

A review of methods to change beliefs

by

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PROBLEM STATEMENT

Many of us - as traffic safety stakeholders - have the goal to reduce traffic fatalities and serious injuries to zero. Because road user behavior is a common factor in traffic crashes, we must explore ways to encourage safer behaviors. Traffic safety culture recognizes that intentional behavior is influenced by the values, beliefs, and attitudes shared among a group of people. Therefore, to change behavior within a group, it is necessary to change the beliefs. However, changing beliefs is difficult, and we require a better understanding of how beliefs are formed and changed so that we can develop more effective traffic safety culture strategies.

BACKGROUND SUMMARY

The Pooled Fund, to date, has focused on defining traffic safety culture (*the shared belief system of a group of people, which influences road user behaviors and stakeholder actions that impact traffic safety*), measuring traffic safety culture, and analyzing the relationships between specific beliefs and road user behavior. Such analyses have allowed us to identify which beliefs we need to change to support our traffic safety goals. Now, it is necessary to shift to the next phase of the work, which focuses on growing traffic safety culture (See Figure 1).



Figure 1. Steps in understanding and applying traffic safety culture.

To begin this next phase of the Pooled Fund Project, we propose to conduct a review of published literature spanning a variety of disciplines to better understand the cognitive processes that form and change beliefs – along with the factors that influence these processes. Gathering and synthesizing this information are critical to inform the design and implementation of effective traffic safety culture strategies.

Different disciplines in the social sciences can help us understand the factors and processes that influence belief formation and belief change. Cognitive psychology focuses on how people think including the role of language, memory, perception, and thinking. Social psychology focuses on how our beliefs are influenced by the presence of others (both actual interactions and our perceptions of others), which is the basis of culture. Developmental psychology explores how people change over the course of their life – which is particularly important as we think about adolescents learning to drive and young adults engaging in risky behaviors. Social psychology studies patterns of behaviors, beliefs, and social interactions among groups of people. How groups influence the formation of individuals beliefs is very relevant to growing traffic safety culture. Research in communication and cognitive neuroscience also will have relevant findings. By reviewing the relevant research from social sciences such as these, we can better understand how beliefs are formed and identify conditions and processes that encourage belief change.

BENEFITS

By better understanding the processes and conditions that form and change beliefs, traffic safety stakeholders can become more effective in developing and implementing strategies to change traffic safety culture. Growing traffic safety culture is necessary to achieve and sustain a vision of zero traffic fatalities and serious injuries.

OBJECTIVES

The aims of this project are to:

1. Understand the processes and conditions that influence belief formation and change.
2. Guide traffic safety stakeholders in the design of effective strategies to change traffic safety culture.

RESEARCH PLAN

Task 0. Project Management

Nic Ward will be the principal investigator for this project with support from Jay Otto, Kari Finley, and Kelly Green. The project will be managed in accordance with the policies established for the pooled fund and those required by MDT.

Task 1. Literature Review

A “narrative literature review” will be conducted to understand how belief change can result in changed behaviors.¹ This literature review will use online search databases that cover multiple disciplines (e.g., developmental, cognitive, social psychology, sociology & cultural studies, communication, cognitive neuroscience). Examples of these databases include iSeek, Google Scholar, ResearchGate, and Brill. This review will be limited to peer-reviewed literature published in English after 2000. For efficiency, an emphasis will be placed on published literature reviews including metaanalyses.

The review will use a keyword search process. The initial set of keywords will include: “belief change,” “belief formation,” and “cultural socialization.” The set of keywords will be adjusted in an iterative process. The initial set of literature will be reviewed to identify other relevant keywords, which will then be added to the keyword set. This revised keyword set will then be used to complete the database searches.

The search will focus on processes and conditions that govern the formation and change of beliefs that influence intentional behaviors. The resulting narrative literature review will summarize the main findings from the collected literature. The narrative of this literature review will be organized around these key questions, each which will define a section of the review document:

- What is a belief?
- How are beliefs formed?
- How are beliefs changed?
- What conditions facilitate belief change?

The review of literature will be submitted as the Task 1 Report. Ward will lead efforts for this task with input from Finley and Otto and support from Arpin (editing) and Gee (graphic layout).

Task 2. Resource Development

Based on the narrative literature review (Task 1), a resource will be developed to guide stakeholders in developing and implementing effective strategies to change beliefs that define traffic safety culture and influence road user behavior. This resource will be designed for practitioners (not academics) and will have three components.

¹ Baumeister, R. F., & Leary, M. R. (1997). Writing Narrative Literature Reviews. *Review of General Psychology*, 1(3), 311–320.

First, the resource will synthesize guidelines for designing and implementing strategies to change beliefs based on the evidence reported in the literature review. These guidelines will be described in a consistent summary format that includes justification for the guideline and references of supporting literature. An example, based on NHTSA human factors guidelines, of a possible format is shown in Figure 2. This format will be adapted for the scope of this literature review and purpose of guiding belief change strategies.

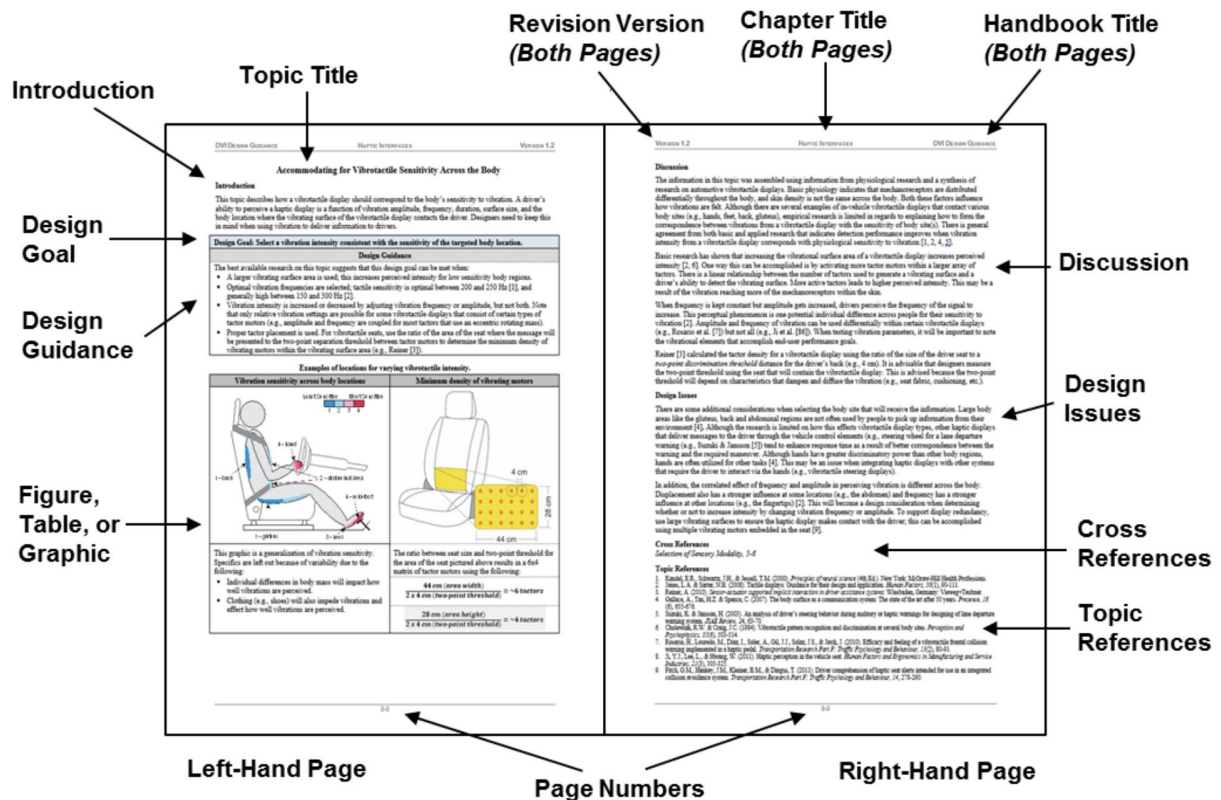


Figure 2. Example of standard format for summarizing guidance.²

Second, these guidelines will be summarized as a self-assessment “checklist” that stakeholders can use to assess the potential effectiveness of existing strategies and plan future belief change strategies. This checklist will include each guideline, provide the cross-reference to the relevant guidance summary, and have a place to rate how well the assessed strategy aligns with the guideline.

The third component of the resource will be guidance on how to use the tool. The Center has found that tools like this can be used by an individual or a group of stakeholders to better understand how to make existing strategies more effective or considerations to address when developing a new strategy. Fostering dialogue among key stakeholders about how a strategy changes belief can facilitate improvements to strategy effectiveness.

² https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812360_humanfactorsdesignguidance.pdf

Finley and Otto will lead efforts to develop the tool with input from Ward and support from Arpin (editing) and Gee (graphic layout).

Task 3. Create Dissemination Resources and Complete Final Report

The following products will be developed to foster dissemination of the results:

- A poster suitable for use at TRB (provided as a PDF document)
- A tool for stakeholders to assess potential effectiveness of existing or proposed strategies (summarized guideline document and self-assessment tool)
- A webinar on the key findings and the tool
- A comprehensive final report of the project.

Ward will be responsible for completing the products. He will have assistance from Arpin, Finley, Gee, and Otto. Using a several staff members with different specialties makes the final products better and is more cost effective. 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 Task 1 Report and the project deliverables.

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 literature Review (report). A synthesis of evidence from social sciences about process and conditions that influence belief formation and belief change and inform the design of strategies to change beliefs.

3. Task 2 Deliverable: Resource

A tool based on guidance from the literature review for stakeholders to assess the potential effectiveness of existing and potential traffic safety culture strategies to change beliefs.

4. Task 3: Dissemination

- A recorded webinar summarizing the results of the literature review and the tool.
- A poster suitable for use at TRB (provided as a pdf document).
- A tool for stakeholders to assess potential effectiveness.
- A comprehensive research report of the project.

PROJECT IMPLEMENTATION

This project will help stakeholders assess the potential effectiveness of their existing traffic safety culture strategies and help them develop more effective strategies in the future.

SCHEDULE

The timeline for the main tasks and deliverables is summarized below for this 11-month project (first delivery of each task is underlined):

	1	2	3	4	5	6	7	8	9	10	11
Task 0. Project Management Quarterly Report	X <u>X</u>	X	X	X <u>X</u>	X	X	X <u>X</u>	X	X	X <u>X</u>	X
Task 1. Literature Review	X	X	X	X	<u>X</u>	X					
Task 2. Resource					X	X	<u>X</u>	X			
Task 3. Dissemination							X	X	<u>X</u>	X	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	\$48,195
Benefits	\$14,133
Total Direct Costs	\$62,328
Indirect Costs (25%)	\$15,582
Total Project Cost	\$77,910

Table 2. Project Budget by Task

Item	Total
0 – Project Management	\$7,089
1 – Literature Review	\$20,091
2 – Resource Development	\$23,091
3 – Final Report	\$27,639
Total Project Cost	\$77,910

Table 3. Project Budget by State and Federal Fiscal Years

Item	State Fiscal Year		Federal Fiscal Year	
	2021	2022	2021	2022
Salaries	43,338	4,857	22,733	25,462
Benefits	12,591	1,542	6,528	7,604
Total Direct Costs	55,929	6,399	29,261	33,067
Indirect Costs (25%)	13,982	1,600	7,315	8,276
Total Project Cost	69,911	7,999	36,576	41,333

STAFFING

Staffing for this project involves members of the Center for Health and Safety Culture. Each staff member contributes to the project based on their specific expertise and background. Table 5 summarizes staff time by task for the 11-month duration of this project. Overall, this effort can be interpreted as the equivalent of one person working on this 33% of the time for 11 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.

Nic Ward, Ph.D., will be the PI for the project and 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. He will be the lead effort in all tasks.

Jay Otto, M.S., is the principal scientist 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 will support the literature review with his primary effort directed to the tool development and dissemination tasks.

Kari Finley, Ph.D., is a Behavioral Specialist with extensive experience in behavior change. She will contribute across all non-management tasks.

Kelly Green will be involved in the financial and contract management of this project.

Jamie Arpin will assist with technical writing and editing.

Karen Gee will assist with graphic design.

Table 4. Schedule of Staffing

Name	Role	FTE*	Hours by Task				
			0	1	2	3	Total
Arpin, Jamie	Research Staff	0.02	0	0	0	40	40
Finley, Kari	Research Staff	0.06	0	41	42	42	125
Gee, Karen	Research Staff	0.02	0	0	0	30	30
Green, Kelly	Financial Management	0.02	40	0	0	0	40
Otto, Jay	Research Staff	0.07	0	20	50	60	130
Ward, Nic	Principal Investigator	0.17	32	100	100	100	332
Total		0.33	72	145	190	290	697

*based on 11 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 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 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.

REFERENCES

Carter, Patrick, C. Raymond Bingham, Jennifer Zakrajsek, Jean Shope, and Tina Sayer, "Social Norms and Risk Perception: Predictors of Distracted Driving Behavior Among Novice Adolescent Drivers." *Journal of Adolescent Health*, Driver Distraction: A Perennial but Preventable Public Health Threat to Adolescents, Vol. 54, No. 5, Supplement (May 2014) pp. S32–41.

LaVoie, Noelle, Yi-Ching Lee, and James Parker, "Preliminary Research Developing a Theory of Cell Phone Distraction and Social Relationships." *Accident Analysis & Prevention*, Vol. 86 (January 2016) pp. 155–60.

Mirman, Jessica, Dennis Durbin, Yi-Ching Lee, and Sara Seifert, "Adolescent and Adult Drivers' Mobile Phone Use While Driving with Different Interlocutors." *Accident Analysis & Prevention* Vol. 104 (July 2017) pp. 18–23.

National Center for Statistics and Analysis, "2016 Fatal Motor Vehicle Crashes: Overview." *Traffic Safety Facts Research Note. Report No. DOT HS 812 456*, National Highway Traffic Safety Administration, Washington, DC (October 2017) 9 pp.

National Center for Statistics and Analysis, "Distracted driving 2016." *Traffic Safety Facts Research Note. Report No. DOT HS 812 517*, National Highway Traffic Safety Administration, Washington, DC (April 2018) 6 pp.

Richardson, Katherine, and Raquel Benbunan-Fich, "Examining the Antecedents of Work Connectivity Behavior during Non-Work Time." *Information and Organization*, Vol. 21, No. 3 (November 2011) pp. 142–160.

Sinelnikov, Sergey and Brett Wells, "Distracted Driving on the Job: Application of a Modified Stages of Change Model." *Safety Science*, Vol. 94 (April 2017) pp. 161–170.