

Resources and Tools to Reduce Multiple Risky Driving Behaviors

by

Kari Finley, Senior Research Scientist and Jay Otto, Principal Scientist
Center for Health and Safety Culture

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Montana Department of Transportation
2701 Prospect Avenue
P.O. Box 201001
Helena, MT 59620-1001

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PROBLEM STATEMENT

There is growing recognition that drivers involved in fatal crashes are often engaged in multiple risky behaviors – not wearing a seat belt, speeding, and driving impaired (FARS, 2018). Research has established associations between impulsivity and multiple risky driving behaviors (Bicaksiz, & Ozkan, 2016). While the association between impulsivity and various risky driving behaviors is established in the literature, there is limited understanding about how to address impulsivity and the underlying beliefs and behaviors of individuals engaging in multiple risky driving behaviors. The proposed research seeks to address this gap by creating and testing an intervention designed to address traffic impulsivity to improve driver behaviors.

BACKGROUND SUMMARY

According to the Fatality Analysis Reporting System (FARS), from 2014 to 2018 there were over 10,350 drivers involved in fatal crashes who were simultaneously unrestrained, speeding, and under the influence of alcohol (FARS, 2018). Drivers engaging in multiple risky behaviors – such as not using a seat belt, speeding, and driving impaired – may require more intensive interventions than are typically provided to drivers who are cited for any one of these risky behaviors in isolation.

Research evidence suggests there are associations between multiple risky driving behaviors (Simons-Morton, Li, Ehsani, & Vaca, 2016; Li, Simons-Morton, & Hingson, 2013). For example, one study revealed that risky drinking was associated with risky driving behaviors among youth (i.e., driving under the influence of alcohol, speeding, tailgating, talking on a cell phone, sending text messages, etc.) and recommended addressing them in combination as these behaviors may be linked by similar underlying belief systems like the affinity for risk or impulsiveness (Simons-Morton et al., 2016). Another study found low risk perception and high impulsivity were significant risk factors for a variety of risky behaviors such as infrequent seat belt use, drinking and driving, riding with an impaired driver, binge drinking, and speeding for the thrill, among patients at a trauma center who had experienced unintentional blunt trauma (from a vehicle crash, as a pedestrian, and from a fall) (Ryb, Dischinger, Kufera, & Read, 2006). Similarly, among people with driving violations, impulsivity was associated with both impaired driving and exceeding speed limits (Paaver, Eensoo, Pulver, & Harro, 2006).

Impulsivity influences various risky driving behaviors (Bicaksiz & Ozkan, 2016). Traffic impulsivity is defined as “the tendency to act quickly and inaccurately or act quickly and accurately without considering and elaborating on the future consequences while driving” Bicaksiz, & Ozkan, 2016, p. 220). Traffic impulsivity “may involve the inability to wait in traffic, expressing anger and aggression to others while driving, speeding, using a cell-phone while driving, close following, and making sudden accurate or inaccurate maneuvers without considering consequences” (Bicaksiz, & Ozkan, 2016, p. 220).

While the association between impulsivity and various risky driving behaviors is established in the literature, there is a gap in understanding how to address impulsivity and the underlying beliefs and behaviors of individuals engaging in multiple risky driving behaviors. The proposed research seeks to address this gap by creating and testing an intervention designed to address traffic impulsivity to improve driver behaviors.

A review of the Transportation Research International Documentation database revealed that interventions designed to address traffic impulsivity to improve driver behaviors are limited. Two studies were found that focused on the same brief intervention addressing impulsivity and driving behaviors with young novice drivers (Paaver et al., 2013; Eensoo, Paaver, Vaht, Loit, & Harro, 2018). The brief intervention included education on impulsivity (i.e., different types of impulsivity, how impulsivity is related to risk-taking, how to recognize impulsiveness in oneself, and situational factors that could potentially trigger impulsive behavior) and group work that focused on identifying psychological factors involved in traffic crashes, assessing one’s own risk, and focusing on ways to decrease risk including teaching skills such as self-monitoring and self-regulation (Paaver et al., 2013). In the initial study, researchers found the brief intervention improved traffic behavior for novice drivers. After participating in the initial intervention, the researchers conducted a follow-up study and tracked traffic violations and traffic accidents for a period of four years. Results from this follow-up study revealed that the benefits of participating

in the intervention remained; “speeding, drunk driving, and involvement in traffic accidents were significantly lower in the intervention group” (Eensoo et al., 2018, p. 19). These findings suggest that brief interventions focused on impulsive behavior may be an important strategy to address multiple risky driving behaviors.

While the proposed brief intervention focuses on traffic impulsivity, it is also important to recognize that traffic impulsivity is likely not the only factor influencing multiple risky driving behaviors. Other underlying beliefs and behaviors such as sensation seeking, affinity for risk, and risk awareness may also be explored. In addition, research shows that drivers with multiple incidences of impaired driving often have a substance use disorder (LaPlante et al., 2008). Therefore, an intervention that seeks to address multiple risky driving behaviors may need to include elements of screening and referral to treatment.

Characteristics such as psychological reactance and moral disengagement may also influence the decisions of drivers engaging in multiple risky driving behaviors. . An intervention will likely need to address these characteristics. This project can build on previous research that has been done by the Traffic Safety Culture Pooled Fund to understand these two characteristics and mechanisms to decrease reactance and overcome moral disengagement. Designing an intervention with these factors and characteristics in mind will be important to address multiple risky driving behaviors.

BENEFITS

The association between impulsivity and various risky driving behaviors is established in the literature (Bicaksiz & Ozkan, 2016). However, there is limited understanding about how to address impulsivity and the underlying beliefs and behaviors of individuals engaging in multiple risky driving behaviors. The proposed research seeks to address this gap by creating and testing a virtual intervention designed to address traffic impulsivity to improve driver behaviors. With this information, agencies can make more informed decisions about strategies to reduce risk and improve traffic safety. A virtual intervention, as proposed in this project, may have additional benefit as the intervention will be designed to standalone or augment an existing infrastructure. Further, having a virtual intervention may help DOTs by providing additional options for reaching their target audience in ways other than through an in-person class.

OBJECTIVES

This project proposes to develop and test a brief intervention designed to address multiple risky driving behaviors that can augment existing infrastructures. This project will provide a set of tools to inform decision making about strategies that focus on individuals who engage in multiple risky driving behaviors.

Objectives of this project include:

1. Conduct a review of literature to understand the multifaceted nature of impulsivity (what it is, types of impulsivity, etc.), how impulsivity is measured, and the relationship between impulsivity and high-risk driving behaviors. We will also explore in the review of literature, other factors like sensation seeking, affinity for risk, risk awareness and substance use disorders as these factors are also shown to influence multiple risky driving behaviors. Further, the literature review will explore ways to reduce impulsivity and other factors associated with multiple risky driving behaviors and inform the development of an effective virtual intervention to influence high-risk driving behaviors. The review will use a keyword search within relevant literature databases.
2. Synthesize what is learned from the literature to develop a brief intervention to reach drivers who engage in multiple risky behaviors.
3. Test the brief intervention that was created to reach drivers who are engaging in multiple risky behaviors.
4. Create recommendations and guidance that traffic safety professionals can use to address multiple risky driving behaviors and seek to leverage existing infrastructures.

RESEARCH PLAN

The Center for Health and Safety Culture is proposing to build on existing research about impulsivity and risky driving behaviors and to develop and test an intervention addressing individuals engaged in multiple risky driving behaviors. The method proposed for this project is divided into four tasks:

- Task 0. Project Management
- Task 1. Literature Review
- Task 2. Content Development for Brief Intervention
- Task 3. Test Brief Intervention
- Task 4. Create Resources and Complete Final Report

Task 0. Project Management

Dr. Kari Finley will be the principal investigator for this project. As a Senior Research Scientist at the Center for Health and Safety Culture (CHSC) and from her experience leading other projects, Finley is well qualified to lead the project. She 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. Finley will be supported by Dr. Nic Ward who will engage in approximately monthly calls with MDT to review progress and will provide quarterly reports of progress addressing time and budget. Finley will assure quality for all aspects of the project. Finley will be supported by Kelly Green 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 pooled fund panel. To ensure quality of deliverables, the pooled fund panel will review draft deliverables. Necessary revisions will then be made for the final products submitted to MDT.

Task 1. Literature Review

A literature review will be conducted to understand the multifaceted nature of impulsivity (what is impulsivity, kinds of impulsivity, etc.), how impulsivity is measured, and the relationship between impulsivity and high-risk driving behaviors. Further, the literature review will explore ways to reduce impulsivity and inform the development of a successful intervention to influence high-risk driving behaviors. While the focus of the literature review is on impulsivity, other factors like sensation seeking, affinity for risk, risk awareness and substance use disorders will also be reviewed as these factors may be important in the development of an intervention that addresses multiple risky driving behaviors.

To obtain research articles for this review, a keyword search will be conducted using databases that cover published academic research (e.g., Google Scholar, TRID database and Montana State University Library search engines Academic Search Complete and EBSCO). The search will be limited to peer-reviewed and publicly available literature published in English after 2000. Word search and phrase combinations will include: "high-risk driving behaviors," "factors associated with unsafe driving," "personal risk recognition," "driving risk perception," "multiple risky driving behavior," "traffic impulsivity," "impulsivity and driver behavior," "impulsivity scales,"

“impulsiveness and driving,” “brief interventions,” and “traffic interventions”. Once articles are reviewed for relevance, additional key words were used in combination to narrow the search. Additionally, the reference lists of relevant articles will be reviewed for other potentially relevant articles that may have been missed with the key word searches. This review will inform the design of the intervention proposed for this project and will inform the creation of an outline of the curriculum for the brief intervention. Additionally, we will explore the potential to leverage existing infrastructures across the social ecology and develop an implementation plan outline and an evaluation plan outline.

Kari Finley, Senior Research Scientist, will lead this task. The **Task 1 Report** will include a summary of the literature review, an outline of the curriculum for the brief intervention, an implementation plan, and an evaluation plan. Otto, McMahill, Ward, Arpin and Green will contribute to these tasks.

Task 2. Content Development for Brief Intervention/ Recruitment

Based on the literature review, content will be created to reach drivers who engage in multiple risky behaviors. The content will be designed to be able to be integrated with an existing infrastructure or as a standalone option and provide enhanced content and methods (e.g., motivational interviewing -- a technique that works with an individual to reveal their underlying values and beliefs that influence their behavior) to improve outcomes and address multiple risky behaviors. The content will be designed for implementation by trained facilitators.

Once content for the brief intervention has been developed, we will pilot test and refine the intervention.

Finley, Otto, and McMahill will be responsible for content development, pilot testing, and refinement. Arpin and Ward will support content development and recruitment efforts.

We will develop a plan for the full experimental design study to be implemented in Task 3 and will recruit a site for the study. We will also train providers to deliver the brief intervention.

The content created for the brief intervention and the plan for the experimental design study will be summarized in the **Task 2 Report**.

Task 3. Test Brief Intervention

We propose to conduct an experimental study to test the brief intervention designed in Task 2. We will recruit college students at one university to participate in the study and will conduct an initial assessment, which will include an assessment of multiple risky driving behaviors, impulsivity, and other risk factors found salient from the literature review. Surveys will be developed to understand the beliefs and behaviors influencing those engaged in multiple risky driving behaviors. A behavioral model will inform the development of surveys.

Those who endorse multiple risky driving behaviors will be recruited for the study. The study will use an experimental design, which includes a control group (participants who do not receive the

brief intervention) and an intervention group (participants who do receive the brief intervention). The brief intervention will be delivered by trained facilitators one-on-one virtually with study participants in the intervention group. The study will include pre-tests (pre intervention) and follow-up surveys (post intervention).

Finley, Otto, McMahill, and Ward will be responsible for creating assessments and testing the intervention. Green and Arpin will contribute to the survey development and support the report of results and tasks. Data collected in the study will be analyzed. Otto and Ward will analyze the results and summarize the findings in the **Task 3 Report**.

Task 4. Create Resources and Complete a Final Report

- **Develop Recommendations and Provide Guidance.** Based on what we learn from testing the brief intervention, we will provide recommendations about how traffic safety professionals can address multiple risky driving behaviors and could seek to leverage existing infrastructures.
- **Poster** A poster will be created for traffic safety professionals to use to disseminate information in a traffic safety poster session.
- **PowerPoint Presentation** A PowerPoint presentation will be created for traffic safety professionals to use to disseminate information.
- **A Recorded Webinar** A webinar will be completed to disseminate findings from this project.
- **Final Report** A final report will be completed summarizing each task in the project.

Finley will be responsible for completing these products and will be supported by Otto, Arpin, Green and McMahill. Ward will contribute to the webinar development and the final report. The Pooled Fund Board will review and approve the final products.

TSC POOLED FUND INVOLVEMENT

We anticipate the assistance of the TSC Pooled Fund board in contributing to the review and approval of the survey and the project deliverables.

PRODUCTS

1. **Task 0.** Quarterly Progress Reports
 - a. Progress reports based on MDT template for each quarter of project
2. **Task 1. Report:** Literature Review
3. **Task 2 Report:** Summary of content created for the brief intervention
4. **Task 3 Report:** Survey developed to test intervention and summary of key findings
5. **Recommendations and Guidance** about how traffic safety professionals can address multiple risky driving behaviors and could seek to leverage existing infrastructures
6. **A Poster** suitable for use at TRB
7. **PowerPoint slides** summarizing the results of the project
8. **A Recorded Webinar** summarizing the results
9. **Final Report:** A comprehensive research report of the project

PROJECT IMPLEMENTATION

This project will develop and test a brief intervention that can augment existing infrastructures and will provide resources that can be used to guide decision making about strategies focused on individuals who engage in multiple risky driving behaviors.

SCHEDULE

The timeline for the main tasks and deliverables is summarized below for this 30-month project. Task deliverables will be given to MDT by the end of the month denoted by an “X”.

	Month																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	
Task 0. Project Management																															
Quarterly Progress Report	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	X	X	<u>X</u>	
Task 1. Literature Review	X	X	X	X	X	X	<u>X</u>	X																							
Task 2. Content Dev. for Brief Intervention/ Recruitment								X	X	X	X	X	X	<u>X</u>	X																
Task 3. Test Brief Intervention															X	X	X	X	X	X	X	X	<u>X</u>	X							
Task 4. Create Resources and Final Report																								X	X	X	X	X	X	<u>X</u>	X

BUDGET

The project costs are summarized below. Table 1 summarizes the costs by budget item; Table 2 summarizes the pay rate and benefit rate for project staff; Table 3 summarizes the costs by task; and Table 4 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.

Table 1. Project Budget by Item

Item	Total
Salaries	\$121,002
Benefits	\$39,521
Contracted Services	\$0
Supplies	\$6,000
Communications	\$0
Other: Qualtrics	\$3,600
Total Direct Costs	\$170,122
Indirect Costs (25%)	\$42,531
Total Project Cost	\$212,653

Table 2. Project Budget by Task

Item	Total
0 – Project Management	\$6,706
1 – Literature Review	\$33,187
2 – Surveys	\$52,793
3 – Develop Guidance	\$74,976
4 – Create Resources and Complete Final Report	\$44,990
Total Project Cost	\$212,653

Table 3. Project Budget by State and Federal Fiscal Years

Item	State Fiscal Year			Federal Fiscal Year			
	2021	2022	2023	2021	2022	2023	2024
Salaries	19,332	49,918	51,752	9,040	47,335	58,499	6,128
Benefits	6,499	16,293	16,729	2,957	15,737	18,832	1,995
Supplies	0	6,000	0	0	0	6,000	0
Other	0	3,600	0	0	3,600	0	0
Total Direct Costs	25,831	75,811	68,480	11,997	66,671	83,331	8,123
Indirect Costs (25%)	6,458	18,953	17,120	2,999	16,668	20,833	2,031
Total Project Cost	32,289	94,763	85,600	14,996	83,339	104,164	10,154

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 5 summarizes staff time by task for the 30-month duration of this project. Overall, this effort can be interpreted as the equivalent of one person working on this 30.90% of the time for 30 months (see FTE in Table 5). We believe this FTE equivalent effort is reasonable to satisfy the goals of this project in a cost-effective manner.

Kari Finley, Ph.D., will serve as the PI for the project and oversee all efforts. Finley is a Senior Research Scientist at the Center for Health and Safety Culture. Finley will oversee all aspects of this project and will contribute as a lead writer for the literature review, will develop content for the intervention, design the experiment, train providers, test the intervention, and provide oversight and support for all other Task deliverables. Finley is a Behavioral Specialist with extensive experience in behavior change and facilitating brief interventions.

Jay Otto, M.S., Otto is the principal scientist of the Center for Health and Safety Culture. He oversees all the Center's projects and fosters integration and dissemination of research findings across projects. Otto will lead the key findings and data analysis for the project. Otto will also support the development of the literature review and evaluation plan, content for the intervention, creation of the experimental design, testing the intervention, and creating resources and recommendations for the project.

Anmarie McMahill, M.S., will contribute to creating the curriculum, implementation plan and evaluation plan. She will support the development of the brief intervention and will contribute to the recruitment of participants. McMahill will contribute to creating recommendations for the resources created for this project and will contribute to the final report. McMahill is the manager for the Center and has extensive experience on traffic safety projects. She is a research scientist with extensive experience at the community level with prevention.

Nic Ward, Ph.D., will communicate approximately monthly with MDT and the pooled fund on the progress of the project. Ward will contribute to the project bringing nearly 20 years of international research in human factors applied to traffic safety. Professor Nicholas Ward (F. Erg. S) is currently a Professor of Mechanical and Industrial Engineering at Montana State University and Director for the Center for Health and Safety Culture. 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. Ward will contribute to the curriculum outline, implementation plan and evaluation plan. He will support the development of the intervention and be involved in the recruitment and development of the experimental design. He will also analyze results from the study and support the development of the recommendations, webinar, and report writing.

Jamie Arpin will contribute to supporting the intervention development, survey work, recruitment, guidance development, and task report writing. She will also contribute to the creation of the curriculum, implementation plan and evaluation plan for the project.

Kelly Green, M.P.A., will be involved in the financial and contract management of this project. She will also support the evaluation and implementation plan, and help in the development of the experimental design, and recruitment of participants for the study, and will contribute to the report on recommendations, resources created for the project, and the final report.

Table 4. Schedule of Staffing

Name	Role	FTE*	Hours by Task					Total
			0	1	2	3	4	
Finley, Kari	Principal Investigator	0.18	48	145	310	315	130	953
Arpin, Jamie	Research Staff	0.047	0	70	35	125	20	250
Green, Kelly	Research Staff	0.034	47	20	40	45	28	180
McMahill, Annmarie	Research Staff	0.045	0	70	100	40	25	235
Otto, Jay	Research Staff	0.11	0	95	70	215	205	585
Ward, Nic	Research Staff	.029	0	10	25	55	65	155
Total		.3090	96	410	580	795	473	2354

*based on 30 months

FACILITIES

Center for Health and Safety Culture

The Center for Health & Safety Culture (CHSC) is an interdisciplinary center serving communities and organizations through research, training, and support services to cultivate healthy and safe cultures. The Center is dedicated to applying research to develop sustainable solutions to complex social problems. Our research focuses on understanding how culture impacts behavior – especially behavior associated with health and safety. We have expanded beyond Positive Community Norms (PCN) to consider a broader set of cultural influences in addition to norms including values, beliefs, and attitudes. This broadly operating model to measure, analyze, and transform culture is called “Positive Culture Framework” (PCF). This framework is grounded in validated psychological models of human social behaviors related to health and safety. We address a variety of issues working with tribal, federal, state, and community agencies as well as private non-profit and for-profit organizations and companies. Current research projects include addressing substance abuse, traffic safety, child maltreatment and violence. The Center works with a variety of clients and sponsors including local, state, federal governmental agencies (e.g., state departments of transportation), private businesses, corporations, community coalitions, and private foundations.

Information Services

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 are 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 video and conference room facilities.

Administrative Services

The researchers at CHSC 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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