



Measuring Minnesota's Traffic Safety Culture

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16. Abstract (Limit: 250 words) The goal of this study was to develop a survey methodology for Minnesota to measure state-level traffic-safety culture with three objectives: <div style="margin-left: 40px;"> <ol style="list-style-type: none"> 1. Index traffic-safety culture as a performance indicator. 2. Identify culture-based strategies to achieve safety targets. 3. Assess receptivity of social environment for planned strategies. </div> <p>The survey was designed around a definition of <u>safety culture</u> as “the socially constructed abstract system of meaning, norms, beliefs, and values.” (Myers et al., 2014; Reiman & Rollenhagen, 2014) Given that the majority of cases in which driver behavior is associated with fatal crashes can be presumed to be deliberate, these cognitions determine the intention to behave in either a safe or risky manner. This definition emphasizes that cognitions – shared by a group of people – influence the behavioral choices of the individual group members.</p> <p>The survey was designed to be implemented using a paper instrument mailed to households in Minnesota. The sample was based on a random sample of 10,000 Minnesota household addresses selected in November 2013 to cover all Area Transportation Partnership (ATP) boundary areas.</p> <p>The results indicate that many aspects of Minnesota are predictive of the level of engagement in both risky and protective behaviors. Often, the misperception that risk-taking is common and accepted increased the probability that individuals would decide to engage in risky behaviors themselves.</p> <p>The results are used to recommend strategies to increase concern about traffic safety overall and to reduce the incidence of risky behaviors in favor of safer choices.</p>			
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Table of Contents

Chapter 1 Introduction	1
1.1 Traffic-safety culture	1
1.2 Overview of Report.....	2
Chapter 2 Survey Development and Implementation.....	3
2.1 Survey Development.....	3
2.1.1 Section One: General Attitudes and Beliefs about Traffic Safety	3
2.1.2 Section Two: Specific Attitudes and Beliefs as Determinants of Selected Risky Behaviors.	4
2.2 Survey Implementation.....	9
2.3 Survey Sample	9
2.4 Survey Validation	10
2.4.1 Concurrent Validity: Comparison to Other Measures	10
2.4.2 Criterion Validity: Integrated Behavioral Model (IBM)	11
Chapter 3 Analysis	15
3.1 Overview of Analyses.....	15
3.2 Frequency Response Analysis.....	15
3.2.1 Overview	15
3.2.2 Process	16
3.2.3 Results.....	16
3.3 Predictive Models	17
3.3.1 Overview	17
3.3.2 Processes	18
3.3.3 Results.....	23
3.3.4 Summary	25
3.4 Actual and Perceived Norms	29
3.4.1 Overview	29
3.4.2 Process	30
3.4.4 Results.....	30
3.4.5 Summary	33
3.5 Unified Metric.....	34

3.5.1 Overview	34
3.5.2 Process	34
3.5.3 Summary	38
Chapter 4 Conclusion and Recommendations	39
4.1 Conclusion.....	39
4.2 Recommendations	40
4.2.1 General Strategies	40
4.2.2 Driving after Drinking	42
4.2.3 Seat Belt Use.....	43
4.2.4 Speeding.....	44
4.3 Next Steps	45
References.....	47

Appendix A: Survey

Appendix B: Survey Letters

Appendix C: Frequency Response

Appendix D: Detailed Overview of CART Analysis

Appendix E: Comparison of Mean Values of Responses Based on Number of Risky Driving Behaviors

Appendix F: Cultural Factors: Family Rules and Workplace Policies and Risky Behaviors

List of Figures

Figure 1.1 Traffic safety performance in Minnesota measures in terms of traffic fatalities.	1
Figure 2.1 Illustration of Integrated Behavior Model (IBM) that was used as framework for development of survey (adapted from Glanz, Rimer, & Viswanath, 2008).	5
Figure 2.2. Distribution of selected demographics in final sample of returned surveys.	10
Figure 3.1. Percentage of respondents indicating perceptions of "very concerned" about traffic safety.	17
Figure 3.2. Interpreted classification tree for drinking and driving (Q12a).	24
Figure 3.3. Interpreted classification tree for seat belt use (Q25a).	26
Figure 3.4. Interpreted classification tree for speeding (Q40a).	28
Figure 3.5. Actual Norms and Percentage of Respondents Misperceiving the Norm.	32
Figure 3.6. Risk ratios based on perception of descriptive norms (* < .05).	33
Figure 3.7. Cultural Factors Related to Driving After Drinking.	35
Figure 3.8. Cultural Factors Related to Seat Belt Use	35
Figure 3.9. Cultural Factors Related to Speeding	36
Figure 3.10. Concern for Traffic Safety Based on Engagement in Risky Behaviors	37
Figure 4.1. Example of using positive images to promote safe behaviors.	42
Figure 4.2. Example of positive messaging to communicate actual norm of safe behavior.	43
Figure 4.3. Example of leveraging cultural values with desired behavior.	44
Figure 4.4 Depiction of "Speed Lottery" representation of automatic speed enforcement (thefuntheory.com, 2009).	45
Figure 4.5. A program of integrated strategies across the social network (based on Allegrante, Hanson, Sleet, & Marks, 2010).	46

List of Table

Table 2.1 List of Survey Questions for each Specific Behavior to Measure the Contribution of each Component of the Integrated Behavior Model (IBM).	7
Table 2.2. Comparison of Survey Self-Reported Behaviors and Other Independent Sources of Reported and Observational Data.	11
Table 2.3. Correlations of IBM Components and Criterion Behavior of Driving after Drinking: "During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol? (0, 1, 2, 3, 4, 5, 6 or more times)."	12
Table 2.4. Correlations of IBM Components and Criterion Behavior of Wearing Seat belt:	13
Table 2.5. Correlations of IBM Components and Criterion Behavior of Speeding:	14
Table 3.1. Reporting of Top Three Ranked Transportation Issues.	16
Table 3.2. Common Set of Predictor Variables for Classification Tree Analyses.	19

Table 3.3. Specific Set of Predictor Variables for Drinking and Driving Classification Tree.	19
Table 3.4. Specific Set of Predictor Variables for Seatbelt Classification Tree.	20
Table 3.5. Specific Set of Predictor Variables for Speeding Classification Tree.	21
Table 3.6. Correlation of Important Variables with Driving and Drinking Behavior (Q12a).	24
Table 3.7. Correlation of Important Variables with Seat Belt Behavior (Q25a).	26
Table 3.8. Correlation of Important Variables with Speeding Behavior (Q40a).	28
Table 3.9. Strength of Relationship (Correlation) between Own Response (Actual Norm) and Perceived Response of Others (Perceived Norm).	31
Table 3.10. Percentage of Respondents Classified as Engaging in each Risk Behavior (N = 3204).	34
Table 3.11. Percentage of Respondents Classified as Engaging in Multiple Risky Behaviors (N = 3204).	36
Table 3.12. Categorical Representation of Survey Sample based on Concern for Traffic Safety.	37

Executive Summary

Currently, MnDOT analyzes performance in terms of outcome variables such as number of traffic fatalities. This project supplements this approach by providing a survey tool to measure the traffic-safety culture of Minnesota drivers that is presumed to underlie the behaviors that result in these crash fatalities.

The goal of this study was to develop a survey methodology for Minnesota to measure state-level traffic-safety culture with three objectives:

1. Index traffic-safety culture as a performance indicator
2. Identify culture-based strategies to achieve safety targets
3. Assess receptivity of social environment for planned strategies

The survey was designed around a definition of safety culture as “the socially constructed abstract system of meaning, norms, beliefs, and values” (Myers et al, 2014; Reiman & Rollenhagen, 2014). Given that the majority of cases in which the driver behavior associated with fatal crashes can be presumed to be deliberate, these cognitions determine the intention to behave in either a safe or risky manner. This definition emphasizes these cognitions – shared by a group of people – influence the behavioral choices of the individual group members.

The integrated behavior model (IBM) was used to operationalize this cognition-based definition of traffic-safety culture and guide development of the survey to measure the cultural determinants of each risky driving behavior. As shown in Figure 0.1, this model integrates several theories that predict intentional behaviors as well as other important concepts such as knowledge and skills, salience, environmental constraints, and habits (Glanz, Rimer, & Viswanath, 2008).

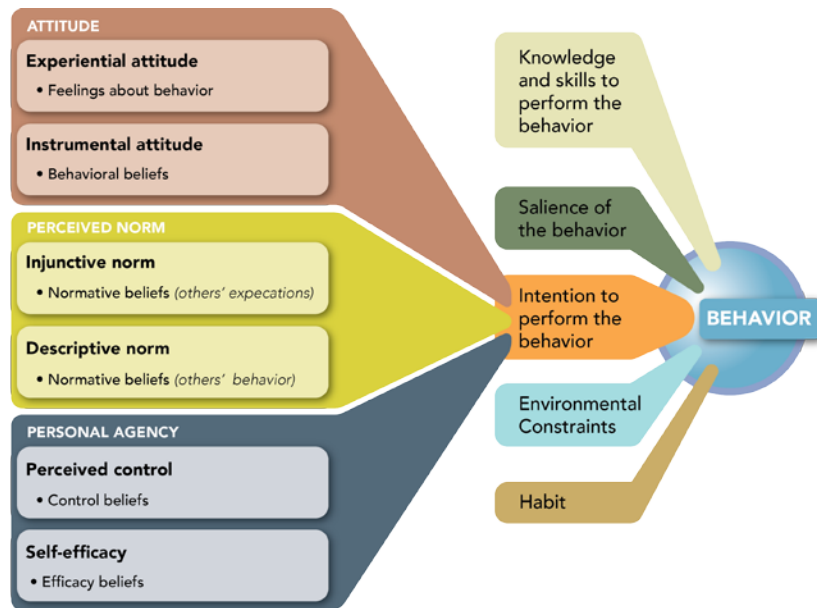


Figure 0.1. Illustration of Integrated Behavior Model (IBM) that was used as framework for development of survey (adapted from Glanz, Rimer, & Viswanath, 2008).

The survey was implemented using a paper instrument mailed to households in Minnesota. The sample was based on a random sample of 10,000 Minnesota household addresses selected in November 2013 to cover all Area Transportation Partner (ATP) Boundary areas.

In an effort to better understand traffic-safety culture in Minnesota, four separate analyses were performed on the survey data:

1. **Frequency Response:** This includes an analysis of the frequency and distribution of survey responses about general traffic safety in general.
2. **Predictive Models:** This analysis examines the best predictors of the self-reported risky behaviors.
3. **Actual and Perceived Norms:** This analysis examines the particular misperceptions about cultural norms and their association with an increase in reported propensity to engage in risky driving behaviors.
4. **Unified Metric:** This analysis sought to identify a single score metric of traffic-safety culture. The intent of this analysis was to provide an intuitive metric that could be used to track traffic-safety culture along with measuring trends in traffic fatalities in Minnesota.

A fundamental challenge for Minnesota to reach its goal of zero traffic fatalities is the fact that a significant percentage of its population does not perceive traffic safety to be the most important transportation issue. While some (34%) ranked traveler safety in the top three most important transportation issues, two-thirds did not. Moreover, nearly 40% of respondents did not agree that zero was the only acceptable number of fatalities on Minnesota roads. Fortunately, there is still concern among Minnesota residents about traffic safety. Indeed, one-third of respondents said they were “extremely concerned” about traffic safety.

- Driving after drinking was reported less frequently by those who:
 - Made plans to not drive after drinking
 - Felt that it was wrong to drive after drinking
 - Said that other people important to them felt it was wrong to drive after drinking
 - Recognized that impairment begins with the first sip of alcohol
- Seat belt use was more frequent among those who:
 - Felt responsible as a driver to ensure all passengers wore seat belts
 - Want the people they care about to wear a seatbelt
 - Had people they cared about who want them to wear a seat belt
 - Habitually think about the need to wear a seat belt
 - Believed it was important to protect themselves.
- Speeding was reported less often among those who:
 - Did not feel speeding to be enjoyable
 - Felt people should not speed and believed most other people felt the same way
 - Felt speeding was wrong and believed most other people felt the same way

The results are used to recommend strategies to increase concern about traffic safety overall and to reduce the incidence of risky behaviors in favor of safer choices.

General Traffic Safety

- Increase the perceived importance of traffic safety in Minnesota as well as the perceived feasibility of the zero deaths goal.
- Leverage the greater acceptance of the zero death goal among family and friends as a way to grow support for zero deaths among the population in general.
- Encourage workplaces to make transportation safety a critical component of workplace safety efforts. .

Driving after Drinking

- Begin all traffic safety communications to encourage both family and workplace rules prohibiting driving after drinking.
- Promote, educate, and support planning strategies (including choosing not to drink) as part of the “image” of the responsible drinker.
- Promote engagement of “bystanders” as a socially acceptable form of intervening to prevent people driving after becoming impaired in public places and social settings.
- Clearly establish that drinking and driving is a major traffic safety issue and that most adults do NOT engage in this risky behavior

Seat Belts

- Promote family rules that emphasize responsibility of drivers to ensure they and all passengers are wearing a seat belt.
- Similarly, promote workplace policies that emphasize responsibility of all employees to ensure everyone is wearing a seat belt during commute driving and work-related driving.
- Integrate training of social skills for new drivers (e.g., within driver education programs) on how to influence others to wear a seat belt in driver education.
- Portray seat belt use as a behavior that satisfies the commonly shared value of protecting oneself and family.

Speeding

- Communicate the positive norms that Minnesota adults do not commonly speed and perceive speeding to be wrong, and use this message to encourage both family and workplace rules prohibiting speeding.
- Leverage the norm that most respondents think speeding is wrong to develop new forms of enforcement.

For next steps, it is recommended that (1) Minnesota focus on one of the targeted behaviors; (2) develop a more detailed framework for each of the relevant strategies; and (3) consider strategies that might impact the behaviors of stakeholders across the social ecology that also impacts road-user behavior.

Chapter 1 Introduction

1.1 Traffic-safety culture

Minnesota has a unified effort comprised of state agencies including the Minnesota Department of Transportation (MnDOT), Department of Public Safety (MnDPS), and other relevant stakeholder groups to reduce traffic deaths to zero (Towards Zero Deaths). Currently, MnDOT analyzes performance in terms of outcome variables such as number of traffic fatalities as shown in Figure 1.1, along with subscribed goals. This project supplements this approach by providing a survey tool to measure the traffic-safety culture of Minnesota drivers that is presumed to underlie the behaviors that result in these crash fatalities.

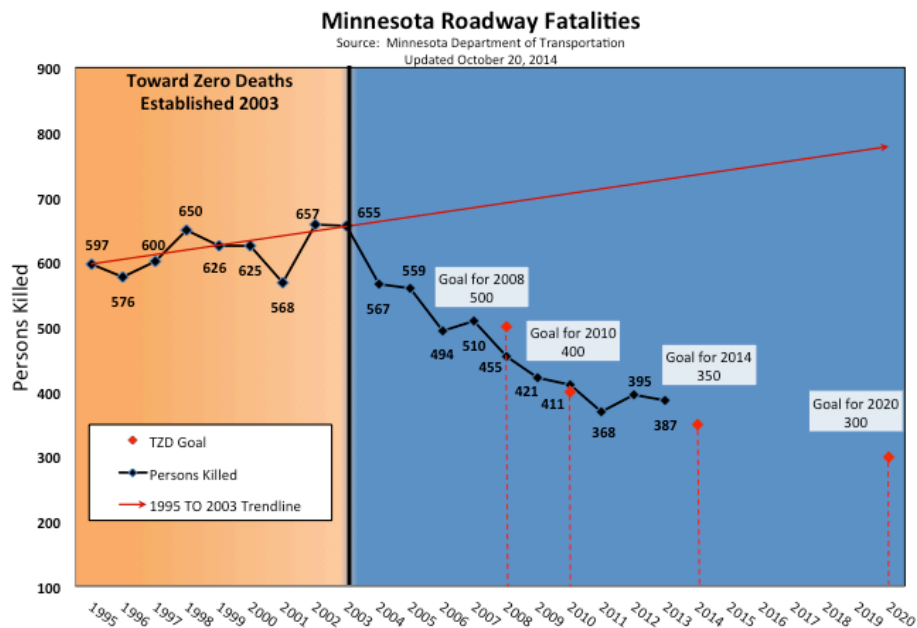


Figure 1.1 Traffic-safety performance in Minnesota measures in terms of traffic fatalities.

"Traffic-safety culture" has gained recent national attention as (1) a variable that may explain risky driver behavior (e.g., Connor et al., 2007), (2) a factor supporting acceptance of existing traffic safety policy and programs (e.g., Rakauskas, Ward, & Gerberich, 2009), (3) a contextual variable to define high risk groups of drivers (e.g., Coogan, et al., 2010), and (3) a new paradigm to support a vision of zero traffic fatalities (e.g., Ward, Otto, & Linkenbach, 2014).

Whereas the concept of "safety culture" has been studied extensively in organizational settings related to safety (Choudhry, Fang, Mohamed, 2007), its application to traffic safety in the general population has been more recent and limited (Girasek & Becher, 2009). Accordingly, there is still some ambiguity about an operational definition for traffic-safety culture.

In this project, a survey tool was development to help Minnesota (i) assess traffic safety performance in terms of self-report risk taking and cultural perceptions of traffic safety, (ii) identify behavioral risk factors (high risk driver groups), (iii) describe possible psychosocial

determinants of the identified risk behaviors, and (iv) guide the development of safety policy and programs. To achieve these benefits, it would be necessary to integrate the regular (annual) administration and analysis of this survey tool with the existing data collection efforts to characterize traffic safety performance in Minnesota.

The goal of this study was to develop a survey methodology for Minnesota to measure state-level traffic-safety culture with three objectives:

1. Index traffic-safety culture as performance indicator.
2. Identify culture-based strategies to achieve safety targets.
3. Assess receptivity of social environment for planned strategies.

1.2 Overview of Report

This report includes four chapters:

1. The preceding introduction
2. An overview of the survey development process
3. The results of the survey using a variety of analytical techniques,
4. And conclusions and recommendations.

The survey development process (2) includes the theoretical background of the approach used in developing the survey, the selection of the target behaviors, the survey instrument, the methodology used to collect samples, and steps taken to validate the responses.

The information provided by this survey methodology was complex (3). A variety of analytical techniques were used including basic frequency analysis, classification and regression trees (to create predictive models of behaviors), comparing what people actually do with what they perceive most people do, and the development of a predictive “score” for traffic-safety culture.

The final chapter provides conclusions and recommendations based on the results (4). The conclusions are based on the analyses, and the recommendations provide guidance for potential strategies to improve traffic safety and offer next steps.

Chapter 2 Survey Development and Implementation

2.1 Survey Development

Traffic-safety culture encompasses both general attitudes and beliefs about safety as well as how those attitudes and beliefs relate to specific driving behaviors – such as speeding or wearing a seat belt. Therefore, a comprehensive survey must address general beliefs and attitudes as well as the very specific behaviors that are associated with the types of fatal crash that we intend to reduce.

Therefore, we designed the survey to have two main sections: the first covering general attitudes and beliefs about traffic safety and the second addressing specific attitudes and beliefs about targeted risky-driving behaviors.

Given the limitations of a respondent's time to complete the survey, we focused the survey on three specific risky-driving behaviors that are commonly cited in the World Health Organization's Road Safety Training Manual (Mohan, Tiwari, Meleckidzedek, & Nafukho, 2006), NHTSA's Rural Urban Comparison (NHTSA, 2006), and Minnesota's Comprehensive Highway Safety Plan (CHSP). These selections of risky-driving behaviors were confirmed with the Technical Advisory Panel (TAP) for this project:

- Driving after consuming alcohol;
- Not using seat belts; and,
- Speeding.

2.1.1 Section One: General Attitudes and Beliefs about Traffic Safety

Key concepts measured in the first section on general attitudes and beliefs about traffic safety included the relative importance of traffic safety, concern about traffic safety, and agreement with a goal of zero deaths and serious injuries. The importance of traffic safety was measured by asking respondents to rank traveler safety relative to seven other transportation issues:

- Snow and ice removal;
- Access to public transportation;
- Conditions of roadways;
- Conditions of bridges;
- Reducing fuel consumption;
- Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.); and,
- Minimal delays on roads / minimal congestion.

Concern for traffic safety was assessed using two approaches. First, respondents were asked how concerned they were about harm associated with traffic crashes (specifically, the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year) and how much they agreed with the statement "I am very concerned about safety on Minnesota's roads and highways."

In addition, respondents were asked their perception of concern by others. In the first case, they were asked how concerned most adults in Minnesota would be about fatalities and serious injuries. In the second case, respondents were asked whether they thought a variety of specific groups with a role in traffic safety were very concerned about traffic safety. Specifically, the

survey asked about their perception of “most of my friends”, “my workplace”, “my local law enforcement agency”, “my local government”, and “Minnesota state government.”

Agreement with a zero deaths and serious injuries goal was assessed using two questions – first, addressing zero deaths and serious injuries among all citizens, and second addressing zero deaths and serious injuries among their family and friends.

Finally, respondents were asked about what they thought were the top three leading contributing factors to roadway related fatalities and serious injuries in Minnesota. This allowed for an assessment of the “saliency” of these risk factors within the general public as causes of traffic related harm (see Figure 2.1).

2.1.2 Section Two: Specific Attitudes and Beliefs as Determinants of Selected Risky Behaviors.

The next three sections sought to elicit the cultural determinants of three risky behaviors targeted by the Minnesota Strategic Highway Safety Plan:

- Driving after drinking,
- Seat belt non-compliance, and
- Speeding.

The survey was designed around a definition of safety culture as a “the socially constructed abstract system of meaning, norms, beliefs, and values.” (Myers et al., 2014; Reiman & Rollenhagen, 2014). Given that the majority of cases of the driver behavior associated with fatal crashes can be presumed to be deliberate, these cognitions determine the intention to behave in either a safe or risky manner. This definition emphasizes these cognitions – shared by a group of people – influence the behavioral choices of the individual group members.

The integrated behavior model (IBM) was used to operationalize this cognition-based definition of traffic-safety culture and guide development of the survey to measure the cultural determinants of each risky driving behavior. As shown in Figure 2.1, this model integrates several theories that predict intentional behaviors as well as important other concepts such as knowledge and skills, salience, environmental constraints, and habits (Glanz, Rimer, & Viswanath, 2008).

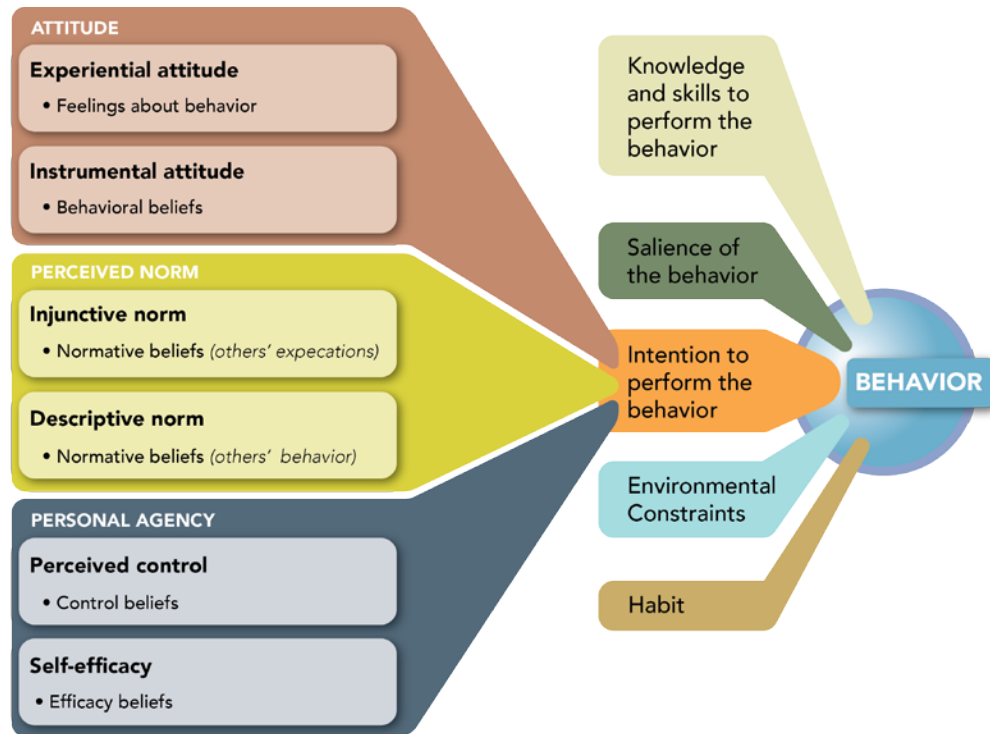


Figure 2.1 Illustration of Integrated Behavior Model (IBM) that was used as framework for development of survey (adapted from Glanz, Rimer, & Viswanath, 2008).

The primary behavioral model used in the IBM is the theory of planned behavior. The theory of planned behavior (TPB) has been widely and effectively used to predict intentional behaviors in a variety of health and safety domains including road user behavior. For example, Conner et al., (2007) used a causal model predicated on the TPB to determine the psychosocial determinants of speeding and then propose culture-based strategies to reduce speeding behavior (e.g., changing cultural attitudes).

Building from the TPB, the IBM addresses three kinds of beliefs – attitudes, perceived norms, and personal agency. Attitudes include both experiential feelings about the behavior (such as speeding makes driving more pleasant) as well as instrumental beliefs (such as seat belts prevent lifelong disabilities). The survey sought to include measures of both kinds of attitudes.

Perceived norms include our beliefs about what is expected or what we perceive as accepted and typical (or “normal”). The IBM addresses two kinds of norms – injunctive and descriptive. Injunctive norms focus on expectations – what we should or should not do (such as people should not drive after drinking alcohol). Descriptive norms focus on what is typical (such as most people always wear their seat belt).

Personal agency includes our sense of being in control of engaging in a behavior and our self-confidence in engaging in the behavior. A sense of control may include the degree to which it is easy or difficult to engage in a behavior in certain situation (such as “I am comfortable wearing my seat belt even if others are not”). Self-confidence is related to our perceived self-efficacy (such as “I am certain I won’t speed even if those around me are”).

Knowledge and skills are important factors impacting engaging in complex behaviors, but are less significant with simpler skills (such as wearing a seat belt). One question was asked about whether people realized they were speeding or not.

Salience addresses situational factors that may inhibit engagement in a certain behavior. We asked one question about a driver's responsibility to get others in a vehicle to wear their seat belts.

Environmental constraints include factors in both the physical and social environment that impact engagement in the behavior. In this case, family rules and workplace policies were included as potential constraints in the social environment.

Habits include engaging in behaviors without reasoning. Behaviors such as wearing a seat belt may occur without much contemplation.

Finally, engagement in the specific risky behaviors was measured using a variety of techniques. Questions include both indefinite time periods for regular behaviors (such as "How often do you wear a seat belt?") and specific look-back periods useful for more episodic events such as driving after drinking ("During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol?").

In addition, certain questions included a matched perception of what most people do or believe. These questions used the same language in the question and answer as the question asking about the individual's behavior or belief (e.g., "How often do you wear a seat belt?", "How often do most Minnesota adults wear a seat belt?").

Table 2.1 summarizes the questions and answer choices (seven point scales) used in the survey based on the IBM. Note that the survey was designed to measure the factors that predicted self-reported behavior rather than simply the intention to behave.

Table 2.1 List of Survey Questions for each Specific Behavior to Measure the Contribution of each Component of the Integrated Behavior Model (IBM).

	Driving After Drinking	Seat Belt Use	Speeding
Experiential Attitude	<p>I believe it is wrong to drive after drinking enough alcohol to be impaired.* <i>Strongly Disagree – Strongly Agree</i></p> <p>I believe it is wrong to drive after drinking any alcohol.* <i>Strongly Disagree – Strongly Agree</i></p>	<p>I believe it is important to protect myself by always wearing a seat belt.* <i>Strongly Disagree – Strongly Agree</i></p>	<p>Driving 10 mph over the speed limit makes driving more pleasant.* <i>Strongly Disagree – Strongly Agree</i></p> <p>Driving 10 mph over the speed limit is wrong.* <i>Strongly Disagree – Strongly Agree</i></p>
Instrumental Attitude	<p>I believe impairment begins with the first sip of alcohol. <i>Strongly Disagree – Strongly Agree</i></p> <p>Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be caught by law enforcement? <i>Extremely Unlikely – Extremely Likely</i></p>	<p>I wear a seat belt because I don't want to get a ticket. <i>Strongly Disagree – Strongly Agree</i></p> <p>Seat belts are just as likely to harm you as help you. <i>Strongly Disagree – Strongly Agree</i></p> <p>Seat belts help prevent lifelong disabilities (such as paralysis, spinal cord injuries and serious brain injuries). <i>Strongly Disagree – Strongly Agree</i></p> <p>Assume that you do not wear your seat belt AT ALL while driving over the next six months. How often do you think you will receive a ticket for not wearing a seat belt? <i>Extremely Unlikely – Extremely Likely</i></p>	<p>Driving 10 mph over the speed limit will get me to my destination quicker. <i>Strongly Disagree – Strongly Agree</i></p> <p>Driving 10 mph over the speed limit increases the chances I will be in a crash. <i>Strongly Disagree – Strongly Agree</i></p> <p>I don't consider driving 10 mph over the speed limit to be 'speeding'.* <i>Strongly Disagree – Strongly Agree</i></p> <p>Assume that you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticket for speeding? <i>Extremely Unlikely – Extremely Likely</i></p>
Perceived Injunctive Norm	<p>I believe people should not drive after drinking any alcohol.* <i>Strongly Disagree – Strongly Agree</i></p> <p>Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol. <i>Strongly Disagree – Strongly Agree</i></p>	<p>I want people I care about to always wear a seat belt. <i>Strongly Disagree – Strongly Agree</i></p> <p>When I am the driver, I believe it is my responsibility to make sure others in the vehicle with me wear a seat belt. <i>Strongly Disagree – Strongly Agree</i></p> <p>People who care about me want me to always wear a seat belt. <i>Strongly Disagree – Strongly Agree</i></p>	<p>I think people should not drive 10 mph over the speed limit.* <i>Strongly Disagree – Strongly Agree</i></p>

	Driving After Drinking	Seat Belt Use	Speeding
Perceived Descriptive Norm	<p>During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol? <i>0, 1, 2, 3, 4, 5, 6 or more</i></p> <p>In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink? <i>0, 1, 2, 3, 4, 5, 6 or more</i></p>	<p>When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts? <i>Never, About half the time, Always</i></p> <p>In your opinion, how often do most adults in Minnesota wear their seat belts? <i>Never, About half the time, Always</i></p>	<p>How often do most adults in Minnesota drive more than 10 mph over the posted speed limit? <i>Never, About half the time, Always</i></p>
Perceived Control	<p>I plan so that I never drive after drinking. This may include choosing not to drink. <i>Strongly Disagree – Strongly Agree</i></p>	<p>I am comfortable wearing my seat belt even if others in the car are not wearing their seat belts. <i>Strongly Disagree – Strongly Agree</i></p>	<p>I am comfortable driving less than 10 mph over the speed limit even if those around me are driving faster. <i>Strongly Disagree – Strongly Agree</i></p>
Perceived Self-efficacy		<p>I am less likely to wear my seat belt when others in the vehicle are not wearing their seat belts. <i>Strongly Disagree – Strongly Agree</i></p>	<p>How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster? <i>Not certain at all, Somewhat certain, Very certain</i></p>
Knowledge			<p>I know when I am driving 10 mph over the speed limit. <i>Strongly Disagree – Strongly Agree</i></p>
Environmental Constraints	<p>My family has a rule about never driving after drinking any alcohol. <i>No, Yes, I don't know, I do not have a family</i></p> <p>My workplace has a policy about never driving after drinking any alcohol. <i>No, Yes, I don't know, I do not have a workplace</i></p>	<p>Seat belts do not fit me properly. <i>Strongly Disagree – Strongly Agree</i></p> <p>My family has a rule about always wearing a seat belt. <i>No, Yes, I don't know, I do not have a family</i></p> <p>My workplace has a policy about always wearing a seat belt. <i>No, Yes, I don't know, I do not have a workplace</i></p>	<p>My family has a rule about not speeding. <i>No, Yes, I don't know, I do not have a family</i></p> <p>My workplace has a rule about not speeding. <i>No, Yes, I don't know, I do not have a workplace</i></p>
Habit		<p>I think about wearing my seat belt every time I am in a vehicle. <i>Strongly Disagree – Strongly Agree</i></p>	

	Driving After Drinking	Seat Belt Use	Speeding
Behavior	<p>When was the last time you drove within two hours of drinking alcohol? <i>In the past day, In the past week, In the past month, In the past 12 months, In the past year, More than year ago, Never</i></p> <p>During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol? <i>0, 1, 2, 3, 4, 5, 6 or more</i></p> <p>During the past 30 days, on how many occasions did you drive after having perhaps too much to drink? <i>0, 1, 2, 3, 4, 5, 6 or more</i></p>	<p>When was the last time you rode in a vehicle without wearing a seat belt? <i>In the past day, In the past week, In the past month, In the past 3 months, In the past year, More than year ago, Never</i></p> <p>When you are driving within a few miles of your home, how often do you wear your seat belt? <i>Never, About half the time, Always</i></p> <p>In general, how often do you wear your seat belt? <i>Never, About half the time, Always</i></p>	<p>How often do you drive more than 10 mph over the posted speed limit? <i>Never, About half the time, Always</i></p>

*Also included an additional question about how most Minnesota adults would respond in order to measure the perceived norm.

Finally, the survey contained items to report key demographics for the obtained sample. Respondents were asked about their city and county of residence, geographical classification (rural, urban, suburban), sex, education attainment, languages read, year of birth, and whether they drive as a part of their work. The final survey is included in Appendix A.

2.2 Survey Implementation

The survey was designed to be implemented using a paper instrument mailed to households in Minnesota. This study sample was designed to be representative at the state level. It was not designed to support analyses at a stratified level (e.g., gender, age, ATP Boundary Area). Thus, the sample was based on a random sample of 10,000 Minnesota household addresses selected in November 2013 to cover all ATP Boundary Areas. Of these, 9164 surveys were successful delivered (836 were returned as “undeliverable” due to invalid addresses).

The data collection procedure began with a letter from MNDOT to introduce the forthcoming survey. Two days later, the full survey was mailed with a prepaid envelope. The instructions indicated that the household resident with the most recent birthday to complete the survey. One week later, a follow-up reminder postcard was mailed to the selected households that had not responded (Appendix C). After another two weeks, a replacement full survey was re-sent to any household that had not yet responded. All correspondences are included in Appendix B.

2.3 Survey Sample

Receipt of the surveys was closed in January 2014. At that time, 3,256 of the delivered surveys were returned in the prepaid envelope for an acceptable response rate of 36%. Amongst these returned surveys, 52 had no response data and were removed to produce a remaining sample of 3,204 surveys. These surveys varied in terms of the number of completed responses to individual questions.

Figure 2.2 shows the demographic distribution of the returned sample. The obtained distributions suggests that the sample did fairly represent gender, but under represented younger respondents. This may be due to the fact that younger respondents are more difficult to reach with direct mailing to addresses (Johnson, 2007). In addition, the sample was over-represented by respondents from urbanized locations, but this is expected given that there are typically more addresses in these census areas.

Demographics

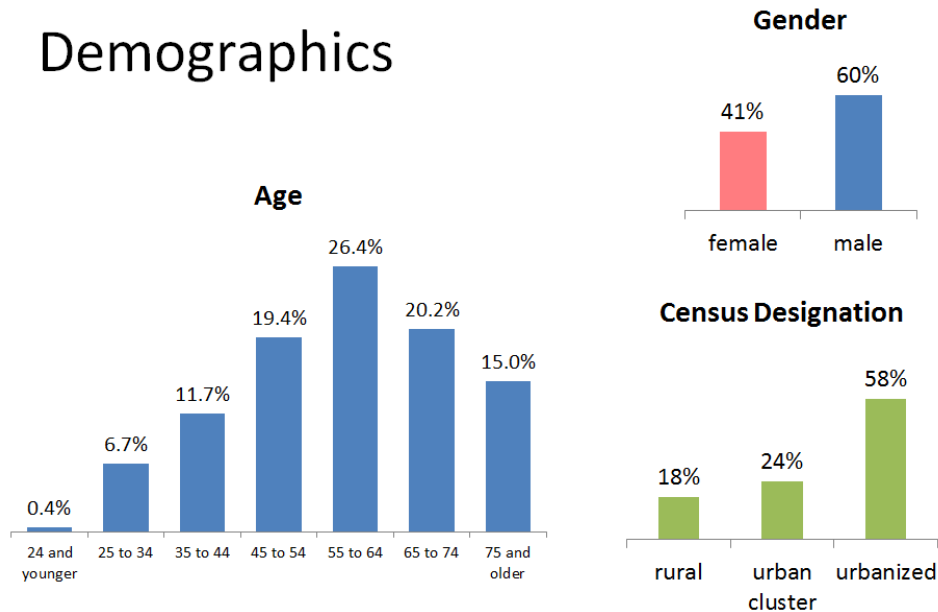


Figure 2.2. Distribution of selected demographics in final sample of returned surveys.

2.4 Survey Validation

Two approaches were used to verify the validity of the self-report responses from the survey. First, responses to behavior questions were compared to independent data from external sources. Second, the strength of association between responses likely to predict behaviors (based on the Integrated Behavioral Model) and self-reported behaviors were assessed to demonstrate internal consistency.

2.4.1 Concurrent Validity: Comparison to Other Measures

The survey assessed the prevalence of three risky driving behaviors: driving after drinking, seat belt use, and speeding. Each of these three measures have been assessed independently in other research efforts. A comparison of the results of this survey with these other independent measures shows consistent reporting of these three behaviors (see Table 2.2). This comparison suggests that the self-reported responses to the survey items were probably indicators of actual behavior.

Table 2.2. Comparison of Survey Self-Reported Behaviors and Other Independent Sources of Reported and Observational Data.

Survey	Independent Source
<p><i>Q13a. “During the past 30 days, on how many occasions did you drive after having perhaps too much to drink?”</i></p> <p>5.5% reported driving after having perhaps too much to drink on one or more occasions.</p>	<p><i>“During the past 30 days, on how many occasions did you drive after having perhaps too much to drink?”</i></p> <p>3.1% reported driving after having perhaps too much to drink on one or more occasions.</p> <p>Source: EpiMachine, LLC. 2014</p>
<p><i>Q25a. “In general, how often do you wear your seat belt?”</i></p> <p>95% reported always or almost always wearing a seat belt.</p>	<p><i>2013 observation study from roadside of vehicle occupants wearing seat belt.</i></p> <p>95% of vehicle occupants were observed to be wearing seat belt.</p> <p>Source: Chen, 2014.</p>
<p><i>Q40a. “How often do you drive more than 10 mph over the posted speed limit?”</i></p> <p>85% reported driving less than 10 mph over speed limit half the time or more.</p>	<p><i>2011 study to measure vehicle speeds using roadway sensors.</i></p> <p>85% of vehicles were driven less than 10 mph over the speed limit.</p> <p>Source: Study and Report on Speed Limits (MnDOT 2009)</p>

2.4.2 Criterion Validity: Integrated Behavioral Model (IBM)

The validity of the data also depends on the validity of the choice to use the Integrated Behavior Model (IBM) as a framework to design the survey. Within this model, each of the risk behaviors is the criterion that is expected to be predicted by the other components of the model that were operationalized by the survey. Thus, to determine if IBM was valid as a framework for the survey, we examined if the items used to operationalize its components correlated with the criterion behaviors as predicted by the model.

In almost all cases, the correlation analysis (Pearson) indicated a significant and expected relationship (two-tailed, $p < 0.0001$) between the model components and the criterion behavior (see Tables 2.3 – 2.5). These results suggest that this model was valid as chosen framework to operationalize traffic-safety culture as a predictor of risky behavior.

Table 2.3. Correlations of IBM Components and Criterion Behavior of Driving after Drinking: “During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol? (0, 1, 2, 3, 4, 5, 6 or more times).”

Construct	Question	Correlation Coefficient¹	Interpretation
Experiential Attitude	I believe it is wrong to drive after drinking enough alcohol to be impaired.	-0.123	Stronger agreement was associated with fewer occasions of driving after drinking.
	I believe it is wrong to drive after drinking any alcohol.	-0.359	Stronger agreement was associated with fewer occasions of driving after drinking.
Instrumental Attitude	I believe impairment begins with the first sip of alcohol.	-0.261	Stronger agreement was associated with fewer occasions of driving after drinking.
	Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be caught by law enforcement?	-0.129	Higher likelihood of getting caught was associated with fewer occasions of driving after drinking.
Perceived Injunctive Norm	I believe people should not drive after drinking any alcohol.	-0.297	Stronger agreement was associated with fewer occasions of driving after drinking.
	Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol.	-0.326	Stronger agreement was associated with fewer occasions of driving after drinking.
Perceived Descriptive Norm	During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol?	0.126	Perceiving more occasions among most Minnesota adults was associated with more occasions of driving after drinking.
	In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink?	N.S.	-
Perceived Control	I plan so that I never drive after drinking. This may include choosing not to drink.	-0.433	Stronger agreement was associated with fewer occasions of driving after drinking.

1. Pearson Correlation, two tailed. All are statistically significant ($p < 0.0001$). A more stringent p value was selected to reduce the family-wise error rate from the large number of correlations.

N.S. denotes not significant.

**Table 2.4. Correlations of IBM Components and Criterion Behavior of Wearing Seat belt:
 “In general, how often do you wear your seat belt?”
 [Never, About half the time, Always using 7-point scale]**

Construct	Question	Correlation Coefficient¹	Interpretation
Experiential Attitude	I believe it is important to protect myself by always wearing a seat belt.	0.652	Stronger agreement was associated with more frequent seat belt use.
Instrumental Attitude	I wear a seat belt because I don't want to get a ticket.	N.S.	-
	Seat belts are just as likely to harm you as help you.	-0.251	Stronger agreement was associated with less frequent seat belt use.
	Seat belts help prevent lifelong disabilities (such as paralysis, spinal cord injuries and serious brain injuries).	0.281	Stronger agreement was associated with more frequent seat belt use.
	Assume that you do not wear your seat belt AT ALL while driving over the next six months. How often do you think you will receive a ticket for not wearing a seat belt?	0.113	Higher likelihood of getting caught was associated with more frequent seat belt use.
Perceived Injunctive Norm	I want people I care about to always wear a seat belt.	0.410	Stronger agreement was associated with more frequent seat belt use.
	People who care about me want me to always wear a seat belt.	0.384	Stronger agreement was associated with more frequent seat belt use.
Perceived Descriptive Norm	When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts?	0.277	Perceiving more frequent seat belt use among most Minnesota adults was associated with more frequent seat belt use.
	In your opinion, how often do most adults in Minnesota wear their seat belts?	0.240	Perceiving more frequent seat belt use among most Minnesota adults was associated with more frequent seat belt use.
Perceived Control	I am comfortable wearing my seat belt even if others in the car are not wearing their seat belts.	0.180	Stronger agreement was associated with more frequent seat belt use.
Self-efficacy	I am less likely to wear my seat belt when others in the vehicle are not wearing their seat belts.	-0.307	Stronger agreement was associated with less frequent seat belt use.
Environmental Constraints	Seat belts do not fit me properly.	-0.231	Stronger agreement was associated with less frequent seat belt use.
Habit	I think about wearing my seat belt every time I am in a vehicle.	0.500	Stronger agreement was associated with more frequent seat belt use.

1. Pearson Correlation, two tailed. All are statistically significant ($p < 0.0001$). A more stringent p value was selected to reduce the family-wise error rate from the large number of correlations. N.S. denotes not significant.

**Table 2.5. Correlations of IBM Components and Criterion Behavior of Speeding:
 “How often do you drive more than 10 mph over the posted speed limit?”
 [Never, About half the time, Always using 7-point scale]**

Construct	Question	Correlation Coefficient¹	Interpretation
Experiential Attitude	"Driving 10 mph over the speed limit makes driving more pleasant."	0.466	Stronger agreement was associated with more frequent speeding.
	"Driving 10 mph over the speed limit is wrong."	-0.404	Stronger agreement was associated with less frequent speeding.
Instrumental Attitude	"Driving 10 mph over the speed limit will get me to my destination quicker."	0.282	Stronger agreement was associated with more frequent speeding.
	"Driving 10 mph over the speed limit increases the chances I will be in a crash."	-0.354	Stronger agreement was associated with less frequent speeding.
	I don't consider driving 10 mph over the speed limit to be 'speeding'.	0.369	Stronger agreement was associated with more frequent speeding.
	Assume that you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticket for speeding?	-0.173	Higher likelihood of getting caught was associated with less frequent speeding.
Perceived Injunctive Norm	I think people should not drive 10 mph over the speed limit.	-0.480	Stronger agreement was associated with less frequent speeding.
Perceived Descriptive Norm	How often do most adults in Minnesota drive more than 10 mph over the posted speed limit?	0.303	Perceiving more frequent speeding among most Minnesota adults was associated with more frequent speeding.
Perceived Control	I am comfortable driving less than 10 mph over the speed limit even if those around me are driving faster.	-0.240	Stronger agreement was associated with less frequent speeding.
Self-efficacy	How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster?	-0.255	More certainty was associated with less frequent speeding.
Knowledge	I know when I am driving 10 mph over the speed limit.	-0.147	Stronger agreement was associated with less frequent speeding.

1. Pearson Correlation, two tailed. All are statistically significant ($p < 0.0001$). A more stringent p value was selected to reduce the family-wise error rate from the large number of correlations.

Chapter 3 Analysis

3.1 Overview of Analyses

In an effort to better understand traffic-safety culture in Minnesota, four separate analyses were performed on the survey data:

- 1. Frequency Response:** This analysis includes an analysis of the frequency and distribution of survey responses about general traffic safety in general. These results provide an initial understanding of respondent general attitudes and beliefs about traffic safety. A complete frequency analysis is included in Appendix C.
- 2. Predictive Models:** This analysis examines the best predictors of the self-reported risky behaviors. In effect, this analysis is an extension of Table 2.3 to Table 2.5 by identifying the components of the model used to operationalize traffic-safety culture that had the strongest relationship to the self-reported behaviors. The statistical analysis performed was an application of a nonparametric statistical procedure called classification and regression trees (CART). The resulting classification trees determine and display the underlying structure amongst the important components of traffic-safety culture that can reliably predict risky behavior. The interpretation of these classification trees may suggest which components would be effective for developing cultural transformation strategies to change behavior.
- 3. Actual and Perceived Norms:** This analysis examined the particular misperceptions about cultural norms and their association with an increased in reported propensity to engage in risky driving behaviors. This information can also provide guidance for strategies to change behavior by targeting specific misperceptions that can be corrected. For example, reducing critical misperceptions by clarifying positive norms within the actual culture could be a cultural incentive for reducing risky driving behaviors.
- 4. Unified Metric:** This analysis sought to identify a single score metric of traffic-safety culture. The intent of this analysis was to provide an intuitive metric that could be used to track traffic-safety culture along with measuring trends in traffic fatalities in Minnesota.

For each form of analysis, a general overview is provided, the analytical process is described, and the results are presented.

3.2 Frequency Response Analysis

3.2.1 Overview

Section One of the survey contained questions about general traffic safety. An examination of responses to these questions can provide insights about the importance of traffic safety (relative to other issue issues), general concern for traffic safety, attitudes about a zero-deaths approach, and the leading contributing factors to traffic fatalities and serious injuries.

3.2.2 Process

This analysis used all returned surveys with complete or partial responses (N = 3204). For each question, frequencies and percentages of each response were calculated based on the total number of valid responses for that question. The complete frequency analysis is reported in Appendix B.

3.2.3 Results

Survey participants were asked to indicate their top three most important issues and rank them relative to one another. As shown in Table 3.1, just over one in ten (12.8%) of adults in Minnesota ranked traveler safety the most important issue. The most commonly issues ranked as most important were snow / ice removal and conditions of roadways. Admittedly, both these issues may have some relevance to traveler safety (e.g., crashes from loose of vehicle control during ice road conditions). Overall, about one in three adults in Minnesota (34%) identified traveler safety as being amongst the top three most important transportation issues.

Table 3.1. Reporting of Top Three Ranked Transportation Issues.

Transportation Issue	Percent Ranking #1 Importance	Percent Ranking #2 Importance	Percent Ranking #3 Importance
Snow and ice removal	31.4	26.1	19.1
Conditions of roadways	34.7	32.1	15.0
Traveler safety	12.8	7.9	13.0
Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.)	2.2	4.5	7.1
Access to public transportation	1.6	3.0	4.5
Conditions of bridges	3.9	11.8	15.6
Reducing fuel consumption	1.9	3.4	7.1
Minimal delays on roads / minimal congestion	11.5	11.2	18.6

Despite the relative low agreement that traffic safety is the most important issue, there was still strong concern about traffic safety as shown in Figure 3.1. Agreement about being very concerned about traffic safety was highest for self and the police. Notably, the lowest agreement about concern for traffic safety was for the workplace.

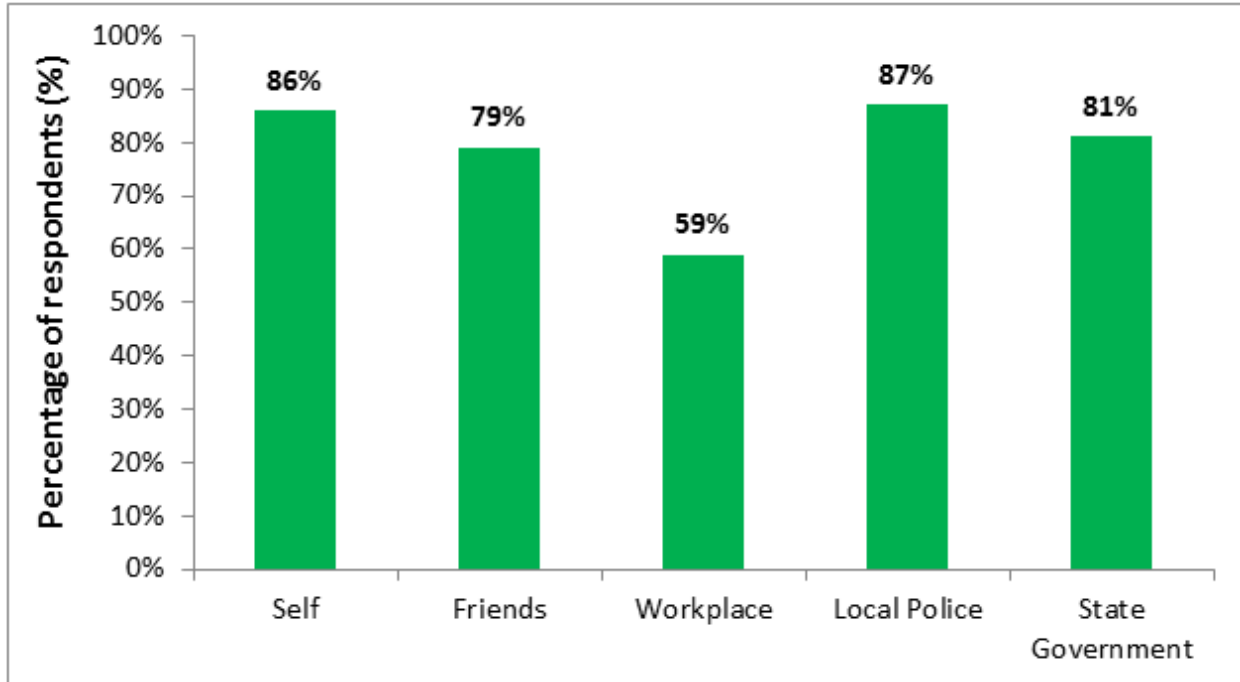


Figure 3.1. Percentage of respondents indicating perceptions of "very concerned" about traffic safety.

In addition, when asked to indicate their level of concern about the number of traffic fatalities in Minnesota, most respondents (72%) reported that there were more than “somewhat concerned” about the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year. An additional one-third (35%) of respondents reported that they were “extremely concerned”.

Finally, agreement with the Minnesota vision for zero traffic fatalities was also examined. Most respondents (59%) agreed that the only acceptable number of deaths and serious injuries on Minnesota roadways is zero, but half that many respondents (26%) disagreed that this is the only acceptable goal. Interestingly, agreement regarding the acceptability of the zero traffic fatality goal was higher when considering fatalities amongst family and friends (79%) than for Minnesotans in general (59%).

3.3 Predictive Models

3.3.1 Overview

With this analysis, the relationship between a set of predictor variables (based on components of model that operationalized traffic-safety culture) and a selected response variable (self-reporting of risky behavior) is examined. This analysis used a non-parametric classification and regression tree method using CART (Salford Systems). This software represents the classification tree graphically as branches. Each branch is based on a predictor variable that can successfully differentiate respondents in terms of the response variable.

The branching of the classification tree is formed by recursive partitioning (binary splits) of the predictor variables with the goal of separating the levels of the response variable into mutually exclusive subsets. Each binary split is performed based on a “yes” or “no” classification rule

associated with a predictor variable. The goal is to form subsets with large differences in the distribution of responses across subsets based on combinations of levels of the predictors.

With this method, a classification tree is generated on a portion of the data set called the “learning set” and then that tree is validated to the remaining data called the “test set”. This cross-validation process replaces the traditional significance-testing paradigm based on assumed distributions of parametric statistics under conditions of the null hypothesis.

The benefits of the CART method include no specification of the predicted effect of any variables (or their interaction) prior to analysis, resistance to outliers in the data set, invariance to monotone transformations of the predictors, inclusion of both categorical and quantitative predictors, and discovery of complex interactions. For a detailed discussion of classification and regression trees the reader is referred to Berk (2008).

For example, imagine that a study that examined university retention as the response variable. In this case, it is a binary response: namely, a student was retained to complete a four-year degree or a student was not retained to complete the degree. For each student, a predictor score is available based on a measure of “motivation” to obtain a university degree, with a higher number signifying greater motivation along a five-point scale. A classification tree may then determine that a binary cutoff motivation score of 3.40 that separates all those students completing their degree within four years from all those that left prematurely within those four years.

The accuracy of this tree can then be examined by comparing the classification predicted by the tree with the true status of the student in the original data set. In this case, the binary split rule for this decision tree would be: “Is the student’s college motivation score less than or equal to 3.40?” Based on whether the answer is “yes” or “no” for each case, the students would be classified as “unsuccessful” or “successful”. Specifically, an optimal tree would predict 100% of unsuccessful cases and 0% of successful case to the answer “yes” and 0% of unsuccessful cases and 100% of successful case to the answer “no”. Note that other motivation score thresholds produce binary groups that are a mixture of both retained and none retained students. Thus, these other splitting rule options would produce higher misclassification rates.

More details on the CART analysis are provided in Appendix D.

3.3.2 Processes

A separate classification tree was generated for each of the three risky behaviors based on the associated survey item that indicated frequency of engaging in the behavior:

- Drinking and Driving: “During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol?”¹ This item used a seven-point scale between “0 times” and “6 or more times”.

¹ The scale for this item was collapsed to represent three response categories: Never {0 times}, Rarely {1 or 2 times}, Often {3 or more times}.

- Seat belt usage: “In general, how often do you wear your seatbelt?” This item used a seven-point scale between “Never” and “Always”.
- Speeding: “How often do you speed more than 10 mph over the posted speed limit?” This item used a seven-point scale between “Never” and “Always”.

Each classification tree included a common set of predictor variables shown in Table 3.2.

Table 3.2. Common Set of Predictor Variables for Classification Tree Analyses.

Construct	Item	Scale (points)
Concern	Q6a. “I am very concerned about safety on Minnesota’s roads and highways.” Q6b. “I believe most of my friends are very concerned about safety on Minnesota’s roads and highways.” Q7. “I believe most of my workplace is very concerned about safety on Minnesota’s roads and highways.” Q8. “I believe most of my local law enforcement agency (police) is very concerned about safety on Minnesota’s roads and highways.” Q9. “I believe most of my local government is very concerned about safety on Minnesota’s roads and highways.” Q10. “I believe most of Minnesota State government very concerned about safety on Minnesota’s roads and highways.”	Strongly disagree – Strongly agree (7)
Agreement with TZD Goal	Q4. “I believe the only acceptable number of deaths and serious injuries on Minnesota roads is zero.” Q5. “I believe the only acceptable number of deaths and serious injuries among my family and friends on Minnesota roads is zero.”	Strongly disagree – Strongly agree (7)

Each classification tree also included a specific set of predictor variables relevant to the specific risk behavior. As shown in Table 3.3 - Table 3.5, these predictor variables aligned with the behavioral model used to design the survey.

Table 3.3. Specific Set of Predictor Variables for Drinking and Driving Classification Tree.

IBM Construct	Item	Scale (points)
Experiential Attitude	Q14a. “I believe it is wrong to drive after drinking enough alcohol to be impaired?” Q14b. “In your opinion, how would most adults in Minnesota respond: I believe it is wrong to drive after drinking enough alcohol to be impaired?” Q15a. “I believe it is wrong to drive after drinking any alcohol?” Q15b. “In your opinion, how would most adults in Minnesota respond: I believe it is wrong to drive after any alcohol?”	Strongly disagree – Strongly agree (7)
Instrumental Attitude	Q16. “I believe impairment begins with the first sip of alcohol?” Q22. “Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be	Strongly disagree – Strongly agree (7)

	caught by law enforcement?"	
Injunctive Norm	Q17a. "I believe people should not drive after drinking any alcohol?" Q17b. "In your opinion, how would most adults in Minnesota respond: I believe people should not drive after any alcohol?" Q18. "Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol."	Strongly disagree – Strongly agree (7)
Descriptive Norm	Q12b. "During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol?" Q13b. "In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink?"	0 – 6 or more times (7) 0-14% 15-29% 30-44% 45-55% 56-69% 70-84% 85-100%
Perceived Control	Q19. "I plan so that I never drive after drinking. This may include choosing not to drink."	Strongly disagree – Strongly agree (7)
Environmental Constraints	Q20. "My family has a rule about never driving after drinking any alcohol." Q21. "My workplace has a rule about never driving after drinking any alcohol."	No, Yes, I don't know, I don't have a family. No, Yes, I don't know, I don't have a workplace.

Table 3.4. Specific Set of Predictor Variables for Seatbelt Classification Tree.

IBM Construct	Item	Scale (points)
Experiential Attitude	Q26a. "I believe it is important to protect myself by always wearing a seat belt." Q26b. "In your opinion, how would most adults in Minnesota respond: I believe it is important to protect myself by always wearing a seat belt?"	Strongly disagree – Strongly agree (7)
Instrumental Attitude	Q27a. "When I am the driver, I believe it is my responsibility to make sure others in the vehicle are wearing a seat belt." Q27b. "In your opinion, how would most adults in Minnesota respond: When I am the driver, I believe it is my responsibility to make sure others in the vehicle are wearing a seat belt?" Q28. "I wear a seat belt because I don't want to get a ticket." *Q29. "Seat belts are just as likely to harm you as to help you." Q30. "Seat belts help prevent lifelong disabilities." Q39. "Assume that you do not wear your seat belt at all while driving over the next six months. How often do you think you will receive a tick for not wearing a seat belt?"	Strongly disagree – Strongly agree (7) Never – Always (7)
Injunctive Norm?	Q32. "I want people I care about to always wear their seat belt." Q33. "People who care about me want me to always wear a seatbelt."	Strongly disagree – Strongly agree (7)

Descriptive Norm	Q24b. "When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts?" Q25b. "In your opinion, how often do most adults in Minnesota wear their seatbelts?"	Never – Always (7)
Perceived Control	Q34. "I am comfortable wearing my seat belt even if other in the car are not wearing their seat belt." *Q35. "I am less likely to wear my seat belt when others are in the vehicle are not wearing their seat belt."	Strongly disagree – Strongly agree (7)
Environmental Constraints	*Q31. "Seat belts do not fit me properly." Q37. "My family has a rule about always wearing a seat belt." Q38. "My workplace has a rule about always wearing a seat belt."	Strongly disagree – Strongly agree (7) No, Yes, I don't know, I don't have a family. No, Yes, I don't know, I don't have a workplace.
Habit	Q36. "I think about wearing my seat belt every time I am in a vehicle."	Strongly disagree – Strongly agree (7)

Table 3.5. Specific Set of Predictor Variables for Speeding Classification Tree.

IBM Construct	Item	Scale (points)
Experiential Attitude	*Q41a. "Driving 10 mph over the speed limit makes driving more pleasant." *Q41b. "In your opinion, how would most adults in Minnesota respond: Driving 10 mph over the speed limit makes driving more pleasant?" Q42a. "Driving 10 mph over the speed limit is wrong." Q42b. "In our opinion, how would most adults in Minnesota respond: Driving 10 mph over the speed limit is wrong?"	Strongly disagree – Strongly agree (7)
Instrumental Attitude	*Q43. "Driving 10 mph over the speed limit will get me to my destination quicker." Q44. "Driving 10 mph over the speed limit increases the chances that I will be in a crash." *Q45a. "I don't consider driving 10 mph over the speed limit to be 'speeding'." *Q45b. "In your opinion, how would most adults in Minnesota respond: I don't consider driving 10 mph over the speed limit to be 'speeding'?" Q52. "Assume you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticking for speeding?"	Strongly disagree – Strongly agree (7) Extremely unlikely – Extremely likely (7)
Injunctive Norm	Q46a. "I think people should not drive 10 mph over the speed limit." Q46b. "In our opinion, how would most adults in Minnesota respond: I think people should not drive 10 mph over the speed limit?"	Strongly disagree – Strongly agree (7)
Descriptive Norm	*Q40b. "How often do most adults in Minnesota drive more than 10 mph over the posted speed limit?"	Always – Never (7)

Perceived Control	Q48. "I am comfortable driving less than 10 mph over the speeding limit even if those around me are driving faster."	Strongly disagree – Strongly agree (7)
Self-efficacy	Q49. "How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster?"	Not at all certain – Very certain (7)
Knowledge	Q47. "I know when I am driving 10 mph over the speed limit."	Strongly disagree – Strongly agree (7)
Environmental Constraints	Q37. "My family has a rule about not speeding." Q21. "My workplace has a rule about not speeding."	No, Yes, I don't know, I don't have a family/workplace.

Only those surveys with two or fewer missing items were retained for the CART analysis for each risk behavior:

- Drinking and driving (N = 3075)
- Seat belt usage (N = 3082)
- Speeding (N = 3094)

To facilitate the generation of simpler classification trees, all original 7-point scales were collapsed to a 5-point scale by combining the two intermediate values between each endpoint and midpoint.² Responses were then coded with a positive or negative sign relative to the midpoint value (0). For example, the response for "Driving 10 mph over the speed limit makes driving more pleasant" (Q41a) was coded as:

- +2 for "Strongly Disagree"
- +1 for "Mostly Disagree" and "Somewhat Disagree" combined as "Disagree"
- 0 for "Neither Agree nor Disagree"
- -1 for "Mostly Agree" and "Somewhat Agree" combined as "Agree"
- -2 for "Strongly Agree"

Finally, item coding reversed as necessary so that higher positive values reflected a more positive safety culture (reversed items are marked by an asterisk in Tables 3.4 and 3.5).

All CART analyses used data based on these converted and recoded scales. The analysis was completed with Version 7 of the CART statistical software package (Salford Systems, 2013). The default analysis parameters were used (e.g., assumed equal probabilities for each response level) along with the following model specifications:

- For potential splitting, a minimum of 200 cases for any parent node is required
- A child node must have a minimum of 50 cases.
(These two specifications imply that if a child node also has between 50 and 199 cases, it becomes a terminal node).
- Learning sample set to 90% of total sample.
- Testing sample set to 10% of total sample.

² The exception to this rule was Q12b and Q13b.

- Splitting algorithm based on “ordered-twoing” that attempts to split a predictor variable to retain the ordinal structure of the underlying scale.³

3.3.3 Results

Drinking and Driving Classification Tree

The classification of drinking and driving frequency was based on Item Q12a “During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol?”

The initial classification tree suggested greater parsimony in the interpretation of this item by collapsing the scale further to represent only three response categories: Never {0 times}, Rarely {1 or 2 times}, Often {3 or more times}. Based on the predictor variables listed in Table 3.2 and Table 3.3, the classification tree represented in Figure 3.2 was chosen for interpretation.

The relative cost for this classification tree was 0.63 with the learning sample and 0.61 for the test sample. This suggests that this classification tree performed approximately 40% better than a random classification assignment. Specifically, this classification was best at predicting the classification of the respondents that reported rarely drinking and driving.

The following conclusions about the classification of respondents based on reported drinking and driving behavior can be made based on the interpretation of this classification tree:

- Respondents that never drove drunk in the past 60 days strongly agreed that they always had a plan not to drink and drive (including not drinking).
- For those respondents that did not agree that they always had a plan not to drink and drive (including not drinking), their perception of normative drinking and driving determined their own reported behavior. Respondents that often drove drunk (3 or more times in the past 60 days) disagreed or were neutral about always having a plan not to drink and drive (including not drinking) and perceived the norm to represent a higher incidence of drinking and driving (4 or more times in the past 60 days).
- Respondents that rarely (1 or 2 times in the past 60 days) drove drunk either (i) agreed that they always had a plan not to drink and drive (including not drinking) or (ii) perceived normal drinking and driving behavior to be less than 4 times in the past 60 days.

³ For example, imagine a predictor scale of agree (1), neutral (2), and disagree (3) for a response outcome of ‘yes’ or ‘no’. A normal split could decide that a value of 1 and 3 predicts most ‘yes’ responses. However, if we consider that the predictor scale is ordinal, it is difficult to explain the reason for this splitting rule. In contrast, using ordered-twoing, the split might be that 1 predicts most ‘yes’ responses and 2 or 3 most ‘no’ responses. Here, the splitting rule retains the logic of the ordinal scale: The amount of agreement determines the probability of a ‘yes’ response.

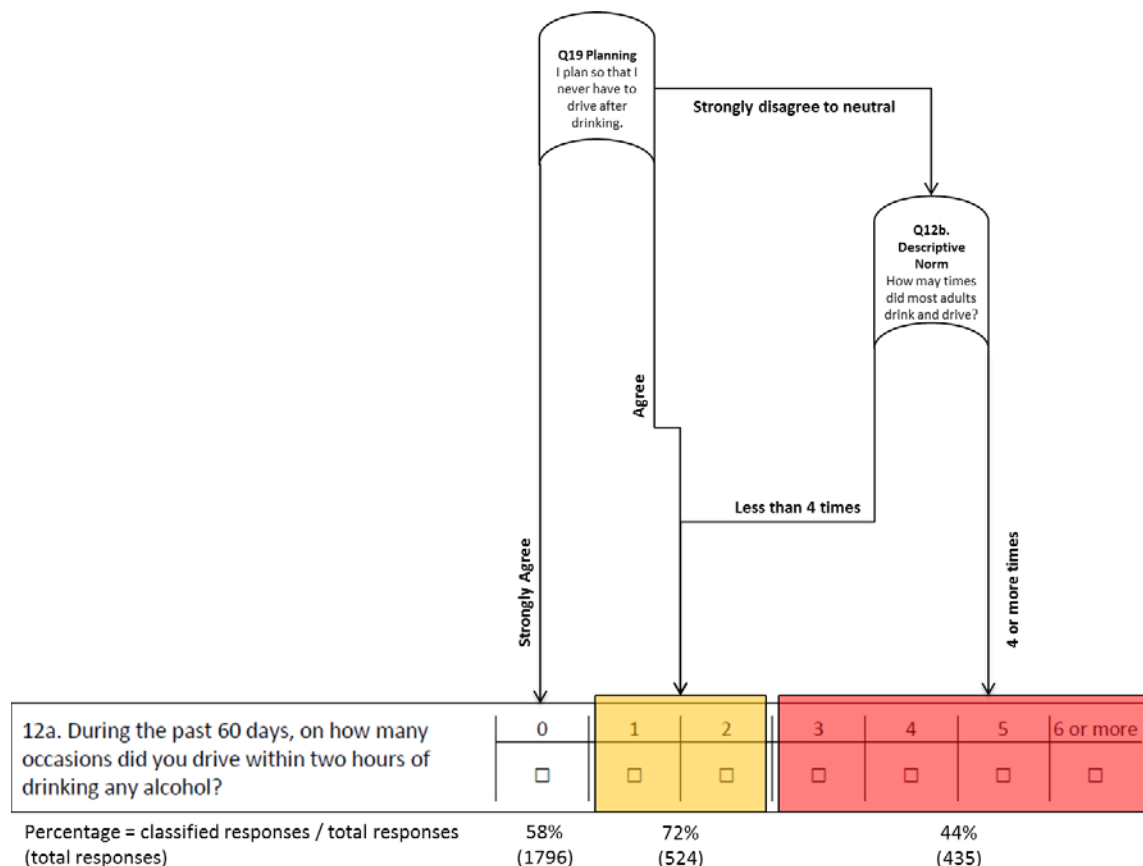


Figure 3.2. Interpreted classification tree for drinking and driving (Q12a).

Table 3.6 lists the five most important variables that supported the generation of the interpreted classification tree for drinking and driving (Figure 3.2). This table includes the associated scale item, its relative importance score, and correlation (Spearman Rho) with the behavior classification variable (Q12a).

In addition to planning to not drink and drive, respondent injunctive norms against drinking and driving and their beliefs about the impairment effects of alcohol were related to their reported drinking and driving behavior. Those respondents that believed alcohol impairs with the first sip and felt driving after drinking alcohol was wrong reported less frequency of drinking and driving themselves.

Table 3.6. Correlation of Important Variables with Drinking and Driving Behavior (Q12a).

Variable	Importance	Correlation
Q15a. I believe it is wrong to drive after drinking alcohol.	100	-.44 (p < .0001)
Q18. Most people around me believe I should not drive after drinking any alcohol.	74	-.40 (p < .0001)
Q17a. I believe people should not drive after drinking any alcohol.	62	-.39 (p < .0001)
Q16. I believe impairment begins with the first sip of alcohol.	57	-.35 (p < .0001)

Q19. "I plan so that I never drive after drinking. This may include choosing not to drink."	43	-.53 (p< .0001)
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3.3.4 Summary

The incidence of drinking and driving was lowest amongst respondents who always planned to not drink and drive, recognized the impairment effects of alcohol, and perceived it to be wrong to drive after drinking alcohol. Conversely, respondents who frequently drove after drinking did not share these views and also perceived that driving after drinking was normal.

Seat Belt Use Classification Tree

The classification of frequency of seat belt use was based on Item Q25A "In general, how often do you wear your seat belt?"

Based on the predictor variables listed in Table 3.2 and Table 3.4, the classification tree represented in Figure 3.3 was chosen for interpretation.

The relative costs for this classification tree were 0.65 with the learning sample and 0.53 for the test sample. This suggests that based on the test sample there is a 47% lower misclassification rate using this classification tree relative to a random classification assignment. Specifically, this classification was best at predicting the classification of the respondents that reported never or always wearing a seat belt.

The following conclusions about the classification of respondents based on reported seat belt use can be made based on the interpretation of this classification tree:

- Respondents that never wore a seat belt disagreed that it was important to protect themselves.
- Respondents that always wore a seat belt were neutral or agreed with the value of protecting themselves and strongly agreed that they thinking about wearing a seat belt every time they drive.
- Less frequent seat belt use was related to less thinking about seat belt use.

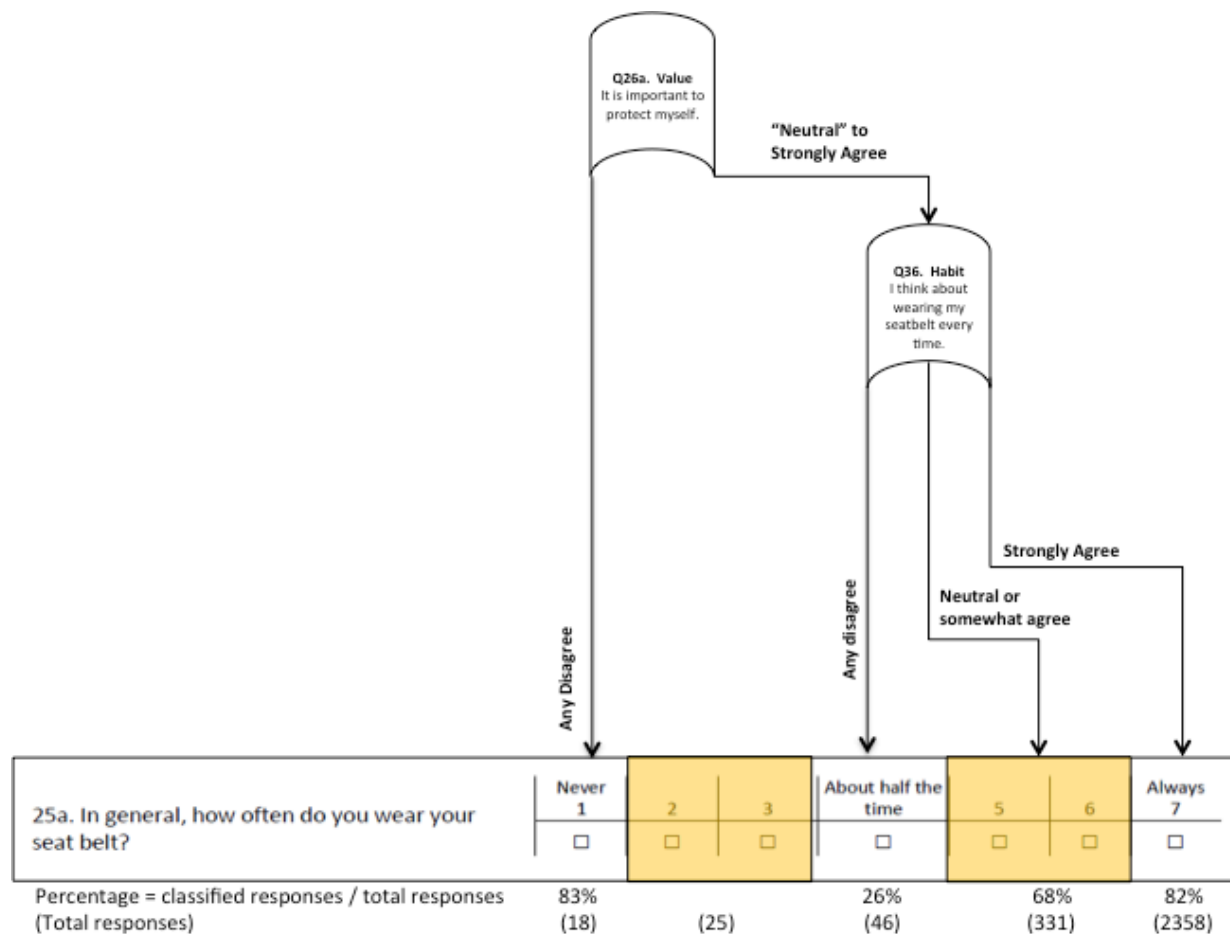


Figure 3.3. Interpreted classification tree for seat belt use (Q25a).

Table 3.7 lists the five most important variables that supported the generation of the interpreted classification tree (Figure 3.3). This table includes the associated scale item, its relative importance score, and correlation (Spearman Rho) with the behavior classification variable (Q25a).

In addition to wanting to protect one-self and always thinking about wearing a seat belt, the frequency of seat belt use was related to taking responsibility and caring that others also wear their seat belt (just as those others also want us to wear a seat belt).

Table 3.7. Correlation of Important Variables with Seat Belt Behavior (Q25a).

Variable	Importance	Correlation
Q27a. When I am the driver, I believe it is my responsibility to make sure others in the vehicle with me wear a seat belt.	100	.40 (p< .0001)
Q33. People who care about me want me to wear a seat belt.	84	.32 (p< .0001)
Q36. I think about wearing a seat belt every time I am in a vehicle.	77	.53 (p< .0001)
Q32. I want people I care about to	76	.41

always wear a seat belt.		(p< .0001)
Q26a. I believe it is important to protect myself by always wearing a seat belt.	76	.56 (p< .0001)

Summary

The frequency of seat belt use was highest amongst respondents who strongly valued protecting themselves by using a seat belt and habitually thought about seat belt use when in the vehicle. Conversely, respondents who never wore a seat belt did not value protecting themselves.

Speeding Classification Tree

The classification of frequency of seat belt use was based on Item Q40a “How often do you drive more than 10 mph over the posted speed limit?”

Based on the predictor variables listed in Table 3.2 and Table 3.5, the classification tree represented in Figure 3.4 was chosen for interpretation.

The relative costs for this classification tree were 0.68 with the learning sample and 0.59 for the test sample. This suggests that based on the test sample there is a 41% lower misclassification rate using this classification tree relative to a random classification assignment. Specifically, this classification was best at predicting the classification of the respondents that reported speeding most of the time.

The following conclusions about the classification of respondents based on reported seat belt use can be made based on the interpretation of this classification tree:

- Respondents who mostly or always sped perceived that most other Minnesotans also mostly or always sped.
- Respondents who never sped perceived that most other Minnesotans rarely or never sped and believed that people should not speed.
- Speeding less frequently was related to stronger beliefs that people should not speed.

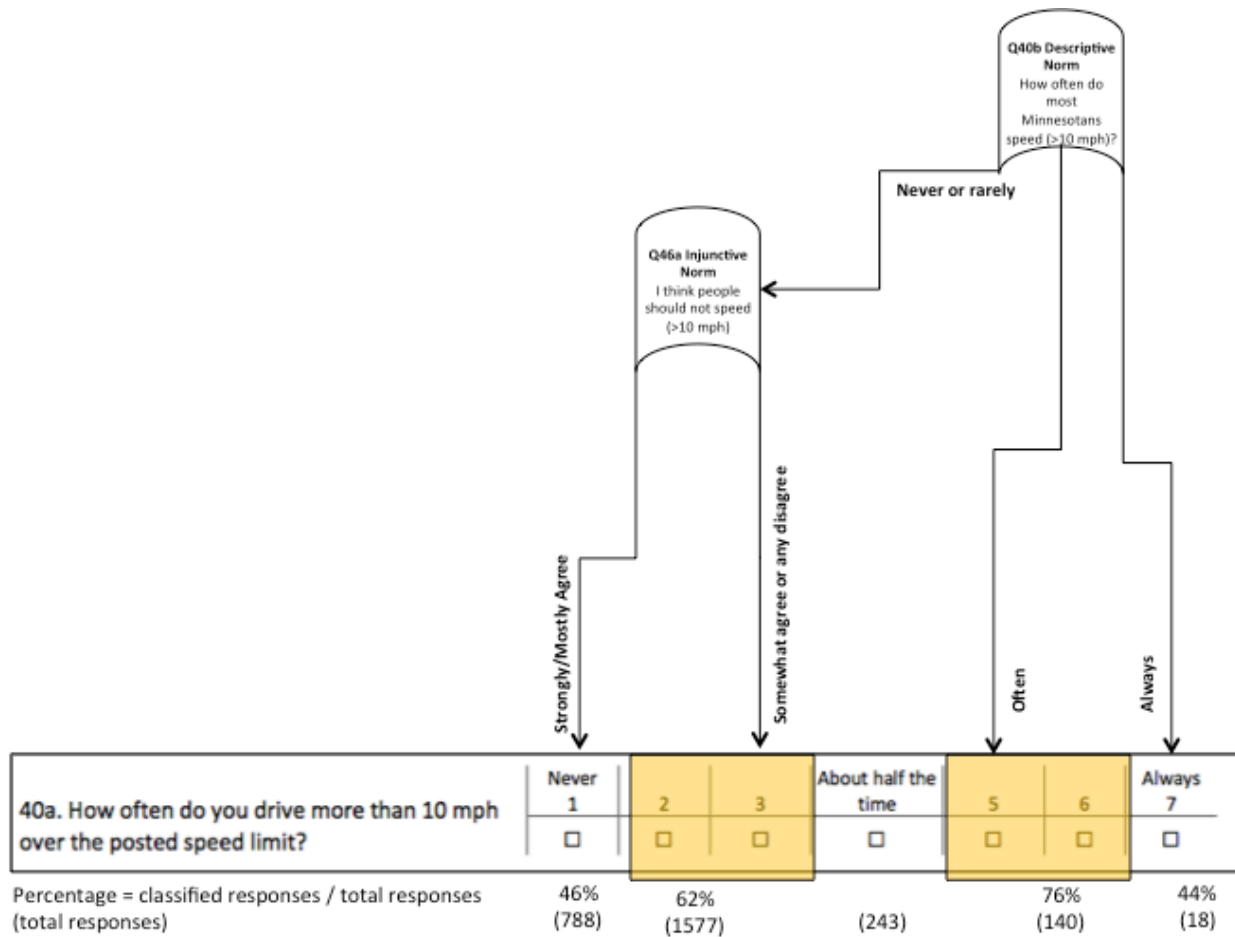


Figure 3.4. Interpreted classification tree for speeding (Q40a).

Table 3.7 lists the five most important variables that supported the generation of the interpreted classification tree (Figure 3.3). This table includes the associated scale item, its relative importance score, and correlation (Spearman Rho) with the behavior classification variable (Q25a).

In addition to believing people should not speed (that it is wrong), speeding behavior was also related to perceptions that such beliefs were normal for most adults in Minnesota (injunctive norm). Significantly, the perceived enjoyment of speeding was significant related to speeding propensity.

Table 3.8. Correlation of Important Variables with Speeding Behavior (Q40a).

Variable	Importance	Correlation
Q41a. Driving 10 mph over the speed limit makes driving more pleasant.	100	.46 (p< .0001)
Q46a. I think people should not drive 10 mph over the speed limit.	59	.49 (p< .0001)
Q42a. Driving 10 mph over the	56	.42

speed limit is wrong.		(p< .0001)
Q46b. In your opinion, how would most adults in Minnesota respond: “I think people should not drive 10 mph over the speed limit”?	23	.19 (p< .0001)
Q42b. In your opinion, how would most adults in Minnesota respond: “Driving 10 mph over the speed limit is wrong”?	22	.14 (p< .0001)

Summary

Those that reported speeding most or all of the time perceived that speeding was normal in Minnesota. Conversely, those that never or rarely sped did not assume speeding was normal and strongly believed that people should not speed.

3.4 Actual and Perceived Norms

3.4.1 Overview

The Oxford American Dictionary defines a norm as what is typical, usual or standard. For example, there are well established norms regarding business attire for workplaces in the US, and most (but not all) people conform to these norms.

While norms may be observable (as in the case of attire in workplaces) or measurable (as in the case of speeds of vehicles on roads), individuals have perceptions as to what the norms are (i.e., beliefs in their heads). Research has shown that behaviors can be influenced by what individuals perceive are the norms among others – regardless of whether these perceived norms are accurate or not (Cialdini, Reno, & Kallgren, 1990). Therefore, if an individual believes the norm is to speed on a certain road (regardless of whether speeding is the norm or not), the individual may be more likely to speed.

This survey measured both what individuals do (actual norm) as well as their perceptions of what they thought most other Minnesota adults do (perceived norm). For example, the survey asked how often “do you drive more than 10 mph over the posted speed limit?” To complement this, the survey also asked, “And how often do most Minnesota adults drive more than 10 mph over the posted speed limit?” The same answer choices were used for both questions. In this way, we were able to measure the actual norms (how most people responded to the first question about their own beliefs) as well as their perception of the norm (how they *thought* most other adults would respond). This paired-question format was applied to selected items in the survey (see marked items (*) in Table 2.1.⁴

Because the survey measured both participants own beliefs as well as their perceived norms, we can measure the strength of the relationship between the two. Understanding the strength of the

⁴ Perceptions of norms were not asked for every question in order to keep the survey from becoming too long.

relationship between individual beliefs and behaviors and perceived norms can help inform traffic strategies. For example, if there is little relationship between the perceived norm and the actual norm, there is less motivation to invest in interventions that seek to clarify the misperception. However, if the relationship is strong and a significant portion of the population misperceives the norm, it may be worthwhile to invest in interventions that seek to clarify the actual norm. For example, individuals that misperceive a higher incidence of a behavior (perceived norm) than is actually the case (actual norm), may have a higher probability (risk) of engaging in that behavior themselves. Thus, it is important to assess both the strength of the relationship between the actual and perceived norm as well as the prevalence of misperceptions about the actual norm.

3.4.2 Process

The strength of the relationship between perceived and actual norms was analyzed by computing the Pearson correlation between items that used the paired-question format.

The prevalence of misperception was analyzed by comparing the percentage of respondents with a normative perception with the actual percentage of individuals engaging in that behavior. For example, 65% of respondents indicated they had not driven within two hours of drinking in the past 60 days. Therefore, from this result, we can conclude that most Minnesota adults (> 50%) do not drive within two hours of drinking in a 60 day period. In other words, *not driving within two hours after drinking* is the actual norm in Minnesota. However, when asked how often they thought most other Minnesota adults engaged in this behavior, 97% believed most adults DO drive within two hours of drinking. This implies that the norm is perceived to be driving after drinking. Therefore, a significant portion of the population (97%) misperceives the actual norm.

3.4.4 Results

Strength of Relationship

Table 3.9 summarizes the correlations between how individuals responded (i.e., their individual behaviors) and their perception of the norm for several survey measures. These correlations are an indication of the strength of the relationship between an individual's responses and their perceptions of the norms.

Table 3.9. Strength of Relationship (Correlation) between Own Response (Actual Norm) and Perceived Response of Others (Perceived Norm).

Question	Pearson Correlation *	Interpretation
Drinking after driving		
12a. During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol? 12b. During the past 60 days, on how many occasions did most adults ...	0.126	Perceiving more occasions among most Minnesota adults was associated with more occasions of driving after drinking.
Seat belt use		
25a. In general, how often do you wear your seat belt? 25b. In your opinion, how often do most adults in Minnesota wear their ...	0.240	Perceiving more frequent seat belt use among most Minnesota adults was associated with more frequent seat belt use.
Speeding		
40a. How often do you drive more than 10 mph over the posted speed limit? 40b. How often do most adults in Minnesota drive more than 10 mph ...	0.303	Perceiving more frequent speeding among most Minnesota adults was associated with more frequent speeding.

*All are significant ($p < 0.0001$).

Prevalence of Misperceptions

Figure 3.5 summarizes what the actual norms in Minnesota are as well as the percentage of respondents who misperceived these norms. These data indicate several important misperceptions about normative behavior:

- **Driving after drinking** – Most people say that they do not drive after drinking, but nearly everyone assumes most people do.
- **Seat belt use** - Most people say that they do always wear their seat belt, but nearly everyone assumes most people do not always wear their seat belt.
- **Speeding** – Most people say they do not speed more than half the time, but nearly everyone assumes most people do speed more than have the time.

It is notable that in all cases, the actual norm for these behaviors was one of safety, whereas the perceived norm assumed the highest risk. This is important because people often choose their own behaviors based on what they perceive to be the norm.

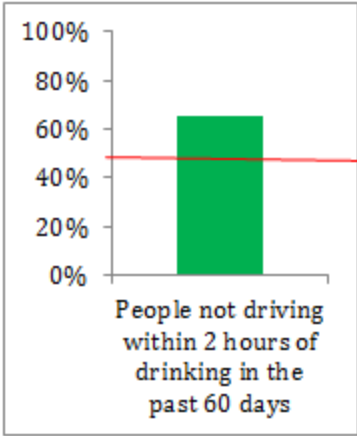
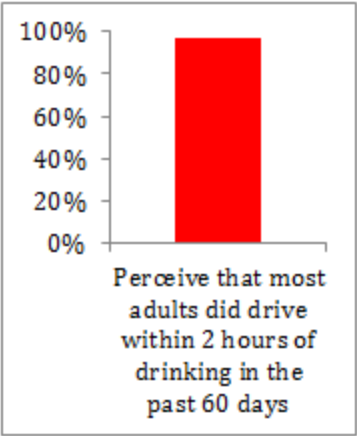
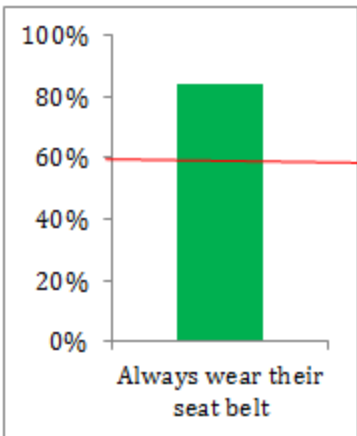
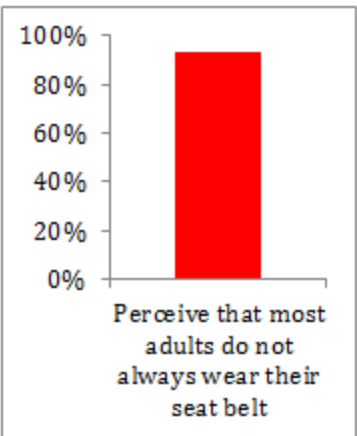
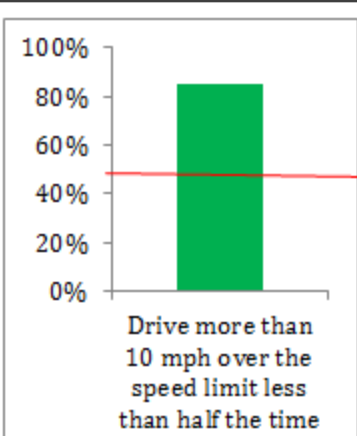
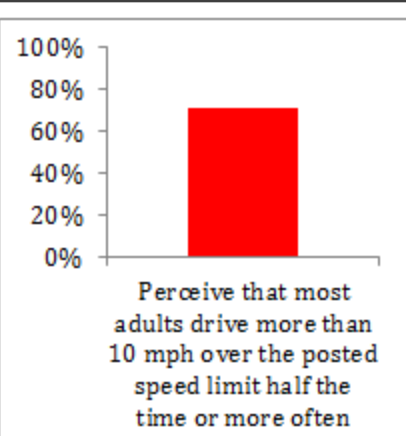
<u>Actual Norm</u>	<u>Percentage Misperceiving the Norm</u>
 <p>People not driving within 2 hours of drinking in the past 60 days</p>	 <p>Perceive that most adults did drive within 2 hours of drinking in the past 60 days</p>
<p>Norm: Most MN adults (65%) did NOT drive after drinking in the past 60 days.</p>	<p>However, 97% of MN adults perceive that most adults DO drive after drinking.</p>
 <p>Always wear their seat belt</p>	 <p>Perceive that most adults do not always wear their seat belt</p>
<p>Norm: MOST MN adults, 84%, always wear their seat belt.</p>	<p>However, 93% perceived that MOST MN adults do NOT always wear their seat belts</p>
 <p>Drive more than 10 mph over the speed limit less than half the time</p>	 <p>Perceive that most adults drive more than 10 mph over the posted speed limit about half the time or more often</p>
<p>Norm: MOST MN adults, 85%, drive more than 10 mph over the posted speed limit less than half the time.</p>	<p>However, 71% perceived that MOST MN adults drive more than 10 mph over the posted speed limit about half the time or more often.</p>

Figure 3.5. Actual Norms and Percentage of Respondents Misperceiving the Norm (Note:

Horizontal line marks the 50% response definition of a norm).

Relevance of Misperceptions

While correlation coefficients are an effective statistical tool to measure the strength of a relationship, they are not necessarily intuitive. Risk ratios are another way to measure and communicate the relationship between two variables. Figure 3.6 shows the risk ratio based on the percentage of respondents reporting engaging in the behavior who accurately perceived the norm compared to the percentage of respondents reporting engaging in the same behavior, but misperceiving that the norm. (Note: For driving after drinking and speeding, the risk ratio represents the increase likelihood of engaging in a risky behavior based on misperceiving the norm; for seat belts, the risk ratio represents the increase in likelihood of wearing a seat belt for those who accurately perceive the norm.) As can be seen, respondents who misperceived the descriptive norm (what they believe others do) were more likely to report engaging in that risky behavior.

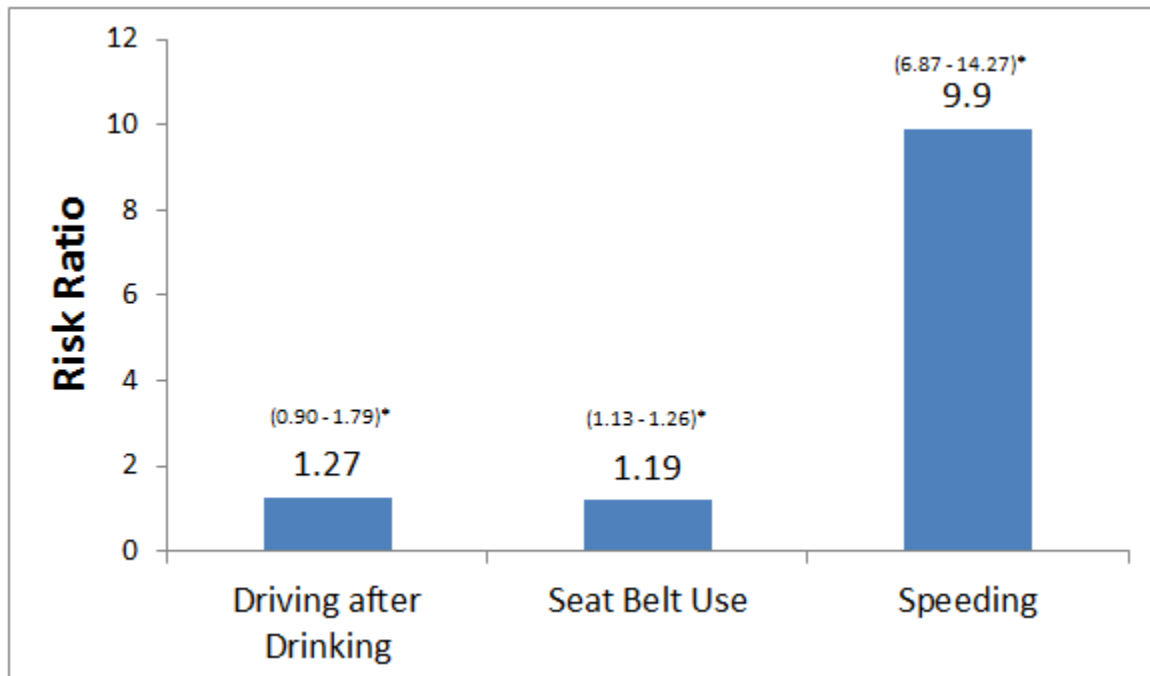


Figure 3.6. Risk ratios based on perception of descriptive norms (* < .05).

3.4.5 Summary

As evidenced by Figure 3.6 and Table 3.9, these analyses show that there is a strong relationship between the perceived norms (what individuals think most people do) and their own behaviors. This strong relationship motivates the importance of recognizing and correcting these misperceptions. Additionally, many respondents misperceive the actual norms in Minnesota. These norms are positive, protective behaviors that are shared by most Minnesota adults. Thus, many people could be impacted by strategies that seek to correct these misperceptions.

3.5 Unified Metric

3.5.1 Overview

There are many components of culture as shown in Figure 2.1 Accordingly, it is difficult to represent culture by a single measure or one-dimensional scale. And yet, ease of communication and the interpretation of trends in reported culture would greatly benefit from a simplified metric.

This part of the analysis sought ways to reduce the components of culture represented in the survey to a single unified value. Several methods were explored to derive this metric such as providing an average score across the model components. However, this method is not easily interpreted because any change in an aggregated score could be attributed to any of its constituent items.

Instead, the advocated method is to select a single intuitive item that has strong face validity to represent the popular meaning of traffic-safety culture and correlate with the other important aspects of the traffic safety model (Figure 2.1). To support communication and the interpretation of trends, such an item should have strong face validity: that is, it should be an intuitive representation of the basic concept of traffic-safety culture.

3.5.2 Process

The survey measured three specific risky-driving behaviors: driving after drinking, not wearing a seat belt, and speeding. To support the identification of a single survey item with face validity, a dichotomous classification of all respondents was performed based on whether or not they engaged in each behavior:

- Driving after drinking in the past 60 days: yes or no
- Always wearing a seat belt: yes or no
- Rarely or never speeding (responses 1 or 2 out of 7): yes or no

The prevalence of engaging in each three risky-driving behaviors is summarized in Table 3.10.

Table 3.10. Percentage of Respondents Classified as Engaging in each Risk Behavior (N = 3204).

Risky Driving Behavior	Engagement
Driving within 2-hours of drinking in past 60 days	35%
Not always wearing a seat belt	19%
Speeding (sometimes or more often)	31%

Next, the responses of those who engaged in a risky behavior were compared with those who did not engage in a risky behavior. A sample of these comparisons is summarized in Figure 3.7, Figure 3.8, and Figure 3.9 (see Appendix E for all responses). This analysis allowed us to identify individual survey items that could reliably discriminate between people who did and did not engage in each risky behavior. In these sample figures, the mean response of respondents who reported the behavior and those who did not were all statistically significant ($p < .0001$). This analysis suggested that the item (“I am very concerned about safety on Minnesota’s roads and highways” was a good candidate.)

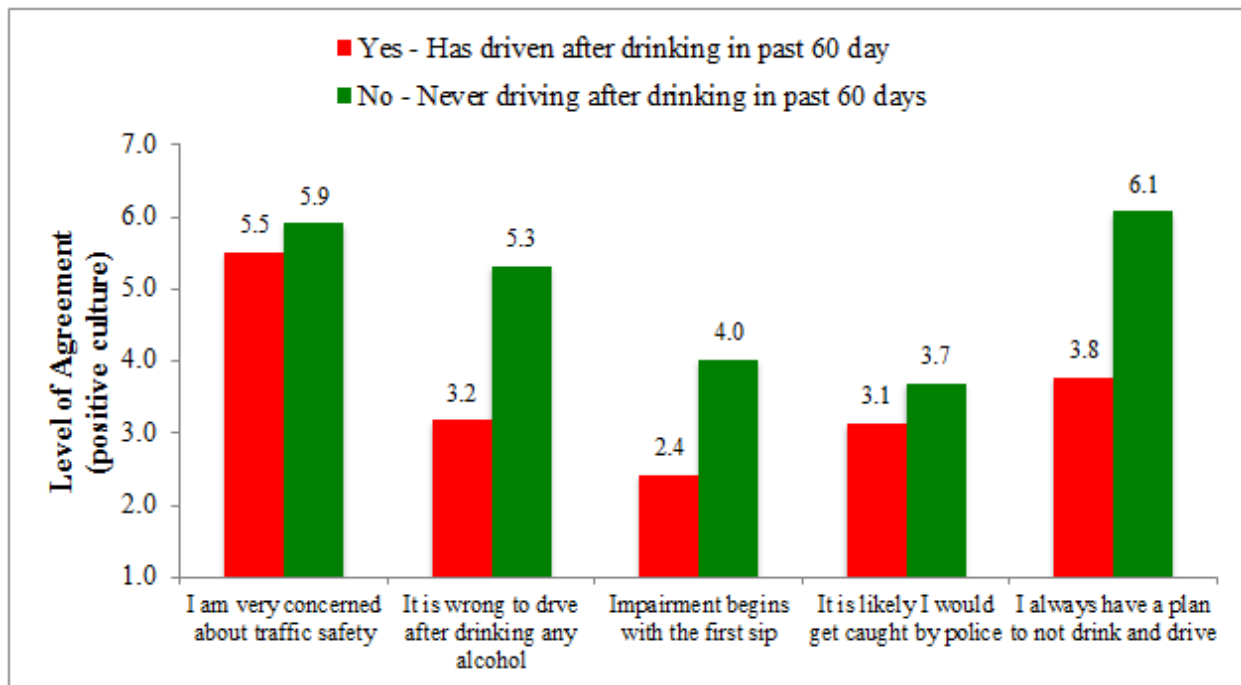


Figure 3.7. Cultural Factors Related to Driving After Drinking

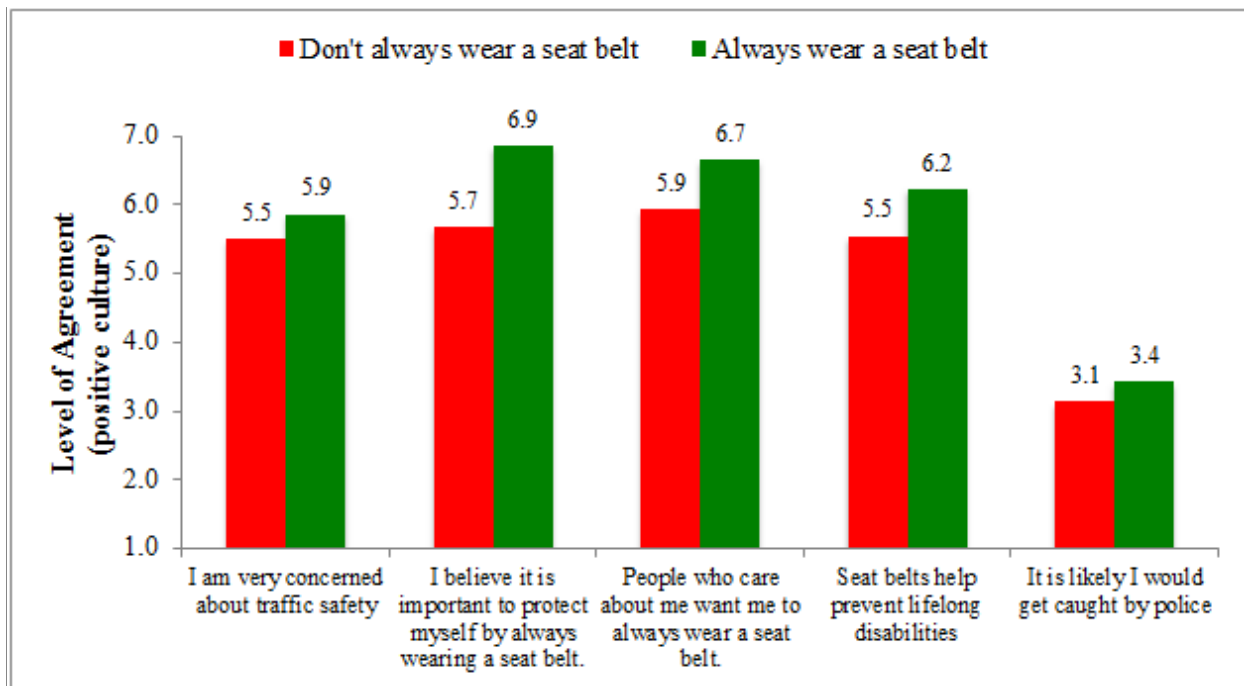


Figure 3.8. Cultural Factors Related to Seat Belt Use

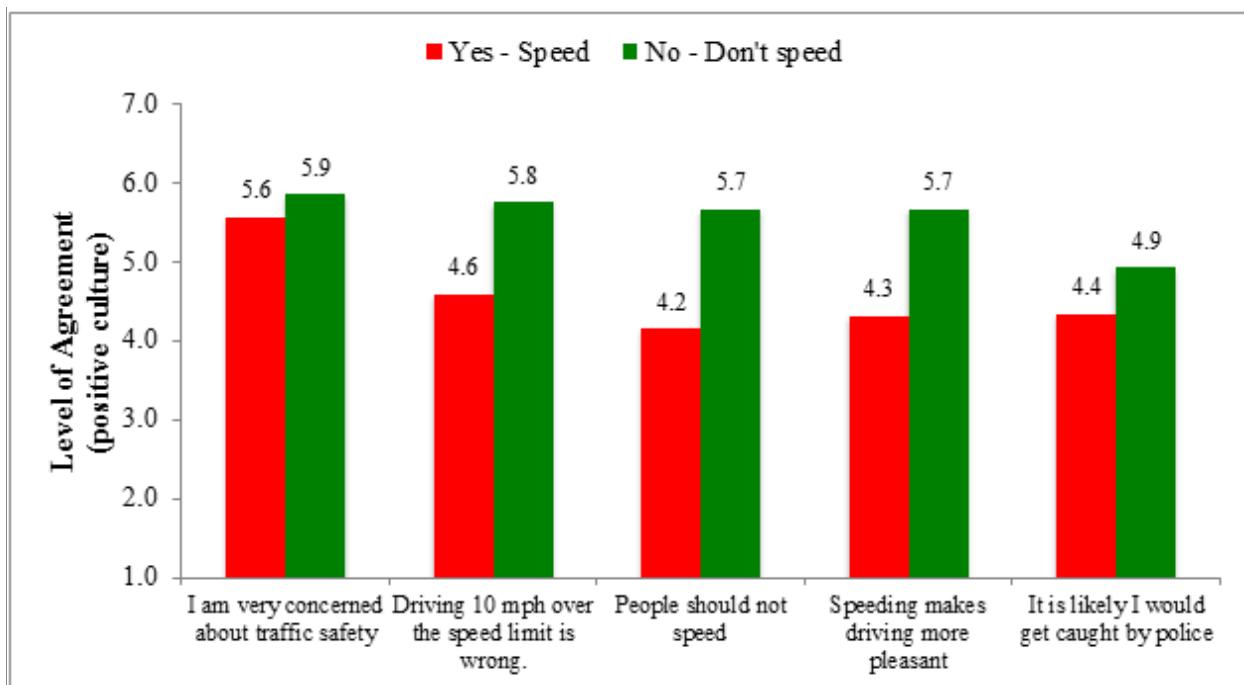


Figure 3.9. Cultural Factors Related to Speeding

Next, a composite measure of risk taking was computed by summing the number of risky-driving behaviors engaged by each respondent. With this composite measure, each individual may have engaged in zero, one, two, or three risky-driving behaviors. The prevalence of multiple risky-driving behaviors is summarized in Table 3.11. The purpose of this analysis was to confirm that the candidate item (“I am very concerned about safety on Minnesota’s roads and highways”) was relevant to general risk-taking tendencies.

Table 3.11. Percentage of Respondents Classified as Engaging in Multiple Risky Behaviors (N = 3204).

Number of Risky Driving Behaviors	Engaging in Behaviors
Zero (none)	40%
One	39%
Two	18%
Three	4%

As shown in Figure 3.10 we then calculated the mean value of concern for traffic safety (“I am very concerned about safety on Minnesota’s roads and highways”) for each of the four groups based on the number of risky behaviors reported (see Table 3.11). The mean concern for traffic safety differed significantly between all four groups ($p < .001$). This trend indicated that lower concern for traffic safety was associated with more risky behaviors

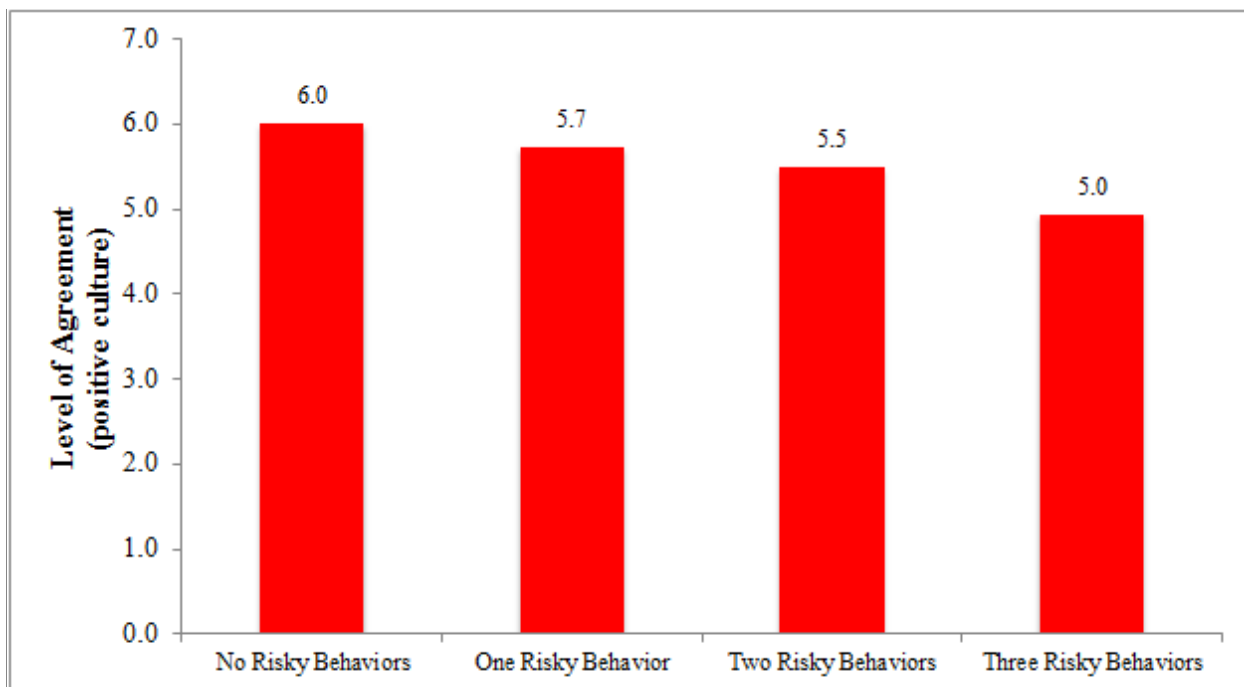


Figure 3.10. Concern for Traffic Safety Based on Engagement in Risky Behaviors

Therefore, concern for traffic safety appears to be a potential unified metric for traffic-safety culture. To simplify the use of this item as a metric for traffic-safety culture, it is possible to reduce the 7-point scale to three categories of agreement about concern for traffic safety (agree, neutral, disagree). Using these categories, Table 3.12 shows the distribution of concern amongst the survey sample based on this metric (collapsed to a three-level scale). As can be seen, nearly all respondents indicated concern for traffic safety in Minnesota. Repeating surveys with this item can be used to see how the distribution of these categories change over time as an indication of shifts in the traffic-safety culture of Minnesota.

Table 3.12. Categorical Representation of Survey Sample based on Concern for Traffic Safety.

Level of Agreement with “I am very concerned about safety on Minnesota’s roads and highways.”	Prevalence
Agree	86%
Neither Agree nor Disagree	8%
Disagree	6%

Finally, to demonstrate the relevance of this categorical metric, we calculated the risk ratio for engaging in one or more risky behaviors based on “agree” and “disagree” categories. The probability of engaging in a risky driving behavior based on agreeing or disagreeing with the statement “I am very concerned about safety on Minnesota’s roads and highways” was calculated. Those who disagreed with the statement were 26% more likely (1.15 - 1.38 at a 95% confidence level) to engage in one or more risky driving behaviors compared to those who

agreed with the statement. Furthermore, those who disagreed with the statement were 75% more likely (1.42 - 2.15 at a 95% confidence level) to engage in two or more risky driving behaviors compared to those who agreed with the statement.

3.5.3 Summary

Concern for traffic safety may be a suitable, one-dimensional unified metric for traffic-safety culture. Based on the results of this survey, concern for traffic safety predicted both engagement in risky driving behaviors as well as attitudes and beliefs related to these risky driving behaviors.

Chapter 4 Conclusion and Recommendations

In this final section, we draw conclusions about the role of the traffic-safety culture in Minnesota in relation to the general issue of traffic safety as well as the self-reported incidence of selected high-risk behaviors. Based on these conclusions, we offer recommendations for strategies to improve traffic safety by reducing the high-risk behaviors through the transformation of the key components of the traffic-safety culture in Minnesota.

4.1 Conclusion

A fundamental challenge for Minnesota to reach its goal of zero traffic fatalities is the fact that a significant percentage of its population does not perceive traffic safety to be the most important transportation issue. While some (34%) ranked traveler safety in the top three most important transportation issues, two-thirds did not (Table 3.1). Moreover, nearly 40% of respondents did not agree that zero was the only acceptable number of fatalities on Minnesota roads.

Fortunately, there is still concern amongst Minnesota residents about traffic safety (Figure 3.1). Indeed, one-third of respondents said they were “extremely concerned” about traffic safety.

To resolve this challenge, Minnesota needs to leverage this concern to make traffic safety the priority for the state and instill the belief that zero fatalities is not only desirable, but feasible. The fact that the goal of zero fatalities was perceived to be more acceptable for family and friends implies that growing concern for traffic safety in Minnesota can be achieved by increasing the social bond (social capital) amongst this state’s residents. One place to start this process may be within Minnesota employers and workplaces. Notably, the perceived concern for traffic safety was reportedly lowest in the workplace (Figure 3.1). Thus, not only can the workplace provide a social environment to increase social bonds, it also is the location where growth of concern about traffic safety has the most potential.

With the concept of “concern” for traffic safety serving as the core concept (Figure 4.9), our method of operationalizing traffic-safety culture in this study suggests numerous strategies to reduce risky driving behaviors (driving after drinking, speeding) and increase protective driver behaviors (wearing seatbelt). Whereas nearly all of the components of traffic-safety culture demonstrated a relationship with the self-reported engagement of the targeted behaviors (Table 2.3 to Table 2.5), a consistent determinant of the propensity to engage in risky behaviors was the misperception that it was “normal” in Minnesota to be risky (Figure 3.5). In fact, the norm in Minnesota is to be safe (Figure 3.5), and yet the perception that it is normal to be risky was shown to increase the propensity of adults in Minnesota to engage in risky behavior themselves (Figure 3.6). To address this bias in decision making, it is important to correct these normative misperceptions that most Minnesotans are unsafe.

Whereas there are general aspects of traffic-safety culture (e.g., concern for traffic safety, misperceptions of normal behavior) that were related to the reported risky driving, there were also certain aspects that were specific to the individual behaviors.

- Driving after drinking was reported less frequently by those who (Table 3.6):
 - Made plans to not drive after drinking.
 - Felt that it was wrong to drive after drinking.
 - Felt that other people important to them felt it was wrong to drive after drinking.
 - Recognized that impairment begins with the first sip of alcohol.

Thus, the overall sentiment of the culture that inhibits drunk driving is one of moral judgment that this behavior is wrong and a critical assessment that alcohol does impair performance. This culture can be codified by “rules” set by families and the workplace to prohibit driving after drinking by family members and co-workers. Indeed, respondents who reported not drinking and driving were significantly more likely to have such rules than those who did report drinking after driving (Figure 4.7).

- Seat belt use was more frequent amongst those who (Table 3.7):
 - Felt responsible as a driver to ensure all passengers wore seat belts.
 - Want the people they care about to wear a seatbelt
 - Had people they cared about who wanted them to wear a seat belt.
 - Habitually think about the need to wear a seat belt.
 - Believed it was important to protect themselves.

Thus, the overall sentiment for a culture that promotes seat belt use is one of responsibility both toward oneself and toward those we care about. This culture was most commonly codified by family rules (Figure 4.6). Consequently, those respondents who reported always wearing a seat belt were significantly more likely to have a family rule than those who did not report always wearing their seat belt (Figure 4.8).

- Speeding was reported less often amongst those who (Table 3.8):
 - Did not feel speeding to be enjoyable.
 - Felt people should not speed and believed most other people felt the same way.
 - Felt speeding was wrong and believed most other people felt the same way.

Thus, the overall sentiment for a culture that reduces speeding is one where the belief that people should not speed because it is wrong is commonly shared. Again, this culture was codified by rules established by the family and – although less common – the workplace, but to a much lesser extent than for seat belt use (Figure 4.6). However, those respondents who did not speed were significantly more likely to have a family rule about speeding than those who reported they did speed (Figure 4.9).

As discussed in the next section, these cultural profiles that promote the type of behaviors Minnesota wants to grow in order to achieve its zero fatality goal can be used to identify and guide the design of strategies to transform the traffic-safety culture in Minnesota.

4.2 Recommendations

Here we suggest specific strategies to reduce drunk driving and speeding while increasing use of seat belts.

4.2.1 General Strategies

To support the strategies specific to the individual risky behaviors, it is advisable to create the cultural conditions that will support those individual strategies.

- Increase the perceived importance of traffic safety in Minnesota as well as the perceived feasibility of the zero deaths goal. To help shift the current culture, both traffic safety and the zero deaths goal must become part of formal and informal conversations across

the state of Minnesota. Such conversations must take place across all levels of the social ecology. To generate these conversations, creative and positive messages should be developed that communicate traffic safety in terms other than just statistics. For example, how does traffic safety reduce years of life in Minnesota compared to other causes that seem to get more public attention? What could people accomplish if those years of life were not taken away from Minnesota? Similarly, providing examples of success stories in behavioral change and reductions in crash fatalities can erode the beliefs that zero fatalities are unattainable.

- Encourage workplaces to make transportation safety a critical component of workplace safety efforts. This would include establishing “rules” for its employees about safe driving as a social responsibility in the community to which the workplace belongs (safety citizenship). Presently, the workplace is seen to be least concerned with traffic safety (Figure 3.1) and less often has rules regarding safe driving behaviors compared to families (Figure 4.6). This provides an opportunity for workplaces to adopt transportation safety as an operating value. This could include not only traveling to and from work and driving as part of a work role, but also safe driving as a member of the community in which the workplace operates. State employees (e.g., within State DOTs) could represent an initial population to develop workplace rules. The benefits of these rules may then migrate into the home environment.
- Leverage the greater acceptance of the zero death goal amongst family and friends as a way to grow support for zero deaths among the population in general. This would require strategies to increase the perceived connection between all Minnesotans (social capital) in order to increase concern for others so that the concern for safety was not only increased, but also shifted from concern about oneself to concern toward others. One potential method to achieve this is to increase the recognition that Minnesotans are more alike than different and that success in traffic safety requires a collaborative effort to achieve benefits not only to our-selves, but to all Minnesotans. This may be facilitated by creating a desirable image of the “true” Minnesotan who accepts responsibility to drive safely to protect all Minnesotans (this may include using spokespersons who already have a positive image in Minnesota). As an example of this strategy, shows a poster campaign to increase seat belt use on Tribal lands by associating seat belt use with positive images of rodeo champions that are a respected part of Tribal culture.



Figure 4.1. Example of using positive images to promote safe behavior.

4.2.2 Driving after Drinking

While most adults do not engage in drinking and driving, they overwhelmingly think most people do. These misperceptions have several negative impacts:

1. They may inhibit important conversations about setting rules and planning
2. They may inhibit support for public or workplace policies
3. They may increase drinking and driving (as demonstrated in the analyses, see Table 2.3 and Table 3.10 and Figures Figure 3.1 and Figure 3.5).

Thus, strategies should seek to clarify that while impaired driving is a significant contributing factor to fatal crashes, most people do not engage in this risky behavior.

- ❑ Begin all communications about drinking and driving by stating that most adults agree drinking and driving is wrong. Use this message to encourage both family and workplace rules prohibiting driving after drinking. Such rules in the family appear to reduce the reported incidence of engaging in this risky behavior (Figure 4.7).
- ❑ Promote, educate, and support planning strategies (including choosing not to drink) as part of the “image” of the responsible drinker. This could include providing alternatives to driving including the development of reward-based “designated driver” campaigns and public transportation options. This would include driver education training programs to develop planning skills and awareness of alternatives to driving after drinking.
- ❑ Promote engagement by “bystanders” as a socially acceptable form of intervening to prevent people driving after becoming impaired in public places. To be successful, this would require that the image of the bystander becomes a positive and accepted image in the culture in support of the zero deaths goal (for example, Figure 4.2). This would also require education and training (e.g., through driver education programs) to provide the skills necessary to recognize the need to intervene and the confidence to intervene in a way that is safe and socially acceptable.

- Clearly establish that drinking and driving is a major traffic safety issue and that most adults do NOT engage in this risky behavior. In fact, it is the behavior of a small portion of the population that puts everyone at risk. An example of a normative message to correct misperceptions by showing that the true norm is safe behavior is shown in Figure 4.2.



Figure 4.2. Example of positive messaging to communicate actual norm of safe behavior.

4.2.3 Seat Belt Use

Seat belt use was predicted by several related aspects of culture (Table 3.7) that relate to core values of being responsible, protecting others (and self), and caring about people. Together, these represent a set of positive underlying values that can be leveraged to promote seat belt use. Together, these create a powerful context to create the habit of always wearing a seat belt and getting others to wear a seat belt.

- Promote family rules that emphasize responsibility of drivers to ensure they and all passengers are wearing a seat belt. Such rules appear to increase the reported incidence of wearing a seat belt (Figure 4.8). Similarly, promote workplace policies that emphasize responsibility of all employees to ensure everyone is wearing a seat belt during commute driving and work-related driving.
- Integrate social skill training for new drivers (e.g., within driver education programs) on how to influence others to wear a seat belt in driver education.
- Portray seat belt use as a behavior that satisfies the need to protect one self and family. An example of this strategy is shown in Figure 4.3. This example leverages the behavior of wearing a seat belt to satisfy the common values of protecting people we care about and protecting ourselves for the sake of those we care about.



Figure 4.3. Example of leveraging cultural values with desired behavior.

4.2.4 Speeding

Speeding is a contributing factor to roadway fatalities in Minnesota (National Highway Traffic Safety Administration, 2013). Most of the respondents from this sample of Minnesota adults did not speed often; 84% reported speeding only half the time and nearly one-third (28%) reported never speeding. Moreover, nearly three-quarters (73%) agreed that speeding was wrong. However, most respondents misperceived these norms and assumed most Minnesota adults sped more than half the time and disagreed that speeding was wrong (Appendix C). Importantly these misperceptions had a strong influence on the decision of individuals to speed themselves (Figure 3.6).

- Communicate the positive norms that Minnesota adults do not commonly speed and perceive speeding to be wrong. This could be a similar messaging strategy as shown in Figure 4.2 for driving after drinking. Use this message to encourage both family and workplace rules prohibiting speeding. Such rules in the family appear to reduce the reported incidence of engaging in this risky behavior (Figure 4.9).
- Leverage the norm that most respondents think speeding is wrong to develop new forms of enforcement. Such forms of enforcement could be designed increase concern for safety and social connections amongst Minnesotans. Importantly, these forms of enforcement should be compatible with the existing culture and be supportive of the desired culture. Specifically, new forms of enforcement should not conflict with cultural beliefs that may prevent their acceptance in Minnesota communities. For example, whereas automated enforcement is often rejected because of the belief it is intended solely as an income generation strategy for enforcement agencies, the “speed lottery” concept shown in Figure 4.4 negates this belief by distributing the fines amongst drivers that are detected to not be speeding. Thus, this novel variation of automated speed enforcement not only dispels a belief that could otherwise prevent its acceptance, it actually reinforces the desired norm of not speeding.



Figure 4.4 Depiction of “Speed Lottery” representation of automatic speed enforcement (thefuntheory.com, 2009).

4.3 Next Steps

There are three primary next steps recommended for this project.

First, it is recommended that Minnesota select one of the targeted behaviors to be the focus of the next project phase, along with concern for traffic safety in general.

Second, it is recommended that Minnesota move forward with a project to develop the framework and process of implementing a subset of the proposed strategies for the selected behavior and concern for traffic safety in general.

Third, it is recommended that Minnesota move forward with a project to expand consideration of strategies that affect road user behavior to consider strategies that might impact the behaviors of stakeholders across the social ecology that also impact road user behavior. This concept of identifying strategies to impact different behaviors at each level of the social ecology is shown as the circles connected by lines in Figure 4.5. For example, what behaviors by schools and workplaces impact the behaviors we are trying to change in road users? What aspects of the culture within schools and workplaces influence those behaviors? What strategies can be applied in schools and workplaces to transform those behaviors? How do we develop and coordinate a “program” of integrated strategies across all the stakeholder groups in the social ecology?



Figure 4.5. A program of integrated strategies across the social network (based on Allegrante, Hanson, Sleet, & Marks, 2010).

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Appendix A

Survey

Minnesota Traffic Safety Survey

Instructions

The Minnesota Department of Transportation is seeking to improve the safety of your roads and needs your help to better understand roadway safety.

We would like to ask you questions about traffic safety, drinking and driving, seat belts and speeding.

Your voice matters. Each and every survey is very important to us.

Your participation is voluntary, and we will only share summary results. Your responses are anonymous and cannot be associated with your identity.

Thank you for taking this survey!

1. The Minnesota transportation system involves a variety of issues. Please circle three (3) of the following which are most important to you? Among these three (3), please identify which is most important to you by placing "1" beside it. Identify which is second most important to you by placing a "2" beside it.

- | | |
|---|--|
| <p><input type="checkbox"/> Snow and ice removal</p> <p><input type="checkbox"/> Conditions of roadways</p> <p><input type="checkbox"/> Traveler safety</p> <p><input type="checkbox"/> Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.)</p> | <p><input type="checkbox"/> Access to public transportation</p> <p><input type="checkbox"/> Conditions of bridges</p> <p><input type="checkbox"/> Reducing fuel consumption</p> <p><input type="checkbox"/> Minimal delays on roads / minimal congestion</p> |
|---|--|

2a. How do you feel about the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year?

Not at all concerned				Somewhat concerned			Extremely concerned
1	2	3	4	5	6	7	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2b. In your opinion, how do you think most adults in Minnesota feel about the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year?

Most are not at all concerned				Most are somewhat concerned			Most are extremely concerned
1	2	3	4	5	6	7	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota?

- | | |
|---|---|
| <p><input type="checkbox"/> Impaired driving</p> <p><input type="checkbox"/> Distracted driving</p> <p><input type="checkbox"/> Following too closely / tailgating</p> <p><input type="checkbox"/> Speeding</p> | <p><input type="checkbox"/> Vehicle failure</p> <p><input type="checkbox"/> Not wearing a seat belt</p> <p><input type="checkbox"/> Tired or sleeping driver</p> <p><input type="checkbox"/> Not wearing a helmet on a motorcycle</p> |
|---|---|

Please continue on the next page

Please indicate how much you agree or disagree with the following statements.

4. I believe the only acceptable number of deaths and serious injuries on Minnesota roadways is zero.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I believe the only acceptable number of deaths and serious injuries <u>among my family and friends</u> on Minnesota roadways is zero.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6a. I am very concerned about safety on Minnesota's roads and highways.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6b. I believe <u>most of my friends</u> are very concerned safety on Minnesota's roads and highways.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I believe <u>my workplace</u> is very concerned about roadway safety among its employees.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I believe <u>my local law enforcement agency</u> (local police) is very concerned about roadway safety.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I believe <u>my local government</u> (town, city, county) is very concerned about roadway safety.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I believe <u>Minnesota state government</u> is very concerned about roadway safety.	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Next, we would like to ask some questions about drinking and driving.

11. When was the last time you drove <u>within two hours</u> of drinking alcohol?	In the past day	In the past week	In the past month	In the past 2 months	In the past year	More than a year ago	Never
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12a. During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol?	0	1	2	3	4	5	6 or more
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12b. During the past 60 days, on how many occasions do you think <u>most adults in Minnesota</u> drove within two hours of drinking any alcohol? <i>Even if you are not sure, give your best guess.</i>	0	1	2	3	4	5	6 or more
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13a. During the past 30 days, on how many occasions did you drive after having perhaps too much to drink?

0	1	2	3	4	5	6 or more
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13b. In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink? *Even if you are not sure, give your best guess.*

Very few 0 – 14%	Few 15-29%	Some 30-44%	About half 45-55%	Many 55-69%	Most 70-84%	Almost all 85-100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate how much you agree or disagree with the following statements.

14a. I believe it is wrong to drive after drinking enough alcohol to be impaired.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14b. In your opinion, how would most adults in Minnesota respond: "I believe it is wrong to drive after drinking enough alcohol to be impaired."
Even if you are not sure, just give your best guess.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15a. I believe it is wrong to drive after drinking any alcohol.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15b. In your opinion, how would most adults in Minnesota respond: "I believe it is wrong to drive after drinking any alcohol."
Even if you are not sure, just give your best guess.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. I believe impairment begins with the first sip of alcohol.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17a. I believe people should not drive after drinking any alcohol.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17b. In your opinion, how would most adults in Minnesota respond: "I believe people should not drive after drinking any alcohol."
Even if you are not sure, just give your best guess.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please continue on the next page

19. I plan so that I never drive after drinking. This may include choosing not to drink.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. My family has a rule about never driving after drinking any alcohol.

No	Yes	I don't know	I do not have a family
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. My workplace has a policy about never driving after drinking any alcohol.

No	Yes	I don't know	I do not have a workplace
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be caught by law enforcement?

Extremely unlikely 1	2	3	Neutral 4	5	6	Extremely likely 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Next, we would like to ask some questions about seat belts.

23. When was the last time you rode in a vehicle without wearing your seat belt?

Today	In the past week	In the past month	In the past 3 months	In the past year	More than a year ago	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24a. When you are driving within a few miles of your home, how often do you wear your seat belt?

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24b. When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts?
Even if you are not sure, just give your best guess.

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25a. In general, how often do you wear your seat belt?

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25b. In your opinion, how often do most adults in Minnesota wear their seat belts?
Even if you are not sure, just give your best guess.

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
26a. I believe it is important to protect myself by always wearing a seat belt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26b. In your opinion, how would <u>most adults in Minnesota</u> respond: "It is important to protect myself by always wearing a seat belt." <i>Even if you are not sure, just give your best guess.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27a. When I am the driver, I believe it is <u>my responsibility</u> to make sure others in the vehicle with me wear a seat belt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27b. In your opinion, how would <u>most adults in Minnesota</u> respond: "When I am the driver, I believe it is my responsibility to make sure others in the vehicle with me wear a seat belt." <i>Even if you are not sure, just give your best guess.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. I wear a seat belt because I don't want to get a ticket.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Seat belts are just as likely to harm you as help you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Seat belts help prevent lifelong disabilities (such as paralysis, spinal cord injuries and serious brain injuries).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Seat belts do not fit me properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. I want people I care about to always wear a seat belt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. People who care about me want me to always wear a seat belt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. I am comfortable wearing my seat belt even if others in the car are not wearing their seat belts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
35. I am less likely to wear my seat belt when others in the vehicle are not wearing their seat belts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. I think about wearing my seat belt every time I am in a vehicle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



37. My family has a rule about always wearing a seat belt.

No	Yes	I don't know	I do not have a family
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

38. My workplace has a policy about always wearing a seat belt.

No	Yes	I don't know	I do not have a workplace
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

39. Assume that you do not wear your seat belt AT ALL while driving over the next six months. How often do you think you will receive a ticket for not wearing a seat belt?

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Next, we would like to ask some questions about speeding.

40a. How often do you drive more than 10 mph over the posted speed limit?

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40b. How often do most adults in Minnesota drive more than 10 mph over the posted speed limit? *Even if you are not sure, just give your best guess.*

Never 1	2	3	About half the time	5	6	Always 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate how much you agree or disagree with the following statements.

41a. "Driving 10 mph over the speed limit makes driving more pleasant."

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

41b. In your opinion, how would most adults in Minnesota respond: "Driving 10 mph over the speed limit makes driving more pleasant." *Even if you are not sure, just give your best guess.*

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

42a. "Driving 10 mph over the speed limit is wrong."

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

42b. In your opinion, how would most adults in Minnesota respond: "Driving 10 mph over the speed limit is wrong." *Even if you are not sure, just give your best guess.*

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43. "Driving 10 mph over the speed limit will get me to my destination quicker."

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

44. "Driving 10 mph over the speed limit increases the chances I will be in a crash."

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

45a. I don't consider driving 10 mph over the speed limit to be 'speeding'.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

45b. In your opinion, how would most adults in Minnesota respond: "I don't consider driving 10 mph over the speed limit to be 'speeding'." *Even if you are not sure, just give your best guess.*

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

46a. I think people should not drive 10 mph over the speed limit.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

46b. In your opinion, how would most adults in Minnesota respond: "I think people should not drive 10 mph over the speed limit." *Even if you are not sure, just give your best guess.*

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

47. I know when I am driving 10 mph over the speed limit.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

48. I am comfortable driving less than 10 mph over the speed limit even if those around me are driving faster.

Strongly disagree	Mostly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Mostly agree	Strongly agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

49. How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster?

Not certain at all 1	2	3	Somewhat certain 4	5	6	Very Certain 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

50. My family has a rule about not speeding.

No	Yes	I don't know	I do not have a family
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

51. My workplace has a rule about not speeding.

No	Yes	I don't know	I do not have work
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

52. Assume that you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticket for speeding?

Extremely Unlikely 1	2	3	Neutral 4	5	6	Extremely Likely 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



53. Indicate your level of agreement with the following statement: "Most people are honest."

I definitely disagree	I generally disagree	I moderately disagree	I moderately agree	I generally agree	I definitely agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

54. Generally speaking, would you say that people can be trusted or that you can't be too careful in dealing with people?

People can almost always be trusted	People can usually be trusted	You usually can't be too careful in dealing with people	You almost always can't be too careful in dealing with people
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

We ask the following questions to make sure we have a good representation of people from across the state and with different backgrounds.

D1. In what city do you live? _____

D2. In what county do you live? _____

D3. What best describes where you live? Rural Urban Suburban

D4. What is your sex? _____

D5. What is the last grade or level of education that you completed?

- | | |
|---|--|
| <input type="checkbox"/> High school or less | <input type="checkbox"/> College graduate |
| <input type="checkbox"/> Technical or vocational school | <input type="checkbox"/> Post graduate work or advanced degree |
| <input type="checkbox"/> Some college | <input type="checkbox"/> Refused |

D6. Do you speak more than one language in the home? Yes No

D7. Please select the languages you fluently read.

- | | |
|--|---|
| <input type="checkbox"/> English | <input type="checkbox"/> Asian and Pacific Island languages |
| <input type="checkbox"/> Spanish | <input type="checkbox"/> Other |
| <input type="checkbox"/> American Indian languages | |

D8. Do you drive as part of your work? Yes No

D9. In what year were you born (example: 1966)? _____

Thank you!

*Please fold the completed survey in half and return it in the envelope provided to:
40 S 7th street, suite 212 box 315
Minneapolis, MN 55402*

Appendix B
Survey Letters



Minnesota Department of Transportation

395 John Ireland Boulevard
Saint Paul, MN 55155

Dear Community Member:

The Minnesota Department of Transportation is asking for your input and help. The Office of Traffic, Safety, and Technology strives to make Minnesota roadways as safe as possible, and we are asking for your input.

Soon you will receive a letter and the "Minnesota Traffic Safety Survey" from the Center for Health and Safety Culture, an organization working with us.

We would greatly appreciate you taking the time to complete this survey. Your responses are confidential and will not be identified with your address or name. Participation in the survey is voluntary. It is your opportunity to provide input to support our state's effort to keep our roads safe.

The survey is very brief and will only take a few minutes of your time. Please look for the envelope labeled "IMPORTANT SURVEY ENCLOSED" arriving soon.

Thank you for your help in making Minnesota roads safer for all of us.

Sincerely,

A handwritten signature in black ink, appearing to read 'B. Estochen'.

Brad Estochen
State Traffic Safety Engineer
Minnesota Department of Transportation
Office of Traffic, Safety, and Technology

An Equal Opportunity Employer





Dear Minnesota Resident:

Your voice matters. I am working with the Minnesota Department of Transportation and very much want to understand your beliefs and attitudes about traffic safety. We need your input so we can find positive ways to work together as a community to make Minnesota's roads safer for everyone.

Your household was randomly selected among households in your community. In order for the results of this study to represent both men and women, we ask that the **member of the household age 18 or older who has had the most recent birthday** complete this questionnaire. If necessary, it is OK for another member of the family to assist this person (to help read or write the responses).

We greatly value your thoughts and opinions. This survey will take approximately 10 minutes to complete and will benefit the well-being of everyone in your community. We will use the results to develop materials specifically for Minnesota.

Participation is voluntary, and only summary results will be reported. Your responses are anonymous and confidential. Your responses will not be associated with your address. If you have questions about returning the survey, please contact me, Steve Swinford, at the Center for Health and Safety Culture at (406) 994-7490 or email me at steven.swinford@coe.montana.edu. This study has been approved by the Montana State University Institutional Review Board. If you have questions about the approval of this study, please contact cherylj@montana.edu.

Remember, there are no "right" or "wrong" answers. We only ask that you read each question carefully and answer as honestly as you can. We are interested in your thoughts as well as how you think most other adults in Minnesota would respond to the same questions.

Please return the survey in the envelope provided – no postage is required.
Thank you for your time in supporting this effort to keep Minnesota roads safer.

Center for Health and Safety Culture
MOST of Us®
P.O. Box 170548
Bozeman, MT 59717-0548
www.mostofus.org
www.westerntransportationinstitute.org/centers/culture

Tel 406-994-7873
Fax 406-994-7285

Mountains & Minds

Sincerely,

A handwritten signature in blue ink that reads 'Steve Swinford'.

Steve Swinford, PhD
Associate Professor, Department of Sociology and Anthropology
Research Scientist, Center for Health and Safety Culture

Dear Resident:

Last week a survey was mailed to your home about traffic safety. This survey was sent on behalf of the Minnesota Department of Transportation. Your name was randomly selected among all households in Minnesota.

If you have already completed and returned the survey, please accept our sincere thanks. If not, we hope that you will consider doing so. We are especially grateful for your help because only by getting responses from all citizens like you can we hope to improve efforts to make our roads safer.

If you did not receive a survey or if it has been misplaced, please email me at steven.swinford@coe.montana.edu or call me at (406) 994-7490, and we will send you another one immediately.

Sincerely,

A handwritten signature in blue ink, appearing to read "Steve Swinford".

Steve Swinford, PhD
Associate Professor, Department of Sociology and Anthropology
Research Scientist, Center for Health and Safety Culture



Dear Minnesota Resident:

About two weeks ago I sent a survey to you about traffic safety. If you have already returned the survey, we thank you and ask you to disregard this letter.

Many households in Minnesota have completed the survey to provide important information to support efforts to make Minnesota's roads safer.

We are writing again to remind you about this opportunity to express your values and opinions. **Your voice matters.** It's only by hearing from nearly everyone in the sample that we can be sure that the results are truly representative.

If you have not completed the survey and still wish to do so, we have included another survey and self-addressed return envelope with pre-paid postage. In order for the results of this study to represent both men and women, we ask that the **member of the household age 18 or older who has had the most recent birthday** complete this questionnaire. If necessary, it is OK for another member of the family to assist this person (to help read or write the responses).

If you have questions about returning the survey, please contact me, Steve Swinford, at the Center for Health and Safety Culture at (406) 994-7490 or email me at steven.swinford@coe.montana.edu. This study has been approved by the Montana State University Institutional Review Board. If you have questions about the approval of this survey please contact cherylj@montana.edu.

Your responses are anonymous and confidential. Your responses will not be associated with your address. Remember, there are no "right" or "wrong" answers. We only ask that you read each question carefully and answer as honestly as you can. We are interested in your thoughts as well as how you think most other adults in Minnesota would respond to the same questions.

Please return the survey in the envelope provided – no postage is required. **Thank you for your time in supporting this effort to keep Minnesota roads safer.**

Sincerely,

A handwritten signature in blue ink that reads 'Steve Swinford'.

Steve Swinford, PhD
Associate Professor, Department of Sociology and Anthropology
Research Scientist, Center for Health and Safety Culture

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Mountains & Minds

Appendix C

Frequency Response

TZD Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	East Central (ATP 3)	451	14.1	14.2	14.2
	Metro	1658	51.7	52.1	66.3
	Northeast (ATP 1)	239	7.5	7.5	73.8
	Northwest (ATP 2)	24	.7	.8	74.5
	South Central (ATP 7)	194	6.1	6.1	80.6
	Southeast (ATP 6)	337	10.5	10.6	91.2
	Southwest (ATP 8)	166	5.2	5.2	96.4
	West Central (ATP 4)	114	3.6	3.6	100.0
	Total	3183	99.3	100.0	
Missing	0	21	.7		
Total		3204	100.0		

Census Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	557	17.4	17.5	17.5
	Urban Cluster	767	23.9	24.1	41.6
	Urbanized Area	1859	58.0	58.4	100.0
	Total	3183	99.3	100.0	
Missing	0	21	.7		
Total		3204	100.0		

1a. The Minnesota transportation system involves a variety of issues. Please circle three (3) of the following which are most important to you? Ranked 1 of 3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Snow and ice removal	995	31.1	31.4	31.4
	Conditions of roadways	1100	34.3	34.7	66.0
	Traveler safety	407	12.7	12.8	78.9
	Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.)	69	2.2	2.2	81.1
	Access to public transportation	52	1.6	1.6	82.7
	Conditions of bridges	123	3.8	3.9	86.6
	Reducing fuel consumption	61	1.9	1.9	88.5
	Minimal delays on roads / minimal congestion	365	11.4	11.5	100.0
	Total	3172	99.0	100.0	
Missing	System	32	1.0		
Total		3204	100.0		

1b. The Minnesota transportation system involves a variety of issues. Please circle three (3) of the following which are most important to you? Ranked 2 of 3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Snow and ice removal	825	25.7	26.1	26.1
	Conditions of roadways	1016	31.7	32.1	58.2
	Traveler safety	251	7.8	7.9	66.1
	Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.)	143	4.5	4.5	70.6
	Access to public transportation	94	2.9	3.0	73.6
	Conditions of bridges	374	11.7	11.8	85.4
	Reducing fuel consumption	108	3.4	3.4	88.8
	Minimal delays on roads / minimal congestion	353	11.0	11.2	100.0
	Total	3164	98.8	100.0	
Missing	System	40	1.2		
Total		3204	100.0		

1c. The Minnesota transportation system involves a variety of issues. Please circle three (3) of the following which are most important to you? Ranked 3 of 3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Snow and ice removal	592	18.5	19.1	19.1
	Conditions of roadways	465	14.5	15.0	34.0
	Traveler safety	405	12.6	13.0	47.1
	Pedestrian and bike facilities (like sidewalks, bike lanes, safe shoulders, etc.)	222	6.9	7.1	54.2
	Access to public transportation	140	4.4	4.5	58.7
	Conditions of bridges	483	15.1	15.6	74.3
	Reducing fuel consumption	221	6.9	7.1	81.4
	Minimal delays on roads / minimal congestion	577	18.0	18.6	100.0
	Total	3105	96.9	100.0	
Missing	System	99	3.1		
Total		3204	100.0		

2a. How do you feel about the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all concerned	52	1.6	1.6	1.6
	2	62	1.9	1.9	3.6
	3	129	4.0	4.0	7.6
	Somewhat concerned	656	20.5	20.5	28.1
	5	522	16.3	16.3	44.5
	6	623	19.4	19.5	64.0
	Extremely concerned	1151	35.9	36.0	100.0
	Total	3195	99.7	100.0	
Missing	System	9	.3		
Total		3204	100.0		

2b. In your opinion, how do you think most adults in Minnesota feel about the fact that nearly 400 people are killed or seriously injured on Minnesota roadways each year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most are not at all concerned	87	2.7	2.7	2.7
	2	134	4.2	4.2	7.0
	3	292	9.1	9.2	16.1
	Most are somewhat concerned	1303	40.7	41.0	57.1
	5	521	16.3	16.4	73.5
	6	384	12.0	12.1	85.6
	Most are extremely concerned	457	14.3	14.4	100.0
	Total	3178	99.2	100.0	
Missing	System	26	.8		
Total		3204	100.0		

3a. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Impaired driving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Impaired driving	2236	69.8	100.0	100.0
Missing	System	968	30.2		
Total		3204	100.0		

3b. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Distracted driving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Distracted driving	2876	89.8	100.0	100.0
Missing	System	328	10.2		
Total		3204	100.0		

3c. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Following too closely / tailgating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Following too closely / tailgating	866	27.0	100.0	100.0
Missing	System	2338	73.0		
Total		3204	100.0		

3d. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Speeding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Speeding	1625	50.7	100.0	100.0
Missing	System	1579	49.3		
Total		3204	100.0		

3e. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Vehicle failure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Vehicle failure	26	.8	100.0	100.0
Missing	System	3178	99.2		
Total		3204	100.0		

3f. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Not wearing a seat belt

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not wearing a seat belt	1093	34.1	100.0	100.0
Missing	System	2111	65.9		
Total		3204	100.0		

3g. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Tired or sleeping driver

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tired or sleeping driver	592	18.5	100.0	100.0
Missing	System	2612	81.5		
Total		3204	100.0		

3h. Please select what you believe are the top 3 leading contributing factors to roadway related fatalities and serious injuries in Minnesota? Not wearing a helmet on a motorcycle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not wearing a helmet on a motorcycle	240	7.5	100.0	100.0
Missing	System	2964	92.5		
Total		3204	100.0		

4. I believe the only acceptable number of deaths and serious injuries on Minnesota roadways is zero.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	253	7.9	8.1	8.1
	Mostly Disagree	246	7.7	7.8	15.9
	Somewhat Disagree	307	9.6	9.8	25.7
	Neither Agree nor Disagree	489	15.3	15.6	41.2
	Somewhat Agree	408	12.7	13.0	54.2
	Mostly Agree	564	17.6	18.0	72.2
	Strongly Agree	874	27.3	27.8	100.0
	Total	3141	98.0	100.0	
Missing	System	63	2.0		
Total		3204	100.0		

5. I believe the only acceptable number of deaths and serious injuries among my family and friends on Minnesota roadways is zero.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	120	3.7	3.8	3.8
	Mostly Disagree	110	3.4	3.5	7.3
	Somewhat Disagree	136	4.2	4.3	11.7
	Neither Agree nor Disagree	304	9.5	9.7	21.4
	Somewhat Agree	231	7.2	7.4	28.7
	Mostly Agree	463	14.5	14.8	43.5
	Strongly Agree	1771	55.3	56.5	100.0
	Total	3135	97.8	100.0	
Missing	System	69	2.2		
Total		3204	100.0		

6a. I am very concerned about safety on Minnesota's roads and highways.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	48	1.5	1.5	1.5
	Mostly Disagree	63	2.0	2.0	3.5
	Somewhat Disagree	88	2.7	2.8	6.3
	Neither Agree nor Disagree	246	7.7	7.8	14.1
	Somewhat Agree	626	19.5	19.9	34.0
	Mostly Agree	873	27.2	27.7	61.7
	Strongly Agree	1208	37.7	38.3	100.0
	Total	3152	98.4	100.0	
Missing	System	52	1.6		
Total		3204	100.0		

6b. I believe most of my friends are very concerned safety on Minnesota's roads and highways.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	41	1.3	1.3	1.3
	Mostly Disagree	79	2.5	2.5	3.8
	Somewhat Disagree	131	4.1	4.2	8.0
	Neither Agree nor Disagree	419	13.1	13.4	21.4
	Somewhat Agree	834	26.0	26.6	48.0
	Mostly Agree	995	31.1	31.8	79.8
	Strongly Agree	633	19.8	20.2	100.0
	Total	3132	97.8	100.0	
Missing	System	72	2.2		
Total		3204	100.0		

7. I believe my workplace is very concerned about roadway safety among its employees.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	81	2.5	2.8	2.8
	Mostly Disagree	120	3.7	4.1	6.9
	Somewhat Disagree	140	4.4	4.8	11.8
	Neither Agree nor Disagree	850	26.5	29.3	41.0
	Somewhat Agree	488	15.2	16.8	57.9
	Mostly Agree	606	18.9	20.9	78.7
	Strongly Agree	617	19.3	21.3	100.0
	Total	2902	90.6	100.0	
Missing	System	302	9.4		
Total		3204	100.0		

8. I believe my local law enforcement agency (local police) is very concerned about roadway safety.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	51	1.6	1.6	1.6
	Mostly Disagree	51	1.6	1.6	3.2
	Somewhat Disagree	98	3.1	3.1	6.4
	Neither Agree nor Disagree	217	6.8	6.9	13.3
	Somewhat Agree	555	17.3	17.7	31.0
	Mostly Agree	1051	32.8	33.5	64.4
	Strongly Agree	1117	34.9	35.6	100.0
	Total	3140	98.0	100.0	
Missing	System	64	2.0		
Total		3204	100.0		

9. I believe my local government (town, city, county) is very concerned about roadway safety.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	47	1.5	1.5	1.5
	Mostly Disagree	77	2.4	2.4	3.9
	Somewhat Disagree	152	4.7	4.8	8.8
	Neither Agree nor Disagree	275	8.6	8.7	17.5
	Somewhat Agree	831	25.9	26.4	43.9
	Mostly Agree	1098	34.3	34.9	78.7
	Strongly Agree	670	20.9	21.3	100.0
	Total	3150	98.3	100.0	
Missing	System	54	1.7		
Total		3204	100.0		

10. I believe Minnesota state government is very concerned about roadway safety.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	49	1.5	1.6	1.6
	Mostly Disagree	85	2.7	2.7	4.3
	Somewhat Disagree	170	5.3	5.4	9.7
	Neither Agree nor Disagree	285	8.9	9.1	18.8
	Somewhat Agree	953	29.7	30.4	49.1
	Mostly Agree	1033	32.2	32.9	82.1
	Strongly Agree	563	17.6	17.9	100.0
	Total	3138	97.9	100.0	
Missing	System	66	2.1		
Total		3204	100.0		

11. When was the last time you drove within two hours of drinking alcohol?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In the past day	72	2.2	2.3	2.3
	In the past week	255	8.0	8.1	10.4
	In the past month	337	10.5	10.7	21.1
	In the past 2 months	196	6.1	6.2	27.4
	In the past year	379	11.8	12.1	39.5
	More than a year ago	811	25.3	25.8	65.3
	Never	1090	34.0	34.7	100.0
	Total	3140	98.0	100.0	
Missing	System	64	2.0		
Total		3204	100.0		

12a. During the past 60 days, on how many occasions did you drive within two hours of drinking any alcohol?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2022	63.1	65.0	65.0
	1	324	10.1	10.4	75.4
	2	272	8.5	8.7	84.1
	3	157	4.9	5.0	89.1
	4	101	3.2	3.2	92.4
	5	54	1.7	1.7	94.1
	6 or more	183	5.7	5.9	100.0
	Total	3113	97.2	100.0	
Missing	System	91	2.8		
Total		3204	100.0		

12b. During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	89	2.8	2.9	2.9
	1	302	9.4	9.7	12.6
	2	587	18.3	18.8	31.4
	3	670	20.9	21.5	52.9
	4	456	14.2	14.6	67.5
	5	179	5.6	5.7	73.3
	6 or more	832	26.0	26.7	100.0
	Total	3115	97.2	100.0	
Missing	System	89	2.8		
Total		3204	100.0		

12b (reverse). During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6 or more	832	26.0	26.7	26.7
	5	179	5.6	5.7	32.5
	4	456	14.2	14.6	47.1
	3	670	20.9	21.5	68.6
	2	587	18.3	18.8	87.4
	1	302	9.4	9.7	97.1
	0	89	2.8	2.9	100.0
	Total	3115	97.2	100.0	
Missing	System	89	2.8		
Total		3204	100.0		

13a. During the past 30 days, on how many occasions did you drive after having perhaps too much to drink?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2937	91.7	94.2	94.2
	1	101	3.2	3.2	97.4
	2	19	.6	.6	98.0
	3	15	.5	.5	98.5
	4	4	.1	.1	98.7
	5	5	.2	.2	98.8
	6 or more	37	1.2	1.2	100.0
	Total	3118	97.3	100.0	
Missing	System	86	2.7		
Total		3204	100.0		

13b. In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very few 0-14%	574	17.9	18.4	18.4
	Few 15-29%	915	28.6	29.3	47.7
	Some 30-44%	852	26.6	27.3	75.0
	About half 45-55%	419	13.1	13.4	88.4
	Many 55-69%	221	6.9	7.1	95.5
	Most 70-84%	98	3.1	3.1	98.6
	Almost all 85-100%	43	1.3	1.4	100.0
	Total	3122	97.4	100.0	
Missing	System	82	2.6		
Total		3204	100.0		

14a. I believe it is wrong to drive after drinking enough alcohol to be impaired.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	54	1.7	1.7	1.7
	Mostly Disagree	21	.7	.7	2.4
	Somewhat Disagree	22	.7	.7	3.1
	Neither Agree nor Disagree	46	1.4	1.5	4.5
	Somewhat Agree	72	2.2	2.3	6.8
	Mostly Agree	301	9.4	9.5	16.4
	Strongly Agree	2637	82.3	83.6	100.0
	Total	3153	98.4	100.0	
Missing	System	51	1.6		
Total		3204	100.0		

14b. In your opinion, how would most adults in Minnesota respond: “I believe it is wrong to drive after drinking enough alcohol to be impaired.”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	29	.9	.9	.9
	Mostly Disagree	41	1.3	1.3	2.2
	Somewhat Disagree	63	2.0	2.0	4.2
	Neither Agree nor Disagree	121	3.8	3.9	8.1
	Somewhat Agree	568	17.7	18.1	26.2
	Mostly Agree	1394	43.5	44.4	70.6
	Strongly Agree	924	28.8	29.4	100.0
	Total	3140	98.0	100.0	
Missing	System	64	2.0		
Total		3204	100.0		

15a. I believe it is wrong to drive after drinking any alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	336	10.5	10.7	10.7
	Mostly Disagree	367	11.5	11.7	22.4
	Somewhat Disagree	394	12.3	12.5	34.9
	Neither Agree nor Disagree	291	9.1	9.3	44.1
	Somewhat Agree	409	12.8	13.0	57.2
	Mostly Agree	458	14.3	14.6	71.7
	Strongly Agree	889	27.7	28.3	100.0
	Total	3144	98.1	100.0	
Missing	System	60	1.9		
Total		3204	100.0		

15b. In your opinion, how would most adults in Minnesota respond: “I believe it is wrong to drive after drinking any alcohol.”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	192	6.0	6.1	6.1
	Mostly Disagree	602	18.8	19.2	25.3
	Somewhat Disagree	563	17.6	17.9	43.2
	Neither Agree nor Disagree	392	12.2	12.5	55.7
	Somewhat Agree	789	24.6	25.1	80.9
	Mostly Agree	444	13.9	14.1	95.0
	Strongly Agree	157	4.9	5.0	100.0
	Total	3139	98.0	100.0	
Missing	System	65	2.0		
Total		3204	100.0		

16. I believe impairment begins with the first sip of alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	789	24.6	25.1	25.1
	Mostly Disagree	496	15.5	15.8	40.9
	Somewhat Disagree	447	14.0	14.2	55.1
	Neither Agree nor Disagree	336	10.5	10.7	65.8
	Somewhat Agree	374	11.7	11.9	77.7
	Mostly Agree	307	9.6	9.8	87.5
	Strongly Agree	392	12.2	12.5	100.0
	Total	3141	98.0	100.0	
Missing	System	63	2.0		
Total		3204	100.0		

17a. I believe people should not drive after drinking any alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	531	16.6	16.9	16.9
	Mostly Disagree	436	13.6	13.9	30.7
	Somewhat Disagree	437	13.6	13.9	44.6
	Neither Agree nor Disagree	330	10.3	10.5	55.1
	Somewhat Agree	353	11.0	11.2	66.3
	Mostly Agree	394	12.3	12.5	78.8
	Strongly Agree	666	20.8	21.2	100.0
	Total	3147	98.2	100.0	
Missing	System	57	1.8		
Total		3204	100.0		

17b. In your opinion, how would most adults in Minnesota respond: "I believe people should not drive after drinking any alcohol."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	310	9.7	9.9	9.9
	Mostly Disagree	706	22.0	22.5	32.4
	Somewhat Disagree	653	20.4	20.8	53.2
	Neither Agree nor Disagree	406	12.7	12.9	66.1
	Somewhat Agree	592	18.5	18.9	85.0
	Mostly Agree	332	10.4	10.6	95.6
	Strongly Agree	138	4.3	4.4	100.0
	Total	3137	97.9	100.0	
Missing	System	67	2.1		
Total		3204	100.0		

18. Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	353	11.0	11.3	11.3
	Mostly Disagree	448	14.0	14.4	25.7
	Somewhat Disagree	336	10.5	10.8	36.5
	Neither Agree nor Disagree	470	14.7	15.1	51.6
	Somewhat Agree	313	9.8	10.1	61.7
	Mostly Agree	468	14.6	15.0	76.7
	Strongly Agree	724	22.6	23.3	100.0
	Total	3112	97.1	100.0	
Missing	System	92	2.9		
Total		3204	100.0		

19. I plan so that I never drive after drinking. This may include choosing not to drink.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	189	5.9	6.0	6.0
	Mostly Disagree	253	7.9	8.0	14.0
	Somewhat Disagree	247	7.7	7.8	21.9
	Neither Agree nor Disagree	270	8.4	8.6	30.5
	Somewhat Agree	312	9.7	9.9	40.4
	Mostly Agree	559	17.4	17.8	58.1
	Strongly Agree	1319	41.2	41.9	100.0
	Total	3149	98.3	100.0	
Missing	System	55	1.7		
Total		3204	100.0		

20. My family has a rule about never driving after drinking any alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1438	44.9	45.5	45.5
	Yes	959	29.9	30.3	75.8
	I don't know	596	18.6	18.8	94.7
	I do not have a family	169	5.3	5.3	100.0
	Total	3162	98.7	100.0	
Missing	System	42	1.3		
Total		3204	100.0		

21. My workplace has a policy about never driving after drinking any alcohol.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	910	28.4	29.4	29.4
	Yes	648	20.2	20.9	50.3
	I don't know	742	23.2	24.0	74.3
	I do not have a workplace	797	24.9	25.7	100.0
	Total	3097	96.7	100.0	
Missing	System	107	3.3		
Total		3204	100.0		

22. Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be caught by law enforcement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely unlikely	566	17.7	18.1	18.1
	2	411	12.8	13.1	31.3
	3	315	9.8	10.1	41.3
	Neutral	1113	34.7	35.6	76.9
	5	335	10.5	10.7	87.7
	6	172	5.4	5.5	93.2
	Extremely likely	214	6.7	6.8	100.0
	Total	3126	97.6	100.0	
Missing	System	78	2.4		
Total		3204	100.0		

23. When was the last time you rode in a vehicle without wearing your seat belt?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Today	131	4.1	4.1	4.1
	In the past week	175	5.5	5.5	9.6
	In the past month	114	3.6	3.6	13.2
	In the past 3 months	75	2.3	2.4	15.6
	In the past year	128	4.0	4.0	19.6
	More than a year ago	794	24.8	25.0	44.6
	Never	1761	55.0	55.4	100.0
	Total	3178	99.2	100.0	
Missing	System	26	.8		
Total		3204	100.0		

24a. When you are driving within a few miles of your home, how often do you wear your seat belt?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	65	2.0	2.0	2.0
	2	32	1.0	1.0	3.1
	3	11	.3	.3	3.4
	About half the time	109	3.4	3.4	6.8
	5	65	2.0	2.0	8.9
	6	273	8.5	8.6	17.5
	Always	2624	81.9	82.5	100.0
	Total	3179	99.2	100.0	
Missing	System	25	.8		
Total		3204	100.0		

24b. When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	12	.4	.4	.4
	2	21	.7	.7	1.0
	3	36	1.1	1.1	2.2
	About half the time	749	23.4	23.7	25.8
	5	921	28.7	29.1	54.9
	6	1174	36.6	37.1	92.0
	Always	253	7.9	8.0	100.0
	Total	3166	98.8	100.0	
Missing	System	38	1.2		
Total		3204	100.0		

25a. In general, how often do you wear your seat belt?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	24	.7	.8	.8
	2	19	.6	.6	1.4
	3	8	.2	.3	1.6
	About half the time	58	1.8	1.8	3.4
	5	50	1.6	1.6	5.0
	6	338	10.5	10.6	15.6
	Always	2685	83.8	84.4	100.0
	Total	3182	99.3	100.0	
Missing	System	22	.7		
Total		3204	100.0		

25b. In your opinion, how often do most adults in Minnesota wear their seat belts?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	6	.2	.2	.2
	2	6	.2	.2	.4
	3	16	.5	.5	.9
	About half the time	471	14.7	14.9	15.7
	5	1068	33.3	33.7	49.4
	6	1372	42.8	43.3	92.7
	Always	232	7.2	7.3	100.0
	Total	3171	99.0	100.0	
Missing	System	33	1.0		
Total		3204	100.0		

26a. I believe it is important to protect myself by always wearing a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	51	1.6	1.6	1.6
	Mostly Disagree	24	.7	.8	2.4
	Somewhat Disagree	27	.8	.8	3.2
	Neither Agree nor Disagree	52	1.6	1.6	4.8
	Somewhat Agree	87	2.7	2.7	7.6
	Mostly Agree	345	10.8	10.8	18.4
	Strongly Agree	2598	81.1	81.6	100.0
	Total	3184	99.4	100.0	
Missing	System	20	.6		
Total		3204	100.0		

26b. In your opinion, how would most adults in Minnesota respond: "It is important to protect myself by always wearing a seat belt."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	.4	.4	.4
	Mostly Disagree	19	.6	.6	1.0
	Somewhat Disagree	39	1.2	1.2	2.2
	Neither Agree nor Disagree	176	5.5	5.5	7.7
	Somewhat Agree	783	24.4	24.6	32.4
	Mostly Agree	1616	50.4	50.8	83.2
	Strongly Agree	533	16.6	16.8	100.0
	Total	3178	99.2	100.0	
Missing	System	26	.8		
Total		3204	100.0		

27a. When I am the driver, I believe it is my responsibility to make sure others in the vehicle with me wear a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	44	1.4	1.4	1.4
	Mostly Disagree	33	1.0	1.0	2.4
	Somewhat Disagree	51	1.6	1.6	4.0
	Neither Agree nor Disagree	109	3.4	3.4	7.5
	Somewhat Agree	202	6.3	6.4	13.8
	Mostly Agree	546	17.0	17.2	31.0
	Strongly Agree	2192	68.4	69.0	100.0
	Total	3177	99.2	100.0	
Missing	System	27	.8		
Total		3204	100.0		

27b. In your opinion, how would most adults in Minnesota respond: "When I am the driver, I believe it is my responsibility to make sure others in the vehicle with me wear a seat belt."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	.6	.6	.6
	Mostly Disagree	43	1.3	1.4	2.0
	Somewhat Disagree	103	3.2	3.2	5.2
	Neither Agree nor Disagree	305	9.5	9.6	14.9
	Somewhat Agree	937	29.2	29.6	44.4
	Mostly Agree	1289	40.2	40.7	85.1
	Strongly Agree	473	14.8	14.9	100.0
	Total	3170	98.9	100.0	
Missing	System	34	1.1		
Total		3204	100.0		

28. I wear a seat belt because I don't want to get a ticket.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	618	19.3	19.5	19.5
	Mostly Disagree	278	8.7	8.8	28.3
	Somewhat Disagree	89	2.8	2.8	31.1
	Neither Agree nor Disagree	393	12.3	12.4	43.5
	Somewhat Agree	374	11.7	11.8	55.3
	Mostly Agree	383	12.0	12.1	67.3
	Strongly Agree	1036	32.3	32.7	100.0
	Total	3171	99.0	100.0	
Missing	System	33	1.0		
Total		3204	100.0		

29. Seat belts are just as likely to harm you as help you.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1305	40.7	41.3	41.3
	Mostly Disagree	771	24.1	24.4	65.8
	Somewhat Disagree	223	7.0	7.1	72.8
	Neither Agree nor Disagree	382	11.9	12.1	84.9
	Somewhat Agree	272	8.5	8.6	93.6
	Mostly Agree	91	2.8	2.9	96.5
	Strongly Agree	112	3.5	3.5	100.0
	Total	3156	98.5	100.0	
Missing	System	48	1.5		
Total		3204	100.0		

30. Seat belts help prevent lifelong disabilities (such as paralysis, spinal cord injuries and serious brain injuries).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	72	2.2	2.3	2.3
	Mostly Disagree	48	1.5	1.5	3.8
	Somewhat Disagree	38	1.2	1.2	5.0
	Neither Agree nor Disagree	241	7.5	7.6	12.6
	Somewhat Agree	272	8.5	8.6	21.1
	Mostly Agree	791	24.7	24.9	46.0
	Strongly Agree	1715	53.5	54.0	100.0
	Total	3177	99.2	100.0	
Missing	System	27	.8		
Total		3204	100.0		

31. Seat belts do not fit me properly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1449	45.2	45.7	45.7
	Mostly Disagree	631	19.7	19.9	65.7
	Somewhat Disagree	143	4.5	4.5	70.2
	Neither Agree nor Disagree	339	10.6	10.7	80.9
	Somewhat Agree	313	9.8	9.9	90.8
	Mostly Agree	150	4.7	4.7	95.5
	Strongly Agree	143	4.5	4.5	100.0
	Total	3168	98.9	100.0	
Missing	System	36	1.1		
Total		3204	100.0		

32. I want people I care about to always wear a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	34	1.1	1.1	1.1
	Mostly Disagree	15	.5	.5	1.5
	Somewhat Disagree	8	.2	.3	1.8
	Neither Agree nor Disagree	101	3.2	3.2	5.0
	Somewhat Agree	93	2.9	2.9	7.9
	Mostly Agree	321	10.0	10.1	18.1
	Strongly Agree	2595	81.0	81.9	100.0
	Total	3167	98.8	100.0	
Missing	System	37	1.2		
Total		3204	100.0		

33. People who care about me want me to always wear a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	30	.9	1.0	1.0
	Mostly Disagree	13	.4	.4	1.4
	Somewhat Disagree	9	.3	.3	1.6
	Neither Agree nor Disagree	160	5.0	5.1	6.7
	Somewhat Agree	144	4.5	4.6	11.3
	Mostly Agree	498	15.5	15.8	27.1
	Strongly Agree	2303	71.9	72.9	100.0
	Total	3157	98.5	100.0	
Missing	System	47	1.5		
Total		3204	100.0		

34. I am comfortable wearing my seat belt even if others in the car are not wearing their seat belts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	258	8.1	8.1	8.1
	Mostly Disagree	120	3.7	3.8	11.9
	Somewhat Disagree	78	2.4	2.5	14.4
	Neither Agree nor Disagree	118	3.7	3.7	18.1
	Somewhat Agree	124	3.9	3.9	22.0
	Mostly Agree	353	11.0	11.1	33.1
	Strongly Agree	2124	66.3	66.9	100.0
	Total	3175	99.1	100.0	
Missing	System	29	.9		
Total		3204	100.0		

35. I am less likely to wear my seat belt when others in the vehicle are not wearing their seat belts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2258	70.5	71.0	71.0
	Mostly Disagree	430	13.4	13.5	84.6
	Somewhat Disagree	82	2.6	2.6	87.1
	Neither Agree nor Disagree	145	4.5	4.6	91.7
	Somewhat Agree	116	3.6	3.6	95.3
	Mostly Agree	56	1.7	1.8	97.1
	Strongly Agree	92	2.9	2.9	100.0
	Total	3179	99.2	100.0	
Missing	System	25	.8		
Total		3204	100.0		

36. I think about wearing my seat belt every time I am in a vehicle.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	104	3.2	3.3	3.3
	Mostly Disagree	37	1.2	1.2	4.4
	Somewhat Disagree	34	1.1	1.1	5.5
	Neither Agree nor Disagree	89	2.8	2.8	8.3
	Somewhat Agree	94	2.9	3.0	11.3
	Mostly Agree	357	11.1	11.2	22.5
	Strongly Agree	2465	76.9	77.5	100.0
	Total	3180	99.3	100.0	
Missing	System	24	.7		
Total		3204	100.0		

37. My family has a rule about always wearing a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	407	12.7	12.8	12.8
	Yes	2298	71.7	72.5	85.3
	I don't know	271	8.5	8.5	93.9
	I do not have a family	195	6.1	6.1	100.0
	Total	3171	99.0	100.0	
Missing	System	33	1.0		
Total		3204	100.0		

38. My workplace has a policy about always wearing a seat belt.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	624	19.5	20.1	20.1
	Yes	837	26.1	26.9	47.0
	I don't know	797	24.9	25.6	72.7
	I do not have a workplace	850	26.5	27.3	100.0
	Total	3108	97.0	100.0	
Missing	System	96	3.0		
Total		3204	100.0		

39. Assume that you do not wear your seat belt AT ALL while driving over the next six months. How often do you think you will receive a ticket for not wearing a seat belt?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	280	8.7	9.0	9.0
	2	850	26.5	27.2	36.1
	3	545	17.0	17.4	53.6
	About half the time	870	27.2	27.8	81.4
	5	226	7.1	7.2	88.6
	6	182	5.7	5.8	94.5
	Always	173	5.4	5.5	100.0
	Total	3126	97.6	100.0	
Missing	System	78	2.4		
Total		3204	100.0		

40a. How often do you drive more than 10 mph over the posted speed limit?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	905	28.2	28.6	28.6
	2	1267	39.5	40.1	68.7
	3	526	16.4	16.6	85.4
	About half the time	281	8.8	8.9	94.3
	5	95	3.0	3.0	97.3
	6	60	1.9	1.9	99.2
	Always	26	.8	.8	100.0
	Total	3160	98.6	100.0	
Missing	System	44	1.4		
Total		3204	100.0		

40b. How often do most adults in Minnesota drive more than 10 mph over the posted speed limit?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	14	.4	.4	.4
	2	301	9.4	9.5	9.9
	3	614	19.2	19.4	29.3
	About half the time	1278	39.9	40.3	69.6
	5	496	15.5	15.7	85.3
	6	364	11.4	11.5	96.8
	Always	102	3.2	3.2	100.0
	Total	3169	98.9	100.0	
Missing	System	35	1.1		
Total		3204	100.0		

41a. Driving 10 mph over the speed limit makes driving more pleasant.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	971	30.3	30.7	30.7
	Mostly Disagree	652	20.3	20.6	51.2
	Somewhat Disagree	256	8.0	8.1	59.3
	Neither Agree nor Disagree	986	30.8	31.1	90.5
	Somewhat Agree	177	5.5	5.6	96.1
	Mostly Agree	80	2.5	2.5	98.6
	Strongly Agree	45	1.4	1.4	100.0
	Total	3167	98.8	100.0	
Missing	System	37	1.2		
Total		3204	100.0		

41b. In your opinion, how would most adults in Minnesota respond: "Driving 10 mph over the speed limit makes driving more pleasant."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	163	5.1	5.2	5.2
	Mostly Disagree	483	15.1	15.3	20.4
	Somewhat Disagree	444	13.9	14.1	34.5
	Neither Agree nor Disagree	1207	37.7	38.2	72.7
	Somewhat Agree	592	18.5	18.7	91.5
	Mostly Agree	208	6.5	6.6	98.0
	Strongly Agree	62	1.9	2.0	100.0
	Total	3159	98.6	100.0	
Missing	System	45	1.4		
Total		3204	100.0		

42a. Driving 10 mph over the speed limit is wrong.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	89	2.8	2.8	2.8
	Mostly Disagree	169	5.3	5.3	8.1
	Somewhat Disagree	208	6.5	6.6	14.7
	Neither Agree nor Disagree	356	11.1	11.2	25.9
	Somewhat Agree	508	15.9	16.0	41.9
	Mostly Agree	778	24.3	24.5	66.4
	Strongly Agree	1065	33.2	33.6	100.0
	Total	3173	99.0	100.0	
Missing	System	31	1.0		
Total		3204	100.0		

42b. In your opinion, how would most adults in Minnesota respond: "Driving 10 mph over the speed limit is wrong."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	85	2.7	2.7	2.7
	Mostly Disagree	307	9.6	9.7	12.4
	Somewhat Disagree	440	13.7	13.9	26.3
	Neither Agree nor Disagree	619	19.3	19.6	45.8
	Somewhat Agree	970	30.3	30.6	76.5
	Mostly Agree	594	18.5	18.8	95.3
	Strongly Agree	150	4.7	4.7	100.0
	Total	3165	98.8	100.0	
Missing	System	39	1.2		
Total		3204	100.0		

43. Driving 10 mph over the speed limit will get me to my destination quicker.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	340	10.6	10.8	10.8
	Mostly Disagree	381	11.9	12.1	22.8
	Somewhat Disagree	252	7.9	8.0	30.8
	Neither Agree nor Disagree	575	17.9	18.2	49.0
	Somewhat Agree	885	27.6	28.0	77.1
	Mostly Agree	472	14.7	15.0	92.0
	Strongly Agree	251	7.8	8.0	100.0
	Total	3156	98.5	100.0	
Missing	System	48	1.5		
Total		3204	100.0		

44. Driving 10 mph over the speed limit increases the chances I will be in a crash.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	87	2.7	2.8	2.8
	Mostly Disagree	181	5.6	5.7	8.5
	Somewhat Disagree	243	7.6	7.7	16.2
	Neither Agree nor Disagree	502	15.7	15.9	32.1
	Somewhat Agree	825	25.7	26.1	58.2
	Mostly Agree	614	19.2	19.4	77.6
	Strongly Agree	708	22.1	22.4	100.0
	Total	3160	98.6	100.0	
Missing	System	44	1.4		
Total		3204	100.0		

45a. I don't consider driving 10 mph over the speed limit to be 'speeding'.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1161	36.2	36.6	36.6
	Mostly Disagree	646	20.2	20.4	56.9
	Somewhat Disagree	356	11.1	11.2	68.2
	Neither Agree nor Disagree	355	11.1	11.2	79.4
	Somewhat Agree	328	10.2	10.3	89.7
	Mostly Agree	201	6.3	6.3	96.0
	Strongly Agree	126	3.9	4.0	100.0
	Total	3173	99.0	100.0	
Missing	System	31	1.0		
Total		3204	100.0		

45b. In your opinion, how would most adults in Minnesota respond: "I don't consider driving 10 mph over the speed limit to be 'speeding'."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	141	4.4	4.4	4.4
	Mostly Disagree	545	17.0	17.2	21.6
	Somewhat Disagree	600	18.7	18.9	40.6
	Neither Agree nor Disagree	578	18.0	18.2	58.8
	Somewhat Agree	751	23.4	23.7	82.5
	Mostly Agree	436	13.6	13.8	96.3
	Strongly Agree	118	3.7	3.7	100.0
	Total	3169	98.9	100.0	
Missing	System	35	1.1		
Total		3204	100.0		

46a. I think people should not drive 10 mph over the speed limit.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	85	2.7	2.7	2.7
	Mostly Disagree	173	5.4	5.5	8.1
	Somewhat Disagree	244	7.6	7.7	15.8
	Neither Agree nor Disagree	571	17.8	18.0	33.8
	Somewhat Agree	456	14.2	14.4	48.2
	Mostly Agree	687	21.4	21.7	69.9
	Strongly Agree	954	29.8	30.1	100.0
	Total	3170	98.9	100.0	
Missing	System	34	1.1		
Total		3204	100.0		

46b. In your opinion, how would most adults in Minnesota respond: "I think people should not drive 10 mph over the speed limit."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	62	1.9	2.0	2.0
	Mostly Disagree	299	9.3	9.5	11.4
	Somewhat Disagree	476	14.9	15.1	26.5
	Neither Agree nor Disagree	765	23.9	24.2	50.7
	Somewhat Agree	866	27.0	27.4	78.1
	Mostly Agree	541	16.9	17.1	95.2
	Strongly Agree	153	4.8	4.8	100.0
	Total	3162	98.7	100.0	
Missing	System	42	1.3		
Total		3204	100.0		

47. I know when I am driving 10 mph over the speed limit.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	.7	.7	.7
	Mostly Disagree	43	1.3	1.4	2.0
	Somewhat Disagree	109	3.4	3.5	5.5
	Neither Agree nor Disagree	190	5.9	6.0	11.6
	Somewhat Agree	478	14.9	15.2	26.8
	Mostly Agree	1079	33.7	34.4	61.1
	Strongly Agree	1221	38.1	38.9	100.0
	Total	3141	98.0	100.0	
Missing	System	63	2.0		
Total		3204	100.0		

48. I am comfortable driving less than 10 mph over the speed limit even if those around me are driving faster.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	110	3.4	3.5	3.5
	Mostly Disagree	156	4.9	5.0	8.5
	Somewhat Disagree	232	7.2	7.5	16.0
	Neither Agree nor Disagree	195	6.1	6.3	22.3
	Somewhat Agree	455	14.2	14.6	36.9
	Mostly Agree	909	28.4	29.2	66.1
	Strongly Agree	1056	33.0	33.9	100.0
	Total	3113	97.2	100.0	
Missing	System	91	2.8		
Total		3204	100.0		

49. How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all certain	130	4.1	4.1	4.1
	2	93	2.9	3.0	7.1
	3	157	4.9	5.0	12.1
	Somewhat certain	655	20.4	20.8	32.8
	5	354	11.0	11.2	44.1
	6	546	17.0	17.3	61.4
	Very certain	1216	38.0	38.6	100.0
	Total	3151	98.3	100.0	
Missing	System	53	1.7		
Total		3204	100.0		

50. My family has a rule about not speeding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1354	42.3	42.8	42.8
	Yes	935	29.2	29.6	72.4
	I don't know	673	21.0	21.3	93.6
	I do not have a family	201	6.3	6.4	100.0
	Total	3163	98.7	100.0	
Missing	System	41	1.3		
Total		3204	100.0		

51. My workplace has a rule about not speeding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	804	25.1	25.9	25.9
	Yes	657	20.5	21.1	47.0
	I don't know	816	25.5	26.3	73.3
	I do not have a workplace	830	25.9	26.7	100.0
	Total	3107	97.0	100.0	
Missing	System	97	3.0		
Total		3204	100.0		

52. Assume that you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticket for speeding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely unlikely	147	4.6	4.7	4.7
	2	249	7.8	7.9	12.5
	3	270	8.4	8.6	21.1
	Neutral	591	18.4	18.7	39.8
	5	754	23.5	23.9	63.7
	6	582	18.2	18.4	82.2
	Extremely likely	563	17.6	17.8	100.0
	Total	3156	98.5	100.0	
Missing	System	48	1.5		
Total		3204	100.0		

53. Indicate your level of agreement with the following statement: "Most people are honest."

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I definitely disagree	68	2.1	2.1	2.1
	I generally disagree	187	5.8	5.9	8.0
	I moderately disagree	303	9.5	9.5	17.5
	I moderately agree	1132	35.3	35.6	53.1
	I generally agree	1373	42.9	43.2	96.3
	I definitely agree	117	3.7	3.7	100.0
	Total	3180	99.3	100.0	
Missing	System	24	.7		
Total		3204	100.0		

54. Generally speaking, would you say that people can be trusted or that you can't be too careful in dealing with people?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	People can almost always be trusted	72	2.2	2.3	2.3
	People can usually be trusted	1862	58.1	58.7	61.0
	You usually can't be too careful in dealing with people	1041	32.5	32.8	93.8
	You almost always can't be too careful in dealing with people	197	6.1	6.2	100.0
	Total	3172	99.0	100.0	
Missing	System	32	1.0		
Total		3204	100.0		

D3. What best describes where you live?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	1075	33.6	34.0	34.0
	Urban	739	23.1	23.3	57.3
	Suburban	1351	42.2	42.7	100.0
	Total	3165	98.8	100.0	
Missing	System	39	1.2		
Total		3204	100.0		

D4. What is your sex?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	1870	58.4	59.6	59.6
	female	1270	39.6	40.4	100.0
	Total	3140	98.0	100.0	
Missing	System	64	2.0		
Total		3204	100.0		

D5. What is the last grade or level of education that you completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school or less	678	21.2	21.3	21.3
	Technical or vocational school	509	15.9	16.0	37.3
	Some college	587	18.3	18.5	55.8
	College graduate	832	26.0	26.2	82.0
	Post graduate work or advanced degree	563	17.6	17.7	99.7
	Refused	10	.3	.3	100.0
	Total	3179	99.2	100.0	
Missing	System	25	.8		
Total		3204	100.0		

D6. Do you speak more than one language in the home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	171	5.3	5.4	5.4
	No	2994	93.4	94.6	100.0
	Total	3165	98.8	100.0	
Missing	System	39	1.2		
Total		3204	100.0		

D7. Please select the languages you fluently read.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	English	3001	93.7	95.8	95.8
	Spanish	57	1.8	1.8	97.6
	American Indian languages	1	.0	.0	97.6
	Asian and Pacific Island languages	20	.6	.6	98.2
	Other	55	1.7	1.8	100.0
	Total	3134	97.8	100.0	
Missing	System	70	2.2		
Total		3204	100.0		

D8. Do you drive as part of your work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1089	34.0	35.0	35.0
	No	2018	63.0	65.0	100.0
	Total	3107	97.0	100.0	
Missing	System	97	3.0		
Total		3204	100.0		

D9. In what year were you born (example: 1966)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1917	2	.1	.1	.1
	1918	1	.0	.0	.1
	1920	2	.1	.1	.2
	1921	2	.1	.1	.2
	1922	7	.2	.2	.4
	1923	8	.2	.3	.7
	1924	9	.3	.3	1.0
	1925	13	.4	.4	1.4
	1926	11	.3	.4	1.8
	1927	14	.4	.4	2.2
	1928	23	.7	.7	2.9
	1929	27	.8	.9	3.8
	1930	26	.8	.8	4.6
	1931	29	.9	.9	5.5
	1932	30	.9	1.0	6.5
	1933	40	1.2	1.3	7.8
	1934	34	1.1	1.1	8.8
	1935	46	1.4	1.5	10.3

1936	52	1.6	1.7	12.0
1937	46	1.4	1.5	13.4
1938	49	1.5	1.6	15.0
1939	51	1.6	1.6	16.6
1940	52	1.6	1.7	18.3
1941	45	1.4	1.4	19.7
1942	67	2.1	2.1	21.8
1943	56	1.7	1.8	23.6
1944	73	2.3	2.3	25.9
1945	50	1.6	1.6	27.5
1946	73	2.3	2.3	29.9
1947	93	2.9	3.0	32.8
1948	76	2.4	2.4	35.2
1949	64	2.0	2.0	37.3
1950	88	2.7	2.8	40.1
1951	87	2.7	2.8	42.8
1952	81	2.5	2.6	45.4
1953	80	2.5	2.5	48.0
1954	99	3.1	3.2	51.1
1955	78	2.4	2.5	53.6
1956	86	2.7	2.7	56.3
1957	77	2.4	2.5	58.8
1958	90	2.8	2.9	61.6
1959	86	2.7	2.7	64.4
1960	70	2.2	2.2	66.6
1961	63	2.0	2.0	68.6
1962	76	2.4	2.4	71.0
1963	62	1.9	2.0	73.0
1964	45	1.4	1.4	74.4
1965	54	1.7	1.7	76.2
1966	60	1.9	1.9	78.1
1967	40	1.2	1.3	79.3
1968	54	1.7	1.7	81.1
1969	51	1.6	1.6	82.7
1970	38	1.2	1.2	83.9
1971	39	1.2	1.2	85.1
1972	43	1.3	1.4	86.5
1973	41	1.3	1.3	87.8
1974	37	1.2	1.2	89.0
1975	36	1.1	1.1	90.1
1976	29	.9	.9	91.1
1977	23	.7	.7	91.8
1978	32	1.0	1.0	92.8

	1979	33	1.0	1.1	93.9
	1980	28	.9	.9	94.7
	1981	28	.9	.9	95.6
	1982	38	1.2	1.2	96.8
	1983	18	.6	.6	97.4
	1984	15	.5	.5	97.9
	1985	24	.7	.8	98.7
	1986	14	.4	.4	99.1
	1987	8	.2	.3	99.4
	1988	6	.2	.2	99.6
	1989	2	.1	.1	99.6
	1990	3	.1	.1	99.7
	1991	3	.1	.1	99.8
	1993	1	.0	.0	99.8
	1995	3	.1	.1	99.9
	1996	1	.0	.0	100.0
	1998	1	.0	.0	100.0
	Total	3142	98.1	100.0	
Missing	System	62	1.9		
Total		3204	100.0		

Appendix D

Detailed Overview of CART Analysis Process

Detailed Overview of CART Analysis Process

The algorithm employed in the CART statistical software package (Salford Systems, 2013) performs an exhaustive search to reveal structures within the data set that are not readily evident. The tree begins with a root or first-generation “parent” node summarizing the frequencies or proportions for the levels of the categorical response. To determine appropriate binary splitting rules to generate “child” nodes, CART considers all possible splits of each node for each predictor variable. Next, CART will rank each potential predictor’s splitting rule based on a statistical measure of how well each splitting rule partitions the response variable at each binary node. The potential contribution of each predictor variable is recorded and ranked as an indication of variable importance. The splitting rule for the highest ranked predictor is then adopted for splitting that node.

In general, the goal is to select a splitting rule that creates two child nodes with maximally dissimilar response outcomes. This tree generate process continues with each child node now serving as a parent node. If a node cannot be split, then it becomes a “terminal” node that defines a classification pathway for the response variable.

The naming (classification) of a node is based on the highest percentage of response cases. For example, consider a parent node with 100 Response A and 1000 Response B. Imagine a binary splitting rule on a predictor variable that produces a Child (or Terminal) Node I with 20 Response A, 100 Response B and another Child (or Terminal) Node II with 80 Response A, 900 Response B. In this scenario, Child Node I would be classified by Response A ($A = 20/100 = 20\% > B = 100/1000 = 10\%$) and Child Node II would be classified by Response B ($A = 80/100 = 80\% < B = 900/1000 = 90\%$).

A stopping rule is based on specified minimal sizes for both parent and child nodes (say, P_{min} and C_{min} , respectively). That is, if a node size is $\geq P_{min}$, it will be treated as a parent node for possible further splitting. However, if a node size is $< P_{min}$, then it becomes a terminal node. Then, for each parent node, if a potential split of parent node leads to at least one child node size $\leq C_{min}$, then the split is not allowed. For the CART analyses of the MNDot survey data, $P_{min}=200$ and $C_{min}=50$, The splitting process terminates once no further split of parent node is allowed. Once the splitting process terminates, the resulting classification tree is called the maximal tree. This maximal tree is then simplified by “pruning” its branches to yield a smaller tree (i.e., it has fewer terminal nodes with a more parsimonious tree structure. In the tree-pruning process, cross-validation is used to systematically remove the weakest branches where weakness is measured in terms of the relative cost. In the cross-validation process, the relative cost of each pruned tree is calculated over the test set. The optimal tree indicated by CART is that pruned tree that minimizes this relative cost. This pruning process is analogous to removing terms in classical regression model. The goal of this pruning process is to produce the simplest tree without sacrificing its performance in explaining a large proportion of the variability in the response variable.

The performance of a tree is calculated in terms of the summed misclassification rate across all responses (Actual Cost, AC). This value is compared to the misclassification rate resulting from a random assignment of classification to each observation (Expected Cost, EC). The “Relative Cost” (RC) of a tree is then computed as AC/EC , with larger values indicating worse performance comparable to random classification assignment ($RC = 1$). CART also produces a

confidence interval around the computed RC value so that smaller or larger trees with comparable performance can be selected. In the case of this research, we favored smaller trees with comparable performance to provide parsimonious descriptions of the results.

Interpretation

There are several ways to interpret the meaning of the resulting classification trees.

First, the resulting decision tree can be interpreted. This involves the interpretation of each pathway represented in the tree structure. The interpretation begins with the initial parent node, often referred to as the root node, and tracing the pathway toward each terminal node that signifies the classification of response.

Second, the importance of each predictor variable is calculated throughout the generation of the decision tree. For each node, the potential contribution of each predictor variable to form a splitting rule is computed. The importance of this splitting rule is assessed in terms of its ability to separate response categories. Whereas only that variable that produces the best separation is retained in the tree, the contribution of all other variables is also recorded. If sufficiently important, these other variables may serve as surrogates when the best predictor has missing data. The contribution of each variable during the generation of any tree is summed to compute a “variable importance score” for that tree. Variables are then ranked in terms of importance with the score for the most important variable set to 100. The reported variable importance scores (Table 3.6 to Table 3.8) correspond to the tree reported in the analysis section (Figure 3.2 to Figure 3.4).

Variable importance signifies the overall relationship between the variable and the classified response variable. However, the most important variables may not be the best predictive variables selected within the decision tree. For example, a variable may have a consistent influence on the classified response along all nodes within decision tree, but never be best predictor at any given node. Conversely, the selected predictor variable that has the strongest contribution for a specific node in the decision tree, but have minimal influence at any other nodes. In this case, a predictor variable only has to “win” once to be selected for a tree. In contrast, the placement of every variable in this “race” is noted and recorded as an indication of the relative “athleticism” (importance).

For this reason, the interpretation of the decision tree specifies pathways to predict specific response categories whereas the interpretation of the variable importance signifies those variables that are relevant to the entire response array.

Appendix E.

Comparison of Mean Values of Responses based on Number of Risky Driving Behaviors

Mean Values of Responses based on Engagement in Risky Behavior

Table Appendix E.1 Mean Values of Responses Based on Driving After Drinking

Construct	Question	Mean Response ¹		Interpretation
		Driven after dinking in the past 60 days?		
		Yes	No	
Experiential Attitude	I believe it is wrong to drive after drinking enough alcohol to be impaired.	6.48	6.74	Those who did not drive after drinking agreed more.
	I believe it is wrong to drive after drinking any alcohol.	3.19	5.33	Those who did not drive after drinking agreed more.
Instrumental Attitude	I believe impairment begins with the first sip of alcohol.	2.43	4.03	Those who did not drive after drinking agreed more.
	Assume that you did drive within two hours after drinking over the next six months. How likely do you think you would be caught by law enforcement?	3.07	3.73	Those who did not drive after drinking agreed more.
Perceived Injunctive Norm	I believe people should not drive after drinking any alcohol.	2.81	4.74	Those who did not drive after drinking agreed more.
	Most people around me (my family, friends, people I hang out with) believe I should not drive after drinking any alcohol.	3.15	5.02	Those who did not drive after drinking agreed more.
Perceived Descriptive Norm	During the past 60 days, on how many occasions do you think most adults in Minnesota drove within two hours of drinking any alcohol?	4.80	4.48	Those who did not drive after drinking perceived less driving after drinking among most adults.
	In your opinion, in the past 30 days what percentage of adults in your community drove at least once when they thought they may have had too much to drink?	2.58	2.86	Those who did not drive after drinking perceived more impaired driving among most adults.
Perceived Control	I plan so that I never drive after drinking. This may include choosing not to drink.	3.78	6.08	Those who did not drive after drinking agreed more.

1. All statistically significantly different ($p < 0.0001$).

Table Appendix E.2 Mean Values of Responses Based on Seat Belt Use

Construct	Question	Mean Response ¹		Interpretation
		Always or almost always wear a seat belt?		
		Yes	No	
Experiential Attitude	I believe it is important to protect myself by always wearing a seat belt.	6.85	5.67	Those who always or almost always wear their seat belt agreed more.
Instrumental Attitude	I wear a seat belt because I don't want to get a ticket.	4.42	5.10	Those who always or almost always wear their seat belt agreed less.
	Seat belts are just as likely to harm you as help you.	2.28	3.16	Those who always or almost always wear their seat belt disagreed more.
	Seat belts help prevent lifelong disabilities (such as paralysis, spinal cord injuries and serious brain injuries).	6.23	5.54	Those who always or almost always wear their seat belt agreed more.
	Assume that you do not wear your seat belt AT ALL while driving over the next six months. How often do you think you will receive a ticket for not wearing a seat belt?	3.42	3.13	Those who always or almost always wear their seat belt agreed more.
Perceived Injunctive Norm	I want people I care about to always wear a seat belt.	6.79	6.04	Those who always or almost always wear their seat belt agreed more.
	People who care about me want me to always wear a seat belt.	6.65	5.93	Those who always or almost always wear their seat belt agreed more.
Perceived Descriptive Norm	When driving within a few miles of home, how often do most adults in Minnesota wear their seat belts?	5.38	4.65	Those who always or almost always wear their seat belt perceived more seat belt use among most adults.
	In your opinion, how often do most adults in Minnesota wear their seat belts?	5.48	5.10	Those who always or almost always wear their seat belt perceived more seat belt use among most adults.
Perceived Control	I am comfortable wearing my seat belt even if others in the car are not wearing their seat belts.	6.00	5.61	Those who always or almost always wear their seat belt agreed more.
Self-efficacy	I am less likely to wear my seat belt when others in the vehicle are not wearing their seat belts.	1.49	2.75	Those who always or almost always wear their seat belt disagreed more.
Habit	I think about wearing my seat belt every time I am in a vehicle.	6.67	5.50	Those who always or almost always wear their seat belt agreed more.

1. All statistically significantly different (p<0.0001).

Table Appendix E.3 Mean Values of Responses Based on Speeding

Construct	Question	Mean Response ¹		Interpretation
		Speed sometimes?		
		Yes	No	
Experiential Attitude	"Driving 10 mph over the speed limit makes driving more pleasant."	3.67	2.32	Those who rarely or never speed agreed less.
	"Driving 10 mph over the speed limit is wrong."	4.60	5.77	Those who rarely or never speed agreed more.
Instrumental Attitude	"Driving 10 mph over the speed limit will get me to my destination quicker."	4.75	3.92	Those who rarely or never speed agreed less.
	"Driving 10 mph over the speed limit increases the chances I will be in a crash."	4.36	5.36	Those who rarely or never speed agreed more.
	I don't consider driving 10 mph over the speed limit to be 'speeding'.	3.61	2.33	Those who rarely or never speed disagreed more.
	Assume that you regularly exceed the speed limit by more than 10 mph over the next six months. How likely do you think you will be to receive a ticket for speeding?	4.35	4.94	Those who rarely or never speed agreed more.
Perceived Injunctive Norm	I think people should not drive 10 mph over the speed limit.	4.16	5.68	Those who rarely or never speed agreed more.
Perceived Descriptive Norm	How often do most adults in Minnesota drive more than 10 mph over the posted speed limit?	4.58	3.86	Those who rarely or never speed perceived less speeding among most adults.
Perceived Control	I am comfortable driving less than 10 mph over the speed limit even if those around me are driving faster.	4.90	5.72	Those who rarely or never speed agreed more.
Self-efficacy	How certain are you that you can drive less than 10 mph over the speed limit even if those around you are driving faster?	4.77	5.66	Those who rarely or never speed agreed more.
Knowledge	I know when I am driving 10 mph over the speed limit.	5.66	6.05	Those who rarely or never speed agreed more.

1. All statistically significantly different ($p < 0.0001$).

Appendix F – Cultural Factors: Family Rules and Workplace Policies and Risky Behaviors

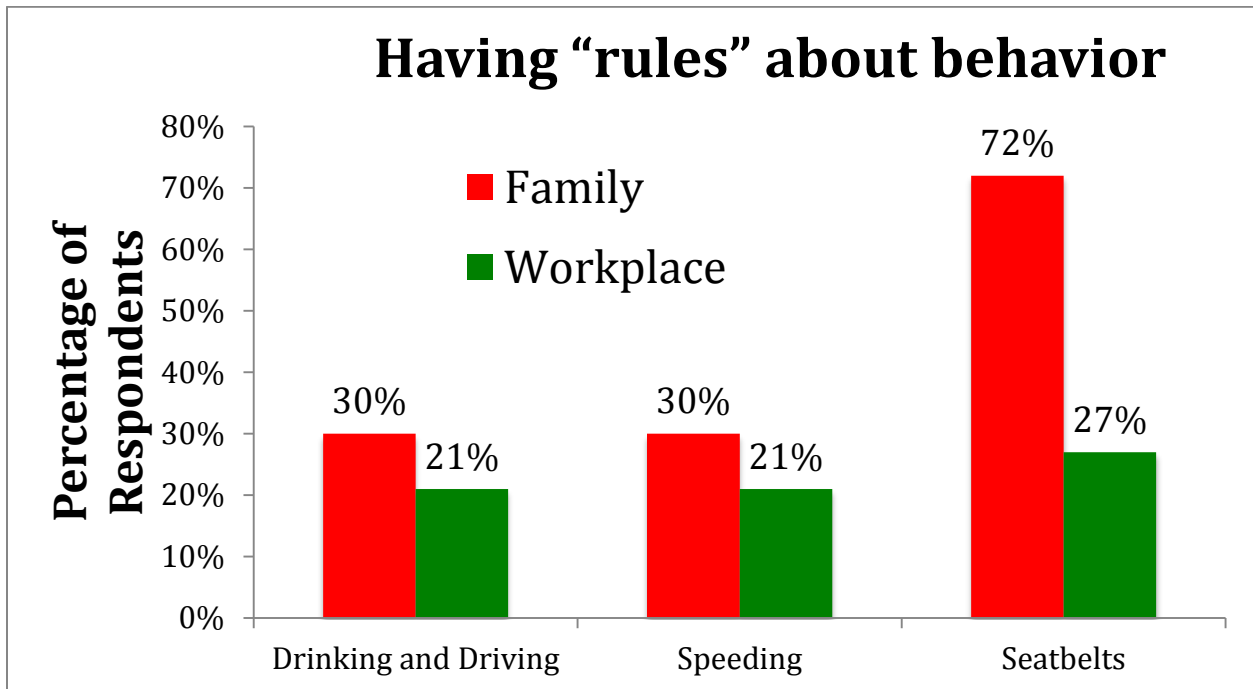


Figure Appendix F.1: Prevalence of Family Rules and Workplace Policies

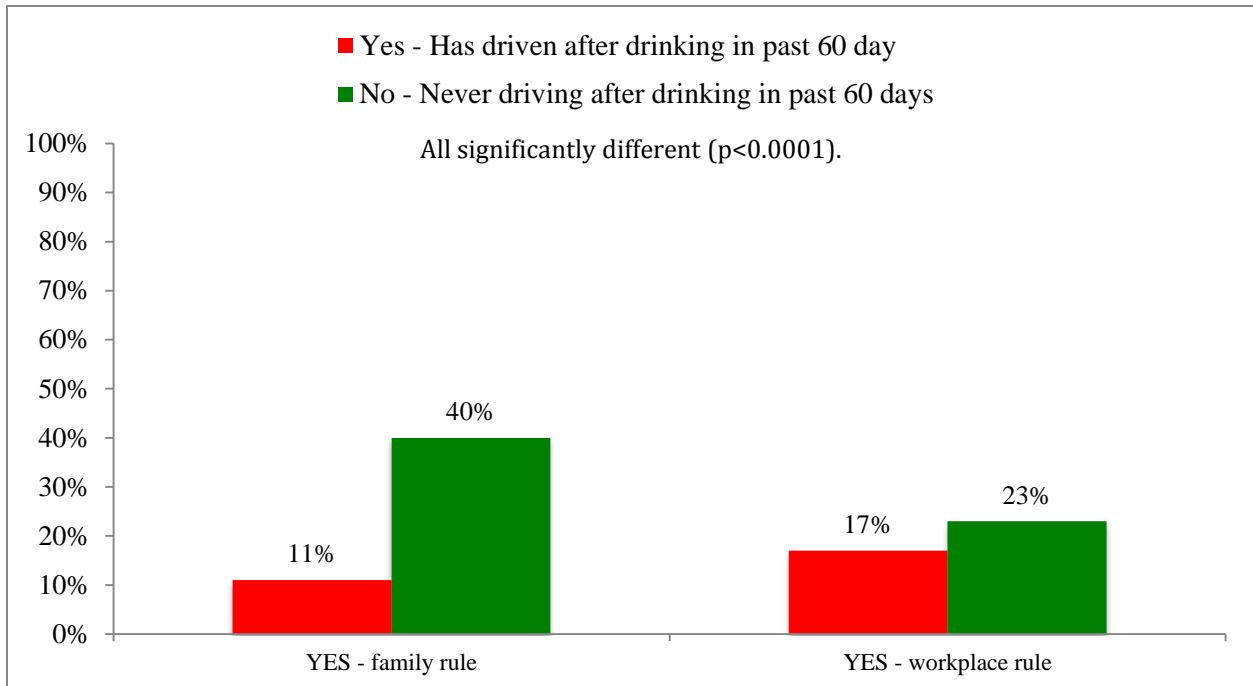


Figure Appendix F.2: Cultural Factors: Family and Workplace Rules about Driving After Drinking

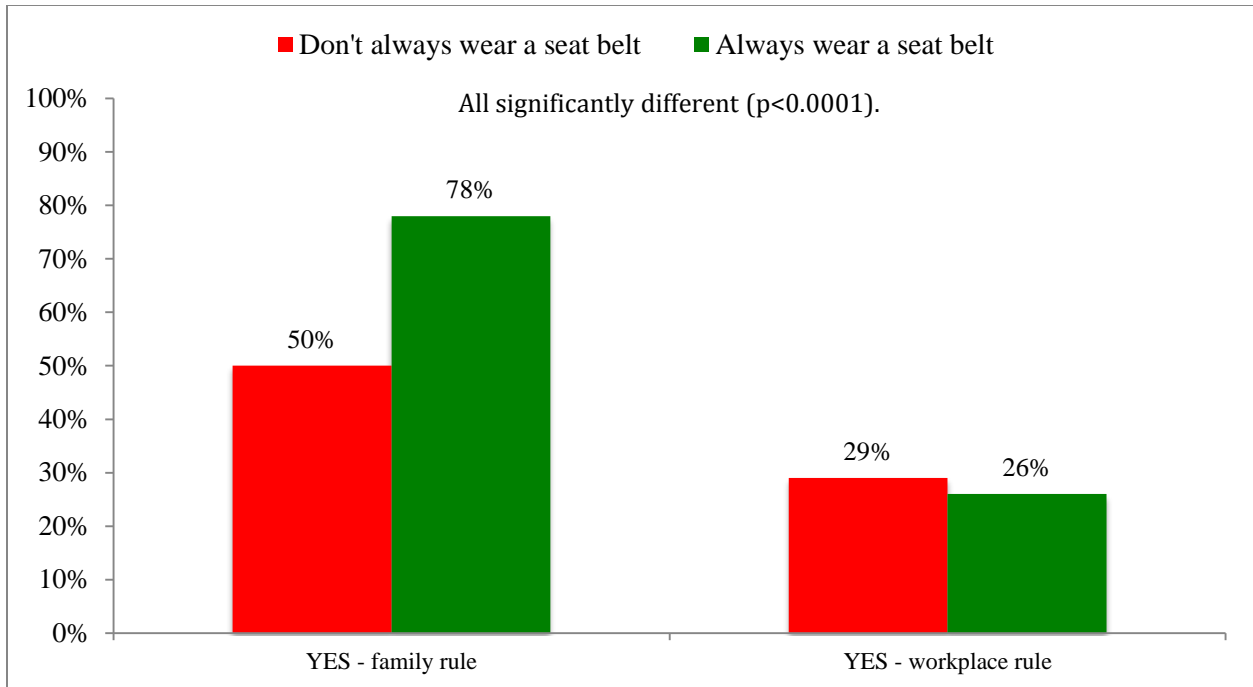


Figure Appendix F.3: Cultural Factors: Family and Workplace Rules About Seat Belts

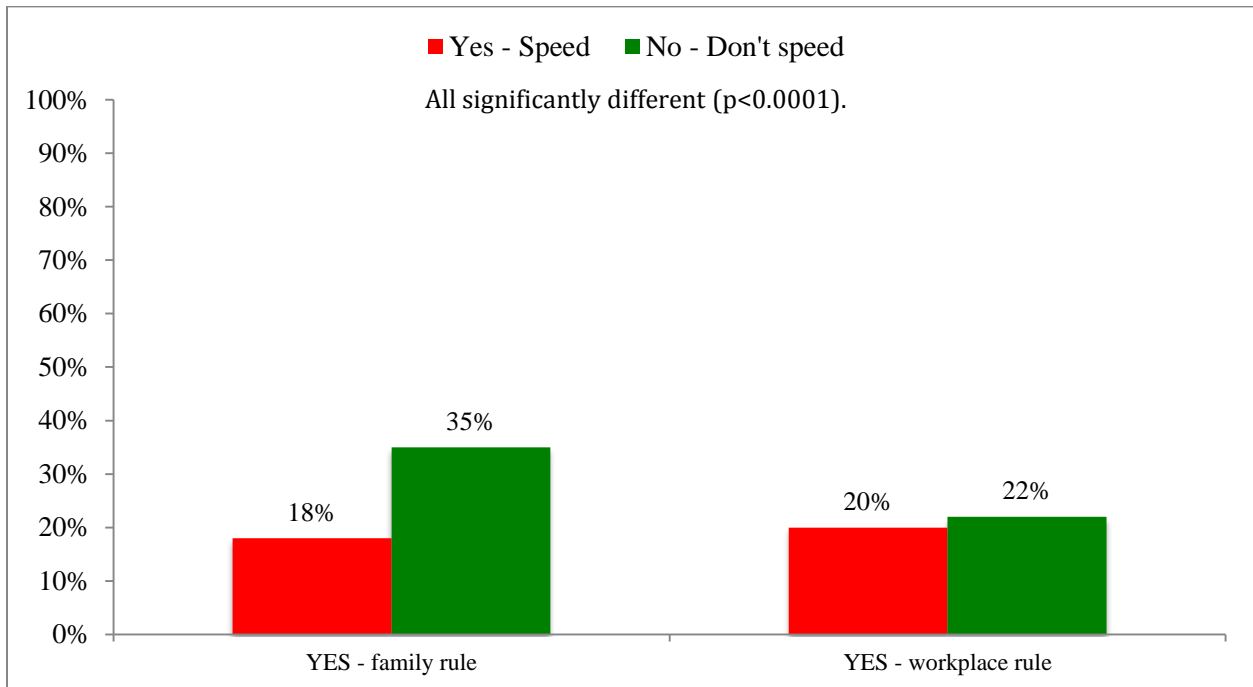


Figure Appendix F.4: Cultural Factors: Family and Workplace Rules About Speeding