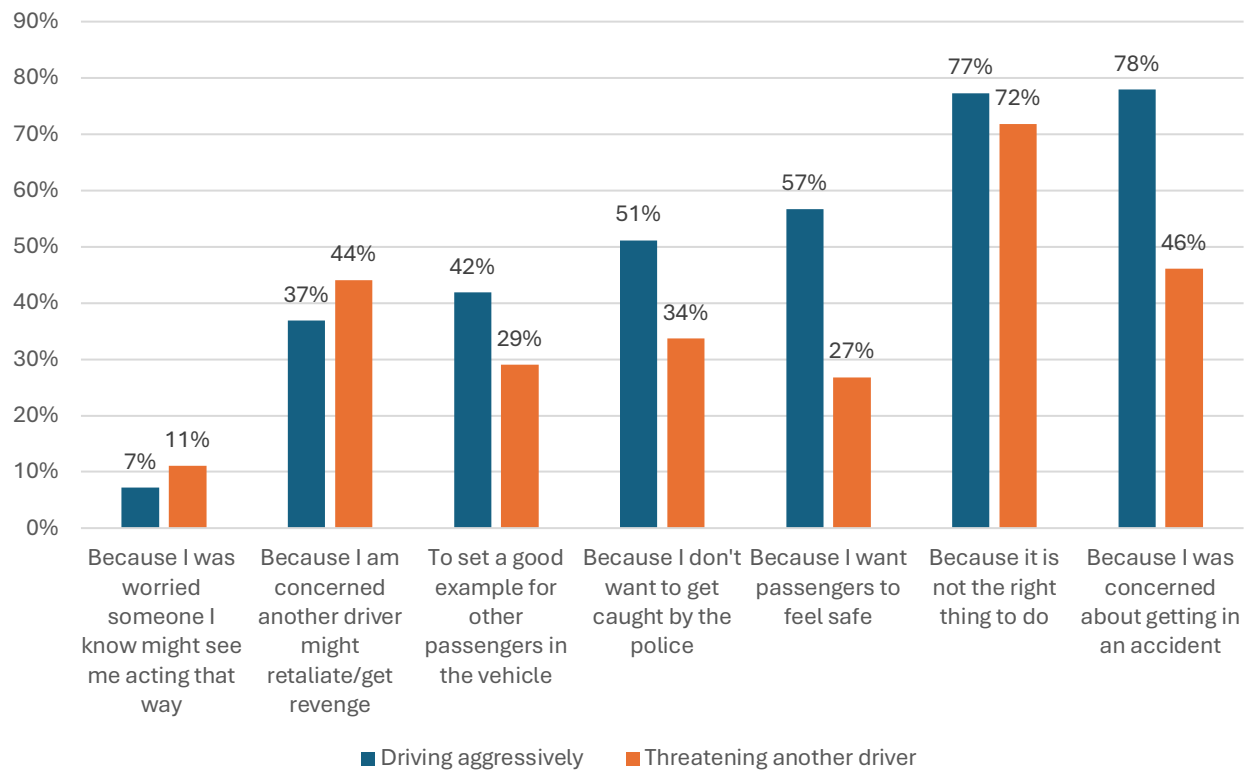
Respondents indicated a number of strategies they used to stop themselves from driving aggressively including the following:

- Thinking about potential consequences (69%)
- Letting other vehicles pass (57%)
- Listening to music, podcasts, or audiobooks (49%)
- Cursing under their breath (30%)
- Focusing on breathing (25%)
- Driving in silence (19%)
- Repeating a mantra, positive affirmation, or calming phrase (11%)
- Rolling down the windows (11%)
- Adjust the temperature in the vehicle (8%)
- Calling a family member or friend (8%)
- Having a drink or snack (7%)

Drivers with experiences of feeling threatened on the road (n=2,475) reported using the following strategies to reduce the threat of violence: avoid eye contact (45%), let someone else go first (45%), take another route (33%), remain silent (32%), lock the

car and/or windows (29%), and pull over (9%). Only 6% of drivers reported that they did not take any action to reduce the threat of violence.

Situational Factors

Drivers were asked to reflect on whether they drove more or less aggressively in particular situations (Figure 8); however, not all situations were relevant for all drivers (e.g. not all drivers have children or a spouse/partner). A large proportion of drivers indicated that they drove somewhat (24%) or much less (56%) aggressively when it rains. Some drivers reflected that they drove somewhat or much more aggressively during rush hour (18%) or when they were stuck in unexpected traffic (16%).

Figure 8. Perceptions of Aggressive Driving in Different Situations
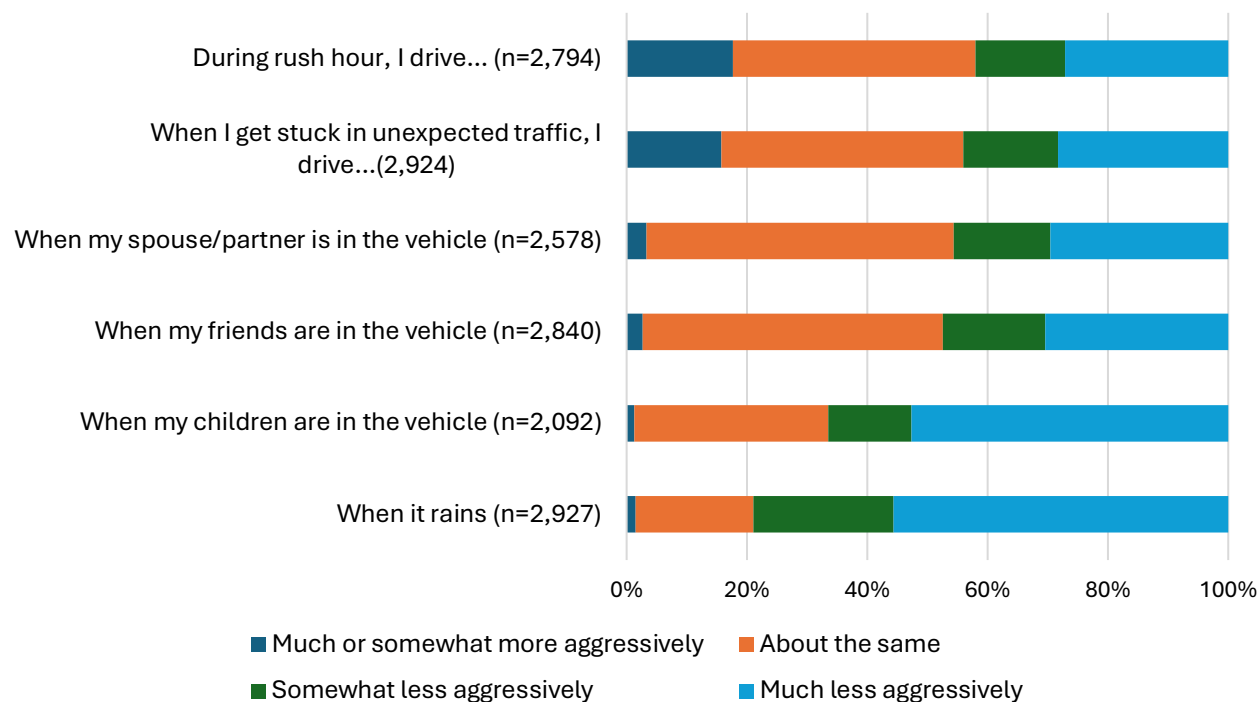
Drivers were also asked how often they carry a gun in their vehicle: 7% of drivers always, 10% sometimes, and 83% never carry a gun in their vehicle.

Vehicle Factors

Drivers were asked how often they saw different types of vehicles driving aggressively (Figure 9). Sports cars were perceived as the most aggressive vehicles with 56% of drivers reporting that they saw sports cars drive aggressively always or often,

followed by motorcycles (51%), and pick-up trucks (48%). Fewer drivers perceived taxis (12%) and 18-wheelers (15%) as driving aggressively always or often.

Figure 9. Proportion of Drivers Who Perceive Vehicles are Driving Aggressively "Always" or "Often"
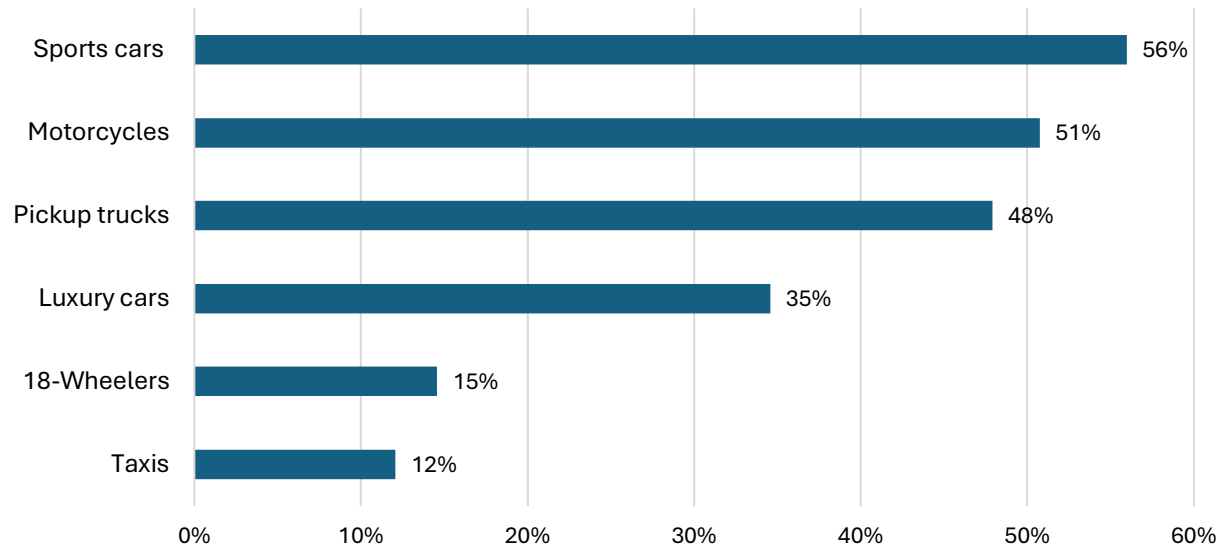
Relationships between Individual, Vehicle, and Situational Factors and Aggressive Driving

Tables 11, 12, and 13 display the bivariate association between individual, vehicle, and situational factors and high levels of aggressive driving overall and by theme. High levels of engagement were defined according to the criteria in Table 6. Across all themes, a smaller proportion of older drivers had high levels of engagement in aggressive driving compared to younger drivers. Results indicate a greater proportion of men compared to women had high levels of engagement in aggressive driving overall and across themes except for the **expression of displeasure** theme, where proportions were similar. There was evidence of differences by education, the proportion of the population that had high levels of engagement was higher among those with a bachelor's degree in the **trying to get ahead** and **putting others at risk** themes, and lower in the **violence** theme. There was a greater proportion of current workers with high levels of engagement in all themes, while there was a greater proportion of parents in the **expression of displeasure** and **provoking interaction** themes. A greater proportion of drivers with household incomes over $100,000 had high levels of engagement overall and in the **putting others at risk**, **trying to get ahead**, and **controlling other driver behavior** themes, however a smaller proportion of this group had high levels of engagement in the **violence** theme.

Driving attitudes were also associated with levels of engagement: a smaller proportion of drivers who reported that good manners were extremely or very

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important had high levels of engagement across all themes compared to drivers who did not think good manners were so important. A smaller proportion of drivers who rated their ability to drive safely as excellent or good compared to others had high levels of engagement in the *violence* theme compared to drivers who rated their ability as about the same, poor, or very poor. A larger proportion of drivers who perceived there was too much police enforcement of aggressive driving in their area had high levels of engagement across all themes.

Driving experience also appeared to play a role in engagement in aggressive driving. A higher proportion of frequent drivers has high levels of engagement in aggressive driving overall and in the ***putting others at risk***, ***trying to get ahead***, ***controlling other behaviors,*** and ***expressions of displeasure*** themes compared to less frequent drivers. A greater proportion of drivers who received a ticket in the past two years had higher levels of engagement in aggressive driving across all themes compared to drivers who had not received a ticket. A greater proportion of drivers who had been in a crash in the past two years had high levels of aggressive driving overall and in the ***putting others at risk***, ***controlling other driving behaviors***, ***expressions of displeasure***, ***provoking reactions***, and ***violence*** themes.

Many vehicle factors were associated with high levels of engagement in aggressive driving (Table 12). A greater proportion of drivers with an electric vehicle had high levels of engagement in the ***putting others at risk***, ***trying to get ahead***, ***stealing space***, ***controlling other driver behavior,*** and ***violence*** themes compared to drivers with other engine types. More drivers who decorated their vehicles with bumper stickers, magnets, or decals had high levels of engagement in overall and in most themes (except ***stealing space*** and ***violence***). More drivers who gave their vehicle a name had higher levels of engagement across all themes (though not all associations were significant).

Many of the measures designed to appraise attitudes towards drivers' own vehicles had associations with high levels of engagement in aggressive driving. Drivers were asked how often different statements were true for them. A greater proportion of respondents who more strongly identified with the following statements had higher levels of engagement in aggressive driving:

- I see my vehicles as a sanctuary from daily life
- I see my vehicle as an extension of my personality
- I have important conversations in my vehicle
- I spend money to make my vehicle look good
- Other drivers would not be able to recognize me outside of my vehicle

Conversely, a smaller proportion of respondents who more strongly identified with the statement about following the suggested maintenance schedule for their vehicle had high levels of engagement in aggressive driving and across most themes.

There were some associations between situational factors and high levels of engagement in aggressive driving (Table 13). A smaller proportion of drivers living in rural areas had high levels of engagement in aggressive driving overall, compared to drivers in suburban and urban areas. A smaller proportion of drivers living in suburban areas had high levels of engagement in the ***provoking reactions*** and ***violence*** themes compared to drivers in urban and rural areas. A greater proportion of drivers in the South had high levels of engagement in aggressive driving overall and by theme compared to drivers in other regions, except for the ***violence*** theme where proportions were similar across regions. A greater proportion of drivers who carried a gun in their vehicle sometimes or always had higher levels of engagement in aggressive driving overall and across themes compared to drivers who never carry a gun.

There appeared to be a strong association between aggressive driving culture and high levels of engagement in aggressive driving overall and across themes. There appeared to be a dose–response relationship where the proportion of drivers with high levels of engagement in aggressive driving increased as the amount of aggressive driving a driver witnessed or experienced increased. Perceptions of manners in a driver's local area also was associated with levels of engagement in aggressive driving. In all but the ***violence*** theme, a greater proportion of drivers that reported local drivers had worse manners compared to other places had high levels of engagement overall and across themes.

Table 11. Bivariate Association between Individual Factors and High Levels of Aggressive Driving Overall and By Theme

	n	Overall	Putting others at risk	Trying to get ahead	Stealing space	Controlling other driver behavior	Expressions of displeasure	Provoking Reactions	Violence
					Row %, Weighted				
All Drivers		25	22	23	12	25	30	34	11
Driver age		*	*	*	*	*	*	*	*
16–24	282	36	33	36	17	30	36	39	10
25–39	773	33	29	30	17	28	39	40	14
40–59	972	27	22	23	12	29	32	38	12
60–74	750	13	11	12	7	15	21	23	7
75+	243	10	10	10	6	15	12	17	4
Driver sex		*	*	*	*	*			*
Male	1,510	28	24	26	14	27	31	35	13
Female	1,510	23	20	20	10	22	29	32	8
Education				*					*
High school or less	987	23	19	20	12	23	30	34	12
Some college	764	27	22	23	13	26	32	36	14
Bachelor's degree or higher	1,269	26	24	26	11	26	29	31	7
Employment Status		*	*	*	*	*	*	*	
Not currently working	1,167	17	16	16	9	19	24	28	9
Currently working	1,853	30	25	27	14	28	34	37	12
Parental Status							*	*	
No	2,215	25	21	22	11	24	29	32	11
Yes	805	26	22	25	14	25	34	38	9
Household Income		*	*	*		*			*
Less than 50k	1,069	23	19	18	12	24	31	35	14
50–100k	954	24	19	21	10	23	30	33	8
Over 100k	997	30	28	31	13	28	30	32	9

	n	Overall	Putting others at risk	Trying to get ahead	Stealing space	Controlling other driver behavior	Expressions of displeasure	Provoking Reactions	Violence
					Row %, Weighted				
How important is it for you to drive with good manners?		*	*	*	*	*	*	*	*
Somewhat/a little bit/ not at all	553	42	38	37	18	36	43	44	20
Extremely/very	2,467	21	18	20	11	22	27	31	9
Rating of ability to drive safely compared to others									*
About the same/poor/very poor	890	26	22	23	12	24	29	33	14
Excellent/good	2,130	25	21	23	12	25	30	34	9
Perceptions of level of police enforcement of aggressive driving		*	*	*	*	*	*	*	*
Not enough	1,682	26	21	23	12	26	33	37	10
About right	1,220	23	21	22	11	22	25	28	10
Too much	118	40	34	37	25	37	42	48	19
Driving frequency		*	*	*		*			
0–3 days per week	591	20	17	19	12	22	26	31	12
4–5 days per week	733	24	22	23	11	22	29	33	10
6–7 days per week	1,696	27	23	25	13	27	32	35	10
Received a ticket (in person or by mail) in the past two years		*	*	*	*	*	*	*	*
No	2,666	23	19	20	11	23	29	33	10
Yes	354	41	39	40	18	34	38	40	16
Been in an accident in the past two years			*			*	*	*	*
No	2,470	24	21	22	12	24	29	32	10
Yes	550	28	26	26	12	29	35	40	15

*Chi-squared tests indicate significant differences in the proportion of drivers with high levels of engagement in aggressive driving by individual factor p<.05.

Table 12. Bivariate Association between Vehicle Factors and High Levels of Aggressive Driving Overall and By Theme

	n	Overall	Putting others at risk	Trying to get ahead	Stealing space	Controlling other driver behavior	Expressions of displeasure	Provoking Reactions	Violence
					Row %, Weighted				
All Drivers		25	22	23	12	25	30	34	11
Vehicle age									
0–5 years	768	25	22	23	13	26	26	32	12
6–10 years	983	27	24	26	13	25	32	35	11
11–15 years	637	23	19	21	11	23	31	33	10
16 years or older	632	24	21	20	12	24	31	35	11
Engine type			*	*					*
Internal combustion engine	2,657	25	21	22	12	24	30	33	10
Hybrid	276	25	23	24	14	26	30	34	14
Electric vehicle	87	34	37	38	21	37	24	40	27
Bumper stickers, magnets, or decals on vehicle		*	*	*		*	*	*	
No	2,302	23	20	22	12	22	28	31	11
Yes	718	32	26	26	13	32	37	41	10
Given vehicle a name		*	*				*		
No	2,396	23	20	22	12	24	29	33	10
Yes	624	31	26	25	14	28	35	37	13
I see my vehicle as a sanctuary from daily life		*	*	*	*	*	*	*	*
Rarely or occasionally true	2,006	22	18	20	9	21	27	30	7
Often/usually/almost always true	1,014	32	29	29	17	31	35	41	17
I see my vehicle as an extension of my personality		*	*	*	*	*	*	*	*
Rarely or occasionally true	1,939	22	18	20	10	21	28	30	8
Often/usually/almost always true	1,081	31	27	28	16	30	34	39	15
I have important conversations in my vehicle		*	*	*	*	*	*	*	*
Rarely or occasionally true	1,892	20	17	18	9	19	26	28	9
Often/usually/almost always true	1,128	33	29	30	17	33	37	42	14

	n	Overall	Putting others at risk	Trying to get ahead	Stealing space	Controlling other driver behavior	Expressions of displeasure	Provoking Reactions	Violence
					Row %, Weighted				
I feel safe in my vehicle									*
Rarely or occasionally true	238	26	21	19	14	25	32	37	18
Often/usually/almost always true	2,782	25	22	23	12	25	30	33	10
I spend money on my vehicle to make it look good		*	*	*	*	*		*	*
Rarely or occasionally true	2,084	24	19	21	11	22	30	32	9
Often/usually/almost always true	936	28	26	26	15	31	31	38	14
I make sure to follow the suggested maintenance schedule for my vehicle		*	*	*			*	*	*
Rarely or occasionally true	370	30	28	28	15	27	38	39	16
Often/usually/almost always true	2,650	24	21	22	12	24	29	33	10
Other drivers would not be able to recognize me outside of my vehicle		*	*	*	*	*		*	*
Rarely or occasionally true	2,210	23	20	21	10	23	29	32	9
Often/usually/almost always true	810	30	27	28	17	29	33	39	14

Chi-squared tests indicate significant differences in the proportion of drivers with high levels of engagement in aggressive driving by vehicle factor p<.05.

Table 13. Bivariate Association between Situational Factors and High Levels of Aggressive Driving Overall and By Theme

	n	Overall	Putting others at risk	Trying to get ahead	Stealing space	Controlling other driver behavior	Expressions of displeasure	Provoking Reactions	Violence
					Row %, Weighted				
All Drivers		25	22	23	12	25	30	34	11
Metro area status									*
Center city	992	28	23	24	12	27	33	36	12
Suburban	1,636	24	22	23	12	24	29	32	9
Non-metro	392	22	17	19	11	22	29	35	13
Region		*	*	*	*	*	*	*	
Northeast	521	25	19	20	10	25	32	34	9
Midwest	638	20	16	17	9	20	31	33	11
South	1,108	29	26	27	14	27	32	37	12
West	753	23	22	23	12	24	25	30	10
Carry a gun in vehicle		*	*	*	*	*		*	*
Never	2,543	24	20	22	11	23	29	32	10
Sometimes	296	30	26	27	18	32	31	39	17
Always	181	35	30	32	15	28	38	42	15
Quartile of aggressive driving culture		*	*	*	*	*	*	*	*
1 (least aggressive)	780	9	9	11	4	11	12	15	5
2	742	21	18	20	8	22	24	27	8
3	762	27	24	25	13	27	35	39	11
4 (most aggressive)	736	43	34	35	22	38	49	53	19
Manners compared to other places		*	*	*	*	*	*	*	
Drivers in my area have better manners	742	21	20	21	11	22	23	29	10
Drivers in my area have similar manners	1,510	22	19	20	11	23	28	31	11
Drivers in my area have worse manners	768	35	28	30	16	30	41	43	12

Chi-squared tests indicate significant differences in the proportion of drivers with high levels of engagement in aggressive driving by situational factor p<.05.

Table 14 displays the results from multivariate poison regression models predicting whether a driver was a "high engager" in aggressive driving, overall and by theme, controlling for individual, vehicle, and situational factors listed in Tables 8, 9, and 10. All factors in Tables 8, 9, and 10 are included in models; however, only factors with a statistically significant relationship with an aggressive driving theme are presented in Table 14. Results are presented as prevalence rate ratios: the ratio of the prevalence of high engagers in a population compared to the reference group. A ratio of one indicates that the prevalence is similar across population groups. Ratios greater than one indicates a higher prevalence compared to the reference group, while a ratio less than one indicated a smaller prevalence compared to the reference group.

Age was significantly associated with high engagement: aggressive driving was less prevalent among older drivers across most themes. However, drivers aged 25–39 and 40–49 were significantly more likely to engage in the *violence* theme compared to drivers aged 16–24. Interestingly, after controlling for other factors there was not a significant association between sex and high engagement in aggressive driving, except for the *violence* theme where women were significantly less likely to engage in violence compared to men. Drivers with a household income of $100,000 or more were significantly more likely to be high engagers in aggressive driving overall and in the *putting others at risk* and *getting ahead* themes. Drivers who felt having good manners was very or extremely important were significantly less likely to have high levels of engagement in aggressive driving overall and across all themes compared to drivers who did not see manners as important. After controlling for other factors, there was no evidence of a significant association between perceptions of police enforcement of aggressive driving and high levels of engagement in aggressive driving across all themes.

Drivers who received a ticket in the past two years were significantly more likely to be high engagers in aggressive driving overall, and in the *putting others at risk* and *getting ahead* themes. Crash experience was predictive of high engagement in the *violence* theme.

Multivariate models revealed some significant associations between measures designed to appraise attitudes towards drivers' own vehicles, even after controlling for other factors. In particular, higher levels of agreement on "I see my vehicle as a sanctuary from daily life" and "I have important conversation in my vehicles" was significantly associated with higher levels of engagement across various themes. Higher levels of agreement on the "I make sure to follow the suggested maintenance schedule for my vehicles" was associated with a lower prevalence of high engagement in aggressive driving across themes.

Many of the significant bivariate associations between situational factors and high levels of engagement in aggressive driving from Table 13 did not hold once other factors

were introduced in the model. For instance, there was no evidence of an association between carrying a gun in the vehicle and high engagement in aggressive driving after controlling for other variables. Across all individual, vehicle, and situational factors examined, experiences of aggressive driving culture were the most highly predictive of high levels of aggressive driving across all themes. Drivers who experienced the most aggressive driving cultures had high engagement prevalence rates, almost four times higher than drivers reporting the least aggressive driving cultures. Drivers who lived in areas with perceived worse manners than other places were more likely to have high levels of engagement in the ***expressions of displeasure*** theme. A sensitivity analysis, which defined high levels of engagement according to a weighted score, found very similar results across all themes. Notably, however, the only substantive difference was a significant association between sex and high levels of engagement, women were significantly less likely than men to have high levels of engagement across all themes.

Table 14. Multivariate Poison Regression Models Predicting whether a Driver was a "High Engager" in Aggressive Driving, Overall and by Theme

	Overall		Putting others at risk		Trying to get ahead		Stealing space		Controlling other driver behavior		Expressions of displeasure		Provoking reactions		Violence	
	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI
Age group																
16–24	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
25–39	0.9	(0.8-1.2)	0.9	(0.7-1.1)	0.8	(0.7-1.0)	1.0	(0.7-1.4)	1.0	(0.8-1.4)	1.1	(0.9-1.3)	1.0	(0.9-1.3)	1.8	(1.1-2.9)
40–59	0.9	(0.7-1.1)	0.7	(0.6-0.9)	0.6*	(0.5-0.8)	0.8	(0.6-1.2)	1.1	(0.8-1.3)	1.0	(0.8-1.2)	1.1	(0.9-1.3)	2.0*	(1.3-3.2)
60–74	0.6*	(0.4-0.7)	0.5*	(0.4-0.7)	0.5*	(0.4-0.7)	0.7	(0.5-1.2)	0.7	(0.5-0.9)	0.9	(0.7-1.1)	0.8	(0.7-1.0)	1.7	(1.0-2.8)
75+	0.5*	(0.3-0.8)	0.5	(0.3-0.9)	0.5*	(0.3-0.8)	0.8	(0.4-1.6)	0.9	(0.6-1.3)	0.5*	(0.4-0.8)	0.7	(0.5-1.0)	1.0	(0.4-2.2)
Sex																
Male	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Female	0.9	(0.8-1.1)	0.9	(0.8-1.1)	0.9	(0.8-1.0)	0.8	(0.7-1.0)	0.9	(0.8-1.1)	1.0	(0.9-1.1)	1.0	(0.9-1.1)	0.7*	(0.5-0.9)
Household income																
Less than $50k	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
50–100k	1.2	(1.0-1.4)	1.1	(0.9-1.4)	1.3	(1.0-1.5)	0.9	(0.7-1.3)	1.0	(0.8-1.2)	1.0	(0.9-1.2)	1.0	(0.9-1.1)	0.8	(0.6-1.1)
Over 100k	1.4*	(1.2-1.6)	1.5*	(1.2-1.9)	1.6*	(1.4-2.0)	1.2	(0.9-1.6)	1.2	(1.0-1.4)	1.0	(0.9-1.2)	1.0	(0.8-1.1)	0.9	(0.6-1.2)
How important is it for you to drive with good manners																
Somewhat or less	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Extremely/very	0.6*	(0.5-0.7)	0.5*	(0.5-0.6)	0.6*	(0.5-0.7)	0.7*	(0.5-0.9)	0.6*	(0.6-0.7)	0.7*	(0.6-0.8)	0.8*	(0.7-0.9)	0.5*	(0.4-0.7)
Received a ticket (in person or by mail) in the past two years																
No ticket	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 ticket or more	1.4*	(1.2-1.6)	1.5*	(1.3-1.8)	1.5*	(1.3-1.7)	1.3	(1.0-1.7)	1.2	(1.0-1.4)	1.1	(0.9-1.2)	1.0	(0.9-1.2)	1.3	(1.0-1.8)
Been in an accident in the past two years																
No crash	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 crash or more	1.0	(0.9-1.2)	1.1	(0.9-1.3)	1.0	(0.8-1.1)	0.9	(0.7-1.2)	1.1	(0.9-1.3)	1.1	(1.0-1.3)	1.1	(1.0-1.3)	1.5*	(1.1-1.9)
Bumper stickers, magnets, or decals on vehicle																
None	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
At least 1	1.3*	(1.1-1.5)	1.2	(1.1-1.4)	1.1	(1.0-1.3)	1.2	(0.9-1.5)	1.4*	(1.2-1.6)	1.3*	(1.1-1.5)	1.3*	(1.2-1.5)	1.0	(0.7-1.3)

	Overall		Putting others at risk		Trying to get ahead		Stealing space		Controlling other driver behavior		Expressions of displeasure		Provoking reactions		Violence	
	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI	PRR	95% CI
I see my vehicle as a sanctuary from daily life																
Rarely/occasionally	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Often or more	1.1	(0.9-1.3)	1.2	(1.1-1.5)	1.2	(1.0-1.4)	1.3	(1.0-1.7)	1.1	(0.9-1.3)	1.0	(0.9-1.1)	1.0	(0.9-1.2)	1.8*	(1.3-2.4)
I have important conversations in my vehicle																
Rarely/occasionally	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Often or more	1.2	(1.0-1.4)	1.1	(1.0-1.3)	1.1	(0.9-1.3)	1.2	(1.0-1.5)	1.3*	(1.1-1.5)	1.2*	(1.1-1.4)	1.2*	(1.1-1.4)	1.1	(0.8-1.4)
I spend money on my vehicle to make it look good																
Rarely/occasionally	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Often or more	1.0	(0.9-1.2)	1.2	(1.0-1.4)	1.1	(0.9-1.3)	1.1	(0.8-1.4)	1.3*	(1.1-1.6)	0.9	(0.8-1.1)	1.1	(0.9-1.2)	1.2	(0.9-1.5)
I follow the suggested maintenance schedule for my vehicle																
Rarely/occasionally	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Often or more	0.8*	(0.6-0.9)	0.7*	(0.5-0.8)	0.7*	(0.6-0.9)	0.7	(0.5-1.0)	0.8	(0.6-1.0)	0.8*	(0.6-0.9)	0.8*	(0.7-0.9)	0.6*	(0.4-0.9)
Quartile of aggressive driving culture																
(least aggressive) 1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	2.0*	(1.5-2.8)	1.7*	(1.2-2.2)	1.6*	(1.2-2.0)	1.7*	(1.1-2.8)	1.9*	(1.4-2.4)	1.8*	(1.4-2.4)	1.6*	(1.3-2.0)	1.5	(1.0-2.3)
3	2.6*	(1.9-3.5)	2.2*	(1.7-2.9)	1.9*	(1.5-2.5)	2.8*	(1.8-4.3)	2.2*	(1.7-2.9)	2.5*	(1.9-3.2)	2.2*	(1.7-2.7)	2.0*	(1.3-3.1)
(most aggressive) 4	3.7*	(2.8-5.0)	2.8*	(2.1-3.8)	2.4*	(1.8-3.1)	4.2*	(2.1-6.4)	2.9*	(2.2-3.8)	3.4*	(2.6-4.3)	2.8*	(2.3-3.5)	3.0*	(2.0-4.7)
Manners compared to other places																
Better manners	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Similar manners	1.0	(0.9-1.2)	0.9	(0.8-1.1)	0.9	(0.8-1.9)	0.9	(0.7-1.2)	1.0	(0.8-1.2)	1.1	(1.0-1.3)	1.0	(0.9-1.1)	0.9	(0.6-1.2)
Worse manners	1.2	(1.0-1.4)	1.1	(0.9-1.3)	1.1	(0.9-1.3)	1.0	(0.8-1.4)	1.0	(0.8-1.2)	1.3*	(1.1-1.5)	1.1	(1.0-1.3)	0.8	(0.6-1.2)

– Reference group

* p<=0.05

Road Rage

In total, 20% of drivers reported that they personally know someone who has been threatened by a weapon in a road rage incident, while 12% of drivers reported personally knowing someone who has been injured or killed in a road rage incident. The analysis of the open-ended question "What does road rage mean to you?" revealed eight different topics that came up in responses.

Perceptions of Irrational Anger. A key way respondents characterized road rage, was drivers getting angry and losing control. Responses indicate that drivers tend to think that road rage is an extreme point of anger. Phrases used to describe this are "acting out in a hostile manner," "acting erratically," and "out of control." Words that are used frequently or exclusively in this topic include "anger," "losing," "dangerous," "violence," and "control."

Internal Battle with Anger. Respondents depicted anger as the motivator of most actions in road rage incidents. Phrases used to describe this include "getting bent out of shape and fed up over something trivial," "allowing anger to overtake your common sense," and "when people's emotions become more important than safety." Frequent and exclusive words include "getting," "anger," "and "frustrated."

Confrontation/Retaliation. A repeated theme in responses was that road rage incidents are the result of drivers retaliating due to perceived wrongdoing. This is indicated by responses like "taking extreme action against the other driver," "chasing down a driver," "deliberately doing something to piss off another driver," and "retaliation for … prior traffic incident." An interesting finding is that respondents use words like "get even," "one-up," and "duel," indicating the desire to engage in a conversation-like back and forth in some instances.

Disregarding Rationality. Respondents perceived that road rage events often lack sense or logic. Responses indicate that drivers think road rage is nonsensical and is the result of drivers disregarding rationality. Some phrases used include "acting irrationally," "focusing on a singular vehicle or person, rather than overall traffic," and "forgetting all rules, manners, and others in pursuit of their own interests and immediate needs." Words that are frequently used or exclusive to the topic include "upset," "harm," "unsafe," and "irrational."

Empathy Towards Emotional Responses. This topic acknowledges the motivating emotion behind the aggressive acts performed during road rage incidences. Respondents mention the intensity of emotion using phrases like "rising blood pressure," "pent-up anger," and "high-tempered outbursts." Words that are frequently used or exclusive to this topic include "aggressive," "behavior," "response," and "emotional."

Selfishness. In responses to the open-ended question, respondents highlighted the lack of consideration for other drivers involved in many road rage incidents. Furthermore, it captures the aspect of prioritizing one's own goals (e.g., speeding up or changing lanes to get to your destination, etc.). Phases that capture this include "without a care for consequences," "drive like they own the road," "does not care what happens to anybody," and "doesn't care for anyone except themselves."

Recklessness. This topic is related to the aspects of violence and danger due to not caring about the consequences of risky actions. Respondents use words like "reckless," "disregard for others safety," and "without concern for others." Frequent and exclusive words in this topic include "recklessly," "driving," "regards," and "concern."

Aggressive and Violent Actions. This topic encompasses responses which focus on actions that respondents closely identify with road rage. These include yelling, swearing, "flipping the bird," and tail-gaiting. Furthermore, some violent and harmful actions are described such as getting out of the car to fight, guns/shooting, killing, and trying to "run you off the road." Words that are frequently used or exclusive to the topic include "yelling," "gestures," "honking," and "speeding."

A search for specific words in the open-ended response revealed that the phrase "aggressive driving" was mentioned 643. Words that indicate or imply violence (e.g., "guns," "fight," "kill") were mentioned 258 times.

Discussion

The current three-pronged approach to studying aggressive driving provided additional context to this prevalent road safety concern, confirming previous literature, and adding new insights to the existing body of research.

Reflections on Qualitative Findings

Results of qualitative focus groups of driving Americans illuminated various facets of aggressive driving that were supported by real, lived experiences. Focus group participants reported behaviors they deemed particularly aggressive, like tailgating, cutting off, excessive speed, obscene hand gestures, brake checking, weaving through traffic, and offensive merging practices. In addition to these behaviors, participants also spoke about the emotions they felt in their experiences with other aggressive drivers, most notably anger, anxiety, irritation, and fear.

Analysis of aggressive driving and road rage behaviors and emotions revealed multiple themes that were present across all focus groups that helped contextualize aggressive driving: Putting others at risk, trying to get ahead of other drivers, "stealing" road space, attempts at controlling other driver behavior, expressions of displeasure,

provoking reactions from other drivers, and inciting road violence. While the formation of these themes was largely in response to *other* driver behavior, notably there were multiple instances of focus group participants admitting to these behaviors and themes, calling attention to the juxtaposition of condemning such actions while oftentimes also willingly participating in them.

An exploration into the motivations for engagement in aggressive driving was a high priority of this qualitative work. The uncovered motivations sometimes related to the forementioned behavioral themes, with some motivations being proactive and others appearing defensive in nature. A large motivation for aggressive driving was "rushing to get somewhere," a proactive motivation by the driver, which mirrors the theme of trying to get ahead of others. This was heavily influenced by situational factors like traffic and commutes to and from work. One reactive motivation for aggressive driving was influenced by perceived threats to one's safety. Drivers often recounted instances of feeling like driving aggressively was a necessity to avoid dangerous road encounters with other drivers, noting that their aggressiveness was a direct reflection of their driving competence. Another reactive motivation was drivers' feeling like they were justified in retaliating against other drivers who performed aggressive acts towards them, oftentimes dolling out punishments they perceived as justifiable. Motivations to avoid engaging in aggressive driving were also discussed, which included practicing positive road etiquette and manners (which participants deemed as good driving) and coping mechanisms.

Focus group participants also mentioned specific situational factors that influenced aggressive driving. Drivers perceived the presence of other people in a vehicle reduced the likelihood a participant engaged in these behaviors, particularly participants' children and parents. Weather conditions, road type, traffic, and time of day were also found to be influential.

Reflections on Quantitative Findings

The results of the nationally representative survey of over 3,020 drivers are clear: everyone experiences aggressive driving, and everyone drives aggressively. The survey asked about a variety of topics including the experience of and engagement in aggressive and road rage behaviors, emotions felt during aggressive encounters with other drivers, attitudes towards driving behaviors, motivations for and against driving aggressively, situational and vehicle factors, and road etiquette and manners, among others.

Questions about aggressive behaviors were derived from existing literature when appropriate and from focus group insights. These behaviors were examined in three distinct ways: the frequency in which respondents experienced said behaviors, the frequency in which respondents reported engaging in said behaviors, and by the seven themes identified during focus groups. The aggressive behavior that was most frequently

witnessed and performed was red light running, with 99% of drivers witnessing this behavior and 82% of drivers admitting to performing this behavior at least once within the previous year. Other highly reported aggressive behaviors include weaving, tailgating, and passing in the right lane (witnessed), and passing in the right lane, honking, and glaring at other drivers (performed). Road rage behaviors were witnessed and performed at much lower frequencies within the previous year, but notably, 53% of drivers wondered whether or not another driver was carrying a weapon in their vehicle.

Previous AAAFTS work on aggressive driving (AAAFTS, 2016) asked about six aggressive driving behaviors and two road rage behaviors; those behaviors were once again asked in the current survey, and comparisons can be cautiously drawn between the results. When comparing aggressive behaviors by prevalence, engagement in honking, making angry gestures, blocking others from changing lanes, and cutting off others increased, while tailgating and yelling at other drivers decreased over the previous decade. Both self-reported road rage behaviors slightly increased.

Overall, 96% of drivers engaged in at least one of the 25 measured aggressive driving and road rage behaviors at least once in the past 30 days. Comparisons across themes showed high engagement in ***putting others at risk*** (92%) and ***trying to get ahead*** (92%) behaviors within the same time frame. Worryingly, 11% of drivers engaged in behaviors categorized into the ***violence*** theme.

Road Etiquette and Manners

Analysis of individual, situational, and vehicle factors both confirmed what has been known about aggressive driving, that the younger demographic and males are more likely to be aggressive drivers (Shinar & Compton, 2004), but also provided new insight into this road safety issue. One new finding suggests that road etiquette and manners appear to be a protective factor against aggressive driving. Though road etiquette and manners were never defined in the focus groups, participants intuitively understood this concept. They mentioned things like giving a "courtesy wave" when another driver lets you over or moving to another lane when someone was trying to pass, and showed appreciation for other drivers who practiced this positive, unspoken etiquette. Conversely, participants also understood what was uncourteous, like failure to use a turn signal.

The national survey showed similar findings where, once again, "manners" were never defined but innately understood. The finding that drivers who valued good manners had lower levels of high engagement in aggressive behavior across all themes helps confirm the hypothesis that courtesy on the road reduces the likelihood of driving aggressively, though further research is needed to understand this idea more fully. Another insight found within the survey suggests the biggest predictor of high levels of engagement in aggressive driving is whether others in your driving environment are

also engaging in aggressive driving behaviors; in other words, driving culture is a large influence on driving behavior. Similar to recent work by Finley and colleagues (2023), quantitative analyses indicated that those who experienced higher levels of aggressive driving were more likely to engage in aggressive driving. Qualitative results echoed this concept, with one focus group participant justifying his aggressive driving engagement because "aggressive driving is the norm in my city."

The Role of the Vehicle

The literature review identified a lack of existing research on the contribution of vehicle factors to aggressive driving and road rage behavior. Therefore, both the qualitative and quantitative analysis set out to unpick some of these relationships. Findings from the qualitative analysis indicate that vehicle elements contribute to aggressive driving and road rage in two major ways. First, vehicle elements affect how both a driver's behavior and driver's personality is interpreted by others. Consistent with work by Hoback (2018, 2019) and Ha & Park (2024), which links vehicle design features to perceptions of anger and aggression, focus group discussions highlighted that the size and noise of vehicles contributed to perceptions of aggression. Focus group participants further attributed personal traits such as feelings of entitlement to drivers of luxury or expensive cars. Links between vehicle choice and personality characteristics are well established in both academic (Irfan & Ahmad, 2021; O'Connor et al., 2022) and more popular discourse (Andersen, 2025). Crucially, what this study adds is that these associations between vehicle designs and driver personality can influence driver's interpretations and reactions to behavior on the road.

Second, qualitative analysis results suggest that vehicle elements can change the way people drive. Participants recounted stories of driving fast in sports cars and feeling like the "big boss" in large vehicles allowing them to intimidate and threaten other drivers. While there is extensive literature on how individual characteristics influence driving styles (AAAFTS, 2024; Eboli et al., 2017), and how driving styles interact with vehicle designs in terms of fuel efficiency and emissions (Miotti et al., 2021; Shahariar et al., 2022), there is surprisingly little work on how vehicle design influences driving styles. One driving simulator study suggests vehicle design may influence driver's speed (Reichelt et al., 2020), and a roadside observation and questionnaire study confirmed significant relationships between vehicle performance and risk-taking behavior (Horswill & Coster, 2002). However, more work is needed to study the impacts of vehicle design on driving styles.

Quantitative analysis of survey responses found many associations between vehicles factors and high levels of engagement in aggressive driving. The presence of bumper stickers, decals, or personalized license plates was associated with high levels of engagement in aggressive driving, as were some indicators of the personal meaning of vehicles, including seeing a vehicle as a sanctuary from daily life, having important

conversations in the vehicle, and spending money to make the vehicle look good. These indicate that drivers' relationships with their vehicle can have important implications for aggressive driving. Taken together, the qualitative and quantitative findings of this study suggest vehicles are more than just machines that can be used to get from point A to point B, and more than spaces where aggression happens. There are complex relationships between drivers and their vehicles that can affect interpretation of and engagement in aggressive driving behaviors. Speculatively, these relationships may suggest there is an opportunity for vehicle solutions to reduce aggressive driving. More work is needed to better understand these pathways.

Location Matters

Both the focus group discussions and analysis of survey data highlighted the importance of "place" in aggressive driving. In focus groups, drivers highlighted particular road designs and hot spots that led to tensions between drivers and opportunities for aggressive behavior. In both the qualitative and the quantitative findings, local cultures around aggressive driving were important predictors of behavior. Speculatively, these findings may indicate a role for place-based solutions in deterring aggressive driving and road rage. Engineering solutions are a key tool to combating risky driving behavior more generally. However, while there is a large evidence base on effective engineering countermeasures to reduce some risky driving behaviors, such as speeding, relatively less is known on how changes to the road environment can affect aggressive driving behavior. Proposed solutions often focus on removing triggers of driver frustration such as congestion—for example, appropriate traffic signal timing, good traffic signal and street sign visibility, and better commute information in congested areas (ASU Center for Problem-Oriented Policing, n.d.). This study's findings suggest there is a role for modifying physical road features to reduce tensions among drivers and supports other work calling for well-designed merging structures with adequate entry and exit areas and appropriate signage (Aljagoub et al., 2023) to help reduce aggressive driving.

Beyond reducing driver tensions at particular locations, there may be a role for place-based initiatives in tackling local cultures of aggressive driving. Changing cultures around risky driving behavior generally, and aggressive driving behavior specifically, is incredibly challenging as these learned behaviors turn into habits, guided by many social, psychological, and systemic factors (Sagberg et al., 2015). Recent guidance on changing traffic safety culture emphasizes that changing traffic safety culture is a process and underscores the importance of local stakeholders and context (Ward et al., 2019). This guidance is congruent with the emerging practice of placed-based road safety, aimed at solving complex local challenges with locally relevant and fit-for-purpose solutions (Shaweesh et al., 2024). Consistent with a Safe System approach, these strategies look at road safety issues more holistically, in collaboration with local communities to develop shared visions and plans incorporating local values. This study's

findings that cultures of aggressive driving are locally constituted suggests that placed-based principles may help efforts to bring about cultural change.

Encouraging Altruistic Driving

Encouraging pro-social or altruistic driving, i.e., the prioritization of the safety and well-being of others on the road, may be a useful approach to start to bring about cultural change and help combat the consequences of aggressive driving. Similar to previous research, which found engagement in pro-social driving behaviors is associated with less frequent aggressive driving (Finley et al., 2023; Zeyin et al., 2022), this study found that the importance of driving manners was negatively associated with high levels of engagement in aggressive driving. Focus group discussions highlighted several behaviors that American drivers consider to be good manners, including turn signals, "courtesy waves," and letting other drivers in. Practicing this type of etiquette increases positive road dialogue and decreases tension among drivers. Encouraging positive behaviors rather than discouraging negative behaviors may start to aid in overcoming some of the barriers experienced by interventions aimed at behavior change. While a small literature on motivations for pro-social driving is emerging (Kaye et al., 2022), more work is needed to better understand how to effectively foster these types of behaviors.

Mitigating Negative Emotions while Driving

The current body of literature regarding the relationship between emotions and aggressive driving largely focuses on anger (Edwards et al., 2013; Vallières et al., 2014). The findings of the current study suggest, however, the need to also consider other emotions, particularly anxiety, in discussions around aggressive driving and road rage. Indeed, the results from the national survey indicated that nearly half of drivers felt anxious during the last time they engaged in aggressive driving. There is evidence of an increasing trend in anxiety among American adults more broadly (Goodwin et al., 2020). Another possible explanation for the high prevalence of anxiety in this study may relate to an evolution in emotional granularity, the way people generally describe and speak about their emotions, pointing to an expanding lexicon and ability to fully identify and verbalize the emotions they experience. It is plausible that previous aggressive driving research describing anger also encapsulated (unintentionally) the emotion of anxiety without ever teasing apart the nuances between the two emotions.

Given the major role that anger and anxiety play in aggressive driving and road rage, coping mechanisms and response modulation strategies are promising methods of mitigating the effects of aggressive driving (Shamoa-Nir, 2023). In focus group discussions, drivers indicated that they used many different coping mechanisms, which echoed in the literature, including relaxation practices (taking deep breaths, repeating a mantra or calming words, and thinking soothing thoughts) (Deffenbacher, 2016), and

environmental soothing (encompassing changes like adjusting the temperature) (Chung et al., 2019).

Bjureberg & Gross (2021) have identified knowing and understanding one's triggers and stressors, like encountering traffic congestion or roundabouts, as a key prevention method in combatting road rage. Their study investigated the effects of using problem-focused and emotion-focused strategies to take actions to handle stressful situations. Problem-focused strategies include, defining the problem and coming up with alternatives or solutions, like pulling over to let a driver that is irritating you pass. Emotion-focused strategies aim to decrease emotional stress and include methods like selective attention (e.g., ignoring conflict and focusing on driving safely), abstaining from aggressive driving events, or finding value in such events (i.e., the "silver lining"). Findings indicated that drivers that employ problem-focused strategies may be less inclined to react violently (Bjureberg & Gross, 2021; Shamoa-Nir, 2023). Additionally, research has also suggested the benefits of practicing mindfulness to alleviate the prevalence and effects of driving anger and aggressive driving. Mindfulness has been found to have a negative association with both driving anger and aggression, making it a likely to be effective for driving anger (Stephens et al., 2018). One approach is cognitive reappraisal, or thinking about other drivers, their goals, and circumstances to prevent them from angering you (Deffenbacher, 2016). An example of this would be dismissing a speeding driver, by thinking "maybe they are on their way to the hospital."

Road Rage is More Than Angry Driving

Expert panel discussions highlighted difficulties in defining "road rage" and flagged concerns that it is not always differentiated from aggressive driving in popular discourse, a concern that was validated by analysis of open-ended survey data. Expert panelists and much of the academic literature characterizes road rage as a hostile confrontation that goes beyond angry or aggressive driving, a concept focus group participants referred to as an "overreaction" to a driving scenario. As much of the literature notes, perhaps a useful differentiation between road rage and aggressive driving is intention to cause harm. While aggressive driving includes a disregard for the safety of other road users, road rage is always accompanied by the intention to inflict physical, psychological, or emotional harm on other road users. For example, a driver who repeatedly switches lanes without signaling may be perceived as driving aggressively, but a driver who decides to follow and stalk a vehicle on the road for a long distance exhibits road rage behavior.

More specifically, indicative terms may be necessary to make this difference more distinguishable. The term "state driving anger" describes situational or momentary anger experienced by drivers and is frequently associated with aggressive driving behaviors within academic discourse (Deffenbacher, 2016). And while aggressive driving and anger are rightfully discussed in tandem, using anger alone to describe road rage

does not fully encapsulate focus group participants characterization of road rage drivers "doing too much," i.e., responding to a driving scenario in a way that crossed the line from an angry reaction to a threating one.

The analysis of respondents' interpretation of the term "road rage" in the national survey revealed the American drivers did not discriminate between road rage and aggressive driving. This is underscored by the drastic difference in the mention of "aggressive driving" 643 times, compared to 258 mentions of words that indicate or imply violence (e.g., "guns," "fight," "kill") when asked "What does the term 'road rage' mean to you?" This helps support the need for a transition to a different phrase to better encompass the meaning of road rage. The expert panelist supported the phrase "violent driving," which better captures the intent to harm another road user and associated danger that separates road rage from aggressive driving. More research is required to understand if a term like "violent driving" would be accepted as a replacement term for road rage or resonate with the driving public.

Strengths and Limitations

Notably, this study's approach to examining aggressive driving and road rage had several strengths and limitations. The SEM framework provided a useful way to organize the information of the contributing factors and correlates, and identified key gaps in knowledge around the role of the vehicle-level and community-level influences on aggressive driving. Involving expert panelists in discussions around study methodology and theoretical framework helped ensure the utility of this work. Both qualitative and quantitative analyses provided valuable insights independently, but triangulating findings from the two different approaches provided a more nuanced picture of what aggressive driving and road rage looks like in 2025. However, there are some threats to the representativeness of this work. Notably, the perspectives of older participants and drivers without a high school diploma were not captured in the qualitative work. While steps were taken to minimize sampling error, survey data may be subject to other forms of bias if (a) people who were unable to be contacted or refused to participate in the survey differ from respondents in ways that affect their attitudes towards or engagement in aggressive driving, and (b) if participants did not properly understand survey questions or misreported information deliberately.

Next Steps

Findings from this study pointed to some possible solutions to tackle aggressive driving and some useful avenues for future research. Place-based solutions are a promising approach to alter the road environment in a way that reduces driver tensions and may also help shift local cultures of aggressive driving. Findings suggest that encouraging positive driving etiquette/good manners may be a fruitful way to reduce aggressive driving. Future work could focus on best practices to encourage pro-social

and altruistic driving. Problem-focused and emotion-focused strategies are potentially useful methods to mitigate negative driver emotions, but more work is need on how to incorporate the role of anxiety in strategies to reduce aggressive driving behavior. Finally, this study speculates that there may be a role for vehicle solutions to reduce aggressive driving, but more research is needed to better understand the influence of vehicle design on driving styles.

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Appendix A: Focus Group Screener Questionnaire and Qualifications

Focus Group Screener Questionnaire

1. What is your gender identity? **(RECRUIT A MIX)**

    1. FEMALE
    2. MALE
    3. TRANSGENDER
    4. NON-BINARY
    5. REFUSED

2. What is your age, please? **(RECRUIT A MIX)**

    1. UNDER 19 **(TERMINATE)**
    2. 19-24
    3. 25-34
    4. 35-44
    5. 45-54
    6. 55-64
    7. 65+
    8. REFUSED

3. Which of the following best describes your racial or ethnic background? **(RECRUIT A MIX)**

    1. WHITE, NON-HISPANIC
    2. BLACK, NON-HISPANIC
    3. AMERICAN INDIAN
    4. ASIAN
    5. ALASKA NATIVE, NATIVE HAWAIIAN, PACIFIC ISLANDER
    6. OTHER, NON-HISPANIC
    7. HISPANIC
    8. DO NOT KNOW
    9. REFUSED

4. What was the last grade of school you completed? **(RECRUIT A MIX)**

    1.   LESS THAN A HIGH SCHOOL GRADUATE

    2.   HIGH SCHOOL GRADUATE

    3.   SOME COLLEGE

    4.   GRADUATED COLLEGE

    5.   GRADUATE SCHOOL OR MORE

    6.   TECHNICAL SCHOOL/OTHER

    7.   REFUSED

5. Which of the following best describes your current employment status? **(RECRUIT A MIX)**

    1.   EMPLOYED FULL-TIME

    2.   EMPLOYED PART-TIME

    3.   RETIRED

    4.   HOMEMAKER/ DO NOT WORK

    5.   STUDENT

    6.   TEMPORARILY UNEMPLOYED

    7.   DISABLED/HANDICAPPED AND NOT WORKING

    8.   OTHER: _____

    9.   REFUSED

6. What state do you live in? **(RECRUIT A MIX)**

7. Would you consider the community you live in to be urban, suburban, or rural? **(RECRUIT A MIX)**

    1.   URBAN

    2.   SUBURBAN

    3.   RURAL

    4.   REFUSED

8. Do you usually drive at least once a week?

    1.   YES

    2.   NO

    3.   REFUSED

9. We are now going to ask you some questions about how you drive. Tailgating is defined as driving very close to another vehicle to get that driver to speed up or move over. Thinking back to the previous month, how often did you tailgate another vehicle?

    1. NEVER
    2. OCCASIONALLY
    3. MORE THAN OCCASIONALLY
    4. REFUSED

10. Thinking back to the previous month, how often did you weave in and out of traffic?

    1. NEVER
    2. OCCASIONALLY
    3. MORE THAN OCCASIONALLY
    4. REFUSED

11. Brake checking is defined as suddenly and deliberately applying your brakes in order to force the vehicle following you to slow down or stop unexpectedly. Thinking back to the previous month, how often did you brake check another vehicle?

    1. NEVER
    2. OCCASIONALLY
    3. MORE THAN OCCASIONALLY
    4. REFUSED

12. Thinking back to the previous month, how often did you cut off another vehicle on purpose?

    1. NEVER
    2. OCCASIONALLY
    3. MORE THAN OCCASIONALLY
    4. REFUSED

13. Thinking back to the previous month, how often did you threaten to harm another person, driver, or vehicle from the safety of your vehicle?

    1.   NEVER
    2.   OCCASIONALLY
    3.   MORE THAN OCCASIONALLY
    4.   REFUSED

14. Thinking back to the previous month, how often did you use your vehicle as a weapon to harm or damage another person or vehicle?

    1.   NEVER
    2.   OCCASIONALLY
    3.   MORE THAN OCCASIONALLY
    4.   REFUSED

15. Do you have a driver's license?

    1.   YES
    2.   NO
    2.   REFUSED

16. Would you be comfortable sharing your driving experiences in a group setting?

    1.   YES
    2.   NO
    3.   REFUSED

17. Do you currently have a working computer with High Speed/Broadband Internet connection in your home that you can access in the evening?

    1.   YES
    2.   NO
    3.   DON'T KNOW/REFUSED

18. Are you willing to keep your camera on for the entire duration of the focus group?

    1.   YES
    2.   NO
    3.   REFUSED

Focus Group Qualifications

Drivers Who Have Engaged in Road Rage (1 Group) (5-7 participants)

- Qualifications:

  o Answers "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 13
  o Or Answers "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 14

Drivers Who Occasionally Engage in Aggressive Driving (2 Groups) (10-14 participants)

- Qualifications:

  o Answers "OCCASIONALLY" to Question 9
  o Or answers "OCCASIONALLY" to Question 10
  o Or answers "OCCASIONALLY" to Question 11
  o Or answers "OCCASIONALLY" to Question 12

Drivers Who Habitually Engage in Aggressive Driving (3 Groups) (15-21 participants)

- Qualifications:

  o Answers "MORE THAN OCCASIONALLY" to Question 9
  o Or answers "MORE THAN OCCASIONALLY" to Question 10
  o Or answers "MORE THAN OCCASIONALLY" to Question 11
  o Or answers "MORE THAN OCCASIONALLY" to Question 12

Drivers Who Either Occasionally or Habitually Engage in Aggressive Driving (2 Groups) (10-14 participants)

- Qualifications:

    o Answers either "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 9
    o Or answers either "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 10
    o Or answers either "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 11
    o Or answers either "OCCASIONALLY" or "MORE THAN OCCASIONALLY" to Question 12

- Please recruit at least 2 occasionally aggressive drivers (answers "OCCASIONALLY") and 2 habitually aggressive drivers (answers "MORE THAN OCCASIONALLY") for these focus groups.

Appendix B: All Focus Group Topic Guide Questions

- What are some of the more common aggressive driving behaviors you witness other drivers doing?

- What are some of the most infuriating behaviors you've seen other drivers do on the road?

- Are there any other driving behaviors do you find aggressive that we have not talked about yet?

- Do you think there are any vehicles that drive more aggressively than others?

- When you are driving, what vehicles tend to make you the angriest?

- Do you think there are any types of people that drive more aggressively than others?

- When did you learn to drive and who taught you?

- What situations do you find yourself driving more aggressively?

- What motivates you to drive more aggressively?

- Think about a time when you drove aggressively. How did it make you feel?

- What stops you from driving aggressively?

- Think about a situation where you have been on the receiving end of driver aggression. How did you react? Does this experience affect you as you go through the rest of your day?

- What do you think of when you hear the term "street racing"?

- Is "street racing" the same thing as aggressive driving, or is it different?

- What kind of messaging or influence would convince drivers to reduce aggressive driving behavior?

- What is something other drivers do that annoys you?

- Is road etiquette important to you?

- How did you learn driving manners? Please provide an example.

- What do you wish people would do more if when driving around you?

- Tell us about a time another driver yelled at you (either verbally or by honking their horn excessively). How did you react?

- Do you ever safely retaliate?

- What feels good about driving aggressively?

- What feels bad about driving aggressively?

- How do you respond to situations that make you angry on the road? Are there certain situations that you think you are more likely to react to?

- Think about a time when you've been tailgated. How did it make you feel? What about tailgating made you feel like that?

- Think about a time where someone brake checked you. How did it make you feel? What is it about brake checking that made you feel like that?

- When was the last time you've threatened someone while driving? Describe what happened in that situation. We're interested in how you were feeling and what prompted you to threaten the other driver.

- Does anyone want to admit to participating in a behavior you wouldn't want your boss to find out about?

- Has anyone ever considered carrying a weapon in your vehicle?

- Would you be comfortable riding in a vehicle where you or another passenger was carrying a weapon?

- What would make you think twice about driving aggressively?

- What does the term road rage mean to you?

- Is road rage different than aggressive driving?

- How do you stop yourself from driving aggressively?

- We have discussed quite a lot today. What have we missed that you think is important for us to know about?

Appendix C: AAA Foundation for Traffic Safety Aggressive Driving and Road Rage Questionnaire

Note: Whenever participants chose the option Other, the prompt "your answers to these questions are very important to us" was shown.

Q1: ALL RESPONDENTS

Have you driven in the **past 30 days** since [INSERT CURRENT DATE MINUS 30 DAYS]?

1. Yes
2. No [TERMINATE]

Q2: ALL RESPONDENTS

How big of a problem do you think aggressive driving is now compared to recent years?

1. Much bigger problem today
2. Somewhat bigger problem today
3. About the same
4. Somewhat smaller problem today
5. Much smaller problem today
6. I don't think aggressive driving is a problem

Q3: ALL RESPONDENTS

Thinking back over the past year since [INSERT CURRENT DATE MINUS 365 DAYS], how often...? [RANDOMIZE ORDER OF BEHAVIORS]

a) Has another driver yelled at you
b) Has another driver made an angry gesture (for example: middle finger) at you
c) Has another driver glared at you in response to something you did on the road
d) Has another driver tried to block you from changing lanes
e) Has another driver cut you off on purpose
f) Has another driver honked their horn at you for doing something inappropriate (not to avoid an accident)
g) Have you seen other drivers overtake traffic by weaving in and out of lanes
h) Has another driver driven very close to you to get you to speed up or move over
i) Has another driver tapped their brakes on purpose in front of you for following them too closely
j) Has another driver sped up on purpose to prevent you from passing them
k) Has another driver flashed their high beams at you so that you would get out of the way
l) Has another driver passed you using the right (slow) lane
m) Have you seen other drivers use the shoulder lane or median to get around traffic
n) Have you seen other drivers speed up when the traffic light was changing from yellow to red

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q4: ALL RESPONDENTS

How would you describe the level of police enforcement of aggressive driving in your area?

1. There is not enough police enforcement
2. The level of police enforcement is about right
3. There is too much police enforcement

Q5: ALL RESPONDENTS

How often do you see the following types of vehicles driving aggressively?

a) Pickup trucks
b) 18-Wheelers
c) Motorcycles
d) Luxury cars
e) Sports cars
f) Taxis
g) Electric vehicles
h) Sport Utility Vehicles (SUVs)
i) Vans
j) Minivans
k) Sedans

Response Options:

1. Often
2. Sometimes
3. Rarely
4. Not at all

Q6. ALL RESPONDENTS

How often do you think you drive aggressively?

1. Always
2. Often
3. Sometimes
4. Rarely
5. Not at all

Q7: IF Q6 NOT = 5

How often are each of the following reasons for driving aggressively true for you?

a) To get to where I'm going faster
b) To show passengers that I am a good driver
c) Because it makes me feel more in control
d) To avoid dangerous situations on the road
e) To punish other drivers for their actions
f) Because it's fun
g) Because of something that happened on the road
h) Because of something else in my life

Response Options:

1. Always
2. Often
3. Sometimes
4. Rarely
5. Not at all

Q8: IF Q6 NOT = 5

Thinking about the last time you drove aggressively, did you feel any of the following emotions:

a) Angry
b) Anxious
c) Annoyed
d) Frustrated
e) Scared
f) Confident
g) Chaotic
h) Calm
i) Pleasure
j) Empowered
k) Guilty
l) Nervous

Response Options:

1. Yes
2. No

Q9: ALL RESPONDENTS

How often do you stop yourself from driving as aggressively as you want to?

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

Q10: IF Q9 NOT = 5

Why do you stop yourself from driving aggressively? (Check all that apply)

1. Because driving aggressively is not the right thing to do
2. To set a good example for other passengers in the vehicle
3. Because I want passengers to feel safe
4. Because I don't want to get caught by the police
5. Because I am concerned another driver might retaliate
6. Because I am concerned about getting in an accident
7. Because I'm worried someone might recognize me
8. Other, please specify [TEXTBOX]

Q11: IF Q9 NOT = 5

What strategies do you use to stop yourself from driving aggressively when you are tempted? (Check all that apply)

1. Focus on breathing
2. Call a family member or friend
3. Remind myself of the potential consequences of driving aggressively
4. Adjust the temperature in the vehicle
5. Roll down the windows
6. Let other vehicles pass
7. Have a drink or snack
8. Repeat a mantra, positive affirmation, or calming phrase
9. Curse under my breath
10. Listen to music, podcasts, or audiobooks
11. Drive in silence
12. Other, please specify [TEXTBOX]

Q12: ALL RESPONDENTS

Please indicate how your driving compares to others:

a) Compared to most people I know, I drive…
b) Compared to most drivers in my local area, I drive…

Response Options:

1. Much more aggressively
2. Somewhat more aggressively
3. About the same
4. Somewhat less aggressively
5. Much less aggressively

Q13: ALL RESPONDENTS

How would you rate your ability to drive safely compared to:

a) Most people you know
b) Most drivers in your local area

Response Options:

1. Excellent
2. Good
3. About the same
4. Poor
5. Very poor

Q14: ALL RESPONDENTS

Please indicate how your driving changes in each situation:

a) When my children are in the vehicle, I drive...
b) When my friends are in the vehicle, I drive...
c) When my spouse/partner is in the vehicle, I drive...
d) During rush hour, I drive...
e) When I get stuck in unexpected traffic, I drive...
f) When it rains, I drive...
g) When I see a police officer, I drive...

Response Options:

1. Much more aggressively
2. Somewhat more aggressively
3. About the same
4. Somewhat less aggressively
5. Much less aggressively
6. Not applicable

Q15: ALL RESPONDENTS

In the past year since [INSERT CURRENT DATE MINUS 365 DAYS], how often…?
[RANDOMIZE ORDER OF BEHAVIORS]

a) Have you yelled at another driver
b) Have you made an angry gesture (for example: middle finger) at another driver
c) Have you glared at another driver in response to something they did on the road
d) Have you honked your horn when another driver did something inappropriate (not to avoid an accident)
e) Have you flashed your high beams at a slower vehicle so that it would get out of your way
f) Have you passed other vehicles using the right (slow) lane
g) Have you recorded another driver's behavior using a phone, dashcam or other recording device in response to something they did on the road
h) Have you intentionally parked in more than one parking space
i) Have you driven 15 miles per hour faster than the normal flow of traffic
j) Have you tried to block another driver from changing lanes
k) Have you prevented another vehicle from merging into traffic in front of you
l) Have you cut off another vehicle on purpose
m) Have you overtaken traffic by weaving in and out of lanes
n) Have you driven very close to another vehicle to get that driver to speed up or move over
o) Have you tapped your brakes on purpose when another car was following too closely
p) Have you sped up on purpose to prevent another driver from passing you
q) Have you driven in the shoulder lane or median to get around traffic
r) Have you sped up when the traffic light was changing from yellow to red
s) Have you merged into traffic even when another driver tried to close the gap between cars
t) Have you slowed down on purpose when another driver clearly wanted you to speed up
u) Have you spontaneously "raced" other vehicles while driving

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q16: ALL RESPONDENTS

In the **past year** since [INSERT CURRENT DATE MINUS 365 DAYS], how often…?

If you have been driving for less than a year, please think back to when you first started driving.

a) Have you yelled at another driver
b) Have you made an angry gesture (for example: middle finger) at another driver
c) Have you tried to block another driver from changing lanes
d) Have you cut off another vehicle on purpose
e) Have you honked your horn when another driver did something inappropriate (not to avoid an accident)
f) Have you driven very close to another vehicle to get that driver to speed up or move over

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q17: ALL RESPONDENTS

How important is it to you…

a) for you to have good manners while driving?
b) for other drivers to have good manners while driving?

Response Options:

1. Extremely
2. Very
3. Somewhat
4. A little bit
5. Not at all

Q18: ALL RESPONDENTS

How does your driving compare to other drivers in your local area?

1. I drive with better manners than others in my area
2. I drive with similar manners to others in my area
3. I drive with worse manners than others in my area

Q19: ALL RESPONDENTS

Please compare the manners of drivers in your area to other places.

1. Drivers in my area have better manners than other places I have driven
2. Drivers in my area have similar manners to other places I have driven
3. Drivers in my area have worse manners than other places I have driven

Q20: ALL RESPONDENTS

What does the term "road rage" mean to you? Please briefly describe. [TEXTBOX]

Q21: ALL RESPONDENTS

How much of a problem do you think road rage is now compared to recent years?

1. Much bigger problem today
2. Somewhat bigger problem today
3. About the same
4. Somewhat smaller problem today
5. Much smaller problem today
6. I don't think road rage is a problem

Q22: ALL RESPONDENTS

Do you think road rage is more or less of a threat to your personal safety than...?

a) Alcohol-impaired driving
b) Drug-impaired driving
c) Distracted driving
d) Drowsy driving
e) Speeding

Response Options:

1. Much more of a threat
2. Somewhat more of a threat
3. About the same
4. Somewhat less of a threat
5. Much less of a threat

Q24: ALL RESPONDENTS

Think back to a time when you felt threatened by another driver. What actions did you take to reduce the threat of violence? (Check all that apply)

1. Taken another route
2. Remain silent
3. Avoid eye contact
4. Let someone else go first
5. Pulled over
6. Locked the car and/or windows
7. Other, please specify [TEXTBOX]
8. I did not take any action to reduce the threat of violence
9. I've never felt threatened by another driver

Q25: ALL RESPONDENTS

In the **past year** since [INSERT CURRENT DATE MINUS 365 DAYS], how often…[RANDOMIZE ORDER OF BEHAVIORS]

a) Has another driver bumped your vehicle on purpose
b) Has another driver forced your vehicle off the road
c) Has another driver followed you because of something you did on the road
d) Has another driver gotten out of their vehicle to confront you

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q26: ALL RESPONDENTS

Now we would like you to think back a little further. Has another driver **ever**:

a) Bumped your vehicle on purpose
b) Forced your vehicle off the road
c) Followed you because of something you did on the road
d) Gotten out of their vehicle to confront you

Response Options:

1. Yes
2. No

Q27: ALL RESPONDENTS

Have you ever felt like you wanted to threaten another driver?

1. Yes
2. No

Q28: IF Q27 = 1

Have you ever threatened another driver?

1. Yes
2. No

Q29: IF Q27 = 1 AND Q28 = 2

Why did you stop yourself from threatening another driver? (Check all that apply)

1. Because threatening another driver was not the right thing to do
2. To set a good example for other passengers in the vehicle
3. Because I wanted passengers to feel safe
4. Because I didn't want to get caught by the police
5. Because I was concerned the driver might get revenge
6. Because I was concerned about getting in an accident
7. Because I was worried someone I know might see me acting that way
8. Other, please specify [TEXTBOX]

Q30: ALL RESPONDENTS

In the **past year** since [INSERT CURRENT DATE MINUS 365 DAYS], how often…
[RANDOMIZE ORDER OF BEHAVIORS]

a) Have you bumped another vehicle on purpose
b) Have you forced another vehicle to drive off the road
c) Have you followed another vehicle with the intention of confronting a driver (whether you actually confronted them or not)
d) Have you gotten out of your vehicle to confront another driver

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q31: ALL RESPONDENTS

Now we would like you to think back a little further. Have you **ever**:

[SAME RANDOM ORDER OF BEHAVIORS AS Q30]

a) Bumped another vehicle on purpose
b) Forced another vehicle off the road
c) Followed another vehicle with the intention of confronting a driver (Whether you actually confronted them or not)
d) Gotten out of your vehicle to confront another driver

Response Options:

1. Yes
2. No

Q32: ALL RESPONDENTS

Do you personally know anyone who has been injured or killed in a road rage incident?

1. Yes
2. No

Q33: ALL RESPONDENTS

Do you personally know anyone who has been threatened by a weapon in a road rage incident?

1. Yes
2. No

Q34: ALL RESPONDENTS

The next few questions ask about street racing events on **public roads**, which can take many different forms:

The first is street takeovers (also sometimes called sideshows or exhibition driving). These are organized or semi-organized events, usually at night, in which drivers take

over an intersection or part of a **public road** and take turns doing donuts or other vehicle stunts in front of spectators.

The second is drag racing on a **public road**. This is an organized or semi-organized speed competition on a **public road** in front of spectators where two or more vehicles start at the same place and race to a finish line.

The third is when drivers weave through traffic at high speeds and/or intentionally make difficult maneuvers while racing another driver. They may record their performance to post on social media.

Thinking back to the **past year** since [INSERT CURRENT DATE MINUS 365 DAYS] have often have you noticed…

a) Street takeovers, sideshows, or exhibition driving in your neighborhood?
b) Illegal drag racing in your neighborhood?
c) Drivers weaving through traffic at high speeds or making difficult maneuvers in your neighborhood?

Response Options:

1. Regularly
2. Fairly often
3. Rarely
4. Just once
5. Never

Q35: ALL RESPONDENTS

Thinking back to the **past year** since [INSERT CURRENT DATE MINUS 365 DAYS] have you noticed any other forms of illegal street racing in your neighborhood?

1. Yes, please specify [TEXTBOX]
2. No

Q36: ALL RESPONDENTS

Now we want you to think back even further. Have you **ever** watched an illegal street racing event in person?

1. Yes, I attended an event intentionally
2. Yes, but not intentionally
3. No

Q37: ALL RESPONDENTS

Have you **<u>ever</u>** been a driver in a street racing event on a public road?

1. Yes
2. No

Q38: ALL RESPONDENTS

How concerned are you, if at all, about street racing on public roads in your state?

1. Extremely concerned
2. Very concerned
3. Somewhat concerned
4. Slightly concerned
5. Not at all concerned
6. I don't know

Q39: ALL RESPONDENTS

How big of a problem, if at all, do you think illegal street racing is now compared to recent years?

1. Much bigger problem today
2. Somewhat bigger problem today
3. About the same
4. Somewhat smaller problem today
5. Much smaller problem today
6. I do not think illegal street racing is a problem

Q40: ALL RESPONDENTS

How often do you drink alcohol?

1. Daily
2. Weekly
3. Monthly
4. Occasionally
5. Rarely
6. Never

Q41: ALL RESPONDENTS

How often do you use marijuana or cannabis?

1. Daily
2. Weekly
3. Monthly
4. Occasionally
5. Rarely
6. Never

Q42: ALL RESPONDENTS

How many days do you typically drive in a normal 7-day week?

Response Options:

[DROPDOWN RANGE 0-7]

Q43: ALL RESPONDENTS

What is the make, model, and year of the vehicle you drive most often?

1. Make: [TEXTBOX]
2. Model [TEXTBOX]
3. Year [DROPDOWN RANGE "2025 or newer" BACKWARDS TO 1990, "Older than 1990"]

Q44: ALL RESPONDENTS

Which of the following best describes this vehicle?

1. I have to fill it up with gas (or diesel or bio-diesel) at a gas station
2. I have to plug it in to charge with electricity- it does not use gas
3. I can fill it up with gas or plug it in to charge it with electricity

Q45: IF Q44 = 1

Is it a hybrid?

1. Yes
2. No
3. I don't know

Q46: ALL RESPONDENTS

The vehicle I drive most frequently is...

1. Owned
2. Rented
3. A company vehicle
4. Borrowed from friends or family

Q47: ALL RESPONDENTS

Please indicate how true the following statements are for you.

a) I see my vehicle as a sanctuary from daily life
b) I see my vehicle as an extension of my personality
c) I have important conversations in my vehicle
d) I feel safe in my vehicle
e) I spend money on my vehicle to make it look good
f) I make sure to follow the suggested maintenance schedule for my vehicle
g) Other drivers would not be able to recognize me outside of my vehicle

Response Options:

1. Almost always true
2. Usually true
3. Often true
4. Occasionally true
5. Rarely true

Q48: ALL RESPONDENTS

Have you named the vehicle you drive most often?

1. Yes, please specify name [TEXTBOX]
2. No

Q49: ALL RESPONDENTS

Do you have any bumper stickers, magnets, decals, or a personalized license plate on the vehicle you drive most often?

1. Yes
2. No

Q51: ALL RESPONDENTS

How often do you carry a gun in your vehicle?

1. Always
2. Sometimes
3. Never

Q51: ALL RESPONDENTS

The next few questions will ask you to think back over the **past 2 years** since [CURRENT DATE MINUS 730 DAYS].

How many accidents have you been involved in while you were driving? (Count all accidents, even if they were not your fault)

Response Option:

[TEXTBOX]

Q52: ALL RESPONDENTS

Have you received a ticket after having been pulled over by the police for speeding, driving under the influence, distracted driving, reckless driving, or running a red light or stop sign in the **past 2 years**?

Response Option:

[TEXTBOX]

Q53: ALL RESPONDENTS

Have you received a ticket in the mail after your car was caught on camera for speeding or red light running in the **past 2 years**?

  a) Speeding [TEXTBOX]
  b) Red light running [TEXTBOX]
  c) Other violation, please specify [TEXTBOX]

Appendix D: Factor Analysis

An exploratory factor analysis used responses to questions around engagement in aggressive driving and road rage behaviors to investigate whether there are any unobserved constructs underlying engagement. The approach condenses the data to a smaller set of dimensions that best explains the correlation and covariance structure of the survey responses to the engagement questions. Before running the factor analysis, all respondents with a missing value for any of the self-reported behavior questions were dropped, leaving a total of 3,005 respondents out of a possible 3,020. The analysis used a principal component factor method to analyze the correlation matrix, explored different oblique rotations to maximize interpretability while allowing for correlation between factors, and used survey weights to account for different probabilities of selection into the survey and nonresponse.

The factor analysis identified four different factors with eigen values greater than 1, indicating four different dimensions of aggressive driving. A promax rotation provided the best-defined factor structure. The four factors explained 80% of the variance. Factor loadings are presented in Table D.1. Factor loadings represent the relationship between observed measures and the underlying dimensions of aggressive driving, with higher loadings indicating a stronger relationship between the measure and the factor.

Table D.1 Factor Loadings

	Factor1	Factor2	Factor3	Factor4
Have you yelled at another driver	0.1	0.0	0.1	**0.7**
Have you made an angry gesture (for example: middle finger) at another driver	0.2	−0.1	0.1	**0.7**
Have you glared at another driver in response to something they did on the road	0.0	0.2	−0.1	**0.7**
Have you honked your horn when another driver did something inappropriate (not to avoid an accident)	−0.1	0.1	0.0	**0.7**
Have you flashed your high beams at a slower vehicle so that it would get out of your way	0.2	0.1	0.2	0.3
Have you passed other vehicles using the right (slow) lane	−0.2	**0.8**	0.1	0.1
Have you recorded another driver's behavior using a phone, dashcam or other recording device in response to something they did on the road	0.1	−0.1	0.3	0.3

	Factor1	Factor2	Factor3	Factor4
Have you intentionally parked in more than one parking space	0.4	−0.1	0.3	0.0
Have you driven 15 miles per hour faster than the normal flow of traffic	0.0	**0.7**	0.0	0.1
Have you tried to block another driver from changing lanes	0.6	0.1	0.0	0.1
Have you prevented another vehicle from merging into traffic in front of you	0.4	0.3	−0.1	0.1
Have you cut off another vehicle on purpose	**0.6**	0.2	0.2	0.0
Have you overtaken traffic by weaving in and out of lanes	0.3	**0.5**	0.1	−0.1
Have you driven very close to another vehicle to get that driver to speed up or move over	0.3	**0.5**	0.0	0.0
Have you tapped your brakes on purpose when another car was following too closely	**0.6**	−0.2	−0.1	0.2
Have you sped up on purpose to prevent another driver from passing you	**0.6**	0.3	−0.1	0.0
Have you driven in the shoulder lane or median to get around traffic	**0.5**	0.1	0.2	−0.1
Have you sped up when the traffic light was changing from yellow to red	0.1	**0.7**	−0.1	0.0
Have you merged into traffic even when another driver tried to close the gap between cars	0.3	0.4	0.0	0.0
Have you slowed down on purpose when another driver clearly wanted you to speed up	**0.7**	−0.1	−0.1	0.2
Have you spontaneously "raced" other vehicles while driving	**0.6**	0.1	0.2	−0.1
Have you bumped another vehicle on purpose	0.0	0.0	**0.9**	−0.1
Have you forced another vehicle to drive off the road	0.0	0.0	**0.9**	0.0
Have you followed another vehicle with the intention of confronting a driver (whether you actually confronted them or not)	0.0	0.0	**0.8**	0.1
Have you gotten out of your vehicle to confront another driver	0.0	0.0	**0.9**	0.1

*Factor loadings >0.5 are in **bold***

Results indicate four dimensions of aggressive driving. The interpretation of these four dimensions aligned with some of the themes present in the qualitative analysis of

the focus group discussions. Measures with high factor loadings on Factor 1 include behaviors that **control other driver behavior** such as cutting off, brake checking, slowing down on purpose when another driver wants you to speed up, and speeding up on purpose to prevent passing. Other measures with high factor loadings on Factor 1 are racing and driving on the shoulder or median. Many of the measures with high factor loadings on Factor 2 represent **trying to get ahead** of other traffic such as driving more than 15 MPH over the normal flow of traffic, red-light running, weaving in and out of lanes, and tailgating. Measures with high factor loadings on Factor 3 denote **violence** including bumping another vehicle, forcing another vehicle off the road, and following and getting out of the vehicle to confront another driver. Finally, measures that describe **expressions of displeasure** including yelling, glaring, honking, and angry gestures have high factor loadings on Factor 4.

Appendix E: Self-reported Frequency of Aggressive Driving Behaviors in the Past Year, United States, 2016

Behavior	Regularly	Fairly Often	Rarely	Just Once	At Least Once
			Row %, Weighted		
Tailgated another vehicle	1.8	7.4	37.1	4.5	50.8
Yelled at another driver	2.7	9.1	27.9	6.9	46.6
Honked to show annoyance or anger	1.3	5.7	28.0	9.4	44.5
Made an angry gesture	1.0	3.4	19.5	8.7	32.5
Tried to block from changing lanes	0.7	3.1	14.1	6.2	24.1
Cut off another vehicle on purpose	0.3	1.1	7.3	3.1	11.9
Exited vehicle to confront another driver	0.2	0.7	1.6	1.3	3.7
Bumped/rammed another vehicle on purpose	0.1	0.4	1.9	0.5	2.8

Base: 2,705 drivers age 16+ who reported driving in the past 30 days, weighted to reflect the U.S. population. Drivers with missing values were excluded where relevant.