

**An assessment of traffic safety culture related to driving after
cannabis use**

by

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PROBLEM STATEMENT

The National Toward Zero Deaths (TZD) Safety Initiative is a cooperative and coordinated effort amongst state highway safety agencies and stakeholders. The transformation of the traffic safety culture is a primary element of the TZD strategy. Only through the growth of a positive safety culture can significant and sustainable reductions in crash fatalities and serious injuries be achieved.

An important risk factor in traffic safety is use of drugs that impair driver perception, decision-making and skill. Cannabis has been shown to impair driver ability, and its use is on the increase. Several states have legalized recreational cannabis use, and more are considering legalization. Increased use of cannabis among drivers may pose a barrier to achieving a zero deaths strategy. Therefore, understanding the cultural factors that influence driving under the influence of cannabis is critical to address this problem.

BACKGROUND SUMMARY

Cannabis is the most commonly used “illicit” drug in the United States. For example, 7.5% of respondents aged 12 years and older reported using cannabis in the past month (SAMHSA, 2014). This prevalence of “recent” use was higher than the period 2002 to 2011. Moreover, the percentage of respondents reporting daily (or almost daily) use rose by nearly 60% in this period.

One reason for this increased usage may be attributed to changes in state laws regarding the decriminalization of cannabis (Ferner, 2015). Notably, states that have legalized recreational cannabis use have higher use rates among all age groups as shown in Figure 1. Changes in state laws are also associated with increased prevalence of cannabis-related compounds in impaired drivers on the road and involved in crashes (Couper & Pederson, 2014).

The implication of changes in state laws and cannabis use is important because the consumption of cannabis has been shown to induce driving impairment – and as a result – increase crash risk (Lagerge & Ward, 2004). Thus, factors that may increase the consumption of cannabis may impact traffic safety (Brady & Li, 2014).

Cultural beliefs and attitudes regarding cannabis will determine use by drivers – and therefore its contribution to crash risk. In turn, our cultural beliefs and attitudes will also determine the types of policies and strategies that might be acceptable and effective in our communities to improve traffic safety. It is therefore timely to better understand the culture regarding the use of cannabis and driving.

For example, attitudes and beliefs about driving under the influence of cannabis may be different than those for driving under the influence of alcohol. Rates of driving after using cannabis were much higher among college students using cannabis than driving after drinking rates among students using alcohol (Whitehill, Rivara, & Moreno, 2014). Legalization may be leading people to believe that cannabis is a safe drug and reduce concerns regarding driving under the influence of cannabis. It is therefore important to determine how legalization influences cultural beliefs and attitudes about cannabis and traffic safety.

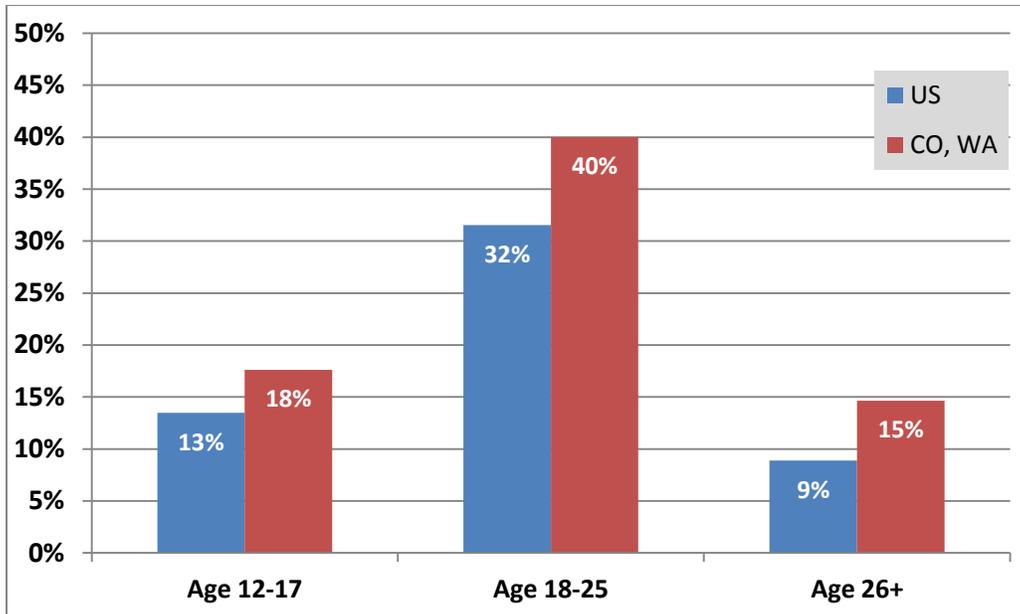


Figure 1. Past Year Cannabis Usage by Age (2012-2013)¹

There is ongoing research taking place to better understand cannabis and traffic safety. Table 1 and Table 2 include a brief review of some of this research. As is evident in these tables, there are no current studies attempting to understand the cultural factors associated with driving under the influence of cannabis and the relationship of these cultural factors to state laws legalizing recreational use. Thus, this research proposal can make a significant and unique contribution to understanding the role of cannabis and associated laws in terms of traffic safety.

Table 1. Summary of Ongoing Research on Cannabis and Traffic Safety

| Research Description |
|---|
| The Pacific Institute for Research and Evaluation (PIRE) is conducting a roadside survey of driver drug and alcohol use in the state of Washington under a contract for the National Highway Traffic Safety Administration and in collaboration with the Washington Traffic Safety Commission. The survey will identify alcohol and/or drugs, and 75 different classifications of drugs. |
| The University of Washington’s Alcohol and Drug Institute is conducting two studies regarding the potential traffic safety implications of cannabis legalization. In the first study, researchers will examine the relationship between changes in Washington State cannabis laws and the incidence of cannabis-impaired driving, as well as the relationship between cannabis levels in driver blood samples, in order to understand the relationship between acute cannabis use and motor vehicle crashes. The second study will examine drug test results from drivers arrested for driving under the influence of cannabis, and fatally injured drivers who tested positive for |

¹ National Survey on Drug Use and Health: Comparison of 2011-2012 and 2012-2013 Model-Based Prevalence Estimates (50 States and the District of Columbia).

| |
|--|
| <p>cannabis, in order to assess the implications of a <i>per se</i> law making it illegal to drive with a certain concentration of cannabis in one’s blood.</p> |
| <p>Washington State Institute for Public Policy (WSIPP) is studying the economic impacts of the legalization of marijuana. Research will look at impacts on public health, substance (alcohol drug) use rates, public safety and criminal justice, state and local agencies and the economy. Reports due to Legislature 9/15, 2017, 2022 and 2032.</p> |
| <p>The Division of Behavioral Health and Recovery at the Department of Social and Health Services in Washington are conducting a Robert Wood Johnson Foundation study of the implications of the deregulation of alcohol which includes aspects of marijuana. A Young Adult Survey will use social media to recruit participants 18 – 25 years of age to determine the impacts of the legalization of marijuana, including impacts on sub-populations (gender, age, ethnicity, income, educational levels). The Healthy Youth Survey (HYS) is conducted every two years in Washington schools and involves about 200,000 students in grades 6, 8, 10 and 12 to determine attitude and trends about alcohol, drugs and suicide.</p> |
| <p>The Washington Traffic Safety Commission is compiling data from fatal crashes from 2008 - 2013 to identify drug and alcohol levels of drivers and others involved in fatal crashes over this time period.</p> |
| <p>The Washington State Patrol Lab is compiling a report of all people who die in vehicle collisions (including pedestrians and bicyclists) based on blood drawn within four hours and tested for the presence of drugs and alcohol.</p> |
| <p>The National Survey of Drug Use and Health, an on-going annual survey conducted on behalf of the Substance Abuse and Mental Health Services Administration (SAMHSA) includes questions about marijuana use.</p> |
| <p>The Centers for Disease Control’s Behavioral Risk Factor Surveillance System (BRFSS) includes a limited number of marijuana related questions. Washington State is adding questions to their state’s BRFSS survey. This research does not assess risk factors or consequence information.</p> |

Table 2. Recently Completed Research on Cannabis and Traffic Safety

| |
|---|
| <p>The U.S. Government Accounting Office completed a study on drug-impaired driving, including both illicit and legal drugs (such as prescription medications), with a focus on the following research objectives:</p> <ol style="list-style-type: none"> (1) What is known about the extent of drug-impaired driving in the U.S.? (2) What types of challenges, if any, exist for federal state, and local agencies in addressing drug-impaired driving? (3) What strategies or policies have federal and state agencies used to mitigate those |
|---|

challenges and what more could be done to address drug-impaired driving?

The methodology included a literature search and interviews with various federal, state, and industry stakeholders (including state and local traffic safety agencies) to identify challenges associated with addressing drug-impaired driving and strategies to mitigate those challenges.

Researchers at the University of Iowa examined the impacts of smoked marijuana on driving. The simulator has been used to study the impairment caused by both alcohol and medications that affect the central nervous system. Researchers examined the ways that active THC affects a person's decision making, psychomotor control, divided attention and inclination to take risks.

BENEFITS

By understanding the cultural factors that predict driving under the influence of cannabis (including the impact of legalization), we will be better able to bolster existing protective factors and develop interventions to address risk factors. Bolstering protection and reducing risk are critical steps in building a positive traffic safety culture that continues to reduce traffic related fatalities and serious injuries.

Best practices in effective intervention design recommend a strong theoretical foundation. The results of this project will provide a better understanding of the values, attitudes, and beliefs that predict driving under the influence of cannabis based on the creation of a behavioral model using a strong theoretical foundation. By knowing the relationship between values, attitudes, beliefs and behaviors, we can leverage existing strengths and address gaps in understanding to change behavior. Having a strong theoretical foundation will make future interventions more cost effective and thereby save public resources and improve overall safety.

As states consider legalization, understanding the impact on traffic safety would help better inform decision making and new policy. Policy makers could better understand the need to enhance impaired driving laws and all of the associated policies and procedures such as testing protocols before legalization.

This is also an important issue for workplaces. Workplace policy (especially for workplaces that involve transportation) will need to understand the impact of changing values, attitudes, and beliefs that may be increasing the likelihood that workers are driving under the influence of cannabis. Providing workplace safety managers with information about these cultural factors will help them address this issue early rather than waiting for negative outcomes.

OBJECTIVES

This research focuses on specific aspects of traffic safety culture that relate to the decision to drive after consuming cannabis. The project will seek to answer three critical questions:

- How does culture compare between users and non-users of cannabis?
- How does culture affect the decision to drive under the influence of cannabis?
- How does culture compare between states with and without legalized recreational use laws?

By culture, we mean the shared values, shared beliefs, and shared attitudes that predict behavior. Understanding these cultural factors provides the opportunities to influence driving after using cannabis.

People develop values, beliefs and attitudes in a number of ways including being influenced by their family, peers, and other social groups in which they interact (e.g., workplace). Comparing the values, beliefs and attitudes of users and non-users will provide a better understanding of the cultural factors that predict driving under the influence behaviors.

Next, it is important to understand how values, beliefs, and attitudes predict driving under the influence. Understanding this is critical to changing behavior. Interventions (including policies and laws) should be informed by a strong understanding of individual decision-making. Thus, understanding how culture affects the decision to drive under the influence is critical to addressing this issue.

Finally, the adoption of new laws and policies influences people's beliefs and attitudes. Thus, it is important to understand how legalization influences beliefs and attitudes predictive of driving under the influence of cannabis. Thus, comparing the culture between states with and without legalized recreational use will begin to inform how legalization impacts cultural beliefs.

RESEARCH PLAN

The project's findings will be based on the analysis of self-reported responses to surveys that will be developed. The questions on the surveys will measure constructs for an augmented, integrated behavioral model based on the theory of reasoned action and the prototype willingness model (Fishbein & Aizen, 2009; Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). As shown in Figure 2, the model seeks to predict driving under the influence of cannabis. The analysis will reveal the relative importance of each construct in predicting behavior. The survey will be conducted with a variety of groups (users and non-users of cannabis, individuals in states with and without legalized recreational use) thus allowing comparison between groups.

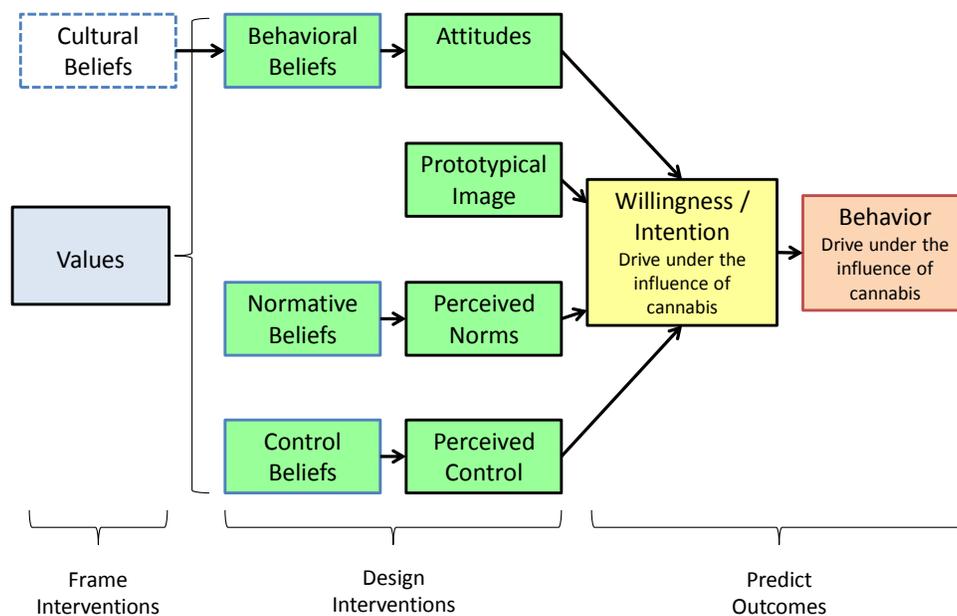


Figure 2. Behavioral Model

Method

The method proposed is divided into five tasks:

- Task 0. Project Management
- Task 1. Literature Review
- Task 2. Survey Design
- Task 3. Survey Implementation and Analysis
- Task 4. Recommendations and Final Report

Task 0. Project Management

Nic Ward will be the principal investigator for this project. As the Director of the Center for Health and Safety Culture and from his experience leading other research projects (including international projects on drugged-driving), Ward is well qualified to lead the project. He will participate in the kick-off meeting to review the details of the project and to make sure all policies and procedures are followed to align with MDT's expectations. This kickoff meeting will be scheduled to coincide with the May meeting of the contributors and participating members of the Traffic Safety Culture – Transportation Pooled Fund (TSC-TPF). He will engage in monthly calls with MDT to review progress and will provide quarterly reports of progress addressing time and budget. He will assure quality for all aspects of the project. He will contribute to and edit all task reports. He will be supported by Kelly Green who will assist in gathering required data for the quarterly reports, and Deb Strachan who will provide financial data. As part of project management, communications will leverage existing communication plans from the support contract including the monthly phone call with MDT and the quarterly meetings with the TSC-TPF. To ensure quality of deliverables, the TSC-TPF will be invited to review draft deliverables and the proposed survey. Necessary revisions will then be made for the final products submitted to MDT.

Task 1. Literature Review

A literature review of published research on values, attitudes, beliefs, and behaviors regarding driving under the influence of cannabis will be completed. This review will inform question design for various constructs in the model. In addition, a literature review on the impact of the legalization of substances (and behaviors) on values, attitudes, and beliefs will be conducted. For example, research conducted to understand the impact of changing the legal drinking age on disapproval of underage drinking may be insightful. This review may reveal additional constructs as well as further analysis to understand the impact of legalization on culture. A graduate student will collect the published research for both literature reviews. Ward, Otto and Finley will review research and draft the literature review. A task report will be written capturing the findings of the review.

Task 2. Survey Design

Based on the literature review and previous research completed by the Center, a survey will be developed based on questions for each construct in the framework model (Figure 2). Typically, multiple questions are used to create a scale for each construct. Questions are designed based on best-practices (for example, Fishbein & Ajzen, 2009; Gerrard et.al, 2008).

Given the multidisciplinary nature of traffic safety culture and the concept of “culture”, this project requires the participation of staff from multiple disciplines. Question design will involve several experts with different specialties including psychology (Ward), sociology (Swinford), behavior (Finley), and prevention (Otto). In addition, Swinford has extensive experience in question design. Careful attention to both question and answer language is critical to improve validity and reliability.

Depending on the results of the literature review, additional formative research may be required. If the literature review does not provide guidance on which behavioral beliefs are most important, additional research may be required. This may be completed using focus groups or

small survey samples (25 respondents). Green has experience conducting this style of research. Green has engaged in qualitative research for the Center – skills valuable in conducting this kind of formative research. Green will assist with obtaining review by Montana State University’s Institutional Review Board prior to engaging in any formative research involving people.

A draft version of the survey will be created online using Montana State University’s Qualtrics System. Qualtrics provides a very high quality, secure platform that also allows for survey completion on mobile devices. Initial testing online allows for an assessment of how much time the survey requires to complete. A long survey typically results in a smaller response rate. The time assessment will be completed using a convenience sample recruited by the Center. The creation of the online survey and preliminary testing will be completed by Otto. Green will assist with obtaining review by Montana State University’s Institutional Review Board prior to performing any time testing.

The TSC-TPF will review the draft survey. The Center and TSC-TPF will engage in a dialogue about the questions, constructs, and the overall model. Green will provide meeting support for dialogues. Otto and Ward will lead the meetings.

Upon approval of the survey by the TSC-TPF, the online version of the survey will be pilot tested with a variety of respondents – both users and non-users of cannabis. The survey will be analyzed by Otto for floor and ceiling effects (a high prevalence of responses in an extreme answer), lack of variability in responses, skipped questions, internal consistency of questions within a single scale, and basic model predictability. Green will assist with obtaining review by Montana State University’s Institutional Review Board prior to performing any pilot testing.

Based on the results of the pilot testing analysis, the survey will be revised by Otto with input from Ward, Finley and Swinford. A version of the survey suitable for paper implementation will be created with the assistance of a graphic artist. Proper layout is important to improve quality of results and enhance participation rates.

A task report will be written that summarizes the survey development process and includes the final survey.

Task 3. Survey Implementation and Analysis

We will survey four distinct groups using two survey methodologies (see Table 3). By surveying these four groups we will obtain a range of respondents (in use of cannabis) as well as respondents in two legal environments – where recreational use is illegal and legal. By gathering responses from these four groups, a better model predicting driving under the influence of cannabis can be created. Comparison between respondents in states with and without legalized recreational use can also be conducted.

We recommend using both an internet and mail-based protocol. A mail-based protocol is most effective for reaching a random sample of respondents. However, typically mail-based surveys do not reach young adults as well as older adults because young adults are often more transient and their addresses are less likely to be maintained on mailing databases. Therefore, an internet-based protocol is recommended to augment the mail-based protocol to reach younger adults.

The mail-based protocol will follow the tailored design method (Dillman, Smyth, & Christian, 2014) . We will use the P4 Marketing Group to prepare and disseminate four mailed contacts: a

pre-survey letter introducing the survey; a survey packet with a pre-stamped, return envelope and a \$2 cash incentive; a reminder post-card; and a follow-up survey packet. This approach has been found to yield the best results with a reasonable cost. The Center has worked previously with the P4 Marketing Group and they are familiar with the standards required and have met our quality requirements. Green will record codes on returned surveys as well as bad addresses. Households associated with returned surveys will be removed from subsequent mailings. Green will code all surveys into a database suitable for additional analysis.

In addition, we will use a purchased panel from Qualtrics (Montana State University’s (MSU) online survey provider) to survey individuals age 18 to 30. This younger age group is very critical to this issue as they have the highest use rates (see Figure 1). A purchased panel from Qualtrics will guarantee a specific number of responses. These responses will not be representative of the general population (like a random sample) because these individuals are recruited and paid to participate in online surveys. However, these responses are appropriate for use in the behavioral model (we will compare these responses with those gathered from the mailed survey).

We propose to survey populations in two states that allow recreational use – Colorado and Washington. We have selected these two states, in particular, because they legalized recreational use a few years ago and both are in the “operational” phase of the laws – that is, recreational use is legal. While other states just recently voted to allow recreational use, it may take time for the laws to be put in effect and for changes to occur.

However, the TSC-TPF may also decide to instead compare states in terms of level of legalization of recreational use (e.g., legalized, decriminalized, and criminalization). In this case, there may be a need to revise the budget to ensure adequate sample sizes for a larger number of states to be surveyed to support this comparison.

Table 3. Survey Summary

| Demographic | Geography | Method | Qualification | Recruitment |
|-------------------------|---|---------------|------------------------|--|
| Adults age 18-30 | states with legalized recreational marijuana use (Colorado, Washington) | Internet | 30-day use of cannabis | Purchased panel (350 responses) |
| Adults age 18-30 | matched states without legalized recreational marijuana use | internet | | Purchased panel (350 responses) |
| Adults age 18 and older | states with legalized recreational marijuana use (Colorado, Washington) | mail | | Random sample of households, \$2 cash incentive (400 responses) ² |

² Number of responses cannot be guaranteed in each wave and is based on a low estimate of a 25% response rate. The use of multiple waves with a conservative estimation for response rate is standard procedure in survey work on human behavior. This conservative approach in our previous research has provided good data for useful conclusions.

| | | | | |
|-------------------------|---|------|--|--|
| Adults age 18 and older | matched states without legalized recreational marijuana use | mail | | Random sample of households, \$2 cash incentive (400 responses) ² |
|-------------------------|---|------|--|--|

In the first phase of analysis, participation rates and demographic variables will be summarized to understand who completed the survey. Next, scales for each construct in the model will be created. The internal consistency of the scale will be assessed and items with low internal consistency may be removed. Next, analysis suitable to address each question will be performed. These analyses will be completed by Otto and reviewed by Ward, Swinford and Finley.

- *How does culture compare between users and non-users of cannabis?*

All constructs measured will be compared between users and non-users of cannabis. These comparisons will reveal how the values, attitudes, and beliefs related to driving under the influence vary.

- *How does culture affect the decision to drive under the influence of cannabis?*

A model will be created using linear regression techniques to see how well the constructs predict behavior. The model will be created using a combined database of all respondents as well as internet-only and mail-only respondents. In addition, we will create a model for states with and without legalized recreational use. The models will be compared for overall predictability as well as relative influence of various constructs.

These models will reveal which constructs dominate driving under the influence behavior. Understanding this will help inform recommendations.

- *How does culture compare between states with and without legalized recreational use laws?*

Values, attitudes, beliefs and behaviors will be compared between the states with and without legalized recreational use. Those constructs most predictive of driving under the influence behaviors will be highlighted. Similarities to changes in legalization of other behaviors / substances as revealed in the literature review will be made.

A task report will be written that summarizes the survey implementation and analyses. The report will be written by Otto, Finley, and Ward with support from Green.

Task 4. Recommendations and Final Report

Based on the results of the analysis and answering the key research questions, recommendations will be made on potential interventions as well as on policy. These recommendations will be developed jointly by Ward, Otto, Finley and Swinford. Each individual’s multidisciplinary

background will contribute to the interpretation and integration of the analyses and the development of recommendations.

The entire project will be documented in a report following MDT's reporting guidelines. This report will be written by Ward, Otto, and Finley. The TSC-TPF will review the draft report and provide feedback.

A final report based on the feedback from the TSC-TPF will be completed by Ward, Otto, and Finley. In addition, a webinar summarizing the results will be recorded and information will be provided for the project summary report. Green will assist in recording of webinar; Otto and Ward will lead webinar.

TSC-TPF INVOLVEMENT

We anticipate the assistance of the TSC-TPF in securing participation of the identified states and contributing to the review and approval of project deliverables. This will include the review and approval of the developed survey. Indeed, some of the member states of the TSC-TPF may be interested in participating in the pilot testing of that survey.

PRODUCTS

1. Task 0 Quarterly Progress Reports
 - Progress reports based on MDT template for each quarter of project.
2. Task 1 Report: Literature Review
 - A summary of the findings of the literature review will be provided. This review will guide survey development.
3. Task 2 Report: Survey Instrument
 - The survey instrument used to measure values, beliefs, attitudes, and behaviors regarding driving under the influence of cannabis will be a tool that others can use to replicate the work with other populations.
4. Task 3 Report: Survey Implementation and Analysis
 - A statistical report of the survey results and summary of the analyses will be provided.
5. Task 4 Final Report
 - The final report will provide comprehensive documentation of the project and include the final section on recommendations.
 - Dissemination of results will be made through the TSC-TPF members as well as potential conference presentations (if travel budget and permission is granted) and journal articles. The research team will also disseminate through relevant committee participation.
6. Task 4 Project Summary Report
 - Provide text and graphics to support products of project summary report (e.g., http://www.mdt.mt.gov/other/research/external/docs/research_proj/seismic/phaseii/project_summary.pdf)
7. Task 4 Video Webinar of Results (recorded)
 - A webinar overviewing the results of the project will be recorded and available for viewing by others. This will provide a brief (15 to 20 minutes) summary of the major findings and recommendations.
 - This video will be made publically accessible on YouTube (e.g., for use by interested families etc.).

PROJECT IMPLEMENTATION

Based on the trends over the past several years, it appears more and more states are considering changing laws about cannabis. Thus, the prevalence of driving under the influence of cannabis does not seem likely to decrease or stay the same but rather increase. Increasing legalization by states may also impact perceptions that cannabis is a safe drug and that driving under the influence of cannabis is safe. Both of these perceptions would lead to increases in driving under the influence. States that truly embrace a towards-zero-death philosophy should assess all changes in laws for their impact on traffic safety. The results of this research could help inform the need for this approach.

This research will help safety leaders (e.g., governments, private sectors, community leaders) proactively develop and promote strategies to prevent driving under the influence of cannabis and will help inform the broader public debate about the legalization of recreational use. For example, if we learn that many people do not understand how cannabis may impact their crash risk and this lack of knowledge is correlated with increased driving under the influence, then it would be important to develop and implement public education interventions. If we find that very few people are concerned about this issue and under-estimate the prevalence of driving under the influence of cannabis, it may be important to raise general concern about the issue.

SCHEDULE

The timeline for the main tasks and deliverables are summarized below for this 14 month project (Note that updates on this project will be made during regular scheduled TSC-TPF meetings):

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| Task 0. Project Management Quarterly Reports | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Task 1. Literature Review Report | X | X | X | | | | | | | | | | | |
| Task 2. Survey Design Survey | | | X | X | X | X | | | | | | | | |
| Task 3. Survey Implementation / Analysis Report | | | | | | | X | X | X | X | X | | | |
| Task 4. Final Report / Webinar Final Report Project Summary Report Recorded Webinar | | | | | | | | | | | X | X | X | X |

BUDGET

The project costs are summarized below. Table 4 summarizes the costs by budget item; Table 5 summarizes the pay rate and benefit rate for project staff; Table 6 summarizes the costs by task; and Table 7 summarizes the project costs by fiscal year. Note that a variety of staff are included in the budget because of (1) the need for skills and knowledge across a range of disciplines, and (2) the need to control the budget by using staff from lower salary ranges. In addition to the funds requested below, WTI will provide match in the amount of \$1,500. This match will consist of \$1196 in salary for Nic Ward, and \$304 in fringe benefits.

Table 4. Project Budget by Item

| Item | Total |
|---|------------------|
| Salaries | \$53,547 |
| Benefits | \$17,046 |
| Contracted Services | \$36,500 |
| Communications | \$300 |
| Other: incentive for survey participation | \$6,400 |
| Total Direct Costs | \$113,793 |
| Indirect Costs (25%) | \$28,448 |
| Total Project Cost | \$142,241 |

Table 5. Pay Rate and Benefits

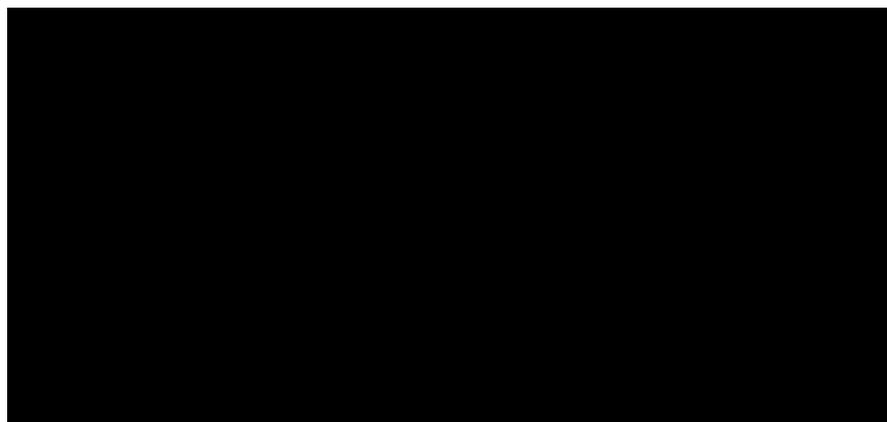


Table 6. Project Budget by Task

| Item | Total |
|--|------------------|
| 0 – Project Management | \$6,140 |
| 1 – Literature Review | \$13,096 |
| 2 – Survey Design | \$31,892 |
| 3 – Survey Implementation and Analysis | \$72,917 |
| 4 – Final Report and Webinar | \$18,195 |
| Total Project Cost | \$142,241 |

Table 7. Project Budget by State and Federal Fiscal Years

| Item | State Fiscal Year | | Federal Fiscal Year | |
|---|--------------------------|----------------|----------------------------|----------------|
| | 2015 | 2016 | 2015 | 2016 |
| Salaries | 6,019 | 47,528 | 24,045 | 29,502 |
| Benefits | 1,916 | 15,130 | 7,654 | 9,392 |
| Contracted Services | 0 | 36,500 | 0 | 36,500 |
| Communications | 43 | 257 | 107 | 193 |
| Other: incentive for survey participation | 0 | 6,400 | 0 | 6,400 |
| Total Direct Costs | 7,978 | 105,815 | 31,806 | 81,987 |
| Indirect Costs (25%) | 1,995 | 26,454 | 7,952 | 20,497 |
| Total Project Cost | 9,973 | 132,269 | 39,758 | 102,484 |

STAFFING

Staffing for this project involves members of the Center for Health and Safety Culture. Each staff member contributes to the project in a unique way based on their specific expertise and background. Table 8 summarizes staff time by task for the 14-month duration of this project. Overall, this effort can be interpreted as the equivalent of one person working on this 55% of the time for 14 months (see FTE in Table 8). We believe this FTE equivalent effort is reasonable to satisfy the goals of this project in a cost-effective manner.

Dr. Nic Ward will serve as the Principal Investigator (PI) for this research project and brings nearly 20 years of international research in human factors applied to traffic safety. Ward will manage the project, monitor all progress for quality, and communicate on a monthly basis with MDT and the TSC-TPF on the progress of the project.

Professor Nicholas Ward (F. Erg. S) obtained his Ph.D. in Human Factors Psychology from Queen's University (Canada). He is currently a Professor of Mechanical and Industrial Engineering at Montana State University and Director for the Center for Health and Safety Culture at WTI. Professor Ward has led several successful interdisciplinary and international consortia for traffic safety research including intelligent transportation systems, driver behavior (impairment), and traffic safety culture. He is a national leader in the definition and advancement of traffic safety culture as a new traffic safety paradigm. In this capacity, his research has contributed to the development of the National TZD Strategy to transform traffic safety culture. Professor Ward organizes, chairs and presents many conference sessions and panels on traffic safety including co-founding the National Summit for Rural Traffic Safety Culture with the AAA Foundation for Traffic Safety. He is one of the founding member of the TRB Subcommittee on Roadway Safety Culture (AND0001). Professor Ward has recently authored a book chapter overviewing methods for measuring traffic safety culture and strategies to transform traffic safety culture. He is currently editing a special edition on “traffic safety culture” for the international journal Transportation Research Part F: Traffic Psychology and Behavior.

Jay Otto will assist with all steps of the project and lead the survey design and analysis. Otto is a research scientist and manager of the Center for Health and Safety Culture. He oversees all of the Center’s projects and fosters integration and dissemination of research findings across projects. He routinely provides presentations and leads trainings. He has developed, implemented and analyzed surveys of students, parents, adults, key leaders, schools, and law enforcement regarding a variety of safety issues. He is a contributing author on several of WTI’s traffic safety reports and is presently leading pilot projects to reduce impaired driving and increase seat belt usage.

Dr. Steve Swinford is responsible for the development of the sampling methodologies to measure traffic safety culture across layers of society. He is also responsible for obtaining the selected samples and managing the survey database, survey design and implementation, data analysis, and report generation. Swinford is an Associate Professor in the Sociology and Anthropology department at Montana State University. He has worked as a research scientist

with the Center for Health and Safety Culture since 2008 and has produced over 50 of the organization's Key Findings Reports.

Kari Finley, Ph.D. will contribute to the literature review and other formative research (e.g., focus groups) as well as contribute to the final report. Finley is a Behavioral Specialist with extensive experience in behavior change.

Kelly Green, M.P.A., will contribute to the design and formatting of the survey (paper and online versions) as well as managing the survey implementation process including IRB approval. She will also support Ward with project management duties like project communication and quality assurance. Green will also coordinate with the university's Institutional Review Board. Green is a Research Associate with training in public administration.

Subconsultants:

The P4 Market Group will print, package and mail the paper-based version of the survey. The Center has worked with this agency in the past and trained them on our protocol. Their standards meet the necessary levels of quality to support a good response rate.

Qualtrics provides purchased panels of respondents for online surveys. MSU uses the Qualtrics survey system – a high quality, subscriber system that assures safe, protected methods for collecting data and works on a variety of platforms including mobile devices.

Table 8. Schedule of Staffing

| Name | Role | FTE* | Hours by Task | | | | | Total |
|-----------------|--|--------------|---------------|------------|------------|------------|------------|--------------|
| | | | 0 | 1 | 2 | 3 | 4 | |
| Nic Ward | Principal Investigator | 0.079 | 20 | 35 | 71 | 35 | 30 | 191 |
| Jay Otto | Survey design, data analysis, recommendations, final report, webinar | 0.091 | | 40 | 85 | 30 | 65 | 220 |
| Steven Swinford | Select and obtain samples, manage survey database | 0.021 | | | 10 | 40 | | 50 |
| Kari Finley | Literature review, formative research, final report | 0.070 | | 40 | 75 | | 55 | 170 |
| Kelly Green | Survey design/formatting, survey implementation, IRB process | 0.191 | | 15 | 190 | 203 | 55 | 463 |
| Deb Strachan | Financial support, contracts for survey implementation, | 0.025 | 60 | | | | | 60 |
| Student | Obtain literature, literature review, manage literature database | 0.033 | | 80 | | | | 80 |
| Graphics | Figures and graphics for survey, final report, and project summary | 0.016 | | | 20 | | 20 | 40 |
| Staff writer | Edit final report | 0.019 | | | | | 45 | 45 |
| Total | | 0.544 | 80 | 210 | 451 | 308 | 270 | 1,319 |

*based on 14 months

FACILITIES

The Western Transportation Institute (WTI) is the nation's largest transportation institute focusing on rural transportation issues and is designated as a National University Transportation Center sponsored by the U.S. Department of Transportation. The Institute was established in 1994 by the Montana and California Departments of Transportation in cooperation with Montana State University (MSU). WTI has a 50+ person multidisciplinary staff of professionals, students and associated faculty from engineering (mechanical/industrial/civil/electrical), computer science, fish and wildlife, ecology, business, and economics.

WTI has an annual budget of approximately \$8 million, which is obtained from a diverse sponsor base including 26 state departments of transportation, the U.S. Department of Transportation (USDOT), and other federal agencies such as the National Science Foundation, Department of Homeland Security, Transportation Research Board and the National Park Service. WTI also receives funding from private foundations, Parks Canada and several companies.

WTI draws from eight integrated research areas to create solutions to rural transportation issues and manages seven laboratories. The 30,000 square feet of space provides dedicated onsite space and laboratories for project staff as well as facilities for archiving and transmitting data. As a department within the College of Engineering at MSU, WTI is also supported by the College and by the umbrella of MSU administrative, academic, and research resources.

Center for Health and Safety Culture

In 2009, WTI established a research center labeled the Center for Health and Safety Culture (CHSC). Made up of an inter-disciplinary team of researchers and practitioners from across North America dedicated to using science to address social issues, the mission of the CHSC is to develop methods to grow positive norms that support health and safety. The Center works with a variety of clients and sponsors including local, state and federal governmental agencies (e.g., state departments of transportation), private businesses, corporations, community coalitions and private foundations.

Information Services

The Western Transportation Institute is housed in the Transportation and Systems Engineering Building on the Montana State University (MSU) campus, which provides ready access to MSU's library, computing, and other facilities. The MSU Library system has licenses with the largest databases of published literature as well as open access to published articles in numerous peer reviewed journals. These resources will be critical in researching past studies and identifying evidence-based strategies. Literature and information gathering is performed through the Carnegie Research Level 1 Library (Renne Library). In addition to an extensive collection of printed material, the library subscribes to dozens of databases and hundreds of refereed journals in print and electronic format. Specific items not accessible through these sources can be located and retrieved by the Interlibrary Loan service, which is affiliated with other research libraries across the United States. Typical sources used to aid literature searches include: TRIS Online (Transportation Research Information Services), E-Science Server, Transportation Research Board Research Records and Annual Meeting CD-ROMs, Google Scholar, Google, and Montana Local Technical Assistance Program library.

Graphic and Communication Services

Communications staff provides technical editing, layout, graphic design, and web page support. Information Technology staff maintains network servers and individual computers, software and hardware. Relevant university communication facilities include a fully video and conference room facilities. WTI routinely conducts internet-based meetings with clients and staff located across the United States and Canada. Webinars are hosted to facilitate training and information dissemination and recorded for later access by stakeholders and clients.

Administrative Services

The researchers at WTI are assisted by a highly qualified group of experienced support staff. Administrative staff members assist with budgeting, procurement, contracts, and accounting. The university provides Extended University services for online educational course development and publications and an Institutional Review Board (IRB) to oversee all research engaging humans.

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